Arba Munch University

Publications Indexed in

Scopus/Web of Science/PubMed

2023

Journal of Information Systems Engineering and Business Intelligence

DOI: http://dx.doi.org/10.20473/jisebi.9.2.161-180

9(2023)

Towards Smart and Green Features of Cloud Computing in Healthcare Services: A Systematic Literature Review

Aschalew Arega[1], D. Sharma[1]

[1]Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: The healthcare sector has been facing multilateral challenges regarding the quality of services and access to healthcare innovations. As the population grows, the sector requires faster and more reliable services, but the opposite is true in developing countries. As a robust technology, cloud computing has numerous features and benefits that are still to be explored. The intervention of the latest technologies in healthcare is crucial to shifting toward next-generation healthcare systems. In developing countries like Ethiopia, cloud features are still far from being systematically explored to design smart and green healthcare services. Objective: To excavate contextualized research gaps in the existing studies towards smart and green features of cloud computing in healthcare information services. Methods: We conducted a systematic review of research publications indexed in Scopus, Web of Science, IEEE Xplore, PubMed, and ProQuest. 52 research articles were screened based on significant selection criteria and systematically reviewed. Extensive efforts have been made to rigorously review recent, contemporary, and relevant research articles. Results: This study presented a summary of parameters, proposed solutions from the reviewed articles, and identified research gaps. These identified research gaps are related to security and privacy concerns, data repository standardization, data shareability, self-health data access control, service collaboration, energy efficiency/greenness, consolidation of health data repositories, carbon footprint, and performance evaluation. Conclusion: The paper consolidated research gaps from multiple research investigations into a single paper, allowing researchers to develop innovative solutions for improving healthcare services. Based on a rigorous analysis of the literature, the existing systems overlooked green computing features and were highly vulnerable to security violations. Several studies reveal that security and privacy threats have been seriously hampering the exponential growth of cloud computing. 54 percent of the reviewed articles focused on security and privacy concerns. Keywords: Cloud computing, Consolidation, Green computing, green features, Healthcare services, Systematic literature review.

Parasitologia

DOI: https://doi.org/10.3390/parasitologia3010011

3(2023)

Human-Biting Activity, Resting Behavior and Yellow Fever Virus Transmission Potential of Aedes Mosquitoes in Southwest Ethiopia

Abate Waldetensai [1], Myrthe Pareyn [3] and **Fekadu Massebo [2],**

[2]Department of Biology, Arba Minch University, Arba Minch P.O. Box 21, Ethiopia

Abstract

Yellow fever (YF) is an emerging and re-emerging arboviral disease transmitted through the bites of infected Aedes mosquitoes, primarily in the genus Aedes. Several outbreaks of yellow fever have been documented in southern Ethiopia. Four outbreaks have been documented since 2012, suggesting that southern Ethiopia is prone to YF outbreaks. Understanding the transmission cycle is pivotal to managing arboviral disease outbreaks, and the aims of the present study were to investigate the mosquito species that most likely contributed to the recent YF outbreaks and to study their behaviors. Therefore, the present study aimed to evaluate which species of Aedes mosquitoes contribute to the YF virus transmission, the outbreaks that have occurred and their behaviors (biting and resting) in the region. Two districts were selected on the basis of recent YF outbreak history. A longitudinal entomological survey was conducted to collect adult mosquitoes by using human landing catches (HLC), mechanical mouth aspirators and pyrethrum sprays. Collections were conducted twice a month for six months, from February 2019 to July 2020. The mosquitoes were identified by species by using morphological keys and molecular techniques. A total of 1689 mosquitoes were collected, of which 93.7% (1582/1689) were members of the genus Aedes and 6.3% (107/1689) of the genus Culex. A total of 58.7% (991/1689) of the mosquitoes were captured in the Ofa District and 41.3% (698/1689) from the Boko Dawula District. The largest number of mosquitoes, 97.9% (1653/1689), were collected during the wet season. A total of 1582 members of the Aedes simpsoni complex were collected, where 57.7% (913/1582) were from the Ofa District and 42.3% (669/1582) were from the Boko Dawula District. Molecular identification showed that members of the Aedes simpsoni complex accounted for 99.5% (404/406), while Aedes aegypti, detected only in the Ofa District, accounted for only 0.5% (2/406). The mosquitoes were pooled and tested for YFV, dengue virus (DENV, serotype 1–4) and chikungunya virus (CHKV) by using qPCR. None of the 934 Aedes simpsoni tested were positive for any arboviruses. The human-biting activities of Ae. simpsoni complex were peaked between 8:00–9:00 and 16:00–17:00, mostly outdoors, both within the villages and the forests. The largest numbers of Aedes simpsoni complex resting mosquitoes were collected from the leaves of the Abyssinian banana, Ensete ventricosum, suggesting that they are the preferred resting places. Although the tested Ae. simpsoni complex was negative for arboviruses; the morning and afternoon activities of the species complex coincide with peak human outdoor activities in these areas and may therefore pose the highest risk of transmitting YFV to humans. The extremely low abundance of Aedes aegypti suggests a minor role in arbovirus transmission in southern Ethiopia. It is of great importance that expanded surveillance activities of arboviruses to include reservoir hosts and sylvatic vectors to the chances of devising and implementing effective control measures.

Keywords: Aedes; mosquitoes; yellow fever; simpsoni complex; behavior; southwestern Ethiopia

Environmental Monitoring and Assessment

DOI: https://doi.org/10.1007/s10661-023-11328-0

195(2023)

Potential risk assessment due to groundwater quality deterioration and quantifying the major influencing factors using geographical detectors in the Gunabay watershed of Ethiopia

Asnakew Mulualem Tegegne [1] · Tarun Kumar Lohani[1] ·Abunu Atlabachew Eshete[1]

[1]Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Groundwater quality has become deteriorated due to natural and anthropogenic activities. Poor water quality has a potential risk to human health and the environment. Therefore, the study aimed to assess the potential risk of groundwater quality contamination levels and public health risks in the Gunabay watershed. For this task, seventy-eight groundwater samples were collected from thirty-nine locations in the dry and wet seasons during 2022. The groundwater contamination index was applied to assess the overall quality of groundwater. Six major driving forces (temperature, population density, soil, land cover, recharge, and geology) and their quantitative impact of each factor on groundwater quality deterioration were demonstrated using Geodetector. The results showed that low groundwater quality was detected in urban and agricultural land. Especially nitrate contamination was highly linked to groundwater quality deterioration and public health risks, and a medium contamination level was observed in the area. This indicates that the inappropriate application of fertilizer on agricultural land and wastewater from urban areas has a great impact on shallow aquifers in the study area. Furthermore, the major influencing factors are ranked as soil type (0.33–0.31) > recharge (0.17–0.15) > temperature (0.13–0.08) > population density (0.1–0.08) > land cover types (0.07–0.04) > lithology (0.05–0.04). The interaction detector revealed that the interaction between soil ∩ recharge, soil ∩ temperature, and soil ∩ land cover, temperature ∩ recharge is more influential to deteriorate groundwater quality in both seasons. Identification and quantification of the major influencing factors may provide new insight into groundwater resource management.

Remote Sensing

DOI: https://doi.org/10.3390/rs15041148

15(2023)

Prediction of Future Land Use/Land Cover Changes Using a Coupled CA-ANN Model in the Upper Omo–Gibe River Basin, Ethiopia

Paulos Lukas [1], Assefa M. Melesse [2], **Tadesse Tujuba Kenea [1]**

[1] Faculty of Meteorology and Hydrology, Water Technology Institute, Arba Minch University, Arba Minch

Abstract

Land use/land cover change evaluation and prediction using spatiotemporal data are crucial for environmental monitoring and better planning and management of land use. The main objective of this study is to evaluate land use/land cover changes for the time period of 1991–2022 and predict future changes using the CA-ANN model in the Upper Omo–Gibe River basin. Landsat-5 TM for 1991, 1997, and 2004, Landsat-7 ETM+ for 2010, and Landsat-8 (OLI) for 2016 and 2022 were downloaded from the USGS Earth Explorer Data Center. A random forest machine learning algorithm was employed for LULC classification. The LULC classification result was evaluated using an accuracy assessment technique to assure the correctness of the classification method employing the kappa coefficient. Kappa coefficient values of the classification indicate that there was strong agreement between the classified and reference data. Using the MOLUSCE plugin of QGIS and the CA-ANN model, future LULC changes were predicted. Artificial neural network (ANN) and cellular automata (CA) machine learning methods were made available for LULC change modeling and prediction via the QGIS MOLUSCE plugin. Transition potential modeling was computed, and future LULC changes were predicted using the CA-ANN model. An overall accuracy of 86.53% and an overall kappa value of 0.82 were obtained by comparing the actual data of 2022 with the simulated LULC data from the same year. The study findings revealed that between 2022 and 2037, agricultural land (63.09%) and shrubland (5.74%) showed significant increases, and forest (−48.10%) and grassland (−0.31%) decreased. From 2037 to 2052, the built-up area (2.99%) showed a significant increase, and forest and agricultural land (−2.55%) showed a significant decrease. From 2052 to 2067, the projected LULC simulation result showed that agricultural land (3.15%) and built-up area (0.32%) increased, and forest (−1.59%) and shrubland (−0.56%) showed significant decreases. According to the study's findings, the main drivers of LULC changes are the expansion of built-up areas and agricultural land, which calls for a thorough investigation using additional data and models to give planners and policymakers clear information on LULC changes and their environmental effects.

Keywords: land use/land cover; machine learning; remote sensing; random forest; MOLUSCE plugin; artificial neural network; cellular automata

Frontiers in Veterinary Science

DOI: https://doi.org/10.3389/fvets.2022.1089931

9(2023)

Sero-prevalence of Newcastle disease and associated risk factors in chickens at backyard chicken production Kindo Koisha, Wolaita zone, Southern Ethiopia

Wondimu Wodajo[1,] **Nejib Mohammed[2,] Ephrem Tora[2,] Wasihun Seyoum[2]**

[2]Department of Animal Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Newcastle disease (ND) is a serious infectious disease of poultry caused by virulent strains of Avian Paramyxovirus-1 and has a substantial impact on villages where people's livelihood depends upon poultry farming in several developing countries including Ethiopia. In the district of the study area, no previous studies have been conducted. Thus, the aim of the present study was to estimate individual and household flock level seroprevalence and risk factors for ND in unvaccinated backyard chickens in Kindo Koisha district, Wolaita zone, Ethiopia. A cross-sectional study design was conducted. For the study, household flocks were sampled as a cluster, and backyard chickens within the cluster with an age of more than 3 months were sampled. A total of 598 blood samples were collected from 86 household flocks during the study period. Serum samples were tested for ND antibodies using an Indirect-Enzyme Linked Immuno Sorbent Assay. The overall seroprevalence of ND virus at individual and flock level was 17.06% (95% CI: 14.25–20.29%) and 73.26% (95% CI: 62.79–81.64%), respectively. The ND seropositivity and associated risk factors were assessed at the individual bird and flock level by using ordinary and mixed effect logistic regression, respectively. Ordinary logistic regression revealed that crossbreed chickens had significantly higher odds of ND seropositivity than local breeds, with an odds ratio of 2.15 (95% CI: 1.54–3.00; $p < 0.001$). The odds of ND seropositivity was significantly higher in backyard chickens which belongs flock size >9 in comparison to <9 with an odds ratio of 3.7 (95% CI: 1.12–12.30; $p < 0.031$). The potential flock level risk factors related to ND seropositivity in this study were flock size, chicken house cleaning frequency, water source for chickens, dead chicken disposal practice, and distance to the next neighbor household, mixing with wild birds and owning pets. In conclusion, the current study generates significant information on the seroprevalence and the potential risk factors associated with ND at individual and flock level in Kindo Koisha district, Wolaita zone. Consequently, ND vaccination campaigns should be launched, and effective extension programs should also be provided to raise awareness about the disease.

American Journal of Epidemiology

DOI: https://doi.org/10.1093/aje/kwac210

192(2023)

Asthma and Respiratory Infections from Birth to Young Adulthood: The Espoo Cohort Study

Abate Bekele Belachew[1], Aino K. Rantala[2], Maritta S. Jaakkola[2], Timo T. Hugg[2], Jouni J.K. Jaakkola[2]

[1]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

We applied data from a population-based prospective study, the Espoo Cohort Study (n = 2,568), to identify the potential susceptibility of persons with asthma to respiratory tract infections (RTIs). Information on the occurrence of asthma and both upper respiratory tract infections (URTIs) and lower respiratory tract infections (LRTIs) was collected with a questionnaire at baseline and at the 6-year and 20-year follow-up studies, and from the Finnish national health registries. We estimated age-and sex-specific incidence rate differences (IRDs) and incidence rate ratios (IRRs) by applying negative binomial regression. Meta-regression was used to summarize the age-specific IRRs from childhood to 27 years of age. Individuals with asthma at any age during the follow-up period had increased risks of both URTIs (adjusted IRD = 72.6 (95% confidence interval (CI): 50.6, 94.7) per 100 person-years; adjusted IRR = 1.27 (95% CI: 1.20, 1.35)) and LRTIs (adjusted IRD = 25.5 (95% CI: 17.9, 33.1); adjusted IRR = 2.87 (95% CI: 2.33, 3.53)) from childhood to young adulthood. In young adulthood, the association between asthma and URTIs was stronger in women than in men, while such an association was not detected for LRTIs. This analysis provides strong evidence that persons with asthma experience more RTIs from preschool age to young adulthood than do those without asthma. Thus, they constitute a susceptible population for RTIs. Women with asthma are at especially high risk.

Keywords: Absolute effects; asthma; cohort studies; longitudinal studies; population-based studies; respiratory tract infections

Environmental Monitoring and Assessment

DOI: https://doi.org/10.1007/s10661-023-11274-x

195(2023)

Proxy modeling approach to evaluate groundwater recharge potentiality zones in the data scarce area of upper Blue Nile Basin, Ethiopia

Asnakew Mulualem Tegegne [1], Tarun Kumar Lohani [1], Abunu Atlabachew Eshete [1]

[1] Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Prioritization of groundwater recharge potentiality evaluation is critical for sustainable water resources management. Since recharge is a main source for enhancing groundwater availability. Water scarcity is extremely severe in the upper Blue Nile Basin (i.e., Gunabay watershed). Therefore, this study emphasizes groundwater recharge delineating and mapping 3920.25 km^2 in the data-limited area of the upper Blue Basin using proxy modeling (i.e., WetSpass-M model and geodetector model) and tools. The driving/influencing factors are rainfall, temperature, wind speed, evapotranspiration, elevation, slope, land cover, soil, groundwater depth, drainage density, geomorphology, and geology that control the movement of groundwater recharge. However, the first nine factors were used as inputs in the WetSpass-M model to evaluate groundwater recharge. To validate the groundwater recharge availability, water table fluctuation was established based on recorded groundwater levels. Furthermore, the major influencing factors and their interaction have been quantified using geodetector model. Spatiotemporal recharge distribution (in mm) is classified as very low (0-6), low (6-30), moderate (30-51), high (51-83), and very high (83-508) comprising 21%, 20%, 20%, 20%, and 19% of the total area, respectively. Very high groundwater recharge zone has been found in the northwest part of the area. The geodetector results showed that soil (0.841) and temperature (0.287) had larger individual contributions, but the interaction between soil and temperature (0.962) was more significant. It indicates that the interaction between climate and soil has the largest influence on groundwater recharge variability. Generally, the overall approach of this study can be applied to water sectors, policymakers, and decision-makers to overcome future water scarcity.

Keywords: Geodetector model;Influencing factors; Temperature and soil interaction; Water table fluctuation; WetSpass-M model.

Natural Hazards

DOI: http://dx.doi.org/10.1007/s11069-023-05916-z

117(2023)

Spatiotemporal analysis of drought in Oromia regional state of Ethiopia over the period 1989 to 2019

Jale Amanuel Dufera[1], **Tewodros Addisu Yate[2] & Tadesse Tujuba Kenea[2]**

[2]Arba Minch University / Water Technology Institute / Meteorology and Hydrology Faculty

Abstract

The Oromia regional state is significantly vulnerable to the impacts of drought. The majority of the population of the region is involved in agricultural and pastoral activities for their livelihood. Agriculture is predominantly dependent on the right onset, amount, period, and distribution of seasonal rainfall. Though there is abundant water resource in the region, irrigation contributes only 5% to produce agricultural products. This makes the region susceptible to the impacts of climatic extreme events such as drought. Yet, there are only a few studies on the spatial and temporal analysis of droughts over the Oromia regional state. This study examines the spatial and temporal characteristics of drought in the period 1989 to 2019 over the region using Standardized Precipitation and Evapotranspiration (SPEI) and Standardized Precipitation Index (SPI) drought indices. We assess temporal trends of drought over the region using Mann–Kendall trend test. We also assess the role of El Niño-Southern Oscillation (ENSO) in inducing seasonal droughts. Complex spatial and temporal patterns of drought occurrences are observed. The drought incidences at each of the stations have diverse magnitudes and durations. Drought during Belg season is more frequent over the southern and eastern parts of the region, whereas it is less frequent over the western and central parts. The spatial coverage of Belg droughts had increased over the study area since 1997 and decreased in recent years, particularly since 2016. On the other hand, drought during Kiremt season is more frequent over western parts of the region, whereas it is less frequent over southern and eastern parts. The year 2002 was the driest year with significant parts of the region having considerably severe Kiremt droughts. The years 1991, 2000, 2002, 2009, and 2015 were among the major drought years in the region; at least 34% of the region experienced annual droughts. There were 26 stations that showed increasing dry tendencies and 28 stations that showed wetting tendencies. Since a mix of signals in wet and dry tendencies exist in the region, clustering into homogeneous hydroclimatic zones is important in future studies. ENSO and seasonal drought over the region were found to be fairly associated.

SN Applied Sciences

DOI: http://dx.doi.org/10.1007/s42452-023-05339-2

5(2023)

Multi-stage biomedical feature selection extraction algorithm for cancer detection

Ismail Keshta[1],Pallavi Deshpande[2],**Dr. Mohammad Shabaz[3],**Mukesh Soni[4],Mohit kumar Bhadla[5],Yasser Muhammed[6]

[3]Arba Minch University, Arba Minch, Ethiopia

Abstract

Cancer is a significant cause of death worldwide. Early cancer detection is greatly aided by machine learning and artificial intelligence (AI) to gene microarray data sets (microarray data). Despite this, there is a significant discrepancy between the number of gene features in the microarray data set and the number of samples. Because of this, it is crucial to identify markers for gene array data. Existing feature selection algorithms, however, generally use long-standing, are limited to single-condition feature selection and rarely take feature extraction into account. This work proposes a multi-stage algorithm for Biomedical Deep Feature Selection (MBDFS) to address this issue. In the first, three feature selection techniques are combined for thorough feature selection, and feature subsets are obtained; in the second, an unsupervised neural network is used to create the best representation of the feature subset to enhance final classification accuracy. Using a variety of metrics, including a comparison of classification results before and after feature selection and the performance of alternative feature selection methods, we evaluate MBDFS's efficacy. The experiments demonstrate that although MBDFS uses fewer features, classification accuracy is either unchanged or enhanced.

Keywords: Artificial intelligence; Artificial Intelligence; Biomedical Image; Cancer Detection; Deep Feature Selection; Feature Selection; Machine Learning

Immunity, Inflammation and Disease

DOI: https://doi.org/10.1002/iid3.839

11(2023)

Toll-like receptors in pathogenesis of neurodegenerative diseases and their therapeutic potential

Dabi,Yosef Tsegaye[1],Ajagbe Abayomi O.[2] , **Degechisa Sisay T.[3]**

[3] Department of Medical Laboratory Sciences, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Toll-like receptors (TLRs) are a family of pattern-recognition receptors triggered by pathogen-derived and tissue-damage-related ligands. TLRs were previously believed to only be expressed in immune cells. However, it is now confirmed that they are ubiquitously expressed in cells within the body including neurons, astrocytes, and microglia of the central nervous system (CNS). Activation of TLRs is capable of inducing immunologic and inflammatory responses to injury or infection of CNS. This response is self-limiting that usually resolves once the infection has been eradicated or the tissue damage has been repaired. However, the persistence of inflammation-inducing insults or a failure in normal resolution mechanisms may result in overwhelming inflammation which may induce neurodegeneration. This implies that TLRs may play a role in mediating the link between inflammation and neurodegenerative diseases namely Alzheimer's disease, Parkinson's disease, Huntington's disease, stroke, and amyotrophic lateral sclerosis. So, new therapeutic approaches that specifically target TLRs may be developed by better understanding TLR expression mechanisms in the CNS and their connections to particular neurodegenerative disorders. Therefore, this review paper discussed the role of TLRs in neurodegenerative diseases.

Keywords: inflammation; neurodegenerative diseases; toll-like receptors

Food Microbiology

DOI: https://doi.org/10.1016/j.fm.2022.104145

109(2023)

Prevalence of Campylobacter species and associated risk factors for contamination of dairy products collected in a dry season from major milk sheds in Ethiopia

Abera Admasie [1], Adane Eshetu [2], Tesfaye Sisay Tessema [2], Jessie Vipham [3], Jasna Kovac [4], Ashagrie Zewdu [5]

[1] Department of Biology, Arba Minch University, College of Natural Sciences, P.O. Box 21, Arba Minch, Ethiopia

Abstract

A cross-sectional study was conducted to investigate the prevalence and risk factors for contamination of Ethiopian dairy products with Campylobacter. A total of 912 dairy food samples were collected from establishments of 682 study participants that were interviewed. Samples were tested for Campylobacter by following the ISO 10272–1:2017 standard and PCR confirmation. Campylobacter was detected in 11% of tested food samples and all detected Campylobacter were C. jejuni. The highest prevalence of C. jejuni was found in raw milk (16%), followed by pasteurized milk (9%) and cottage cheese (2%) ($P < 0.001$). Using warm water and soap for cleaning cow udders and teats on farms reduced the likelihood of detecting Campylobacter in milk (AOR = 0.3, P = 0.023). Filtering milk with a cloth, using a plastic filter (AOR = 0.065, P = 0.005), and storing milk in an aluminum container (AOR = 0.23, P = 0.027) reduced the likelihood of detecting Campylobacter in milk at the collection facilities. In contrast, Campylobacter detection was significantly more likely in milk collected at collection centers with concrete floors (AOR = 5.2, P = 0.004). The odds of detecting Campylobacter in milk were 17 times greater (AOR = 17, P = 0.007) in milk processing facilities that did not calibrate a pasteurizer on an annual basis. Finally, having a separate refrigerator for milk storage reduced the odds of detecting Campylobacter in retail (AOR = 0.29, P = 0.021).

Keywords: Campylobacter jejuni; Contamination; Cottage cheese; Dairy products; Ethiopia; Pasteurized milk; Raw milk; Risk factors

Geotechnical and Geological Engineering

DOI: https://doi.org/10.1007/s10706-022-02362-9

41(2023)

Analysis of Overall Reliability of Embankment Dam for Steady-State Seepage

Kelifa Shirago[1], Demoze Kasahun[1], Democracy Dirate[2]

[1]Faculty of Hydraulic and Water Resources Engineering, Arba Minch University, Arba Minch, Ethiopia
[2]Faculty of Civil Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

The reliability method of slope stability analysis, unlike the deterministic approach, received a series of attention to evaluating the performance of the slope, this method considered uncertainties of the random variables of the soil parameters. This study considered steady-state seepage conditions and the soil variability resulting from the inevitable uncertainties. Uncertainties were managed by Monte Carlo simulation (MCS) for 1000 iterations integrated into Slide 6 software. Both normal and lognormal probability distributions were considered for the most likely value of the soil parameters and the standard deviation of each soil parameter. The standard deviation for each soil was expressed with the soil's coefficient of variation (COV). For the random variable of each of the soil parameters, the stability analysis of the dam by the Morgenstern-price method gave a mean factor of safety (FS) of 1.202, probability of failure (PF) of 0.217% or reliability (R) of 99.783%, reliability index (RI) of 2.608 and 2.827 respectively for a normal and lognormal distribution. Sensitivity analysis showed that FS is more sensitive to the shell material's friction angle (ϕ) than other soil parameters. Moreover, the effect of the surcharge on the probabilistic stability of the dam showed that PF increased and R decreased simultaneously with an increased surcharge load.

Keywords: Embankment · FS · MCS · Reliability · Sensitivity · Steady-state

World Journal of Engineering

DOI: http://dx.doi.org/10.1108/WJE-07-2021-0410

20(2023)

Flood hazard mapping and analysis under climate change using hydro-dynamic model and RCPs emission scenario in Woybo River catchment of Ethiopia

Tigistu Yisihak Ukumo[1],Adane Abebe[2],Tarun Kumar Lohani[1],Muluneh Legesse Edamo[1]

[1]Department of Hydraulic and Water Resources Engineering, Arba Minch University, Arba Minch, Ethiopia
[2]Arba Minch Water Technology Institute, Arba Minch, Ethiopia

Abstract

Purpose: The purpose of this paper is to prepare flood hazard map and show the extent of flood hazard under climate change scenarios in Woybo River catchment. The hydraulic model, Hydrologic Engineering Center - River Analysis System (HEC-RAS) was used to simulate the floods under future climate scenarios. The impact of climate changes on severity of flooding was evaluated for the mid-term (2041–2070) and long-term (2071–2100) with relative to a baseline period (1971–2000). Design/methodology/approach: Future climate scenarios were constructed from the bias corrected outputs of five regional climate models and the inflow hydrographs for 10, 25, 50 and 100 years design floods were derived from the flow which generated from HEC-hydrological modeling system; that was an input for the HEC-RAS model to generate the flood hazard maps in the catchment. Findings: The results of this research show that 25.68% of the study area can be classified as very high hazard class while 28.56% of the area is under high hazard. It was also found that 20.20% is under moderate hazard and about 25.56% is under low hazard class in future under high emission scenario. The projected area to be flooded in far future relative to the baseline period is 66.3 ha of land which accounts for 62.82% from the total area. This study suggested that agricultural/crop land located at the right side of the Woybo River near the flood plain would be affected more with the 25, 50 and 100 years design floods. Originality/value: Multiple climate models were assessed properly and the ensemble mean was used to prepare flood hazard map using HEC-RAS modeling.

Keywords: Climate change; Flood hazard mapping; HEC-RAS; Hydrologic Engineering Center - Hydrologic Modeling System (HEC-HMS); Woybo River catchment

Sustainability (Switzerland)

DOI: http://dx.doi.org/10.3390/su15108192

15(2023)

Integration of Multicriteria Decision Analysis and GIS for Evaluating the Site Suitability for the Landfill in Hargeisa City and Its Environs, Somaliland

Nimcan Abdi Mohamed[1],Yemane G. Asfaha[2],**Akiber Chufo Wachemo[3]**

[3]Faculty of Water Supply and Environmental Engineering, Arba Minch Water Technology Institute (AWTI), Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Poor waste management and illegal waste shipments adversely affect the environment and public health, resulting in environmental degradation. Indeed, environmental degradation is one of the most visible problems in Hargeisa. Currently, solid waste is disposed of at two dumping sites within the city limits, causing problematic and unsanitary conditions. Moreover, the existing dumpsites are on the verge of closure, highlighting an important need that must be addressed. This research aimed to integrate multicriteria decision analysis and GIS to evaluate the site suitability for landfill in Hargeisa, Somaliland. For this purpose, eleven significant parameters were selected: proximity to built-up areas, surface water, groundwater well points, sensitive sites (airports), land use/land cover, geology, soil type, elevation, slopes, roads, and separation from existing dumpsites. Next, these were combined via an analytical hierarchy technique. Subsequently, restriction buffer analysis was performed on the seven parameters to obtain better and more accurate results, and restricted zones were omitted. Furthermore, the pair-wise comparison used to obtain priorities between the selected criteria showed that the LULC is the most significant criterion in the model, with a relative weight of 0.1829, followed by habitations, with 0.1506. The overall result reveals that approximately 68.96% (21,060.9 ha) of the study area is unsuitable, while 24.36% (7441.53 ha) and 6.68% were considered less and highly appropriate zones, respectively. As a result, this study reveals that despite the vast extent of the study area, the areas ideal for landfill remain severely limited. Therefore, in light of the findings of this study, the municipal council of Hargeisa must reevaluate dumpsite locations and waste management practices to address the issues in the region in a timely manner. Furthermore, this systematic research approach will assist regional and global researchers, policymakers, and municipal governments.

Keywords: analytic hierarchy process; GIS; landfill site; multicriteria decision analysis; solid waste

Journal of Food Measurement and Characterization

DOI: https://doi.org/10.1007/s11694-022-01632-7

17(2023)

Development of edible films based on anchote (Coccinia abyssinica) starch: process optimization using response surface methodology (RSM)

Ararsa Tessema[1],Habtamu Admassu[2],Tessema,Belay Dereje[3]

[1]Department of Food Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Starch-based edible films derived from a variety of botanical sources can be used as an alternative to address issues in the food packaging industry. The present study aimed to develop edible films using starch extracted from anchote (an underutilized, drought-resistant tuber crop that contains massive amounts of starch) as the main ingredients. Three factors Box-Behnken experimental design (BBD) of response surface methodology (RSM) were used to optimize anchote starch (3, 4 and 5% w/v), glycerol (10, 20 and 30% w/w) and acetic acid (0.1, 0.2, 0.3% w/v) levels for the development of anchote starch-based edible films. The optimization was carried out based on response properties of edible films such as thickness, water-solubility, tensile strength and elongation at break. The films were prepared using the casting method. The optimum level resulting in a film with maximum tensile strength (10.076 MPa) and elongation at break (33.95%) and lower thickness (0.0903 mm) and water solubility (26.076%) were obtained at 3.801% w/v anchote starch, 28.566% w/w glycerol level and 0.1% w/v acetic acid concentrations. The optimized value was validated, and the measured and predicted values were found to agree. The color of the edible film was measured in L*, a*, b*, ΔE values and obtained 91.21, − 3.65, 6.73, 8.33, respectively. The values of water vapor permeability and transparency of edible film were recorded as 2.21×10−10 g m−1 s−1 Pa−1 and 80.53% respectively. The stretched regions of FTIR analysis confirmed the miscibility of different components during film formation. The result showed that edible films with desirable physical properties, mechanical stability, and optical properties can be effectively developed from anchote starch and could be used in the food packaging industry.

Journal of Molecular Liquids

DOI: https://doi.org/10.1016/j.molliq.2022.121070

371(2023**)**

Physico-chemical investigation of the assembly and clouding development nature of the mixture of metformin hydrochloride and ionic/nonionic surfactants: Influences of hydro tropes

Malik Abdul Rub[1], Tajmul Hasan [2], Roksanur Akter [2], Dileep Kumar[3]**, Kabir-ud-Din [4],** Abdullah M. Asiri [5], Md. Anamul Hoque[2]

[4]Department of Chemistry, College of Natural and Computational Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

The clouding development and the association of the mixture of surfactant and antidiabetic drug metformin hydrochloride (MNH) have been investigated in aq. solutions of two anionic hydrotropes (sodium salicylate (NaSal) and sodium benzoate (NaBenz)) and an uncharged hydrotrope (4-amino benzoic acid (4-ABA)) (HDTs) media. In the present study, nonionic (triton X-100 (TX-100)) and cationic (tetradecyltrimethylammonium bromide (TTAB)) surfactants were employed. The cloud point (CP) of TX-100 + MNH system has been reduced with the enhancing contents of HDTs. The micellar variables (critical micelle concentration (CMC) and extent of ionization (α) of TTAB + MNH system have been assessed while the parameters are dependent on the HDT contents and changes of study temperature. The free energy of clouding (ΔGc0) and assembly (ΔGc0) processes have been detected as positive and negative respectively which indicated that the respective processes are non-spontaneous and spontaneous in nature. For the clouding and assembly processes, the standard enthalpy (ΔHc0/ΔHm0), and standard entropy (ΔSc0/ΔSm0) were also determined and discussed. The ΔHc0 and ΔSc0 recommend that the core forces between TX-100 and MNH in presence of 4-ABA are H-bonding and electrostatic interactions but hydrophobic interaction is suggested as main force amid the employed components in aq. NaBenz and NaSal media. The ΔHm0 and ΔSm0 values of TTAB + MNH assembly reveal the occurrence of electrostatic interaction and hydrophobic forces amid the components inspected.

Science of the Total Environment

DOI: https://doi.org/10.1016/j.scitotenv.2023.162023

871(2023)

Application of $KHSO_5$ for remediation of soils polluted by organochlorides: A comprehensive study on the treatment's efficacy, environmental implications, and phytotoxicity

Belay Tafa Oba[1];Zheng, Xuehao[2];Aborisade, Moses Akintayo[3];Kumar, Akash[3];Battamo, Ashenafi Yohannes[3];Liu, Jiashu[3];Laghari, Azhar Ali[3];Sun, Peizhe[3];Yang, Yongkui[3];

[1]Department of Chemistry, Arba Minch UniversityThe institution will open in a new tab, Arba Minch, 21, Ethiopia

Abstract

Soil pollution caused by complex organochloride mixtures has been increasing in many parts of the world in recent years; as a result, countless numbers of people are exposed to dangerous pollutions; hence, the treatment of organochlorides-polluted soils is gaining considerable attention. In this study, the potential of inactivated peroxymonosulfate ($KHSO_5$) in remediating soil co-contaminated with trichlorophenol, para-dichlorobenzene, and para-chloro-meta-cresol was investigated. In addition, the treatment's collateral effect on critical soil properties was explored. The result revealed that treating 10 g of soil with 20 mL of 5 mM $KHSO_5$ for 60 min could oxidize 70.49% of the total pollutants. The pH of the soil was decreased following the treatment. The significant decrease, ($p < 0.05$), in the soil organic matter following the remediation has affected cation exchange capacity, and available nitrogen. It was also observed that the treatment reduced the β-glucosidase, urease, invertase, and cellulase activities significantly, ($p < 0.05$). The treatment, on the other hand, brought negligible effects on available phosphorus, available potassium, and particle size distribution. The phytotoxicity tests, which included seed germination and root elongation and soil respiration tests revealed that the treatment did not leach toxins into the treated soil. The treatment method was found to be relatively ecofriendly and cost effective.

Keywords: Chemical oxidation; Organochlorides; Peroxymonosulfate; Soil remediation; Treatment impact

Journal of Anthropological Archaeology

DOI: https://doi.org/10.1016/j.jaa.2023.101505

70(2023)

Javelin use among Ethiopia's last indigenous hunters: Variability and further constraints on tip cross-sectional geometry

Yonatan Sahle[1], **Seid Ahmed[2],** Samuel J. Dira[3]

[2]Department of History & Heritage Management, Arba Minch University, PO Box 21, Ethiopia

Abstract

Ethnographically known weapon systems are crucial for the functional interpretation of pertinent archaeological materials. The tip cross-sectional geometries of North American ethnographic projectiles are particularly widely used as standards against which the probable functions of archaeological stone points are assessed. While their known weapon-delivery mechanisms make these North American samples ideal references for archaeological investigations, their applicability to Afro-Eurasian assemblages is contestable. Using metric and contextual data from contemporary hunting javelins in southwestern Ethiopia, we expand on recent efforts to recalibrate such reference datasets. We find that overall javelin size and tip geometry are governed by factors ranging from the hunter's age and physical competence to prey type and the intended hunting (e.g., startling, diverting, wounding, killing), and even symbolic/ceremonial, tasks. We argue that such dynamics may explain the great variation in the tip cross-sectional geometries of stone points in the archaeological record. Comparisons of our tip cross-sectional values with relevant published data provide further metric constraints and highlight the need for cautious interpretations of prehistoric weapon-delivery mechanisms where the role of symbolism and of children in the making of the archaeological record should also be considered.

Trees, Forests and People

DOI: https://doi.org/10.1016/j.tfp.2023.100376

11(2023)

People's attitudes and perceptions towards area enclosure in Ethiopian central rift valley: Implications for land restoration and livelihood improvement

Mohammed Seid [1], Simon Shibru [1], Serekebirhan Takele [1], Dikaso Unbushe [2], **Shetie Gatew [1]**

[1]College of Natural Sciences, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Land degradation is a common environmental problem affecting the ecological functions and ecosystem services leading to biodiversity loss and impoverishment of rural livelihood. This study explores people's attitudes and perceptions in central rift valley, Ethiopia. We interviewed 384 households using semi-structured questionnaires, conducted focus group discussions, and key informant interviews. The results showed that 92.1% of the respondents were aware of the role of area enclosure in degraded land restoration; 94.5% had a positive opinion of the establishment of new enclosures; 94.5% agreed to maintain the existing enclosures whereas 88.1% support the expansion. The benefits gained from the enclosure increased significantly with increased vegetation cover (OR = 41.961, $P < 0.001$). An improvement in the local communities' attitude towards the area enclosure is directly correlated with the economic benefits they obtain from the enclosures. Our results showed that farmers were optimistic to perceive that area enclosure plays a positive role to restore degraded lands thereby improving the livelihood of the local community. We found that the socioeconomic profile of farmers affects their attitude, and perception of the role of area enclosure to improve and restore the degraded area.

Keywords: Area enclosure: Benefits gain: Degradation: Household: Restoration

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e17299

9(2023)

Quality assessment and evaluation of irrigation water and soil used for maize (*Zea mays* L.) production in Boloso Sore district, southern Ethiopia

Alefu Chinasho [1 2], Bobe Bedadi [2], Tesfaye Lemma [2], Tamado Tana [3], Tilahun Hordofa [4], **Bisrat Elias [5]**

[5]Faculty of Meteorology and Hydrology, Arba Minch University, P.O.Box.21, Arba Minch, Ethiopia

Abstract

Poor quality of irrigation water and soil are among the major factors determining maize productivity in Ethiopia. This study assessed and evaluated the quality of irrigation water and soil under maize production in Soke and Woybo irrigation schemes in Boloso Sore district, Ethiopia. Four water samples per site per season were collected from the first point of the irrigation schemes and farm gate for dry and rainy seasons in 2019/2020. Soil samples of 108 were collected from 36 points, from which 18 composited samples were taken for laboratory analysis. Results show that irrigation water of the two schemes is non-saline (electrical conductivity <0.2 dS m^{-1}) and in the normal pH range (6.5–7.5). Maximum concentration of cations in irrigation water was in the order of sodium (22.3 mg l^{-1}) > potassium (7.3 mg l^{-1}) > calcium (6.2 mg l^{-1}) > magnesium (3.1 mg l^{-1}). Moderate to severe sodicity (sodium adsorption ratio of 10.9) was also recorded. Sulfate, nitrate, and phosphate contents in water were trace, and increased during rainy seasons in downstream. Textural classes of soils are clay loam to clay, and less compact to restrict root penetration (bulk density ≤1.4 g cm^{-3}), have slow infiltration rate (≤0.13 cm h^{-1}), and medium level of total available water (≤178 mm m^{-1}). Soils are strongly acidic to neutral (pH: 5–6.5), salt-free, and have low soil organic carbon (≤2.1%), low total nitrogen (≤0.1%), low available phosphorus and sulfur, and low Ca^{2+}: Mg^{2+} ratio. It can be concluded that the irrigation water in the study area has cation imbalance (poor quality) which affects soil quality and maize productivity. Likewise, soils of the study area have poor quality. Lime application, efficient fertilizer use, and organic matter applications can be suggested. Further study on optimizing fertilizer rates and irrigation levels has to be conducted to improve maize productivity.

Keywords: Concentration: Productivity: Season: Soke: Woybo

Water (Switzerland)

DOI: https://doi.org/10.3390/w15050930

15(2023)

Setting a Baseline Residential Water Demand Management Solution in Urban Towns of Ethiopia

Mosisa Teferi Timotewos[1], Matthias Barjenbruch[1], **Beshah M. Behailu[2]**

[2]Department of Water Supply and Environmental Engineering, Arba Minch University, Arba Minch P.O. Box 21, Ethiopia

Abstract

Due to the country's expanding population, inadequate urban water management practices, limited community knowledge of water management, and urbanization, urban water management in Ethiopia is of great importance to the administration of the country. This study draws on a qualitative and quantitative research approach to evaluate the available water supply resources and management techniques in three Ethiopian metropolitan districts, factor in the sustainability of the urban water supply services, and then recommend a workable plan for a sustainable urban water management system. Open-ended and semi-structured questionnaires were used to interview urban water utility officials to reveal important information on water demand management and current water supply services. Documented secondary data analysis and field observations are also used to identify the existing problem in order to draw future suggestions. The findings of this study indicate that some of the common issues with urban water supply systems in towns include outdated water supply infrastructures, rapid population growth and corresponding water demand, high water losses in the distribution system, poor water management practices, and a lack of appropriate institutional framework. The assessments of the three study regions demonstrate that while the percentage of water supply coverage hasn't changed significantly over the previous 10 years, both the number of customers and the overall population growth have increased by nearly 50%. In order to address this, the Ethiopian government would need to put up a lot of effort into developing water use policies and raising consumer understanding of water demand management techniques.

Keywords: Water demand; water supply; Arba Minch; Ziway; Debre Birhan

GeoJournal

DOI: https://doi.org/10.1007/s10708-022-10710-8

88(2023)

Pastoralists under threat continuum: quantifying vulnerabilities of pastoralists to climate variability in southern Ethiopia

Mekuria Guye[1], Abiyot Legesse[2] & Yimer Mohammed[3]

[1]Department of Geography and Environmental Studies, Arba Minch University, Arba Minch, Ethiopia

Abstract

Climate variability is emerging as a major threat to Ethiopian pastoralists. Increased vulnerability to climate variability not only wrecked pastoralists' livelihoods but also eroded scarce resource management practices. The objective of this research was to investigate the status of pastoralists' vulnerability to climate variability in the Burkitu watershed in Southern Ethiopia. The Livelihood Vulnerability Index (LVI) was used in the study to assess household vulnerability to climate variability through direct household surveys. To select 340 sample respondents, multistage sampling techniques were used. Data on socioeconomic and biophysical attributes were collected and combined into indices, from which vulnerability scores for each watershed unit were calculated. There was some variation in the level of vulnerability across watershed units. The outlet had a higher vulnerability score (0.73) due to the pastoralists' higher level of exposure and low adaptive capacity status. The upper watershed unit was identified as having a lower level of vulnerability with a score of (0.19), whereas the middle watershed unit has an intermediate level of vulnerability (0.44). Therefore, any interventions aimed at improving pastoralists' livelihood resilience should concentrate on addressing characteristics that exacerbate households' exposure to climate variability, thereby increasing adaptive capacities.

Keywords: Pastoralists · Watershed · Vulnerability · Adaptive capacity · Exposure · Sensitivity

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e14016

9(2023)

Changes in extreme precipitation over Mpologoma catchment in Uganda, East Africa

Ambrose Mubialiwo [1], **Adane Abebe[2],** Charles Onyutha [3]

[2]Department of Water Resources and Irrigation Engineering, Arba Minch University, PO Box 21, Arba Minch, Ethiopia

Abstract

Changes of five Extreme Precipitation Indices (EPIs) over Mpologoma catchment were examined. The EPIs were obtained from the long-term (1948–2016) gridded (0.25° × 0.25°) Princeton Global Forcing (PGF) daily precipitation dataset. The number of days with precipitation intensity greater than 5 mm/day (NWD5) and 10 mm/day (NWD10) were part of the five EPIs. Trend and variability analyses were by the nonparametric technique based on the cumulative sum of the difference between exceedance and non-exceedance counts of data. The simple multiplicative bias correction method was employed to bias correct the PGF dataset using observed rainfall from nine weather stations. The number of wet days were decreasing although insignificant ($p > 0.05$). On the other hand, the annual total precipitation considering days with rainfall intensities greater than 5 mm/day (SPre5) exhibited a significant ($p < 0.05$) decrease. However, annual maxima rainfall (ANMS) increased even though insignificant. This indicates that less frequent rains are received over the study area but some events having high intensity. The insights from the findings of this study constitute a good baseline for predictive planning of water resources management applications across Mpologoma catchment.

Keywords: Extreme precipitation indices Trend and variability Mpologoma catchment Uganda

Modeling Earth Systems and Environment

DOI: http://dx.doi.org/10.1007/s40808-022-01516-1

9(2023)

Assessment of hydro-meteorological regimes of gidabo river basin under representative concentration pathway scenarios

Tegegn Takele Mana[1] & Berhanu Wegayehu Abebe[1]

[1]Faculty of Meteorology and Hydrology, Arba Minch Water Technology Institute, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Climate change is a clear fact today, and its impact is seriously disrupting regional hydrometeorology. In this study, four dynamical downscaled regional climate model output variables with 0.44° spatial resolution were used to assess climate change's impact on hydrometeorology of the Gidabo river basin. Based on the climate model performance evaluation result RACMO2.2T model performed best in the basin and the outputs from this model were used as input data for the successfully validated HBV model to assess climate change impacts. The Mann Kendell trend test result shows an increasing trend in maximum temperature, minimum temperature, and potential evapotranspiration but the test result does not show any trend in precipitation. The climate projection result shows streamflow will decrease in the mid-future due to a significant decrease in precipitation and an increase of potential evapotranspiration in the basin. The drop-in stream flow can be up to 19.6% and 6.7%, under RCP 4.5 and RCP 8.5, respectively. This drop-in streamflow will have an impact on the river basin's prospective water resource availability. Therefore, it is recommended that adequate water-related adaptation strategies and choices must be planned and implemented throughout the river basin in the future.

Water Practice and Technology

DOI: **https://doi.org/10.2166/wpt.2023.055**

18(2023)

Coupling support vector machine and the irrigation water quality index to assess groundwater quality suitability for irrigation practices in the Tana sub-basin, Ethiopia

Kibru Gedam Berhanu[1],Samuel Dagalo Hatiye[2],Tarun Kumar Lohani[3]

[1]Faculty of Water Resources and Irrigation Engineering, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia
[2]Faculty of Water Resources and Irrigation Engineering, Arba Minch Water Technology Institute, Water Resources Research Center, Arba Minch University, Arba Minch, Ethiopia
[3]Faculty of Hydraulic and Water Resources Engineering, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Long-term and sustainable agricultural practices can be achieved through monitoring and evaluation of groundwater quality for irrigation operations. However, less attention was given to irrigation water quality in the Tana sub-basin, Ethiopia. The present study is aimed to assess the seasonal and spatial groundwater suitability for irrigation uses. The groundwater quality parameters measured in 40 samples in each dry and wet season were the pH, electrical conductivity (EC), Na+, Ca2+, Mg2+, K+, Fe2+, HCO3-, CO32-, Cl−, and NO3-. The groundwater suitability for irrigation was assessed using the irrigation water quality index (IWQI) and support vector machine (SVM). The results showed high and medium irrigation suitability classes in the dry and wet seasons. The proportion of groundwater samples in the medium irrigation suitability class in the dry and wet seasons, respectively, was 72.5 and 67.5%. The groundwater in the wet season is comparatively more suitable than that in the dry season, which is attributed to the leaching of accumulated salts during the wet season. To avoid a salinity threat, vigilance should be exercised when using groundwater during the dry seasons. The groundwater quality map developed here for irrigation may aid in locating better-quality groundwater sources for irrigation.

Tropical Medicine and Infectious Disease

DOI: https://doi.org/10.3390/tropicalmed8020102

8(2023)

Epidemiological Survey on Tick-Borne Pathogens with Zoonotic Potential in Dog Populations of Southern Ethiopia

Hana Tadesse1, Marika Grillini2, Giulia Simonato2, Alessandra Mondin2, Giorgia Dotto2, Antonio Frangipane di Regalbono2, Rudi Cassini2, Maria Luisa Menandro2, Bersissa Kumsa3

[1]Arba Minch Agricultural Research Center, Southern Agricultural Research Institute, Arba Minch P.O. Box 2228, Ethiopia

Abstract

Dogs are known to host several tick-borne pathogens with zoonotic potential; however, scant information is available on the epidemiology of these pathogens in low-income tropical countries and in particular in sub-Saharan Africa. With the aim of investigating a wide range of tick-borne pathogens (i.e., Rickettsia spp., Anaplasma spp., Erhlichia spp., Borrelia spp., Hepatozoon spp. and Babesia spp.), 273 blood samples were collected from dogs in selected districts of Ethiopia and analyzed by real-time and/or end-point PCR. The results of the study showed that Hepatozoon canis was the most prevalent pathogen (53.8%), followed by Anaplasma phagocythophilum (7.0%), Babesia canis rossi (3.3%), Ehrlichia canis (2.6%) and Anaplasma platys (2.2%). Furthermore, five samples tested positive for Borrelia spp., identified as Borrelia afzelii (n = 3) and Borrelia burgdorferi (n = 2), and two samples for Rickettsia spp., identified as Rickettsia conorii (n = 1) and Rickettsia monacensis (n = 1). The finding of Anaplasma phagocythophilum and different species of the genera Borrelia and Rickettsia with zoonotic potential was unexpected and alarming, and calls for further investigation on the roles of dogs and on the tick, species acting as vector in this specific context. Other pathogens (Hepatozoon canis, Babaesia Canis Rossi, Ana plasma platys, Ehrlichia canis) are already known to have an important impact on the dogs' health but have minor zoonotic potential as they were rarely or never reported in humans. Dogs from rural areas were found to be at higher risk for different pathogens, probably due to the presence of other wild canids in the same environment. The findings of the present study contribute to a better knowledge of the epidemiology of tick-borne pathogens, which is relevant to human and animal health.

Keywords: dogs; tick-borne pathogens; Anaplasma; Ehrlichia; Rickettsia; Borrelia; piroplasm; Ethiopia

PLoS ONE

DOI: https://doi.org/10.1371/journal.pone.0281242

18(2023)

Knowledge of postpartum complications and associated factors among women who gave birth in the last 12 months in Arba Minch Town, Southern Ethiopia, 2019: A community-based cross-sectional study

Godana Yaya Tessema[1] ,Gistane Ayele[2] ,Kassahun Fikadu Tessema[1] ,Gebresilasea Gendisha Ukke[1] ,Wanzahun Godana Boynito [2]

[1]Department of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Introduction The knowledge of women about obstetric complications can helps them to seek health care earlier before obstetric complications arise. Most maternal deaths occur due to the poor health care seeking behavior after childbirth, but little is done on maternal knowledge of postpartum complications. Therefore, this study aimed to assess knowledge of postpartum complications and associated factors among women who gave birth in the last 12 months in Arba Minch Town, Sothern Ethiopia. Methods A community-based cross-sectional study was conducted on 418 women from December 01 to 15, 2019. A multi-stage sampling method was applied to reach study units. A semi structured questionnaire was used to collect the data using face-to-face interviews. Bivariable and multivariable logistic regression was applied to examine the relationship between dependent and independent variables. Statistical significance was declared at a P-value ≤ 0.05 with the corresponding 95% confidence level. Results Knowledge of women on postpartum complications was 23.9%. Secondary and above educational level (AOR = 3.82, 95% CI: [1.70, 8.65]), Grand multiparity (AOR = 2.31, 95% CI: [1.13, 4.71]), having four and above ANC visit (AOR = 2.04, 95% CI: [1.10, 3.81]) and self-decision-making power to seek care (AOR = 3.68, 95% CI: [2.21, 6.11]) were statistically significant factors. Conclusion and recommendation Mothers' knowledge of postpartum complications was low in this study area. Improving women's educational level, decision-making power to seek health care, and counseling during ANC follow-up may be useful approaches to increase their knowledge of postpartum complications. © 2023 Yaya Tessema et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Journal of Environmental Sciences (China)

DOI: https://doi.org/10.1016/j.jes.2022.04.001

126(2023)

Decomposition of Al13 promoted by salicylic acid under acidic condition: Mechanism study by differential mass spectrometry method and DFT calculation

Guangyu An [1], Ye Yue [1 2], Lian Yang [3], **Hailu Demissie [1 2 4],** Ruyuan Jiao [1 5], Jinyang Xi [6], Dong sheng Wang [7]

[4]Department of Chemistry, Arba Minch University, Arba Minch 021, Ethiopia

Abstract

Decomposition of the polycation Al13O4(OH)24(H2O)127+ (Al13) promoted by ligand is a vital subject to advance our understanding of natural and artificial occurrence and evolution of aluminum ions, especially in the case of acidic condition that dissolved Al3+ species can be released from the Al-bearing substances. However, the microscopic pathway of synchronous proton-promoted and ligand-promoted decomposition process for Al13 is still in the status of ambiguity. Herein, we applied differential mass spectrometry method and DFT calculation to study the initial detailed process of Al13 decomposition under the presence of proton and salicylic acid (H2Sal). Mass results showed that the mononuclear Al3+-H2Sal complexes dominated the resulting Al species, whereas the monodentate complex Al13HSal6+ was not observed in the spectra. The difference of decomposition levels between the ligand/Al ratio 0.2 and 0.5 cases revealed that proton and ligand performed synergistic effect in initial Al13 decomposition process, and the proton transfer determined the ring closure efficiency. The ring closure reaction is the prerequisite for the collapse of Al13 structure and detachment of the mononuclear complex. DFT calculations reveal that hydrogen bond plays an important role in inducing the formation of chelated complex accompanying proton transfer. Attachment of protons at the bridging OH− can elongate and weaken the critical bond between targeted Al3+ and μ4-O2- resulting from delocalization of electron pairs in the oxygen atom. These results demonstrate the detailed mechanism of Al13 composition promoted by ligand and proton, and provide significant understanding for further application and control of Al13.

OPEC Energy Review

DOI: https://doi.org/10.1111/opec.12264

47(2023)

The hybrid power generation and balancing energy supply-demand for rural village in Ethiopia

Getachew Tesfaye Gezahegn[1], **Samuel Dagalo Hatiye[2], Melkamu Teshome Ayana[2], Abebe Temesgen Ayalew[2], Thomas Torora Minda[2]**

[2]Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Ethiopia has a wide range of environmentally-friendly, renewable energy resources that can assist the country to overcome its rural electricity problems. The Hybrid Optimization Model for Multiple Energy Resources (HOMER) software package was used to evaluate the viability of solar, hydro and wind hybrid power generation for a remote community in Ethiopia's Geba catchment. The hydrologic, climatic and demographic data were used to analyze the community's electrical supply and demand. Using survey data from chosen residences, the community's hourly and daily electricity demands were calculated. Two or more schemes were investigated besides the standalone scheme to assess the hybrid system's capacity. Wind, micro-hydro and solar can generate an average annual power of 96.8, 272.4 and 161.8 kW, respectively. A mix of energy sources can meet the community's electricity demand. During peak demand periods, however, the hybrid system's mean hourly variability in power production showed inadequacy, which could be remedied by power stored in the battery and generator output. The economic analysis showed that the hybrid system proposed here is less expensive, indicating that hybrid energy generation might be employed to electrify Ethiopia's remote settlements. We advise decision-makers and power authorities to use hybrid systems for rural electrification.

Heliyon

DOI: http://dx.doi.org/10.1016/j.heliyon.2023.e15375

9(2023)

Medication errors and associated factors among pediatric inpatients in public hospitals of gamo zone, southern Ethiopia

Agegnehu Bante[1], Abera Mersha[1], Zeleke Aschalew[1], Aklilu Ayele [2]

[1]School of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[2]Department of Pharmacy, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Medication errors are the most common medical errors in the world. In particular, pediatric patients are more susceptible to severe injuries and death. Despite their multidimensional impact, medication errors are not recognized well in developing nations, including Ethiopia. Thus, this study aimed to assess the prevalence of medication errors and associated factors among pediatric inpatients in public hospitals of Gamo zone, southern Ethiopia. Methods: A facility-based cross-sectional study was conducted among 416 pediatric inpatients from August 1, 2020, to February 30, 2021. Open data kit tools and Stata version 16.0 were used for data collection and analysis, respectively. Bivariable and multivariable analyses were performed to identify factors associated with medication errors. An adjusted odds ratio with a 95% confidence interval was computed and a P-value of <0.05 in the multivariable analysis was set to declare statistical significance. Results: Overall, 69.5% (95% CI: 64.80, 73.86) of pediatric inpatients experienced medication errors. Unsuitable working environment (aOR: 2.40, 95% CI: 1.48, 3.91), child weight <5 Kg (aOR: 3.72, 95% CI: 1.79, 7.73), medication administered by diploma professionals (aOR: 2.10, 95% CI: 1.31, 3.36), parent involvement (aOR: 0.55, 95% CI: 0.33, 0.95), non-adherence with medication administration rights (aOR: 2.68, 95% CI: 1.32, 5.44) and hospital stay for >5 days (aOR: 1.83, 95% CI: 1.15, 2.93) were significantly associated with medication errors. Conclusion: Medication errors were high among pediatric inpatients as compared to previous national studies. To reduce the occurrences of medication errors, it is critical to create a suitable working environment, arrange education and training opportunities for providers, involve families in the medication administration process, and strictly adhere to medication administration rights.

PLoS ONE

DOI: https://doi.org/10.1371/journal.pone.0285406

18(2023)

Perinatal suicidal behavior in sub-Saharan Africa: A study protocol for a systematic review with meta-analysis

Mohammed amin Hajure [1], Gebiso Roba [2], Wubishet Gezimu [3], Desalegn Nigatu [3], Mustefa Mohammedhussein [4], Jemal Ebrahim [4], Aman Mamo [1], Aman Dule [1], **Kiyar Jemal** [5]

[5]Department of Medical Laboratory Science, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Perinatal mental illnesses are predominant during gestation and continue for a year after delivery. According to the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10), suicide is classified as a direct cause of death among the maternal population. The occurrence of suicidal behavior among perinatal women was considered the main contributor to the burden of the disorder. Hence, the current study will develop a protocol for a systematic review as well as a meta-analysis on estimating the prevalence and determinants of perinatal suicidal behavior in Sub-Saharan African countries.

Methods: PubMed/MEDLINE, Scopus, EMBASE, PsycINFO, and the Web of Science electronic databases will be searched for studies reporting primary data. The second search strategy will be done with Google Scholar, using a combination of the medical subject headings and keywords as the search terms. The studies will be classified into included, excluded, and undecided categories. The studies will be judged based on the eligibility criteria. Heterogeneity will be checked by using the I2 test (Cochran Q test) at a p-value of 0.05 and assuming that the I2 value is > 50%. Publication bias will be checked using a funnel plot, Beg's rank, and Eggers linear statistical tests. A subgroup analysis and sensitivity test will be carried out. The risk of bias will be assessed using the Joanna Briggs Institute (JBI), and the quantitative analysis will determine whether or not to proceed based on the results.

Discussion: This protocol's comprehensive review is expected to generate sufficient evidence on the prevalence of suicidal behavior and its determinants among women during the perinatal period in Sub-Saharan African countries over the last two decades. Hence, this protocol will be imperative to collect and combine empirical data on suicidal behavior during the perinatal period, and doing so will help to provide essential implications or better evidence to plan different kinds of interventions considering determinants expected to impact the burden of suicidal behavior during the perinatal period.

Mathematics

DOI: https://doi.org/10.3390/math11092044

11(2023)

An Optimization of Home Delivery Services in a Stochastic Modeling with Self and Compulsory Vacation Interruption

S Selvakumar[1], Kathirvel Jeganathan[1], **Krishnasamy Srinivasan[2],** N. Anbazhagan[3], Soojeong Lee[4], Gyanendra Prasad Joshi[4], Ill Chul Doo[5]

[2]Department of Management, College of Business and Economics, Arba Minch University, Arba Minch 4400, Ethiopia

Abstract

Quantification of suspended sediment dynamics is a proxy for the intensity of soil erosion processes in a catchment. However, direct measurement of suspended sediments is difficult. Long-term based discharge-suspended sediment relationships often fail to provide sufficiently accurate results due to the temporal variations in sediment supply. This study evaluates temporal variations in suspended sediment-discharge relations for six stations in two selected catchments within the Gamo highlands in the Southern Ethiopian Rift Valley. During a three-year period (2018-2020), discharge was monitored at 10-minute interval using a TD-diver, while 1938 samples of suspended sediment concentration were taken at specific events. Observed suspended sediment concentration varied between 0.04 and 130 kg m-3 for discharge ranging between quasi-zero to 339 m3 s-1. The results show that pooled annual datasets lead to unsatisfying sediment rating curves and large errors in estimated sediment load. However, stratifications of the data into three rainy season periods strongly improved the performance of the sediment rating curves. The development of a vegetative cover throughout the rainy season largely controls sediment supply from hillslopes to the river channel and hence the shape of the sediment rating curve. Furthermore, localized bank erosion and gully head dynamics also lead to important interannual changes in sediment rating curves within one river systems, as well as between different rivers. Thus, attention should be given to possible errors due to high temporal and spatial variability while using discharge-suspended sediment relations to quantify sediment load.

Land Degradation and Development

DOI: https://doi.org/10.1002/ldr.4473

34(2023)

Temporal and spatial variability of suspended sediment rating curves for rivers draining into the Ethiopian Rift Valley

Alemayehu Kasaye Tilahun[1], Gert Verstraeten[2], Margaret Chen[3], **Guchie Gulie[1], Liuelsegad Belayneh[4], Tizita Endale[4]**

[1]Arba Minch University Institute of Water Technology, Arba Minch, Ethiopia
[4]Department of Natural Resources Management, Arba Minch University, Arba Minch, Ethiopia

Abstract

Quantification of suspended sediment dynamics is a proxy for the intensity of soil erosion processes in a catchment. However, direct measurement of suspended sediments is difficult. Long-term-based discharge-suspended sediment relationships often fail to provide sufficiently accurate results due to the temporal variations in sediment supply. This study evaluates temporal variations in suspended sediment-discharge relations for six stations in two selected catchments within the Gamo Highlands in the southern Ethiopian Rift Valley. During a three-year period (2018–2020), discharge was monitored at a 10-min interval using a TD-diver, while 1938 samples of suspended sediment concentration were taken at specific events. Observed suspended sediment concentration varied between 0.04 and 130 kg m^{-3} for discharge ranging between quasi-zeros to 339 m^3 s^{-1}. The results show that pooled annual datasets lead to unsatisfying sediment rating curves and large errors in estimated sediment load. However, stratification of the data into three rainy season periods strongly improved the performance of the sediment rating curves. The development of a vegetative cover throughout the rainy season largely controls sediment supply from hillslopes to the river channel and hence the shape of the sediment rating curves. Furthermore, localized bank erosion and gully head dynamics also lead to important interannual changes in sediment rating curves within one river system, as well as between different rivers. Thus, attention should be given to possible errors due to high temporal and spatial variability while using discharge-suspended sediment relations to quantify sediment load.

Proceedings of International Conference on Contemporary Computing and Informatics, IC3I 2023

DOI: http://dx.doi.org/10.1109/IC3I59117.2023.10398092

29(2023)

A High-Band Compact Microstrip Patch Antenna for 5G Wireless Technologies

Santhakumar, G[1].; Muthukumar, R[2].; Asa Jyothi[3], G.; **Balakumar, S[4]**.; Maranan, R[5].; Bonde, R.[6]

[4]Arba Minch University, Faculty of Electrical & Computer Engineering, Arba Minch, Pin: 21, Ethiopia

Abstract

This examination presents a High Increase, Overhauled Bandwidth Patch antenna for 5G Undertakings. Using an inset-took care of taking care of method for the microstrip patch antenna wave band, the double band is achieved. Two rectangular apertures are embedded on the patch's transmitting component to provide it a high increase. The anticipated antenna Consolidating three stages at the edge of the rectangular patch increases bandwidth. Fifth-generation (5G) networks clearly outperform 4G because to reduced idleness, more transmission speed, greater bandwidth, and a higher possibility of integrating with more notable various devices. For impending 5G association technologies, this paper studies and presents a microstrip patch antenna working at 28 GHz. The outcome of this reenactment is superior to the previous one. It typically acts as a dependable choice for 5G wireless innovation as a result. The performance of the suggested antenna is superior to that of earlier antennas spread in logical diaries.

Keywords: 5g; High-Band; Microstrip; Patch Antenna; Wireless Technologies

Results in Applied Mathematics

DOI: https://doi.org/10.1016/j.rinam.2023.100364

18(2023)

Accelerated parameter-uniform numerical method for singularly perturbed parabolic convection-diffusion problems with a large negative shift and integral boundary condition

Wondimagegnehu Simon Hailu [1], Gemechis File Duressa [2]

[1]Department of Mathematics, Arba Minch University, Arba Minch, 21, Ethiopia
[2]Department of Mathematics, Jimma University, Jimma, 378, Ethiopia

Abstract

The singularly perturbed parabolic convection–diffusion equations with integral boundary conditions and a large negative shift are studied in this paper. The implicit Euler method for the temporal direction and the exponentially fitted finite difference scheme for the spatial direction are applied to formulate a parameter-uniform numerical method. The Simpson's integration rule is used to handle the integral boundary condition. The Richardson extrapolation technique is applied to enhance the order of convergence of the method. The stability and uniform convergence analysis of the proposed method are studied. It is shown that the method is uniformly convergent with a convergence order of two in both temporal and spatial direction after Richardson extrapolation. Two test examples are considered to verify the validity of the proposed numerical scheme. The obtained numerical results confirm the theoretical estimates. The proposed method provides more accurate results and a higher order of convergence than methods available in the literature.

Keywords: Singularly perturbed problem; Parabolic convection–diffusion equations; Exponentially fitted finite difference method; Integral boundary condition; Large negative shift

Journal of Infection in Developing Countries

DOI: https://doi.org/10.3855/jidc.17553

17(2023)

Salmonellosis prevalence and risk factors in chicken breeding farms in and around Arba Minch town, Gamo Zone, Ethiopia

Edget Abayneh [1], Henok Goba [2], Mesfin Shurbe [3]

[1]College of Agricultural Science, Animal Health Science Department, Arba Minch University, Ethiopia.
[2]Arba Minch Zuria District, Livestock and Fishery Department, Arba Minch, Ethiopia.
[3]Arba Minch University Livestock and Fishery Resource Research Center, Arba Minch, Ethiopia.

Abstract

Introduction: Salmonellosis is one of the diseases affecting chicken breeding farms in research locations. This study aimed to estimate the prevalence of Salmonella, its risk factors, and the distribution of antibiotic resistance in chicken breeding farms in and around Arba Minch town, Southern Ethiopia.

Methodology: A total of 390 samples were obtained from the chicks selected using stratified random selection from the breeding farms. Each chick's rectum was sampled for cloacal swabs and fecal samples, which were later analyzed for Salmonella using microbial culture and serological methods. Drug sensitivity testing was done using disk diffusion techniques.

Results: Salmonella isolates were found in 7/285 (2.45%) of fecal dropping and 14/105 (13.33%) of cloacal swabs. S. Anatum 6/21 (28.57%), S. Saintpaul 5/21 (23.8%), S. Typhimurium 4/21 (19.04%), S. Kentucky 4/21(19.04%), and S. Haifa 2/21 (9.52%) were the identified serotypes with a prevalence of 21/390 (5.38%) (95% CI = 2.2-8). According to a multivariate logistic regression analysis of the risk factors, the source of feed, contact with other farms, chick breed, and management were statistically significant influences on the presence of Salmonella in chicks ($p < 0.05$). The 8 antimicrobials tested were found to be ineffective against 90.47% of the isolates. These antimicrobials are used in both human and animal medicine.

Conclusion: Our findings confirmed that risk factors such as feed source, breed, contact with other farms, and management had a significant effect on the occurrence of salmonellosis in chicks, and disease control in the study area requires special attention.

Keywords: Salmonella; antimicrobial; chicks; prevalence; resistance; risk.

Neutrosophic Sets and Systems

DOI: 10.5281/zenodo.10224254

60(2023)

Enhancing Failure Mode and Effect Analysis with Neutrosophic Inverse Soft Expert Sets

Vijayabalaji S.[1,] **Thillaigovindan N.[2]** , Sathiyaseelan N.[1] and Broumi S.[3]

[2]Department of Mathematics, College of Natural and Computational Sciences, Arba Minch University, Abaya Campus, Arba Minch, Ethiopia

Abstract

In this study, we introduce a novel concept, the Neutrosophic Inverse Soft Expert Set (NISES), and apply it to the Failure Mode and Effect Analysis (FMEA) framework. Developed by NASA, FMEA is a robust tool for addressing industrial challenges. Our approach leverages the Evaluation based on Distance from Average Solution (EDAS) algorithm to solve FMEA problems. We implement this methodology in a real-world scenario involving a steam valve with eight distinct failure modes. Through rigorous analysis, we employ the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) to rank the identified failure modes. Comparing our FMEA model, which integrates rough set theory and TOPSIS, with the conventional method, we demonstrate the superior efficiency of our approach. Additionally, we extend the application of Neutrosophic Inverse Soft Expert Sets using the Additive Ratio Assessment-Simplified Version (ARAS-SV) method. This innovative method facilitates a quantitative assessment of alternative options based on multiple attributes, allowing for a precise determination of the optimal choice.

Keywords: Additive Ratio Assessment-Simplified Version method; Failure Mode and Effect Analysis; inverse soft set; neutrosophic inverse soft set; neutrosophic set; Soft set

Journal of Hydrology: Regional Studies

DOI: https://doi.org/10.1016/j.ejrh.2022.101291

65(2023)

Application of PCSWMM for assessing the impacts of urbanization and climate changes on the efficiency of stormwater drainage systems in managing urban flooding in Robe town, Ethiopia

Takele Sambeto Bibi [1], Kefale Gonfa Kara [2], Habtamu Jima Bedada [2], Robera Daba Bededa [2]

[1]Arba Minch University, Institute of Water Technology, Department of Water Supply and Sanitation Engineering, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Study region This study was conducted in Robe town, Ethiopia. Study focuses in this, the PCSWMM was used to investigate the potential effects of climate change and land-use change on the peak flow magnitude and efficiency of stormwater drainage systems in managing urban flooding. Four simulation scenarios were developed to demonstrate the changes in the flooding volume and adequacy of existing systems. Moreover, the effectiveness of three low-impact developments: rain barrels, rain gardens, and a combination of both practices as a mitigation strategy in reducing flooding volume were investigated. New hydrological insights for region the trend of landuse change showed that the increased peak flow and flooding volume of junctions increased from 45.13 to 68.72 m^3/s and 35,418–50,106 $\times 10^6$ Ltr respectively, due to the imperviousness increasing from 10% to 70%. Similarly, in response to climate change, the simulated peak runoff increased by 46.9%, 34.8%, and 37.5% for, RCA4, RACMO22T, and REMO2009, respectively. This finding showed that if the current land use and climate changes continue in the coming years, the study area threatened by the increased flooding due to the drainage systems will fail to accommodate increased peak runoff. The present study suggests the adopted LIDs can be significantly reduced the effects of flooding problems in the town.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e14320

9(2023)

Anchote (Coccinia abyssinica) starch extraction, characterization and bioethanol generation from its pulp/waste

Etalema Desta Tulu [1], Ramesh Duraisamy [1], Belay Haile Kebede [1], Alemu Mekonnen Tura [1]

[1]Arba Minch University, College of Natural and Computational Sciences, Chemistry Department, P.O. Box 21, Arba Minch, Ethiopia.

Abstract

A polysaccharide molecule called starch exists in nature and is cheap, renewable, biodegradable, and readily accessible. The main objective of this project is to extract and characterize anchote (*Coccinia abyssinica*) starch, as well as to generate bio-ethanol from its pulp/waste. The anchote sample used in this investigation came from Ethiopia's western Oromia region. Anchote (*Coccinia abyssinica*) starch was extracted, and the pulp from the tuber was peeled and the supernatant isolated for bio-ethanol production. The extracted starch from anchote and bio-ethanol from pulps were characterized by physicochemical, functional properties and FT-IR analysis. The result of physicochemical and functional properties of anchote starch was found to be pH (4.44), WHC (112%), Solubility (5.03%), swelling power (5.781%), Gelatinization temperature (53.33 °C), WAC (2 g/g), bulk density (0.605 g/cm^3) and OAC (3 g/g). According to this FTIR research, anchote starch has a chemical structure that is similar to corn, cassava, and potato starch. As the results showing a promising alcoholic content (25% v/v) and the existence of bioethanol being validated by a combustion test, the pulps/wastes recovered from anchote are also good sources of bioethanol. Finally, the FTIR spectroscopic analysis revealed that ethyl alcohol was produced from anchote pulps/waste after acid hydrolysis, fermentation, and distillation.

Keywords: Anchote; Bio-ethanol; Distillation; Fermentation; Pulp/wastes; Starch.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e17497

9(2023)

Accommodating students' learning styles differences in English language classroom

Endelibu Goa Yotta

Department of English Language & Literature, Arba Minch University, Ethiopia.

Abstract

Learning style is the way in which learners characteristically prefer to learn. In spite of teachers' less accommodation of different learning styles, mismatches often occur between the students learning style differences and instructional methods employed by teachers. This results less learning and misbehaving. This paper defined several dimensions of learning thought to particularly relevant to foreign language classes. The research examined the teachers' classroom practice of accommodating learning style differences and suggests the important steps and modalities to address the educational needs of all students in English language classes. Questionnaire was used to obtain adequate information about teachers' classroom practice of learning style differences. The data assembled and organized was analyzed and explained in detail. The result was interpreted in line with the objectives of the research questions. Findings of the study indicate that more than averages of EFL teachers of Chamo secondary school in Arba Minch, Ethiopia were not accommodating learning style differences in the classroom. Besides, the instructional aids and classroom exercises were mismatching with learning style differences. EFL teachers also were not accommodating and addressing the learning style differences.

Keywords: Auditory learning; Individual differences; Kinesthetic learning; Learning style; Read/write learning; Visual learning.

Water, Air, and Soil Pollution

DOI: https://doi.org/10.1007/s11270-023-06114-0

234(2023)

Modeling Nitrogen Balance for Pre-Assessment of Surface and Groundwater Nitrate (NO_3^-−N) Contamination from N–Fertilizer Application Loss: A Case of the Bilate Downstream Watershed Cropland

Bereket Geberselassie Assa[1], Anirudh Bhowmick[1] & Bisrat Elias Cholo[1]

[1]Faculty of Meteorology and Hydrology, Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Nitrogen is an essential plant nutrient, but in excess amounts in the soil can cause significant water quality problems. Since nitrate is very soluble and is not retained by soil, it easily leaches into groundwater and contaminates it. Therefore, modeling nitrate concentration derived from N-fertilizer in the area where the land dominating crop coverage helps to ensure the security of soil and water and also the environmental sustainability actions in the agricultural watershed. Adding N-fertilizer without understanding the concentration of nitrates in the soil and neglecting responsibilities and lacking concern of excess application of nitrogen N fertilizers on agriculture can cause further problems on groundwater resources. In order to evaluate nitrate contamination on surface water and groundwater, estimating partial nitrogen balance (PNB) in crop land is essential. The objective of this study was to model the crop land partial nitrogen balance (PNB) for pre-assessment of nitrate contamination in the downstream of Bilate watershed crop land based on agricultural field N-fertilizer application loss in a scenario within Bilate watershed. The loss of agricultural nitrogen fertilizer in the Bilate watershed is one of the major factors that may contribute to nitrate contamination in the downstream water bodies in Bilate watershed. Geographically weighted regression (GWR) model with (EO-MODIS 250 *m*-NDVI) and time series cropland from (MODIS-MCD12Q1-IGBP of crop land class) has been utilized. Field crop data using GPS is collected from the upper, middle, and lower parts of watershed confirming the IGBP crop land classification (0.92 kappas) has scored. Additionally, the (MODIS 250 m–NDVI) data observation has been calibrated by the Google Earth Engine using a machine learning approach. Based on the FAO-Agricultural Stress Index System (ASIS), crop growth phonology curves value interval has been indexed, and simulated crop growth index has been validated for 0.25 min and 0.75 max crop growth curves. The results were utilized to replicate the time series heterogeneous crop pattern on crop land NDVI mean zonal statics. For last 20 years, a partial nitrogen balance for observed nitrogen application (Nkg/ha/year^{-1}) and crop N uptake (Nkg/ha/year^{-1}) is predicted. For the simulated outcome, the model has been verified for its linear correlation value of (R^2 of 0.9986). The idea underlying this research is based on the scientific fact that nitrogen (NO_3^--N) contamination of surface and subsurface water is unattainable without knowledge of the nitrogen level above the root zone to the particular crop zonal area.

eClinicalMedicine

DOI: https://doi.org/10.1016/j.eclinm.2023.101936

59(2023)

Global burden of chronic respiratory diseases and risk factors, 1990–2019: an update from the Global Burden of Disease Study 2019

Meshe-Sha Tsegazeab Ayele [47], Lankamo Ena Digesa [85], Tamiru Getachew [113]

[47]Department of Anatomy Arba Minch University, Arba Minch, Ethiopia.
[85]Department of Comprehensive Nursing Arba Minch University, Arba Minch, Ethiopia.
[113]Department of Biomedical Science Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Updated data on chronic respiratory diseases (CRDs) are vital in their prevention, control, and treatment in the path to achieving the third UN Sustainable Development Goals (SDGs), a one-third reduction in premature mortality from non-communicable diseases by 2030. We provided global, regional, and national estimates of the burden of CRDs and their attributable risks from 1990 to 2019.

Methods: Using data from the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019, we estimated mortality, years lived with disability, years of life lost, disability-adjusted life years (DALYs), prevalence, and incidence of CRDs, i.e. chronic obstructive pulmonary disease (COPD), asthma, pneumoconiosis, interstitial lung disease and pulmonary sarcoidosis, and other CRDs, from 1990 to 2019 by sex, age, region, and Socio-demographic Index (SDI) in 204 countries and territories. Deaths and DALYs from CRDs attributable to each risk factor were estimated according to relative risks, risk exposure, and the theoretical minimum risk exposure level input.

Findings: In 2019, CRDs were the third leading cause of death responsible for 4.0 million deaths (95% uncertainty interval 3.6–4.3) with a prevalence of 454.6 million cases (417.4–499.1) globally. While the total deaths and prevalence of CRDs have increased by 28.5% and 39.8%, the age-standardised rates have dropped by 41.7% and 16.9% from 1990 to 2019, respectively. COPD, with 212.3 million (200.4–225.1) prevalent cases, was the primary cause of deaths from CRDs, accounting for 3.3 million (2.9–3.6) deaths. With 262.4 million (224.1–309.5) prevalent cases, asthma had the highest prevalence among CRDs. The age-standardised rates of all burden measures of COPD, asthma, and pneumoconiosis have reduced globally from 1990 to 2019. Nevertheless, the age-standardised rates of incidence and prevalence of interstitial lung disease and pulmonary sarcoidosis have increased throughout this period. Low- and low-middle SDI countries had the highest age-standardised death and DALYs rates while the high SDI quintile had the highest prevalence rate of CRDs. The highest deaths and DALYs from CRDs were attributed to smoking globally, followed by air pollution and occupational risks. Non-optimal temperature and high body-mass index were additional risk factors for COPD and asthma, respectively.

Interpretation: Albeit the age-standardised prevalence, death, and DALYs rates of CRDs have decreased, they still cause a substantial burden and deaths worldwide. The high death and DALYs rates in low and low-middle SDI countries highlights the urgent need for improved preventive, diagnostic, and therapeutic measures. Global strategies for tobacco control, enhancing air quality, reducing occupational hazards, and fostering clean cooking fuels are crucial steps in reducing the burden of CRDs, especially in low- and lower-middle income countries.

Parasite Epidemiology and Control

DOI: https://doi.org/10.1016/j.parepi.2023.e00295

21(2023)

Biology and epidemiology of Plasmodium falciparum and Plasmodium vivax gametocyte carriage: Implication for malaria control and elimination

Aklilu Alemayehu [2]

[2]Department of Medical Laboratory Sciences, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Malaria is among the leading public health problems worldwide. Female anopheles mosquito orchestrates the transmission of malaria by taking gametocytes and introducing sporozoite while taking blood meals. Interrupting transmission is the major strategy for malaria elimination. The gametocyte stage is essential for the onward transmission of malaria. Thus, understanding its basic biology and epidemiology is key to malaria control and elimination. Therefore, the current review focuses on revealing the biology, prevalence, and determinants of gametocyte carriage as well as its implication on mitigation of malaria. It also illustrates the role of asymptomatic and sub-microscopic Plasmodium infections and G-6-PD deficiency in gametocyte carriage and hence malaria transmission.Gametocytogenesis is initiated at committed merozoites and gives rise to the development of gametocytes.The trigger for gametocytogenesis depends on the host, parasite, and intervention factors. Gametocytes pass through five developmental stages identifiable by molecular markers. A considerable number of malaria patients carry gametocytes at a sub-microscopic level, thereby serving as a potential infectious reservoir of transmission. Factors involving the human host, Plasmodium parasite, and intervention parameters play a critical role in gametocyte biology and prevalence. The contribution of asymptomatic and sub-microscopic infections to malaria transmission is unknown. The clear impact of G-6-PD deficiency on malaria control and elimination remains unclear. Lack of clarity on such issues might impede the success of interventions. Basic science and epidemiological studies should continue to overcome the challenges and cope with the ever-evolving parasite and guide interventions.

Keywords: Gametocyte; Transmission; Plasmodium; Malaria Elimination; Epidemiology

Journal of Hydrometeorology

DOI: https://doi.org/10.1175/JHM-D-22-0134.1

24(2023)

Turkana Low-Level Jet Influence on Southwest Ethiopia Climate

Mark R. Jury[1] and **Thomas T. Minda[2]**

[2]Faculty of Meteorology and Hydrology, Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

The Turkana Jet in northern Kenya is shown to modulate the climate of southwest Ethiopia's Omo River Valley using in situ hydrometeorological data, satellite measurements, and atmospheric reanalyzes from decadal to diurnal time scales. Temporal statistics from lowland (2.5°–5°N, 35°–38°E) and highland (6°–9°N, 35°–38°E) areas show that 850-hPa westward airflow over Lake Turkana is stronger in March and October but is weakened when western Indian Ocean Sea temperatures become warmer than usual at intervals of 2–7 years. A case study on 24 March 2019 reveals how a stronger Turkana Jet induces warming and drying of the Omo Valley. A second case study on 27 September 2018 reveals Hadley cell subsidence over the southern flank of the Turkana Jet. We demonstrate how nocturnal airflow draining off the mountains joins the channelized jet. Satellite and atmospheric reanalyzes exhibit realistic diurnal cycles in the east Omo mountains, but some products have incorrect phase and warm bias. Omo Valley soil moisture and runoff exhibit little trend in historical records and model projections; however, unpredictable multiyear wet and dry spells and a growing demand for water are ongoing concerns.

Keywords: Africa; Channel flows; Drought; Statistical techniques

East European Journal of Physics

DOI: https://doi.org/10.26565/2312-4334-2023-2-29

2(2023)

Magneto-Thermoelectric Coefficients of Heavily Doped N-Type Mg2Si Material

Mulugeta Habte Gebru

[1]Department of Physics, Arba Minch University, Arba Minch, Ethiopia

Abstract

In contrast to parabolic band model typically used in understanding electronic properties in general, thermoelectric and magneto-thermoelectric in particular, this study confirms non-parabolic band model results in better understanding of See beck coefficient and Nernst coefficient in the presence of magnetic field for Mg_2Si. The magneto See beck coefficient was found significantly enhanced from its zero-field value for different electron concentrations in the range 0.6 - $12\times10^{25}/m^3$ and at room temperature due to the magnetic field in the range 0.2 – 1 T for non-parabolic model compared to parabolic band model. The result for Nernst coefficient shows increasing trend as function of magnetic field except for certain electron concentrations for parabolic band model while it is decreasing with magnetic field on average for non-parabolic band model.

Keywords: Magneto-See beck coefficient, Nernst coefficient, heavily doped semiconductor, magneto-thermoelectricity, magnesium Silicide

Pedagogy of Physical Culture and Sports

DOI: https://doi.org/10.15561/26649837.2023.0103

27(2023)

The effects of Halli wick aquatic exercises on gross motor function of children aged from 3 to 5 years with spastic cerebral palsy

Somaia A. Hamed[1],Mohamed Magdy Elmeligie[2],**Efrem Kentiba[3]**

[3]Doctor of philosophy, Arba Minch University

Abstract

Background and Study Aim. Cerebral palsy is a broad term for a variety of non-progressive, resulting in physical impairment, movement dysfunction, and poor posture. The purpose of the study was to compare the effectiveness in the Halliwick aquatic exercise versus conventional land-based therapy on gross motor function of children aged from 3 to 5 years with spastic cerebral palsy.
 Material and Methods. In this randomized controlled trial, (n=34) children diagnosed with spastic Cerebral palsy were randomly assigned into either the Halliwick concept group (n=17) or active control (conventional exercising group) (n=17). A physiotherapist performed the sessions with participants three times a week, 45 minutes duration over 12 weeks. An independent pediatric rehabilitation specialist assessed the children's gross motor function using the gross motor function measures (sitting, crawling and kneeling, standing, walking, running, and jumping).
 Results. After the intervention, both Halliwick concept group and conventional exercising group significantly improved activities of sitting, crawling & kneeling, standing and walking, running and jumping. Besides, the estimate of the effect of the Halliwick exercises on sitting, standing and walking, running & jumping activities was more clinically significant than conventional exercises, with sitting; MD = -0.06 [95%, CI; -0.19 to 0.32], standing; MD = 0.14 [95%, CI; -0.15-0.31], and walking, running & jumping activities; MD = -0.09 [95%, CI; -0.11 to 0.20]. None of the between-group differences for any remaining outcomes was significant.
 Conclusion. Aquatic exercises based on the Halliwick concept are better than conventional exercises to improve sitting, standing and walking, running and jumping activities in children aged 3 to 5 years with spastic cerebral palsy.

PLoS ONE

DOI: https://doi.org/10.1371/journal.pone.0284682

18(2023)

Undernutrition and associated factors among children aged 6–59 months in nutrition-sensitive agriculture intervention implemented Basona district, North Shewa Zone, Amhara region, Ethiopia

Gebretsadik Keleb Yehuala [1], Afework Hailu Orcho [1], Mizan Habtemichael Gebresilassie [2], Habtemariam Abate Meshesha [3], Tewodros Getnet Amera [4], **Eshetu Zerihun Tariku [5]**

[5]Department of Public Health Nutrition, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background In Ethiopia, child malnutrition is a significant public health problem. To address the problem, Nutrition-Sensitive Agriculture (NSA) program was introduced. However, there is a paucity of evidence about the prevalence of child undernutrition in NSA-implemented districts. Therefore, this study aimed to assess the prevalence of undernutrition among children aged 6-59 months in NSA-implemented districts. Method A community-based cross-sectional study was conducted by enrolling 422 children aged 6-59 months paired with their mothers. A systematic sampling technique was used to select respondents. Data were collected by Open Data Kit (ODK) data collection platform, and Stata version 16 was used for analysis. The multivariable logistic analysis model was fitted to assess the association between variables, and 95% CI was estimated to measure the strength of the association. The level of statistical significance was declared at a p-value of less than 0.05 in the multivariable model. Result Overall, 406 respondents participated in the study, and a response rate of 96.2% was obtained. The prevalence of stunting, wasting, and underweight was 24.1% (95% CI: 19.9-28.4), 8.87% (95% CI: 6.3-12.1) and 19.95% (95% CI: 16.2-24.2), respectively. Household food insecurity was significantly associated with being underweight (AOR: 3.31, 95% CI (1.7-6.3). Child dietary diversity (AOR: 0.06, 95% CI: 0.01-0.48) and being a beneficiary of the NSA (AOR: 0.12, 95% CI: 0.02-0.96) program were associated with wasting. Lack of ANC visits and diarrhea in the past two weeks was associated with stunting and wasting, respectively. Conclusion The prevalence of malnutrition was a moderate public health problem. Wasting was more prevalent than the recent national and Amhara region averages. However, the prevalence of stunting and underweight was lower than the national average and other studies conducted in Ethiopia. Healthcare providers should work to increase dietary diversity, ANC visits, and reduce diarrheal disease.

Clinical Trials

DOI: https://doi.org/10.1177/17407745231154215

20(2023)

Adapting international clinical trials during COVID-19 and beyond

Tamiru Shibiru Degaga [2], Dagimawie Tadesse [2], Tedla Teferi [8]

[2]College of Medicine & Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[8]Arba Minch General Hospital, Arba Minch, Ethiopia.

Abstract

Background: The COVID-19 pandemic and resulting restrictions, particularly travel restrictions, have had significant impact on the conduct of global clinical trials. Our clinical trials programme, which relied on in-person visits for training, monitoring and capacity building across nine low- and middle-income countries, had to adapt to those unprecedented operational challenges. We report the adaptation of our working model with a focus on the operational areas of training, monitoring and cross-site collaboration.

The new working model: Adaptations include changing training strategies from in-person site visits with three or four team members to a multi-pronged virtual approach, with generic online training for good clinical practice, the development of a library of study-specific training videos, and interactive virtual training sessions, including practical laboratory-focused training sessions. We also report changes from in-person monitoring to remote monitoring as well as the development of a more localized network of clinical trial monitors to support hybrid models with in-person and remote monitoring depending on identified risks at each site. We established a virtual network across different trial and study sites with the objective to further build capacity for good clinical practice-compliant antimalarial trials and foster cross-country and cross-study site collaboration.

Conclusion: The forced adaptation of these new strategies has come with advantages that we did not envisage initially. This includes improved, more frequent engagement through the established network with opportunities for increased south-to-south support and a substantially reduced carbon footprint and budget savings. Our new approach is challenging for study sites with limited prior experience but this can be overcome with hybrid models. Capacity building for laboratory-based work remains difficult using a virtual environment. The changes to our working model are likely to last, even after the end of the pandemic, providing a more sustainable and equitable approach to our research.

Keywords: COVID-19; clinical trial management; clinical trials network; malaria trials; remote monitoring; virtual training.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e15052

9(2023)

Assessment of public building defects and maintenance practices: Cases in Mettu town, Ethiopia

Taye Tariku Awasho[1], Shambel Kifle Alemu[1]

[1]Faculty of Civil Engineering, Arba Minch Institute of Technology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Building flaws are one of the main aspects of building problems that need to be carefully considered. Besides the high demand for construction projects in Ethiopia, the problems of defective buildings and maintenance issues were so prevalent. According to the researchers' field survey, Mettu town's public buildings have suffered from major building defects and deterioration, and neglect of maintenance practices. This research aimed to assess building construction defects and maintenance practices in Mettu building projects. A case study and questionnaire survey were utilized for data collection. A Case study was conducted on a randomly selected nine public building projects in Mettu Town using site observation and formal checklists. Whereas, a questionnaire method was used to address the study objectives based on respondents' perspectives using ordinal scales of Likert's. The Spearman rank correlation coefficient, mean score, and weighted average values were utilized for data analysis using Microsoft Excel spreadsheet and SPSS version 20 tools. The study revealed that non-structural cracks were found the top first-ranked building defect. Shortage of budget, inadequate maintenance standards, and Poor maintenance cultures were the top-ranked building maintenance factors. Project delay, High maintenance cost, and diminishing reputation were the top-ranked impacts of building defects. Periodic and regular construction supervision and proper and periodic maintenance were the top measures to minimize building defects.

Keywords: Building defects; Defect maintenance practice; Public buildings; Building maintenance management

Desalination and Water Treatment

DOI: https://doi.org/10.5004/dwt.2023.29478

290(2023)

Estimation of evapotranspiration based on METRIC and SEBAL model using remote sensing, near Al Jouf, Saudi Arabia

Esubalew Adem[2], Silvena Boteva [3], Lifu Zhang [4], Mohamed Elhag [1 4 5 6]

[2]Department of Geology, Faculty of Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

The current study focuses on estimating evapotranspiration in arid and semi-arid environments in the Northern part of Saudi Arabia near Al-Jouf. The objective of the research is to study, analyze and estimate evapotranspiration (ET) using the surface energy balance algorithm for land (SEBAL) and mapping evapotranspiration at high resolution with internalized calibration (METRIC) model and compare the two models with vegetation index and land surface temperature. The image was processed in ArcGIS and MATLAB software with the toolbox LandMOD ET mapper. The area average evapotranspiration is about 2.21 mm/d for the METRIC model, 2.6 mm/d for SEBAL and the average land surface temperature is 324.3 K. ET and land surface temperature are highly inverse correlated, with an $R^2 = 0.8$. The value of ET ranges from 0.05 to 8 mm for both SEBAL and METRIC models during 2019/07/07. Both highly elevated and agricultural area shows a high value of ET ranging from 5 to 8 mm/d. In addition, the normalized differential vegetation index, leaf area index, and emissivity were also calculated from the surface energy balance equation. The estimation of ET from the SEBAL model is better than the METRIC model based on R^2 of different vegetation indices. The importance of the work is to estimate ET and explain the impact on environmental effects for better planning in water resource development.

Keywords: Evapotranspiration; Surface energy balance algorithm for land; Mapping evapotranspiration at high resolution with internalized calibration; Landsat; Land MOD mapper

Sustainable Water Resources Management

DOI: https://doi.org/10.1007/s40899-023-00831-4

9(2023)

Effects of land use land cover change on streamflow of Akaki catchment, Addis Ababa, Ethiopia

Ephrem Derso Negash[1], Wegayehu Asfaw[1], Claire L. Walsh[2], Getahun Kebede Mengistie[3], Alemseged Tamiru Haile[4]

[1]Faculty of Hydraulic and Water Resources Engineering, Arba Minch University Water Technology Institute (AWTI), P. O. Box 21, Arba Minch, Ethiopia

Abstract

Evaluation of the hydrological impact of urbanization-induced land use land cover (LULC) changes for medium to large catchments is still an important research topic due to the lack of evidence to conclude about how local changes translate to impacts across scales. This study aims to provide evidence on the effects of LULC change on the streamflow of the Akaki catchment that hosts Addis Ababa, the capital city of Ethiopia. Since the comparative performance of classification algorithms is poorly understood, we compared the performance of one parametric and five non-parametric machine learning methods for LULC mapping using Landsat imageries. To investigate the effect of LULC changes on streamflow, a semi-distributed HEC-HMS model was calibrated and validated using daily discharge data at multiple sites. Findings of this study showed that: (i) the accuracy of classification and regression tree (CART) was superior to the other classifiers, (ii) from 1990 to 2020, urban and forest cover increased at the expense of agricultural and bare land, (iii) the performance of the HEC-HMS model was acceptable at all stations during both the calibration and validation periods, and (iv) the mean annual and main rainy seasonal streamflow of the catchment experienced significant increases due to LULC change but the simulated streamflow changes highly varied with the type of LULC classifier. This study contributes to the limited evidence on how catchments, with rapidly developing cities are prone to hydrological regime changes that need to be recognized, understood and quantified, and incorporated into urban planning and development.

PLoS ONE

DOI: https://doi.org/10.1371/journal.pone.0286704

18(2023)

Using geographically weighted regression analysis to assess predictors of home birth hot spots in Ethiopia

Samuel Hailegebreal [1], **Firehiwot Haile [2], Yosef Haile [2]**, Atsedu Endale Simegn [3], Ermias Bekele Enyew [4]

[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Annually, 30 million women in Africa become pregnant, with the majority of deliveries taking place at home without the assistance of skilled healthcare personnel. In Ethiopia the proportion of home birth is high with regional disparity. Also limited evidence on spatial regression and deriving predictors. Therefore, this study aimed to assess the predictors of home birth hot spots using geographically weighted regression in Ethiopia.

Methods: This study used secondary data from the 2019 Ethiopian Mini Demographic and Health Survey. First, Moran's I and Getis-OrdGi* statistics were used to examine the geographic variation in home births. Further, spatial regression was analyzed using ordinary least squares regression and geographically weighted regression to predict hotspot area of home delivery.

Result: According to this result, Somalia, Afar, and the SNNPR region were shown to be high risk locations for home births. Women from rural residence, women having no-education, poorest wealth index, Muslim religion follower, and women with no-ANC visit were predictors of home delivery hotspot locations.

Conclusion: The spatial regression revealed women from rural resident, women having no-education, women being in the household with a poorest wealth index, women with Muslim religion follower, and women having no-ANC visit were predictors of home delivery hotspot regions. Therefore, governmental and other stakeholders should remain the effort to decrease home childbirth through access to healthcare services especially for rural resident, strengthen the women for antenatal care visits.

Environmental Earth Sciences

DOI: https://doi.org/10.1007/s12665-023-10929-9

82(2023)

Quantification of change in land cover and rainfall variability impact on flood hydrology using a hydrological model in the Ethiopian river basin

Sintayehu Yadete Tola[1], Amba Shetty[2]

[1]Faculty of Water Supply and Environmental Engineering, Arba Minch Water Technology Institute, Arba Minch University, PO. Box 21, Arba Minch, Ethiopia

Abstract

Changes in land cover and climate are the dominant factors that significantly impact the hydrological process. However, the impact on flood response behaviour varies spatiotemporally. This study quantitatively assessed the effects of individual and coupled changes in land cover and climate on peak and high flows in the upstream and downstream parts of the Upper Awash River basin. Two time periods were chosen for comparison: baseline (1988–2001) and evaluation (2002–2015). The Soil Water and Assessment Tool (SWAT) was used to estimate the impact of these changes. The model satisfactorily simulated daily and extreme flows. The evaluation of annual maximal discharge variability between 1985 and 2015 at upstream and downstream stations showed significant positive and insignificant negative trends, respectively. However, the sub-basin's annual wet day rainfall (PRCPTOT) showed a downward trend. The annual maximal discharge–PRCPTOT relationship was significant during the baseline but later had no significance. The SWAT model showed that the main factor that affected the changes in upstream flow was the land cover change, increasing peak and high flow by 38.69% and 11.95%, respectively, compared to the baseline period. However, combined changes resulted in downstream peak and high flow reductions of 19.55% and 50.33%, respectively. As a result, changes in flood characteristics are strong functions of land cover, especially in the upstream sub-basin and land cover and climate in the downstream sub-basin. Overall, the impact of changes in the cropland-dominated basin was noticeably different. The study assists water resource managers in understanding the causes of hydrological dynamics and developing mitigation strategies.

Asian Journal of Accounting Research

DOI: http://dx.doi.org/10.1108/AJAR-03-2022-0093

8(2023)

Impact of income diversification on bank stability: a cross-country analysis

Mohammed Adem

Department of Accounting and Finance, Arba Minch University, Arba Minch, Ethiopia

Abstract

Purpose –The impact of diversification on bank stability and risk remains an ongoing topic of discussion with inconclusive results. Hence, this study investigated the implications of income diversification on bank stability within African markets. Design/methodology/approach – The study utilized longitudinal financial data on 45 countries from 2000 to 2017 and employed static and dynamic panel model estimation. Findings – The results of the study suggest income diversification technique could improve financial stability throughout typical and crisis periods which validate portfolio management theory. The study also confirms the "too big to fail" hypothesis, extensive diversifying over an optimal range negatively impacts stability. Banks with a high level of liquidity, a higher operating efficiency and a larger deposit ratio become more resilient. Banking capital regulations found to be the appropriate monitoring instrument for lowering risks and maintaining stability. However, profitability was found to have a positive effect on bank risk-taking. The finding also suggests that political institutions have substantial, direct implications that are positively related to bank fragility. Macroeconomic factors such as gross domestic product (GDP) growth and inflation also influenced bank stability. Practical implications This study has important implications for bankers, regulators and academicians concerned about the effect of diversification on a bank's risk-taking or stability in developing economies. Originality/value – To the best of the author's knowledge, this is the first study on Africa to analyses the quadratic influence of income diversification and the effects of political institutions on the level of bank stability.

Keywords; Africa, Stability, Risk-taking, Income diversification, Dynamic panel model

Fuel

DOI: https://doi.org/10.1016/j.fuel.2022.126752

334(2023)

Pyrolysis of de-fatted microalgae residue: A study on thermal-kinetics, products' optimization, and neural network modelling

Akash Kumar [1], Imtiaz Ali Jamro [1], Beibei Yan [1 2], Zhanjun Cheng [1 2], Junyu Tao [3], Shengquan Zhou [1], Lata Kumari [4], Jian Li [1], Moses Akintayo Aborisade [1], **Belay Tafa Oba [5]**, Waheed Ali Bhagat [6], Azhar Ali Laghari [1], Guanyi Chen [3]

[5]College of Natural Science, Arba Minch University, Arba Minch 21, Ethiopia

Abstract

The present work focused on the pyrolysis-based valorization of microalgae biomass residual for the generation of sustainable fuel and value-added chemicals. Key pyrolysis factors, including temperature, residence time, particle size, and heating rate, were modeled via an artificial neural network (ANN) and response surface methodology (RSM) models. The use of such an integrated technique was able to conquer the individual constraints of both modeling approaches. RSM model for H2-rich syngas demonstrated that the value; R2 = 0.99, minimum p = 0.00, and maximum F = 3877.16 has close relation among the statistical parameters. The ANN model for H2-rich syngas revealed that higher R2 = 0.9985 and lower RSME = 0.1038 were obtained for the training phase, while; the higher R2 and lower RSME values of 0.9862 and 0.2661 were estimated for the training phase hence showed a better agreement among the parameters. Optimum H2 production of 44.46 vol% was produced at temperature = 516.76 °C, residence time = 17.7 min, particle size = 0.23 mm, and heating rate = 17.37 °C/min. All the pyrolytic products have been characterized in detail and are recommended for high end-use. The GC/MS technique revealed that bio-oil was constituted of various organic complexes, which could be used as a substitute for hydrocarbon fuels after undergoing certain upgradation procedures (e.g., hydrotreating, hydrodeoxygenation, hydrodenitrogenation, and hydrocracking) and extracted into different chemicals. In addition, the biochar was characterized using the SEM technique, which also demonstrated its potential as fuel and in a variety of other applications. The study showed that de-fatted Chlorella sorokiniana residue (De-CR) could be efficiently employed to produce bio-energy precursors.

Journal of Hazardous Materials

DOI: https://doi.org/10.1016/j.jhazmat.2022.129826

441(2023)

Metastatic effects of environmental carcinogens mediated by MAPK and UPR pathways with an in vivo Drosophila Model

Fangnon Firmin Fangninou [1], Zhenyang Yu [2], Zhuo Li [3], **Awoke Guadie [4]**, Wenzhe Li [5], Lei Xue [5], Daqiang Yin [6]

[4]Department of Biology, College of Natural Sciences, Arba Minch University, Arba Minch 21, Ethiopia

Abstract

Metastasis includes tumor invasion and migration and underlies over 90% of cancer mortality. The metastatic effects of environmental carcinogens raised serious health concerns. However, the underlying mechanisms remained poorly studied. In the present study, an in vivo $Ras^{V12}/lgl^{-/-}$ model of the fruit fly, Drosophila melanogaster, with an 8-day exposure was employed to explore the metastatic effects of 3,3',4,4',5-pentachlorobiphenyl (PCB126), perfluorooctanoic acid (PFOA) and cadmium chloride ($CdCl_2$). At 1.0 mg/L, PCB126, PFOA, and $CdCl_2$ significantly increased tumor invasion rates by 1.32-, 1.33-, and 1.29-fold of the control, respectively. They also decreased the larval body weight and locomotion behavior. Moreover, they commonly disturbed the expression levels of target genes in MAPK and UPR pathways, and their metastatic effects were significantly abolished by the addition of p38 inhibitor (SB203580), JNK inhibitor (SP600125) and IRE1 inhibitor (KIRA6). Notably, the addition of the IRE inhibitor significantly influenced sna/E-cad pathway which is essential in both p38 and JNK regulations. The results demonstrated an essential role of sna/E-cad in connecting the effects of carcinogens on UPR and MAPK regulations and the resultant metastasis.

Journal of Geographical Sciences

DOI: https://doi.org/10.1007/s11442-023-2130-x

33(2023)

Dynamics of soil loss and sediment export as affected by land use/cover change in Koshi River Basin, Nepal

Yigez Belayneh[1],[2], Xiong Donghong[1],[3], Zhang Baojun[1] , Belete Marye[4] , Chalise Devraj[5] , Chidi Chhabi Lal[6] , **Guadie Awoke[7]** , Wu Yanhong[1],[3] Rai Dil Kumar[1],[2]

[7]Department of Biology, College of Natural Sciences, Arba Minch University, Arba Minch 21, Ethiopia

Abstract

How the dynamics in soil loss (SL) and sedimentation are affected by land use/cover change (LULCC) has long been one of the most important issues in watershed management worldwide, especially in fragile mountainous river basins. This study aimed to investigate the impact of LULCC on SL and sediment export (SE) in eastern regions of the Koshi River basin (KRB), Nepal, from 1990 to 2021. The Random Forest classifier in the Google Earth Engine platform was employed for land use/land cover (LULC) classification, and the Integrated Valuation Ecosystem Services and Trade-offs (InVEST) Sediment Delivery Ratio model was used for SL and SE modeling. The results showed that there was a pronounced increase in forest land (4.12%), grassland (2.35%), and shrubland (3.68%) at the expense of agricultural land (10.32%) in KRB over the last three decades. Thus, the mean SL and SE rates decreased by 48% and 60%, respectively, from 1990 to 2021. The conversion of farmland to vegetated lands has greatly contributed to the decrease in SL and SE rates. Furthermore, the rates of SL and SE showed considerable spatiotemporal variations under different LULC types, topographic factors (slope aspect and gradient), and sub-watersheds. The higher rates of SL and SE in the study area were observed mostly in slope gradient classes between 8° and 35° (accounting for 83%–91%) and sunny and semi-sunny slope aspects (SE, S, E, and SW) (accounting for 57%–65%). Although the general mean rate of SL presented a decreasing trend in the study area, the current mean SL rate (23.33 t ha−1 yr−1) in 2021 is still far beyond the tolerable SL rate of both the global (10 Mg ha−1 yr−1) and the Himalayan region (15 t ha−1 yr−1). Therefore, landscape restoration measures should be integrated with other watershed management strategies and upscaled to hotspot areas to regulate basin sediment flux and secure ecosystem service sustainability.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e15263

9(2023)

Evaluation of groundwater quality for drinking and irrigation purposes using proxy indices in the Gunabay watershed, Upper Blue Nile Basin, Ethiopia

Asnakew Mulualem Tegegne [1], Tarun Kumar Lohani [1], Abunu Atlabachew Eshete [1]

[1]Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Evaluation of groundwater potential and its quality assessment for drinking and irrigation has recently become a major concern, especially in developing countries due to various constraints. The primary aim of this study is to evaluate the quality of groundwater and establish whether they are safe for domestic and agricultural usage. 78 samples were collected during dry and wet seasons from 39 locations in the Gunabay district of the upper Blue Nile, Ethiopia. The following physicochemical parameters were evaluated successfully (T, pH, EC, TDS, Na^+, K^+, Ca^{2+}, Mg^{2+}, Fe, Cl^-, F^-, SO_4^{2-}, PO_4^{3-}, CO_3^{2-}, HCO_3^-, and NO_3^--N). Then, Entropy Weight Water Quality Index (EWQI) and irrigation water quality indices (SAR, %Na, MAR, RSC, PS, KI, PI, and IWQI) were used to assess the distribution of groundwater quality in the study area. The Piper diagram used to characterize the groundwater types revealed that Ca–HCO_3 is dominant in the area and rock-water interaction regulates the chemical characteristics of groundwater. Wilcox diagram was used to analyze the salinity level in the groundwater. The findings showed that the groundwater had higher nitrate levels relative to the permissible level of WHO standards due to excessive use of fertilizers in rural areas. Depending on the EWQI approach, the study area was categorized as excellent, good, and medium zones, covering 84.6%, 12.8%, and 2.6%, respectively. The results depict that high-quality drinking water was available in rural areas, n high to medium in the urban regions. The comparative irrigation water indices record 85% of water wells are suitable for irrigation, but some well sites are unsuitable due to higher salinity hazards and deep rock interaction. These integrated water quality indices were effective in validating drinking and irrigation water quality in the study area.

Keywords: EWQI;Drinking water; Irrigation water indices; Wastewater management

Journal of Financial Crime

DOI: http://dx.doi.org/10.1108/JFC-11-2019-0145

30(2023)

Socioeconomic determinants of property crime offending in Ethiopia: convicted offenders in focus

Nigatu Wassie[1], Bekele Melese[2], Nahom Eyasu[2]

[1]Department of Sociology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Purpose – The purpose of this study is to investigate the socioeconomic determinants of property crimes on convicted offenders in the Chilga district correctional institution (CDCI). Design/methodology/approach – This study conducted a socioeconomic determinant of property crimes on convicted offenders using quantitative research. Respondents consisted of a random sample of 170 convicted offenders in CDCI. This study used descriptive statistics, logistic regression and Pearson correlations for analyzing the quantitative data in CDCI. Findings – The results of the study showed that the age at first engagement, educational status, offender's immediate economic situation and previous experience of the offender were the perceived reasons in one's major property crime offending. However, average monthly income, peer effect and family structure (grown up with) were found to be non-perceived reasons. Youths who are unmarried, illiterate and unemployed offenders had over three times more probabilities of committing theft than robbery and burglary in the winter season, especially in February, because of the determinants of illiteracy and unemployment such as negligence for the future life. Furthermore, the convicted offenders who were illiterate, unemployed and raised by single parents have engaged in theft for the first time, but burglary and robbery by employed and literate offenders in more probable. Originality/value – This paper takes a fresh perspective on knowledge about property crime and economic as well as criminological theories using various bodies of academic research. This paper's insight will be helpful to fill the literature gaps; there are lot research studies with little investigations addressing to the issue of the determinants of property crime. It will also be useful for policymakers to mitigate the determinant of property crime.

Keywords: Unemployment, Income, Theft, Burglary, Family structure, Robbery, Differential association theory, social bond theory, Strain theory

World Journal of Engineering

DOI: http://dx.doi.org/10.1108/WJE-04-2021-0223

20(2023)

A comprehensive approach of hydrological issues related to ground water using GIS in the Hindu holy city of Gaya, India

Tarun Kumar Lohani[1], Melkamu Teshome Ayana[1], Abdella Kemal Mohammed [2,]

Mohammad Shabaz Chitkara[3], Gaurav Dhiman [4], Vishal Jagota[5]

[1]Department of Hydraulic and Water Resources Engineering, Arba Minch University, Arba Minch, Ethiopia
[2]Department of Hydraulic Engineering, Arba Minch Water Technology Institute, Arba Minch, Ethiopia

Abstract

Purpose – Gaya, the holy city of Hindus, Buddhists and Jains, is facing an acute shortage of potable water. Although the city is blessed with some static and dynamic water bodies all around the region, they do not fulfill the requirement of millions of public either inhabitants of the area or tourists or pilgrims flocking every day. Countless crowds, congested roads, swarming pedestrians, innumerable vehicles moving throughout the day and night have made the city into a non-livable one. The present status of surface water is a mere nightmare to the requirements of the people. Due to which, massive ground water pumping mostly illegally has added a grid in addition to the other socio-economic issues. Design/methodology/approach – To focus on such problem, the ground water of the region was studied thoroughly by calculating the depth of water level, discharge, pre-and post-monsoon water table and specifically the storability in ten different locations. Some data were acquired, others were assessed, and few are calculated to provide an overall view of the ground water scenario. Findings – After a long and tedious field study, it was finally established from that static water level ranges from 2.45 to 26.59 m, below ground level (bgl), discharge varies from 3.21 m3 /day to 109.32 m3 /day. Post pumping drawdown falls between 0.93 m and 16.59 m, whereas the specific capacity lies in between 0.96 and 7.78 m3 /hr/m. Transmissivity, which is a key objective to assess ground water potential ranges from 109.8 to 168.86 m2 /day.

Keywords; GIS, Discharge, Pumping test, Static water level, Storability, Transmissivity

Tropical Animal Health and Production

DOI: https://doi.org/10.1007/s11250-023-03593-5

55(2023)

Sheep and goat response to Trichostrongylus colubriform is infection based on egg output and worm burden

Tamirat Kaba [1], Getachew Terefe [2], Hika Waktole [2]

[1]College of Agricultural Science, Department Animal Science, Veterinary Program, Arba Minch University, P.O. Box: 21, Arba Minch, Ethiopia.

Abstract

This study was aimed to assess the performance of Trichostrongylus colubriform is and the host's responses to regulate egg outputs and worm burden. Infective larva (L3) was prepared by culturing egg of the worms harvested from the intestine of slaughtered sheep. Following this, L3 was maintained in the donor sheep to get adequate quantity of it for experimental trials. A complete randomized block design was used by considering host as blocking factor. Twenty-eight small ruminants (sheep = 14) and (goat = 14) were employed in such a way that half of them were drenched with 10,000 T. colubriform is L3 and the remaining halves were controls. Faecal egg count (FEC) was recorded from the initial period (day-zero) up to day-56. At the end of experiment, animals were euthanized in humane manner, worms were recovered from the intestines, counted, and burden was estimated. FEC at various days post infection was insignificantly ($P > 0.05$) higher in goats than in sheep. The worm burden was significantly ($P = 0.040$) higher in infected goat than in infected sheep despite they were given equal dose of L3. In conclusion, relatively lower worm burden under natural conditions in goat may be due to their feeding behavior rather than their inherent resistance.

Keywords: Experimental infection; Host response; Small ruminant; Worm infectivity.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e16341

9(2023)

Plant species diversity, plant use, and classification of agroforestry home gardens in southern and southwestern Ethiopia

Gezahegn Kassa [1] , Tamrat Bekele [2], Sebsebe Demissew [2], Tesfaye Abebe [3]

[1]Department of Natural Resource Management, Arba Minch University, Arba Minch, Ethiopia.

Abstract

The attainment of ever more sustainable agricultural production and reconciling agriculture with conservation are the main challenges that human beings are confronted with head-on in the future. Through expanding and enhancing agroforestry home gardens at the agricultural landscape level, biodiversity can be increased and maintained while addressing several utility values, ensuring both ecological and socioeconomic sustainability. This study was conducted in agroforestry home gardens of southern and southwestern Ethiopia, to examine plant species richness and other diversity indices, plant use, and classify and identify different types of home gardens based on their species composition and abundance. In total, 93 home garden owners participated in the study. Two hundred and six (mean 15.44 per home garden) different plant species (excluding weeds) that belonged to 161 genera and 66 plant families were identified across the studied sites. Fifteen species (about 7.28% of all species recorded) are endemic and threatened to Ethiopia. The overall mean plant species richness per agroforestry home gardens, mean individual density and other diversity parameters varied strongly among sites ($P < 0.05$). In all of the agroforestry home gardens, roots, and tubers food producing plant species tended to be more dominant (based on summed dominance ratio, SDR) than other species, except the cereal crop's barley and maize. Based on cluster analysis, four groups of agroforestry home gardens were identified including, 'small-sized, low plant diversity, barley-potato-enset-apple home gardens (Cluster-1)'; 'intermediate-sized, taro-enset-coffee home gardens (Cluster-2)'; 'large-sized, maize-taro-sweet potato-teff-enset home gardens (Cluster-3)'; and 'small-sized, high plant diversity with mixed-use category home gardens (Cluster-4)'. The results also indicate that agroforestry home gardens as ecological niches are valuable for the conservation and maintenance of biological diversity both for crop genetic as well as forest tree resources, including harboring of endemic and threatened species in those human-dominated landscapes.

Keywords: Cluster analysis; Diversity parameters; Ecological sustainability; Human-dominated landscapes; Use category.

Journal of Cleaner Production

DOI: https://doi.org/10.1016/j.jclepro.2023.136728

401(2023)

Revealing the potential of organo-mineral complexes in agricultural application using bibliometrics

Xuehao Zheng [12], **BelayTafa Oba [3]**, Han Wang [1], Bin Zhang [2], Chengqiang Shu [2], Yan Song [4], J ianfeng Fu [1], Shejiang Liu [1], Yuxin Zhang [5], Nan Dai [5], Dan Song [6] Hui Ding[1]

[3]College of Natural Science, Arba Minch University, Arba Minch, 21, Ethiopia

Abstract

Organo-mineral complexes (OMCs) are referred to as biogeochemical black boxes and are widely thought to contribute to the long-term preservation of organic matter. However, the history and potential research directions of OMC research, as well as the deep applications of OMCs, have not been fully investigated. We conducted a comprehensive bibliometric study based on the Science Citation Index core database publications from 1959 to 2020 to fill this research gap in OMC studies. The results showed that a total of 751 publications involving OMCs (OMCPs) were published. There was a significant positive correlation between the frequency of international associations and the number of OMCPs. A dendrogram containing six categories and 130 keywords was constructed to represent the research content of OMCPs. In particular, the keyword co-occurrence analysis and a laboratory-scale practice jointly verified the feasibility of using silicate minerals and manure compost to produce synthetic OMCs. The life span prediction analysis revealed that the research on OMCs is in the climax stage, while the current number of studies is still less than 50% of the saturation amount. The two most potentially promising research directions are the use of OMCs in agriculture and pollutant control, which currently account for less than 30% and 25% of the saturation amount, respectively. This report clarified the research gap and predicted the development trend of OMC research using bibliometrics for the first time, and highlighted the importance of OMCs in improving agricultural production while stabilizing pollutant migration in agricultural soil.

Handbook of Ionic Liquids: Fundamentals, Applications and Sustainability

DOI: https://doi.org/10.1002/9783527839520.ch7

161(2023)

Polymers and Ionic Liquids

Hailu Demissie [1], Fidelis O. Ajibade [3,4,5,6], Jean J. R. Kinhoun [4,] Eden Mulu [7], Temitope F. Ajibade [3,5,6,8], Ehiaghe A. Elimian [6,9,10,11], Bashir Adelodun [12,13], Pankaj Kumar [14], and Oluwaseyi A. Ajala [15,16]

[1]Department of Chemistry, Arba Minch University 1000, Ethiopia

Abstract

The nanometer-scale polymeric material's design and functionalities have attracted extra attention from polymer scientists, and they have put a lot of effort into the introduction of inorganic-rich nano-objects, block copolymers, or ionomers. Over the last decade, ionic liquids (ILs) have evolved from a relatively new material to being known by most chemists as a new component of polymer materials, and are indeed exhibiting a continuous trend at present. Their nonvolatility (green) and a special set of physicochemical properties emanating from their structure make them suitable for a wider range of applications. They can be used as plasticizers, polymeric materials additive/structuration agents, processing acids, novel electrolytes in batteries, and surfactants in functional polymeric preparations. This chapter aimed to provide a complete overview of the preparation methods, the physicochemical properties, and the technological applications of ILs (fire retardancy, mechanical strengthening, and gas-barrier behavior), including the new class of polyelectrolytes, namely polymeric ILs.

Indian Journal of Environmental Protection

DOI: http://dx.doi.org/10.1155/2023/8199000

43(2023)

Hydrogeochemical Characterization and Assessment of Groundwater Chemistry in Satame River Catchment, Ethiopia

Tigistu B[1], Abunu A[1], Abel A[1], Jagadeshan G[1], Muralitharan J[1].

[1] Department of Geology, College of Natural Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

Groundwater is the primary water resource in the study region and is used for a variety of purposes including consumption, cultivation and manufacturing. The research was carried out in Southern Ethiopia, in Satame river watershed in the Kembata Tembaro zone. The purpose of this research was to investigate the hydrogeochemical characterization and usability of groundwater for various uses. Thirty groundwater samples were taken for this investigation from shallow and deep dug wells. Thirteen parameters were tested for the basic physico-chemical composition of groundwater. Water sample chemistry in the research region gives numerous water types classified as Ca-HCO3, Ca-Na-HCO3 and Na-HCO3. The piper diagram shows that most of the groundwater quality falls in the middle of the graph, showing that rock-water contact is the dominating process in the examined area. The WHO water norms provided the baseline for defining the reliability of groundwater for drinking. Electrical conductivity (EC), sodium percentage (Na%) and sodium adsorption ratio (SAR) were used to determine its appropriateness for cultivation purposes.

Keywords: Geochemical facies; Groundwater; Hydrochemistry; Satame river; Suitability analysis Sustainable Development Goals

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e16899

9(2023)

Psychological problems and associated factors among high school students during COVID-19 pandemic in Sawla town, Gofa zone, southern Ethiopia

Alemwork Abera [1], Zerihun Ayalew [2], Markos Kanko [1], Agegnehu Bante [3]

[1]Department of Psychology, School of Pedagogical and Behavioral Sciences, Arba Minch University, Ethiopia.
[2]Department of Psychology, School of Pedagogical and Behavioral Sciences, Arba Minch University, Ethiopia.
[3]School of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Depression, anxiety, and stress (DAS) are common among high school students, and they have a negative impact on their academic performance and future lives. Pandemics, such as coronavirus disease 2019 (COVID-19), exacerbate these issues. Although psychological problems are studied in developed countries, they are overlooked in developing countries such as Ethiopia. Therefore, this study was aimed to assess the prevalence of psychological problems and associated factors among high school students during the COVID-19 pandemic in Sawla town, Gofa zone, southern Ethiopia.

Methods: A facility-based cross-sectional study was conducted among 663 randomly selected high school students from March 1 to 31, 2021. The data was collected using the depression, anxiety, and stress scale (DASS-21) questionnaire and analyzed using SPSS version 26.0. Bivariable and multivariable analyses were computed to identify factors associated with DAS. An adjusted odds ratio with 95% CI was used to see the strength of the association and statistical significance was declared at p-value <0.05.

Results: The overall prevalence of depression, anxiety, and stress were 52.1% [95% CI: 48.3, 55.98], 52.6% [95% CI: 48.8, 56.4], and 22.6% [95% CI: 19.4, 25], respectively. Being rural residence (AOR: 4.88, 95% CI: 3.02, 7.88), living in a prison house or with a husband (AOR: 5.94, 95% CI: 1.65, 21.3), having a lower academic level (AOR: 6.23, 95% CI: 3.42), having poor knowledge about COVID-19 (AOR: 1.75, 95% CI: 1.21, 2.53) and poor COVID-19 prevention practices (AOR: 1.74, 95% CI: 1.09, 2.79) were associated with depression. Similarly, being a rural resident (AOR: 3.73, 95% CI: 2.38, 5.84), being a lower academic level (AOR: 2.54, 95% CI: 1.50, 4.30), having poor knowledge about COVID-19 (AOR: 1.54, 95% CI: 1.08, 2.19), and poor COVID-19 prevention practices (AOR: 2.12, 95% CI: 1.36, 3.32) were associated with anxiety. Furthermore, stress was associated with rural residence (AOR: 2.24, 95% CI: 1.42, 3.53), lower academic level (AOR: 4.70, 95% CI: 2.12, 10.4), and poor knowledge of COVID-19 (AOR: 1.71, 95% CI: 1.13, 2.58).

Conclusions: Depression, anxiety, and stress were all prevalent among high school students in the area. Rural residence, lower academic level, and poor knowledge about COVID-19, as well as poor COVID-19 prevention practices, all increase the likelihood of DAS. As a result, school-based psychological counseling interventions, particularly during pandemics, are critical.

Keywords: Anxiety; COVID-19; Common mental disorders; Depression; Ethiopia; Stress; Students; Teenagers.

Travel Medicine and Infectious Disease

DOI: https://doi.org/10.1016/j.tmaid.2022.102537

52(2023)

Guidelines to prevent malarial transmission among interprovincial travelers to malaria endemic regions

Saravanan Sekaran [1], Dhanraj Ganapathy [1], Sivaperumal Pitchiah [1], **R S Suresh Kumar [2]**

[2]College of Natural Sciences, Arba Minch University, SNNPR, Ethiopia.

Abstract

Malaria remains a substantial public health burden in Peru despite decades of intense attempts to control it [2]. The spread of malaria can be limited if people take appropriate measures to protect themselves from getting it. We take the liberty of providing our insights to increase awareness about malaria among the travellers and prevent malaria contagion among population. (a) In geographic locations identified hosting endemic malarial parasites, a public information center with all educational material regarding the various aspects, risks, prevention, and management of malaria can be circulated to all the travelers arriving the bus stations and railway stations including the airports. (b) A small medical setup to screen for fever and antimalarial medications to dispense to travelers showing signs of malarial fever can be established. (c) Public health workers and volunteers can be employed to educate about the preventive measures to be followed by the travelers while visiting those endemic malaria confessed zones. (d) According to the CDC guidelines, interprovincial travelers visiting endemic malarial zones despite being infected show no clinical signs of malaria and can function as vectors hence a database of all the travelers with their communication and contact details can be maintained [3]. These travelers after returning home should be monitored carefully and periodically for any signs of infection for a period of one year. This will definitely help us to curb the transmission and infection of malaria among travelers to endemic regions. The suggested guidelines could also be implemented along the existing protocols followed in Peru. Future studies to determine how information, attitudes, and social behaviour impact the success of malaria vector control techniques could also be planned to effectively curb malaria transmission

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e13098

9(2023)

Spatio-temporal analysis of urban heat island (UHI) and its effect on urban ecology: The case of Mekelle city, Northern Ethiopia

Solomon Tesfamariam [1], Vanum Govindu [1], Abera Uncha [1]

[1]Department of Geography and Environmental Studies, Arba Minch University, Ethiopia

Abstract

The bio-geophysical effects of land cover classes are considered to be an important factor in land surface temperature variations between urban and suburban areas. This means that major cities are significantly warmer than surrounding suburban or rural areas, which is known as the Urban Heat Island (UHI) effect. The aim of this study was to assess and analyze the spatiotemporal variation, correlation and impact of UHIs on Mekelle city (1990–2020) using remote sensing techniques. The study's primary objective was accomplished using the a number of techniques, including the extraction of LULC classes, estimation of the seasonal LSTs, assessment of UHI and UTFVI, and showing the relationship between LULC and LST as well as the interactions between UHI, UTFVI, and urban LULC classes. By analyzing TIRs/OLI thermal band data after calibrating uncertainty in the images and validating it using the concept of theoretical relationships and least squares fitting method, estimates of local LST, UHI (both in Mekelle and periphery rural areas), and UTFVI were obtained. The result of standard multiple regression models showed that impervious urban land surface, built-up areas, and dry bare soil highly contribute and influence variation at LST intensity caused for the formation of UHI in the study area. The result showed that the maximum UHI value in Mekelle city was 2.73 °C during the dry season in 1990. It decreased slightly to 2.53 °C in 2000 and then increased regularly to 2.83 °C and 2.98 °C in 2010 and 2020, respectively. To determine the city's UHI status in comparison to eight selected peripheral suburban areas, a trend analysis has been done. The UHI intensity of Mekelle city was higher relatively to that of most of the periphery suburban districts, particularly in 2020 (both dry and rainy seasons); this could be due to the city's explosive growth. It's worth noting that the research area affected by the urban heat island effect has grown over time, and as a result, the study area also has severe microclimate conditions that primarily damage the quality of urban life and create the worst conditions for thermal discomfort. The results of this study provide major conceptual understandings of how improper distribution and use of urban land affects the urban environment and fuels the creation of the UHI and thermal discomfort phenomena. Hence policy makers and urban planners should consider the effects of LST and UHI and integrate UHI comprehensive mitigation strategies with urban development patterns, and current and projected local climate changes in order to create sustainable urban environments, cities, and communities. In conclusion, compared to the conventional method, satellite remote sensing provides a faster and more efficient method for researching LST and UHI.

Keywords: Dry bare soil; Built-up; Impervious surface; Urban Heat Island; Urban thermal variance

Environmental Development

DOI: https://doi.org/10.1016/j.envdev.2022.100783

45(2023)

Farmer-science-based soil degradation metrics guide prioritization of catchment-tailored control measures

Tizita Endale [1], Jan Diels [4], **Dereje Tsegaye [2], Alemayehu Kassaye [3], Liuelsegad Belayneh [1],** Ann Verdoodt [5]

[1]Arba Minch University, Department of Natural Resource Management
[2]Arba Minch University, Department of Plant Science
[3]Arba Minch University, Department of Water Resource and Irrigation Engineering

Abstract

Locally valid and up-to-date soil degradation surveys that account for the spatial variability and the dynamic nature of degradation processes within environmentally diverse catchments are scant. Failure to understand local priorities and involve land users in the assessment of soil degradation and restoration initiatives however might compromise the adoption of effective soil and water conservation (SWC) measures. This paper presents farmer-science-based metrics (FSBM) of soil degradation status for locally perceived degradation processes, thereby using socio-economically relevant criteria and permitting a standardized comparison of their status across various decision-making entities. The approach was tested in the low-, mid-and highland agro-ecological zones (AEZs) in two catchments of the Lake Abaya-Chamo Basin, Ethiopia. After defining land users' relevant classes of land degradation degree, extent and impact, the soil degradation status perceived by 384 household heads was collected during face-to-face interviews. The respondents' evaluation of soil degradation status was translated into numerical scores (FSBM) and shown on radar diagrams, stratified by AEZ and catchment. Our findings demonstrate that the adopted FSBM offered spatially explicit information on the three dimensions of degradation status by soil degradation type. Disentangling degree, extent and impact revealed the diversified occurrence of the soil degradation processes between and within similar AEZs of the catchments. Natural and human factors were pinpointed as causes, while assessment of consequences revealed spill-over effects of soil erosion taking place in midland AEZs into the lowlands. Biophysical aspects, socio-economic characteristics and proximity to training centers played significant roles in the respondents' perceptions. Despite the subjectivity associated with FSBM, our findings demonstrate that involving land users in the assessment of soil degradation provided a comprehensive overview of soil degradation status and current bottlenecks in its combat.

GeoJournal

DOI: https://ui.adsabs.harvard.edu/link_gateway/2023GeoJo.88...985A/doi:10.1007/s10708-022-10671-y

88(2023)

Farmers' perceptions of large-scale agricultural investment and its impacts on traditional ecological knowledge in Gololcha District, South Eastern Ethiopia

Nebiyu Abesha[1], Engdawork Assefa[1], Maria A. Petrova[2] & **Salih Seid[3]**

[3]Department of Sociology and Anthropology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Commons land is a designation of sustainable land resources management where local communities apply Traditional Ecological Knowledge (TEK) to govern and sustain ecological services for generations. Regardless of its ecological and socioeconomic benefits, large-scale agricultural investment (LSAI) is replacing the common-property system in the developing world, despite the lack of tangible evidence that commons land is a preferable target for the current global land rush. This study therefore critically assesses farmers' perceptions of LSAI and its impact on TEK in Gololcha district, and attempts to detect attitudinal differences among groups of farmers. This mixed research study involved 239 household heads and focus group discussions from two villages. One from a village that hosts LSAI (Bullala Hara) and the other one from a village relatively far away from the district's LSAI influences (Dirre Gudo) to check if farmers' resident location, in addition to sex and education, affects farmers' perceptions of LSAI and associated TEK. Despite the fact that the development implications of LSAI are hotly debated among scholars, the majority of participants in this study had a positive attitude toward LSAI and its contributions to rural development, and farmers have a moderate attitude toward the importance of TEK and the effects of LSAI on TEK for sustainable land resource management. Contrary to findings from earlier research, education and sex had no significant impact on farmers' attitudes, whereas location had a mixed effect on farmers' perceptions, with a significant difference detected between farmers located in the hosting village and those in the non-hosting village. In order to establish and maintain sustainable use and conservation of natural resources, it is critical to reconsider environmental policies and conservation strategies to reflect and incorporate TEK.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e16857

9(2023)

Microbial diversity, transformation and toxicity of azo dye biodegradation using thermo-alkaliphilic microbial consortia

Samson Tizazu [1], Getaneh Tesfaye [1], Aijie Wang [2], **Awoke Guadie [1 2]**, Berhanu Andualem [3]

[1]Biotechnology Stream, Biology Department, Natural and Computational Sciences' College, Arba Minch University, Arba Minch 21, Ethiopia.

Abstract

In this research, the transformation and toxicity of Reactive Red 141 and 239 biodegraded under anaerobic-aerobic conditions as well as metagenomic analysis of Reactive Red 239 degrading microbial consortia collected from Shala Hot Spring were investigated. Toxicity of dyes before treatment and after treatment on three plants, fish and microorganisms were done. A halotolerant and thermo-alkaliphilic bacterial consortia decolorizing azo dyes (>98% RR 141 and > 96% RR 239 in 7 h) under optimum conditions of salt concentration (0.5%), temperature (55 °C) and pH (9), were used. Toxicity effect of untreated dyes and treated dyes in Tomato > Beetroot > Cabbage plants, while the effect was Leuconostoc mesenteroides > Lactobacillus plantarum > Escherichia coli in microorganisms. Among fishes, the toxicity effect was highest in Oreochromis niloticus followed by Cyprinus carpio and Clarias gariepinus. The three most dominant phyla that could be in charge of decolorizing RR 239 under anaerobic-aerobic systems were Bacteroidota (22.6-29.0%), Proteobacteria (13.5-29.0%), and Chloroflexi (8.8-23.5%). At class level microbial community structure determination, Bacteroidia (18.9-27.2%), Gammaproteobacteria (11.0-15.8%), Alphaproteobacteria (2.5-5.0%) and Anaerolineae (17.0-21.9%) were dominant classes. The transformation of RR 141 and RR 239 into amine compounds were proposed via high performance liquid chromatography-mass spectroscopy (HPLC/MS) and fourier transform infrared spectroscopy (FT-IR). Overall, dye containing wastewaters treated under anaerobic-aerobic systems using thermo-alkaliphilic microbial consortia were found to be safe to agricultural (fishes and vegetables) purposes.

Keywords: Consortia; FT-IR; Metagenomic analysis; Shala hot spring; Thermo-alkaliphiles; Toxicity.

Geographies

DOI: https://doi.org/10.3390/geographies3010004

3(2023)

Hydrological Responses to Land Use/Land Cover Changes in Koga Watershed, Upper Blue Nile, Ethiopia

Habitamu Alesew Ayele [1], Alemu O. Aga [2,] **Liuelsegad Belayneh [3]** Tilahun Wankie Wanjala[1]

[3]Department of Natural Resources Management, Arba Minch University, Arba Minch P.O. Box 21, Ethiopia

Abstract

Information on land use and land cover modification and their related problems for the streamflow and sediment yield are crucial for spatial planners and stakeholders to devise suitable catchment resources management plans and strategies. This research sought to assess the changes in land use and land cover (LULC) effects on the streamflow and sediment yield of the Koga watershed. Landsat-5 TM, Landsat-7 ETM+, and Landsat-8 OLI data were used to create the land use and land cover maps. The LULC type identification analysis was performed by using ERDAS Imagine 2015. After the supervised classification, the land use and land cover maps for three distinct years (1991, 2008, and 2018) were generated, and the accuracy of the maps was reviewed. The LULC change analysis results were pointed out, as there was an appreciable LULC change in the study watershed. Agricultural land increased by 14.21% over the research period, whereas grassland decreased by 22.91%. The other LULC classes (built-up area, forest area, water body, and wetland) increased by 0.39%, 6.36%, 4.30%, and 0.46%, respectively. Contrarily, bushland decreased by 2.80%. Human activities were decisive in the significant land use alterations within the catchment. The flow rate of the river basin increased over the rainy season in the years 1991–2008 and declined in the drier months. The watershed's sediment yield increased from 1991 to 2008 as a result of the extension of its agricultural area. Thus, the findings of this investigation demonstrated that the flow and sediment yield characteristics are changed because of the modifications within the LULC in the catchment. Some downstream and upstream parts of the area are exposed to comparatively high erosion, and the maximum amount of sediment is generated during the rainy season.

Keywords: LULC change; streamflow; sediment yield; SWAT; Koga watershed

PLoS ONE

DOI: https://doi.org/10.1371/journal.pone.0276678

18(2023)

Factors associated with poor glycemic control among adult patients with type 2 diabetes mellitus in Gamo and Gofa zone public hospitals, Southern Ethiopia: A case-control study

Firehiwot Dawite [1], Meseret Girma [1], Tamiru Shibiru [2], Etenesh Kefelew [1], Tadiwos Hailu [2], Rodas Temesgen [2], Getachew Abebe [3]

[1]School of Public Health, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia.
[2]School of Medicine, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia.
[3]Department of Anatomy, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Diabetes mellitus is a serious global public health problem that affects the whole life of people in terms of their biological, psychological, and social effects. Complications and death from diabetes occur from poorly controlled blood glucose levels. Thus, dealing with glycemic control is essential for controlling the development of devastating acute and chronic complications related to diabetes. Therefore, this study aims to assess factors associated with poor glycemic control among type2 diabetes patients in public hospitals of Gamo and Gofa zone southern, Ethiopia, 2021.

Methods: An institution-based unmatched case-control study was employed among 312 randomly selected participants using a pre-tested, interviewer-administered, and structured questionnaire. Bivariate and multivariable logistic regression analysis was conducted to identify factors associated with poor glycemic control using IBM SPSS version 25. The strength of association was assessed by using an Adjusted odds ratio (AOR) with a 95% confidence interval (CI).

Result: Factors associated with poor glycemic control based on multivariable analysis were, having comorbidity (AOR = 2.35, 95% CI (1.39-3.95)), adhering to dietary recommendations (AOR = 0.31, 95% CI (089-0.51)), poor social support (AOR = 3.31, 95% CI (1.59-6.85)), physical exercise (AOR = 1.86 95% CI (1.11-3.12)), and having poly-pharmacy (AOR = 2.83, 95% CI (1.39-5.74)).

Conclusion and recommendation: This study indicated a significant association of comorbidity, physical exercise, poly-pharmacy, low social support, and adherence to dietary recommendations with poor glycemic control. We suggest that the health care providers and concerned bodies encourage patients to have regular check-ups and work on providing necessary social support.

PLoS ONE

DOI: https://doi.org/10.1371/journal.pone.0282637

18(2023)

Joint modeling of longitudinal change in pulse rate and survival time of heart failure patients treated at Arbaminch General Hospital, Southern Ethiopia

Belay Belete Anjullo [1], Sebisibe Kusse Kumaso [2], **Markos Abiso Erango [1]**

[1]Department of Statistics, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Introduction: Heart failure is a chronic progressive disease in which the heart muscle is unable to pump enough blood to meet the body's need. It is a severe health problem around the world with high re-hospitalization and death rates. The main aim of this study was to identify the factors associated with longitudinal change of pulse rate and survival time to death of congestive heart failure patients treated at Arba Minch General Hospital.

Methods: A retrospective study design was undertaken on congestive heart failure patients admitted to the Arba Minch General Hospital from January 2017 to December 2020. Data was collected from a total of 199 patients. After evaluating the longitudinal data with a linear mixed model and the survival time to death data with cox proportional model, Bayesian joint model of both sub models was fitted in R software using JMbayes2 package.

Results: Findings from Bayesian joint model revealed that the estimated value for the association parameter was positive and statistically significant. This indicates that there is significant evidence of an association between the mean longitudinal change of pulse rate and the risk of death. Weight of patients at baseline, gender, chronic kidney disease, left ventricular ejection fraction, New York Heart Association classification, diabetes, tuberculosis, pneumonia and family history were statistically significant factors associated with mean evolution of pulse rate of congestive heart failure patients. Left ventricular ejection fraction, etiology of congestive heart failure, type of congestive heart failure, chronic kidney disease, smoking, family history, alcohol and diabetes were found to be statistically significant factors associated with survival time to death.

Conclusion: To reduce the risk level, health professionals should give attention to congestive heart failure patients with high pulse rate, co-morbidities of chronic kidney disease, tuberculosis, diabetic, smoking status, family history, and pneumonia in the study area.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e13948

9(2023)

Modeling on number of children ever born and its determinants among married women of reproductive age in Ethiopia: A Poisson regression analysis

Niguss Cherie [1 2], Lemma Getacher [3 2], Alemayehu Belay [4 2], **Teklemariam Gultie [5], Aleme Mekuria [5]**, Samrawit Sileshi [6 2], Getu Degu [7]

[5]School of Nursing and Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: One of the main components of population dynamics that determine the size, structure, and composition of a country's population is the number of ever-born children. Psychological, economic, social, and demographic factors all have a strong influence on and predict it. However, there is little information on its current status in Ethiopia. As a result, modeling the number of children ever born and its determinants is critical for the Ethiopian government to develop appropriate policies and programs.

Methods: A total of 3260 eligible women were used as a study sample in this study to assess the number of children ever born and determinants among married reproductive age women in Ethiopia. Secondary data were culled from the 2019 Ethiopian Demography and Health Survey datasets. The factors associated with the number of children born were identified using a Poisson regression model (CEB).

Results: The average number of children per mother was 6.09, with a standard deviation of 8.74. There were 2432 (74.6%) rural residents among the total respondents, 2402 (73.7%) have no formal education, and three out of five women are not currently working. The participants' average age was 41.66, with a standard deviation of 3.88. When compared to urban residents, the number of CEB for rural residents is 1.37 times higher. When compared to women with no education, the number of CEB for women with higher education was reduced by 48%. For every unit increase in respondents' current age, the percent change in the number of children ever born increases by 2.4%. For every unit increase in the family's wealth index status, the percent change in the number of children ever born decreases by 1.7%.

Conclusion: When compared to the target of Ethiopia's health transformation plan, the average number of children born is higher. Improving the household wealth index, women's education, and employment status all contribute to a reduction in the number of CEB, which is important in balancing population growth with natural capacity and the country's economic development.

Keywords: Children ever born; Determinants; Ethiopia; Poisson regression.

BMJ Open

DOI: https://doi.org/10.1136/bmjopen-2022-069278

13(2023)

Determinants of childhood vaccination among children aged 12-23 months in Ethiopia: a community-based cross-sectional study

Sewunet Sako [1], Girma Gilano [2], Samuel Hailegebreal [2]

[1]Department of Health Informatics, School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia zesew1lalem@gmail.com.
[2]Department of Health Informatics, School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Objective: Childhood vaccination is a cost-effective, essential service to reach a larger population globally. Due to unclear reasons, new emergence and resurgence of vaccine-preventable diseases increase. Thus, the aim of this study is to identify prevalence and determinants of childhood vaccination in Ethiopia.

Design: Community-based cross-sectional study.

Setting: We used data from 2019 Ethiopia Mini Demographic and Health Survey. The survey included all the nine regional states and two city administrations of Ethiopia.

Participants: A weighted sample of 1008 children 12-23 months of age was included in the analysis.

Main outcome measures: A multilevel proportional odds model was fitted to identify determinants of childhood vaccination status. In the final model, variables with a p value of less than 5% and an adjusted OR (AOR) with a 95% CI were reported.

Result: The full childhood vaccination coverage of Ethiopia was 39.09% (95% CI: 36.06%-42.28%). Mothers who attended primary (AOR=2.16; 95% CI: 1.43-3.26), secondary (AOR=2.02; 95% CI: 1.07-3.79) and higher education (AOR=2.67; 95% CI: 1.25-5.71); being in union (AOR=2.21; 95% CI: 1.06-4.58); kept vaccination cards (AOR=26.18; 95% CI: 15.75-43.53); children receiving vitamin A_1 (AOR=4.14; 95% CI: 2.9-5.9); living in Afar (AOR=0.14; 95% CI: 0.04-0.45), Somali (AOR=0.19; 95% CI: 0.06-0.60), Gambela (AOR=0.22; 95% CI: 0.06-0.77), Harari (AOR=0.14; 95% CI: 0.04-0.52) and Dire Dawa (AOR=0.23; 95% CI: 0.06-0.79) regions; and rural residents (AOR=0.53; 95% CI: 0.30-0.93) were factors significantly associated with childhood vaccination.

Conclusion: The full childhood vaccination coverage in Ethiopia was low and remained unchanged since 2016. The study identified that both the individual-level and community-level factors affected the vaccination status. Accordingly, public health interventions targeted to these identified factors can increase childhood full vaccination status.

Keywords: Community child health; PREVENTIVE MEDICINE; PUBLIC HEALTH.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e13833

9(2023)

Self-medication practice among pregnant women in Wolaita Zone, Southern Ethiopia: An institutionally based cross-sectional study

Temesgen Leka Lerango [1], **Amsalu Alagaw [2], Abayneh Tunje [2], Eshetu Andarge [2],** Bereket Duko [4 5], Asres Bedaso Tilahune [6], Semalgn Leka Lerango [7]

[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Self-medication is a treatment based on symptoms without prescription and medical consultation. Despite being one of the critical practices that impose a harmful effect on the fetus and the woman herself, evidence on its practice and associated factors are not well-documented. This study, therefore, assessed the self-medication practice and associated factors among pregnant women in Wolaita Zone, Southern Ethiopia.

Methods: An institutionally based cross-sectional study was conducted at public health institutions in Wolaita Zone, Southern Ethiopia by recruiting a total of 408 pregnant women using a systematic random sampling technique between March 2019 and April 2019. We used the Antenatal care (ANC) registry as a sampling frame. A pre-tested, structured, interviewer-administered questionnaire used to depict Self-medication practice and associated factors. Data entered using Epi-data and analyzed by SPSS 23.0.

Results: The overall prevalence of self-medication was 14.9% (95% CI:11-18). The odds of using self-medication may decreased by 75% for women who were in their third trimester (AOR = 0.25, 95% CI: 0.10, 0.64). However, the odds of practicing increased by 13-folds among pregnant women reported earlier (previous) self-medication experience (AOR = 13.62, 95% CI: 6.66-27.84).

Conclusion: The prevalence of self-medication was high in the current study setting. Women's gestational period (third trimester) and earlier self-medication experience were associated with their current self-medication practice.

Keywords: ANC, Antenatal Care; AOR, Adjusted Odds Ratio; CHI, Community-Based Health Insurance; CI, Confidence Interval; COR, Crude Odds Ratio; Cross-sectional; EFDA, Ethiopian Food and Drug Authority; ETB, Ethiopian Birr; HC, Health Center; HDA, Health (Women) Development Army; HMIS, Health ManagementInformation System; OTC, Over-The-Counter Medicines; PH, Primary Hospital; POM, Prescription-Only-Medicines; Pregnant women; SNNPR, Southern Nations Nationalities and Peoples Region; Self-medication; Southern Ethiopia; WHO, World Health Organization; Wolaita.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e13690

9(2023)

Antimalarial activity of the 80%methanol extract and solvent fractions of Cucumis ficifolius A. rich roots against Plasmodium berghei in mice

Gizachew Kassahun Bizuneh [1], Getnet Tadege [2], **Betelhem Sirak [3]**, Abyot Endale Gurmu [1], Betelhem Anteneh Adamu [1], Aschalew Mulatu Tefera [1], Yeniewa Kerie Anagaw [4]

[3]Department of Pharmacy, College of Medicine and Health Sciences, Arba Minch University, P. O. Box 21, Arba Minch, Ethiopia.

Abstract

Ethnopharmacological relevance: Malaria is still a known health threat, especially in parts of sub-Saharan Africa. It is one of the frequently mentioned issues with hospital admission and outpatient care in Ethiopia. Cucumis ficifolius A. Rich roots are historically used in Ethiopia to treat meningitis, inflammation, and malaria. However, the antimalarial activity of this plant has not been scientifically studied so far.

Aim of the study: This study aimed to determine the in vivo antimalarial activity of 80% methanol extract and solvent fractions of the roots of Cucumis ficifolius against Plasmodium berghei infection in mice.

Methods: The in vivo antimalarial activity of the 80% methanol extract and solvent fractions of Cucumis ficifolius A. Rich was evaluated by standard chemo suppressive, curative and repository tests using Plasmodium berghei (ANKA strain) in Swiss albino mice at doses of 100, 200 and 400 mg/kg/day. The level of parasitemia, survival time, variation in weight, rectal temperature, and packed cell volume of mice were determined to establish the activity of the extracts.

Result: The 80% methanol extract of Cucumis ficifolius A. Rich roots had a promising suppression of parasitemia at 400 mg/kg with a chemosuppression value of 65.21 ± 1.20%. Among the solvent fractions, the chloroform fraction showed the highest antimalarial activity in the four-day suppressive test with a chemosuppression value of 55.9 ± 0.28%, followed by the n-butanol (42.9 ± 0.24%), and aqueous (40.57 ± 0.52%) fractions at a dose of 400 mg/kg. The highest survival times were observed with crude extract (15.4 ± 0.24 days) at 400 mg/kg, and chloroform fraction (13.4 + 0.24 days), though all extracts increased survival time.

Conclusion: The findings of the present study collectively indicate the root extract of Cucumis ficifolius has a promising antiplasmodial activity which substantiates the traditional claim of the plant.

Keywords: Antimalarial activity; Cucumis ficifolius; Plasmodium berghei.

Sustainability (Switzerland)

DOI: https://doi.org/10.3390/su15031763

15(2023)

Groundwater Recharge Estimation in Upper Gelana Watershed, South-Western Main Ethiopian Rift Valley

Endale Siyoum Demissie [1], Demisachew Yilma Gashaw[1], Andarge Alaro Altaye [1], SolomonS.Demissie[2,*] andGebiaw T. Ayele [3,*]

[1]Arba Minch Water Technology Institute, Arba Minch University, Arba Minch P.O. Box 21, Ethiopia

Abstract

Estimating the spatial and temporal patterns of groundwater recharge through integrated water balance modeling plays an important role in sustainable groundwater resource management. Such modeling effort is particularly essential for data-scarce regions, such as the Rift Valley Lake basin in the Basement Complex of Ethiopia, which has shallow aquifers, a proliferation of wells, and poor groundwater monitoring networks. A spatially distributed water balance model (WetSpass), along with GIS and remote sensing tools, was used for groundwater recharge estimation for its suitability and efficiency in data-scarce hydrogeological regions. The WetSpass model depicted a very good performance in simulating the groundwater recharge in the Upper Gelana watershed within the Rift Valley Lake basin. The water balance analysis revealed that about 7% of the mean annual rainfall is converted to groundwater recharge, and the remaining rainfall amounts are partitioned into surface runoff (19%) and evapotranspiration (75%). The model simulation outputs are also used to investigate the relative influences of biophysical driving factors on the water balance components. While the land use types had a greater influence on the actual evapotranspiration processes, the soil texture classes were the dominant factors in the surface runoff and groundwater recharge processes in the watershed. The groundwater recharge rates were found to be higher than 400 mm/yr in the central parts (Fisehagenent, Tore, and Gedeb) and lower than 165 mm/yr in the southern parts (Hageremariam) of the watershed. The areal proportions of the low, medium, and high recharging parts of the watershed are, respectively, estimated as 15%, 68%, and 17% of the watershed area. Therefore, the spatial and temporal patterns of groundwater recharge should be taken into consideration in developing a sustainable groundwater resources management plan for the Upper Gelana watershed. Managed aquifer recharge can be adopted in high and medium groundwater recharging parts of the watershed to capture stormwater runoff during the wet season to improve the groundwater supply during dry months. Furthermore, monthly groundwater withdrawals should be regulated according to the spatial and temporal patterns of the groundwater recharge in the watershed.

Keywords: groundwater recharge; sustainable development; WetSpass model; Gelana watershed

Handbook of Ionic Liquids: Fundamentals, Applications and Sustainability

DOI: https://doi.org/10.1002/9783527839520.ch23

459(2023)

Application of Ionic Liquids in Biocatalysis and Biotechnology

Elimian, Ehiaghe Agbovhimen[1]; Ajibade, Fidelis Odedishemi[2]; Ajibade, Temitope Fausat[3]; **Demissie, Hailu[4]**; Nwogwu, Nathaniel Azubuike[5]; Lasisi, Kayode Hassan[6]; Ayetoro, Daniel A.[7]; Okonofua, Ehizonomhen Solomon[8]

[4]Arba Minch University, Department of Chemistry, Arba Minch, 1000, Ethiopia

Abstract

Ionic liquids have emerged as a strategically well-characterized class of compounds that are widely considered to be good substitutes for organic solvents during the biotransformation process. Ionic liquids have proven to be advantageous in terms of selectivity, activity, and shelf life. There are challenges associated with the application of these solvents, e.g. Low purity of the ionic liquids, lack of control of the reaction conditions, and poor products, but isolation limits the practical application. In this chapter, we present the quantitative data on the activity of ionic liquids for enzyme-catalyzed processes taken from the literature. This chapter is an update on the development and application of ionic liquids in biocatalysis and biotechnology. Finally, the activity of pure native and polymerized ionic liquids was compared, and the limitations associated with the application of ionic liquids were discussed.

Journal of Agriculture and Food Research

DOI: https://doi.org/10.1016/j.jafr.2023.100551

12(2023)

Response of maize to irrigation and blended fertilizer levels for climate smart food production in Wolaita Zone, southern Ethiopia

Alefu Chinasho [12], Bobe Bedadi [2], Tesfaye Lemma [2], Tamado Tana [3], Tilahun Hordofa [4], **Bisrat Elias[5]**

[5]Faculty of Meteorology and Hydrology, Arba Minch University, P.O. Box.21, Arba Minch, Ethiopia

Abstract

Sustainable development needs climate-smart food production systems. This study examined maize responses to irrigation levels of 70, 85, and 100% crop evapotranspiration (ETc) and blended fertilizer rates of 0, 50, 100, and 150 kg ha^{-1}, in factorial combinations. Blended fertilizer contains nitrogen, phosphorus, sulfur, and boron (NPSB). A field experiment was conducted for two seasons (2020 and 2021) in a randomized complete block design with three replications. Results indicate that the earliest tasseling (68 days), silking (73.5 days), and maturity (117 days) were recorded at the interaction effect of up to 30% deficit irrigation with 100 kg ha^{-1} NPSB. In response to the interaction effect of 30% deficit irrigation with the highest fertilizer level, the highest canopy cover (2.5) and stem diameter (4.35 cm) were recorded at 70% ETc × 150 kg ha^{-1} NPSB. Plants also produced the highest leaf area index (4.47) and height (2.53 m) at full irrigation level with the highest fertilizer. The highest cob length (23.4 cm), number of kernels per cob (586), thousand kernels weight (395g), biomass yield (23.27-ton ha^{-1}), and grain yield (8.8-ton ha^{-1}) were recorded at 100% ETc × 150 kg ha^{-1} NPSB. The highest harvest index (32.33%) and fertilizer use efficiency (51.1 kg kg^{-1}) were recorded at 85% ETc × 100 kg ha^{-1} NPSB, and 100% ETc × 50 kg ha^{-1} NPSB, respectively. The highest water productivity was obtained in response to the main effects of 30% deficit irrigation (2.71 kg m^{-3}) and 150 kg ha^{-1} NPSB (3.21 kg m^{-3}). The future maize productivity is projected to decrease by up to 15.11% by 2030, 2050, and 2070, under two representative concentration pathways (RCP4.5 and RCP8.5). Based on the results, using 85% ETc with 100 kg ha^{-1} NPSB is optimum. Policymakers and agricultural offices better consider climate-smart maize production systems in Ethiopia.

PLoS ONE

DOI: https://doi.org/10.1371/journal.pone.0285571

18(2023)

The association between HIV diagnosis disclosure and adherence to anti-retroviral therapy among adolescents living with HIV in Sub-Saharan Africa: A systematic review and meta-analysis

Melkamu Merid Mengesha [1], Awugchew Teshome [1], Dessalegn Ajema [1], Abera Kenay Tura [2,] Inger Kristensson Hallström [3], Degu Jerene [3 4]

[1]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Introduction: Nine in ten of the world's 1.74 million adolescents living with human immunodeficiency virus (ALHIV) live in Sub-Saharan Africa. Suboptimal adherence to antiretroviral therapy (ART) and poor viral suppression are important problems among adolescents. To guide intervention efforts in this regard, this review presented pooled estimates on the prevalence of adherence and how it is affected by disclosure of HIV status among ALHIV in Sub-Saharan Africa.

Methods: A comprehensive search in major databases (Excerpta Medica database (EMBASE), PubMed, Ovid/MEDLINE, HINARI, and Google Scholar) with additional hand searches for grey literature was conducted to locate observational epidemiologic studies published in English up to November 12, 2022 with the following inclusion criteria: primary studies that reported disclosure of HIV status as an exposure variable, had positive adherence to ART as an outcome, and conducted among adolescents and children. The COVIDENCE software was used for a title/abstract screening, full-text screening, the JBI quality assessment checklist, and data extraction. Random effects model was used to pool estimates. Furthermore, sensitivity analysis and subgroup analysis were also conducted by age groups and type of adherence measures used.

Results: This meta-analysis combines the effect estimates from 12 primary studies with 4422 participants. The prevalence of good adherence to ART was 73% (95% CI (confidence interval): 56 to 87; I2 = 98.63%, P = <0.001), and it was higher among adolescents who were aware of their HIV status, 77% (95% CI: 56 to 92; I2 = 98.34%, P = <0.001). Overall, knowledge of HIV status was associated with increased odds of adherence (odds ratio (OR) = 1.88, 95% CI: 1.21 to 2.94; I2 = 79.8%, P = <0.001). This was further supported in a subgroup analysis by age (seven studies, pooled OR = 1.89, 95% CI: 1.06 to 3.37; I2 = 81.3%, P = <0.0001) and whether primary studies controlled for confounding factors (six studies provided adjusted estimates, pooled OR = 2.61, 95% CI: 1.22 to 5.57; I2 = 88.1%, P = <0.001) confirmed this further.

Conclusions: Our meta-analysis and systematic review revealed that knowledge of one's HIV status was associated with adherence to ART, particularly among adolescents. The findings underscored the importance of encouraging disclosure in order to enhance adherence among adolescents.

Frontiers in Public Health

DOI: https://doi.org/10.3389/fpubh.2022.1032467

10(2023)

Sputum smears quality inspection using an ensemble feature extraction approach

Amarech Kiflie [1], Guta Tesema Tufa [1], Ayodeji Olalekan Salau [2]

[1]Faculty of Electrical and Computer Engineering, Arba Minch Institute of Technology, Arba Minch, Ethiopia.

Abstract

The diagnosis of tuberculosis (TB) is extremely important. Sputum smear microscopy is thought to be the best method available in terms of accessibility and ease of use in resource-constrained countries. In this paper, research was conducted to evaluate the effectiveness of tuberculosis diagnosis by examining, among other things, the underlying causes of sputum smear quality for Ethiopian states such as Tigray, Amahira, and Oromia. However, because it is done manually, it has its limitations. This study proposes a model for sputum smear quality inspection using an ensemble feature extraction approach. The dataset used was recorded and labeled by experts in a regional lab in Bahir Dar, near Felege Hiwot Hospital after being collected from Gabi Hospital, Felege Hiwot Hospital, Adit Clinic and Gondar Hospital, as well as Kidanemihret Clinic in Gondar. We used a controlled environment to reduce environmental influences and eliminate variation. All the data was collected using a smartphone (the standard 15) with a jpg file extension and a pixel resolution of 1,728 × 3,840. Prior to feature extraction, bicubic resizing, and ROI extraction using thresholding was performed. In addition, sequential Gaussian and Gabor filters were used for noise reduction, augmentation, and CLAHE was used for enhancement. For feature extraction, GLCM from the gray label and CNN from the color image were both chosen. Ultimately, when CNN, SVM, and KNN classifiers were used to test both CNN and GLCM features, KNN outperformed them all with scores of 87, 93, and 94% for GLCM, CNN, and a hybrid of CNN and GLCM, respectively. CNN with GLCM outperformed other methods by 0.7 and 0.1% for GLCM and CNN feature extractors using the same classifier, respectively. In addition, the KNN classifier with the combination of CNN and GLCM as feature extractors performed better than existing methods by 1.48%.

Keywords: CNN; GLCM; KNN; feature extraction; sputum smear inspection.

Annals of Medicine and Surgery

DOI: https://doi.org/10.1097/ms9.0000000000000605

85(2023)

Factors associated with hypertension among diabetic patients in Gamo Zone, Southern Ethiopia, 2021: case-control study

Etenesh Kefelew [1], Firdawek Getahun [1], Addisalem Damtie [1], Firehiwot Dawite [1], Selamawit Gebeyehu [1], Tadiwos Hailu [2], Rodas Temesgen [2], Getachew Abebe [3], Mesfin Abebe [4]

[1]School of public health.
[2]School of Medicine.
[3]Department of Anatomy, College of Medicine and Health Science, Arba Minch University

Abstract

The prevalence of hypertension in diabetic patients is nearly twice that of non-diabetic patients. The presence of both hypertension and diabetes accelerates complications and raises the risk of death. Thus, identifying determinants of hypertension in diabetic patients is critical for preventing the development of devastating acute and chronic complications, as well as diabetes-related death.

Methods and materials: A case-control study was carried out in public hospitals of Gamo Zone, Southern Ethiopia. To select study participants, a systematic random sampling technique was used. The KOBO toolbox was used to collect data, which was then exported to the IBM SPSS version 25 software package for analysis. Bivariate and multivariable logistic regression analyses were performed to identify factors associated with hypertension in diabetes patients, and variables in the multivariable logistic regression analysis with a *P* value less than 0.05 were declared significantly associated at a 95% CI.

Results: In this study, age greater than or equal to 50 years [adjusted odd ratio (AOR)=4.08, 95% CI (1.41, 11.82)], higher body mass index [AOR=3.23, 95% CI (1.40, 7.66)], and higher waist to hip ratio [AOR=2.15, 95% CI (1.12, 4.13)] were significantly associated with hypertension in diabetic patients.

Conclusions: This study found that factors associated with hypertension among diabetic patients included older age (>50 years), a high waait to st#to#hip ratio, and a higher body mass index. The concerned health authorities and healthcare providers in the study area should focus on those identified factors to prevent hypertension among diabetic patients.

Keywords: Diabetic patient; ethiopia; factors associated; hypertension.

Indian Phytopathology

DOI: https://doi.org/10.1007/s42360-023-00617-w

76(2023)

Late blight (Phytophthora infestans) management with fungicide and varietal combination of potato at Fagita Lekoma, North Western Ethiopia

Zemenu Fentahun[1], Merkuz Abera[2], Abaynew Jemal Jenber[2]

[1]Plant Protection section, Southern Agricultural Research Institute, Arba Minch Agricultural Research Center, P.O. Box 2228, Arba Minch, Ethiopia

Abstract

Phytophthora infestans is a destructive disease in potato growing areas of Ethiopia. The experiment was conducted at Fagita Lekoma district during 2019 main cropping season to evaluate the effect of variety and fungicide combinations for late blight. In the study four potato varieties and two fungicides were used. Fungicide applications was started soon after the appearance of late blight symptom and continued at weekly intervals. The field experiment was laid out in factorial arrangement in Randomized Complete Block Design with three replications. The highest disease incidence (100%) at 52 day and PSI (76.68 and 63.92%) at 87 day was obtained from unsprayed plots of Key and Zengena varieties, respectively. Whereas, the lowest disease incidence and Percentage Severity Index was obtained from Belete and Gudene varieties both sprayed with Ridomil Gold 68% WG. The maximum disease progress rate (0.0930unit day^{-1}) was obtained from unsprayed plots of Key variety. On the other hand, the lowest rate (0.0405unit day^{-1}) were calculated from Belete variety sprayed with Ridomil Gold 68% WG. Maximum yield (31.66 t ha^{-1}) was gained from Belete variety combined with Ridomil Gold 68% WG. The highest MRR (1631.18%) obtained from local Key sprayed with Ridomil Gold 68% WG. The maximum net profit was obtained from Belete variety sprayed with Ridomil Gold 68% WG. Therefore, combination of moderately resistant variety Belete with fungicide applications, especially Ridomil Gold 68% WG is better for the management of late blight and sustainable production of potato for the study area.

Pan African Medical Journal

DOI: https://doi.org/10.11604/pamj.2023.45.105.35949

45(2023)

Determinants of early interruption of exclusive breastfeeding at Dollo Ado refugee camps, Dollo Ado district, Ethiopia

Dawit Getachew [1], **Desta Haftu [2]**, Tewodros Yosef [1]

[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Introduction: nearly three-quarters of infants younger than six months were not exclusively breastfed globally. Despite some research indicating what factors influence early exclusive breastfeeding interruption in Ethiopia's stable population, there is little evidence indicating what factors influence exclusive breastfeeding interruption in vulnerable populations such as refugee camps. Therefore, this study aimed to determine the factors that contributed to the early termination of exclusive breastfeeding in Ethiopian refugee camps in the Dollo Ado district.

Methods: a case-control study was conducted at the Dollo Ado refugee camps from April 05th to 25th, 2017. The eligible 112 cases and 224 controls were identified using the 24-hour recall method. The information was gathered using an interviewer-administered questionnaire that was pretested and organized. Logistic regression analysis was computed to assess the effect of independent variables.

Results: the determinants for early interruption of exclusive breastfeeding were not counseled about infant feeding during antenatal care follow-up (adjusted odds ratio (AOR =5.87, 95% CI [2.61-13.1]), not counseled about infant feeding during postnatal care service use (AOR= 4.33, 95% CI [2.71-10.8), breastfeeding problem (AOR= 5.62, 95% CI [4.55-15.2]) and late initiation of breastfeeding (AOR= 4.79, 95% CI [28-10.1]).

Conclusion: in this study, early termination of exclusive breastfeeding was caused by breastfeeding problems and late commencement of breastfeeding, as well as not receiving infant feeding advice during antenatal care or postnatal care. The results of this study highlight the significance of concentrating on newborn and young child feeding counseling during prenatal and postnatal care services in order to promote exclusive breastfeeding. In addition, health providers should educate parents on the significance of starting exclusive breastfeeding on time and obtaining help right away if there is a problem, such as breast soreness or the infant refusing to eat due to oral trash, to avoid early exclusive breastfeeding interruption.

Keywords: Dollo Ado refugee camps; Ethiopia; Exclusive breastfeeding; determinants; early interruption.

Journal of Ethnopharmacology

DOI: https://doi.org/10.1016/j.jep.2022.116073

304(2023)

In vitro and in vivo anti-seizure activity of hydromethanolic extract and fractions of Pterolobium stellatum

Samson Sahile Salile [1], Hamin John Lee [2], Paul Sewes Frederick Alberts [3], Teferra Abula [4], Joseph Valentino Raimondo [2], Gary Ivan Stafford [5]

[1]Pharmacy Department, College of Medicine and Health Sciences, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia.

Abstract

Ethnopharmacological relevance: In Ethiopia, the whole plant juice of Pterolobium stellatum is used to treat seizures and epilepsy. Aim of the study: To investigate the antiseizure activity of hydromethanolic crude extract and fractions collected from leaves of P. stellatum using both in vitro, and in vivo seizure models in mice.

Materials and methods: Fresh leaves of P. stellatum were collected from Awash Melka, Addis Ababa, Ethiopia. An 80% crude methanol extract was further fractionated to produce petroleum ether, chloroform, butanol, and aqueous fractions. Anti-seizure activity of the crude extract and fractions (petroleum ether, chloroform, butanol, and water) were assessed at a concentration of 0.7 mg/ml using the in vitro 0 Mg2+ model of seizures in mouse brain slices prepared from 14- to 21-day-old C57BL/6 mice. The maximal electroshock seizure (MES) model and the pentylenetetrazol (PTZ) seizure model for seizures were performed on male BALB/c mice using 400 mg/kg and 800 mg/kg of crude 80% methanol extract, as well as the four fractions described above. Diazepam and phenytoin were used as positive controls for PTZ and MES test respectively.

Results: Addition of 0.7 mg/ml of crude 80% methanol extract of P. stellatum prevented the onset of SLEs in most brain slices in the 0 Mg2+in vitro model of seizures, with similar efficacy to diazepam (3 μM). The same extract at 400 and 800 mg/kg was efficacious in reducing the hindlimb extension time in the MES model and delaying the onset of myoclonic convulsions in the PTZ model, although not to the same extent as phenytoin (10 mg/kg) or diazepam (5 mg/kg). The chloroform and water fractions of the crude extract also showed significant anti-seizure activity across all three models whilst the non-polar petroleum ether and butanol fractions did not. The UPLC-MS analysis indicated the presence of gallic acid, ellagic acid, kaempferol, myricitrin, isoquercitrin and quercitirin in the crude extract. Gallic acid and ellagic acid were observed in chloroform fraction and in the water fraction ellagic acid, kaempferol, myricitrin and isoquercitrin were detected.

Conclusion: The crude hydromethanolic extract of P. stellatum has significant anti-seizure activity. The chloroform and aqueous fractions have antiseizure activity. The extracts have previously identified compounds with anticonvulsant activity which indicates the antiseizure potential of the plant.

Keywords: 0 Mg (2+) model; Anti-epileptic; Epilepsy; Maximal electroshock seizure model; Pentylenetetrazol seizure model; Pterolobium stellatum; Seizures.

Ethiopian journal of health sciences

DOI: https://doi.org/10.4314/ejhs.v33i2.18

33(2023)

Assessment of Treatment Outcome and Its Associated Factors among Adult Epileptic Patients in Public Hospitals in the Southern Ethiopia: A Multi-center Cross-sectional Study

Muluken Ahmed [1], Mohammed Nasir [2], **Solomon Yalew** [1], **Firdawek Getahun** [3], **Fitsum Getahun** [4]

[1]Pediatrics department, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[3]School of public health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[4]Internal medicine department, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Epilepsy accounts for 0.5 % of the world's disease burden. Around 80 % of these are living in low and middle-income countries. In Ethiopia, the prevalence is 0.6 to 5 per 1000 population. There is a little study in our study area on the treatment and predictors of response of adult epilepsy. The purpose of this study was to determine the treatment outcome and its associated factors among adult epileptic patients in public hospitals in southern Ethiopia.

Methods: Multi-centered, Hospital-based cross-sectional study was conducted from October 2021 - august 2022. Data were collected by face-to-face interviews and record review. Data was analysed using SPSS. The bivariate and multivariable logistic regression analyses have been performed between the dependent and the independent variables.

Result: Of the total 422 participants, 55.9 % were males and 62.6% were below 30 years of age. The most common type of seizure was a generalized tonic-clonic seizure. Most (87.9 %) were treated by immunotherapy. Phenobarbitone is most common medication (77.5). One-quarter reported adverse effects of medication. The majority (78%) had good control (seizure free for at least one year) and 22% had poor control. Poor medication adherence (AOR=4.03) and shorter duration of seizure before treatment (AOR=4.233) were associated with poor control.

Conclusion: A significant number of patients had poor control of seizures. Early identification of issues on medication adherence and early initiation of treatment will improve treatment outcome.

Keywords: Epilepsy; anti-epileptic drugs; good adherence; good control; poor adherence; poor control; seizure.

Handbook of Ionic Liquids: Fundamentals, Applications and Sustainability

DOI: http://dx.doi.org/10.1002/9783527839520.ch12

(2023)

Theoretical Description of Ionic Liquids

Daniel A[1]. Ayetoro[2], Nathaniel A. Nwogwu[3], Kelechi E. Igwe[4], Ehiaghe A. Elimian[5], **Hailu Demissie[6],** Temitope F. Ajibade[7], Abdulhamid Yusuf[8], Kayode H. Lasisi[9], Pankaj Kumar[10]

[6]Arba Minch University, Department of Chemistry, Arba Minch, 1000 Ethiopia

Summary

Ionic liquids (ILs) are often regarded as future-oriented materials with applications in a variety of sectors. The capacity to apply an electrical charge, a broader temperature spectrum in the liquid state, an extremely low vapor pressure, no ignitability, and a large capacity to disband chemical components in a different preferential form on the given IL are all factors that contribute to the IL's high application interest. Despite their unique features, only a few have made it to the industrial scale thus far, owing to a lack of experimental data and the high value that ILs have gained in recent years due to their ability to be employed on large scales. Theoretical models of ILs are becoming more significant in determining the behavior of these novel materials and interpreting experimental results. In this chapter, we will review theoretical approaches in general and how they are applied to ILs, as well as the extractions, properties, and green natures of pure ILs.

World Development

DOI: http://dx.doi.org/10.1016/j.worlddev.2022.106137

162(2023)

Relating risk preferences and risk perceptions over different agricultural risk domains: Insights from Ethiopia

Ashenafi Duguma Feyisa[1], Miet Maertens[2], Yann de Mey[3]

[1]PhD in Agricultural and Development Economics Arba Minch University

Abstract

Households in developing countries are exposed to various shocks and risks, which leaves them vulnerable as they typically have limited resources to cope with them. Even though a large body of development literature has focused on the role of risk in rural livelihoods, the focus is often on single sources of risk and taking a unidimensional view on risk preference. This paper explores the diversity in risk perception and risk preferences of Ethiopian households by combining incentivized field experiments with detailed primary household survey data. We disentangle the relationship between risk perception and risk preferences using an innovative combination of time framing and instrumental variable estimation approaches. We find that our respondents are exposed to multiple past shocks and perceive multiple sources of future threats across different agricultural risk domains. Our respondents can be characterized as relatively risk-averse and loss-averse, and they also overweight unlikely extreme outcomes. We find a statistically significant association between the prospect theory risk preferences parameters—risk aversion, loss aversion, and probability weighting—and overall risk perception, domain-specific risk perceptions (except for the personal domain) and the impact dimension of future risk. Our findings make an important contribution to our understanding of farm households' risk behavior, and can guide prioritizing development efforts to stimulate better informed and well-targeted risk management policy interventions.

Journal of Hydrology: Regional Studies

DOI: http://dx.doi.org/10.1016/j.ejrh.2022.101287

45(2023)

Blending high-resolution satellite rainfall estimates over urban catchment using Bayesian Model Averaging approach

Wegayehu Asfaw[1], Tom Rientjes[2], **Alemseged Tamiru Haile[3]**

[3]Faculty of Hydraulic and Water Resources Engineering, Institute of Water Technology, Arba Minch University, P. O. Box 21, Arba Minch, Ethiopia

Abstract

Study region: Akaki is a headwater catchment of Awash River Basin that hosts the capital city of Ethiopia, Addis Ababa. The area encompasses several agglomerated towns, water supply, and hydropower reservoirs and is characterized by a chain of mountains and floodplains. Due to basin rainfall, and the expansion of urbanized areas, the catchment is frequently affected by flooding. Study focus: This study evaluates dynamic Bayesian Model Averaging (BMA) approach to improve rainfall estimation over the catchment by blending four high-resolution satellite rainfall estimate (SRE) products. Using daily data (2003–2019) observed at thirteen stations as a reference, seven statistical metrics served to assess the point and spatial scale accuracy of the rainfall estimates. New hydrological insights: Main findings from this study are: (i) the blended product outperformed the individual SRE products by notably improving correlation with in-situ observed rainfall, and reducing the error of the estimated rainfall, (ii) the blended and individual SRE products performed better in the highlands than the lowlands of the catchment, and (iii) the amount of daily rainfall during the main-rainy season was mostly overestimated by the individual SRE products but was fairly estimated by the blended product. This study showed the nonexistence of surpassing individual SRE products and emphasized the blending of several products for gaining optimal results from each product.

Keywords: Akaki catchment Awash River Basin Bayesian model averagingBlendingEvaluation of precipitation Satellite rainfall estimates Urban catchment

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e17616

45 (2023)

Groundwater potential assessment in the Blue Nile River catchment, Ethiopia, using geospatial and multi-criteria decision-making techniques

Yohanis Tamesgen [1], Abunu Atlabachew [2], Muralitharan Jothimani [1]

[1]Department of Geology, College of Natural and Computational Sciences, Arba Minch University
[2]Faculty of Water Resources and Irrigation Engineering, Water Technology Institute, Arba Minch University

Abstract

Groundwater supplies have been exploited because of global water shortage. Therefore, effective management of water resources is crucial. Identifying potential groundwater regions in arid and mountainous terrains is challenging for many developing nations because of a lack of financial and human resources. An integrated strategy using remote sensing, geographic information systems, and multi-criteria decision analysis of the hierarchical analytical process was used to identify potential zones for groundwater in the Gulufa Watershed, Blue Nile River Basin, Ethiopia, which covers 1700 km^2. Nine groundwater-influencing thematic layers were produced from conventional and satellite data, including lineament density, lithology, slope, geomorphology, soil, land use/land cover, drainage density, rainfall, and elevation. Satty scale values for the thematic layers and their classes were determined based on experts' opinions and literature. Thematic maps were integrated based on their weights and rates to produce a potential zone map using ArcGIS weighted overlay spatial function tool. According to the results, the prospect zone map consists of 383 km^2 of very high, 865 km^2 of high, 350 km^2 of moderate, 58 km^2 of low, and 0.3 km^2 of poor zones. Validation of the potential zone map using existing boreholes yielded a close agreement, demonstrating the method's accuracy. According to the map removal sensitivity analysis results, the potential zone was more sensitive to lithology than other thematic layers. The map created in the research region can be an essential reference for identifying potential locations for additional groundwater resource exploration, planning, and management.

Keywords: AHP; Blue Nile Basin; Ethiopia; Geospatial; Groundwater potential; Sensitivity analysis.

Journal of Food Composition and Analysis

DOI: https://doi.org/10.1016/j.jfca.2023.105218

118(2023)

Occurrence and accumulation of metals in lupine seeds in Ethiopia

Gedefaw Woreta [1], Atnafu Guadie [1], Mengistu Mulu [1], Tamene Beshaw[2], Tsegu Lijalem [1], **Dessie Ezez [3]**, Addis Kokeb [1], Mulugeta Leggesse [1], Molla Tefera [1]

[3]Department of chemistry, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Metals are persistent in the environment and can cause bioaccumulation in the food chain, and contamination of agricultural soils is a growing concern due to food safety concerns and potential health risks. Plants accumulate metals from multiple sources, but soil plays a major role. This study aimed to determine the levels of metals including Mn, Fe, Co, Ni, Cu, Zn, Cr, Cd, and Pb in lupine and agricultural soil in four districts from South Gondar Zone with flame atomic absorption spectroscopy (FAAS). The levels of Mn (292–309 mg/kg), Co (44.5–48 mg/kg), Fe (148–155 mg/kg), and Zn (92.5–98.8 mg/kg) in lupine were below the World Health Organization (WHO) maximum allowable limits, but the concentrations of Ni (68.5–73.4 mg/kg), Cu (85.4–92.2 mg/kg), Cr (36.6–39.9 mg/kg), Cd (9.23–10.5 mg/kg), and Pb (12.2–12.7 mg/kg) exceeded the recommended WHO allowable limits in legumes and thus, need attention from concerned bodies. Besides, the concentrations of Co, Ni, Cu, and Cd in soil samples were above the maximum permissible limits set by WHO. Bioaccumulation Factor (BAF) of lupine at both study sites were less than one for all metals and the metal accumulation index (MAI) values of Fe and Mn were relatively higher than other metals. Therefore, the relatively low BAF values (<1) indicated that lupine has less capability of accumulating these metals from the soil.

Natural Hazards

DOI: https://doi.org/10.1007/s11069-023-05849-7

117(2023)

Agricultural drought analysis and its association among land surface temperature, soil moisture and precipitation in Gamo Zone, Southern Ethiopia: a remote sensing approach

Amba Shalishe[1], Anirudh Bhowmick[1], Kumneger Elias[1]

[1]Faculty of Meteorology and Hydrology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Drought is a multifaceted natural hazard that has an impact on various aspects like; agricultural, hydrological, ecological and socio-economic systems. Drought has been a predominant concern for farmers in Gamo Zone over the last decades; hence, monitoring drought is important for soil conservation, water planning and management to mitigate impacts on agriculture in the Zone. The vegetation indices normal difference vegetation index and vegetation condition index are popular since they are based only on satellite images. The present study attempts to monitoring spatiotemporal distribution of agricultural droughts and its association with land surface temperature, precipitation and soil moisture from the period 2000–2020 using remote sensing application method in Gamo Zone. The vegetation condition index (VCI) and Normal difference vegetation index (NDVI) were used to evaluate spatial and temporal distribution of agricultural drought in Gamo Zone. The Pearson correlation method was used to identify Normal difference vegetation index association with land surface temperature, soil moisture and precipitation. The results discovered that severe drought to very severe drought was identified in 2000, 2002, 2004, 2008, 2009 and 2015 with the area coverage 39.7%, 28.8%, 33.4%, 24.5%, 61.3% and 23.0%, respectively. Similarly, the findings show that slight to mild droughts have a great chance of occurrence in Gamo Zone. The data also demonstrate that normal difference vegetation index has a strong relationship with land surface temperature ($R = -0.95$), precipitation ($R = 0.65$) and soil moisture ($R = 0.85$), indicating that normal difference vegetation index is more sensitive to land surface temperature than soil moisture and precipitation, although soil moisture has a positive relationship with precipitation ($R = 0.60$). Therefore, this study revealed that normal difference vegetation index and vegetation condition index indices are suitable for agricultural drought monitoring and they are strongly associated with precipitation, soil moisture and land surface temperature. This study shall be helpful for decision makers to take the necessary measures by considering the drought risk maps for early warning system and future drought management plans.

Chemistry Select

DOI: https://doi.org/10.1002/slct.202202080

8(2023)

Solution Behavior of Bovine Skin Gelatin in the Presence of Cationic Gemini Surfactants

Ansari, Farah[1,2]Lal, Hira[1,2]; Osama, Mohammad[1,2]; Akram, Mohd.[1,2], **Kabir-ud-Din[3]**

[3]Department of Chemistry, Arba Minch University, P.O. box no. 25, Arba Minch, Ethiopia

Abstract

The biophysical interaction between gelatin and cationic biodegradable C_m−E2O−C_m gemini surfactants (C_m represents alkyl chain where m=12, 14 and 16; E2 and O denote two ester groups and ethylene oxide, respectively) was analyzed utilizing a multi-technique approach. The electronic absorption spectroscopy, far-UV CD and pyrene micropolarity data evinced the formation of a complex between the concerned geminis and the biopolymer. Interestingly, the intrinsic fluorescence spectra do not exhibit concentration dependent behavior with respect to the surfactants giving an impression of poor interaction of gelatin with the geminis. Thereafter, the bulk solution properties, viz. foaming stabilities, viscosities and emulsion stabilities were measured to analyze the effect of binding. All the results combined together led to the inference of significant interaction between gelatin and the gemini surfactants which influence their physicochemical properties.

Keywords: Bovine skin gelatin; C_m−E2O−C_m gemini surfactants; Emulsion; Fluorescence spectroscopy; UV/Vis spectroscopy

Cogent Business and Management

DOI: https://doi.org/10.1080/23311975.2023.2257829

10(2023)

The impact of macroprudential policy and political institutions on bank credit risk in Ethiopia: A dynamic ordinary least squares analysis

Mohammed Adem

Department of Accounting and Finance, College of Business and Economics, Arba Minch University, Arba Minch, Ethiopia

Abstract

Credit risk in financial institutions has been widely debated among experts and legislators as a substantial risk to the financial industry's health. In addition to examining bank-specific and macroeconomic reasons, the study examines the impacts of political institutions and macroprudential regulations on credit risk in Ethiopia. Using panel data from 2011–2019 and employing dynamic ordinary least squares, the findings imply that political institutions have significant positive links to credit risk. It also found that macroprudential policy helps to control bank risk and reduce exposure in the banking industry. The results indicate that banks with larger sizes and profitability have less credit risk. The findings support the'skimping' and "dark side of diversification" hypotheses; retaining a higher loan-to-asset ratio, cost-effectiveness, and diversity of the banking commercial model reduces credit quality by promoting credit risk. A higher inflation rate reduces credit risk by increasing borrowers' potential to service their debts when lending rates are fixed. GDP and the exchange rate have little influence on credit risk. The outcomes of this study provide significant implications for authorities and bankers in developing countries such as Ethiopia in the understanding of credit risk-determining elements to implement prudential rules and remedial management policies.

Keywords: Credit risk; Political institution; Macroprudential policy; Ethiopia; Dynamic ordinary least square

Clinical Ophthalmology

DOI: https://doi.org/10.2147/opth.s431436

17(2023)

Prevalence of Post-Operative Trichiasis in Southern Ethiopia, 2021: A Community Based Cross Sectional Study

Chuchu Churko [1], Alemayehu Bekele Kassahun [1], Tamiru Getachew [2], Belachew Bokicho [3], Haileyesus Deboch Terefe [3], **Selamawit Dagne [4], Tsegaye Yohanes [1]**

[1]Collaborative Research and Training Center for Neglected Tropical Diseases, College of Medicine and Health Sciences, Arba Minch University, Arba Minch Town, Southern Nation Nationality Region, Ethiopia.
[2]Department of Medical Anatomy, Arba Minch University, Arba Minch Town, , Ethiopia.
[4]Orbis International Ethiopia, Arba Minch Branch Office, Arba Minch Town, Ethiopia.

Abstract

Background: Post-operative trichiasis (PTT) is a major challenge following corrective eyelid surgery for trachomatous trichiasis. There is a scarcity of research on post-operative trichiasis in Southern Ethiopia, particularly in the study area. This study aimed to assess the prevalence of post-operative trichiasis in patients who underwent corrective surgery.

Objective: To assess the prevalence of post-operative trichiasis in the Gamo Zone in Southern Ethiopia in 2021.

Methods: A descriptive community-based cross-sectional study was conducted in the Dita district, Southern Ethiopia. The data were collected between 2014 and 2020. Three Qualified trachoma trichiasis (TT) graders working on a trachoma impact survey were recruited for this study. Eye examinations were performed by graders on all study subjects using a loupe to identify post-operative trichiasis. All patients underwent upper eyelid surgery only. A systematic sampling technique was used to select 459 participants from the TT Surgery Logbook.

Results: Of the 459 study participants, more than three quarter 353 (76.9%) were female. The mean age of the study subjects was 48.38 years with a standard deviation of +-10.4. A total of 10 upper eyelids (7 bilateral and 3 left upper eyelids) underwent PTT. The prevalence of post-operative trichiasis in the study area was 2.2% (95% CI: 0.9-3.5%. Fourteen (4.7%) unoperated upper eyelids developed trichiasis infection. A few patients had left and right lower eyelid trichiasis (6/459 [1.3%] and 3/459 [0.7%], respectively).

Conclusion and recommendation: The prevalence of post-operative trichiasis in the study area was similar to that recommended by the World Health Organization (WHO) recommendation range. Trachoma trichiasis was observed on the lower and upper unoperated eyelids of the study participants. Therefore, sustainable interventions should be considered in the study area for all the components of the SAFE strategy, particularly on S component.

Keywords: Dita district; post-operative trichiasis; trachoma.

HIV/AIDS - Research and Palliative Care

DOI: https://doi.org/10.2147/hiv.s412586

15(2023)

Association Between Overweight/Obesity and ART Drug Regimen Among Adult HIV Patients in Gamo Zone Public Health Facilities Southern Ethiopia

Nigus Kabtu Belete [1], Darik Temesgen Assefa [1], Tesfaye Feleke Gadore [1], Manaye Yihune Teshale [1], Eshetu Zerihun Tariku [1]

[1]School of Public Health, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Introduction: Overweight/obesity is an emerging public health problem in low-income countries. Currently sub-Saharan African countries are facing a double burden of malnutrition. Evidence has shown that overweight/obesity is becoming a problem for people living with HIV. But little is known in our setting. Thus, this study is designed to assess the association between overweight/obesity and ART drug regimen among adult HIV patients in Gamo zone public health facilities southern Ethiopia.

Objective: To assess the association between overweight/obesity and ART drug regimen among adult HIV patients in Gamo zone public health facilities southern Ethiopia.

Methods: Institution-based cross-sectional study was conducted from April 10 to May 10, 2022, among systematically selected adult HIV patients. The data were collected by using a structured interviewer-administered questionnaire, patient record review, and physical measurements. Multivariate logistic regression model was used to assess the association between dependent and independent variables. A p-value <0.05 with its 95% CI was considered as a statistically significant and interpreted accordingly.

Results: The magnitude of overweight/obesity were 13.5% (95% CI:(10.4-17.2)). Being male (2.484(1.308, 4.716)), duration on ART (took for ≥5 years) ((2.249(1.218, 4.152)), and ART drug regime (3.789(1.965, 7.304)) were significantly associated with overweight/obesity.

Conclusion: Overweight/obesity is significantly associated to ART drug regimen type among adult HIV patients. Furthermore, sex and duration on ART drug were found significantly associated with overweight/obesity of adult HIV patients.

Keywords: Ethiopia; Gamo zone; HIV; anti-retroviral therapy; drug; obesity; overweight.

Journal of Multidisciplinary Healthcare

DOI: https://doi.org/10.2147/jmdh.s421208

16(2023)

Intimate Partner Violence During Pregnancy and Maternal Morbidity in South Ethiopia: A Cohort Study

Mesfin Mamo Utaile [1 2], Ahmed Ali Ahmed [2], Alemayehu Worku Yalew [2]

[1]Department of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Purpose: Intimate partner violence during pregnancy is a universal public health problem. However, its link with maternal morbidity is not well understood in Ethiopia. Thus, the study assessed its effect on maternal morbidity during delivery and postpartum in South Ethiopia.

Methods: A prospective cohort study was conducted among 1535 pregnant women. Pregnant women with intimate partner violence during pregnancy were enrolled as the "exposed group", and pregnant women without intimate partner violence were registered as the "unexposed group". A total of 711 exposed and 774 unexposed women were included in the analysis of this study. Data were collected using an interviewer-administered questionnaire. Data entry and analysis were done in STATA Version 14. A generalized linear model with a log link function using the binreg command was applied to examine the effect of intimate partner violence on maternal morbidity.

Results: The level of maternal morbidity during delivery and postpartum was higher among women with intimate partner violence than women without intimate partner violence (34.0% vs 26.6%). After adjusting for confounders, women with intimate partner violence during pregnancy were more likely to experience maternal morbidity than women without intimate partner violence (aRR=4.45; 95% CI: 3.15, 6.28). Psychological violence was also identified as a risk factor for maternal morbidity (aRR=2.17; 95% CI: 1.76, 2.67). Likewise, women with physical violence were more likely to experience maternal morbidity than those without physical violence (aRR=1.31; 95% CI: 1.12, 1.53).

Conclusion: The current study demonstrated a higher level of maternal morbidity among women with intimate partner violence. Psychological violence, physical violence, and intimate partner violence during pregnancy were found to increase the risk of maternal morbidity. Strengthening the prevention and prompt management of intimate partner violence during pregnancy may significantly reduce the incidence of maternal morbidity.

Keywords: Ethiopia; cohort; intimate partner; morbidity; violence.

International Journal of River Basin Management

DOI: https://doi.org/10.1080/15715124.2023.2248488

(2023)

Assessment of river response to water abstractions in the Weyib Watershed, Ethiopia

Mesfin Reta Aredo[1], Tarun Kumar Lohani[1], Abdella Kemal Mohammed[1]

[1]Faculty of Hydraulic and Water Resources Engineering, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

This study aimed to examine the impact of water abstractions on runoff and streamflow using the MIKE 11 NAM model. A field survey of water abstraction was conducted to ascertain the actual withdrawal from the Weyib watershed. The baseline period from 1986–2000 was considered based on low human interventions of water abstractions to simulate existing from 2013 to 2022, short-term from 2026 to 2035, and 2036 to 2045 for long-term developments. The annual water withdrawals for those development periods were 10.22, 31.25, and 77.42 Mm^3, respectively. The mean annual streamflow in the baseline period was 15.16 m^3/s, whereas for existing, short-term, and long-term developments depicted as 10.81, 9.55, and 8.42 m^3/s, respectively. The mean annual runoff for the natural baseline was 132.53 mm, and it dropped down by 37.64, 48.70 and 58.54 mm for existing, short-term and long-term developments, respectively. In comparison to the baseline period (7177.93 Mm^3), the cumulative volume streamflow of the river was decreased by 2038.01, 2637.12, and 3169.84 Mm^3 owing to the development periods, respectively. The streamflow and surface runoff dropped significantly due to increasing water abstraction. The beneficiaries required to follow efficient irrigation water application and extraction practices for sustainable water resources development. To cope up with the challenges of water abstraction, the long-term development plan needs to be revised, and Ethiopia's proposed irrigation water charges policy need to be implemented.

Keywords: Existing development; Irrigation; development; MIKE; Short-term; Stream flow ;Water abstraction

Applied and Environmental Soil Science

DOI: https://doi.org/10.1155/2023/3946508

2023(2023)

Assessment and Characterization of Agricultural Salt-Affected Soils around Abaya and Chamo Lakes, South Ethiopia Rift Valley

Azmera Walche[1], Wassie Haile[2], Alemayehu Kiflu[2], **Dereje Tsegaye**[1]

[1]College of Agricultural Sciences, Arba Minch University, P.O. Box: 21, Arba Minch, Ethiopia

Abstract

Soil salinity/sodicity is becoming a challenge for crop production in Ethiopia's semi-arid and arid regions. However, more information on soil salinity/sodicity needs to be available around Abaya and Chamo Lakes, South Ethiopia Rift Valley. This study aimed to assess and characterize soil salinity/sodicity and determine salt-affected soils' morphological, physical, and chemical properties. The representative soil pits that were $60 * 60 * 60$ cm in size were examined, and samples were taken from 0–20, 20–40, and 40–60 cm depths based on the criteria set for agricultural salt-affected soil studies. The soil properties determined include soil color, structure, consistency, bulk density, particle density, porosity, texture, pH, EC, SAR, ESP, CEC, BS, OC, TN, available P, $CaCO_3^-$, exchangeable bases, and soluble ions (Na^+, Ca^{2+}, Mg^{2+}, K^+, Cl^-, SO_4^{-2}, NO_3^-, CO_3^{-2}, and HCO_3^-. The soil-analyzed results were rated and interpreted following a guide to standardized analysis methods for soil data. The results of this study reveal that the soils had considerable heterogeneity in soil morphological, physical, and chemical properties. The soils of the study site were highly alkaline and had very high sodium content, very high CEC value, and low levels of organic carbon and exchangeable calcium. The dominant soluble cation was sodium, followed by magnesium, calcium, and potassium in all soil depths of the pits. Similarly, Cl^- was dominant among the anions throughout the soil depth, followed by HCO_3^-, SO_4^{2-}, and NO_3^-. The findings of this study imply that removing sodium and salts from the soil depth may improve the salt-affected soils' productivity in the study area. Application of organic amendments, including manures and crop residues, may also be beneficial in increasing fertility and organic matter content.

Journal of Pregnancy

DOI: https://doi.org/10.1155/2023/3338929

2023(2023)

Parental Satisfaction towards Care Given at Neonatal Intensive Care Unit and Associated Factors in Comprehensive and Referral Hospitals of Southern Ethiopia

Eden Sileshi [1], **Bedria Mohammed [2]**, Derese Eshetu [3], **Aster Dure [4], Agegnehu Bante [4], Abera Mersha [4]**, Teketel Ermias Geltore [1]

[2]Department of Midwifery, Arbaminch College of Health Science, Arba Minch, Ethiopia.
[4]School of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Patient satisfaction is an important aspect of the quality of care in the inpatient setting. In neonatal intensive care units, parents' satisfaction and their experiences are fundamental to assessing clinical practice and improving the quality of care delivered to infants. Hence then, it reduces infant mortality rates globally. In Ethiopia, few studies address the level of parental satisfaction towards care given at neonatal intensive care unit and no single study was done in the study area. Therefore, this study is aimed at assessing parental satisfaction towards care given at neonatal intensive care unit and associated factors in comprehensive and referral hospitals of southern Ethiopia.

Methods: An institutional-based cross-sectional study was conducted among 401 parents who visited neonatal intensive care from March 28 to April 28, 2022. The data were assorted via a structured interviewer-administered questionnaire using ODK collect version and exported to SPSS window version 25 for further cleaning and analysis. Bivariate and multivariate logistic regressions were used to identify factors associated with parental satisfaction with care given at the neonatal intensive care unit. The adjusted odds ratio with 95% CI was used to show the strength of the association, and a *P* value < 0.05 was used to declare the cutoff point to determine the level of significance.

Results: In this study, 63% (95% CI: 58%, 68%) of the parents were satisfied with the care given at the neonatal intensive care unit. Factors associated with parental satisfaction towards care given at neonatal intensive care unit were parents with no formal education (AOR: 0.15; 95% CI: 0.07-0.31), availability of necessary information using direction indicator (AOR: 3.14; 95% CI: 1.85-5.31), and availability of enough chairs in waiting area (AOR: 3.26; 95% CI: 1.81-5.87).

Conclusion: Nearly two-thirds of the parents were satisfied with the care given at the neonatal intensive care unit. The availability of enough chairs in the waiting area and the creation of direction indicators are key issues to improve parental satisfaction towards their neonatal care.

Current Research in Parasitology and Vector-Borne Diseases

DOI: https://doi.org/10.1016/j.crpvbd.2023.100137

4(2023)

Infectivity of symptomatic *Plasmodium vivax* cases to different generations of wild-caught and laboratory-adapted *Anopheles arabiensis* using a membrane feeding assay, Ethiopia

Tenaye Ayele [1 2], Biniam Wondale [1], Girum Tamiru [1], Nigatu Eligo [1], Bernt Lindtjørn [1 3], Fekadu Massebo [1]

[1]Department of Biology, Arba Minch University, Arba Minch, Ethiopia.

Abstract

When measuring human to mosquito transmission of *Plasmodium* spp., laboratory-adapted (colony) mosquitoes can be utilized. To connect transmission studies to the local epidemiology, it can be important to comprehend the relationship between infectivity in laboratory-adapted (colony) and wild-caught (wild) mosquitoes of the same species. Microscopically confirmed *Plasmodium vivax* cases were recruited from health facilities in Arba Minch town, and a nested polymerase chain reaction (nPCR) was used for subsequent confirmation. We performed paired membrane-feeding assays using colony *An. arabiensis* and three generations of wild origin *An. arabiensis*. *Anopheles arabiensis* aged 3-6 days were fed after being starved for 8-14 h. Microscopically, the oocyst development was evaluated at day 7 after feeding. Circumsporozoite proteins (CSPs) assay was carried out by enzyme-linked immunosorbent assay (ELISA). In 19 paired feeding experiments, the feeding efficiency was more than doubled in colony (median: 62.5%; interquartile range, IQR: 35-78%) than in wild mosquitoes (median: 28.5%; IQR: 17.5-40%; $P < 0.001$). Among the 19 *P. vivax* gametocyte-positive blood samples, 63.2% ($n = 12$) were infective to wild *An. arabiensis* and 73.7% ($n = 14$) were infective to colony *An. arabiensis*. The median infection rate was twice as high (26%) in the colony than in the wild (13%) *An. arabiensis*, although the difference was marginally insignificant ($P = 0.06$). Although the observed difference was not statistically significant ($P = 0.19$), the median number of oocysts per midgut was more than twice as high (17.8/midgut) in colony than in wild (7.2/midgut) *An. arabiensis*. The median feeding efficiency was 26.5% (IQR: 18-37%) in F1, 29.3% (IQR: 28-40%) in F2 and 31.2% (IQR: 30-37%) in F3 generations of wild *An. arabiensis*. Also, no significant difference was observed in oocyst infection rate and load between generations of wild *An. arabiensis*. CSP rate of *P. vivax* was 3.1% (3/97; 95% CI: 0.6-8.8%) in wild and 3.6% (3/84; 95% CI: 0.7-10.1%) in colony *An. arabiensis*. The results of the present study revealed that oocyst infection and load/midgut, and CSP rate were roughly comparable, indicating that colony mosquitoes can be employed for infectivity studies, while larger sample sizes may be necessary in future studies.

Keywords: Anopheles arabiensis; Ethiopia; Membrane feeding assays; Plasmodoum vivax.

Development Studies Research

DOI: https://doi.org/10.1080/21665095.2023.2220580

10(2023)

The effect of foreign direct investment on capital accumulation in developing countries

Ezo Emako[1], Seid Nuru[1], Mesfin Menza[1]

[1]Economics Department, Arba Minch University, Arba Minch, Ethiopia

Abstract

The purpose of this study is to examine whether foreign direct investments are a blessing or a curse for capital accumulation in developing countries. Data were collected for 16 developing countries over the period 2005–2018. An Arellano-Bover/Blundell-Bond dynamic panel estimation method was adopted to analyze the physical capital accumulation effect of foreign direct investments. Our analysis indicates that for every percentage increase in foreign direct investment inflows to developing countries, physical capital increases by 2.31 percent. In addition, a random-effect panel estimation was implemented to analyze the effect of foreign direct investments on human capital. For a one-percent increase in foreign direct investments, human capital increases by 2.38 percent. The results of our regressions show that not only the volume but also the type of foreign direct investment matters for capital formation in developing countries. Specifically, foreign direct investments in the secondary sector have a statistically significant positive effect on both physical and human capital. By contrast, foreign direct investments in the primary and tertiary sectors have a negligible effect. Our analysis suggests that developing countries would benefit from investing more resources in education and opening up their economies to attract foreign direct investments, particularly in the manufacturing sector.

Keywords: Foreign direct investment ;physical capital; human capital; developing countries

Nursing Research and Practice

DOI: https://doi.org/10.1155/2023/9656636

2023(2023)

Clinical Competence of Nurses and the Associated Factors in Public Hospitals of Gamo Zone, Southern Ethiopia: A Cross-Sectional Study

Shitaye Shibiru [1], Zeleke Aschalew [1], Mekidim Kassa [2], Agegnehu Bante [1], Abera Mersha [1]

[1]School of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Introduction: Nursing competency is an essential component for improving the quality of care in the healthcare system. However, assessing competency solely on the dimensions of skills and knowledge does not provide complete picture of a nurse ability to provide quality patient care. This is because it lacks focus on the nurse's attitudes and values, which are also important determinants of clinical competence. Therefore, this study aimed to assess the comprehensive clinical competence of nurses and its associated factors in public hospitals of Gamo Zone, Southern Ethiopia.

Materials and methods: A cross-sectional study was conducted using a census method to collect information from nurses through self-administered questionnaires. The data were entered into EpiData version 3.1 and exported to Stata version 15 for analysis. A linear regression model was used to identify factors associated with clinical competence.

Results: In this study, the average clinical competence of nurses was 177.32, with a standard deviation of 19.19, and 31.2% of the respondents had a high level of clinical competence. Associated factors identified with clinical competence include gender, age, marital status, qualification, position, work experience, unit, interest in their profession, critical thinking disposition, clinical self-efficacy, and emotional intelligence.

Conclusions: The overall level of clinical competence among nurses in this study was moderate. As such, nurses improve their clinical competence by receiving training and development opportunities that focus on critical thinking, clinical self-efficacy, and emotional intelligence; working in a supportive work environment that encourages them to take risks and learn from their mistakes; and being monitored and coached on a regular basis.

Cogent Food and Agriculture

DOI: https://doi.org/10.1080/23311932.2023.2270276

9(2023)

Estimation of feed dry matter supply in relation to land use and livestock requirements in southwestern Ethiopia

Asrat Guja Amejo

Department of Animal Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

The study is being done to assess the availability of feed dry matter (DM) from private holdings and communal lands in relation to livestock demand and to provide management solutions in a smallholder system in Gamo Gofa and Dawuro zones of south western Ethiopia. Data for the study were compiled by combining crop and livestock production information at the household level. The extents of community land cover and land utilisation were calculated using spatial contours in geographic information system (GIS) and field survey results. Monthly feed DM availability by land cover area (ha) was computed using data from the livelihoods early assessment and protection (LEAP) software derived from eight years of normalised differential vegetation index values. According to the study, private land generated 33% of the feed while common land produced 67%. Around 1,300 tonnes of DM were generated as livestock feed per year, with 47% coming from private property and the remaining 53% from communal land. When compared to the existing livestock population, the required amount of DM is only 62% of total supply, yielding a 38% surplus. However, feed shortages are prevalent in the region due to supply inconsistencies. Livestock requirements can be met by employing appropriate management strategies that preserve feed availability from varied land use types and land cover in times of scarcity. Planning and preserving feeds, training communities in the operation and use of available resources, and developing infrastructure for in-situ feed conservation throughout dry season will help smallholder livelihoods and the national economy.

Keywords: East Africa**;**feed resource management implication**;**feedstuffs**;**land use for livestock;mixed smallholder systems

Cogent Food and Agriculture

DOI: https://doi.org/10.1080/23311932.2023.2219114

9(2023)

Development and characterization of bread from wheat, banana (*Musa* spp), and orange-fleshed sweet potato (*Ipomoea batatas* L.) composite flour

Masresha Gebeyehu Ewunetu[1],Ararsa Tessema[1],Meaza Kitaw[1]

[1]Department of Food Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Malnutrition is a major challenge in Ethiopia. On the other hand, there is high production of banana and orange-fleshed sweet potatoes in the northern part of Ethiopia. However, it is exposed to postharvest loss without value addition to them. This study aimed to characterize bread developed from wheat, banana, and orange-fleshed sweet potato composite flour. The bread was developed with different proportions of wheat, banana, and orange-fleshed sweet potato flour in the ratio of 100:0:0, 90:5:5, 80:10:10, 70:15:15, and 60:20:20, respectively. The value of moisture%, ash%, crude fiber%, crude fat%, and β-carotene µg/100 g was in the range of 7.92–11.23, 1.76–3.66, 1.99–6.43, 1.13–3.20, and 0.13–73.51, respectively, whereas the content of crude protein and carbohydrate and caloric values were in the range of 8.08–11.02%, 67.36–76.27%, and 330.56–359.33 kcal/100 g, respectively. According to the sensory scores, bread composite flour containing (60:20:20) wheat, banana, and orange-fleshed sweet potato was preferred. Based on the result of this finding, it is better to produce bread from wheat, banana, and orange-fleshed sweet potato composite flour than usual wheat flour bread. The results showed that the incorporation of banana and orange-fleshed sweet potato powder can improve the ash and β-carotene content of bread.

Keywords: Banana:β-Carotene: Bread: Malnutrition: Orange-fleshed sweet potato

Education Research International

DOI: https://doi.org/10.1155/2023/9932873

2023(2023)

Language Teacher's Experience and Preference toward Online Learning Platforms during the COVID-19 Pandemic

Hailay Tesfay Gebremariam

Department of Ethiopian Languages and Literature-Amharic, College of Social Science and Humanities, Arba Minch University, Arba Minch, Ethiopia

Abstract

The COVID-19 pandemic compelled the educational sector to act quickly, resulting in the adoption of replacement online learning platforms (OLPs) to keep the educational system running throughout the crisis. This study explored how language teachers in Ethiopia are prepared in terms of their experience and preference toward OLPs. To achieve this goal, data were collected from 203 participants (aged 22–46, including 81 males and 122 females) using a self-perceived questionnaire. The data was then analyzed using descriptive statistics, including means and standard deviations, and inferential statistics, including ANOVA tests, to determine the teachers' experiences and preferences toward OLPs. The mean score of the teachers' experience findings revealed a score of 3.406 out of a five-point Likert scale, and the preference subdimensions mean scores ranged from 3.164 to 3.476. The ANOVA findings revealed that, in the mean scores of language teachers' experience toward OLPs ($p > 0.05$) and preferences toward OLPs, there were statistically significant differences for video streaming platforms ($p > 0.05$), digital reading materials platforms ($p > 0.05$), and mixed OLPs ($p > 0.05$). Regarding the statistically significant correlation between language teachers' experiences and preferences (LTEP) toward OLPs (except between video streaming platforms and digital reading materials platforms ($r = -0.011$, $p = 0.878$)), there was a statistically significant impact. Post hoc results showed, however, that there was no statistically significant correlation between language teachers' preference dimensions. To summarize, Ethiopian language teachers preferred video streaming platforms and mixed OLPs over digital reading materials platforms. Moreover, further research into the LTEP toward OLPs in various ecological aspects is required.

Clinical Ophthalmology

DOI: https://doi.org/10.2147/opth.s408610

17(2023)

The Magnitude of Refractive Error and Its Associated Factors Among Patients Visiting Ophthalmology Clinics in Southern Ethiopia, 2022

Seid Worku [1], Tamiru Getachew [1], Khaleel Nagarchi [1], Misgun Shewangizaw [2]

[1]Department of Anatomy, Arba Minch University, Arba Minch, Ethiopia.
[2]School of Public Health, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Introduction: Refractive error is a vision-impairing condition due to light rays not being able to focus on the retina, resulting in the visual outcome of a cloudy image. It is one of the main causes of central vision impairment globally and in Africa, including Ethiopia. This study was conducted to assess the magnitude of refractive error and its associated factors among patients attending ophthalmic clinics.

Methods: An institutional-based cross-sectional study design was utilized. A systematic random sampling technique was applied to select 356 participants. The data were gathered using an interview-structured questionnaire and check list. Then, the data were entered into Epi-data version 4.6 and transferred to SPSS version 25 for further clean up and analysis. Descriptive and analytical statistics were conducted. A binary logistic regression analysis was done, and variables with a p-value of less than 0.25 in univariate analysis were taken for bivariate analysis. Statistically significant was declared at a p-value of less than 0.05 with an adjusted odds ratio and 95% confidence interval.

Results: Among 356 participants, 96 (27.5%), with 95% CI (22.8, 32.1) had a refractive error, of which nearsighted is the most common type (15.8%). Regular use of electronic devices, near working distance (<33cm), less or lack of outdoor activities, history of diabetes mellitus and family history of refractive error were factors significantly associated with refractive error.

Conclusion and recommendations: The magnitude of refractive error was 27.5%, which is relatively elevated than the previous studies. Clients need to get screened regularly so that refractive defects can be detected and corrected early. Eye care professionals shall make a big concern for patients with a history of diabetes and other medical illnesses since they are related to ocular refractive defects.

Keywords: Southern Ethiopia; magnitude; refractive errors; risk factors.

Frontiers in Public Health

DOI: https://doi.org/10.3389/fpubh.2023.1181591

11(2023)

Prevalence of low back pain and its associated factors among traditional cloth weavers in Gulele sub-city, Addis Ababa, Ethiopia

Amare Terfe [1], Temima Jemal [2], Tolossa Waqkene [3]

[1]Department of Environmental Health Science, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

The prevalence of work-related musculoskeletal disorders particularly low back pain is significantly high among common informal or small-scale enterprises within developing countries like weaving. However, there is little information on risk factors for low back pain in the informal sector such as the weaving sector in the areas of Addis Ababa as well as in Ethiopia. Therefore, this study was aimed to assess the magnitude of low back pain and its associated factors among traditional cloth weavers in the Gulele sub-city, Addis Ababa, Ethiopia. A cross-sectional study with internal comparison was conducted from June 1, 2022, and August 30, 2022. A total of 660 traditional cloth weavers were included in the study by using a systematic random sampling method to select participants in each of cooperatives as well as individual households in 5 woredas in Gulele sub-city. The data was analyzed and managed using SPSS version 20. A multivariate logistic regression analysis was used to control potential confounding factors and to determine the association. Among 660 (100%) respondents, 330 (50%) of them experienced low back pain after starting weaving. Out of the respondents with low back pain through their job career, 291 (44.1%) of them experienced low back pain during the last 12 months. Working greater than 8 h per day (AOR = 4.60, 95%CI: 2.35, 8.87), working with frequent bending (AOR = 3.32, 95%CI: 1.49, 7.40), job stress (AOR = 1.68, 95%CI: 1.18, 2.40) were among factors significantly associated with the occurrence of low back pain. This study has shown a high prevalence of low back pain among traditional cloth weavers which indicates the need for immediate public health action. However, very small improvements in the working condition, weaving tools design, working methods can potentially lead to large benefits.

Keywords: factors; low back pain; musculoskeletal—disorders; prevalence; weavers.

International Journal of Forestry Research

DOI: https://doi.org/10.1155/2023/8859316

2023(2023)

Species-Site Suitability Assessment of Bamboo and Its Detailed Study in Different Agroecological Zones of Kenya

Tarun Kumar Lohani[1], Gordon Sigu[2], Nellie Oduor[3], Selim Reza[3], Jayaraman Durai[4]

[1]Faculty of Hydraulic & Water Resources Engineering Arba Minch University y, P.O. Box 21, Arba Minch, Ethiopia

Abstract

The site suitability assessment of Bamboo in Kenya was studied for diverse agroecological zones (AEZs) comprising one indigenous and fifteen exotic bamboo species in nine different AEZs of Kenya. Three bamboo clumps from each species that were at least five years old were assessed to accurately capture data on growth performance and yield. Soil samples collected at 0-30 cm depth from different areas varied considerably. The proportion of soil varied across the bamboo planting sites ($F_{(1,11)} = 24.94$; $p < 0.001$), soil pH in the planting sites varied significantly ($F_{(1,11)} = 13.92$; $p < 0.001$), and soil bulk densities had different results ($F_{(1,11)} = 13.92$; $p < 0.001$). The lowest bulk density (0.61 ± 0.01) was recorded in Kakamega (UM1), while the highest (1.63 ± 0.01) was reported in Gede. Data on characteristics of clumps and internode length and wall thickness integrated through GenStat statistical software using ANOVA entail a huge variation in growth performance for each bamboo species across planting sites. Morphological characters were also studied in detail. The mean height, diameter, and stocking density were comparatively lower even in elevated zones that were only 200 m below its natural range. This resulted in an extremely low yield, which is not viable for economic investment. The species is unsuitable for plantation establishment outside its natural range of 2300 m-3200 m above the sea level (a.s.l.). Plantation below this range will not dissipate but will not attain a healthy growth. The primary use will be restricted for ornamental and conservation purposes such as scaffolding, roof construction, and fabrication of basic household furniture.

International Journal of Pediatrics (United Kingdom)

DOI: https://doi.org/10.1155/2023/3882801

2023(2023)

Determinants of Acute Malnutrition among Under-Five Children in Governmental Health Facilities in Sodo Town, Southern Ethiopia: Unmatched Case-Control Study

Zenebe Jebero [1], Fikre Moga [1], Bereket Gebremichael [2], Tewodros Tesfaye [2]

[1]College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Acute malnutrition is a major public health challenge among children globally. The burden is high in low-income countries like Ethiopia. Different reports and literatures revealed different risk factors of acute malnutrition in different geographical areas, but there were regional variations. So, the main aim of this study was to identify determinants of acute malnutrition among under-five children in governmental health facilities of Sodo town, Southern Ethiopia.

Methods: An institutional-based unmatched case-control study was conducted from February 1 to March 1, 2021. Consecutive sampling was used to select cases, and controls were selected using a systematic random sampling technique. An interviewer-administered structured questionnaire was used to collect data, and standardized anthropocentric measurement equipment was used to identify cases and controls. Data were analyzed using SPSS version 26. A logistic regression model was used to identify the determinants of acute malnutrition, and statistical significance was declared at $P < 0.05$.

Result: A total of 133 cases and 266 controls were included in the study making a response rate of 97.8%. Mothers with no formal education, birth interval less than 24 months, marital status (divorced widowed and separated), diarrhea in the past two weeks, using nonprotected water for drinking, exclusive breastfeeding less than 6 months, not taking sick children to health facility within 24 hours of the onset of any sickness, low birth weight, breastfeeding for less than 24 months, using nonimproved toilet, low dietary diversity, and food insecurity were significantly associated with acute malnutrition.

Conclusion: This study identified the major determinants of acute malnutrition among under-five children in the study area. Thus, ensuring safe water supply, empowering women, and improving knowledge and practices of mothers regarding exclusive breastfeeding and family planning are recommended.

Cogent Food and Agriculture

DOI: http://dx.doi.org/10.1080/23311932.2023.2258776

9(2023)

Effect of storage periods on quality characteristics and sugar yield of pre-harvest burnt and unburnt cane of sugarcane varieties (Saccharum spp. hybrid) at Finchaa Sugar Factory, Oromia, Ethiopia

Fantaye Ergasi[1], **A. Q Khan[2]**, Ebisa Olika Keyata[1]

[2]Department of Plant Sciences, College of Agricultural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

The study aimed to determine the effects of cane storage periods on pre-harvested burnt and unburnt green harvested canes on quality characteristics and sugar yield of sugarcane varieties at Finchaa Sugar Factory, Ethiopia. Experiments were conducted on a split–split plot design with two varieties, N 14 and N Co 334 as main plots, types of canes burnt and unburnt green harvested canes as sub-plots, and eight cane storage periods (0, 24, 48, 72, 96, 120, 144, and 168 h) as sub–subplots with three replications. All quality parameters were investigated using the standard procedure. The results showed that the loss in cane weight increased and pol %, purity % juice, estimated recoverable sugar, and sugar yield decreased significantly with increasing periods of storage. The results also indicated that losses were more in burnt harvested canes than the unburnt canes over the storage period. Brix and reducing sugar in juice increased with the storage periods and these were more in burnt canes than unburnt harvested canes. The loss in cane weight, pol, juice purity, recoverable sugar, and sugar yield was high in NCo334 variety at each storage period. The pol and purity % juice, recoverable sugar % cane, and sugar yield were more in burnt and unburnt harvested canes in both varieties at storage periods. The findings suggested that the N 14 cane variety of burnt harvested canes and green canes should be crushed within 24 and 48 h to obtain better sugar quality than N Co 334 variety.

Keywords: sugarcane; storage periods**;** green harvested cane**;** burnt cane**;** Ethiopia

Frontiers in Medicine

DOI: https://doi.org/10.3389/fmed.2023.1196063

10(2023)

Community-based treatment of cutaneous leishmaniasis using cryotherapy and miltefosine in Southwest Ethiopia: the way forward?

Saskia van Henten [1], Myrthe Pareyn [1], **Dagimawie Tadesse [2], Mekidim Kassa [3], Mehret Techane [4], Eyerusalem Kinfe [4], Nigatu Girma [5], Degnet Demeke [3], Mebratu Mesay [3]**, Mekibib Kassa [6], **Rodas Temesgen [7], Misgun Shewangizaw [3], Fekadu Massebo [5]**, Johan van Griensven [1], **Teklu Wegayehu [5], Behailu Merdekios [3].**

[2]Department of Medical Laboratory Sciences, College of Medicine and Health Sciences, Arba Minch University
[3]Department of Public Health, College of Medicine and Health Sciences, Arba Minch University
[4]Department of Dermatology, College of Medicine and Health Sciences, Arba Minch University
[5]Department of Biology, College of Natural and Computational Sciences, Arba Minch University
[7]Department of Internal Medicine, College of Medicine and Health Sciences, Arba Minch University

Abstract

Background: Cutaneous leishmaniasis (CL) is a common, yet massively underreported skin morbidity in Ethiopia. Most patients never seek treatment, as this is offered only in specialized treatment centers. Early diagnosis and treatment through decentralization is crucial to decrease transmission and to reach the NTD roadmap goals. However, little information is available on outcomes and challenges of community-based treatment initiatives.

Methods: A community-based prospective cohort study was conducted in Ochollo. Patients with clinically or microscopy confirmed CL were included. Cryotherapy was (to be) given weekly with at least four sessions for uncomplicated lesions, and miltefosine was given for 4 weeks for complicated lesions. Miltefosine adherence was assessed by counting pill strips. Clinical and patient-reported outcomes (dermatological life quality index and patient-global assessment) were assessed at month 6 (M6).

Results: A total of 107 patients were included, with a median age of 6 years. Two patients refused, and 15 could not be treated as they were too young (<4 years) for miltefosine. Giving cryotherapy to patients weekly was not feasible due to long wound healing times and required use of topical antibiotics. Only 52.4% of miltefosine patients finished >90% of their tablets by M1. Among 46 patients treated with cryotherapy, 24 (52.2%) were cured at M6, and 9 (19.6%) had substantial improvement. The cure rate was 16/39 (41.0%) for miltefosine with 28.2% (11/39) substantial improvement. Before treatment, more than half (57.8%) of patients reported that CL did not negatively impact their life, which significantly increased to 95.2% at M6. At this time, 61.7% of patients said their lesion was clear, which was 1% before treatment.

Conclusion: Our study is the first to identify the challenges and opportunities of miltefosine and cryotherapy for community treatment of CL. Although overall cure rates were lower than expected, patient-reported outcomes were generally positive and quite some patients had good improvement.

Keywords: decentralization; impavido; operational research; patient-reported outcomes; treatment outcomes.

Journal of Applied Animal Research

DOI: https://doi.org/10.1080/09712119.2023.2288613

52(2023)

Use of a novel fodder herb, *Commelina* species, in Black Head Ogaden lambs: nutrient utilization, weight gain performance, and economic viability

Kebede Gelgelo[1], Yisehak Kechero[1], Dereje Andualem[2]

[1]Department of Animal Sciences, College of Agricultural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

This study was carried out to determine the effects of supplementing *Commelina* forage species on nutrient uptake, weight gain, and economic viability in Black Head Ogaden lambs. Twenty yearling lambs were used in four treatments with five replicates in randomized complete block design. The treatments included Teff straw + 120 g dried *Moringa stenopetala* leaves (DMSL) for treatment 1 (T1), Teff straw + 120 g DMSL + 300 g *C.benghalensis* (T2), Teff straw + 120 g DMSL + 300 g *C.imberbis* (T3) and Teff straw + 120 g DMSL + 300 g concentrate (T4). A 60-day feeding trial was followed by a 10-day digestibility investigation. The study used SAS 9.0 for data analysis; the Duncan multiple range test for mean separation and partial budget analysis for financially feasibility testing. With better responses in T4 followed by T3, T2, and T1, supplementation significantly improved total DM, nutritional intakes, and apparent digestibility ($P < 0.001$). The two *Commelina* species and conventional concentrate-supplemented treatments resulted in average daily weight gains of 47.58 and 72.69 g, respectively but the former treatments produced higher marginal returns (2.02) than the later ones (0.22). With promising profit, *Commelina* species could be used as a supplement to improve the animals' nutrient uptake and growth efficiency.

Keywords: Black Head Ogaden lambs**;** *Commelina* species**;** Konso**;** nutrient utilization**;** *Moringa stenopetala*

Frontiers in Public Health

DOI: https://doi.org/10.3389/fpubh.2023.1204525

11(2023)

Zoonotic tuberculosis in a high bovine tuberculosis burden area of Ethiopia

Sosina Ayalew [1 2], Getinet Habtamu [1], Fantanesh Melese [1], Bamlak Tessema [1], Roland T Ashford [3], Shubhada K Chothe [4], Abraham Aseffa [1], James L N Wood [5], Stefan Berg [3 6], Adane Mihret [1]

[2]Department of Biology, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Tuberculosis (TB) is a major cause of ill health and one of the leading causes of death worldwide, caused by species of the *Mycobacterium tuberculosis* complex (MTBC), with *Mycobacterium tuberculosis* being the dominant pathogen in humans and *Mycobacterium bovis* in cattle. Zoonotic transmission of TB (zTB) to humans is frequent particularly where TB prevalence is high in cattle. In this study, we explored the prevalence of zTB in central Ethiopia, an area highly affected by bovine TB (bTB) in cattle.

Method: A convenient sample of 385 patients with pulmonary tuberculosis (PTB, $N = 287$) and tuberculous lymphadenitis (TBLN, $N = 98$) were included in this cross-sectional study in central Ethiopia. Sputum and fine needle aspirate (FNA) samples were obtained from patients with PTB and TBLN, respectively, and cultures were performed using BACTEC™ MGIT™ 960. All culture positive samples were subjected to quantitative PCR (qPCR) assays, targeting IS*1081*, RD9 and RD4 genomic regions for detection of MTBC, *M. tuberculosis* and *M. bovis*, respectively.

Results: Two hundred and fifty-five out of 385 sampled patients were culture positive and all were isolates identified as MTBC by being positive for the IS*1081* assay. Among them, 249 (97.6%) samples had also a positive RD9 result (intact RD9 locus) and were consequently classified as *M. tuberculosis*. The remaining six (2.4%) isolates were RD4 deficient and thereby classified as *M. bovis*. Five out of these six *M. bovis* strains originated from PTB patients whereas one was isolated from a TBLN patient. Occupational risk and the widespread consumption of raw animal products were identified as potential sources of *M. bovis* infection in humans, and the isolation of *M. bovis* from PTB patients suggests the possibility of human-to-human transmission, particularly in patients with no known contact history with animals.

Conclusion: The detected proportion of culture positive cases of 2.4% being *M. bovis* from this region was higher zTB rate than previously reported for the general population of Ethiopia. Patients with *M. bovis* infection are more likely to get less efficient TB treatment because *M. bovis* is inherently resistant to pyrazinamide. MTBC species identification should be performed where *M. bovis* is common in cattle, especially in patients who have a history of recurrence or treatment failure.

Keywords: Mycobacterium bovis; Mycobacterium tuberculosis; cattle; central Ethiopia; zoonosis.

Cogent Economics and Finance

DOI: https://doi.org/10.1080/23322039.2023.2223810

11(2023)

The role of foreign public debt on foreign exchange reserve in SSA countries: Does governance really matters?

Solomon Kebede[1], **Getachew Zerihun**[1], Kuma Berhanu[2], **Tora Abebe**[1]

[1]Department of Economics, Arba Minch University, Arba Minch, Ethiopia

Abstract

The debt and reserve are playing a pivotal role in the growth and development of national economies. To examine the role of foreign public debt (FPD) on foreign exchange reserve (FER) the study used a panel data by considering 20 Sub-Saharan Africa (SSA) countries by interacting FPD with governance index across 15 years. The dynamic and static Generalized Method of Moments (GMM) models were utilized after checking the possible assumptions. The GMM model found that FPD, governance index, labour and human capital predicted the FER positively and significantly. While foreign debt augmented with governance predicted the variation of FER negatively and significantly. Therefore, Sub-Saharan Africa's low performance of foreign debt in enhancing foreign exchange reserve partly attributed to bad governance. Finally, the government of SSA countries should improve their quality of governance to properly utilize FPD to enhance the stock of FER, among others.

Keywords: Foreign; foreign public debt**;** GMM model; Sub-Saharan Africa

Cogent Social Sciences

DOI: https://doi.org/10.1080/23311886.2023.2267742

9(2023)

Reviewing the deployment of multiple indicators at micro-level food in/security investigations in Eastern Africa: Evidence from Ethiopia

Thomas Toma Tora

College of Social Sciences and Humanities, Department of Geography and Environmental Studies, Arba Minch University, Arba Minch, Ethiopia

Abstract

Food security has remained on the common and alive agenda of scholars and actors globally. Particularly, in developing countries with a large number and rapid growth of populations, attaining food security is found to be a challenging duty. Overall, this work has aimed to provide information on the deployment of multiple food security indicators and food insecurity drivers in the investigations conducted on food in/security statuses at a micro-level in Ethiopia. A systematic literature review was conducted where a total of 132 pieces of literature were reviewed. An attempt was exerted to look into food in/security-related approaches and the commonly discoursed pillars. Apart from this, the empirical findings of academics on the issues targeted were perused wherein the inclusion of regularly conversed food security pillars was checked through respective indicators of food in/security at household or community levels regardless of the agroecological and settlement disparities. The review findings disclosed that the majority of the existing studies deployed either single or combined indicators of food in/security using households/communities as a unit of analysis where the major food security pillars were not fully addressed. This condition does not show all pillars of food security to be attained despite the objective-driven investigations of various contributors. Hence, the review findings call for the deployment of multiple food security indicators which potentially would reveal the major food security dimensions at a household and/or community level since a single non-holistic indicator is deemed not to capture the basic food security dimensions and insights regularly acknowledged.

Keywords: deployment; Ethiopia; food in/security; indicators; pillars

International Journal of Antennas and Propagation

DOI: https://doi.org/10.1155/2023/5906721

2023(2023)

Advancing 5G Connectivity: A Comprehensive Review of MIMO Antennas for 5G Applications

Poonam Tiwari ,[1] Vishant Gahlaut ,[1]Meenu Kaushik ,[2]Preeti Rani,[1] Anshuman Shastri ,[3]

Bhupender Singh[4]

[4]Department of Water Supply and Environmental Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

The review focuses on the emergence of 5G wireless communication and the need for multiple-input multiple-output antennas to support high-speed communication systems. The article discusses the advantages of MIMO antennas, including increased channel capacity and the ability to focus radio frequency energy on specific users. However, the challenges of creating compact MIMO antennas with ideal isolation are addressed, including short wavelengths, connection losses, constrained bandwidth, and path losses in the millimeter-wave range. Design techniques and methods to enhance the performance of conventional antennas for 5G applications are discussed, along with potential solutions for upcoming challenges. The article provides an overview of MIMO antennas for 5G applications, covering frequency bands, system architecture, advantages, challenges, advancements, performance enhancement techniques, design techniques, and state-of-the-art developments.

Infection and Drug Resistance

DOI: https://doi.org/10.2147/idr.s424927

16(2023)

Factors Associated with Otitis Media Among Pediatrics in Two Government Hospitals in Arba Minch, Southern Ethiopia

Ephrem Araya Henok [1], Aseer Manilal [1], Yisiak Oumer [2], **Gebre Keyta [1], Melkam Birru [1], Birhane Desta Araya [3], Addis Aklilu [1],** Reham Mosleh Alahmadi [4], Gurusamy Raman [5], Akbar Idhayadhulla [6]

[1]Department of Medical Laboratory Sciences, College of Medicine and Health Sciences, Arba Minch University
[3]School of Medicine, College of Medicine and Health Sciences, Arba Minch University.

Abstract

Background: Bacterial otitis media (OM) is a common infection among the pediatric community worldwide and is the first reason for prescribing antibiotics in pediatric practices. However, if not promptly diagnosed and appropriately treated, it may persist and cause severe intra- and extra-cranial hard-to-cure complications. Hence, knowing the magnitude, etiology, and antibiotic susceptibility profile is very important for the proper management.

Methods: A cross-sectional study was carried out in 312 pediatrics (1 to 18 years) attending the Ear Nose Throat outpatient departments of the two title hospitals from 25 February to 30th August 2022. Patients were chosen through a systematic random sampling method. Data were obtained by means of a semi-structured questionnaire. Samples were collected to identify the causative bacteria as per microbiological guidelines. The antibiotic susceptibility test was done according to the Kirby-Bauer disc diffusion; SPSS version 25 was used for the analysis.

Results: The overall prevalence of otitis media was 67.3% (n=210); CSOM showed a slight preponderance (n=107) Gram-negative bacteria and Gram-positive bacteria were present in 59.8% (n=137) and 40.1% (n=92), respectively. Otitis media was predominantly caused by *S. aureus* (n=52, 56.5%), followed by *Proteus* spp. (n=33, 24%). Gram-negative bacteria were highly resistant to co-trimoxazole, amoxicillin-clavulanic acid, piperacillin, and tetracycline, whereas their positive counterparts were considerably penicillin and co-trimoxazole resistant. Overall, 61.5 and 19.2% of the isolates were MDR and XDR, respectively. MRSA, MR-CoNs, and VRE were 38.4% (n=20), 17.1% (n=5), and 58.3% (n=12), respectively; 19.7% (n=25) of Gram-negative bacteria produced ESBL, and 7% (n=9) were carbapenem-resistant. History of exposure to loud noise [AOR=3.4; CI=1.14-10.23; P-value=0.028] and family history of smoking at home [AOR=2.9; CI=1.18-7.25; P-value=0.020] have the greatest odds of otitis media.

Conclusion: Overall, the prevalence of otitis media is showing an upward trend, and MDR among bacterial isolates is increasing alarmingly.

Keywords: bacterial etiology; drug resistance; otitis media; prevalence; southern Ethiopia.

Research in Mathematics

DOI: https://doi.org/10.1080/27684830.2023.2283261

10(2023)

Convex Subalgebras and Convex Spectral Topology on Autometrized Algebras

Gebrie Yeshiwas Tilahun[1], Radhakrishna Kishore Parimi[1], Mulugeta Habte Melesse[1],

Lishan Liu[2]

[1]Department of Mathematics, Arba Minch University, Arba Minch, Ethiopia

Abstract

In the development of the theory of automatized algebra, various types of research have been conducted. However, there are some properties like convex sub algebra, prime convex sub algebra, meet closed sets, regular convex sub algebra, and convex spectral topology on automatized algebras that have not been studied yet. In this paper, we define the notions of convex sub algebras and congruence relations on an automatized algebra. We demonstrate that the collection of all convex sub algebras of an automatized algebra forms a lattice and distributive. In particular, we will show that there exists a one-to-one correspondence between the set of all convex sub algebras and the set of all congruence's on an np-automatized algebra. Furthermore, we explore prime convex sub algebras, meet closed subsets, and regular convex sub algebras and obtain some related results. For instance, we show that in a semiregular np-automatized l-algebra, the intersection of a chain of prime convex sub algebra is a prime convex sub algebra. We also prove that any convex sub algebra in an automatized algebra is the intersection of regular convex sub algebras. Lastly, we introduce the convex spectral topology of proper prime convex sub algebras in an automatized l-algebra and discuss some fundamental facts. We also prove that a convex spectrum is compact in an np-automatized l-algebra A if and only if A is generated by some element. Specifically, we demonstrate that the convex spectrum is a T1 - space and Hausdorff space.

Keywords: automatized algebra convex sub algebra congruence relation np-automatized algebra prime convex sub algebra convex spectrum convex spectral topology

Drug, Healthcare and Patient Safety

DOI: https://doi.org/10.2147/dhps.s416310

15(2023)

Assessment of Medication Prescribing Pattern in COVID-19 Admitted Patients by Using WHO Prescribing Indicators at Eka Kotebe General Hospital, Addis Ababa, Ethiopia; Retrospective Cross-Sectional Study

Belete Birhanu [1], Solomon Debebe [1], **Tsegaye Nigussie [2]**, Alemayehu Dandana [1]

[2]Department of Pharmacy, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Introduction: Drug therapy is a crucial component of health care and plays a vital role in preserving life. However, the irrational utilization of medications is a worldwide issue, particularly in developing nations.

Objective: To assess the prescription patterns of medications based on the World Health Organization's prescribing indicator among patients who were admitted with COVID-19 to Eka Kotebe General Hospital in Addis Ababa, Ethiopia, in June 2021.

Methods: A retrospective cross-sectional analysis was conducted to evaluate the prescription patterns of medications in patients admitted with COVID-19 at Eka Kotebe General Hospital from June 2021 to September 15, 2021. The data were extracted using card review formats and prescription assessment questionnaires, and a systematic random sampling procedure was employed to collect the data. Finally, the data were coded and analyzed using SPSS version 26 to meet the study's objectives. Descriptive statistics were employed to determine the frequency and prevalence, and the results were presented using tables and figures.

Results and discussion: The average number of medications prescribed per encounter was 2.64, which is above the WHO standard. The percentage of encounters in which antibiotics and injections were prescribed was 80.20% and 99.2%, which exceeds the upper limit of WHO standard range (20-26.8%) and (13.4-24.1%), respectively. All medications were prescribed using generic names and were included in Eka Kotebe General Hospital's essential drug list, which is in line with WHO standards.

Conclusion: The degree of polypharmacy and the prescription practices for antibiotics and injections at Eka Kotebe General Hospital deviated from the World Health Organization's standards. As a result, there is a need to enhance medical education programs to rationalize the prescription of antibiotics and injection use.

Keywords: COVID-19; Eka Kotebe General Hospital; drug prescribing; prescription pattern.

Frontiers in Education

DOI: https://doi.org/10.3389/feduc.2023.1130113

8(2023)

The effect of teachers' empowerment on government secondary schools' performance in Konso zone, Southern Ethiopia

Addisu Tukura[1], **Solomon Sapo[2]**

[2]School of Pedagogical and Behavioral Sciences, Department of Pedagogical Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

This study was conducted in government secondary schools in the Konso zone, southern Ethiopia, to investigate the effect of teachers' professional empowerment on school performance. A correlational explanatory research design and a mixed research approach were used. The participants of this study were 350 including teachers, principals, supervisors, and heads of educational offices. The secondary schools and their respective principals, supervisors and educational office heads were selected purposively where as teachers were selected randomly. The participants provided written informed consent to participate in this study. Both primary and secondary data gathered through interviews, questionnaires, and document reviews were used. Qualitative data were arranged into themes then analyzed and interpreted whereas quantitative data were analyzed by SPSS V.20. Among teachers in the study area, the majority (90.3%) were males and all of the principals, supervisors and education head offices were males indicating gender imbalance in the educational system. Teachers primarily (3.81 ± 1.098) participate in decision-making by consultation, followed by their involvement in setting school goals and objectives (3.78 ± 1.20). In-service trainings were primarily (4.03 ± 1.14) offered to change the attitudes and skills of teachers and strengthen profession (3.78 ± 1.20). The respondents weakly agree (3.65 ± 1.16) that school leaders provide opportunities for teachers to work actively for better school performance. A strong positive correlation ($p < 0.01$; $R^2 > 0.8$) and interdependence was observed between teachers' empowerment and school performance. While there were positive signs regarding teachers' empowerment in the study schools, these measures were not implemented in a way that met teachers' needs. Also, the school performance activities implemented fell short of teachers' expectations, requiring further administrative action. To boost school performance, school leaders should identify teachers' needs and provide them with professional learning. Future works should consider the unstudied secondary, elementary and primary schools to have a clear picture of the issues of teachers' empowerment and its effect on school performance in all the secondary schools of the study area.

International Journal of Agronomy

DOI: https://doi.org/10.1155/2023/5584859

2023(2023)

Evaluating Plant Leaf Tinctures against Maize Weevils (*Sitophilus zeamais* Motsch.) in Stored Maize (*Zea mays* L.) under Laboratory Conditions

Shetie Gatew[1], Abrham Chalew[1]

[1]Environmental Science, Department of Biology, College of Natural Sciences, Arba Minch University, Arba Minch 21, Ethiopia

Abstract

Maize weevils (*Sitophilus zeamais* Motschulsky) are commonly stored grain pests of economic importance in several parts of Africa. A huge amount of synthetic pesticides is being used for the management of crop pests, which have many negative effects on the biotic and abiotic components of the environment. Plant-derived pesticides, on the other hand, are safe for the environment, affect only target insects, have a low application cost, and are easily biodegradable. The purpose of this research was to determine the effectiveness of ethanol leaf tinctures of four selected botanicals against *S. zeamais: Brucea antidysenterica* (J.) (Waginos), *Croton macrostachyus* (Hochst.) (broad-leaved croton), *Nephrolepis exaltata* (L.) (Boston fern), and *Carica papaya* (L.) (papaya). The experiment was carried out in a completely randomized design (CRD) with four different concentrations (0 mL, 2.5 mL, 5 mL, and 7.5 mL) and four plant leaf tinctures in three replicates. A random sample of 300 g of clean maize seed was treated with the four selected botanicals in plastic jars covered with a muslin cloth. Twenty adult maize weevils were introduced into each disinfected, treated, and untreated maize grain. The mortality rate, grain damage, and F_1 progeny emergences were assessed and analyzed using SPSS software version 25. The highest (100%) mortality rate of *S. zeamais* was recorded for maize seeds treated with the leaf tincture of *B. antidysenterica*, followed by maize seeds treated with the leaf tincture of *C. papaya* (97.5%) at an application rate of 7.5 mL/300 g. The mean weight loss of the seeds showed a significant variation between the treatments. The mean weight loss of the seeds in the control (8.96%) was higher than the total mean weight loss treated by all plant leaf tinctures (3.66%). The emergence of F_1 progeny of *S. zeamais* on maize grains showed significant differences among the treatments. The highest emergence (100%) of F_1 progenies was recorded for the control treatment followed by *C. macrostachyus* (16.65%) at a rate of 2.5 mL/300 g maize grain treatment. The study concluded that *B. antidysenterica* and *C. papaya* tinctures had the potential to control the infestation of maize grains by *S. zeamais.*

Frontiers in Global Women's Health

DOI: https://doi.org/10.3389/fgwh.2023.1001479

4(2023)

Fertility desire and associated factors among women of reproductive age living with HIV/AIDS attending antiretroviral therapy clinic in Arba Minch General Hospital, South Ethiopia, 2021

Disasa Tufa [1], **Biresaw Wassihun [2]**, Direslgne Misker [3], **Kassaw Beyene [4]**

[3]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[4]Department of Midwifery, College of Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: The fertility desire of women living with HIV to have children can have significant implications for public health. Despite the increase in the number of HIV-positive women, the issues of their fertility desire have not been well-studied. This study aims to assess fertility desire and associated factors among women living with HIV/AIDS.

Methods: A facility-based cross-sectional study was conducted from 1 May to 30 July 2021. The researchers employed a systematic sampling technique. The data were gathered and entered into EpiData 3.1 software, and subsequently exported to the statistical package for social science version 25 for analysis. Binary logistic regression analyses were used to identify the factors involved, and a *p*-value of <0.05 at a 95% confidence level was deemed to be statistically significant.

Result: The findings of this study indicate that 47.8% of women expressed a desire to conceive. Various factors such as parents' pressure [adjusted odds ratio (AOR) = 4.41, 95% confidence interval (CI): 2.15-9.05], community pressure (AOR = 2.62, 95% CI: 1.30-5.26), being married (AOR = 0.25, 95% CI: 0.09-0.73), having only female offspring (AOR = 2.57, 95% CI: 1.12-5.90), and having HIV seropositive children (AOR = 2.45, 95% CI: 1.23-4.85) had statistically significant association with fertility desire.

Conclusion: The study area exhibited a high level of fertility desire. Various factors can influence fertility desire, including parents' pressure, community pressure, being married, having only female offspring, and having children who are HIV seropositive. When developing interventions on sexual and reproductive health issues, it is imperative for policymakers and healthcare providers who are working in antiretroviral therapy clinics to take into account the effects of these factors on women living with HIV. When designing and implementing prevention of mother-to-child transmission services, it is important to consider the fertility desires of mothers who are living with HIV.

Keywords: Arba Minch; Ethiopia; antiretroviral; fertility desire; women living with HIV.

Iranian Journal of Microbiology

DOI: https://doi.org/10.18502/ijm.v15i4.13503

15(2023)

Bacterial etiology, antimicrobial resistance and factors associated with community acquired pneumonia among adult hospitalized patients in Southwest Ethiopia

Abdulhakim Mussema [1 2], Getenet Beyene [2], Esayas Kebede Gudina [3], **Dagninet Alelign [4], Tofik Mohammed [5],** Solomon Gebre Bawore [1], Abdurezak Mohammed Seid [1], Wondwossen Tadesse [1], Mulatu Gashaw [2]

[4]Department of Medical Microbiology, School of Medical Laboratory Science, Arba Minch University.
[5]Department of Internal Medicine, School of Medicine, Arba Minch University..

Abstract

Background and objectives: Antibiotic resistance is a significant problem that restricts the options for treating bacterial pneumonia. This research aimed to determine the bacterial causes of pneumonia and antibiotic resistance among hospitalized patients in southwest Ethiopia.

Materials and methods: We collected and analyzed 150 sputum samples from individuals with community-acquired pneumonia from April 1st to October 30th, 2019. Standard bacteriological procedures were used to identify the bacteria. Kirby Bauer's disk diffusion method was used to assess the bacteria's susceptibility patterns. Production of carbapenemase and extended-spectrum-lactamase were confirmed phenotypically. Odds ratios and the chi-square test were computed.

Results: On the whole, bacterial pathogens were verified in 50% of the sputum samples. The predominant bacterial isolates were *Klebsiella* species, followed by *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Streptococcus pneumoniae*. About 77.5% of isolates were multidrug resistant. Moreover, 40.5% and 10.8% of the isolates were ESBL and carbapenemase producers, respectively. Aging, tobacco smoking, previous history of pneumonia, heart disease, and chronic respiratory disease had association with sputum culture-positivity.

Conclusion: As a result, it is important to regularly monitor the bacterial etiologies and their patterns of resistance. Additionally, sociodemographic and clinical characteristics should all be taken into account while managing patients with pneumonia empirically in this context.

Keywords: Antimicrobial drug resistance; Bacterial; Ethiopia; Etiology; Hospitalized; Pneumonia.

Social Sciences and Humanities Open

DOI: https://doi.org/10.1016/j.ssaho.2023.100577

8(2023)

Professional development for academic engagement: Primary school EFL teachers' perceptions and predictors

Hatuye Helate [1], Tekle Ferede Metaferia [2], **Tesfaye Habtemariam Gezahegn**[1]

[1]Department of English Language and Literature, Arba Minch University, Ethiopia

Abstract

This study assessed primary school English language teachers' perceptions and predictors of Professional development for academic engagement. To achieve this, the study employed a descriptive survey design that uses a mixed-methods approaches. This is useful to blend both quantitative and qualitative data collection instruments. Accordingly, the study used questionnaire and interview to collect enough data at a time. Regarding the data analysis and results, it used concurrent-convergent strategies within which the data interpretation was made under each theme and then the discussion was made convergently. The results thus indicated that English language teachers' perceptions was depended on cognitive knowledge compared to social, emotional, and personal knowledge domains. Furthermore, the teachers' perceptions was significantly predicted by three most important predictors including the age, the salary paid, and the marital status of the teachers. Accordingly, the findings are useful to impact primary school English teachers' perceptions for effective professional development for academic engagement. Moreover, the educational authorities including MoE can use these findings to design, train, coach and monitor English language teachers' perceptions for professional development for academic engagement which incorporates professional learning, self-directed and autonomous learning. Finally, these findings can be used as a body of knowledge and corner stone for scholars and prospective researchers.

Keywords: Academic engagement; Autonomous learning; English as a foreign language teachers; Perceptions; Professional learning; Professional development; Self-directed learning

Cogent Social Sciences

DOI: https://doi.org/10.1080/23311886.2023.2275937

9(2023)

Indigenous knowledge and forest management practices among *Shekachoo* people in the *Sheka* Biosphere Reserve A case of *Shato* core area, South-west Ethiopia

Workaferahu Ameneshewa[1], **Yechale Kebede[2]**, Dikaso Unbushe[3], Abiyot Legesse[4]

[2]Department of Geography and Environmental Studies, College of Social Science, Arba Minch University.

Abstract

Natural places that are maintained and managed with the help of indigenous people are both culturally and environmentally vital, and can be studied in a wide range of contexts. This research explores indigenous forest conservation and management practices and related taboos, values, and beliefs of *Shekachoo* people in the *Shato* core area, *Sheka* biosphere reserve, South-west Ethiopia. Semi-structured interviews and participant observation were used to gather qualitative information for this study, which was based on an interpretive paradigm. Both primary and secondary sources were examined to obtain data relevant to this study. The focus group discussions and key informant interviews included a significant number of informants, including clan leaders, community elders, women, youth, and forestry experts. Case studies, observations, and published and unpublished materials were also examined. The results of this research show how intrinsically tied *Shekachoo* people's culture is to the forest, as well as to the *Kobbo* system of knowledge and practice. Forest resources in the *Shato* core area have been safeguarded, managed, and utilized sustainably for many generations because of this indigenous knowledge system. And, the study did show that today's youth do not recognize these strategies. Therefore, research will open the door to documenting this important knowledge for all those concerned to gain insight into. Thus, Indigenous knowledge should be respected and recognized, traditional rules and regulations on the sustainable management of forest resources should be adequately communicated, especially to the young, and the government should employ an integrative strategy that considers both technical and indigenous knowledge systems to manage natural resources.

Keywords: indigenous knowledge; practice; Kobbo and Shekachoo people; clan leader; taboos

Journal of Social and Economic Development

DOI: https://doi.org/10.1007/s40847-023-00270-z

26(2023)

Questioning the democracy–growth debate in countries of the East African region: a political economy perspective

Sisay Demissew Beyene[1], Mohammed Seid Ali[2], Belayneh Taye[3], **Yihenew Wubu Endalew[4]**

[4]College of Social Sciences and Humanities, Arba Minch University, Arba Minch, Ethiopia

Abstract

In Africa, though the nexus between democracy and economic growth has been studied for decades, the issue remains topical in academic and public policy debates. This has been common, particularly from the vantage point of the continent's drive to meet the 2030 United Nations Sustainable Development Goals. However, existing literature in East African countries has substantial limitations in comprehensively analyzing the conventional democracy–growth hypothesis' intellectual, theoretical, and ideological compatibility. Moreover, most research findings and reports did not employ a mixed research approach and overlooked key econometric variables to address the underlying research question. Hence, this study aims to investigate the impact of democracy on economic growth in countries in the East African region from a political economy perspective. For the quantitative analysis, the study uses secondary panel data with panel autoregressive distributed lag, fully modified OLS, and dynamic OLS regression approaches from 1990 to 2018. For qualitative discussion, the study uses secondary documents and further discusses and interprets the quantitative results. The quantitative results show that all panel mean models provide different and mixed results concerning the impact of democracy on economic growth. As such, it reveals an inconclusive outcome, showing that a direct link between democracy and economic growth in countries in the East African region cannot be established. The study indicates that such a mixed or blurred result of the above econometric tests necessitates the consideration of country-specific, ideological, and policy contexts of the countries and global and exceptionally regional socio-economic as well as ideological–political contexts in the study of the democracy–growth nexus in East Africa.

The Role of Tropics in Climate Change: Global Case Studies

DOI: https://doi.org/10.1016/B978-0-323-99519-1.00008-9

(2023)

Study of spatio-temporal climate variability and changes in South America using climate data tools

Shalishe, Amba[1]; Bhowmick, Anirudh[1]; Chaturvedi, Subodh Kumar[2]; **Ojha, Jai Ram[3]**

[1] Faculty of Meteorology and Hydrology, Arba Minch Water Technology Institute, Arba Minch University
[3] Department of Geology, College of Natural Sciences, Arba Minch University

Abstract

The goal of this chapter is to look at the effects of climate change on the South American continent. South America has experienced climate variability. The study found that under three RCPs, both temperature and precipitation will rise in the future. The annual average minimum temperature is expected to rise by 1.25°C and 1.6°C for the periods 2031–50, respectively, compared to the baseline period, while the annual average maximum temperature is expected to rise by 1.25°C and 1.85°C for the periods 2031–50 under RCP4.5 and RCP 8.5. Similarly, projected annual average precipitation has been expected to increase. Changes in an increased temperature and geographical and temporal rainfall variability have been evident. Droughts and famines have become more frequent as a result of climate change. Further, flooding, desertification, the loss of wetlands, biodiversity loss, and a drop in agricultural production and productivity have also been observed in the recent past. South America had made numerous measures in various sections of the country to mitigate climate change. Conservation, agriculture, home gardens, traditional agroforestry systems, harvesting non-timber forest products, protected area systems, reforestation and afforestation programs, renewable energy sources, and livestock sales and production are some of the mechanisms in practice for mitigating and adapting to climate change in South America.

Keywords: Climate change; Climate variability; RCP 4.5; RCP 8.5; South America

Pharmacognosy Journal

DOI: http://dx.doi.org/10.5530/pj.2023.15.143

15(2023)

Ethnobotanical Study of the Traditional Use and Maintenance of Medicinal Plant Species and Indigenous Knowledge by the Konso People, Southern Ethiopia

Tizazu Gebre[1], Bhaskar Rao Chinthapalli[2, *], D. S. Vijaya Chitra[1,2]

[1]Department of Biology, College of Natural Sciences, Arba Minch University, P.O. Box 21, Arba Minch, ETHIOPIA.

Abstract

Background: For thousands of years, indigenous people have developed their own localized knowledge of plant use, management, and conservation. However, this rich traditional knowledge on plant utilization was not well documented, and most of the indigenous knowledge acquired by the local people was verbally passed from generation to generation. The people of Konso in South Ethiopia use and maintain traditional medicinal plant species, according to their specific ethnobotanical pharmacopeia. Methods: A total of 80 informants aged 25 to 87 years old were chosen (10 individuals of which 5 healers and 5 clients) from the 24 key informants were identified representing 6 from each kebele. The present study explores the unique indigenous knowledge that enables the community to identify medicinal plants, prepare medications, and then apply the cures used to treat a variety of human diseases as dangers to their long-term use. This study was carried out from September 2018 to July 2019. Results: Some medicinal plant species are more popular than others Lepidium sativum, Hagenia abyssinica and Allium sativum were cited by all the 80 informants for their medicinal value. Powdered form was directly used from 40.0% of the medicinal plant species, while 51.4% are chewed, extracted with water, and / or with butter (17.1% each) and 8.6% are extracted with local beer. Of the herbal remedies used in the study area, 68.6% were applied orally and 31.4% were applied externally. Roots are the parts mostly used (35.7%), followed by leaves (32.9%), combination of parts (18.6%), root bark (5.7%), fruit (2.9%), in that order, respectively. It was known that highest source of the medicinal plants was the forest (45.3%). Conclusions: Home gardens and agro forests together contribute 41.86% of the medicinal plants. This study was undertaken to bring awareness towards community-based in-situ and ex-situ conservation actions, attracting younger generations to grab the indigenous knowledge from the parents and ancestors and strengthening home gardens and other agro-forestry systems be used as repositories of medicinal plant species and alternative conservation sites to preserve the traditional medicinal plant species of the study area.

Keywords: Ethnobotany, Indigenous knowledge, Medicinal plant species., Traditional healers

Journal of Engineering (United Kingdom)

DOI: https://doi.org/10.1155/2023/4856457

2023(2023)

Performance Evaluation of Faffa Food Share Company through Computerized Maintenance Management System (CMMS)

Gadisa Alemayehu[1], Muralidhar Avvari[1], Bikila Alemu[2], Atkilt Mulu Gebrekidan[1]

[1]Faculty of Mechanical Engineering, Arba Minch Institute of Technology, Arba Minch University
[2]Faculty of Computing and Software Engineering, Arba Minch Institute of Technology, Arba Minch University

Abstract

Since 1962 EC, the Faffa Food Share Company has been producing and supplying flour in Ethiopia both for relief and commercial markets. However, it is incompetent in the market due to a poor maintenance management system. So, the aim of this research is to overcome the poor maintenance management problems by using the CMMS application. The data collected from the company by survey studies, unstructured interviews, and stopwatches and from company records revealed that frequent failure machines, as well as a poor maintenance management system, cause production downtimes, resulting in a 29.19% decrease in production from the planned production. The collected data are analyzed by, tools such as time and motion study, SPSS software and CMMS effectively. The finding from the outcome of the bivariate correlation of CMMS elements and manufacturing performance dimension has an alpha α value of greater than 0.5, which indicates that the relationships between CMMS and manufacturing performance are positive. The findings from company records and stopwatch equipment and manpower (technicians) should be managed to activate machine servicing. Finally, the proposed smart maintenance management system tool, CMMS improves the availability of machines, reduces the frequency of equipment failure, reduces the breakdown time, decreases the cost of maintenance, and then improves the manufacturing performance by 5 percent.

The Role of Tropics in Climate Change: Global Case Studies

DOI: http://dx.doi.org/10.1016/B978-0-323-99519-1.00003-X

(2023)

Potential of the lake sediments study of Ethiopia in understanding the Holocene climatic conditions: a case study of Chamo Lake, Southern Nations, Nationalities, and People's Region, Ethiopia

Subodh Kumar Chaturvedi [1], **Anirudh Bhowmick [2], Gosaye Berhanu [3], Geremu Gecho [3], Jai Ram Ojha [3]**

[2] Faculty of Meteorology and Hydrology, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

[3] Department of Geology, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Ethiopia, a north-eastern country of Africa, constitutes one of the most significant environmental reserves on Earth. The varied geography and climate, rich fertile land, and diverse life have all the potential not only to become self-sufficient in food grains but also to export to other countries. However, the frequent occurrences of floods and drought in the country not only impact agricultural products but also have a greater impact on the country's economy. Therefore, a long-term climate prediction on a decadal to century basis is the need of the hour for guarding against nature's furies and to enable the government agencies to plan and make necessary arrangements in advance for its population. In absence of a long-term instrumental record of climatic data, a record of the high-resolution paleoclimatic data based on natural proxies is the need of the hour to model the future climatic scenario of the country. Ethiopia is endowed with a number of large natural lakes both in the rift valleys and on high-elevated plateaus. The sediment deposits of these lakes can serve as the repository of paleoclimate. In the present paper, the spatial distribution of the sediment's textural parameters, geochemical, and organic matter of the Chamo Lake has been carried out to understand the depositional environment in the lake. The spatial distribution of the lake floor sediments and its various sedimentological and geochemical parameters not only reflect the modern hydrological conditions and organic productivity of the lake, but study can form baseline data to investigate the fluctuations in lake level and paleoclimate through the study of the sediment core from the Chamo Lake. It is recommended to carry out a high-resolution paleoclimatic study from the selected lakes of Ethiopia to help model the future scenario of climate in this region.

Keywords: Alluvial fans; Food habits; Holocene; Paleoclimatic; Volcanic systems

Frontiers in Urology

DOI: https://doi.org/10.3389/fruro.2023.1196925

3(2023)

Prevalence of pelvic floor disorder and associated factors among women in Arba Minch Health and Demographic Surveillance Site, Gamo Zone, Southern Ethiopia, 2021

Berhanu Negese Kebede[1], Desta Haftu Hayelom[2], Gebremaryam Temesgen Birgoda[1], Awol Arega Yimer[1]Bezawit Afework Mesfin[1], Mesfin Difer Tetema[3], Solomon Seyife Alemu[4], **Kassaw Beyene Getahun[1]**

[1]Department of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch,Ethiopia
[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Globally, millions of women develop pelvic floor disorder. It imposes a considerable emotional, social, and financial burden on women's lives. Despite this, in developing countries, nearly half of women with pelvic floor disorder do not seek any help due to feelings of isolation, depression, shame, and loss of control. Thus, the magnitude of the problem is largely unknown. The aim of this study was to assess the prevalence of pelvic floor disorder and associated factors among women at Arba Minch Health and Demographic surveillance site. A cross-sectional study with a simple random sampling technique was employed on a community basis. The data were entered into EpiData version 3.1 and then exported to Statistical Package for Social Sciences version 25 for data cleaning and analysis. Bivariate and multivariable analyses using binary logistic regressions were carried out to identify factors associated with pelvic floor disorder. The level of significance was declared at a p-value of < 0.05. The prevalence of pelvic floor disorder was 31.4% (95% CI = 26.9% to 35.8%). Being grand multiparous (AOR = 3.919, 95% CI = 1.495–10.276), having a history of instrumental delivery (AOR = 3.042, 95% CI = 1.483 to 6.241), having a history of perianal tearing (AOR = 2.972, 95% CI = 1.491 to 5.927), and having a medical disease (AOR= 2.698, 95% CI = 1.526 to 4.770) were factors associated with pelvic floor disorder. The prevalence of pelvic floor disorder was high in the study area. Parity, instrumental delivery, perianal tears, and medical problems were factors affecting the prevalence of pelvic floor disorder. There is a need for an improvement of policies and strategies focusing on prevention and treatment services to alleviate the problem.

Open Microbiology Journal

DOI: https://doi.org/10.2174/18742858-v17-e230711-2022-35

17(2023)

The Magnitude and associated factors of *Helicobacter Pylori* Infection among Dyspeptic Patients at the Arba Minch General Hospital in Southern Ethiopia

Dagninet Alelign [1], Goshu Furo [1], Maykil Degu [1], Dagimawie Tadesse [1], Gebre Kayta [1], Asc halew Kidanewold [1]

[1]Department of Medical Laboratory Sciences, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Infection with Helicobacter pylori (H. pylori) is a major public health problem, with a higher prevalence reported in developing countries, including Ethiopia. Persistent H. pylori infection could result in chronic gastritis, duodenal ulcers, and subsequently gastric carcinoma. However, the burden of the infection varies within and between countries.

Methods: An institution-based cross-sectional study was carried out on 422 adult dyspeptic patients attended at Arba Minch General Hospital from March 1st to June 30th, 2022. Pretested structured questionnaires were used to collect socio-demographic characteristics, clinical information, and other related factors for H. pylori infection. Stool samples were analyzed using the H. pylori fecal antigen rapid test kit. The data was analyzed using SPSS version 25. The p-value < 0.05 was considered statistically significant.

Results: The overall magnitude of H. pylori was found to be 32.2% (136/422), with a 95% CI = (27.7-36.5). The highest proportion of H. pylori occurred in male study participants (55.1%) and in participants aged 31-40 years (42.6%). H. pylori stool antigen positivity was significantly associated with alcohol consumption [AOR = 1.87, 95% CI: (1.06-3.29)], smoking cigarettes [AOR = 2.75, 95% CI: (1.43-5.27)], and hand washing practice after the toilet [AOR = 3.02, 95% CI: (1.41-6.48)].

Conclusion: Overall, a considerable magnitude of H. pylori was identified in the setting. Alcohol consumption, smoking cigarettes, and hand washing practice after using the toilet were found to be statistically significantly associated with H. pylori infection. Health education is therefore essential, particularly regarding societal lifestyle changes and knowledge of the potential sources of infection and H. pylori transmission.

Keywords: Helicobacter pylori; Stool antigen; Dyspeptic; Arba Minch; Ethiopia; Alcohol consumption; Cigarettes; Stool samples

HIV/AIDS - Research and Palliative Care

DOI: https://doi.org/10.2147/hiv.s422173

15(2023)

Proportion of Attrition and Associated Factors Among Children Receiving Antiretroviral Therapy in Public Health Facilities, Southern Ethiopia

Tamirat Gezahegn Guyo [#1], Temesgen Mohammed Toma [#1], Desta Haftu [2], Mesfin Kote [2], Fasika Merid [1], Kebede Kulayta [3], Markos Makisha [4], Kidus Temesgen [2]

[1]Department of Public Health, Arba Minch College of Health Sciences, Arba Minch, Ethiopia.
[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[3]Department of Medical Laboratory Technology, Arba Minch College of Health Sciences, Arba Minch, Ethiopia.
[4]Department of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Purpose: Acquired immunodeficiency syndrome (AIDS) is a major global public health concern. Despite the improved access and utilization of antiretroviral therapy (ART), attrition from care among children continues to be a major obstacle to the effectiveness of ART programs. Hence, this study aimed to assess the proportion of attrition and associated factors among children receiving ART in public health facilities of Gamo and South Omo Zones, Southern Ethiopia.

Patients and methods: A retrospective follow-up study was conducted in public health facilities of Gamo and South Omo Zones in Southern Ethiopia from April 12, 2022, to May 10, 2022. The proportion of attrition was determined by dividing the number of attritions by the total number of participants. Descriptive statistics were calculated. A binary logistic regression model was used to identify factors associated with attrition. Statistical significance was set at p-value <0.05.

Results: The median age of the participants was 5.5 (IQR: 2-9) years. The proportion of attrition from ART care was 32.4% (95% confidence interval (CI): 27.57% to 37.69%). Death of either of the parents (adjusted odds ratio (AOR) = 2.19; 95% CI:1.14, 4.18), or both parents (AOR = 3.19; 95% CI: 1.20, 8.52), hemoglobin level <10mg/dL (AOR = 2.39, 95% CI: 1.21, 4.70), a cluster of differentiation (CD)4 count ≤200 cells/mm^3 (AOR = 6.78, 95% CI: 3.16, 14.53), CD4 count 200-350 cells/mm^3 (AOR = 2.65, 95% CI: 1.16, 6.03), suboptimal adherence (AOR = 6.38; 95% CI: 3.36, 12.19), and unchanged initial regimen (AOR = 6.88; 95% CI: 3.58, 13.19) were factors associated with attrition.

Conclusion: Attrition from care is identified to be a substantial public health problem. Therefore, designing interventions to improve the timely tracing of missed follow-up schedules and adherence support is needed, especially for children with either/both parents died, unchanged initial regimen, low CD4, and/or low hemoglobin level.

Keywords: Ethiopia; antiretroviral therapy; attrition; children; proportion.

Frontiers in Global Women's Health

DOI: https://doi.org/10.3389/fgwh.2023.1234013

4(2023)

Knowledge and practice of obstetric care providers on prevention of obstetric fistula 2023: an institution-based cross-sectional study

Solomon Seyife Alemu [1], Mahlet Tesfaye Agago [2], **Eshetu Yisihak Ukumo [3], Tesfahun Simon Hadero [3]**

[3]Department of Midwifery, College of Medicine and Health Science, Arba Minch University, Arbaminch, Ethiopia.

Abstract

Background: Obstetric fistula is a preventable devastating condition that is mostly caused by obstructed labour. About 22% of obstructed labor is complicated by obstetric fistula. Skilled birth attendants during delivery are essential for the prevention of obstetric fistula. However, little is known about the status of the knowledge and practice of obstetric fistula prevention in the Gamo zone.

Objective: We aimed to assess the knowledge, practice, and associated factors of obstetric caregivers on the prevention of obstetric fistula in public health facilities of the Gamo zone in southwest Ethiopia 2023.

Method: A cross-sectional study was employed among 372 obstetric caregivers in selected public health facilities of the Gamo zone in southwest Ethiopia from 1 December 2022 to 30 January 2023. Study participants were selected by a simple random sampling technique, and data were collected by using a pre-tested and self-administered questionnaire. The collected data were coded and entered into Epi-Data version 4.6 computer software and exported to SPSS version 27 for analysis purposes. Bivariable and Multivariable Logistic analyses were applied. The level of significance was declared at a *P*-value ≤0.05 and a 95% confidence interval.

Results: About 57% [95% CI (53.00-62.00)] of participants had good knowledge, and about 55.4% [95% CI (50.00-60.00)] of obstetric caregivers showed good practice for obstetric fistula prevention. The factors significantly associated with knowledge were service year [AOR = 2.50, 95% CI = (1.12-6.73)], types of a health facility [AOR = 1.99, 95% CI = (1.01-3.92)], age [AOR = 2.38, 95% CI = (1.03-5.49)], and in-service training [AOR = 4.61, 95% CI = (2.35-9.05)]. In-service training [AOR = 14.86, 95% CI = (12.75-18.73)], service year [AOR = 3.58, 95% CI = (1.24-10.29)], and knowledge [AOR: 13.24, 95% CI = (6.18-14.34)] were factors which were significantly associated with the practice of obstetric caregivers towards obstetric fistula prevention.

Conclusion: The knowledge and practice of obstetric caregivers on the prevention of obstetric fistula was low in public health facilities of the Gamo zone. In this study, practicing at a hospital was a factor significantly associated with the knowledge of obstetric caregivers. Having in-service training, advanced service year, and age were factors significantly associated with the knowledge and practice of obstetric caregivers. Regular in-service training of health professionals can enhance their knowledge and practice of obstetric fistula prevention.

Keywords: Gamo zone; knowledge; obstetric caregivers; obstetric fistula; practice.

Advances in Meteorology

DOI: https://doi.org/10.1155/2023/2730839

2023(2023)

Modelling the Impacts of the Changing Climate on Streamflow in Didesa Catchment, Abay Basin, Ethiopia

Amsalu Gudeta Awetu[1], Tadesse Tujuba Kenea[2]

[1]Faculty of Water Resources and Irrigation Engineering, Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia
[2]Faculty of Meteorology and Hydrology, Water Technology Institute, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

The Didesa catchment, which is the second largest subbasin of the Abay basin, significantly contributes to the Blue Nile's outflow. Understanding the dynamics of water availability under the changing climate in such a basin assists in the proper planning of land use and other development activities. This study presents changes in climatic elements such as rainfall, temperature, and evapotranspiration using observation data and regional climate models (RCMs) under two representative concentration pathways (RCPs) for three future periods. We use a calibrated hydrological model to further assess climate change's effects on streamflow. We select three RCMs and their ensemble's mean by evaluating their performance with respect to observations. We apply the modified Mann–Kendall test to detect trends in each dataset. The result shows that annual mean maximum and minimum temperatures increase in the catchment for the 2021–2040, 2041–2070, and 2071–2100 periods as compared to baseline (1989–2018) under both RCP4.5 and RCP8.5 scenarios. Annual mean maximum temperature and potential evapotranspiration experienced a significant decreasing trend during the year from 1989 to 2018. Furthermore, there was an increasing trend in annual rainfall from 1989 to 2018, which could be related to the cooling of sea surface temperature over the equatorial Pacific. We detect an increasing trend in temperature in both scenarios and all periods; however, no clear trend pattern is found in rainfall. The result from hydrological model simulations reveals that the mean monthly streamflow slightly increases in the winter season while it decreases during the main rainy season. Further study of detailed weather systems, which affect the subbasin's climate, is recommended.

Cogent Social Sciences

DOI: https://doi.org/10.1080/23311886.2023.2280337

9(2023)

Adequacy of governance in the link between foreign direct investment and structural transformation

Solomon Kebede Menza[1], Zerihun Getachew Kelbore[2], **Tora Abebe Duka**[1], Berihanu Kuma Shano[3]

[1] Department of Economics, Arba Minch University, Arba Minch, Ethiopia

Abstract

The inflow of foreign direct investment has increased in developing nations. The study used panel data from sub-Saharan Africa and East Asia and the Pacific countries to observe the adequacy of governance in linking FDI and structural transformation. Pooled Mean Group estimation technique is utilized for analysis purposes using 31-year-old data. The econometric results suggest that FDI inflows boost structural transformation, while debt and inflation dis-improve structural transformation. Across countries, in the short run, FDI with governance had a negative effect for South Korea. Accordingly, the governments of these regions that attempt to succeed in structural transformation should focus on active utilization of FDI and minimize massive inflow of foreign public debts.

Keywords: Foreign direct investment; Governance; pooled mean group and structural transformation

Agris On-line Papers in Economics and Informatics

DOI: http://dx.doi.org/10.7160/aol.2023.150402

15(2023)

The Impact of Livelihood Diversification as a Climate Change Adaptation Strategy on the Food Security Status of Pastoral Households in Southeastern and Southern Ethiopia

Baro Beyene[1, 4], Mesfin Tilahun[2,3], **Mebratu Alemu[4]**

[4]Department Economics, Arba Minch University, Ethiopia

Abstract

The objective of this study was to investigate the determinants of food security and quantify the impact of livelihood diversification as an adaptation strategy on the level of food security of pastoral households in Arero district in Borena zone and Rayitu district in Bale zone in Ethiopia. A multistage sampling technique was used, selecting 396 households from Arero and Rayitu districts. The study used a multidimensional food security index to measure the food security status of pastoralist households. The descriptive result showed that 60.6 percent, 20.2 percent, and 19.2 percent of the pastoralist households had medium, high and low food security, respectively. The result of ordered logistic regression showed that the age of household head, herd size (TLU) and frequency of extension contacts significantly increased the food security status of pastoralist households. However, male household head, age of household head, household size (adult equivalent) and distance to market significantly decrease the food security status of pastoral households in Arero district. On the other hand, the result of the multinomial endogenous switching regression model showed that the uptake of non-farm activities as well as crop production and non-farm activities together have a positive and significant impact on the level of food security of the pastoralist households. Therefore, the results of the study suggest that working on participatory strategies to promote livelihood diversification among pastoralist communities is very important to improve the food security of pastoralist households.

Keywords; Food security, determinants of food security, livelihood diversification, impact, Ethiopia.

International Journal of Women's Health

DOI: https://doi.org/10.2147/ijwh.s412241

15(2023)

The Effect of Fresh Moringa Leaf Consumption During Pregnancy on Maternal Hemoglobin Level in Southern Ethiopia: Multilevel Analysis of a Comparative Cross-Sectional Study

Zeritu Dewana Derbo [1], Gurmesa Tura Debelew [2]

[1]Department of Midwifery, Arba Minch Health Science College, Arba Minch, Ethiopia.

Abstract

Purpose: Anemia, especially iron-deficiency anemia during pregnancy, significantly impacts maternal health, fetal growth, and development. Moringa leaf is an iron-rich food that can overcome anemia, but there is a lack of evidence on the association between fresh moringa leaf consumption and maternal hemoglobin level during pregnancy. The aim of this study is to test the effect of fresh moringa leaf consumption during pregnancy on maternal hemoglobin levels in southern Ethiopia.

Methods: A community-based comparative cross-sectional study was conducted from May to June 2022 among 230 fresh moringa leaf consumers and 230 non-consumers pregnant women. Data were collected using an interviewer-administered structured questionnaire and hemoglobin level was determined by HemoCue Hb 301. Multivariate multilevel linear regression models were fitted using Statistical Software for Data Science (STATA) version 14.

Results: The overall mean hemoglobin level among pregnant women was 11.76 g/dl ± 1.47 [12.06 g/dl ± 1.22 among fresh moringa leaf consumers and 11.45 g/dl ± 1.64 among non-consumers] with a significant coefficient of association (β) of 0.90 g/dl [β = 0.90 g/dl, 95% CI: 0.54, 1.27]. A number of under-five children, bleeding during the current pregnancy, male-headed household, and current antenatal care visit were the individual-level factors. Distance from the nearest health facility and urban dweller was identified as the community-level factor associated with maternal hemoglobin level during pregnancy.

Conclusion: This study showed that the consumption of fresh moringa leaf during pregnancy increases the level of hemoglobin. So, policymakers and maternal and child health program managers need to target moringa tree scale-up and encourage fresh moringa leaf consumption during pregnancy, but its use needs additional rigorous clinical trials. In addition to this, mark the above factors in their efforts to increase maternal hemoglobin levels during pregnancy.

Keywords: Southern Ethiopia; fresh moringa leaf consumption; hemoglobin level; pregnant women.

Health, Sport, Rehabilitation

DOI: https://doi.org/10.58962/HSR.2023.9.4.85-93

9(2023)

The effects of COVID-19 restrictions on gross motor function of children with cerebral palsy

Somaia A. Hamed[1], Ahmed Elsayed[2], Nevien Maher Waked[2], Radwa Mohamed Yehia[1], **Efrem Kentiba[3],** Akram M. Helmy[4]

[3]Department of Sports Science, Arba Minch College of Teachers Education; Arba Minch, Ethiopia.

Abstract

Purpose.COVID-19 is an extremely infectious, life-threatening viral illness that has constituted a global public health emergency. Rehabilitation programs of children with cerebral palsy were interrupted during the COVID-19 pandemic. The aim of the study was to assess the effects of COVID-19 restrictions on gross motor function of children with cerebral palsy. Material and Methods. In this study, a survey of fifty-eight cerebral palsied children of both genders who received physical therapy recruited from three hospitals in Cairo, Egypt (October 6 university hospital -6th of October general hospital- El Hosary hospital- Zaid general hospital- Zaid special led hospital- Private physical therapy centers). It was done through pediatrics' Quality of life inventory (cerebral therapy module) to compare between the level of the children's quality of life before and after frequent stopping of physical therapy sessions due to covid-19 pandemic. Results. The result of this study shows that there was a significant difference in movement and balance before and after the lockdown ($p < 0.001$). The mean value was decreased from 54.1% to 33.3%. Also, there was a significant decrease in Pain and hurt ($p<0.001$) from 68.2% to 37.1% and in fatigue ($p<0.001$) from 58.8% to 37.8%. Regarding age there was a significant difference between different age groups regarding daily activities ($p<0.001$), pain ($p<0.010$) and fatigue ($p<0.030$), while after lockdown, there was a significant difference between different age groups regarding daily activities ($p<0.001$) and fatigue ($p<0.001$). Conclusion. Children with cerebral palsy were protected from COVID-19 exposure by staying at home, but their rehabilitation activities were disrupted. Therefore, during pandemics, caregivers must develop effective homecare therapy procedures, and healthcare professionals must routinely reassess the state of the child and caregiver. Additionally, caregivers of children with CP should experience less stress and anxiety. Children with CP can get multidisciplinary support, effective communication, and contact between medical professionals and families.

Keywords: cerebral palsy; COVID-19; gross motor function; lockdown; children© Hamed SA, El-Gayed AS, Waked NM, Yehia RM, Kentiba E, Helmy AM, 2023

Research in Mathematics

DOI: https://doi.org/10.1080/27684830.2023.2225267

10(2023)

New approach of convergent numerical method for singularly perturbed delay parabolic convection-diffusion problems

Zerihun Ibrahim Hassen[1], Gemechis File Duressa[2], Lishan Liu[3]

[1]Department of Mathematics, Arba Minch University, Arba Minch, Ethiopia

Abstract

In this paper, a parameter-uniform convergent numerical scheme is provided for solving singularly perturbed parabolic convection-diffusion differential equations with a large delay. A priori bounds on the exact solution and its derivatives derived by asymptotic analysis of the problem are provided. The problem is discretized by the Crank-Nicolson method on uniform mesh in time direction and a fitted operator upwind finite difference method on uniform mesh in spatial direction. The fitting factor is derived from the zeroth-order asymptotic expansion of the exact solution and then introduced for the term containing the singular perturbation parameter. The convergence analysis is given for the proposed numerical method using the barrier function approach and the Peano kernel. We proved the scheme is uniformly convergent with first -order in space and second order in time, both independent of the perturbation parameter. Numerical experiments are presented to support the theoretical findings.

Keywords: Fitted operator, convection-diffusion, boundary layer, delay differential equations, Crank-Nicolson, peano kernel, zeroth-order expansion

Environmental Pollution

DOI: https://doi.org/10.1016/j.envpol.2023.122144

334(2023)

High-efficiency carbon-coated steel wool filter for controlling cooking-induced oil smoke

Ho-Sheng Wei [1], **Abiyu Kerebo Berekute [2]**, Sepridawati Siregar [3], Kuo-Pin Yu [4]

[2]Department of Chemistry, College of Natural and Computational Sciences, Arba Minch University, Arbaminch, Ethiopia.

Abstract

Cooking oil smoke (COS) contains many harmful substances, such as particulate matter, formaldehyde, and phenyl esters. Currently, commercial COS treatment equipment is expensive and requires a large space. Furthermore, a large amount of agricultural waste is generated and is mainly burned onsite, producing large amounts of greenhouse gases and air pollutants. This waste could be reused as a precursor for biochar and activated carbon. Therefore, this research used saccharification and catalytic hydrothermal carbonization to process rice straw and produce compact carbon-based filters (steel wool-C) for removing cooking-induced pollutants. Scanning electron microscopy indicated that carbon layers were coated on the steel wool. The Brunauer-Emmett-Teller surface area of the carbon filter was 71.595 m^2/g, 43 times larger than that of steel wool. The steel wool filter removed 28.9%-45.4% of submicron aerosol particles. Adding a negative air ionizer (NAI) to the filter system enhanced the particle removal efficiency by 10%-25%. The removal efficiency of total volatile organic compounds was 27.3%-37.1% with the steel wool filter, but 57.2%-74.2% with the carbon-containing steel wool filter, and the NAI improved the removal efficiency by approximately 1%-5%. The aldehyde removal efficiency of the carbon filter with NAI was 59.0%-72.0%. Conclusively, the compact steel wool-C and NAI device could be promising COS treatment equipment for households and small eateries.

Keywords: Cooking oil smoke; Hydrothermal synthesis; Negative air ionizer; Particulate matter; Rice straw; Total volatile organic compounds.

PLOS Global Public Health

DOI: https://doi.org/10.1371/journal.pgph.0000821

3(2023)

Acceptability and feasibility of video-based health education for maternal and infant health in Dirashe District, South Ethiopia: A qualitative study

Wanzahun Godana Boynito [1] , **Godana Yaya Tessema** [3], Kidus Temesgen [1], Stefaan De Henauw [2], Souheila Abbeddou [2]

[1]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia. [3]Department of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Evidence about innovative methods to facilitate nutrition education counseling and promote the intended behavior change at scale is limited. We assessed the acceptability and feasibility of a video-based health education intervention aiming to promote community care for pregnant women, mothers, and infants in the Dirashe District, Ethiopia. Using a phenomenological study design, the experiences of study participants in a trial testing the effectiveness of video-based health education on birth outcomes and nutritional status of mothers and their infants six months postpartum were assessed. Focus group discussions (FGDs) and key informant interviews (KIIs) were used to collect the data. The study was conducted in the Dirashe District, South Ethiopia. Five FGDs and 41 KII were conducted among video implementers, mothers, nurses, and health extension workers (HEWs) in eight intervention villages. All data were collected with a tape recorder. The tape-recorded data were transcribed and then translated into English. Data were analyzed using thematic content analysis. The videos delivered messages about nine themes on health, nutrition, and hygiene related to mothers and infants. Overall, the video-based health education interventions was acceptable and feasible. Messages delivered were found to be clear, easily understandable, culturally acceptable, and relevant to the needs of the mothers. Feasibility was affected by the nature of the work, lack of help, and overlapping duties of the HEWs. The video-based health education intervention was acceptable and feasible. It was suggested that determining a common location/venue to show the videos, involving husbands, and involving HEWs could improve the intervention. Trial registration: The effectiveness "parent" study was registered as a clinical trial with the U.S. National Institute of Health (www.ClinicalTrials.gov; NCT04414527). The qualitative study included recipients from the same cohort (participating mothers from the intervention group), in addition to video implementers, health extension workers the Health Development Army, and nurses from the intervention communities.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e19531

9(2023)

Effectiveness of a covered oil-free cooking process on the abatement of air pollutants from cooking meats

Wei-Wen Huang [1], Rasham Sallah-Ud-Din [1 2], Wonder Nathi Dlamini [1 2], **Abiyu Kerebo Berekute [1 3]**, Mastewal Endeshaw Getnet [4], Kuo-Pin Yu [1 2]

[3]Department of Chemistry, College of Natural and Computational Sciences, Arba Minch University, Arbaminch, Ethiopia.

Abstract

Cooking events can generate household air pollutants that deteriorate indoor air quality (IAQ), which poses a threat to human health and well-being. In this study, the emission characteristics and emission factors (EFs) of air pollutants of different meats (beef, lamb, chicken, pork, and fish) cooked by a novel oil-free process and common with-oil processes were investigated. Oil-free cooking tends to emit lower total volatile organic compound (TVOC) levels and fewer submicron smoke particles and can reduce the intake of fat and calories. However, TVOC emissions during oil-free cooking were significantly different, and the lamb EFs were nearly 8 times higher than those during with-oil cooking. The particle-bound polycyclic aromatic hydrocarbon (ΣPPAH) and benzo(*a*)pyrene-equivalent (ΣBaP_{eq}) EFs during with-oil cooking ranged from 76.1 to 140.5 ng/g and 7.7-12.4 ng/g, respectively, while those during oil-free cooking ranged from 41.0 to 176.6 ng/g and 5.4-47.6 ng/g, respectively. The ΣPPAH EFs of chicken, pork, and fish were lower during oil-free cooking than during cooking with oil. Furthermore, the ΣBaP_{eq} EFs of beef, chicken, pork, and fish were lower during oil-free cooking than during cooking with oil. Therefore, it is recommended to use the oil-free method to cook chicken, pork, and fish to reduce ΣPPAH and ΣBaP_{eq} emissions, but not recommended to cook lamb due to the increase of ΣBaP_{eq} emissions. The with-oil uncovered cooking EFs of aldehydes ranged from 3.77 to 22.09 μg/g, and those of oil-free cooking ranged from 4.88 to 19.96 μg/g. The aldehyde EFs were lower during oil-free covered cooking than with-oil uncovered cooking for beef, chicken, and fish. This study provides a better realizing of new cooking approaches for the reduction of cooking-induced emission, but further research on the effects of food composition (moisture and fat) and characteristics is needed.

Keywords: Cooking-induced emissions; Emission factors; Particle-bound polycyclic aromatic hydrocarbons (PPAHs); Particulate matter; Volatile organic compounds.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e17966

9(2023)

Three-dimensional strength reduction and two-dimensional limit equilibrium methods of slope stability analysis

Kelifa Shirago [1], Democracy Dirate [1]

[1]Arba Minch University, Arba Minch, Ethiopia.

Abstract

Landslides caused tremendous damage to the life and properties of society. In this study, cut slopes were analyzed using the two-dimensional (2D) limit equilibrium method (LEM) by slope/w software and a three-dimensional (3D) strength reduction method (SRM) by using Fast Lagrangian Analysis of Continua in 3 Dimensions (FLAC3D), which is a finite difference method (FDM) numerical software. Analysis of the slope is done by representative soil samples collected and transported to the laboratory to determine input parameters like unit weight (γ), shear strength parameters (c,φ), and the water level position. Strength parameters were determined from direct shear tests for cohesionless soil and consolidated undrained (CU) triaxial tests for cohesive soils. For 2D analysis, the factor of safety (FOS) was calculated for the condition of dry and maximum water levels using Morgenstern-price methods, and the analysis gave FOS 0.743 and 0.614 for the dry and maximum water level conditions, respectively; for SRM, the input parameters of bulk and shear modulus (B, G) which were determined from the empirical equation using modulus of elasticity(E) and Poisson's ratio(υ). Moreover, υ were adjusted according to the principle of φ-*v* inequality. For 2D analysis, FOS were 0.743 and 0.614 for dry and maximum water levels using Morgenstern-price methods, whereas 3D analysis gave FOS 0.34 and 0.31 for dry and maximum water levels, respectively. From the analysis, it is concluded that 2D LEM is given higher FOS than 3D FDM. Moreover, the 3D analysis showed that velocity and displacement in the lateral Y direction were minimal and maximum in the horizontal X direction. The maximum horizontal velocity for the respective dry and maximum water level conditions gave $6.64*10^{-4}$ m/step and $6.04*10^{-4}$ m/step and maximum horizontal displacement 7.36 m and 6.06 m for dry and maximum water levels, respectively.

Keywords: Displacement; FEM; FLAC3D; Factor of safety; LEM; Stability analysis.

Journal of Plant Physiology

DOI: https://doi.org/10.1016/j.jplph.2023.154023

287(2023)

Remediation of soil polluted with Pb and Cd and alleviation of oxidative stress in Brassica rapa plant using nanoscale zerovalent iron supported with coconut-husk biochar

Moses Akintayo Aborisade [1], Hongzhi Geng [2], **Belay Tafa Oba [3]**, Akash Kumar [2], Efomah Andrew Ndudi [2], Ashenafi Yohannes Battamo [2], Jiashu Liu [2], Daying Chen [2], Oluwaseun Princess Okimiji [4], Oluwasheyi Zacchaeus Ojekunle [5], Yongkui Yang [2], Peizhe Sun [2], Lin Zhao [6]

[3]College of Natural Science, Arba Minch University, 21, Arba Minch, Ethiopia.

Abstract

Accumulation of toxic elements by plants from polluted soil can induce the excessive formation of reactive oxygen species (ROS), thereby causing retarded plants' physiological attributes. Several researchers have remediated soil using various forms of zerovalent iron; however, their residual impacts on oxidative stress indicators and health risks in leafy vegetables have not yet been investigated. In this research, nanoscale zerovalent iron supported with coconut-husk biochar (nZVI-CHB) was synthesized through carbothermal reduction process using Fe_2O_3 and coconut-husk. The stabilization effects of varying concentrations of nZVI-CHB and CHB (250 and 500 mg/kg) on cadmium (Cd) and lead (Pb) in soil were analyzed, and their effects on toxic metals induced oxidative stress, physiological properties, and antioxidant defence systems of the Brassica rapa plant were also checked. The results revealed that the immobilization of Pb and Cd in soil treated with CHB was low, leading to a higher accumulation of metals in plants grown. However, nZVI-CHB could significantly immobilize Pb (57.5-62.12%) and Cd (64.1-75.9%) in the soil, leading to their lower accumulation in plants below recommended safe limits and eventually reduced carcinogenic risk (CR) and hazard quotient (HQ) for both Pb and Cd in children and adults below the recommended tolerable range of <1 for HQ and 10^{-6} - 10^{-4} for CR. Also, a low dose of nZVI-CHB significantly mitigated toxic metal-induced oxidative stress in the vegetable plant by inhibiting the toxic metals uptake and increasing antioxidant enzyme activities. Thus, this study provided another insightful way of converting environmental wastes to sustainable adsorbents for soil remediation and proved that a low-dose of nZVI-CHB can effectively improve soil quality, plant physiological attributes and reduce the toxic metals exposure health risk below the tolerable range.

Keywords: Antioxidants; Brassica rapa; Health risk; ROS; Soil remediation; nZVI-supported coconut-husk biochar.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e17659

9(2023)

Shelf-life improvement of raw milk using ethanolic extracts of selected medicinal plants (*Moringa stenopetale, Artemesia anua and MenthaSpicata)*

Amsalu Matewos Orcho [1], Tolera Seda Badessa [1], Alemu Mekonnen Tura [1], Temesgen Dingamo Dirko [2]

[1]Chemistry Department, College of Natural & Computational Sciences, Arba Minch University
[2]Biodiversity Conservation and Research Center, College of Natural Science, Arba Minch University

Abstract

The current study was designed to examine the Shelf life extension ability and antioxidant activity of the ethanolic extracts processed from Moringa stenopetale, Artemesia anua and Mentha Spicata. The raw milk and preservative plants was collected from Chencha woreda, Arba Minch. Purposive sampling techniques were used for collection of milk and plant samples. The crude extracts were isolated from three plant species using Soxhlet extraction method and characterized for the presence of bio-active compounds qualitatively and quantitatively. He accelerated shelf-life testing method was used to estimate the shelf-life of milk samples. Deterioration was tracked using measurements of the peroxide values and sensory characteristics. The DPPH free radical scavenging assay was used to determine the antioxidant capacity of various extracts, and the absorbance was measured at 517 nm. Mentha Spicata had the highest TPC value of 2.842 ±± 0.109 mg GAE/g, while Moringa stenopetale had the lowest at 0.285±± 0.0098 mg GAE/g. Similarly, Moringa stenopetale had the greatest TTC value of 69.86 ±± 1.25 mg QE/g, while Mentha Spicata had the lowest at 46.2 ±± 0.7 mg QE/g. The extracts of Moringa stenopetale, Artemesia anua, and Mentha Spicata showed good antioxidant activities, with IC_{50} values of 39.490 ±± 0.029, 61.189±± 0.058, and 68.062±± 0.014 g/mL, respectively. The shelf-life of the milk sample improved with Moringa stenopetale was 6.99 days at 27 °C. Generally, Moringa stenopetale had the longest shelf life of all the plant extracts tested for milk samples.

Keywords: Anti-oxidant; Peroxide value; Phytochemical screening; Raw milk; Shelf-life.

BMJ Open

DOI: http://dx.doi.org/10.1136/bmjopen-2022-068498

13(2023)

Burden of lower respiratory infections and associated risk factors across regions in Ethiopia: a subnational analysis of the Global Burden of Diseases 2019 study

Addis Aklilu[13], Zeleke Gebru[15], Belay Boda Abule Bodicha[13], Chuchu Churko[15], Lankamo Ena[13], Mathewos Alemu Gebremichael[13], Bereket Beyene[13], Negussie Boti Sidamo[15]Melat Weldemariam[34]

[13]Arba Minch University, Arba Minch, Ethiopia
[15]Public Health, Arba Minch University, Arba Minch, Ethiopia
[34]Department of Medical Laboratory Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Objective This analysis is to present the burden and trends of morbidity and mortality due to lower respiratory infections (LRIs), their contributing risk factors, and the disparity across administrative regions and cities from 1990 to 2019. Design This analysis used Global Burden of Disease 2019 framework to estimate morbidity and mortality outcomes of LRI and its contributing risk factors. The Global Burden of Disease study uses all available data sources and Cause of Death Ensemble model to estimate deaths from LRI and a meta-regression disease modelling technique to estimate LRI non-fatal outcomes with 95% uncertainty intervals (UI). Study setting the study includes nine region states and two chartered cities of Ethiopia. Outcome measures We calculated incidence, death and years of life lost (YLLs) due to LRIs and contributing risk factors using all accessible data sources. We calculated 95% UIs for the point estimates. Results In 2019, LRIs incidence, death and YLLs among all age groups were 8313.7 (95% UI 7757.6–8918), 59.4 (95% UI 49.8–71.4) and 2404.5 (95% UI 2059.4–2833.3) per 100 000 people, respectively. From 1990, the corresponding decline rates were 39%, 61% and 76%, respectively. Children under the age of 5 years account for 20% of episodes, 42% of mortalities and 70% of the YLL of the total burden of LRIs in 2019. The mortality rate was significantly higher in predominantly pastoralist regions—Benishangul-Gumuz 101.8 (95% UI 84.0–121.7) and Afar 103.7 (95% UI 86.6–122.6). The Somali region showed the least decline in mortality rates. More than three-fourths of under-5 child deaths due to LRIs were attributed to malnutrition. Household air pollution from solid fuel attributed to nearly half of the risk factors for all age mortalities due to LRIs in the country. Conclusion In Ethiopia, LRIs have reduced significantly across the regions over the years (except in elders), however, are still the third-leading cause of mortality, disproportionately affecting children younger than 5 years old and predominantly pastoralist regions. Interventions need to consider leading risk factors, targeted age groups and pastoralist and cross-border communities.

Environmental Research

DOI: https://doi.org/10.1016/j.envres.2023.116047

231(2023)

Synergistic between autotrophic and heterotrophic microorganisms for denitrification using bio-S as electron donor

Qi Sun [1], Ying-Ke Fang [2], Wen-Zong Liu [3], Nan Xie [4], Heng Dong [5], **Awoke Guadie [6]**, Ying Liu [7], Hao-Yi Cheng [3], Ai-Jie Wang [8]

[6]Department of Biology, College of Natural Sciences, Arba Minch University, Arba Minch 21, Ethiopia.

Abstract

In recent years, biological sulfur (bio-S) was employed in sulfur autotrophic denitrification (SAD) in which autotrophic Thiobacillus denitrificans and heterotrophic Stenotrophomonas maltophilia played a key role. The growth pattern of T.denitrificans and S.maltophilia exhibited a linear relationship between OD_{600} and CFU when $OD_{600} < 0.06$ and <0.1, respectively. When S.maltophilia has applied alone, the NorBC and NosZ were undetected, and denitrification was incomplete. The DsrA of S.maltophilia could produce sulfide as an alternative electron donor for T.denitrificans. Even though T.denitrificans had complete denitrification genes, its efficiency was low when used alone. The interaction of T.denitrificans and S.maltophilia reduced nitrite accumulation, leading to complete denitrification. A sufficient quantity of S.maltophilia may trigger the autotrophic denitrification activity of T.denitrificans. When the colony-forming units (CFU) ratio of S.maltophilia to T.denitrificans was reached at 2:1, the highest denitrification performance was achieved at 2.56 and 12.59 times higher than applied alone. This research provides a good understanding of the optimal microbial matching for the future application of bio-S.

Keywords: Biological sulfur; Growth curve; Microbial interaction; Stenotrophomonas maltophilia; Sulfur autotrophic denitrification; Thiobacillus denitrificans.

The Lancet
DOI: https://doi.org/10.1016/s0140-6736(23)01301-6
402(2023)

Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: a systematic analysis for the Global Burden of Disease Study 2021

A B Bekele[1], F W Demisse[2] and H L Esayas[2]
[1]Department of Medical Anatomy, Arba Minch University, Arba Minch, Ethiopia
[2]Department of Midwifery, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Diabetes is one of the leading causes of death and disability worldwide, and affects people regardless of country, age group, or sex. Using the most recent evidentiary and analytical framework from the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD), we produced location-specific, age-specific, and sex-specific estimates of diabetes prevalence and burden from 1990 to 2021, the proportion of type 1 and type 2 diabetes in 2021, the proportion of the type 2 diabetes burden attributable to selected risk factors, and projections of diabetes prevalence through 2050. **Methods:** Estimates of diabetes prevalence and burden were computed in 204 countries and territories, across 25 age groups, for males and females separately and combined; these estimates comprised lost years of healthy life, measured in disability-adjusted life-years (DALYs; defined as the sum of years of life lost [YLLs] and years lived with disability [YLDs]). We used the Cause of Death Ensemble model (CODEm) approach to estimate deaths due to diabetes, incorporating 25 666 location-years of data from vital registration and verbal autopsy reports in separate total (including both type 1 and type 2 diabetes) and type-specific models. Other forms of diabetes, including gestational and monogenic diabetes, were not explicitly modelled. Total and type 1 diabetes prevalence was estimated by use of a Bayesian meta-regression modelling tool, DisMod-MR 2.1, to analyse 1527 location-years of data from the scientific literature, survey microdata, and insurance claims; type 2 diabetes estimates were computed by subtracting type 1 diabetes from total estimates. Mortality and prevalence estimates, along with standard life expectancy and disability weights, were used to calculate YLLs, YLDs, and DALYs. When appropriate, we extrapolated estimates to a hypothetical population with a standardised age structure to allow comparison in populations with different age structures. We used the comparative risk assessment framework to estimate the risk-attributable type 2 diabetes burden for 16 risk factors falling under risk categories including environmental and occupational factors, tobacco use, high alcohol use, high body-mass index (BMI), dietary factors, and low physical activity. Using a regression framework, we forecast type 1 and type 2 diabetes prevalence through 2050 with Socio-demographic Index (SDI) and high BMI as predictors, respectively. **Findings:** In 2021, there were 529 million (95% uncertainty interval [UI] 500-564) people living with diabetes worldwide, and the global age-standardised total diabetes prevalence was 6·1% (5·8-6·5). At the super-region level, the highest age-standardised rates were observed in north Africa and the Middle East (9·3% [8·7-9·9]) and, at the regional level, in Oceania (12·3% [11·5-13·0]). Nationally, Qatar had the world's highest age-specific prevalence of diabetes, at 76·1% (73·1-79·5) in individuals aged 75-79 years. Total diabetes prevalence-especially among older adults-primarily reflects type 2 diabetes, which in 2021 accounted for 96·0% (95·1-96·8) of diabetes cases and 95·4% (94·9-95·9) of diabetes DALYs worldwide. In 2021, 52·2% (25·5-71·8) of global type 2 diabetes DALYs were attributable to high BMI. The contribution of high BMI to type 2 diabetes DALYs rose by 24·3% (18·5-30·4) worldwide between 1990 and 2021. By 2050, more than 1·31 billion (1·22-1·39) people are projected to have diabetes, with expected age-standardised total diabetes prevalence rates greater than 10% in two super-regions: 16·8% (16·1-17·6) in north Africa and the Middle East and 11·3% (10·8-11·9) in Latin America and Caribbean. By 2050, 89 (43·6%) of 204 countries and territories will have an age-standardised rate greater than 10%.**Interpretation:** Diabetes remains a substantial public health issue. Type 2 diabetes, which makes up the bulk of diabetes cases, is largely preventable and, in some cases, potentially reversible if identified and managed early in the disease course. However, all evidence indicates that diabetes prevalence is increasing worldwide, primarily due to a rise in obesity caused by multiple factors. Preventing and controlling type 2 diabetes remains an ongoing challenge. It is essential to better understand disparities in risk factor profiles and diabetes burden across populations, to inform strategies to successfully control diabetes risk factors within the context of multiple and complex drivers.

AIP Conference Proceedings

DOI: http://dx.doi.org/10.1063/5.0165295

2856(2023)

Improving output parameters of eco-friendly bio fueled diesel engine by swirling grooves piston design

Isaac Joshua Ramesh Lalvani[1] , Solomon Neway Jida[1]; Teshome Dengiso Megiso[1]; Elumalai Perumal Venkatesan[2]; Anjanidevi Sanipina[3]

[1]Faculty of Mechanical Engineering, AMIT Campus, Arba Minch University, Arba Minch, Ethiopia

Abstract

The main aim of the study is to improve the combustion chamber's ability to squish, swirl, and tumble while also increasing its efficiency. Because of improved in-cylinder motion, the rate of fuel consumption has increased. The swirling grooves on the piston crown, as well as the shallow depth type combustion chamber, were used to create this feature. To achieve three distinct widths, three swirling grooves with varying depth (2mm) were constructed (5.5mm, 6.5mm, and 7.5mm). Pongamia biodiesel is utilized as an energy source for the experiments. It has been observed that the 6.5mm wide swirling grooved shallow depth piston offers superior performance, along with improved combustion characteristics, especially resulting in lower emissions.

Journal of Failure Analysis and Prevention

DOI: https://doi.org/10.1007/s11668-023-01718-4

23(2023)

Failure Analysis on the Wheel Bolt of Light-Duty Vehicle Through Metallurgical Investigation

Dilinesaw Bogale[1], Tesfaye Tamiru[3], Abraham Debebe[4], **Haileyesus Hatano**[1] **& Ewnetu Getu**[2]

[1]Faculty of Mechanical Engineering, Arba Minch Institute of Technology, Arba Minch University
[2]Renewable Energy Technology Research Center, Arba Minch Institute of Technology, Arba Minch University

Abstract

This paper contributes to know the root causes of wheel bolt failure using experimental methods by providing appropriate solutions concerning repair strategies and the mitigation of future failure for durable vehicle operation. The investigation was carried out on a damaged and new specimen for comparison purposes with the standard specification of the bolt. The analysis was conducted through fracture surface examination of visual observation, chemical composition, metallographic analysis, and mechanical hardness test. The experimental results revealed that the fracture surface of the damaged bolt showed fatigue beach mark characteristics that unintentionally can occur due to fatigue, and the microstructural examination exhibited a more amount of dark structure on the damaged specimen because of the increased carbon content in the bolt. Finally, it was concluded that the typical features of overloading and fatigue mechanism observed at the bolts are assessed as the likely probable root cause of failure in wheel bolts.

Irrigation and Drainage

DOI: https://doi.org/10.1002/ird.2831

72(2023)

Determination of yield response factors for different varieties of teff

Ligalem Agegn Asres[1], Melkamu Ateka Derebe[1]

[1]Faculty of Water Resources and Irrigation Engineering, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

The yield response factor (K_y) at different crop growth stages for different varieties of teff is important to identify the sensitivity stage to water stress for irrigation water management. However, K_y is affected by crop variety and agroclimatic conditions, but there has been no study for different varieties of teff. Therefore, this study focused on the determination of K_y for different varieties of teff. In total, 18 treatments were designed as randomized complete block design and replicated three times. Crop evapotranspiration was measured using a weighing-type lysimeter. Yield response factors were determined as a function of yield and crop evapotranspiration at each crop growth stage of teff. Accordingly, the stagewise K_y for the Tseday teff variety was 0.32, 0.39, 0.55 and 0.06 and for the Quncho teff variety 0.19, 0.24, 0.56 and 0.03 for the vegetative, flowering, yield formation and ripening growth stages, respectively. The seasonal K_y values for Tseday and Quncho were 1.30 and 1.11, respectively. Therefore, water stress during the yield formation growth stage is not recommended, whereas it is possible to adopt irrigation water stress at the ripening growth stage to save water. The saved water will be used for the extension of irrigable agricultural areas.

The Lancet

DOI: https://doi.org/10.1016/s0140-6736(23)00860-7

402(2023)

The unfinished agenda of communicable diseases among children and adolescents before the COVID-19 pandemic, 1990-2019: a systematic analysis of the Global Burden of Disease Study 2019

S M Degualem[1], A A Demlash[2]

Department of Nursing, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Communicable disease control has long been a focus of global health policy. There have been substantial reductions in the burden and mortality of communicable diseases among children younger than 5 years, but we know less about this burden in older children and adolescents, and it is unclear whether current programmes and policies remain aligned with targets for intervention. This knowledge is especially important for policy and programmes in the context of the COVID-19 pandemic. We aimed to use the Global Burden of Disease (GBD) Study 2019 to systematically characterise the burden of communicable diseases across childhood and adolescence.

Methods: In this systematic analysis of the GBD study from 1990 to 2019, all communicable diseases and their manifestations as modelled within GBD 2019 were included, categorised as 16 subgroups of common diseases or presentations. Data were reported for absolute count, prevalence, and incidence across measures of cause-specific mortality (deaths and years of life lost), disability (years lived with disability [YLDs]), and disease burden (disability-adjusted life-years [DALYs]) for children and adolescents aged 0-24 years. Data were reported across the Socio-demographic Index (SDI) and across time (1990-2019), and for 204 countries and territories. For HIV, we reported the mortality-to-incidence ratio (MIR) as a measure of health system performance.

Findings: In 2019, there were 3·0 million deaths and 30·0 million years of healthy life lost to disability (as measured by YLDs), corresponding to 288·4 million DALYs from communicable diseases among children and adolescents globally (57·3% of total communicable disease burden across all ages). Over time, there has been a shift in communicable disease burden from young children to older children and adolescents (largely driven by the considerable reductions in children younger than 5 years and slower progress elsewhere), although children younger than 5 years still accounted for most of the communicable disease burden in 2019. Disease burden and mortality were predominantly in low-SDI settings, with high and high-middle SDI settings also having an appreciable burden of communicable disease morbidity (4·0 million YLDs in 2019 alone). Three cause groups (enteric infections, lower-respiratory-tract infections, and malaria) accounted for 59·8% of the global communicable disease burden in children and adolescents, with tuberculosis and HIV both emerging as important causes during adolescence. HIV was the only cause for which disease burden increased over time, particularly in children and adolescents older than 5 years, and especially in females. Excess MIRs for HIV were observed for males aged 15-19 years in low-SDI settings.

Interpretation: Our analysis supports continued policy focus on enteric infections and lower-respiratory-tract infections, with orientation to children younger than 5 years in settings of low socioeconomic development. However, efforts should also be targeted to other conditions, particularly HIV, given its increased burden in older children and adolescents. Older children and adolescents also experience a large burden of communicable disease, further highlighting the need for efforts to extend beyond the first 5 years of life. Our analysis also identified substantial morbidity caused by communicable diseases affecting child and adolescent health across the world.

IET Communications

DOI: https://doi.org/10.1049/cmu2.12530

17(2023)

Retracted: Development of intrusion detection system using machine learning for the analytics of Internet of Things enabled enterprises

Raghavendra S.[1], Dharmesh Dhabliya[2], Dipannita Mondal[3], Batyrkhan Omarov[4], Krishnan Sakthidasan Sankaran[5], Anishkumar Dhablia[6], Sushovan Chaudhury[7], **Mohammad Shabaz[8]**

[8]Hydraulic and Water Resources Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Internet of Things (IoT) is a smart network for connecting everything to the internet. In an IoT network, things and devices can talk to each other wirelessly because they use smart but small sensors. It is possible for IoT devices to talk to each other without the help of a person. The IoT communicates with other objects/things and collaborates with other objects to come up with new applications or services. The rapid growth of network infrastructure has made the landscape more vulnerable. More and more viruses are being made specifically for security devices, and this is a big problem. There are so many devices out there, and they do not have any real protection. Machine learning algorithms have the capability of learning from previously available malware or intrusion data and then apply that learning on upcoming threats. This has shown significant results. This article presents a feature selection and machine learning enabled method for classification of intrusion data set. PCA is used for feature selection. Machine learning algorithms namely—KNN, Bayesian Classifier and ID3 are used for classification. KNN with PCA is performing better on parameters like accuracy, sensitivity and specificity.

Ecological Indicators

DOI: https://doi.org/10.1016/j.ecolind.2023.110416

153(2023)

Land use change alters phosphatase enzyme activity and phosphatase-harboring microbial abundance in the subalpine ecosystem of southeastern Qinghai-Tibet Plateau, China

Belayneh Azene [a b c 1], Renhuan Zhu [a b 1], Kaiwen Pan [a], Xiaoming Sun [a], Yalemzewd Nigussie [d], Piotr Gruba [e], Ali Raza [a b], **Awoke Guadie [f]**, Xiaogang Wu [a], Lin Zhang [a]

[f]Department of Biology, College of Natural Sciences, Arba Minch University, Arba Minch 21, Ethiopia

Abstract

In the presence of limited phosphorus (P) in terrestrial ecosystems, exploring how land use change (LUC) affects phosphatase enzyme activity and microbial communities is important for managing soil P, because microorganisms carry out the majority of P cycling in the soil through producing phosphatase enzymes. In this study, we explored the impact of LUC on P availability, phosphatase enzyme, the abundance of phosphatase-encoding genes, and microorganisms. We collected 168 soil samples at soil depths of 0–20 cm and 20–40 cm from seven sampling sites, each of which represented by four different land uses: artificial forests (AF), farmlands (FL), natural forests (NF), and shrubland (SL). We analyzed phosphatase-encoding genes and microbes from metagenome datasets. Results indicated that P availability substantially increased following NF to FL conversion. In contrast, phosphatase enzyme activity significantly decreases when NF is converted to different land uses, due to the decline of soil organic carbon (SOC), moisture content (MC) and total nitrogen (TN). We have also detected 13 P solubilizing and mineralizing genes. The *phoD* and *gcd* were the dominant mineralizing and solubilizing genes, respectively. Farmland had higher *gcd* gene abundance, while NF had significantly higher *phoD* gene abundance. The *gcd* gene abundance were mainly governed by pH and total P, whereas pH and available P were the primary factors controlling *phoD* gene. MC, SOC and TN regulated other genes detected in this study. With regard to the dominant *gcd*-harboring phyla, Acidobacteria, Proteobacteria, Bacteroidetes and Gemmatimonadetes were the dominant, while Proteobacteria, Acidobacteria, Actinobacteria, and Candidatus_Rokubacteria were the dominant *phoD*-harboring phyla. The majority of *gcd* and *phoD*-harboring microorganisms were primarily controlled by pH, available P and total P. However, some phyla also regulated by MC, SOC, and TN. In general, our findings suggested that LUC significantly alters phosphatase enzymes and the abundance of phosphate-encoding genes and microbes. These changes have significant implications for soil P cycling.

Keywords: *gcd*-Encoding gene*; gcd*-Harboring microbes; Land use change; *phoD*-Encoding gene; *phoD*-Harboring microbes; Phosphatase enzymes

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e17833

9(2023)

Effect of furrow irrigation systems and irrigation levels on maize agronomy and water use efficiency in Arba Minch, Southern, Ethiopia

Tigabie Setu [1], Terhas Legese [1], Geteneh Teklie [1], **Birara Gebeyhu [2]**

[2]Water Resources and Irrigation Engineering Faculty, AWTI, Arba Minch University, Ethiopia.

Abstract

Improved irrigation water management is the main strategy to improve water use efficiency in areas with limited water resources. Optimizing scarce water by selecting suitable furrow irrigation systems in arid and semi-arid parts of Ethiopia is rarely practiced. A field experiment was carried out to evaluate the effect of conventional, alternate, and fixed furrow irrigation systems with three levels of irrigation (100%ETc, 75%ETc, and 50%ETc) on maize agronomy and water use efficiency in Arba Minch, Southern, Ethiopia. The experimental study had nine treatments under a randomized complete block design with three replications. Furrow irrigation system and deficit irrigation levels had a significant impact ($P < 0.01$) on maize agronomy, grain yield, and water use efficiency. The maximum grain yield of 7.99 ton ha^{-1} obtained under a conventional furrow irrigation system at 100%ETc was significantly higher than the other treatments and the minimum grain yield of 4.24 ton ha^{-1} obtained under a fixed furrow irrigation system at 50%ETc was significantly inferior as compared to other treatments. The maximum values of crop, field, and expense water use efficiencies were 2.49, 2.80, and 1.72 kg m^{-3} under conventional furrow irrigation at 50%ETc, respectively. The minimum values of crop, field, and expense water use efficiencies were 1.47, 1.28, and 1.05 kg m^{-3} under a fixed furrow irrigation system at 100%ETc, respectively. A conventional furrow irrigation system at 50%ETc can increase 0.64 ha net additional irrigable land pre each hectare compared to the conventional furrow irrigation system at 100%ETc. Water saving up to 50%ETc in conventional furrow irrigation can solve the water shortage problem by improving water use efficiency with insignificant yield reduction.

Keywords: Deficit irrigation; Furrow irrigation; Water use efficiency.

Applied Water Science

DOI: https://doi.org/10.1007/s13201-023-01987-2

13(2023)

Biosynthesis of magnesium oxide nanoparticles using *Hagenia abyssinica* female flower aqueous extract for characterization and antibacterial activity

Belete Yilma Hirphaye[1], Nafikot Berhanu Bonka[1], Alemu Mekonnen Tura[1] & Gada Muleta Fanta[1]

[1]Department of Chemistry, College of Natural and Computational Sciences, Arba Minch University.

Abstract

The present study deals with the biosynthesis of magnesium oxide nanoparticles using the *Hagenia abyssinica* female flower aqueous extract. The prepared MgO NPs were characterized by visual observation, UV–Vis, XRD, FTIR, and SEM studies. Optimum parameters such as plant extract volume (25 mL), temperature (60 ℃), pH (12), precursor concentration (1 mM), reaction time (120 min), and the formation of the MgO NPs in the colloidal solution were monitored by a UV–Vis spectrophotometer. XRD patterns of MgO NPs confirmed the face-centered cubic structure and average crystallite size of NPs at 12.8 nm. The FTIR spectra depicted a peak at 407 cm^{-1}, which corresponds to the stretching vibration of MgO and is the characteristic peak for MgO NPs. SEM confirms spherical morphology, and the overall size of MgO NPs ranges from 10 to 40 nm. The antibacterial activity of synthesized MgO NPs was determined by the agar-well-diffusion method, which found that nanoparticles have significant antibacterial activity zone of inhibition against *Staphylococcus aureus* (27 ± 0.28 mm) and against *Escherichia coli* (15 ± 0 mm).

Applied Water Science

DOI: http://dx.doi.org/10.1007/s13201-023-01952-z

13(2023)

Investigation of the Wabe River water's suitability for drinking purposes and aquatic life and detection of pollution sources

Tilahun Kasa[1] & Daniel Reddythota[1]

[1]Faculty of Water Supply and Environmental Engineering, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Wabe River is a vital source of drinking water, irrigation for agriculture, and income for the local residents. However, the river's declining quality has led to an increase in waterborne infections and made it appear muddier. The study's objective was to evaluate the Wabe river water quality using 23 different water quality parameters to calculate the Weighted Arithmetic Water Quality Index (WAWQI), Metal Index (MI), Pollution Index (PI), and Potential Ecological Risk Index (PERI). The origins and hydro-chemical makeup of the river water were also ascertained using Piper diagrams and Gibb's plots. During the wet season, the WAWQI results revealed that the river water is unfit for drinking, which range from 205.4 to 487.8 (> 100) at all sampling stations. During the dry season, the water quality ranged from good to unsuitable (48.7–101.4). Similarly, the results of the Metal Index were greater than 1(MI > 1) indicates 'Threshold of warning' for drinking and aquatic life in both seasons. Pollution index results showed 'seriously' effect on aquatic life. However, the risk level posed by those metals according to PERI was in the range of 436.9 (Strong) to 1714.1 (Very high) and 288.5 (Moderate) to 704.3 (Very high) during the wet and dry seasons, respectively. The sources of contamination were confirmed by Gibb's plots as rock weathering, evaporation, and anthropogenic activities, and the water type was classified as calcium-magnesium-chloride by the piper diagram. Controlling the sources of pollution is necessary for preserving the Wabe River's sustainability.

PLoS ONE

DOI: https://doi.org/10.1371/journal.pone.0280993

18(2023)

Mothers' health care seeking behavior for neonatal danger sign in southern Ethiopia: Community based cross-sectional study

Molalegn Mesele [1], Kelemu Abebe [1], Samuel Dessu [2], Walellign Anmut [1], Addisu Yeshambel [1], **Zinabu Dawit [3]**, Tiwabwork Tekalign [4], Natnael Atnafu [1], Yohannes Fikadu [5]

[3]Department of Nursing, Arba Minch Health Science College, Arba Minch, Southern Ethiopia.

Abstract

Background: Over the previous few decades, significant progress has been made in reducing newborn mortality, but the worldwide scale of the problem remains high. A considerable number of newborn death and difficulties owing to neonatal danger signs could be avoided if mothers sought appropriate health care for common neonatal risk indications, according to a number of studies presently underway in Ethiopia. The aim of this study is to assess health care seeking behavior of mothers' in related to neonatal danger signs.

Method: A community-based cross-sectional study was conducted among 410 participants in Wolaita Sodo, From October 1 to October 30, 2019. To collect data, structured interviewer administered questionnaire was used. Data was coded, cleaned, recoded and entered in to epi-data version 3.1 and transported to SPSS window version 21 for analysis. Multivariable logistic regression was carried out and p-value of less than or equal to 0.05 was considered statistically significant.

Result: A total of 410 mothers participated in this study, 110 (47.6%) mothers preferred health intuition for their neonate. Husband educational status (AOR = 2.4, 95% CI = 1.1, 5.5), communication media (AOR = 4.3, 95% CI = 2.4, 7.5), place of residence (AOR = 3.5, 95% C.I = 1.9, 6.7), ANC follow up (AOR = 2.8, 95% CI = 1.4, 5.8), and PNC follow (AOR = 1.7, 95% CI = 1.1, 3.1) were all factors that significantly associated with health care seeking practice neonatal dander signs.

Conclusion: Overall, there was a low degree of health-seeking practice. The educational status of the mother's husband, communication media, residence, ANC follow-up, and PNC follow-up all predicted the mothers' health-care seeking behavior. The study also identifies the Wolaita Zone and Sodo town health offices, the health development army, one to five local community organizations with and health extension workers as key contributors.

Community Ecology

DOI: http://dx.doi.org/10.1007/s42974-023-00159-1

24(2023)

Plant community types and species compositional variations of the forest patches in Wolaita zone, Southwest Ethiopia

Eyasu Chama[1], Simon Shibru[1], Tizazu Gebre[1], Sebsebe Demissew[2] & Zerihun Woldu[2]

[1]Biology Department, Arba Minch University, P.O. Box 21, Arba Minch (South), Ethiopia

Abstract

Forests in Ethiopia are of high ecological value, but their area is declining at an alarming rate due to various anthropogenic pressures. We identified and characterized plant communities, species diversity, and their determinants in forest patches in Wolaita, Southwest Ethiopia. We recorded the number of individuals of plants, species cover-abundance, and environmental factors in 126 (20 m × 20 m) quadrats. We sampled soils from three layers of 10 cm depth each and took air-dried composite samples to soil laboratory of Arba Minch University for analyses. The plant community–environment relationship was determined using canonical correspondence analysis. We used various diversity indices to compute species diversity. Species composition resemblance between the plant communities was determined using Sorensen's similarity coefficient. We identified five distinct plant communities using hierarchical agglomerative clustering. *Diospyros abyssinica—Combretum collinum* community was rich, while *Combretum molle—Ficus vasta* community was poor in species. *Juniperus procera—Olea europaea* community and *Cordia africana—Prunus africana* community showed the highest species similarity. *D. abyssinica—C. collinum* community had the maximum Shannon entropy ($H = 4.19$), while *C. molle—F. vasta* community had the minimum ($H = 3.17$). Shannon entropy was high in the study area ($H = 3.75$; Evenness = 0.86; Number of effective species = 41.7). *J. procera—O. europaea* community was dense (1014 individuals' ha^{-1}), whereas *C. molle—F. vasta* community was sparse (762 individuals ha^{-1}). Altitude, pH, EC, total nitrogen, sand, and clay explained most of the variations among community types. In general, low level of disturbance was detected in the study areas. Anthropogenic pressures, such as livestock grazing, and browsing, tree cutting for construction material and fuelwood, and mowing of grasses for livestock feed and roof cover may expose the soil to erosion and can alter the composition and structure of the forest patches in the study area. The low disturbance value, the high Shannon entropy, and other metrics show that these communities are of high natural value; thus, their preservation is of utmost importance. Monitoring and conservation intervention are necessary to sustain the importance of forest ecosystems.

PLoS ONE

DOI: https://doi.org/10.1371/journal.pone.0287991

18(2023)

Exploring facilitators and barriers of the sustainable acceptance of e-health system solutions in Ethiopia: A systematic review

Agmasie Damtew Walle [1], Addisalem Workie Demsash [1], Jibril Bashir Adem [2], Sisay Maru Wubante [3], Adamu Ambachew Shibabaw [1], **Daniel Niguse Mamo [4]**, Shimels Derso Kebede [5], Ayana Alebachew Muluneh [5], Muluken Belachew Mengiste [6], Ayenew Sisay Gebeyew [6], Fikadu Wake Butta [1], Alex Ayenew Chereka [1], Abiy Tasew Dubale [1], Sisay Yitayih Kassie [1], Tigist Andargie Ferede [7]

[4]Department of Health Informatics, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: eHealth is the use of information and communications technologies in support of health and health-related fields, including healthcare services, health surveillance, health literature, and health education knowledge and research, has the potential to improve the delivery and support of healthcare services by promoting information sharing and evidence-based health practice. Acceptance of e-health in Ethiopia using systematic review is uncertain. As a result, this study aimed to assess barriers and facilitators of the sustainable acceptance of e-health system adoption in Ethiopia through a systematic review of the literature.

Methods: The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist was used to conduct this study. Relevant articles have been searched in Google Scholar, Medline, PubMed, Embrace, Web of Science, Scopus, Cochrane Library, and empirical research done in Ethiopia is the main emphasis of the search strategy. The total number of studies that satisfied the criteria for inclusion was ten. In this research, empirical data related to e-health acceptance factors were retrieved, examined, and summarized by the authors.

Results: This systematic review identified a total of 25 predictors that have been found in the ten studies. The identified facilitators were effort expectancy, performance expectancy, facilitating conditions, social influences, attitude, computer literacy, participant age, perceived enjoyment, and educational status, duration of mobile device use, organizational culture, and habit. Moreover, technology anxiety was the most barrier to sustainable acceptance of e-health systems in Ethiopia.

Conclusions: The most common facilitator identified from the predictors was effort expectancy, which played a major role in the adoption of the e-health system in Ethiopia. Therefore, eHealth implementers and managers in those settings should give users of the system priority in improving the technical infrastructure by regularly providing them with basic facilitating conditions. They should also pay attention to the system they want to implement because doing so will improve the users' perception of the system's value and attitude.

The Lancet Haematology

DOI: https://doi.org/10.1016/s2352-3026(23)00118-7

10(2023)

Global, regional, and national prevalence and mortality burden of sickle cell disease, 2000-2021: a systematic analysis from the Global Burden of Disease Study 2021

GBD 2021 Sickle Cell Disease Collaborators, **F W Demisse**[1]

Department of Midwifery, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Previous global analyses, with known underdiagnosis and single cause per death attribution systems, provide only a small insight into the suspected high population health effect of sickle cell disease. Completed as part of the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2021, this study delivers a comprehensive global assessment of prevalence of sickle cell disease and mortality burden by age and sex for 204 countries and territories from 2000 to 2021.

Methods: We estimated cause-specific sickle cell disease mortality using standardised GBD approaches, in which each death is assigned to a single underlying cause, to estimate mortality rates from the International Classification of Diseases (ICD)-coded vital registration, surveillance, and verbal autopsy data. In parallel, our goal was to estimate a more accurate account of sickle cell disease health burden using four types of epidemiological data on sickle cell disease: birth incidence, age-specific prevalence, with-condition mortality (total deaths), and excess mortality (excess deaths). Systematic reviews, supplemented with ICD-coded hospital discharge and insurance claims data, informed this modelling approach. We employed DisMod-MR 2.1 to triangulate between these measures-borrowing strength from predictive covariates and across age, time, and geography-and generated internally consistent estimates of incidence, prevalence, and mortality for three distinct genotypes of sickle cell disease: homozygous sickle cell disease and severe sickle cell β-thalassaemia, sickle-haemoglobin C disease, and mild sickle cell β-thalassaemia. Summing the three models yielded final estimates of incidence at birth, prevalence by age and sex, and total sickle cell disease mortality, the latter of which was compared directly against cause-specific mortality estimates to evaluate differences in mortality burden assessment and implications for the Sustainable Development Goals (SDGs).

Findings: Between 2000 and 2021, national incidence rates of sickle cell disease were relatively stable, but total births of babies with sickle cell disease increased globally by 13·7% (95% uncertainty interval 11·1-16·5), to 515 000 (425 000-614 000), primarily due to population growth in the Caribbean and western and central sub-Saharan Africa. The number of people living with sickle cell disease globally increased by 41·4% (38·3-44·9), from 5·46 million (4·62-6·45) in 2000 to 7·74 million (6·51-9·2) in 2021. We estimated 34 400 (25 000-45 200) cause-specific all-age deaths globally in 2021, but total sickle cell disease mortality burden was nearly 11-times higher at 376 000 (303 000-467 000). In children younger than 5 years, there were 81 100 (58 800-108 000) deaths, ranking total sickle cell disease mortality as 12th (compared to 40th for cause-specific sickle cell disease mortality) across all causes estimated by the GBD in 2021.

Interpretation: Our findings show a strikingly high contribution of sickle cell disease to all-cause mortality that is not apparent when each death is assigned to only a single cause. Sickle cell disease mortality burden is highest in children, especially in countries with the greatest under-5 mortality rates. Without comprehensive strategies to address morbidity and mortality associated with sickle cell disease, attainment of SDG 3.1, 3.2, and 3.4 is uncertain. Widespread data gaps and correspondingly high uncertainty in the estimates highlight the urgent need for routine and sustained surveillance efforts, further research to assess the contribution of conditions associated with sickle cell disease, and widespread deployment of evidence-based prevention and treatment for those with sickle cell disease.

Water (Switzerland)

DOI: https://doi.org/10.3390/w15193473

15(2023)

Groundwater Level Prediction with Machine Learning to Support Sustainable Irrigation in Water Scarcity Regions

Wanru Li [1], **Mekuanent Muluneh Finsa [2,3]**, Kathryn Blackmond Laskey [1], Paul Houser[4] and Rupert Douglas-Bate[5]

[3]Water Resource Research Center, Arba Minch University, Arba Minch P.O. Box 21, Ethiopia

Abstract

Predicting groundwater levels is challenging, especially in regions of water scarcity where data availability is often limited. However, these regions have substantial water needs and require cost-effective groundwater utilization strategies. This study uses artificial intelligence to predict groundwater levels to provide guidance for drilling shallow boreholes for subsistence irrigation. The Bilate watershed, located 80 km north of Arba Minch in southern Ethiopia and covering just over 5250 km2, was selected as the study area. Bilate is typical of areas in Africa with high demand for water and limited availability of well data. Using a non-time series database of 75 boreholes, machine learning models, including multiple linear regression, multivariate adaptive regression splines, artificial neural networks, random forest regression, and gradient boosting regression (GBR), were constructed to predict the depth to the water table. The study considered 20 independent variables, including elevation, soil type, and seasonal data (spanning three seasons) for precipitation, specific humidity, wind speed, land surface temperature during day and night, and Normalized Difference Vegetation Index (NDVI). GBR performed the best of the approaches, with an average 0.77 R-squared value and a 19 m median absolute error on testing data. Finally, a map of predicted water levels in the Bilate watershed was created based on the best model, with water levels ranging from 1.6 to 245.9 m. With the limited set of borehole data, the results show a clear signal that can provide guidance for borehole drilling decisions for sustainable irrigation with additional implications for drinking water.

Keywords: machine learning; groundwater table; ground water level; sustainable irrigation; drinking water; water-scarcity regions; AI; gradient boosting regression

IET Communications

DOI: https://doi.org/10.1049/cmu2.12538

17(2023)

Retracted: Aspect-based sentiment analysis employing linguistics content over social media for Web of Things

Latika Jindal[1] ,Sumit Kumar[2] ,Chetna Kaushal[3] ,Manisha Bhende[4] ,Anuradha Thakare[5] ,**Mohammad Shabaz[6]**

[6]Hydraulic and Water Resources Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

To implicitly reflect the relationship between traits and emotional expressions in a context, prevalent ways to uncover emotional configurations mostly rely on attention processes. Aspect-level sentiment analysis (ABSA) seeks to identify the emotional patterns of certain qualities in phrases while omitting the grammatical information of the Web of Things. The model includes a graph convolutional neural network (GCN) based on a dependency syn-tax tree and exploits syntactic structural data to directly correlate traits with their related emotional expressions, hence reducing classification interference brought to by duplicated inputs. The pretrained model BERT also picks up more grammatical knowledge by being guided by intermediary layer representations of different types of grammatical information. Each GCN layer's input is merged with the preceding layer's output and the guiding information from the BERT intermediate layer. Finally, the feature for sentiment classification is the representation of characteristics in the final layer of GCN. The experimental results on the SemEval 2014, Task4, Restaurant, Laptop, and Twitter datasets show that the proposed model provides better performance of classification accuracy than a substantial number of benchmark models.

Plants

DOI: https://doi.org/10.3390/plants12173064

12(2023)

AMMI and GGE Biplot Analyses for Mega-Environment Identification and Selection of Some High-Yielding Oat (Avena sativa L.) Genotypes for Multiple Environments

Kibreab Yosefe Wodebo [1 2], Taye Tolemariam [1], Solomon Demeke [1], Weyessa Garedew [1], **Tessema Tesfaye [3]**, Muluken Zeleke [4], Deribe Gemiyu [5], Worku Bedeke [5], Jane Wamatu [4], Mamta Sharma [6]

[3]Arba Minch Agricultural Research Center, Arba Minch P.O. Box 2228, Ethiopia.

Abstract

This paper reports an evaluation of eleven oat genotypes in four environments for two consecutive years to identify high-biomass-yielding, stable, and broadly adapted genotypes in selected parts of Ethiopia. Genotypes were planted and evaluated with a randomized complete block design, which was repeated three times. The additive main effect and multiplicative interaction analysis of variances revealed that the environment, genotype, and genotype-environment interaction had a significant ($p \leq 0.001$) influence on the biomass yield in the dry matter base (t ha^{-1}). The interaction of the first and second principal component analysis accounted for 73.43% and 14.97% of the genotype according to the environment interaction sum of squares, respectively. G6 and G5 were the most stable and widely adapted genotypes and were selected as superior genotypes. The genotype-by-environment interaction showed a 49.46% contribution to the total treatment of sum-of-squares variation, while genotype and environment effects explained 34.94% and 15.60%, respectively. The highest mean yield was obtained from G6 (12.52 kg/ha), and the lowest mean yield was obtained from G7 (8.65 kg/ha). According to the additive main effect and multiplicative interaction biplot, G6 and G5 were high-yielding genotypes, whereas G7 was a low-yielding genotype. Furthermore, according to the genotype and genotype-environment interaction biplot, G6 was the winning genotype in all environments. However, G7 was a low-yielding genotype in all environments. Finally, G6 was an ideal genotype with a higher mean yield and relatively good stability. However, G7 was a poor-yielding and unstable genotype. The genotype, environment, and genotype x environment interaction had extremely important effects on the biomass yield of oats. The findings of the graphic stability methods (additive main effect and multiplicative interaction and the genotype and genotype-environment interaction) for identifying high-yielding and stable oat genotypes were very similar.

Keywords: AMMI; GGE; GXE Interaction; biomass yield; oat (Avena sativa L.).

International journal of surgery (London, England)

DOI: https://doi.org/10.1097/js9.0000000000000555

109(2023)

Surgical intervention paradoxically enhances micro metastasis - targeting perioperative variables

Vimalraj Selvaraj [1], Saravanan Sekaran [1], **Suresh Kumar Rajamani Sekar [2]**

[2]College of Natural Sciences, Arba Minch University, Arba Minch, SNNPR, Ethiopia

Abstract

Surgery plays a crucial role in the treatment of cancer, and ~60% of cancer patients undergo some form of surgical intervention. Micrometastases and the development of new metastatic foci are more likely to progress rapidly during the perioperative period. In order to invade and thrive at a new metastatic location, a cancer cell must first enter the circulation, then endure the host's defensive systems, then get imprisoned at a regional or distant site. However, metastasis as a whole is inefficient, and most cancer cells that make it into the bloodstream are promptly eliminated[1]. Besides careful dissection performed by surgeons, like any other kind of tissue damage, may trigger a systemic and local inflammatory response that may help the cancer cell survive and spread. It has been proven that tumor cells are lost into the blood and lymphatic circulation during resection due to the inevitable injury to the patient's tissues during excision and manipulation of the tumor being excised and its vasculature[2]. In addition, the number of cancer cells that are circulating in the blood before and after surgery is an excellent predictor of recurrence[2]. Dissemination of circulating cells is just part of the problem; various postoperative modifications aid cancer cell survival in circulation and boost the possibility of distant implantation. Both macrophages and natural killer cells are essential in the fight against metastatic cancer and its spread throughout the body[2]. The release of neutrophils after surgical stress seems to aid in tumor encapsulation and progression[3]. In response to tissue damage, neutrophils release a web-like DNA structure called a neutrophil extracellular trap (NET) that may capture migrating tumor cells. DNA strands are studded with a range of proinflammatory chemicals that are essential for the capture of tumor cells and the enhanced proliferation of metastases in surgically

IET Communications

DOI: http://dx.doi.org/10.1049/cmu2.12513

17(2023)

Retracted: Object detection and recognition using deep learning-based techniques

Preksha Sharma[1], Surbhi Gupta[1], Sonali Vyas[2], **Mohammad Shabaz[3]**

[3]Arba Minch University, Arba Minch, Ethiopia

Abstract

Object detection has received a lot of academic attention in recent years because of its tight association with video analysis and picture interpretation. With the fast growth of deep learning, more powerful tools capable of learning semantic, high-level, and deeper features are being offered to address difficulties in traditional architectures. These models react differently in terms of network design, training approach, and optimization function, among other things. This study describes multiple deep learning models and their characteristics for object detection in pictures and videos. Convolutional Neural Networks (CNN), models based on region proposal, and models based on regression/classification are the many deep learning approaches. The study also discusses how deep learning approaches differ from one another and their weaknesses in comparison to the prior model. Face identification, pedestrian detection, autonomous driving, and other applications of object detection are also explored in this work. From the study, it was found that object recognition is a group of tasks for recognizing items in digital pictures. R-CNNs, or Region-based Convolutional Neural Networks, are a class of algorithms for tackling object localization and recognition problems that are optimized for model performance. You Only Look Once, or YOLO is a second family of object identification systems geared for speed and real-time application.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e20785

9(2023)

Diaper dermatitis and associated factors among 1-24 months children visiting public health facilities of Arba Minch town, Gamo zone, southern Ethiopia

Agegnehu Bante [1], Meseret Girma [2], Muluken Ahmed [3], Zeleke Aschalew [1]

[1]School of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[3]School of Medicine, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Diaper dermatitis is one of infants and toddlers' most common skin diseases; it accounts for 10-20 % of all skin diseases and 25 % of pediatric dermatology visits. Diaper dermatitis also increases parents' mental health problems and compromises the quality of life. Despite its ill outcome, diaper dermatitis's burden and risk factors are poorly studied in Ethiopia. Therefore, this study aimed to assess the magnitude of diaper dermatitis and associated factors among 1-24 months children visiting public health facilities in Arba Minch town, southern Ethiopia.

Methods: A facility-based cross-sectional study was conducted among 671 mother-child pairs from May 15 to June 15, 2022. A structured and pretested interviewer-administered questionnaire and observational checklist were used to collect the information. The data was collected using an open data kit tools and analyzed using Stata version 17.0. Bivariable and multivariable analyses were carried out to identify factors associated with diaper dermatitis. P-value <0.05 was considered to declare statistical significance.

Results: In this study, 664 mother-child pairs, yielded a response rate of 98.96 %, were involved. Overall, 35.69 % [95 % CI: 32.04, 39.47] of children encountered diaper dermatitis. Being government-employed (AOR: 2.49, 95 % CI: 1.42, 4.35), primiparity (AOR: 1.52, 95 % CI: 1.03, 2.23), unplanned pregnancy (AOR: 1.93, 95 % CI: 1.22, 3.04), having poor knowledge about diaper dermatitis (AOR: 1.74, 95 % CI: 1.19, 2.56), using both disposable and non-disposable diapers alternatively (AOR: 3.35, 95 % CI: 1.55, 7.22), and applying ointments on diaper area (AOR: 1.93, 95 % CI: 1.26, 2.97) all increase the likelihood of diaper dermatitis.

Conclusion: Diaper dermatitis was high in the study hospitals; over one-third experienced it. Maternal occupation, parity, pregnancy status, maternal knowledge of diaper dermatitis, diaper type, and ointment application were significantly associated with diaper dermatitis. Improving maternal/guardian knowledge about diapering and diaper dermatitis is critical to reducing the burden and severity of the problem.

Keywords: Diaper rash; Ethiopia; Napkin dermatitis; Nappy rash; Predictors; Risk factors.

Water, Air, and Soil Pollution

DOI: http://dx.doi.org/10.1007/s11270-023-06560-w

234(2023)

Investigation on the Source of Soil Salinity in Agricultural Land Adjacent to Chamo Lake, Ethiopia

Abeanezer Lukas Bassa[1], Tilahun Kasa[1], Daniel Reddythota[1] & Geleta Tilahun Negatu[2]

[1]Faculty of Water Supply & Environmental Engineering, AWTI, Arba Minch University, Arba Minch, Ethiopia
[2]ArbaMinch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

The soil salinization causing land degradation and decline in soil fertility is becoming a potential problem in some regions of Ethiopia. Finding source of salinization could help devise appropriate measures for solving the problem. The present study was taken up to investigate the source of salinity in an area (1229 ha) lying between the Sile and Elgo rivers near Chamo Lake. The area has remained uncultivated since 2012 and is showing signs of salinity in the form of white deposit on the soil surface. Surface water, groundwater, and soil samples were obtained based on the research area's proximity to potential influencing sources of salinity and fertility decline during the dry and wet seasons. Groundwater samples were taken from seven piezometric stations and eight hand-dug wells while surface water samples were taken from two river sites and four wetland points. The soil samples were taken from four locations. The laboratory results of the groundwater samples in piper diagrams revealed a salt dominance of Ca^{+2}, Mg^{+2}, and Na^{+} with SO_4^{-2} and Cl^{-}. According to the Arc GIS 10.4.1 flow direction analysis tool, the flow direction of the regional water table towards the lake was northwest to south and southeast. The correlation analysis in Python revealed that Na^{+} and K^{+}, as well as SO_4^{-2} and Cl^{-}, were the most common salt types. Gibbs' theories typically highlighted continuous rock weathering as a significant source of salts in the soils.

World Journal of Engineering

DOI: https://doi.org/10.1108/wje-12-2021-0702

20(2023)

GIS mapping used as supplementary tool to experimentally investigated subgrade soil for robust pavement design in rural area of Ethiopia

Eldana Ayka Anka[1], Defaru Katise Dasho[1], Democracy Dilla Dirate[1], Tarun Kumar Lohani[2]

[1]Department of Civil Engineering, Arba Minch University, Arba Minch, Ethiopia
[2]Department of Hydraulic and Water Resources Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Purpose – This paper aims to present physical and geotechnical study in terms of experimental field and laboratory investigations of the subgrade soils in severely damaged and highly degraded road section with numerous potholes between Chencha to Ezo towns of Ethiopia needs to be addressed for a robust pavement. Design/methodology/approach – Eighteen soil samples were collected from 18 km road stretch at a kilometer interval by considering variation and composition of soils along the road alignment. The field density with dry density, natural moisture content, consistency limit, compaction and California Bearing Ratio (CBR) were determined. Findings – Soils were classified predominantly as silty-clay that replicates its expansive nature, characterized as bad to medium subgrade. The average optimum moisture content and maximum dry density are 17.18% and 1.83 g/cc, whereas the average CBR and swell as 8.40% and 1.49%, respectively. The investigated results indicated that the indispensable way for a stable and durable road subgrade in the existing silty clayey soil requires a capping layer. The results were uploaded into ArcGIS platform to create interactive maps for spatial distribution, composition and strength of the subgrade properties. Originality/value – Experimental investigation of subgrade soils by scientific procedures and presenting important properties through integrated approach using ArcGIS Mapping for the road pavement design and construction purpose of under developed areas like Chencha-Ezo. ArcGIS-based mapping of all required and numerical subgrade properties with a single click using ArcGIS tool is the main significance and contribution of this study. To the best of the authors' knowledge, this paper is original, and all the references are properly cited.

Keywords: ArcGIS mapping, Atterberg's limit, CBR, Chencha and Ezo towns, ERA

PLoS ONE

DOI: https://doi.org/10.1371/journal.pone.0291983

18(2023)

Timely initiation of breastfeeding among women who gave birth by cesarean section in central Ethiopia, 2022: A cross-sectional study

Arega Abebe Lonsako [1], Haymanot Mezmur [2], Arsema Gebreyesus [2], Gadissa Tolosa [2], Sagni Girma [2 3]

[1]School of Nursing, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Timely initiation of breastfeeding reduces the risk of neonatal mortality. However, there was paucity of literature on the timely initiation of breastfeeding among women who gave birth by cesarean section (CS) in Ethiopia. Thus, the aim of this study was to assess the magnitude of timely initiation of breastfeeding and factors associated with it among women who gave birth by CS in central Ethiopia.

Methods: A facility-based cross-sectional study was conducted among 403 women who gave birth by CS. Data were collected by using an interviewer-administered questionnaire and observation checklist, entered into EpiData 4.6, and exported to statistical package for the social sciences (SPSS) version 26. Descriptive and multivariate logistic regression analyses were performed and statistical significance is declared at $p<0.05$.

Results: The magnitude of timely initiation of breastfeeding was 47.4% [95% CI: (42.5, 52.6)]. Attending four or more antenatal care visits [(AOR): 2.27, 95%CI: (1.28, 4.02)], counseling during antenatal care [AOR: 4.78, 95% CI: (2.66, 8.60)], early skin to skin contact with newborn [AOR: 2.83, 95% CI: (1.60, 5.02)], post-delivery counseling [AOR: 2.93, 95% CI: (1.56, 5.50)], and getting assistance from health professionals [AOR: 3.07, 95% CI: (1.64, 5.75)] were factors associated with timely initiation of breastfeeding.

Conclusions: The magnitude of timely initiation of breastfeeding in the study area was low. Strengthening counseling by health care practitioners during ANC and post-natal period should be prioritized to support women in initiating early skin-to-skin contact within one hour of birth is mandatory.

Biocatalysis and Agricultural Biotechnology

DOI: https://doi.org/10.1016/j.bcab.2023.102872

53(2023)

Responses of common enset (Ensete ventricosum) varieties in Ethiopia to Xanthomonas and virulence of Xanthomonas strains

Birhanu Gemeda [a b], Getaneh Tesfaye [a], Addis Simachew [c], Aijie Wang [d], Addisu Mekonnen [e f], **Awoke Guadie** [a d], Berhanu Andualem [g]

[a]Department of Biology, College of Natural Sciences, Arba Minch University, Arba Minch, 21, Ethiopia
[b]Biodiversity Research and Conservation Center, Arba Minch University, Arba Minch, 21, Ethiopia

Abstract

Enset is a vital food crop for over 20% of the population living in Ethiopia. Enset bacterial wilt (EBW) disease caused by a pathogen Xanthomonas vasicola pv. Musacearum (Xvm) is among the challenges for its production. This study evaluated the tolerance level of enset varieties in Gamo highland against Xvm. During the field survey, EBW infected enset samples were collected for isolating and characterizing Xanthomonas responsible for causing EBW disease. The isolates were used for infecting different enset varieties in the field. Soil samples were also collected from the farm before enset cultivation (F-BC), during enset cultivation (F-DC), and after EBW disease development (F-AD). Among 126 bacterial isolates, 18 Xvm were found to yield amplicons at 420 bp using Xcm-36 as a specific primer. During pathogenicity tests, all Xvm isolates caused EBW disease before 38 days in the Bodha enset variety. Except for the variety Maze, all the field-tested varieties began to show a typical wilt symptom after 45 days of infected enset cultivation. Isolate X-D5 showed a significantly ($P \leq 0.05$) higher virulent capacity to all enset varieties tested than isolates X–B4 and X–K4. Overall, findings of the fieldwork provide clues on the traditional knowledge of characterizing different enset varieties for susceptibility and tolerance to Xvm that can be useful in designing EBW disease management strategies.

Water Practice and Technology

DOI: https://doi.org/10.2166/wpt.2023.146

18(2023)

Evaluation of drainage water quality for irrigation reuse in Kulfo and Hare irrigation command areas, southern Ethiopia

Edmealem Temesgen[1]; Guchie Gulie[1]; Destaw Akili[1]

[1]Faculty of Water Resources and Irrigation Engineering, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Water from agricultural drainage systems can be reused when its quality is good or blended to overcome the irrigation water shortage. The primary goal of this research was to determine the quality of surface drainage water in the Kulifo and Hare irrigation projects for irrigation reuse. Water quality was evaluated in situ and in the laboratory during the irrigation season of 2022 for the irrigation projects. Turbidity, TDS, pH, EC, salt, and DO were analyzed in the field using an Aqua meter. Fifty-seven water samples were collected and analyzed for the major cation (Na+, Ca2+, K+, and Mg2+) and anion (HCO3−, CO32−, Cl−, and SO42−). The result of the drainage water quality index study, according to the water quality index for irrigation purpose reuse, ranged from 47.84 to 84.89 index. Therefore, this indicated that the suitability of drainage water reuse for irrigation purposes was categorized as 'poor to very poor,' except in Shara community-managed farms. Therefore, to avoid the impact on soil quality for crop production due to the hazard of poor agricultural drainage water for irrigation reuse in the study area, it needs to be treated before being reused for irrigation purposes, except at the Shara irrigation community-managed farm.

Environment Conservation Journal

DOI: https://doi.org/10.36953/ECJ.14322445

24(2023)

Spatiotemporal dynamics of land use/land cover changes and its drivers in Bilate watershed, central rift valley, Ethiopia

Mohammed Seid[1], Simon Shibru[1], Serekebirhan Takele[1], Dikaso Unbushe[2], Shetie Gatew[1]

[1]Arba Minch University, College of Natural Sciences, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Land use/land cover (LULC) changes influence the ecological function, consequence on ecosystem services, which are tightly linked to human wellbeing. However, quantification of the LULC changes and identifying the underlying factors remain patchy particularly in developing nations, despite this information is crucial to propose a feasible restoration action. Therefore, this study investigates the land use/land cover changes and its drivers in central Rift Valley, Ethiopia. GIS and Remote sensors i.e. Landsat 5 (TM), and Landsat 8 (OLI/TIRs) imagery sensors acquired from USGS, and field observation were used. Using the supervised classification method and the support of ArcGIS 10.5 and ERDAS IMAGINE 2014, all images were classified into various land cover types. Focus group discussions, key informant interviews, and structured questionnaire surveys were used to investigate the drivers of LULC change. NDVI was used to detect the vegetation cover change. Woodland, grassland, and barren lands were the major LULC types identified in this study. After 28 years, the woodland cover increased from 20.6% to 40.2% whereas the barren land decreased from 43.4% to 22.6%. Grassland showed very slight increment, i.e. from 35.9% to 36.9%. This implies that area enclosure plays a significant role in the restoration of degraded lands. The highest NDVI values (0.6) were determined in the year 2022 at the end of the classification. Focus group discussants and key informants confirmed that human-induced factors were the major drivers of LULC changes in the study area. Our findings indicated that human interventions are the key determinants of land use/land cover dynamics, and as a result, enforcement of the law and public education campaigns to change human behavior in support of the area enclosure approach are essential to restoring degraded land for the benefit and wellbeing of humans and nature while also advancing the achievement of the global goals.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e17804

9(2023)

The effect of preoperative anemia on perioperative outcomes among patients undergoing emergency surgery: A multicenter prospective cohort study

Kanbiro Gedeno Gelebo [1], Derartu Neme [2], Belete Destaw [2], Zemedu Aweke [2], Simeneh Mola Kasa [2]

[1]Department of Anesthesia, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Introduction: Preoperative anemia is a common finding among surgical patients. It is associated with an increased risk of perioperative morbidity and mortality. Outcomes among emergency surgical patients are not established. This study aimed to assess the effect of preoperative anemia on perioperative outcomes among patients undergoing emergency surgery in selected Southern Ethiopia governmental teaching hospitals, Southern Ethiopia, 2022.

Method: A multicenter prospective cohort study was conducted. Data were collected at selected hospitals, after obtaining ethical approval from the institutional review board. Descriptive statistics, cross-tabulation, and multivariable binary logistic regression analysis were performed. A *P*-value less than 0.05 were taken as statistically significant.

Result: A total of 200 patients who underwent emergency surgery were grouped into the anemia group (100 patients) while the rest were in the non-anemia group. There was no statistically significant difference between the groups regarding socio-demographic and intraoperative patient characteristics. Based on multivariate logistic regression, anemia group had a significant risk of perioperative transfusion requirement (Relative Risk (RR) = 4.030, $p < 0.001$), developing postoperative complications (RR = 1.868, $p = 0.017$), occurring in-hospital mortality (RR = 5.763, $p = 0.045$), prolong the length of hospital stay (RR = 4.028, $p < 0.001$), and requiring postoperative intensive care unit admission (RR = 6.332, $p = 0.003$) compared with non-anemia groups.

Conclusion: Preoperative anemia was associated with a higher rate of perioperative transfusion requirements, along with increased postoperative complication, increased in-hospital mortality, increased Intensive Critical Care Unit admission rate, and prolonged length of hospital stay. We recommend adequate preoperative assessment and correction of hemoglobin concentrations to normal values to improve surgical outcomes and reduce complications.

Keywords: Anemia; Blood transfusion; Emergency surgery; Postoperative complication.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e20298

9(2023)

Assessment of surface water resource and allocation optimization for diverse demands in Ethiopia's upper Bilate Watershed

Mamushet Gebrewold Genjebo [1], Abdella Kemal [1], Abera Shigute Nannawo [2]

[1]Faculty of Hydraulic and Water Resources Engineering, Arba Minch Water Technology Institute, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia.
[2]Faculty of Water Resources and Irrigation Engineering, Arba Minch Water Technology Institute, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia.

Abstract

Water planning and management is very crucial for all computing sectors for water uses to maximize the scarce and allocated water uses based on their demands sustainably in Ethiopia's upper Bilate watershed. The shortage of surface water, especially during dry months, has become a major point of contention between upstream and downstream water users in the upper Bilate River. Therefore, the key objectives of the study are to evaluate the surface water resources and determine the best distribution for a range of requirements in the watershed. The historical climatic and stream flow daily data for the period of 2010-2019 have been used for the analysis. Hydrologic Engineering Center Hydrologic Modeling System-Geospatial Hydrologic Modeling Extension with the Hydrologic Engineering Center Hydrologic Modeling System was used for rainfall-runoff analysis. The model output further represents that the yearly overall surface water of the watershed is 502 MC M. Estimated annual environmental requirement is 75.32MCM which is 15% of the average annual available flow in watershed. Current annual irrigation, livestock, and domestic water demand were estimated to be 19.34 MC M, 12.39 MC M, and 79.4 MC M, respectively. The net amount of water delivered was 19.25 MC M, 79.28 MC M, and 12.36 MC M for irrigation, domestic, and Livestock demands, respectively, in the reference scenario. In the currently available (reference) scenario, 99.8% of the water supply need had been fulfilled, yet only 0.2% of the requirements for water were unmet. Average annual water demand of 111.13 MC M in the current scenario growth to 176.08 MC M when the future growth scenario. In contrast, for the future irrigation development and population projections scenario, 69.8% of the supply-demand became acquainted, and 30.2% of the demand for water remained unfulfilled in 2035. Therefore, to realize good water availability for productive use and allocate water optimal manner constructing a hydraulic structure (dam) upstream of the watershed was recommended.

Keywords: HEC-HMS; Optimization; Upper Bilate watershed; Water demand; Water-allocation.

PLoS ONE

DOI: https://doi.org/10.1371/journal.pone.0288582

18(2023)

Effectiveness of curriculum-based sexual and reproductive health education on healthy sexual behaviors among year one students at Arba Minch University: A quasi-experimental study

Negussie Boti Sidamo [1], Sultan Hussen [1], Mulugeta Shegaze Shimbre [1 2], Eshetu Zerihun [1], Wanzahun Godana Boynito [1], Sintayehu Abebe [1], Tamiru Shibiru [3], Simon Shibiru [4], Woyinshet Gebretsadik [5], Nathan Desalegn [5], Bilcha Oumer [6], Gebremaryam Temesgen Birgoda [7], Hanan Abdulkadir [2]

[1]Arba Minch University, College of Medicine & Health Sciences, School of Public Health, Arba Minch, Ethiopia.
[3]Arba Minch University, College of Medicine & Health Sciences, School of Medicine, Arba Minch, Ethiopia.
[4]Department of Biology, Arba Minch University, College of Natural Sciences, Arba Minch, Ethiopia.
[5]Arba Minch University, College of Medicine & Health Sciences, School of Nursing, Arba Minch, Ethiopia.
[6]Department of Midwifery, Arba Minch Health sciences college, Arba Minch, Ethiopia.
[7]Department of Midwifery, Arba Minch University, College of Medicine and Health Sciences, Arba Minch, Ethiopia.

Abstract

Introduction: Curriculum-based sexual and reproductive health education (CBSRHE) is one of the preventive strategies targeting youth in higher institutions to protect them from sexual and reproductive health problems, despite never assessing the effect in Ethiopia. Therefore, this study aimed to assess the effect of CBSRHE on knowledge and attitude about SRH services to have safer sexual behaviors among first-year students of Arba Minch University.

Method: We conducted a quasi-experimental study among purposively selected campuses. The campuses were allocated to (i) an intervention arm consisting of curriculum-based sexual and reproductive health, or (ii) a control arm for those who were free from intervention. Data was collected, at baseline and immediately after the intervention ended by using a structured self-administered questionnaire. To compare differences in the change from baseline to post-intervention between the two arms we use the chi-square test and independent-samples t-test. To see the effect of the CBSRHE by controlling the effect confounding inverse probability-weighted analysis was conducted.

Result: A total of 832 and 820 students participated in a baseline and post-test respectively. The proportion of youth who practice receptive penetrative sex decreases from 40.9% to 28.3% in the intervention arm compared to 37.6% to 37.3% in the non-intervention arm between baseline and end line, with statistically significant differences between groups. However, there are statistically significant differences between the intervention and control groups in terms of changes in contraception utilization ($X2 = 1.21$; $P>0.05$). Furthermore, there were significant improvements in knowledge and attitude among the intervention arm a comprehensive knowledge of HIV/AIDS (ATE = 0.22,95% CI, 0.14 to 0.29; $p < 0.01$), an average change of attitude toward HIV/AIDS(ATE = 1.32, 95% CI, 1.18 to 1.47; $p < 0.01$), comprehensive condom knowledge score (ATE = 0.23, 95% CI, 0.13 to 0.33; $p < 0.01$) and the average change of attitude toward condom score (ATE = 1.83, 95% CI, 1.19 to 2.77; $p < 0.01$).

Conclusion and recommendation: It was found that there was a significant difference in knowledge and attitude toward a disk sexual behavior among r one student. This implies that the educational authority o the country can gain through the adoption of courses to all universities across the country, besides doing further comparative studies to determine the long-term effect of the course supported with models and/or theories like the theory of change.

The Lancet Neurology

DOI: https://doi.org/10.1016/s1474-4422(23)00195-3

22(2023)

Global, regional, and national burden of meningitis and its aetiologies, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019

A Aklilu[1] ,T M Ayana[2] , S Demissie[3], H L Esayas[4] , M Woldemariam[5] and GBD 2019 Meningitis Antimicrobial Resistance Collaborators

[1]Department of Medical Laboratory Sciences, Arba Minch University, Arba Minch, Ethiopia
[2]School of Nursing, Arba Minch University, Arba Minch, Ethiopia
[3]Department of Anatomy, Arba Minch University, Arba Minch, Ethiopia
[4]Department Midwifery, Arba Minch University, Arba Minch, Ethiopia
[5]Department of Medical Laboratory Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Although meningitis is largely preventable, it still causes hundreds of thousands of deaths globally each year. WHO set ambitious goals to reduce meningitis cases by 2030, and assessing trends in the global meningitis burden can help track progress and identify gaps in achieving these goals. Using data from the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019, we aimed to assess incident cases and deaths due to acute infectious meningitis by aetiology and age from 1990 to 2019, for 204 countries and territories.

Methods: We modelled meningitis mortality using vital registration, verbal autopsy, sample-based vital registration, and mortality surveillance data. Meningitis morbidity was modelled with a Bayesian compartmental model, using data from the published literature identified by a systematic review, as well as surveillance data, inpatient hospital admissions, health insurance claims, and cause-specific meningitis mortality estimates. For aetiology estimation, data from multiple causes of death, vital registration, hospital discharge, microbial laboratory, and literature studies were analysed by use of a network analysis model to estimate the proportion of meningitis deaths and cases attributable to the following aetiologies: Neisseria meningitidis, Streptococcus pneumoniae, Haemophilus influenzae, group B Streptococcus, Escherichia coli, Klebsiella pneumoniae, Listeria monocytogenes, Staphylococcus aureus, viruses, and a residual other pathogen category.

Findings: In 2019, there were an estimated 236 000 deaths (95% uncertainty interval [UI] 204 000-277 000) and 2·51 million (2·11-2·99) incident cases due to meningitis globally. The burden was greatest in children younger than 5 years, with 112 000 deaths (87 400-145 000) and 1·28 million incident cases (0·947-1·71) in 2019. Age-standardised mortality rates decreased from 7·5 (6·6-8·4) per 100 000 population in 1990 to 3·3 (2·8-3·9) per 100 000 population in 2019. The highest proportion of total all-age meningitis deaths in 2019 was attributable to S pneumoniae (18·1% [17·1-19·2]), followed by N meningitidis (13·6% [12·7-14·4]) and K pneumoniae (12·2% [10·2-14·3]). Between 1990 and 2019, H influenzae showed the largest reduction in the number of deaths among children younger than 5 years (76·5% [69·5-81·8]), followed by N meningitidis (72·3% [64·4-78·5]) and viruses (58·2% [47·1-67·3]).

Interpretation: Substantial progress has been made in reducing meningitis mortality over the past three decades. However, more meningitis-related deaths might be prevented by quickly scaling up immunisation and expanding access to health services. Further reduction in the global meningitis burden should be possible through low-cost multivalent vaccines, increased access to accurate and rapid diagnostic assays, enhanced surveillance, and early treatment.

BMC Women's Health

DOI: http://dx.doi.org/10.1186/s12905-023-02649-w

501(2023)

Extended postpartum intimate partner violence and its associated factors: community-based cross-sectional study design

Lema Fikadu Wedajo[a], **Abera Mersha Mamo[b],** Solomon Seyife Alemu[c] & **Bezawit Afework Mesfin[d]**

[b]Departments of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[d]Departments of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Intimate partner violence is a global problem that threatens mothers. It has multidimensional consequences but has not gained attention from scholars after childbirth.

Objective: To assess the prevalence of extended postpartum intimate partner violence and its associated factors.

Method: A community-based cross-sectional study design was employed among 570 postpartum mothers in Arba Minch Town, Southern Ethiopia, from May 21st to June 21st, 2022. A pretested, face-to-face interviewer-administered structured questionnaire was used. Bivariable and multivariable logistic regression analyses were used. The level of statistical significance was declared at $P < 0.05$ with a 95% CI.

Results: Overall, the prevalence of extended postpartum intimate partner violence was 45% (95% CI: 40.89, 49.20). Participants whose husband has no formal education (AOR = 3.62; 95%CI: 1.32, 9.90) and only secondary education (AOR = 2.96; 95%CI: 1.56, 5.48), husband alcohol consumption (AOR = 1.73; 95%CI: 1.06, 2.80), husband dominance in decision-making (AOR = 1.94; 95%CI: 1.13, 3.33), husband disappointment in the gender of the baby (AOR = 2.13; 95%CI: 1.28, 3.56), previous history of intimate partner violence (AOR = 5.71; 95%CI: 3.59, 9.07), and low social support (AOR = 4.37; 95%CI: 2.53, 7.55) were significantly associated factors.

Conclusions and recommendations: The prevalence of extended postpartum intimate partner violence was found to be high. Thus, increasing awareness of husbands with no formal education and having lower academic achievement, incorporating maternal social support assessment into maternity and child health care; teaching on alcohol reduction behavior and gender roles; and screening of mothers during the prenatal period should be given.

Heliyon

DOI: http://dx.doi.org/10.1016/j.heliyon.2023.e21632

e21632 (2023)

Assessment of soil mulching field management, and deficit irrigation effect on productivity of watermelon varieties, and AquaCrop model validation

Birara Gebeyhu [1], Genet Markos [1]

[1]Faculty of Water Resources and Irrigation Engineering, Arba Minch Water Technology Institute, Arba Minch University

Abstract

Watermelon productivity in the Arba Minch irrigation scheme has been hampered by water scarcity, with only the Lady Bells watermelon variety being cultivated in the area. This challenge can be mitigated by adopting water-saving irrigation techniques and selecting water stress-resistant varieties. Hence, this study aimed to investigate the combined impact of soil mulching and deficit irrigation on the productivity of various watermelon varieties and validate the AquaCrop model. The experiment employed a randomized complete block design with two levels of water application (100 % SMD and 50 % SMD), two mulching practices (non-mulching and mulching), and four watermelon varieties: Lady Bells (V1), Green Pearl (V2), Kaolack (V3), and Koloss (V4). Soil physical properties and crop-related data were used to calibrate the AquaCrop model. Straw mulching, on average, conserved 64.50 mm and 262.75 mm of water under 100 % and 50 % water application levels, respectively. The minimum and maximum land productivity averages were 6.2 tonsha−1 (T13) and 17.6 tonsha−1 (T2), while water productivity ranged from 5.2 kgm−3 (T1) to 12.4 kgm−3 (T10). Lady Bell watermelon varieties displayed high sensitivity to water stress, with a 1.27 yield response factor under non-soil mulching treatment with 50 % water application. The mean benefit-cost ratio varied from 1.52 (T13) to 2.90 (T10). The average values of RMSE, NSE, and R2 for the AquaCrop model were 0.70, 0.65, and 0.80, respectively, indicating the model's acceptability in predicting the effects of mulching and deficit irrigation on watermelon productivity. Overall, the use of straw mulching combined with 50 % deficit irrigation, particularly for Green Pearl varieties, emerged as the most productive watermelon cultivation method in the Arba Minch region when facing limited irrigation water. Future research will focus on assessing the impact of deficit irrigation during various watermelon growth stages.

Biotechnology Reports

DOI: http://dx.doi.org/10.1016/j.btre.2023.e00819

e00819 (2023)

Phytochemicals reduced growth, sporulation and conidial dimensions of Fusarium verticillioides, cause of fumonisin contamination in maize grains

Habtamu Terefe [1], Getnet Yitayih [2], **Getachew G Mengesha [3]**

[3]Arba Minch Agricultural Research Center, SARI, Arba Minch, P.O. Box 2228, Ethiopia

Abstract

The objective of the study was to evaluate the effectiveness of methanolic extracts of plants against radial growth and spore dimensions of Fusarium verticillioides. Leaf extracts of 25 plants were tested against the fungus. Of which, thirteen extracts were potent against the fungus and evaluated using food poising technique. Growth was evaluated on PDA medium amended with the extracts at 5 mg ml–1. Control treatments included plates without (negative) extracts and with synthetic (positive) fungicide. Spore dimension was determined using PDB. The results showed T. vulgaris extract completely inhibited mycelial growth of the fungus as equivalent as the fungicide. Similarly, G. parviflora, C. citratus, R. officinalis, R. chalepensis, and Agave sp. also recorded growth reductions ranging from 71.04 to 81.35 % at day seven. In addition, extracts of Agave sp., C. citratus and T. vulgaris did not support sporulation. Overall, the results indicate that T. vulgaris extracts could be safe source of bioactive chemicals to control F. verticillioides.

Scientific Reports

DOI: http://dx.doi.org/10.1038/s41598-022-27120-y

439(2023)

Joint modeling of longitudinal change of fasting blood sugar and systolic blood pressure with survival time to death among hypertension patients

Markos Abiso Erango

Department of Statistics, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Hypertension is a universal public health challenge and a leading modifiable risk factor for cardiovascular disease and death. It is also called high blood pressure, described by two measured quantities systolic blood pressure (SBP) 140 mmHg or greater and diastolic blood pressure (DBP) 90 mmHg or greater. As the result, this study aims to use the joint model application to identify the factors that affect longitudinal changes in fasting blood sugar, SBP, and survival time to death of hypertension patients and their associations admitted to the Arba Minch General Hospital. We considered a total of 354 random samples of hypertension patients who had under follow-up at Arba Minch general hospital from January 2012 to February 2020. Among 2330 hypertension patients under follow-up, 354 were selected with a simple random sampling technique, and data was collected from the patient's medical cards. After evaluating the longitudinal data with a linear mixed model and the baseline data with Cox proportional models, the joint models of both sub-models were assessed in R software version 4.2. According to the findings, the association between longitudinal changes (FBS, SBP, and time to death in hypertension patients was statistically significant. Ages, place of residence, lifestyle change, stages of hypertension, blood cholesterol level, related diseases, adherence to treatment, family history of hypertension patients, and DBP at baseline were associated factors that affect survival time and longitudinal measurement of FBS and SBP of the patients. The computed association parameters revealed subject-specific values. The subject-specific linear time slope of FBS and SBP was negatively related to the hazard rate of time to death of hypertension patients in Arba Minch general hospital. To reduce the risk of hypertension in patients, health professionals, governmental organizations, and non-governmental organizations must promote the implementation of community-based screening programs for early detection of hypertension.

BMC Public Health

DOI: http://dx.doi.org/10.1186/s12889-023-16785-3

1884 (2023)

Identification of determinant factors for crash severity levels occurred in Addis Ababa City, Ethiopia, from 2017 to 2020: using ordinal logistic regression model approach.

Tariku Bekelcho[1], Ararso Baru Olani[1], Asfawosen Woldemeskel[2], Micheal Alemayehu[3] & **Geleta Guta[4]**

[1]Department of Emergency Medicine and Critical Care, Arba Minch University, Arba Minch, Ethiopia
[4]Department of Water Resources and Irrigation Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background

Road traffic Injuries (RTI) are multifaceted occurrences determined by the combination of multiple factors. Also, severity levels of injuries from road traffic accidents are determined by the interaction of the composite factors. Even though most accidents are severe to fatal in developing countries, there is still a lack of extensive researches on crash severity levels and factors associated with these accidents. Hence, this study was intended to identify severity levels of road traffic injuries and determinant factors in Addis Ababa City, Ethiopia.

Methods

The study was conducted in Addis Ababa, the capital city of Ethiopia, using secondary data obtained from the Addis Ababa Police Commission office. The ordinal logistic regression model was used to investigate road traffic injury severity levels and factors worsening injury severity levels using the recorded dataset from October 2017 to July 2020 Results

A total of 8458 car accidents were considered in the study, of which 15.1% were fatal, 46.7% severe, and 38.3% were slight injuries. The results of the ordinal logistic regression analysis estimation showed that being a commercial truck, college and above level educated driver, rollover crash, motorbike passengers, the crash day on Friday, and darkness were significantly associated factors with crash injury severity levels in the study area. On the contrary, driving experience (> 10 years), passenger of the vehicle, two-lane roads, and afternoon crashes were found to decrease the severity of road traffic injuries.

Conclusions

Road traffic injury reduction measures should include strict law enforcement in order to maintain road traffic rules especially among commercial truckers, motorcyclists, and government vehicle drivers. Also, it is better to train drivers to be more alert and conscious in their travels, especially on turning and handling their vehicles while drive

BMC Infectious Diseases

DOI: https://doi.org/10.1186/s12879-023-07988-5

29(2023)

Causes and trends of adult mortality in southern Ethiopia: an eight-year follow up database study.

Gebrekiros Gebremichael Meles[6*], **Gistane Ayele[1] , Befkadu Tariku Gutema[1] , Mekides Kondale[1] , Zerihun Zerdo[2] , Behailu Merdekios[1] , Tsegaye Tsalla[2] , Mesfn Kote[1] , Alazar Baharu[3]** , Alemayehu Bekele[4] , **Feleke Gebremeskel[1] , Mulugeta Shegaze[1],[7] and Teklemariam Gultie[5]**

[1]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[2]Department of Medical Laboratory Sciences, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
3 Department of Computer Sciences, Arba Minch University, Arba Minch, Ethiopia
5 Department of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Broad and specific causes of adult mortalities are often neglected indicators of wellbeing in low-income countries like Ethiopia due to lack of strong vital statistics. Thus, this database study aimed to assess the causes of adult mortality using demographic surveillance data.

Methods: An 8-year (12 September 2009–11 September 2017) surveillance data from the Arba Minch Health and Demographic Surveillance Site was used for this study. Verbal autopsy methods and ICD codes were used to identify the causes of the adult deaths. The collected data were entered to the database by data clerks. We used Microsoft Excel and STATA version 16 software for data cleaning and analysis. Chi-squared test was used to see the significances of the trend analyses.

Result: From the 943 adult deaths from 2009 to 2017 in the Health and Demographic Surveillance Site in southern Ethiopia, more than half of them were females. The specific leading cause of death in the adults were tuberculosis (16.8%), malaria (9.7%), and intestinal infectious diseases (9.6%).

Communicable diseases (49.2%, 95% C.I 45.7, 52.7) accounted for about half of the deaths followed by non-communicable diseases (35%, 95% C.I 31.7, 38.4) where both categories showed an increasing trend.

Conclusion: Although pieces of evidences are showing the shift from communicable diseases to non-communicable diseases as the major causes of adult death in developing countries, this study showed that communicable diseases are still the major causes of adult deaths. Efforts and emphasis should be given to control infectious diseases such as tuberculosis and malaria

BMC Musculoskeletal Disorders

DOI: https://doi.org/10.1186/s12891-023-07082-6

966(2023)

Magnitude of flat foot and its associated factors among school-aged children in Southern Ethiopia: an institution-based cross-sectional study

Asaminew Birhanu[1*], Khaleel Nagarchi[1], Firdawek Getahun[2], Mathewos Alemu Gebremichael[3] and **Habtamu Wondmagegn[1]**

[1]Department of Anatomy, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[2]Department of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Flat foot, also known as pes planus, is a common condition among primary school children and is a leading cause of all clinical visits related to foot problems worldwide. It can cause skeletal problems and joint misalignment. This study aimed to assess the magnitude of flat foot and its associated factors among public primary school children.

Methods: An institutional-based cross-sectional study was conducted on 1072 school children aged 11 to 18 years. A structured questionnaire was used for data collection and the footprints were used to calculate the plantar arch index. Data were entered into Epi data version 4.6, and analyzed by STATA version 15. Bivariable and multivariable binary logistic regressions were conducted. Adjusted odds ratios (AORs) with corresponding 95% confidence intervals (CIs) were calculated. Statistical significance was declared at a P-value < 0.05.

Result: Out of 1022 participants, 105(10.27%) 95%CI: 8.5–12) had a flat foot. Being male (AOR = 2; 95%CI:1.22-3.30), living in highland altitude (AOR = 8.83; 95% CI: 4.64-16.79), living in midland altitude (AOR = 3.32;95% CI:1.75-6.29), living in an urban area (AOR = 2.42;95% CI:1.15-5.09), insufficient physical activity (AOR = 8.78;95% CI: 4.42-12.3), wearing closed-toe shoes (AOR = 2.33;95%CI:1.27-4.28), obesity (AOR = 6.30;95% CI:3.31-11.9), and foot pain (AOR = 3.52;95%CI:2.08-6.27) had a higher likelihood of flat foot as compared to their counterparts.

Conclusion: One in every ten children had a flat foot. Altitude, residence, sex, physical activity, foot pain, body mass index, and type of footwear were found to be factors statistically associated with flat foot. Integrated interventions for children to have sufficient physical activity, wearing sandals, maintaining a healthy body mass index, and flatfoot screening and monitoring are recommended.

BMC Women's Health

DOI: https://doi.org/10.1186/s12905-023-02442-9

287(2023)

The severity of menopause and associated factors among middle-aged women residing in Arba Minch, DHSS, Ethiopia, 2022

Begosew Misiker[1], Kefita Kashala[1] & Direslgne Misker[2]

[1]Biomedical Science Department, Arba Minch University, Arba Minch, Ethiopia
[2]School of Public Health, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Menopause is a common practice in women, and it is recognized as a complete pause of menses for more than twelve months. A decrease in sex hormone levels particularly estrogen in the blood is associated with different types of menopausal symptoms. Those symptoms include different psychological, vasomotor, physical, and sexual symptoms. They are among the major public health problems of middle-aged women. Particularly severe forms of menopausal symptoms are bothersome for middle-aged women. However, little is known about the severity status and associated factors of menopausal symptoms among middle-aged women in the study area.

Objective: The main aim of the present study was to assess the severity of menopausal symptoms and associated factors among middle-aged women residing in Arba Minch DHSS.

Methods and materials: Community-based crossectional study was employed. A single population proportion formula was used to determine the sample size. A total of 423 study participants were recruited to conduct the study. A simple random sampling technique was used to employ study participants. Proportional sample size allocation formula was used to allocate study participants in each Kebele of Arba Minch DHSS (demographic and health surveillance site). A menopausal rating scale was used to assess the severity status of Menopausal symptoms. The collected data were analyzed by using SPSS version 20. A descriptive analysis was made to describe the Sociodemographic characteristics of the study participants. Moreover, binary and ordinal logistic regressions were used to identify the factors associated with the severity of menopausal symptoms among middle-aged women. On binary logistic regression variables with p-value < 0.25 were eligible for ordinal logistic regression. Variables with a p-value < 0.05 were considered statistically significant.

Result: The present study revealed that the prevalence of menopausal symptoms was 88.7%. According to the Menopausal rating scale, 91.7% of the study participants were Asymptomatic, 6.6% of them were mild in severity, 1.4% of them were moderate and the remaining 0.23% individuals were severe menopausal symptoms. The most severe menopausal symptom was the sexual problem. The factors that have a significant association with the severity of menopausal symptoms were Age with [AOR = 1.46(95%CI: 1.27–1.64)] and history of chronic disease with [AOR = 2.56(95%CI: 1.78–3.4)] and p < 0.001.

Conclusion and recommendation: Generally, menopausal symptoms among middle-aged women were common. Asymptomatic and mild forms are the dominant severity forms of menopausal symptoms. Age and history of chronic diseases have statistically significant associations with the severity of menopausal symptoms. The ministry of health, researchers, and different stakeholders are recommended to be concerned about this neglected issue.

Agricultural Systems

Doi: http://dx.doi.org/10.1016/j.agsy.2023.103768

103768(2023)

Linking indigenous with scientific knowledge about enset (Ensete ventricosum) disease management in Gamo highlands of Ethiopia: Evidence from local people response, soil physicochemical and microbial dynamics

Birhanu Gemeda [a b], **Getaneh Tesfaye** [a], Addis Simachew [c], Aijie Wang [d], Addisu Mekonnen [e] [f], **Awoke Guadie** [a d], Berhanu Andualem [g]

[a]Department of Biology, College of Natural Sciences, Arba Minch University, Arba Minch 21, Ethiopia
[b]Biodiversity Research and Conservation Center, Arba Minch University, Arba Minch 21, Ethiopia

Abstract

Enset (Ensete ventricosum) is a staple food for millions in Ethiopia and characterized by climate resilient crop, but enset bacterial wilt (EBW) disease caused by Xanthomonas is the major threat to enset growing regions in the country that puts the food security of smallholder farmers at risk. Enset is a drought tolerant plant used for nutritional, medicinal and cultural activities for over 20 million people in Ethiopia. However, enset bacterial wilt (EBW) disease is a serious challenge. Although there is a good EBW disease management system from local people, the link between indigenous and scientific knowledge is not explored. OBJECTIVE: This study aimed to assess indigenous-scientific knowledge nexus about enset (Ensete ventricosum) disease management in Gamo highlands of Ethiopia using data generated from local people response, soil physicochemical and microbial dynamics. METHODS: Samples (soil and plant) were collected from different farm sites (with no enset, with enset and with enset-medicinal) at three districts for physicochemical, antibacterial and microbial analysis. We considered various physicochemical parameters (moisture, temperature, pH, macro- and micro-nutrients); extracted phytochemical compounds from medicinal plant leaves using different solvents (water, ethanol, methanol and n-hexane); and 16S rRNA gene sequence using Illumina sequencing technique. RESULTS And CONCLUSIONS: We found that farmers have no knowledge gap in classifying healthy enset from sick/infected one. However, farmers were unable to classify the different stages of infected enset. Farmers were able to recognize that farm tool > animals > plant debris > air as a means of disease transmission. Nearly all respondents (97.3%) did not use chemicals to control EBW, rather they remove infected enset by uprooting. We found that farm tool cleaning, crop rotation, wrapping, bone smoking, and inter-planting medicinal plants were the main local EBW disease management practices employed by farmers. Medicinal plant extracts (E. abyssinica > D. afromontana > P. fruticosus) showed promising antibacterial activity (1.33 ± 0.28–8.81 ± 0.32 mm) against Xanthomonas. Planting medicinal plants with enset also significantly enhanced some soil physicochemical parameters and shifted the soil bacterial abundance from Proteobacteria to Firmicutes. Although indigenous practice enhanced soil physicochemical parameters and non-pathogenic microbial community in the soil, integrating it with modern knowledge (applying chemicals) were recommended as an effective EBW management strategy. SIGNIFICANT: Soil physicochemical and microbial shift due to inter-planting medicinal plants with enset indicates that medicinal plants may have means of protection against EBW disease through optimizing soil physicochemical and microbial dynamics in the Gamo highlands. Additionally, the inhibition of medicinal plants against Xanthomonas suggests the inclusive influence of medicinal plants on the EBW causing bacteria

Communications Biology

DOI: https://doi.org/10.1038/s42003-023-04908-w

530(2023)

The earliest Ethiopian wolf: implications for the species evolution and its future survival

Bienvenido Martínez-Navarro [1,2,3], **Tegenu Gossa** [4,5,6], Francesco Carotenuto [7], Saverio Bartolini-Lucenti[8,9], Paul Palmqvist [10], Asfawossen Asrat[11,12], Borja Figueirido [10], Lorenzo Rook [8], Elizabeth M. Niespolo[13,14,15], Paul R. Renne [14,15], Gadi Herzlinger[5] & Erella Hovers [5,16]

[6]Department of History and Heritage Management, Arba Minch University, Arba Minch, Ethiopia.

Abstract

In 2017, a hemimandible (MW5-B208), corresponding to the Ethiopian wolf (Canis simensis), was found in a stratigraphically-controlled and radio-isotopically-dated sequence of the Melka Wakena paleoanthropological site-complex, on the Southeastern Ethiopian Highlands, ~ 2300 m above sea level. The specimen is the first and unique Pleistocene fossil of this species. Our data provide an unambiguous minimum age of 1.6–1.4 Ma for the species' presence in Africa and constitutes the first empirical evidence that supports molecular interpretations. Currently, C. simensis is one of the most endangered carnivore species of Africa. Bioclimate niche modeling applied to the time frame indicated by the fossil suggests that the lineage of the Ethiopian wolf faced severe survival challenges in the past, with consecutive drastic geographic range contractions during warmer periods. These models help to describe future scenarios for the survival of the species. Projections ranging from most pessimistic to most optimistic future climatic scenarios indicate significant reduction of the already-deteriorating territories suitable for the Ethiopian Wolf, increasing the threat to the specie's future survival. Additionally, the recovery of the Melka Wakena fossil underscores the importance of work outside the East African Rift System in research of early human origins and associated biodiversity on the African continent.

MethodsX

DOI:10.1016/j.mex.2023.102336

102336(2023)

Graded mesh B-spline collocation method for two parameters singularly perturbed boundary value problems

Andisso, Fellek Sabir [a] and Duressa, Gemechis

[a] Department of Mathematics, Arba Minch University, Arba Minc, 21, Ethiopia

Abstract

The solutions of two parameters singularly perturbed boundary value problems typically exhibit two boundary layers. Because of the presence of these layers standard numerical methods fail to give accurate approximations. This paper introduces a numerical treatment of a class of two parameters singularly perturbed boundary value problems whose solution exhibits boundary layer phenomena. A graded mesh is considered to resolve the boundary layers and collocation method with cubic B-splines on the graded mesh is proposed and analyzed. The proposed method leads to a tri-diagonal linear system of equations. The stability and parameters uniform convergence of the present method are examined. To verify the theoretical estimates and efficiency of the method several known test problems in the literature are considered. Comparisons to some existing results are made to show the better efficiency of the proposed method. Summing up: • The present method is found to be stable and parameters uniform convergent and the numerical results support the theoretical findings. • Experimental results show that the present method approximates the solution very well and has a rate of convergence of order two in the maximum norm. • Experimental results show that cubic B-spline collocation method on graded mesh is more efficient than cubic B-spline collocation method on Shishkin mesh and some other existing methods in the literature

Legume Science

DOI: http://dx.doi.org/10.1002/leg3.200

e200(2023)

Potential of indigenous legume fodder tree and shrubs to animal feed and mitigation of methane emission in the semi-humid condition of southern Ethiopia

Getachew Abraham[1] , Yisehak Kechero[1] and Dereje Andualem[2]

[1] Department of Animal Science, College of Agricultural Sciences, Arba-Minch University, Arba Minch, Ethiopia

Abstract

The study was conducted to investigate the in vitro gas production characteristics and methane (CH4) emission potential of indigenous legume fodder trees and shrubs (ILFTS). The most predominant 11 ILFTS species were selected, and leaves and fruit/pod samples were collected, oven dried, and ground. The potential leaf biomass yield (PBY), dry matter (DM), ether extract, digestible crude protein, carbohydrate (CHO), acid detergent lignin, ash, total phenol, condensed tannin, gross energy, digestible energy, metabolizable energy (ME), gas production characteristics, CH4 emissions, organic matter digestibility (OMD), and short-chain fatty acids (SCFA) were determined. ANOVA and independent t test were used to examine variation among species in plants nature and between fruits and pods within agroecosystems, respectively. Correlation analysis was used to determine relationships among parameters. The study indicated that only DM and CHO showed substantial variation in nutritional quality parameters among trees, shrubs, and fruit/pods in the lowlands. Fruits/pods and trees displayed significant differences in gas production characteristics in the lowlands, unlike shrubs, which had non-substantial variations. Moreover, the PBY, CH4 emission, OMD, and ME of ILFTS revealed substantial variation ($P < .05$) with species and among trees, shrubs, and fruits/pods in both agroecosystems. Besides, CH4 production showed a positive significant correlation with gas volume and (b) substantiating the effect of rate and degree of fiber fermentation on CH4 emission. It was discovered that there was a positive significant correlation between the 6 and 24 h incubation period, (c) which substantiated the need for optimal microbial density and substrate for high rate constant gas production of b (c). In conclusion, ILFTS produce considerable biomass rich in nutrients but vary in the degradability of CHO with plant nature, species, and forage origin. This elicits differences in gas production characteristics and CH4 emission with in vitro fermentation, resulting in differences in the corresponding OMD, ME, and SCFA values.

Hydrology Research

DOI: https://doi.org/10.2166/nh.2023.119

54(2023)

Estimation of change in terrestrial water storage for Abbay River Basin, Ethiopia

Agegnehu Kitanbo Yoshe

Department of Water Resources and Irrigation Engineering, Arba Minch University, 21 Post Office Box, Arba Minch, Ethiopia

Abstract

Access to freshwater resources has become more limited. Correspondingly, water monitoring methods in sensitive or critical areas interims of terrestrial water storage are becoming increasingly important. The monitoring of the water storage in this area, using appropriate methods and datasets, is highly effective in preventing possible future water crises. This paper aims to estimate terrestrial water storage of the Abbay River Basin with available data and tools where hydro climatological studies are scarce due to limited observation. The data obtained from Global Land Assimilation System (GLDAS), gravity recovery and climate experiment (GRACE), and TerraClimate were used for the analysis of terrestrial water storage in the river basin. The result shows that there was a varying trend of terrestrial water storage for the study time. We have observed water shortages during the dry season and surplus water during the wet season. The monitoring of changes in terrestrial water storage is crucial for optimal water resource utilization and our results confirm the major role of such monitoring in decision-making processes and management

BMC Microbiology

DOI: http://dx.doi.org/10.1186/s12866-023-03137-9

393(2023)

Magnitude of extended-spectrum β-lactamase and carbapenemase producing Enterobacteriaceae among commonly vended street foods in Arba Minch town, southern Ethiopia

Dagninet Alelign[1*] and Aschalew Kidanewold[1]

[1]department of Medical Laboratory Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: The rising prevalence of extended-spectrum beta-lactamase and carbapenemase-producing Enterobacteriaceae (ESβL-PE) in street foods poses a significant risk to human health due to its epidemiological significance. Thus, the aim of this study was to determine the magnitude of foodborne Enterobacteriaceae that produce carbapenemase and ESβL, as well as their patterns of antibiotic resistance, in the studied area. Methods: A community-based cross-sectional study was carried out from January 1st, 2023, to February 30th, 2023. One hundred randomly chosen street-vended food items (one hundred grams of each food item) were aseptically collected, and aliquots of 0.1 ml from the homogenized (25 g of samples into 225 ml of buffered peptone water (BPW)) were inoculated on MacConkey agar and Xylose Lysine Deoxycholate Agar (XLD). Enterobacteriaceae isolates were identified using various biochemical tests. ESβL and carbapenemase were first screened by indicator cephalosporins and carbapenem antibiotics, respectively. ESβL and carbapenemase were confirmed by a double-disc synergy test and modified carbapenem inactivation methods, respectively. Kirby-Bauer disc diffusion method was used for the antimicrobial-resistant test. Results: A total of 112 Enterobacteriaceae belonging to six different genera were isolated. E. coli was attributed 39 (34.8%), followed by Citrobacter spp. 22 (19.6%) and K. pneumoniae 18 (16.1%), with only 8 (7.1%) isolated Salmonella spp. About 15.2% (n = 17) and 8.9% (n = 10) of Enterobacteriaceae were phenotypically confirmed to be extended-spectrum beta-lactamase (ESβL) and carbapenemase producers, respectively. The highest percentage of ESβL-producing isolates was attributed to K. pneumoniae (n = 5), E. coli (n = 4), and Enterobacter spp. (n = 3). Proteus spp. and Salmonella spp. isolates were carbapenemase-negative. All carbapenemase-positive isolates were found to be ESβL-producers. 70.6% (12/17) of ESβL-producing Enterobacteriaceae were found to be multidrug-resistant (MDR). Conclusion: A considerable number of multidrug-resistant ESβL and carbapenemase-producing Enterobacteriaceae were identified, suggesting that street foods may be a potential source of MDR foodborne infections. Consequently, it is important to conduct routine examinations of street food items and track trends in medication resistance

Water Conservation Science and Engineering

DOI: http://dx.doi.org/10.1007/s41101-023-00182-3

4(2023)

Comprehensive Evaluation of Hormat Golina-7 Drip Irrigation Project of Ethiopia Using Various Performance Indicators

Amare Tadesse[1], BeleteMeketaw[1], Tarun Kumar Lohani[2], Yohannes Smeneh[1]

[1] Faculty of Water Resources and Irrigation Engineering, Arba Minch University, Arba Minch, Ethiopia
[2] Faculty of Hydraulic and Water Resources Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

The performance of Hormat Golina-7 drip irrigation in Kobo-Girana valley of Ethiopia has been extensively developed into modern drip irrigation system employing groundwater resources. The emitter discharge and soil moisture content were collected from the field and relevant hydro-meteorological data were collected from Sirinka Agricultural Research. The emitter flow was measured by using a direct graduated container in the study area. Engineering, field water use, crop and water productivity, and socio-economic and agricultural performance indicators were considered the performance evaluation indicators. For each indicator, application efficiency (Ea), equity water delivery performance (PE), reference evapotranspiration (ETO), delivery performance ratio (DPR), and distribution uniformity characteristics such as emission uniformity (EU), emitter flow rate variation (qvar), coefficient of variation (Cv), and coefficient of uniformity (Uc) were assessed. Based on the results, Ea (62.85%), PE (0.21), DPR (1.56%), EU (49.28%), Pvar (73.92%), CV (43.80%), and UC (56.20%) were assessed. During the field research, it was observed that there is emitter clogging, lack of irrigation infrastructure and training, and inaccurate lateral collection after irrigation. Considering all the facts and parameters studies including field assessment, it has been evaluated that Hormat Golina-7 drip irrigation system is a poor-performing scheme

Heliyon

DOI: http://dx.doi.org/10.1016/j.heliyon.2023.e21257

e21257(2023)

Optimized landfill site selection for municipal solid waste by integrating GIS and multicriteria decision analysis (MCDA) technique, Hossana town, southern Ethiopia

Tesfaye Doboch Wanore[1*], Zelalem Abera Angello[1] and Zemed Menberu Fetanu[1]

[1]Faculty of Water Supply and Environmental Engineering, Arba Minch Water Technology Institute, Arba Minch University, Ethiopia

Abstract

Improper solid waste disposal has remained the major bottleneck for the socio-economic development particularly in urban and peri-urban areas of Ethiopia. This study was conducted with the prime aim of identifying an optimum municipal solid waste (MSW) management option subsequently selecting the best landfill site in Hossana town using integrated geographical information systems (GIS) and multicriteria decision analysis (MCDA) techniques. Accordingly, GIS integrated with MCDA was used to analyze the relative weight of each criterion and the overall suitability map where ten criteria were considered within their respective constraints. To create a landfill suitability index, environmental and socioeconomic factors such as distance from settlement, land use and land cover, lineament, slope, road, and wind direction/aspect were weighted. Population growth, waste generation rate, and waste volume/year were used to calculate the required landfill size. The study finding revealed that the town's MSW generation rate was 0.45 kg/cap/day, which was within the range of most of Ethiopian urban areas. On the other hand, the total daily and annual MSW generation was found to be 79.58 and 29,047 tonnes, respectively. Moreover, the study's findings revealed that 20.8 % of the solid waste was found was recyclable and the remaining 79.20 % was non-recyclable. Considering the future trend of waste generation, 19 ha of land in the city's Northern and Southern outskirts was chosen as a candidate landfill site with all the necessary suitability analysis. Therefore, optimized landfill site selection and better management system of MSW in urban and peri-urban areas could be achieved by the conjunctive application of MCDA and GIS

International Journal of Climatology

DOI: http://dx.doi.org/10.1002/joc.8262

43(2023)

Spatial patterns and temporal dynamics of drought in southern Ethiopia from 1981 to 2100

Markato Markos Mena[1], Tadesse Tujuba Kenea[1], Tewodros Addisu Yate[1]

[1]Meteorology and Hydrology Faculty, Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

We assess the spatiotemporal characteristics of historical and projected future drought over southern Ethiopia using the Standardized Precipitation Evapotranspiration Index and the K-means clustering method. Historical assessment is done for the period 1981–2018 while projected drought is analysed over two consecutive future periods, that is, 2021–2060 (near future) and 2061–2100 (far future). Projected drought events are identified under RCP 4.5 and 8.5 climate scenarios based on three RCMs selected after performance evaluation. Modified Mann–Kendall trend test is applied to determine trends and significance at the 5% significance level. The results reveal broadly diverse and heterogeneous spatiotemporal characteristics both over the historical and future periods. Droughts of various frequencies, durations, and magnitudes are observed amongst stations, while trends generally lack spatial coherence. The year 1984 is noted to be the driest year in the historical period while the years 1982, 2009, and 1991 are with the driest March–May (MAM), June–August (JJA), and September–November (SON) seasons, respectively. Compared to the historical period, the frequency, magnitude, and duration of drought events are projected to decrease in the near future and increase in the far future. The frequency of drought events in SON and JJA seasons are projected to increase in the near future and far future, respectively, under both scenarios. More number of station shows a wetting tendency in the historical period while more number of stations exhibit a drying tendency during the projected future periods under the two scenarios. Since complex drought characteristics are observed both in the historical and future periods, rigorous local-scale drought monitoring and management is recommended.

BMC Medical Informatics and Decision Making

DOI: http://dx.doi.org/10.1186/s12911-023-02174-8

78(2023)

An early detection and segmentation of Brain Tumor using Deep Neural Network

Mukul Aggarwal[1], Amod Kumar Tiwari[2], M Partha Sarathi[3] and **Anchit Bijalwan[4*]**

[4]Faculty of Electrical and Computer Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Magnetic resonance image (MRI) brain tumor segmentation is crucial and important in the medical field, which can help in diagnosis and prognosis, overall growth predictions, Tumor density measures, and care plans needed for patients. The difficulty in segmenting brain Tumors is primarily because of the wide range of structures, shapes, frequency, position, and visual appeal of Tumors, like intensity, contrast, and visual variation. With recent advancements in Deep Neural Networks (DNN) for image classification tasks, intelligent medical image segmentation is an exciting direction for Brain Tumor research. DNN requires a lot of time & processing capabilities to train because of only some gradient diffusion difficulty and its complication. Methods: To overcome the gradient issue of DNN, this research work provides an efficient method for brain Tumor segmentation based on the Improved Residual Network (ResNet). Existing ResNet can be improved by maintaining the details of all the available connection links or by improving projection shortcuts. These details are fed to later phases, due to which improved ResNet achieves higher precision and can speed up the learning process. Results: The proposed improved Resnet address all three main components of existing ResNet: the flow of information through the network layers, the residual building block, and the projection shortcut. This approach minimizes computational costs and speeds up the process. Conclusion: An experimental analysis of the BRATS 2020 MRI sample data reveals that the proposed methodology achieves competitive performance over the traditional methods like CNN and Fully Convolution Neural Network (FCN) in more than 10% improved accuracy, recall, and f-measure.

South African Journal of Botany

DOI: https://doi.org/10.1016/j.sajb.2023.11.017

163 (2023)

Carbon stocks of Geramo forest, the western escarpment of the rift valley of Ethiopia

Zeleke Assefa Getaneh [a b], Sebsebe Demissew [a], Zerihun Woldu [a], Ermias Aynekulu [c]

[b] Department of Biology, College of Natural Sciences, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Forests play a vital role in the global carbon balance and combating global climate change by sequestering and retaining carbon from the atmosphere in their biomass and soil. Thus, this study aims to estimate the carbon stocks in the biomass and soil along with various environmental factors in the Geramo forest in southern Ethiopia. Ninety-six plots (20 × 20 m2) were laid at a distance of 250 m along 16 line transects that were laid 300 m apart. Five 1 × 1 m2 subplots (4 at the corner and 1 at the center) were laid inside each main plot for LHG and soil data collection. The results revealed that the estimated total carbon stocks and mean carbon stock densities of the study forest were 57994 Mg h−1and 604 ± 344 Mg h−1, respectively, with a mean CO2 equivalent of 2217 ± 1262 Mg h−1. This result indicates the remarkable role of the Geramo forest in carbon stock and sequestration potential compared with other remnant forests in Ethiopia. Thus, the Geramo forest plays a crucial role in climate change mitigation through carbon sequestration, and hence, this forest can generate carbon credits as financial benefits to the nearby population in the future. The results also revealed that anthropogenic disturbances were negatively associated with the carbon stocks of the forest. Therefore, sustainable forest conservation activities are needed to conserve forest resources, protect the forest from growing anthropogenic disturbances, and sustain its current global climate change mitigation and adaptation benefits

Malaria Journal

DOI: https://doi.org/10.1186/s12936-023-04736-7

311(2023)

Schoolchildren with asymptomatic malaria are potential hotspot for malaria reservoir in Ethiopia: implications for malaria control and elimination efforts

Abdissa Biruksew[1,2*] , **Ashenafi Demeke[3]**, Zewdie Birhanu[4] , Lemu Golassa[5] , Masrie Getnet[6] and Delenasaw Yewhalaw [1,2]

[3]Arba Minch Health Science College, Arba Minch, Ethiopia

Abstract

Background: Schoolchildren with asymptomatic malaria infections often go undiagnosed and untreated, serving as reservoirs for infection that hamper malaria control and elimination efforts. In this context, little is known about the magnitude of asymptomatic malaria infections in apparently healthy schoolchildren in Ethiopia. This study was aimed at determining the prevalence of asymptomatic malaria infection and its associated factors in apparently healthy schoolchildren in Ethiopia. Methods: From September 2021 to January 2022, a school-based cross-sectional study was conducted on 994 apparently healthy schoolchildren (aged 6–15 years) selected from 21 primary schools in the Gomma district, of Jimma zone, southwestern Oromia, Ethiopia. A multi-stage sampling technique was used to select schools and participants. After allocating the total sample proportionally to each school and then to each grade, participants were selected using the lottery method from a list of student records (rosters). Finger-pricked blood samples were collected for microscopy blood film preparation and malaria rapid diagnostic test (RDT) (SD Bioline Malaria Ag Pf/Pv). Moreover, dry blood spots (DBSs) were prepared onto filter papers for quantitative real time polymerase chain reaction (qPCR) analysis. Results: As determined by RDT and microscopy, the prevalence of asymptomatic malaria was 2.20% and 1.51%, respectively. Using qPCR, the overall prevalence was 5.03% (50/994). Of this, Plasmodium falciparum, Plasmodium vivax and mixed infections accounted for 90%, 6% and 4%, respectively. Submicroscopic asymptomatic malaria infection was also accounted for 70% (35/50) of the overall prevalence. Household head age, nighttime outdoor activities of household heads, family history of malaria, absence of insecticide-treated nets (ITN), and presence of stagnant water around the houses are all significantly associated with asymptomatic malaria infections among schoolchildren. Conclusions: This study found that both RDT and microscopy underestimated the prevalence of asymptomatic malaria in schoolchildren. However, qPCR was able to detect even low levels of parasitaemia and revealed a higher prevalence of asymptomatic submicroscopic malaria infections. The findings imply that schoolchildren with asymptomatic malaria infection are potential hotspot for malaria reservoir that fuels ongoing transmission. Therefore, it is imperative to include schoolchildren and schools in malaria intervention package and equally important is the adoption of more advanced and sensitive diagnostic tools, which would be crucial for successful malaria control and elimination efforts. Targeted interventions for asymptomatic malaria-infected schoolchildren can provide invaluable support to the National Malaria Control Programme in controlling and eventually eliminating the disease

BMC Medical Research Methodology

DOI: http://dx.doi.org/10.1186/s12874-023-02022-3

198(2023)

The heterogeneity of symptom reporting across study sites: a secondary analysis of a randomised placebo-controlled multicentre antimalarial trial

Tamiru Shibiru Degaga[4]

[4]College of Medicine & Health Sciences, Arba-minch University, Arbaminch, Ethiopia.

Abstract

Introduction: Symptoms reported following the administration of investigational drugs play an important role in decisions for registration and treatment guidelines. However, symptoms are subjective, and interview methods to quantify them are difficult to standardise. We explored differences in symptom reporting across study sites of a multicentre antimalarial trial, with the aim of informing trial design and the interpretation of safety and tolerability data. Methods: Data were derived from the IMPROV trial, a randomised, placebo-controlled double blinded trial of high dose primaquine to prevent Plasmodium vivax recurrence conducted in eight study sites in Afghanistan, Ethiopia, Indonesia and Vietnam. At each follow up visit a 13-point symptom questionnaire was completed. The number and percentage of patients with clinically relevant symptoms following the administration of primaquine or placebo, were reported by study site including vomiting, diarrhoea, anorexia, nausea, abdominal pain and dizziness. Multivariable logistic regression was used to estimate the confounder-adjusted site-specific proportion of each symptom. Results: A total of 2,336 patients were included. The greatest variation between sites in the proportion of patients reporting symptoms was for anorexia between day 0 and day 13: 97.3% (361/371) of patients in Arba Minch, Ethiopia, reported the symptom compared with 4.7% (5/106) of patients in Krong Pa, Vietnam. Differences attenuated slightly after adjusting for treatment arm, age, sex, day 0 parasite density and fever; with the adjusted proportion for anorexia ranging from 4.8% to 97.0%. Differences between sites were greater for symptoms graded as mild or moderate compared to those rated as severe. Differences in symptom reporting were greater between study sites than between treatment arms within the same study site. Conclusion: Despite standardised training, there was large variation in symptom reporting across trial sites. The reporting of severe symptoms was less skewed compared to mild and moderate symptoms, which are likely to be more subjective. Trialists should clearly distinguish between safety and tolerability outcomes. Differences between trial arms were much less variable across sites, suggesting that the relative difference in reported symptoms between intervention and control group is more relevant than absolute numbers and should be reported when possible.

World Development Sustainability

DOI: http://dx.doi.org/10.3389/fclim.2024.1478923

100099(2023)

Climate-smart agriculture in Ethiopia: Adoption of multiple crop production practices as a sustainable adaptation and mitigation strategies

Leta Hailu[1 *] and **Wondimagn Teka[2]**

[2]Southern Agricultural Research Institute, Natural Resource Management Research, Arba Minch Agricultural Research Center, PO.BOX. 2228, Arba Minch, Ethiopia

Abstract

Given that Ethiopian agriculture is seriously threatened by climate change, understanding the factors that influencing the adoption of various climate-smart agricultural (CSA) practices supports policy interventions to reduce negative effects of climate change. Therefore, this study was aimed at exploring determinants of the adoption of multiple CSA practices by focusing on crop production. This study used data from 271 randomly selected smallholder farmers from the Gamo, Gofa and Konso zones of Southern Ethiopia, and a multivariate probit (MVP) model was used to analyze the data. Crop diversification, irrigation, drought-tolerant and early-maturing crop varieties, integrated soil fertility management, and integrated pest management were prominent CSA practices to improve crop productivity, increase adaptivity capacity, and mitigate the adverse climate change effects in the study area. The study's findings indicate that the adoption of CSA practices varies considerably between farmers and agroecology. The MVP simulation result reveals that farmers' adoption decisions for CSA practices are highly interdependent, indicating that farmers adopt two or more adaptation and mitigation strategies as mutual CSA practices. Furthermore, the regression result reveals that the education level of farmers, extension contact, accessing climate variability information, access to irrigation facilities, and social group participation were similar underlying factors that affected the adoption decision of CSA practices. By providing climate change information, respective organizations should encourage farmers to utilize available alternate irrigation access and climate-resilient crop varieties. In addition, strengthening social norms through agricultural cooperatives and training on the application of integrated pest management and soil fertility management are suggested to spur farmers' CSA uptake

BMC Nutrition

DOI: http://dx.doi.org/10.1186/s40795-023-00681-5

22(2023)

Early cessation of breastfeeding and the associated factors among mothers with children aged 2 to 3 years in rural Southern Ethiopia: a community-based cross-sectional study

Kidus Temesgen[1]*, Eshetu Andarge[1,2], Teshale Fikadu[1,3], Muluken Bekele[1], Yilma Chisha[1],Habtamu Esubalew[1] and Temesgen Mohammed Toma [4]

[1]School of public Health, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Breast milk is the first natural food for babies. It has nutritional, immunological, developmental, psychological, societal and environmental advantages. Failing to feed children for twenty-four months has so many negative consequences to children. Though studies have well documented the duration of breast feeding in the first six months, the proportion of women completing the recommended duration and factors associated with it has not been well investigated in rural places of Ethiopia. Therefore, this study aims to fill this gap in evidence among mothers with children aged 2 to 3 years in Arba Minch Health and Demographic Surveillance Site in 2021 E.C. Methods: A community-based cross-sectional study was conducted in all kebeles of the surveillance site by employing multi-stage sampling technique. Descriptive statistics was done to summarize findings and binary logistics regression model was used to identify factors significantly associated with early breast-feeding cessation respectively. OR with its 95% CI was obtained to quantify the degree of association between explanatory variables and early breastfeeding cessation. Result: The proportion of early cessations of breast feeding was 29.30% (25.02, 33.64%). Being from a household with no fathers 'education or primary education [AOR=0.22; 95%CI (0.07, 0.74)] and [AOR=0.30; 95%CI (0.12, 0.76)], farmer mothers [AOR=6.40; 95%CI: (1.38, 29.74)], birth interval of less than 2 years [AOR=2.07; 95%CI: (1.03, 4.16)], and with mothers' one or two to three antenatal care visits [AOR = 2.73; 95%CI: (1.27,5.88)] were factors significantly associated with early cessations of breast feeding. Conclusion and recommendation: The proportion of early cessations of breast feeding was high. Father's education, being farmer, birth interval and ante natal care visit were significant factors. Health education about proper breast feeding practice and improving ante natal care attendance might improve premature cessation of breast feeding among women.

Water Conservation Science and Engineering

DOI: http://dx.doi.org/10.1007/s41101-023-00216-w

47(2023)

Evaluating The Effect of Initial Soil Moisture Content on Infiltration Characteristics Using Empirical and Hydrus 1D Models

Yohannes SmenehKetsela[1], Samuel Dagalo Hatiye[1]· Amare Tadesse Muche[1]

[1]Faculty of Water Resources and Irrigation Engineering, Arba Minch University Water Technology Institute, Arba Minch, Ethiopia

Abstract

In irrigation water management, it is critical to understand the infiltration rate and its properties. The study aimed to evaluate the ability of some empirical equations and Hydrus 1D models to predict soil infiltration and the effect of initial soil moisture content on infiltration characteristics. The experiment was conducted on Arba Minch demonstration farmland using a double-ring infiltrometer, and the performance of the various infiltration models (Horton, Philip, Kostiakov, and modified Kostiakov) and Hydrus 1D was evaluated in the study area at five different initial water contents. The results showed that the Horton and Hydrus 1D models were fitted with the observed infiltration for the soil with five initial water contents (0.13, 0.256, 0.31, 0.354, and 0.375), and the goodness of fits was evaluated by R 2 and RMSE with a range between 0.9967–0.997, 0.93–0.94, and 0.0054–0.006 and 0.024, respectively. Hence, Horton and Hydrus 1D models were successfully used to evaluate the cumulative infiltration of soil in the study area. Therefore, in this study, the Hydrus 1D model well captured the infiltration rates at different initial soil moisture contents.

Substance Abuse: Treatment, Prevention, and Policy

DOI: http://dx.doi.org/10.1186/s13011-023-00567-6

61(2023)

Alcohol consumption and associated factors among pregnant women attending antenatal care at governmental hospitals in Harari regional state, Eastern, Ethiopia

Tilahun Bete[1], Henock Asfaw[1], Kabtamu Nigussie[1], Addisu Alemu[2], Addis Eyeberu Gebrie[3], Deribe Bekele Dechasa[4], Kabtamu Gemechu[5], Mesay Arkew[5], **Beniam Daniel[6],** Habtam Gelaye[7], Asrat Wolde[8], Mulat Awoke Kassa[9] and Tamrat Anbesaw[7*]

[6]Department of Psychiatry, College of Health and Medicine Science, Arba Minch UniversityThe institution will open in a new tab, Arba-Minch, Ethiopia

Abstract

Background: Alcohol consumption during the pregnancy period is high despite the well-established evidence of its harmful effects on pregnancy and infant development. Early identification and behavioral modification are of great significance. This study aimed to assess the prevalence and associated factors of alcohol consumption among pregnant women attending antenatal care at governmental hospitals in the Harari regional state, Eastern Ethiopia. Method: From April 1/2022-May 1/2022, an institutional-based cross-sectional survey was conducted among 589 pregnant women attending antenatal care governmental hospitals in Harari regional state. A systematic random sampling technique was used to select study participants during the study period. Data were collected through face-to-face interview methods using AUDIT-C. The collected data were coded, entered into Epi-data data version 3.1, and analyzed by SPSS Version 26. Binary logistic regression was carried out to identify independent predictors of alcohol consumption at a 95% confidence level. Results: From a total of 617 eligible participants, 589 participated in the study with a response rate of 95.46%. The overall prevalence of alcohol consumption among pregnant women in Harari regional state governmental hospitals was 21.2% (95% CI:17.8, 24.4). In multivariate analysis, single marital status (AOR = 5.18;95% CI (2.66,10.11), previous history of abortion(AOR = 4.07;95% CI(2.06,8.04), family history of mental illness (AOR = 4.79;95% CI (1.94,11.83), depression (AOR 2.79; 95%CI(1.35,5.76), and anxiety(AOR = 2.51; 95% CI (1.23, 5.12) were variables found to have a statistically significant association with alcohol consumption during pregnancy in Harari regional state governmental hospitals. Conclusion: In comparison to the majority of other research, the prevalence of alcohol usage during pregnancy was high in this study. This study observed that single marital status, previous history of abortion, family history of mental illness, depression, and anxiety were highly associated with alcohol consumption during pregnancy. Hence, responsible bodies working on mother and child health should try to mitigate or remove the above-mentioned risks when developing interventions

Scientific Reports

DOI: http://dx.doi.org/10.1038/s41598-023-41826-7

14490(2023)

Maize pollen diet enhances malaria mosquito longevity and infectivity to Plasmodium parasites in Ethiopia

Shilimat Ayele [1,2], Teklu Wegayehu [2], Nigatu Eligo [2], Girum Tamiru [2], Bernt Lindtjørn [2,3] & Fekadu Massebo [2]*

[2]Department of Biology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Although larval diet quality may affect adult mosquito fitness, its impact on parasite development is scarce. Plant pollen from Zea mays, Typha latifolia, and Prosopis juliflora was ultraviolet-sterilized and examined for effects on larval development, pupation rate, adult mosquito longevity, survival and infectivity. The control larvae were fed Tetramin fish food as a comparator food. Four treatment and two control groups were used for each pollen diet, and each experimental tray had 25 larvae. Female An. arabiensis were starved overnight and exposed to infectious blood using a membrane-feeding system. The Kaplan–Meier curves and log-rank test were used for analysis. The Z. mays pollen diet increased malaria mosquito survival and pupation rate (91.3%) and adult emergence (85%). Zea mays and Tetramin fish food had comparable adulthood development times. Adults who emerged from larvae fed Z. mays pollen had the longest average wing length (3.72 mm) and were more permissive to P. vivax (45%) and P. falciparum (27.5%). They also survived longer after feeding on infectious blood and had the highest number of P. vivax oocysts. Zea mays pollen improved larval development, adult mosquito longevity, survival and infectivity to Plasmodium. Our findings suggest that malaria transmission in Z. mays growing villages should be monitored.

Egyptian Journal of Remote Sensing and Space Science

DOI: http://dx.doi.org/10.1016/j.ejrs.2023.07.005

26(2023)

Assessment of potential groundwater Zones in the drought-prone Harawa catchment, Somali region, eastern Ethiopia using geospatial and AHP techniques

Ahmed Abdullahi, Muralitharan Jothimani*, Ephrem Getahun, Jagadeshan Gunalan, Abel Abebe

[1]Department of Geology, College of Natural and Computational Sciences, Arba Minch University, Arba Minch, Ethiopiabebe, Abel

Abstract

Groundwater is essential for the sustainable growth of society, economy, and agriculture. Identifying potential zones for groundwater is required to fulfill the needs of various sectors. This study aims to identify prospective groundwater zones in the drought-prone Harawa catchment area of the Somali region of eastern Ethiopia using geospatial and analytical hierarchy process (AHP) approaches. Eight significant groundwater regulating variables were developed by combining primary and remote sensing data, and AHP analysis was performed to identify groundwater prospect zones. The findings of the prospective groundwater zone model were categorized into four groups: very low, low, moderate, and high. Approximately 14.2% of the research area was recognized as having high potential, 24.0% as having moderate potential, and 38.7% and 23.2% as having very low and low potentials, respectively. Groundwater prospect maps were examined and confirmed using the discharge data from numerous production wells in the study region. The results demonstrated a strong correlation or agreement with the yield data. The curve approach was cross-validated with the area, revealing an 81.7% correlation between the model findings and the water well points. The sensitivity analysis showed that lithology, land use/land cover, and rainfall significantly impacted groundwater occurrence. In contrast, the slope of the study region had little effect.

BMC Health Services Research

DOI: http://dx.doi.org/10.1186/s12913-023-09671-6

670(2023)

Patient safety culture and associated factors among nurses working at public hospitals in Gamo Zone, Southern Ethiopia

Bereket Beyene Shashamo[1]*, Gesila Endashaw Yesera[2], Meseret Girma Abate[3], Wubshet Estifanos Madebo[2], Lankamo Ena Digesa[2] and Tamiru Chonka Choramo[2]

[1]School of Nursing, Department of Comprehensive Nursing, College of Medicine and Health Sciences, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia
[2]School of Nursing, Department of Comprehensive Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[3]School of Public Health, Department of Reproductive Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Patient safety culture is the prevention of errors and adverse effects to patients associated with health care delivery. It is a vital component in the provision of quality care. In healthcare settings where there is a safety culture, the people (providers, staff, administrators, and patients/families) are engaged, encouraged, and supported to make care safer. Though it is an essential component in the provision of quality care, little is known about its level, contributory, and hindering factors from the nurses' perspectives. This study aimed to assess patient safety culture and associated factors among nurses working at public Hospitals in Gamo Zone, Southern Ethiopia. Methods: This institution-based cross-sectional study was conducted among 398 nurses working at public hospitals in Gamo Zone. Data were collected by pretested, well-structured self-administered questionnaire from June 1 to 30, 2022. The collected data were checked, coded, and entered into Epi-data version 4.6.0.2 and were exported to SPSS version 25 for analyses. Bivariable and multivariable logistic regression was done to identify independent factors associated with patients' safety culture. Results: This study revealed that 202(50.8%), 95% CI: (46%—56%) of the participants had indicated good patient safety culture. From factors analysis, having an educational status of a bachelor's degree and above [AOR = 2.26, 95%CI: (1.13—4.52)], working in a surgical ward [AOR = 5.48, 95%CI: (1.96—15.34)], not being blamed when medical errors happened [AOR = 3.60, 95%CI: (1.82 – 7.14)], and working 40 up to 49 h per week [AOR = 0.30, 95%CI: (0.13 – 0.74)] were identified to be significantly associated with good patient safety culture. Conclusion: Based on the study findings, it could be observed that good patient safety culture was indicated only by half of the study participants. Implementing actions that support dimensions of patient safety culture, and creating opportunities for continuous educational advancement is recommended. Moreover, Hospital administrators, nurses' directors, and healthcare policy-makers should work in collaboration to improve the patient safety culture, and also it would be better to create a blame-free environment to promote event reporting practices.

BMC Psychiatry

DOI: http://dx.doi.org/10.1186/s12888-023-05005-2

728(2023)

Preoperative anxiety and associated factors among women admitted for elective obstetric and gynecologic surgery in public hospitals, Southern Ethiopia: a cross-sectional study

Abera Mamo Dibabu[1]*, **Teklemariam Gultie Ketema[2], Maechel Maile Beyene[2]**, Dereje Zeleke Belachew[1], Hailegiyorgis Geleta Abocherugn[1] and Abdu Seid Mohammed[1]

[2]Department of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Preoperative anxiety is a major mental health problem during the preoperative period. Admission of women to surgery is stressful, and a high level of anxiety was associated with increased perioperative morbidity and mortality, poor treatment satisfaction, and bad obstetric outcomes, including long-term cognitive impairment in children. Despite its negative consequences, little is known on this area, particularly in the study area. Objective: To assess preoperative anxiety and associated factors among women admitted for elective obstetrics and gynecologic surgeries in public hospitals in Southern Ethiopia, 2022. Methods and Materials: An institution-based cross-sectional study design was conducted among 389 women using structured interviewer-administered samples who were selected by systematic random sampling from May 20th to June 20th, 2022. The Amsterdam preoperative anxiety and information scale (APAIS) was used to assess the level of anxiety. Data were collected electronically using the Open Data Kit version 2022.2.3 and analyzed with the Statistical Package for Social Sciences version 26.0. Bivariate and multivariable logistic regression analyses were done. The strength of the association was declared by using an adjusted odds ratio (AOR) with a 95% confidence interval, and a statistical significance of $P < 0.05$. Results: The magnitude of preoperative anxiety was 57.1% (95% CI = 51.4–61.5), and 48.1% of women required an average amount of information. Being a gynecologic patient (AOR = 2.0, 95% CI = 1.21, 3.32), having previous anesthesia and surgery (AOR = 2.09, 95% CI = 1.10, 3.96), having fear of postoperative pain (AOR = 1.96, 95% CI = 1.08, 3.53), having concern for family (AOR = 2.56, 95% CI = 1.49, 4.37), having poor social support (AOR = 3.75, 95% CI = 1.99, 7.09), and moderate social supports (AOR = 3.27, 95% CI = 1.74, 6.17), and having a high information requirement about anesthesia and surgery (AOR = 4.68, 95%CI = 2.16, 10.13) were statistically associated with preoperative anxiety. Conclusion: Preoperative anxiety was often high in the region. Associated factors were the type of surgery, previous anesthesia and surgery, fear of postoperative pain, fear for family, social support, and a high information need. So the national and regional health bureau should develop guidelines and implement strategies to reduce women preoperative anxiety as part of midwifery care. The women should be assessed regularly during the preoperative visits; and appropriate anxiety reduction and information regarding surgery, and anesthesia should be provided.

International Journal of Educational Research Open

DOI: http://dx.doi.org/10.1016/j.ijedro.2023.100293

100293(2023)

Using need-based writing instruction through self-reflection to improve students' writing difficulties: A counterbalanced design

Hailay Tesfay Gebremariam [a], Belete Hiluf [b]

[a] Ethiopian Languages and Literature (Amharic), College of Social Science and Humanities, Arba Minch University, Arba Minch, Ethiopia

Abstract

Despite the complex nature of writing, many students are hesitant to tackle difficult tasks, and there have not been enough studies conducted to determine whether writing instruction from the perspective of self-reflection improves students' writing difficulties. This article aims to bridge this gap by utilizing students' need-based writing instruction through self-reflection on their writing skills. To achieve this goal, 42 students from Arba Minch University participated and were given a writing performance test to differentiate those with writing difficulties, then completed a self-reflection on their experiences of writing effectively using an open-ended questionnaire. After thematic analysis of the self-reflection data, self-reflection-based writing instruction was employed to minimize the students' difficulties. In the analysis stages, mean and standard deviation statistics were applied, and a univariate analysis of variance was conducted to answer the question of the impact of need-based writing instruction through self-reflection on students' writing performance. The findings demonstrated that, despite the difficulties students encountered during their writing practices, self-reflection-based instruction had a significant positive impact on the participants' writing. To summarize, the findings have implications for how writing is taught in language classrooms; it is recommended that teachers should consider using self-reflection-based instruction to improve their students' writing skills

Agriculture and Food Security

DOI: http://dx.doi.org/10.1186/s40066-023-00437-1

37(2023)

Women empowerment in agriculture and its effect on household food security: evidence from Gamo Zone of Southern Ethiopia

Sileshi Abebe Jemaneh[1*] and Elias Mekonnen Shibeshi[1]

[1] Department of Economics, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Women empowerment and food security are supposed to be two mutually reinforcing goals of the 2030 Sustainable Development Agenda of the United Nations. However, the measurement of women's empowerment and its relationship with household food security in the agricultural context is too limited, especially in Ethiopia. The main objective of this study is to examine the effect of women's empowerment in agriculture on household food security in the Gamo zone of Ethiopia. Methods: Cross-sectional data were collected from 385 dual-adult households, selected through a multistage random sampling procedure from two districts—Chencha and Kucha of Gamo zone in Ethiopia. The data were collected on the sample households' demographic, socioeconomic, women empowerment, food consumption and livelihood activities—crop production, livestock holding and off-farm participation by interviewing both primary male and female decision-makers from each household. Household food security was measured using Calorie Availability, Household Food Consumption and Dietary Diversity Score, while women's empowerment in agriculture was measured using the Abbreviated Women Empowerment in Agriculture Index. Ordinary Least Square, Two-Stage Least Square, Poisson and Instrumental Variable Poisson regression were used as analytical models. Results: Our study shows that increases in women's empowerment are positively and significantly associated with all food security indicators—adult equivalent calorie availability, household-level food consumption and dietary diversity. The result also shows that food security is positively related to the proportion of adult household members, age and education of primary female, landholding size, crop diversification, food crop production, the number of dairy cows owned and off-farm participation. However, food security is negatively related to household size. Conclusion: The implication of the finding is that stakeholders should give due attention to promoting women's empowerment and eliminating the gender gap in agriculture through appropriate gender mainstreaming intervention in dual-adult households. Food security programmes could also gain from prioritizing female education and promoting agricultural diversification (crop and livestock) and off-farm income diversification strategies as valuable investments to improve household food security. This study is the first application of the Abbreviated Women's Empowerment in Agriculture Index in Ethiopia as a predictor to household food security, and contributes to the women's empowerment–household food security nexus literature in developing countries.

International Journal of Climate Change Strategies and Management

DOI: http://dx.doi.org/10.1108/IJCCSM-03-2022-0036

15(2023)

Appraisal of climate change mitigation and adaptation regulatory frameworks in Ethiopia and their congruency with the UN climate change convention

Bilate Bisare Bitire

School of Law, Arba Minch University, Arba Minch, Ethiopia

Abstract

Purpose: The purpose of this paper is to critically investigate the Ethiopia's climate change adaptation and mitigation regulatory frameworks and their congruency with the guiding principles under the United Nations (UN) Climate Convention, to show the alignment of the regulatory frameworks with the UN Climate Change rules. Rising temperatures, erratic rainfall distribution, recurrent droughts and floods require robust climate change mitigation and adaptation policies and effective implementation in the country. Design/methodology/approach: Through the doctrinal legal research method, the author has used a detailed analysis of primary sources, both national and international legislative enactments. Besides, the research has benefitted from secondary sources like research reports, online publications, scientific journals, international reports, books and journal articles. Findings: The findings reveal that in Ethiopia, there is no national climate change-specific policy and legislation. Although there are scattered sectoral climate-related policies and strategies, they are not consistent with the principles of the United Nations Framework Convention on Climate Change (UNFCCC). Originality/value: This study argues that having comprehensive specific climate change policy and legislative frameworks consistent with UNFCCC guiding principles could help to mitigate and adapt to the adverse effects of climate change in the country.

Reproductive Health

DOI: http://dx.doi.org/10.1186/s12978-023-01713-w

169(2023)

Evaluation of a community-based intervention package to improve knowledge of obstetric danger signs, birth preparedness, and institutional delivery care utilization in Arba Minch Zuria District, Ethiopia: a cluster-randomized trial

Mekdes Kondale Gurara[1,2*], Veerle Draulans[3], Yves Jacquemyn[2,4] and Jean-Pierre Van Geertruyden[2]

[1]Department of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Introduction: Maternal healthcare utilization, particularly the institutional delivery, is disproportionately low in rural Ethiopia. This study aimed to evaluate the effectiveness of an integrated package of community-based interventions on the improved knowledge of obstetric danger signs, birth preparedness, and institutional delivery services utilization in rural areas of Gamo zone, southern Ethiopia. Methods: We conducted cluster-randomized controlled trial (NCT05385380) from 2019 to 2021 at the Arba Minch Health and Demographic Surveillance System site. We randomly assigned the 10 kebele clusters to intervention and control arm. We used a package of interventions, which included providing information on safe motherhood via video and/or audio with a birth preparedness card for pregnant women, training for community volunteers and health extension workers, and improving maternity waiting home services. Women in the control arm received routine services only. We used generalized mixed-effects logistic regression models to evaluate the effectiveness of the intervention on the outcome variables. Results: The study enrolled 727 pregnant women across the 10 clusters, with a 617 (84.9%) successful follow-up rate. The proportion of institutional delivery in the intervention arm was increased by 16.1% from 36.4% (174/478) at the baseline to 52.5% (224/427) at the endline (Adjusted odds ratio [AOR] for McNemar's Test = 1.5; 95% confidence interval [CI]: 1.1 to 2; $p < 0.001$). In the control arm, however, there was a 10.3% fall in the proportion of institutional delivery (from 164/249 to 105/190). Pregnant women who received the intervention were significantly more likely to give birth in a health institution than those who did not (AOR 2.8; 95% CI: 1.2, 6.4). Conclusion: The study demonstrates that an integrated community-based intervention package that included video-based storytelling and upgrading maternity waiting homes increased institutional delivery care utilization among rural women. We recommend that audio-visual storytelling, starting during pregnancy and continuing postpartum, be incorporated into routine maternal healthcare services to address access to care inequalities in rural settings.

Malaria Journal

DOI: http://dx.doi.org/10.1186/s12936-023-04711-2

273(2023)

Malaria misdiagnosis in the routine health system in Arba Minch area district in southwest Ethiopia: an implication for malaria control and elimination

Engida Yigezu[1], Biniam Wondale[1], Daniel Abebe[2,3], **Girum Tamiru[1], Nigatu Eligo[1]**, Bernt Lindtjørn[4], Endalamaw Gadisa[3], Fitsum Girma Tadesse[3] and **Fekadu Massebo[1*]**

[1]Department of Biology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Plasmodium falciparum and Plasmodium vivax are coendemic in Ethiopia, with different proportion in different settings. Microscopy is the diagnostic tool in Ethiopian health centres. Accurate species-specific diagnosis is vital for appropriate treatment of cases to interrupt its transmission. Therefore, this study assessed the status of species-specific misdiagnosis by microscope compared with polymerase chain reaction (PCR). Methods: A health facility based cross-sectional study was conducted from November 2019 to January 2020 in Kolla Shelle Health centre, Arba Minch Zuria district. The study population were suspected malaria cases, who visited the health centre for a diagnosis and treatment. Consecutive microscopy positive cases as well as a sample of microscopically negative cases were included for molecular analysis by polymerase chain reaction (PCR). Results: 254 microscopically negative and 193 microscopically positive malaria suspects were included. Of the 193 malaria positive cases, 46.1% [95% confidence interval (CI) 38.9–53.4] (89/193) were P. falciparum infection, 52.3% (95% CI 45.0–59.5) (101/193) were P. vivax infection, and 1.6% (3/193) had mixed infection of P. falciparum and P. vivax. Of the microscopically positive cases of P. falciparum, 3.4% (3/89) were P. vivax and 11.2% (10/89) were mixed infections with P. falciparum and P. vivax and a single case was negative molecularly. Similarly, of the microscopically positive P. vivax cases, 5.9% (6/101) were P. falciparum and 1% (1/101) was mixed infection. Single case was negative by molecular technique. Of the 254 microscopically negative cases, 0.8% were tested positive for P. falciparum and 2% for P. vivax by PCR. Considering molecular technique as a reference, the sensitivity of microscopy for detecting P. falciparum was 89.2% and for P. vivax, it was 91.2%. The specificity of microscopy for detecting P. falciparum was 96.1% and for P. vivax, it was 97.7%. However, the sensitivity of microscopy in detecting mixed infection of P. falciparum and P. vivax was low (8.3%). Conclusion: There were cases left untreated or inappropriately treated due to the species misidentification. Therefore, to minimize this problem, the gaps in the microscopic-based malaria diagnosis should be identified. It is recommended to regularly monitor the competency of malaria microscopists in the study area to improve species identification and diagnosis accuracy.

Journal of Health, Population and Nutrition

DOI: http://dx.doi.org/10.1186/s41043-023-00387-1

46(2023)

Bacteriological quality and safety of bottle food and associated factors among bottle-fed babies attending pediatric outpatient clinics of Government Health Institutions in Arba Minch, southern Ethiopia

Alebachew Marege[1], Belayneh Regassa[1], Mohammed Seid[1*], Dagimawie Tadesse[1], Munira Siraj1 and Aseer Manilal[1*]

[1]Department of Medical Laboratory Science, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Microbial contamination of baby bottle food has been identified as a significant public health concern, especially in developing countries, but it remains overlooked. Therefore, this study aimed to determine microbiological hazards, compliance with hygiene practices, and critical control points of contamination in baby bottle food in Arba Minch, southern Ethiopia. Objective: To evaluate the bacteriological quality and prevalence of foodborne pathogens in baby bottle food and to identify associated factors among bottle-fed babies attending three government health institutions in Arba Minch, southern Ethiopia. Methods: A cross-sectional study was conducted between February 24 and March 30, 2022. A total of 220 food samples, comprising four types prepared with different sources of materials, were collected from systematically selected bottle-fed babies attending health facilities. The data on sociodemographic characteristics, food hygiene, and handling practices were solicited by face-to-face interview using a semi-structured questionnaire. Food samples (10 mL) were quantitatively analyzed for total viable counts (TVC) and total coliform count (TCC) and qualitatively for the presence of common foodborne bacterial pathogens. Data were analyzed using SPSS; ANOVA and multiple linear regression analyses were done to identify factors influencing microbial counts. Results: Results revealed that the means and standard deviations of TVC and TCC were 5.3 ± 2.3 log10 colony forming units (CFU)/mL and 4.1 ± 2.6 log10 CFU/mL, respectively. Of the various food samples analyzed, 57.3 and 60.5% had a TVC and TCC above the maximum acceptable limits, respectively. The result of the ANOVA showed that there was a significant difference in the mean score of TCV and TCC among the four types of food samples ($p < 0.001$). Enterobacteriaceae were found in the majority of positive food samples (79.13%), followed by Gram-positive cocci (20.8%). Salmonella spp., diarrheagenic Escherichia coli, and Staphylococcus aureus were the common foodborne pathogens detected in 8.6% of tested foods. The regression result revealed that the type of baby food, hand washing practices of mothers or caregivers, and sterilizing and disinfecting procedures of feeding bottles are independent determinants of bacterial contamination ($p < 0.001$). Conclusion: The high microbial load and the presence of potential foodborne bacterial pathogens in the bottle food samples analyzed indicate unsanitary practices and the potential risk of exposure to foodborne pathogens in bottle-fed babies. Thus, interventions such as educating parents about proper hygiene practices, sterilizing feeding bottles and limiting bottle feeding practices are critical to reducing the risk of foodborne to bottle-fed infants

BMC Women's Health

DOI: http://dx.doi.org/10.1186/s12905-022-02150-w

30(2023)

Sexual violence and risk factors among night shift female college students in Hawassa city, South Ethiopia, 2020

Hawi Leul Esayas[1*], Hirut Gemeda[2], Teshome Melese[2], **Gebremariam Temesgen Birgoda[1]**, **Bezabih Terefe[1], Samuel Abebe1, Muluken Bekele[3], Fitsum Wolde[1]** and Bamlaku Birie[4]

[1]Departments of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[3]Schools of Public Health, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Sexual violence is any sexual act, attempt to obtain a sexual act, unwanted sexual comments or advances, against a person's sexuality using coercion, by any person regardless of their relationship to the victim, in any setting. Several studies were undertaken on sexual violence among students in general. Nevertheless, there is paucity of information about sexual violence among night shift students in particular; even if they are more vulnerable to sexual violence due to the nature of the class time. The government has embraced legal and policy frameworks to discourse the problem of sexual violence in Ethiopia; nevertheless, the problem still is quite pervasive. Objective: This study was aimed to assess the prevalence of sexual violence and risk factors among night shift female college students in Hawassa city. Methods: Institution-based cross-sectional study design was employed. A structured questionnaire was used to collect the data from 345 study participants. Systematic random sampling technique was used to choice study participants. Epi data version 3.1statistical software and Statistical Package for Social Sciences version 22.0 were used to enter and analysis the data. Both bivariable and multivariable logistic regression analyses were performed to recognize risk factors. P values < 0.05 with 95% confidence level were used to state statistical significance. Results: A total of 330 students were participated in the study making a response rate of 95.6% with a mean age of 24.9. The prevalence of last 12 month sexual violence was 202 (61.2%) 95% CI (55.8, 66.4) which includes rape, attempted rape and sexual harassment. The 12 month prevalence of each form of violence was 46 (13.9%) 95% CI (10.6, 17.9), 23 (6.9%) 95% CI (3.6, 10.9) and 163 (49.4%) 95% CI (46.2, 53.6) of rape, attempted rape and sexual harassment respectively. The independent predictors of sexual violence having a father with no formal education (AOR = 2.39, 95% CI 1.04, 5.33) presence of multiple sexual partners (AOR = 3.44, 95% CI 1.64, 7.2), having sexual partner (AOR = 1.89, 95% CI 1.03, 3.5), and consuming alcohol (3.55, 95% CI 1.84–6.85) by the victims. Conclusion: This study shown that the prevalence of sexual violence is high among night shift female college students in Hawassa city. Having a father with no formal education, drinking alcohol, having multiple sexual partners and having sexual partner were more likely to have sexual violence within the last 12 month. Thus, students should prevent themselves from health risky behaviors and Hawassa educational bureau should be work on awareness creation concerning women empowerment with in marriage and Further broad and longitudinal studies are needed to determine the predictors of the problem among female students at Hawassa and Ethiopia as a whole.

The Lancet

DOI: http://dx.doi.org/10.1016/S0140-6736(23)01553-2

402(2023)

Primaquine radical cure in patients with Plasmodium falciparum malaria in areas co-endemic for P falciparum and Plasmodium vivax (PRIMA): a multicentre, open-label, superiority randomised controlled trial

Kamala Thriemer, **Tamiru Shibiru Degaga**[b], Michael Christian, Mohammad Shafiul Alam, Megha Rajasekhar, Benedikt Ley, Mohammad Sharif Hossain, Mohammad Golam Kibria, Tedla Teferi Tego, Dagamawie Tadesse Abate, Sophie Weston, Hellen Mnjala, Angela Rumaseb, Ari Winasti Satyagraha, Arkasha Sadhewa, Lydia Vista Panggalo, Lenny L Ekawati, Grant Lee, **Rodas Temesgen Anose**[b], **Fitsum Getahun Kiros**[b], Julie A Simpson, Amalia Karahalios, Adugna Woyessa, J Kevin Baird, Inge Sutanto, Asrat Hailu, Ric N Price

[b] College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: In areas co-endemic for Plasmodium vivax and Plasmodium falciparum there is an increased risk of P vivax parasitaemia following P falciparum malaria. Radical cure is currently only recommended for patients presenting with P vivax malaria. Expanding the indication for radical cure to patients presenting with P falciparum malaria could reduce their risk of subsequent P vivax parasitaemia. Methods: We did a multicentre, open-label, superiority randomised controlled trial in five health clinics in Bangladesh, Indonesia, and Ethiopia. In Bangladesh and Indonesia, patients were excluded if they were younger than 1 year, whereas in Ethiopia patients were excluded if they were younger than 18 years. Patients with uncomplicated P falciparum monoinfection who had fever or a history of fever in the 48 h preceding clinic visit were eligible for enrolment and were required to have a glucose-6-dehydrogenase (G6PD) activity of 70% or greater. Patients received blood schizontocidal treatment (artemether–lumefantrine in Ethiopia and Bangladesh and dihydroartemisinin–piperaquine in Indonesia) and were randomly assigned (1:1) to receive either high-dose short-course oral primaquine (intervention arm; total dose 7 mg/kg over 7 days) or standard care (standard care arm; single dose oral primaquine of 0·25 mg/kg). Random assignment was done by an independent statistician in blocks of eight by use of sealed envelopes. All randomly assigned and eligible patients were included in the primary and safety analyses. The per-protocol analysis excluded those who did not complete treatment or had substantial protocol violations. The primary endpoint was the incidence risk of P vivax parasitaemia on day 63. This trial is registered at ClinicalTrials.gov, NCT03916003. Findings: Between Aug 18, 2019, and March 14, 2022, a total of 500 patients were enrolled and randomly assigned, and 495 eligible patients were included in the intention-to-treat analysis (246 intervention and 249 control). The incidence risk of P vivax parasitaemia at day 63 was 11·0% (95% CI 7·5–15·9) in the standard care arm compared with 2·5% (1·0–5·9) in the intervention arm (hazard ratio 0·20, 95% CI 0·08–0·51; p=0·0009). The effect size differed with blood schizontocidal treatment and site. Routine symptom reporting on day 2 and day 7 were similar between groups. In the first 42 days, there were a total of four primaquine-related adverse events reported in the standard care arm and 26 in the intervention arm; 132 (92%) of all 143 adverse events were mild. There were two serious adverse events in the intervention arm, which were considered unrelated to the study drug. None of the patients developed severe anaemia (defined as haemoglobin <5 g/dL). Interpretation: In patients with a G6PD activity of 70% or greater, high-dose short-course primaquine was safe and relatively well tolerated and reduced the risk of subsequent P vivax parasitaemia within 63 days by five fold. Universal radical cure therefore potentially offers substantial clinical, public health, and operational benefits, but these benefits will vary with endemic setting. Funding: Australian Academy of Science Regional Collaborations Program, Bill & Melinda Gates Foundation, and National Health and Medical Research Council.

PLoS ONE
DOI: http://dx.doi.org/10.1371/journal.pone.0293542
e0293542(2023)

Prevalence of work-related musculoskeletal disorders and its associated factors among traditional cloth weavers in Chencha district, Gamo zone, Ethiopia, an ergonomic study

Desta Haftu[1*], Haregewein Kerebih[2], **Amare Terfe**[3]

[1]Department of Public Health, School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[3]Department of Environmental Health Science, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Musculoskeletal disorders at work are common in the majority of African countries. Weaving is very important in Ethiopia for the national economy and for enhancing the country's cultural values. However, the prevalence of musculoskeletal disorders in developing countries is significantly higher in common informal or small-scale enterprises such as weaving. Moreover, little is known about the prevalence and risk factors for musculoskeletal disorders in the weaving industry in Ethiopia. Therefore, the purpose of this study was to determine the prevalence of work-related musculoskeletal disorders and associated factors among traditional cloth weavers in Chencha district, Gamo zone, Ethiopia. A community-based crosssectional study was conducted in Chencha district from November 1 to December 30, 2021, using a simple random sampling technique. A total of 420 traditional cloth weavers working in individual households were interviewed. Multivariable logistic regressions were performed on variables with p-values less than 0.025 in the bivariate analysis. Work-related musculoskeletal disorders had been reported in the previous 12 months by approximately 97 (46.9%) of respondents. Work-related musculoskeletal disorders were reported by 76.1% of weavers in the shoulder region, 64.2% in the low back, 56.3% in the neck, and 0.2% in the upper back. Working for more than 10 years (AOR = 5.05, 95%CI: 1.23, 20.77), working with prolonged sitting (AOR = 4.77, 95%CI: 1.37, 16.62), and job dissatisfaction (AOR = 2.41, 95%CI: 1.04, 5.55) were among the determinants of work-related musculoskeletal disorders. As a result, ergonomically oriented weaving workstations are required because the majority of musculoskeletal disorders are caused by poorly designed workstations.

Scientific Reports

DOI: http://dx.doi.org/10.1038/s41598-023-38980-3

11695(2023)

Genetic structure analysis and identifying key founder inbred lines in diverse elite sub-tropical maize inbred lines

Melaku Gedil [1*], Abdoul-Raouf Sayadi Maazou[1,2], **Degife A. Zebire[1,3]**, Ana Luísa Garcia-Oliveira[6,7], Nnanna Unachukwu [4], César Petroli [5], Sarah Hearne [5], Leslie A. Everett [8], Soon-Kwon Kim [9,10] & Abebe Menkir [1]

[3]Department of Plant Science, College of Agricultural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Understanding the genetic relationships between the key founder inbred lines and derived inbred lines could provide insight into the breeding history and the structure of genetic diversity of the available elite inbred lines with desirable target traits. The maize improvement program at the International Institute of Tropical Agriculture (IITA) analyzed the pedigree information of 623 sub-tropical maize inbred lines generated at the IITA maize breeding program to identify the key founder inbred lines. We also used 5032 SNP markers to assess the genetic similarities of the founder inbred lines with their progenies subsequently developed for specific target traits. The results of pedigree analysis and SNP markers-based similarity scores identified 20 key founder inbred lines with significant contributions to the development of drought tolerant, early maturing, productive, Striga resistant, provitamin A enriched, and quality protein maize inbred lines. In our breeding program, line TZMi501 belonging to a flint heterotic group (HGA), and TZMi407-S and TZMi214, representing the dent heterotic group (HGB), were identified as the most useful founder inbred lines. The 623 inbred lines were consistently separated into four clusters based on Ward's hierarchical clustering, structure, and principal component analyses, with the 20 founder inbred lines spread into all clusters. The founder inbred lines were more genetically related to the productive inbred lines but showed genetic divergence from the provitamin A enriched inbred lines. These results provide a better understanding of the breeding history of the sub-tropical maize inbred lines to facilitate parental selection aligned to existing heterotic groups for use in breeding programs targeting the improvement of essential traits in maize.

Journal of Plant Pathology

DOI: https://doi.org/10.1007/s42161-023-01461-7

10 (2023)

Agronomic practices and environmental factors influenced the distribution and severity of black Sigatoka (Mycosphaerella fijiensis Morelet) of banana in southern Ethiopia

G. Mengesha, Abu Jambo, H. Terefe, Shiferaw Mekonnen, Tariku Simion, A. Mensa, G. Fikre, Mulualem Ayele, Yemaneh Woldeyohanes, **Berhanu Lemma[4]**, **Meseret Turuko[4]**, T. Ayele, Z. Yemataw, Agdew Bekele Woldesilassie

[4]Department of Plant Sciences, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Banana Black Sigatoka (BBS) is the most threatening and production-limiting factor for banana worldwide. A total of 330 banana fields were assessed from two districts in southern Ethiopia during 2020 and 2021 to determine the distribution and association of BBS severity with agronomic practices and environmental factors. Meteorological variables were obtained from the nearby meteorological stations. The results showed that BBS was prevalent across surveyed areas, with varying degrees of severity. Higher BBS severity was recorded in Mihirab Abaya (66.82 ± 1.47%) than Arba Minch (58.03 ± 1.39%) district. The logistic regression model was used to explain the association of disease severity with independent variables. District, year, time of assessment, moisture source, source of plant material, banana cultivar, growth stage, cropping pattern, nutrient, sucker and disease management, weed infestation, and other agronomic practices were significantly ($P < 0.05$ to 0.001) associated with BBS severity of > 50% in the multiple-variable model. Lower (≤ 50%) disease severity was strongly associated with Pisang Sri cultivar, vegetative stage, ≤ 5 years of plantation, row planting, mixed cropping, low plant density and weed infestation, and good nutrient (KCl at ≤ 385 kg ha–1), sucker (≤ 5 plants spot–1), disease and other agronomic managements than other class variables. Moreover, high precipitation and humidity, low temperature, rain-wash, and water splash were also identified as the most important driving forces for BBS infection and establishment. Thus, cultivar resistance, mixed cropping, row planting, optimal plant density, good nutrient, sucker and weed management, complete earthing up, and better irrigation and drainage practices should be considered as management options.

Parasites and Vectors

DOI: http://dx.doi.org/10.1186/s13071-023-06057-9

457(2023)

First report of cutaneous leishmaniasis caused by Leishmania donovani in Ethiopia

Gashaw Azanaw Amare[1*,] Gebeyaw Getnet Mekonnen[2], Mekibib Kassa[2], Ayenew Addisu[2], Desalegn Adane Kendie[2], Banchamlak Tegegne[3], Adugna Abera[4], **Dagimawie Tadesse[5]**, Seid Getahun[6],Yenesew Mihret Wondmagegn[2], Behailu Merdekios[5], Mezgebu Silamsaw Asres[2], Johan van Griensven[7],Gert Van der Auwera[7], Saskia van Henten[7] and Myrthe Pareyn[7]

[5]Arba Minch University, Arba Minch, Ethiopia

Abstract

Bckground: Leishmaniasis is a common neglected tropical disease in Ethiopia. Visceral leishmaniasis (VL) caused by Leishmania donovani presents in the lowlands, while cutaneous leishmaniasis (CL) affects people living in the highlands. Although CL is described as being caused by Leishmania aethiopica, there is also evidence of L. tropica and L. major isolated from a patient, sand flies and potential reservoirs. Information on species causing CL in Ethiopia is patchy, and no nation-wide study has ever been done. Understanding which species are causing CL in Ethiopia can have important implications for patient management and disease prevention. Methods: We analyzed stored routine samples and biobanked DNA isolates from previously conducted studies of CL patients from different centers in the north, center and south of Ethiopia. Species typing was performed using ITS-1 PCR with high-resolution melt (HRM) analysis, followed by HSP70 amplicon sequencing on a selection of the samples. Additionally, sociodemographic, clinical and laboratory data of patients were analyzed. Results: Of the 226 CL samples collected, the Leishmania species could be determined for 105 (45.5%). Leishmania aethiopica was identified in 101 (96.2%) samples from across the country. In four samples originating from Amhara region, northwestern Ethiopia, L. donovani was identified by ITS-1 HRM PCR, of which two were confirmed with HSP70 sequences. While none of these four patients had symptoms of VL, two originated from known VL endemic areas. Conclusions: The majority of CL was caused by L. aethiopica, but CL due to L. tropica and L. major cannot be ruled out. Our study is the first to our knowledge to demonstrate CL patients caused by L. donovani in Ethiopia. This should spark future research to investigate where, how and to which extent such transmission takes place, how it differs genetically from L. donovani causing VL and whether such patients can be diagnosed and treated successfully with the currently available tools and drugs.

BMC Psychiatry

DOI: http://dx.doi.org/10.1186/s12888-023-04575-5

103(2023)

Prevalence and associated factors of stress and anxiety among female employees of hawassa industrial park in sidama regional state, Ethiopia

Etenesh Kefelew[1*], Adane Hailu[2], Mesfin Kote[1], Awgchew Teshome[1], Firehiwot Dawite[1] and Mesfin Abebe[3]

[1]School of Public Health, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Work-related stress and anxiety are emerging global public health problems causing serious social and economic consequences. Working women bear a heavy burden due to high social disparity, gender inequality, and an important responsibility to balance work and family life in undeveloped society. Objective: To assess the prevalence and associated factors of work related stress and anxiety among female employees of Hawassa industrial park in Sidama Region, Ethiopia, 2021. Methods: Institution-based cross-sectional study design was conducted among 417 female employees using structured interviewer-administered questionnaires and depression, Anxiety, and Stress scale (DASS) 21 items. A simple random sampling technique was used through the computer-generated random method. The outcome variables were work related stress and anxiety. Work related stress and anxiety were ascertained using the DASS 21(stress ≥ 15 &anxiety8 – 14). The associated factors assessed included sociodemographic, behavioral factor, job and organization related factors, past illness and social support related factors. Bivariate and multivariable logistic regression analyses were done. The strength of association was declared by using an adjusted odds ratio (AOR) with a 95% confidence interval and, the statistical significance of P-value < 0.05. Result: The prevalence of work-related stress and anxiety were 59.3% [95% CI: (54.7, 63.9)] and 79.8% [95% CI: 75.5, 83.6)] respectively. Respondents with single marital status [AOR = 5.31, 95% CI: (1.68, 16.86)], having chronic illness [AOR = 4:00, 95% CI: (1.24, 12.9)], and current alcohol drinking [AOR = 12.5, 95% CI: (4.56, 34.2)] were significantly associated with stress. Likewise, being single in marital status [AOR = 1.99, 95% CI: (1.15, 3.46)], poor social support [AOR = 3.78, 95% CI: (1.53, 9.35)], overtime work [AOR = 2.31, 95% CI: (1.12, 4.74)], having work experience (3–4 years) [AOR = 4.71, 95% CI: (1.49, 14.84)], and fear of losing job [AOR = 1.72, 95% CI: (1.01, 2.93)] were significantly associated with anxiety. Conclusion: The prevalence of work-related stress and anxiety was high in the study area. Marital status, alcohol drinking, and chronic illnesses were factors associated with work-related stress. In contrast the fear of losing a job, work experience, overtime work, and having poor social support were factors associated with anxiety. The significant factors identified in this study can be targeted to reduce the occurrence of work related stress and anxiety among women through designing preventive programs and strategies which includes acknowledging the importance of mental health services for the welfare of the public, screening for work related stress and anxiety, counselling, and the provision of support for women as well as lifestyle modification.

Tropical Medicine and Health

DOI: http://dx.doi.org/10.1186/s41182-023-00529-5

38(2023)

Anopheles mosquito diversity, entomological indicators of malaria transmission and challenges of morphological identification in southwestern Ethiopia

Adilo Assa[1], Nigatu Eligo[1] and Fekadu Massebo[1*]

[1]Department of Biology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: A number of Anopheles species play either a primary or secondary role in malaria transmission. This necessitates understanding the species composition, bionomics, and behaviors of malaria mosquitoes in a particular geographic area, which is relevant to design and implement tailored intervention tools. This study aimed to assess the species composition, sporozoite infection rate, and blood meal origins of malaria mosquitoes in two malaria-endemic villages of Boreda district in Gamo Zone, southwest Ethiopia. Methods: Thirty houses, 20 for Center for Disease Control and Prevention (CDC) light traps and 10 for Pyrethrum Spray Catches (PSC) were randomly selected for bimonthly mosquito collection from October 2019 to February 2020. An enzyme-linked immunosorbent assay (ELISA) was carried out to detect the blood meal origins and circumsporozoite proteins (CSPs). The entomological inoculation rate (EIR) was calculated by multiplying the sporozoite and human biting rates from PSCs. Anopheles gambiae complex and An. funestus group samples were further identified to species by the polymerase chain reaction (PCR). Anopheles species with some morphological similarity with An. gambiae complex or An. funestus group were tested using the primers of the two species complexes. Results: A total of 14 Anopheles species were documented, of which An. demeilloni was found to be the dominant species. An. arabiensis was found to be positive for P. falciparum CSP with the overall CSP rate of 0.53% (1/190: 95% CI 0.01–2.9). The overall estimated P. falciparum EIR of An. arabiensis from PSC was 1.5 infectious bites/person/5 months. Of the 145 freshly fed Anopheles mosquitoes tested for blood meal sources, 57.9% (84/145) had bovine blood meal, 15.2% (22/145) had human blood meal origin alone, and 16.5% (24/145) had a mixed blood meal origin of human and bovine. Anopheles demeilloni were more likely to feed on blood meals of bovine origin (102/126 = 80.9%), while An. arabiensis were more likely to have blood meals of human origin. Eleven samples (2.6%; 11/420) were morphologically categorized as An. demeilloni, but it has been identified as An. leesoni (the only An. funestus group identified in the area) by PCR, though it requires additional verification by sequencing, because different species genes may have amplified for these species specific primers. Similarly, a small number of An. arabiensis were morphologically identified as An. salbaii, An. maculipalpis and An. fuscivenosus. Conclusions and recommendations: In spite of the wide variety of Anopheles mosquito species, An. arabiensis dominates indoor malaria transmission, necessitating additional interventions targeting this species. In addition, increasing entomological knowledge may make morphological identification less difficult.

Journal of Health, Population and Nutrition

DOI: http://dx.doi.org/10.1186/s41043-023-00487-y

138(2023)

Assessing the effect of mHealth on child feeding practice in African countries: systematic and meta-analysis

Girma Gilano[1*], Sewunet Sako[1], Temesgen Dileba[1], Andre Dekker[2] and Rianne Fijten[2]

[1]Department of Public Health Informatics, School of Public Health, College of Medicine and Health Sciences, Arba Minch University, P.O Box: 21, Arba Minch, Ethiopia

Abstract

Introduction: Poor child feeding practice is a public health problem in Africa. Mobile health (mHealth) is a supportive intervention to improve this problem; however, the evidence available in the current literature is inconsistent and inconclusive in Africa. Some studies state that exclusive breastfeeding is not different between controls and mHealth interventions in the first month. Other studies state that health providers need additional training for the success of mHealth interventions. Objective: This systematic review and meta-analysis aims to provide the summarized effect of mHealth on child-feeding practices in Africa to improve future planning and decisions. Method: We conducted a systematic review and meta-analysis based on the published and unpublished evidence gathered from PubMed, Web of Science, Cochrane Library, and Embase databases between January 1, 2000, and March 1, 2022. Studies included were randomized control trials and experimental studies that compared mHealth to standards of care among postpartum women. Preferred Reporting Items for Systematic Review and Meta-analysis guidelines followed for the reporting. Results: After screening 1188 studies, we identified six studies that fulfilled the study criteria. These studies had 2913 participants with the number of total intervention groups 1627 [1627/2913 = 56%]. Five studies were completed within 24 weeks while one required 12 weeks. We included two RCTs, two cluster RCTs, and two quasi-experimental studies all used mHealth as the major intervention and usual care as controls. We found significant improvement in child-feeding practices among intervention groups. Conclusion: This systematic review and meta-analysis showed that the application of mHealth improved child-feeding practices in Africa. Although the finding is compelling, the authors recommend high-quality studies and mHealth interventions that consider sample size, design, regional differences, and environmental constraints to enhance policy decisions. The place of residence, access, low socioeconomic development, poor socio-demographic characteristics, low women empowerment, and low women's education might cause high heterogeneity in the included regions and need consideration during interventions.

Korean Journal of Mathematics

DOI: http://dx.doi.org/10.11568/kjm.2023.31.4.445

31(2023)

Direct Product, Subdirect Product, and Representability in Autometrized Algebras

Gebrie Yeshiwas Tilahun[1] *, Radhakrishna Kishore Parimi[1],and Mulugeta Habte Melesse[1]

[1]Department of Mathematics, Arba Minch University, Arba Minch, Ethiopia

Abstract

The paper introduces the concept of direct product and discusses some basic facts about distant ideals. We also introduce the definition of directly indecomposable in an autometrized algebra. Furthermore, we present the concept of a subdirect product and simple autometrized algebra and its behavior. We also introduce the definition of subdirectly irreducible in an autometrized algebras. In particular, we prove that every subdirectly irreducible monoid autometrized algebra is directly indecomposable. Finally, we discuss different properties of chain autometrized algebras and introduce the representability in the autometrized algebra. We also prove that if a weak chain monoid normal autometrized l-algebra is nilradical, then it is representable.

Scientific Reports

DOI: http://dx.doi.org/10.1038/s41598-023-39974-x

12814(2023)

Energy efficient IRS assisted 6G network for Industry 5.0

Ashu Taneja[1], Shalli Rani[1], Saleem Raza[2], Amar Jain[3], **Shebnam M. Sefat[4]**

[4] Electrical and Computer Engineering Department, Arba Minch Institute of Technology, Gamo Gofa, Ethiopia

Abstract

The real world applications are more prone to difficulties of challenges due to fast growth of technologies and inclusion of artificial intelligence (AI) based logical solutions. The massive internet-of-things (IoT) devices are involved in number of Industry 5.0 applications like smart healthcare, smart manufacturing, smart agriculture, smart transportation. Advanced wireless techniques, customization of services and different technologies are experiencing a major transformation. The desire to increase the communication reliability without adding energy overhead is the major challenge for massive IoT enabled networks. To cope up with the above challenges, Industry 5.0 requirements needs to be monitored at the remote level which again adds on the communication challenge. Use of relays in 6G based wireless networks is denied due to high requirement of energy. Therefore in this paper, Intelligent reflecting surfaces (IRSs) assisted energy constrained 6G wireless networks are studied. To provide seamless connection between the communicating mobile nodes, IRS with an array of reflecting elements are configured in the system set up. A use-case scenario of IRS enabled network in Internet-of-Underwater things (IoUT) for smart ocean transportation is also provided. The IRS assisted wireless network is evaluated for target rates achieved. A power consumption model of the IRS supported system is also proposed to optimise the energy efficiency of the system. Further, the paper evaluates the impact of number of reflecting elements N on the IRS and the phase resolution b of each element on the system performance. The energy efficiency improves by 20% for IRS with N= 100 with b= 2 over IRS with b= 1

BMC Pediatrics

DOI: http://dx.doi.org/10.1186/s12887-023-03901-w

992023)

Quality of option B + prevention of mother-to-child transmission of HIV services in public hospitals of Gamo zone, Southern Ethiopia, mixed approach

Yosef Haile[1*], Zeleke Gebru[1], Tesfaye Feleke[1] and Yonas Fissha Adem2

[1]Arba Minch University, College of Medicine and Health Sciences, School of Public Health, Arba Minch, Ethiopia

Abstract

Background: Prevention of mother-to-child transmission service is a comprehensive package of services planned to reduce the risk of mother-to-child transmission of HIV. It is very crucial to determine the level of quality of PMTCT services in this study area since other studies in our country omitted several variables in each category of the Donobedian model. Therefore, this study aimed to determine the level of quality of option B + PMTCT of HIV services. Methods: An institution-based cross-sectional study design with both quantitative and qualitative data collection method was employed. Donabedian's model was used to assess the level of quality of PMTCT service. A total of 422 pregnant women were used to assess the level of satisfaction of clients. An inventory of resources and direct observation was done to assess the quality of the input and output component of the Donobedian model respectively. In addition to satisfaction items, 12 output-related items were also used to assess quality in the output dimension. Finally, those hospitals that scored above 90% in each component of the Donovedian model were categorized as having good quality. Finally, twelve in-depth interviews were conducted to explore barriers to the quality of option B + PMTCT services. The qualitative data were analyzed using the thematic analysis method and finally, it was presented with the quantitative result through triangulation. Results: No hospitals simultaneously met the requirements for good quality in all three dimensions of option B + PMTCT service quality. Only one hospital out of the four hospitals met the requirements for good quality of PMTCT service in the input dimension. Regarding the process and output dimension's quality of PMTCT services, two of the hospitals met the criteria for good quality. One hospital out of the total exhibited poor performance in all three dimensions of service quality for option B + PMTCT services. Conclusion: According to this study no hospitals simultaneously met the requirements for good quality in all three dimensions of option B + PMTCT service quality. PMTCT unit performance must be continuously monitored, reviewed, and supervised. To obtain the minimum required resources primary hospitals must be supported.

Physica B: Condensed Matter

DOI: https://doi.org/10.1016/j.physb.2023.415187

415187(2023)

Structural, thermal properties and improved ionic conductivity of cerium-doped Li0.5+xLa0.5-xCe2xTi1-xO3 solid electrolyte materials

Tekeste Dankala [a], K. Vijaya Babu [b], **Paulos Taddesse** [a]

[a]Department of Physics, College of Natural and Computational Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

A series of Ce-doped Li0.5+xLa0.5-xCe2xTi1-xO3(x = 0.0, 0.025, and 0.05) ionic conductive crystalline oxides were produced by a solid-state reaction process. The effect of Ce-doping on the thermal, structural, electrical, and dielectric characteristics of Li0.5La0.5TiO3 was investigated using TGA/DTA, XRD, SEM/EDS, FT-IR spectroscopy, and impedance spectroscopy techniques. The TGA/DTA spectra confirmed the phase transformation and weight loss of the mixed precursors. The XRD and FT-IR analysis revealed that the materials exhibited a cubic system with a perovskite phase, which corresponds to the Pm3m space group. The EDS analysis clearly detected the presence of all elements except Li in the Li0.5+xLa0.5-xCe2xTi1-xO3 materials. The electrical conductivities were found to be 3.9 × 10−5 S/cm for Li0.525La0.475Ce0.05Ti0.975O3, and 3.1 × 10−5 S/cm for Li0.55La0.45Ce0.1Ti0.95O3, which are higher than that of Li0.5La0.5TiO3 (1.7 × 10−5 S/cm). This confirmed that the incorporation of a small quantity of Ce4+ ions can enhance the electrical conductivity of Li0.5La0.5TiO3 sample.

Journal of Water and Climate

DOI: http://dx.doi.org/10.2166/wcc.2023.541

14(2023)

Modeling the impact of climate change on streamflow responses in the Kessem watershed, Middle Awash sub-basin, Ethiopia

Mamush Tekle Assfaw[1]*, Bogale Gebremariam Neka[1] and Elias Gebeyehu Ayele[1]

[1]Hydraulic and Water Resource Engineering, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

In this study, we examined how future climate change will affect streamflow responses in the Kessem watershed. Climate variables from SSP2-4.5 and SSP5-8.5 emission scenarios were extracted from GCMs for the 2040s (2031–2060) and 2070s (2061–2090). The bias-corrected precipitation and temperature were converted into streamflow using a calibrated SWAT model. The simulated output of the future streamflow for the periods 2040s and 2070s was compared with the base period (1992–2020) and presented as percentage changes. During calibration and validation, the SWAT model showed Nash–Sutcliffe efficiency (NSE) values of 0.79 and 0.77, as well as coefficient of determination (R2) values of 0.8 and 0.79, demonstrating its capability of simulating streamflow. The annual mean maximum and minimum temperatures are predicted to increase, with a pronounced increase in the minimum temperature for the mid-term and long-term futures under both emission scenarios. As we approach the end of the century, we see an increase in annual mean rainfall and streamflow under the SSP5-8.5 emission scenario. The increment in annual mean rainfall (streamflow) is expected to be 3% (12.5%) and 23% (48.8%) for the 2040s and 2070s, respectively, under the SSP5-8.5 emission scenario.

AIP Conference Proceedings

DOI: http://dx.doi.org/10.1063/5.0178523

194502(2023)

Analytical Modelling of Fiber Reinforced Composite Coupling Beams

Gizachew M. Dabi[1, 2], Marina I. Rynkovskaya[1], **Tewodros T. Baza**[1, 2], Lami S. Dereje[1, 3], Ebisa K. Nagassa[1, 4], Yusuf M. Ali1

[2]Arba Minch University, P.O. Box 21, SNNPR, Arba Minch, Ethiopia

Abstract

The coupling member, coupling beams are characterized by large deformations and shear-dominated responses. To accurately evaluate the magnitude of the seismic response of the buildings with the coupled shear walls, the model must be the one that includes the parameters that are expected to influence these responses. In this study, using the constructed database of prior studies, the formulation is proposed to determine the nominal shear strength of the Fiber Reinforced Composite coupling beams. Three samples of the diagonally reinforced concrete coupling beam specimens: one sample with fiber reinforcement composites and two samples without fiber reinforcement composites are analytically modelled. The time history nonlinear direct integration modelling method by using SAP2000 is used to evaluate the energy dissipation capacities of the coupling beams. To accurately evaluate the performance of diagonally reinforced coupling beams under reversal cyclic loadings, the strength and the chord rotation capacity of each specimen as a function of the parameters that are used in each sample is used in this study. Results show that the chord rotation capacity that is exhibited by the specimens with FRC is much less than that exhibited by the concrete without fiber reinforcement. And at the end, the diagonal bars also perform less at a higher aspect ratio, and hence this significantly decreases the shear carrying capacity of the coupling beam.

Journal of the Indian Chemical Society

DOI: http://dx.doi.org/10.1016/j.jics.2023.101103

101103(2023)

Nanostructured Ni0.8Co0.2MnxFe2-xO4 ferrites: Structural, elastic, optical, and electromagnetic properties

Gezahegn Gezimu [a], **Paulos Taddesse** [b], **Alemayehu Chufamo** [c], **Kassahun Lewetegn** [b], **Belete Tilahun** [b], **Baye Zinabe** [b], K. Vijaya Babu [d], Sumit Saxena [e]

[b] Department of Physics, College of Natural and Computational Science, Arba Minch University, Ethiopia
[c] Faculty of Mechanical Engineering, Arba Minch Institute of Technology, Arba Minch University, , Ethiopia

Abstract

Nanostructured Ni0.8Co0.2MnxFe2-xO4 (x = 0.05 and 0.1) ferrites were synthesized via a solution combustion method in a citric acid matrix. The structure, elastic, optical, electrical, dielectric, and magnetic characteristics of these ferrites were analyzed by x-ray diffraction (XRD), Furrier transform infrared (FTIR) spectroscopy, ultraviolent visible (UV–vis) spectroscopy, impedance spectroscopy (IS), and vibrational sampling magnetometer (VSM) techniques. The lattice parameter, crystallite size, hopping length, bond length, cation distribution, elastic parameters, and many others of the ferrites were evaluated using XRD and FTIR data. Well-crystallized single-phase cubic spinel-structured ferrites with the composition of Ni0.8Co0.2MnxFe2-xO4 were produced. The mechanical stability conditions of both ferrites were revealed by the study of their elastic properties. Both ferrites displayed optical activity across the ultraviolet and visible regions, spanning from 300 to 550 nm. The absorption spectra also exhibited peaks at 440 and 460 nm, and a blue shift was observed when Mn3+ content varied from x = 0.05 to x = 0.1. The electrical conductivity was found to be 1.64 × 10−7 S/cm for x = 0.05 and 1.68 × 10−7 S/cm for x = 0.1, and both ferrites exhibited a polaron hopping conduction behavior. The room temperature VSM measurement revealed the ferromagnetic behavior in both of the tested specimens. Higher values of saturation magnetization (60.3 emu/g) and magnetic number nB (2.53 μB) were observed for x = 0.05 ferrite.

Heliyon

DOI: http://dx.doi.org/10.1016/j.heliyon.2023.e21553

e21553(2023)

Forest products monetary contribution to households' income: A means to improve the livelihood of a low-income rural community in South Ethiopia

Eyasu Chama [a], Simon Shibru [a,*], Tizazu Gebre [a], Sebsebe Demissew [b], Zerihun Woldu [b]

[a] Arba Minch University, College of Natural Sciences, Biology Department, P.O. Box 21, Ethiopia

Abstract

Forest products and forest-based activities in Ethiopia play a substantial economic contribution to the livelihoods of rural households. Despite its pivotal role, empirical data are inadequate on forests' monetary contribution across a range of ecological locations and social situation, particularly for rural agrarian communities of the developing nations, like Ethiopia. We estimated the economic contributions of forest products and forest-based activities to forest-dependent rural households' income and highlighted key socioeconomic characteristics in Wolaita, Ethiopia. We collected demographic, socioeconomic, and forest use data using a semi-structured questionnaire survey of 384 households, and surveyed markets to determine the prices of forest products for the valuation of forest use in three districts. We used descriptive statistics, the Chi-square test, the two-sample t-test, and one-way ANOVA to analyze the data. Findings showed that all respondents were engaged in one way or another in forest-based activities, while 84.6 % were involved in farming. The annual average income from forest products was 252.7US per household, contributing to 28.1 % of the total yearly average income (989.4US$), and 38.3 % relative forest income (RFI). Annual mean household income from crops was 648.1US$. Average annual household income from grazing, charcoal, firewood, woodcutting, cut-and-carry, NTFP, seed selling, medicinal plants, and seedling selling was 77.3 %, 58.4 %, 50.2 %, 24.1 %, 18.5 %, 12.7 %, 7.1 %, 6.8 % and 5.4 % of the total annual mean income, respectively revealing a significant difference ($p < 0.05$). Family size, farmland size, distance to the forest, and occupation were the determinants of the contribution of forest products to household income. In general, poor households derive the highest relative forest income implying high dependence of the poorer on forest resources in the study area. The findings provide useful information for developing sustainable forest management policies and strategies to enhance the economic and ecological benefits of forests, and highlight the need for funding projects to pay attention to the specific household variables that affect forest use. Mainstreaming conservation activities in development sectors and integrating development and conservation projects may improve the livelihood of the low-income family in the region.

BMC Public Health

DOI: http://dx.doi.org/10.1186/s12889-023-15438-9

556(2023)

Assessment of the status of improved F&E trachoma control practices among children of agro-pastoralists in Southern Ethiopia: a mixed design survey using theory of triadic influences

Serawit Lakew[a]*, Genet Asefa[a] and Zerihun Zerdo[a]

[a] College of Medicine and Health Sciences, Arba Minch University, Southwest Ethiopia, Arba Minch, Ethiopia

Abstract

Background: Ethiopia is one of the countries with heavy trachoma burdens states globally. More than 75 million people in Ethiopia live in the trachoma endemic zones. Most populations with neglected tropical diseases (NTDs) live in hard-to-reach residences because of landscape and socio-cultural variances. This survey assessed the status of improved Face hygiene and Environmental cleanliness (F&E) trachoma control practices in children 1–9 years of age. Methods: A mixed-method study design was applied concurrently. Enumeration was done through interviews using the standard tool and observational technique. Focus Group discussions (FGDs) and Key informant Interviews (KIIs) were used to conduct the qualitative arm. Confounders were controlled by modeling with multivariable logistic regression. Results: For the Quantitative survey: The response rate was 99.8% of participants. The proportion with improved practice was 8%. About 13.9% of a child washed their faces and were visibly clean. About 15.2% of the households had an observable clean environment. High Wealth index, Perceived ability, knowledge about trachoma transmission from person to person, and stance toward preventive behavior were associated with improved practices. The odds of having improved F&E practice were 67% lower for those who reported positive normative preventive behavior than negatives. Qualitative arm: Some key informants reported village dwellers' shortage of basic knowledge; attitude and behavioral change for improved hygienic practices are the challenges. Inhabitants, including elder children, are aware of the hygiene issue though they do not practice it or have no intention to practice it. Conclusions: Improved F&E practices were much lower in the study region than the regional plan to achieve.

Scientific Reports

DOI: https://doi.org/10.1038/s41598-023-38980-3

13256(2023)

Author Correction: Genetic structure analysis and identifying key founder inbred lines in diverse elite sub-tropical maize inbred lines (Scientific Reports, (2023), 13, 1, (11695), 10.1038/s41598-023-38980-3)

Melaku Gedil , Abdoul-Raouf Sayadi Maazou , **Degife A. Zebire**[c] , Ana Luísa Garcia-Oliveira , Nnanna Unachukwu , César Petroli , Sarah Hearne , Leslie A. Everett , Soon-Kwon Kim & Abebe Menki

[c] Department of Plant Science, College of Agricultural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Correction to: Scientific Reports, published online 20 July 2023 The original version of this Article contained errors in affiliations 6, 7, 9 and 10. The correct affiliations are listed below. 6 International Maize and Wheat Improvement Center (CIMMYT), ICRAF House, UN Avenue, Nairobi, P.O. Box 1041-00621, Kenya. 7 Department of Molecular Biology, College of Biotechnology, CCS Haryana Agricultural University, Hisar 125004, Haryana, India. 9 Handong Global University, Pohang, Republic of Korea. 10 International Corn Foundation, Pohang, Republic of Korea. The original Article has been corrected.

BMC Emergency Medicine

DOI: http://dx.doi.org/10.1186/s12873-023-00791-0

19(2023)

Epidemiological characteristics of deaths from road traffic accidents in Addis Ababa, Ethiopia: a study based on traffic police records (2018–2020)

Micheal Alemayehu[1]*, Asfawesen Woldemeskel[2], **Ararso Baru Olani[3] and Tariku Bekelcho[3]**

[3]Department of Nursing, College of health sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Introduction: Road traffic accidents are a major cause of fatal and nonfatal injuries, causing permanent disabilities, and other indirect health complications. Each year, road traffic accidents (RTA) cause a lot of fatalities and injuries in Ethiopia, putting the country among the list of the most affected countries by RTA in the world. Despite the high rates of road traffic collisions in Ethiopia, very little is known about the factors that contribute to fatal RTA in the country. Objectives: the objective of this study is to assess the epidemiological characteristics of deaths from road traffic accidents in Addis Ababa, Ethiopia: A study based on traffic police records (2018–2020). Method: A retrospective observational study design was conducted used in this study. All road traffic accident victims reported to Addis Ababa police station between 2018 and 2020 were study population and the collected data was evaluated with Statistical Package for the Social Sciences (SPSS) version 26 software. Binary logistic regression model was used to indicate the association between dependent and independent variables. Statistically, significant associations were declared at $P < 0.05$. Result: There were 8458 recorded road traffic accidents in Addis Ababa during 2018–2020. Among these accidents, 1274 (15.1%) caused death while 7184 (84.1%) caused an injury. Males accounted for 77.1% of the decedents (sex ratio of almost 3.36:1). The majority 1020 (80%) of the fatality occurred on a straight road and 1106 (86.8%) of the fatality occurred in dry weather. Weekday 1.243 (AOR, 1.234, 95 CI, 1.071–1.443), driver educational status below grade twelve 0.326(AOR 0.326, CI, 0.285–0.374), and commercial truck vehicle 1.682 (OR, 1.696, CI, 1.410–2.040) were statistically associated with fatality after adjusting for potential confounding variables. Conclusion: The prevalence of RTA fatality in Addis Ababa is high. The accidents that occurred during the weekdays were more fatal. Driver's educational status, weekdays, and vehicle type were factors associated with mortality. There is a need to introduce road safety interventions that targeted identified factors in this study to reduce fatalities attributed to RTIs.

Journal of Sustainable Agriculture and Environment

DOI: http://dx.doi.org/10.1002/sae2.12070

2(2023)

A large-scale survey reveals agro-ecological factors influence spatio-temporal distribution and epidemics of maize leaf blight: Implications for prioritizing sustainable management options

Habtamu Terefe[1], **Getachew G. Mengesha[2]**, Getnet Yitayih3, Girma A. Bogale[4]

b Arba Minch Agricultural Research Center, SARI, Arba Minch, Ethiopia

Abstract

Introduction: Productivity of maize (Zea mays L.) is predominantly constrained by diseases, weeds, and insect pests. The northern leaf blight (NLB) disease, caused by Exserohilum turcicum, inflicts significant maize yield losses in the tropics and humid tropics, including Ethiopia. A large-scale field survey was conducted to assess the spatio-temporal distribution of maize NLB in southern Ethiopia, and to determine the association of maize farming practices and agro-ecological factors with NLB epidemics during 2016–2019. Materials and Methods: A total of 814 maize farms were assessed in 12 major maize-producing districts. During the assessment, data related to the disease, crop, farming practices and agro-ecological factors were collected. The associations of disease severity with independent factors were determined using the ordinal logistic regression model. Results: The results showed that all studied districts and zones recorded high (≥85%) NLB prevalence over the 4 years, and the disease continues to be a major threat to maize production. Variable disease severity was recorded across districts/zones during the study periods. The highest (75.45%) mean severity was recorded from Boreda, followed by Konso (75.36%), Bonke (71.61%) and Derashe (71.30%), while Mihirab Abaya (33.25%) and Arba Minch (38.285%) districts recorded the lowest mean severity. In the multiple regression model, zone, altitude, cropping year, land preparation, NPS fertilization, weeding practice, growth stage and cropping system were highly significantly ($p < 0.0001$) associated with disease severity. Conclusion: Maize cultivation at an altitude of ≤1500 m with intermediate to good weeding practices, recommended NPS (51–100 kg ha–1) fertilization, mixed- and intercropping systems, sparse plant (≤20 plants m–2) population, and vegetative to blistering growth stages had significant relationships with low (≤25, 26%–50%) disease severity, and can be considered as management options to reduce NLB pressure and yield losses to sustainably ensure maize production and productivity.

BMC Health Services Research

DOI: http://dx.doi.org/10.1186/s12913-023-09623-0

615(2023)

Satisfaction of health informatics professionals with Ethiopian health system: the case of three zones in Ethiopia

Girma Gilano[1]*, Sewunet Sako[1], Belachew Boranto[2], Firehiwot Haile[1] and Hadiya Hassen[1]

[1]Department of Health Informatics, School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[2]Department of Pharmacy, School of Medicine, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: The importance of the health information system faces multiple challenges such as supply, acceptance, and pressure from other professions in Ethiopia. Work-related challenges might cause low professional satisfaction and hinder service provision. There is a paucity of evidence for policy decisions to improve these challenges. Therefore, this study aims to assess Health Informatics professional satisfaction in the Ethiopian health system and associated factors to provide evidence for future improvements. Methods: We conducted an institutions-based cross-sectional study on health informatics professionals in three zones in Southern Ethiopia in 2020. We used a simple random sampling technique to select 215 participants. The local health officials were contacted regarding the research questions, and letters of permission were collected for data collection. Results: Out of 211(98%) Health Informatics professionals who accepted the interview, 50.8% (95%CI: 47.74%-53.86%) were satisfied. Age (AOR = 0.57; 95% CI: 0.53, 0.95), experience (AOR = 5; 95% CI: 1.50, 19.30), working time (AOR = 1.35; 95% CI: 1.10, 1.70), working as HMIS officers (AOR 2.30; 95% CI: 3.80, 13), single marital status (AOR = 9.60; 95% CI: 2.88, 32), and urban residence (AOR = 8.10; 95% CI: 2.95, 22) were some of the associated factors. Conclusions: We found low satisfaction among health informatics professionals compared to other studies. It was suggested that the responsible bodies must keep experienced professionals and reduce pressure from other professions through panel discussions. Work departments and working hours need consideration, as they are the determinants of satisfaction. Improving educational opportunities and career structure is the potential implication area.

Plant and Soil

DOI: http://dx.doi.org/10.1007/s11104-023-06256-4

493(2023)

Remediation of metal toxicity and alleviation of toxic metals-induced oxidative stress in Brassica chinensis L using biochar-iron nanocomposites

Moses Akintayo Aborisade· **Belay Tafa Oba**[b]· Akash Kumar· Jiashu Liu · Daying Chen· Oluwaseun Princess Okimiji · Lin Zha

[b]College of Natural Science, Arba Minch University, 21, Arba Minch, Ethiopia

Abstract

Introduction: Soil pollution caused by toxic elements such as lead (Pb) and cadmium (Cd) induces environmental stress on vegetable plants and soil microbial communities, reducing crop yield and disrupting ecosystem functions. Methodology: In this study, nanoscale zerovalent iron supported with eggshell biochar and activated carbon (nZVI-ESB/AC) was synthesized using carbothermal reduction synthesis and evaluated the effectiveness in minimizing the toxicity of lead and cadmium in soil and alleviating the toxic effects of these metals on Brassica chinensis L. and soil microbial communities. Results: The nZVI-ESB/AC immobilized Pb and Cd in the soil more than ordinary eggshell biochar, resulting in their lower bioaccumulation in the edible part of Brassica chinensis L. The nZVI-ESB/AC treatments were significantly more effective than biochar treatments in enhancing plant growth, reducing oxidative stress indicators by 1.5–2 folds, and increasing the relative abundance level of Bacilli and Clostridia by 52–67% and 10–15%, respectively. The presence of iron in nZVI-ESB/AC enhanced the activities of antioxidant enzymes, leading to the decreased generation of reactive oxygen species and lipid peroxidation in the plants. Conclusions: This study demonstrates the potential of nZVI-ESB/AC as an effective adsorbent for soil remediation, alleviating stress induced by toxic metals on vegetable plants and promoting bacterial community diversity. The successful application of nZVI-ESB/AC presents promising prospects for sustainable agriculture, mitigating the environmental impact of lead and cadmium pollution and improving crop yield.

Sustainability (Switzerland)

DOI: http://dx.doi.org/10.3390/su152215887

15887(2023)

Recharge Estimation Approach in a Data-Scarce Semi-Arid Region, Northern Ethiopian Rift Valley

Sisay S. Mekonen [1, 2], *, Scott E. Boyce [1,3] , **Abdella K. Mohammed [4]**, Lorraine Flint[5], Alan Flint[5] and Markus Disse[1]

[2] Faculty of Water Resources and Irrigation Engineering, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia
[4] Faculty of Hydraulic and Water Resources Engineering, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Sustainable management of groundwater resources highly relies on the accurate estimation of recharge. However, accurate recharge estimation is a challenge, especially in data-scarce regions, as the existing models are data-intensive and require extensive parameterization. This study developed a process-based hydrologic model combining local and remotely sensed data for characterizing recharge in data-limited regions using a Basin Characterization Model (BCM). This study was conducted in Raya and Kobo Valleys, a semi-arid region in Northern Ethiopia, considering both the structural basin and the surrounding mountainous recharge areas. Climatic Research Unit monthly datasets for 1991 to 2020 and WaPOR actual evapotranspiration data were used. The model results show that the average annual recharge and surface runoff from 1991 to 2020 were 73 mm and 167 mm, respectively, with a substantial portion contributed along the front of the mountainous parts of the study area. The mountainous recharge occurred along and above the valleys as mountain-block and mountain-front recharge. The long-term estimates of the monthly recharge time series indicated that the water balance components follow the temporal pattern of rainfall amount. However, the relation of recharge to precipitation was nonlinearly related, showing the episodic nature of recharge in semi-arid regions. This study informed the spatial and temporal distribution of recharge and runoff hydrologic variables at fine spatial scales for each grid cell, allowing results to be summarized for various planning units, including farmlands. One third of the precipitation in the drainage basin becomes recharge and runoff, while the remaining is lost through evapotranspiration. The current study's findings are vital for developing plans for sustainable management of water resources in semi-arid regions. Also, monthly groundwater withdrawals for agriculture should be regulated in relation to spatial and temporal recharge patterns. We conclude that combining scarce local data with global datasets and tools is a useful approach for estimating recharge to manage groundwater resources in data-scarce regions.

Agriculture (Switzerland)

DOI: http://dx.doi.org/10.3390/agriculture13112152

2152(2023)

Mixed Silage of Banana Pseudostem and Maize Stover on Ethiopian Smallholder Farms: Effect of Fermentation Package and Location on Microbiological and Nutritional Evaluation

Ashenafi Azage Mitiku [1,2], Dries Vandeweyer [1], Ines Adriaens [3], **Yisehak Kechero** [2], Leen Van Campenhout [1] and Ben Aernouts [3,*]

[2] College of Agricultural Sciences, Department of Animal Science, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Preservation of widely available crop residues as silage could reduce feed shortages in Ethiopia. Four mixtures of banana pseudostem (BPS) and fresh maize stover (FMS) were prepared for fermentation considering the local conditions and available resources: 100% FMS, 80% FMS + 20% BPS, 60% FMS + 40% BPS and 95% BPS + 5% molasses. Each of the four mixtures was fermented in plastic bags as well as in plastic drums. Apart from the effect of the mixture and fermentation package, two fermentation locations were also considered. The fermentation was replicated three times for each combination of mixture, fermentation package and fermentation condition. The pH, microbial counts (total viable count, lactic acid bacteria count, Enterobacteriaceae count, yeast and mold count) and nutritional values of the fresh material and mixed silage were measured. Fermentation was successful for all mixed silages, reaching a pH below four, while the total viable count, Enterobacteriaceae count, yeast and mold count dropped (all $p \leq 0.05$) and digestibility and metabolizable energy increased compared to the fresh mixtures. Enterobacteriaceae counts reached values below the detection limit in all mixed silages fermented in drums unlike the bag silages. The plastic bags used as fermentation package were found to be sensitive to damage, resulting in a a higher pH and visible signs of yeast and mold. Although fermentation of BPS with molasses resulted in a significant increase in dry matter digestibility (41.14 to 46.17–49.92%) and organic matter digestibility (50.52 to 55.22–58.75%), they were lower compared to most mixed silages with FMS. Fermentation of 80 and 60% FMS mixtures increased the crude protein content from 44.30 to 71.27–82.20 g/kg DM, and from 43.63 to 63.10–65.83 g/kg DM, respectively. The highest increase (1.77 MJ/kg DM) in metabolizable energy was recorded for 80% FMS fermented in drums. The location of fermentation had no effect on pH, microbial counts and nutritional values. This study demonstrates that crop by-products can be successfully fermented under conditions prevailing in Ethiopia, with drums being preferred over bags. Mixing BPS with FMS is advised to absorb BPS juice losses and obtain silage with more crude protein, neutral and acid detergent fibers and metabolizable energy, as well as a higher digestibility.

Scientific Reports

DOI: http://dx.doi.org/10.1038/s41598-023-40490-1

13800(2023)

Quantum correlation in a nano-electro-optomechanical system enhanced by an optical parametric amplifier and Coulomb-type interaction

Habtamu Dagnaw Mekonnen[1,2], **Tesfay Gebremariam Tesfahannes 3***, Tewodros Yirgashewa Darge[1,4] & Alemayehu Getahun Kumela[1,4]

[3]Department of Physics, Arba Minch University, P.O.Box 21, Arba Minch, Ethiopia

Abstract

In this paper, we investigated the quantum correlation of nano-electro-optomechanical system enhanced by an optical parametric amplifier (OPA) and Coulomb-type interaction. In particular, we consider a hybrid system consisting of a cavity and two charged mechanical oscillators with an OPA, where the optical cavity mode is coupled with a charged mechanical oscillator via radiation pressure, and the two charged mechanical oscillators are coupled through a Coulomb interaction. We use logarithmic negativity to quantify quantum entanglement, and quantum discord to measure the quantumness correlation between the two mechanical oscillators. We characterize quantum steering using the steerability between the two mechanical oscillators. Our results show that the presence of OPA and strong Coulomb coupling enhances the quantum correlations between the two mechanical oscillators. In addition, Coulomb interactions are more prominent in quantum correlations. Besides, in the presence of OPA, the maximum amount of quantum entanglement, quantum steering, and quantum discord were achieved between the two mechanical oscillators is greater than in the absence of OPA. Moreover, a proper phase choice of the optical field driving the OPA enhances quantum correlations under suitable conditions. We obtain quantum entanglement confines quantum steering and quantum discord beyond entanglement. Furthermore, quantum entanglement, quantum steering, and quantum discord decrease rapidly with increasing temperature as a result of decoherence. In addition, quantum discord persists at higher temperature values, although the quantum entanglement between the systems also vanishes completely. Our proposed scheme enhances quantum correlation and proves robust against fluctuations in the bath environment. We believe that the present scheme of quantum correlation provides a promising platform for the realization of continuous variable quantum information processing.

Clinical Nutrition Open Science

DOI: http://dx.doi.org/10.1016/j.nutos.2023.09.009

52(2023)

Individual and community-level factors associated with introducing prelacteal feeding in Ethiopia

Girma Gilano [a,*], Samuel Hailegebreal[a], Kefita Kashala[b], Kasarto Gilano[c]

[a] Department of Health Informatics, Arba Minch University, College of Health Science, Southern, Ethiopia
[b] Department of Biomedical Science, Arba Minch University, College of Health Science, Southern, Ethiopia
[c] Department of Public Health, Arba Minch Health Sciences College, Southern, Arba Minch, Ethiopia

Abstract

Background: The undesirable effect of prelacteal feeding on children's health, growth, and development become a persistent health problem in low-income countries such as Ethiopia. It increases the risk of acquiring respiratory tract infections, diarrhea, and malnutrition. Without identifying and interrupting factors contributing to this practice, it may continue costing the lives of newborn children. Thus, this study to explores the individual and community-level factors that contribute to introducing prelacteal feeding and provides information on future improvement and policy decisions. Methods: We conducted a community-based quantitative cross-sectional study using secondary EDHS 2016 data collected from nine regions and two city administrations. We used 4,128 weighted samples of women with under-five children for this analysis. We applied a multilevel binary logistic regression to know the random, fixed, and mixed effects of prelacteal feeding. We used a P-value of <0.25 for select variables and a P-value of <0.05 to declare final associations. Results: From 4,128 mothers, 328.38 (7.95%) with 95% CI (7.14–8.81%) women reported prelacteal feeding. The highest prevalence was in Afar (43%), Somali (42%), Harari (26%), and Dire Dawa (22%). Factors such as health institutions delivery 0.69 (0.05–0.96), early initiation of breastfeeding 0.21 (0.17–0.28), middle economic status 0.63 (0.42–0.95), and greater than four ANCs 0.63 (0.45–0.90) showed an association with reduced prelacteal feeding, while the caesarian section was associated with increased prelacteal feeding 2.01 (1.17–3.47). Conclusion: Although prelacteal feeding deprives a newborn of vital nutrients and exposes infant to high mortality, women still practice it in Ethiopia. This shows that government commitment, policy intervention, and community mobilization for health education with motivated caregivers on prelacteal feeding are important.

International Journal of Applied Earth Observation and Geoinformation

DOI: http://dx.doi.org/10.1016/j.jag.2023.103505

124(2023)

Interannual comparison of historical floods through flood detection using multi-temporal Sentinel-1 SAR images, Awash River Basin, Ethiopia

Alemseged Tamiru Haile[a], **Tilaye Worku Bekele[a b]**, Tom Rientjes[c]

[b] Water Technology Institute, Arba Minch University, Arba Minch, P.O. Box 21, Ethiopia

Abstract

Synthetic-aperture radar (SAR) data from Sentinel-1 satellites provides unprecedented opportunity to evaluate inter-annual flood characteristics, although consensus on best flood detection methods is lacking. This study compared the performance of three flood detection methods to evaluate inter-annual flood characteristics at two sites in the Awash River Basin of Ethiopia. The methods are Change Detection and Thresholding (CDAT), Normalized Difference Flood Index (NDFI) and Root of Normalized Image Difference (RNID). The reference flood map was prepared based on a field survey for the maximum extent of the 2020 flood. Inter-annual flood characteristics were evaluated in terms of flood onset, recession and frequency of occurrence over the analysis period (2017 to 2022) but with a particular focus on the 2020 extreme flood events at Borkena and Dubti sites. Findings showed that the performance of the flood detection methods significantly differed. The RNID method, which allowed manual estimation of threshold, provided the highest flood detection capability at both sites. Flood detection accuracy improved when normalizing signal backscatter intensity of S-1 in change detection method. Flood onset and recession showed noticeable difference across the sites. Findings of this study indicate the potential of the satellite remote sensing methods to evaluate the spatial and temporal characteristics of floods, but further research is needed to evaluate and improve the performance of these methods for other flood affected sites

Journal of the Indian Society of Remote Sensing

DOI:10.1007/s12524-023-01761-6

51(2023)

Delineation of Ground Water Prospect Zones of Mojo Watershed, Ethiopia, East Africa, Using GIS, Remote Sensing and Analytical Hierarchy Process

Anirudh Bhowmick[a], Tewodros Addisu Yate[a], Amba Shalishe Shanka[a], Bhupender Singh Sandhar[b], Subodh Kumar Chaturvedi[c] & **Jai Ram Ojha[d]**

a Faculty of Meteorology and Hydrology, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia
[b]Faculty of Water Supply and Environment Engineering, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia
[c] Department of Geology, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

One of the most important elements in the development of human civilization is the prospect and availability of groundwater. Ethiopian farmers depend upon the rainy season for farming practices. The natural and man-made factors create extreme poverty and suffering for the farming communities and the country at large. Ethiopia's potential for its groundwater is not fully understood. Also, a high-resolution groundwater prospect mapping availability is restricted to only a few localities of the Ethiopian Rift Valley. Therefore, this research was conducted to demonstrate how well remote sensing and GIS techniques combined with weight assignment utilizing an analytical hierarchy process can be used to decipher groundwater prospects with the least amount of resources and the highest degree of accuracy. The priority of geology/lithology, slope, lineament, density, geomorphology, drainage density, soil, land cover, and rainfall is established in the Ethiopian Main Rift Valley through the validation process by borewell locations and their safe yields, which also reveals the sustainability of groundwater resources. The findings show 91.53% of agreement and 8.47% of disagreement during the validation of the study. Additionally, this analysis shows that close to 59% of the Mojo watershed is classified as having good to very good groundwater prospects, while approximately 31% of the area is classified as a moderate groundwater potential index. And the remaining 8.31%, of the area comes under the poor to very poor groundwater potential index.

Ecosystem Services

DOI: http://dx.doi.org/10.1016/j.ecoser.2023.101564

101564(2023)

Implications of changes in land use for ecosystem service values of two highly eroded watersheds in Lake Abaya Chamo sub-basin, Ethiopia

Wolde Mekuria [a], **Assefa Gedle [b]**, Yitna Tesfaye [c], Euan Phimister [d e]

[b] Arba-Minch University, Arba-Minch, Ethiopia

Abstract

Ecosystems provide a variety of ecosystem services and functions for mankind, and their sustainable use plays an important role in livelihoods. However, the resulting land degradation due to land use and land cover changes leads to loss of valuable ecosystems and associated ecosystem functions and services. This study takes two highly degraded watersheds, Aba-Bora and Guder, in Ethiopia and uses the value transfer valuation method to estimate changes in ecosystem service values. The study shows how loss of cropland and grazing lands can significantly affect ecosystem services even when plantations and shrubland increase. The results suggest that over a period of 41 years, the ecosystem service value of exclosures/shrublands and plantations increased, whereas that of crop and grazing lands decreased. The loss of ecosystem service values due to the decrease in cropland and grazing lands outweigh the gains due to the expansion of plantations and exclosures and resulted in a total loss of ecosystem service values of US$ 1.6 million in Aba-Bora watershed and US$ 24.4 million in Guder. In both watersheds, the greatest contributor to ecosystem service loss was a decline in supporting services, while the increase in plantation and shrublands (mainly through establishment of exclosures) meant that regulating ecosystem services suffered the smallest loss. Given their importance to livelihoods in these areas, the loss in crop and grazing lands significantly increase the vulnerability to shocks and narrow future livelihood options for many households. Given that severe gully erosion is the major contributor to the reduction in crop and grazing lands, catchment management that integrates the conservation of upstream areas using diverse sustainable land management practices, and gully rehabilitation measures in downstream areas could be an important option to reducing the expansion of big gullies, and conserving crop and grazing lands and ecosystem service values. However, the results suggest that the risks to livelihoods may be underestimated while the effectiveness of current actions to address land degradation over-estimated by communities.

Environmental Monitoring and Assessment

DOI: http://dx.doi.org/10.1007/s10661-023-11968-2

1329(2023)

LULC change detection using support vector machines and cellular automata-based ANN models in Guna Tana watershed of Abay basin, Ethiopia

Damte Tegegne Fetene[a]·, Tarun Kumar Lohani[a], Abdella Kemal Mohammed[a]

[a] Hydraulic and Water Resources Engineering, AWTI, Arba Minch University, Arba Minch, Ethiopia

Abstract

Recurrent changes recorded in LULC in Guna Tana watershed are a long-standing problem due to the increase in urbanization and agricultural lands. This research aims at identifying and predicting frequent changes observed using support vector machines (SVM) for supervised classification and cellular automata-based artificial neural network (CA-ANN) models for prediction in the quantum geographic information systems (QGIS) plugin MOLUSCE. Multi-temporal spatial Landsat 5 Thematic Mapper (TM) imageries, Enhanced Thematic Mapper plus 7 (ETM+), and Landsat 8 Operational Land Imager (OLI) images were used to find the acute problem the watershed is facing. Accuracy was assessed using the confusion matrix in ArcGIS 10.4 produced from ground truth data and Google Earth Pro. The results acquired from kappa statistics for 1991, 2007, and 2021 were 0.78, 0.83, and 0.88 respectively. The change detection trend indicates that urban land cover has an increasing trend throughout the entire period. In the future trend, agriculture land may shoot up to 86.79% and 86.78% of land use class in 2035 and 2049. Grassland may attenuate by 0.03% but the forest land will substantially diminish by 0.01% from 2035 to 2049. The increase of land specifically was observed in agriculture from 3128.4 to 3130 km2. Judicious planning and proper execution may resolve the water management issues incurred in the basin to secure the watershed.

Occupational and Environmental Medicine

DOI: http://dx.doi.org/10.1136/oemed-2022-108682

80(2023)

Effect of cold winters on the risk of new asthma: A case-crossover study in Finland

Abate Bekele Belachew,[1,2] Aino K Rantala,[1] Maritta S Jaakkola,[1] Timo T Hugg,[1] Reija Ruuhela,[3] Jaakko Kukkonen,[3,4] , Jouni J K Jaakkola[1,3]

[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background Cold weather increases respiratory symptoms and provokes exacerbations of asthma, but there are no previous studies on its role in the aetiology of asthma. Objective We tested the hypothesis that a cold winter increases the risk of developing asthma during the following 1 to 2 years. Methods We conducted a case-crossover study of 315 newly diagnosed cases of asthma from the population-based Espoo Cohort Study from birth to the age of 27 years. The hazard period constituted 3 winter months preceding the onset of asthma and bidirectional reference periods of 1 year before hazard period and 1 year after onset of asthma. Exposure constituted average ambient temperature during the winter months of December, January and February. The outcome of interest was new doctor-diagnosed asthma. The measure of effect was OR of asthma estimated by conditional logistic regression analysis. Results The average winter temperature for the study period from winter 1983 to 2010 was -4.4°C (range -10.7 to 0.4). A 1°C decrease in the average winter temperature predicted a 7% increase in the risk of new asthma (OR=1.07, 95% CI 1.02 to 1.13). A cold winter with an average temperature below the climate normal value (-4.5°C; period 1981-2010) increased the risk of new asthma by 41% during the following year (OR: 1.41; 95% CI 1.04 to 1.90). Conclusions This case-crossover study provides original evidence that a cold winter with below normal average temperatures increases the risk of developing new asthma during the following 1 to 2 years.

Chinese Journal of Physics

DOI: https://doi.org/10.1016/j.cjph.2023.09.018

86(2023)

High magnetic field effects on transport coefficients in heavily doped n-type Mg2Si

M.H. Gebru

Department of Physics, Arba Minch University, Arba Minch, Ethiopia

Abstract

In contrast to parabolic band model typically used in understanding electronic properties in general, thermoelectric and magneto-thermoelectric in particular, this study confirms non-parabolic band model results in better understanding of Seebeck coefficient and Nernst coefficient in the presence of magnetic field for Mg2Si. The magneto Seebeck coefficient was found significantly enhanced from its zero-field value for non-parabolic band model compared to parabolic band model for different electron concentrations in the range 0.6 - 12× 1025/m3 and at room temperature due to the high magnetic field slightly beyond |3|T, but not for others. In both cases, the Seebeck coefficient is enhanced as a result of the magnetic field. The result for Nernst coefficient shows increasing trend in high magnetic field in the range |3-9|T for parabolic band model while it is decreasing with magnetic field on average for non-parabolic band model except for few of them slowly increasing

Hydrogeology Journal

DOI: http://dx.doi.org/10.1007/s10040-023-02698-3

31(2023)

Identification of groundwater recharge and flow processes inferred from stable water isotopes and hydraulic data in Bilate River watershed, Ethiopia

Bisrat Elias Cholo[1] , Jiregna Gidisu Tolossa[2]

[1]Faculty of Meteorology and Hydrology, Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

The stable water isotopes can reflect the locations of recharge sources of groundwater. δ18O and δ2H composition reflect the hydrological mixing at land surface and the origin of moisture at the time of precipitation and infiltration; therefore, understanding the spatial variability in groundwater recharge and the flow paths is significant for the effective management of aquifers. This study investigates the groundwater recharge sources and groundwater flow paths using the stable water isotopes (δ18O and δ2H) and measured groundwater levels in the Bilate River watershed, Ethiopia. The isotopic ranges in the groundwater samples are more similar to precipitation than river water. The groundwater isotopes are distributed close to the meteoric water line of the watershed. Mass balance analysis of the stable water isotopic characteristics also shows that local rainfall is the dominant recharge source for the groundwater. The groundwater isotopes and static-water-level data analysis indicate that the watershed groundwater is mainly recharged by rainfall in the highlands during abundant precipitation. However, the groundwater in the northeast and east of the watershed shows high enrichment resembling surface-water isotope content, and could be better associated with the mixture of groundwater and surface water due to the effect of lake water intrusion at the watershed boundary. The isotopic signature of the watershed, along with the hydraulic flow pattern, identified four recharge mechanisms: recharge by local rainfall only, recharge at higher altitudes, recharge by local rainfall and surface flows, and recharge of regional deep aquifers by rainfall and interaction with open water.

BMC Infectious Diseases

DOI: http://dx.doi.org/10.1186/s12879-023-08464-w

486(2023)

Effect of malaria prevention education on bed net utilization, incidence of malaria and treatment seeking among school-aged children in Southern Ethiopia; cluster randomized controlled trial

Zerihun Zerdo[1,2]*, Hilde Bastiaens[3], Sibyl Anthierens[3], **Fekadu Massebo[4], Matewos Masne[4], Gelila Biresaw[1], Misgun Shewangizaw[5], Abayneh Tunje[5], Yilma Chisha[5], Tsegaye Yohannes[1]** and Jean-Pierre Van Geertruyden[2]

[1]Department of Medical Laboratory Science, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[4]Department of Biology, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia
[5] Department of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: School-aged children (SAC) have an increased risk to contract malaria and play a major role in its transmission dynamics. However, their malaria prevention experience is poor. Thus, the effect of malaria prevention education (MPE) on bed net utilization, treatment seeking from a health facility and cumulative incidence of malaria was evaluated in Southern Ethiopia. Methods: A two arm cluster randomized controlled trial was conducted by recruiting 2038 SAC from 32 schools. Structured questionnaire was used to collect data on socio-demographic, economic, bed net ownership, bed net utilization, whether the participated child suffered from malaria and has got treatment from a health facility. Generalized mixed effect logistic regression using school as random variable was used to assess the effect of the intervention on the outcome variables. Results: The ownership of bed net in households of the control and intervention schools was similar respectively with 84.6 and 88.6% (Crude Odds Ratio (COR): 1.5; 95%CI: 0.5–4.8). The percentage of SAC slept under the bed net the night before the survey was also similar (55.1% versus 54.0%); COR:1.04; 95%CI: 0.5–2.4). Bed net utilization was affected by household size to the bed net ratio ≤ 2 (Adjusted Odds Ratio (AOR) = 1.6; 95%CI:1.3–2.1), bed net utilization at baseline of the study (AOR = 2.3; 95%CI:1.5–3.6), and history of malaria attack in the last twelve months (AOR = 1.3; 95%CI:1.01–1.8). Reported cumulative incidence of malaria and treatment seeking from a health facility by SAC was similar between intervention and control arms: -2.1% (COR = 0.8; 95%CI: 0.5–1.5) and 9.6% (COR = 1.4; 95%CI: 0.4–4.3) respectively. The reported incidence of malaria was affected by altitude (AOR = 0.5; 95%CI: 0.3–0.8), low and medium wealth index (AOR = 0.7; 95%CI: 0.5–0.96 and AOR = 0.7; 95%CI: 0.5–0.98), adequate bed net number for household members (AOR = 0.7; 95%CI:0.5–0.9) and bed net utilization (AOR = 1.3; 95%CI:1.1–1.8). Conclusions: MPE had no significant effect on the use of malaria prevention measures considered, treatment seeking from a health facility and reported cumulative incidence of malaria though bed net use was associated with malaria incidence. Before organizing any health education program, sustainable implementation efforts have to be warranted especially in SAC, a neglected but relevant vulnerable and reservoirs.

BMC Health Services Research

DOI: http://dx.doi.org/10.1186/s12913-023-09745-5

773(2023)

Health professionals' readiness to implement electronic medical record system in Gamo zone public hospitals, southern Ethiopia: an institution based cross-sectional study

Samuel Hailegebreal[1,2]*, Temesgen Dileba[2], Yosef Haile2 and Sintayehu Abebe[2]

[2] School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: The adoption of Electronic Medical Records (EMR) by the healthcare sector can improve patient care and safety, facilitate structured research, and effectively plan, monitor, and assess disease. EMR adoptions in low-income countries like Ethiopia were delayed and failing more frequently, despite their critical necessity. The most popular way to solve the issue is to evaluate user preparedness prior to the adoption of EMR. However, little is known regarding the EMR readiness of healthcare professionals in this study setting. Therefore, the objective of this study was to assess the readiness and factors associated with health professional readiness toward EMR in Gamo Zone, Ethiopia. Methods: An institution-based cross-sectional survey was conducted by using a pretested self-administered questionnaire on 416 study participants at public hospital hospitals in southern Ethiopia. STAT version 14 software was used to conduct the analysis after the data was entered using Epi-data version 3.2. A binary logistic regression model was fitted to identify factors associated with readiness. Finally, the results were interpreted using an adjusted odds ratio (AOR) with a 95% confidence interval (CI) and p-value less than 0.05. Results: A total of 400 participants enrolled in the study, with a response rate of 97.1%. A total of 65.25% (n = 261) [95% CI: 0.60, 0.69] participants had overall readiness, 68.75% (n = 275) [95% CI: 0.64, 0.73] had engagement readiness, and (69.75%) (n = 279) [95% CI: 0.65, 0.74] had core EMR readiness. Computer skills (AOR: 3.06; 95% CI: 1.49–6.29), EMR training (AOR: 2.00; 95% CI: 1.06–3.67), good EMR knowledge (AOR: 2.021; 95% CI: 1.19–3.39), and favorable attitude (AOR: 3.00; 95% CI: 1.76–4.97) were factors significantly associated with EMR readiness. Conclusion: Although it was deemed insufficient, more than half of the respondents indicated a satisfactory level of overall readiness for the adoption of EMR. Moreover, having computer skills, having EMR training, good EMR knowledge, and favorable EMR attitude were all significantly and positively related to EMR readiness.

Food Safety and Risk

DOI: http://dx.doi.org/10.1186/s40550-023-00102-2

1(2023)

Evaluation of bacteriological profile of meat contact surfaces, handling practices of raw meat and its associated factors in butcher shops of Arba Minch town, southern Ethiopia-A facility based cross sectional study

Tesfaye Kanko[1]*, Mohammed Seid[2] and Mathewos Alemu[3]

[1]Department of Biomedical Sciences, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[2]Department of Medical Laboratory Sciences, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Meat is subjected to contamination from a range of sources throughout animal slaughter and its sale. The demand for meat products in Ethiopia has been increased dramatically; especially the consumption of fresh chilled meat becomes a status of symbol. Objectives: This study aimed to evaluate the bacteriological profile of meat contact surfaces, raw meat handling practices, and its associated factors in butcher shops located in Arba Minch town, southern Ethiopia. Methods and Materials: A facility-based cross-sectional study was carried out among meat handlers in butcher shops in Arba Minch town from November to December 2020. A pre-tested and semi-structured interviewer-administered questionnaire was used to collect the data on workers meat handling practices and the sterile swab was used to collect samples from selected meat contact surfaces for bacteriological analysis. Statistical Package for Social Sciences (SPSS) version 21 was used for data analysis. Binary logistic regression analysis was utilized to assess the presence and degree of association between raw meat handling practice and independent variables. Adjusted odds ratio with a 95% confidence interval at P-value < 0.05 was considered statistically significant. Result and Conclusion: This study revealed the knowledge and handling practice gap among meat handlers of butcher shops. Knowledge of food handling hygiene has shown significant association with handling practice [AOR = 4.5 (1.182,17.202)]. The median total viable count of bacterial loads from the swab samples of butchers' hands, knives, and the tables was 5.60 ± 0.80, 5.60 ± 1.00, 5.70 ± 1.00 log10 Colony-forming unit (CFU)/cm2, respectively. Escherichia coli was the predominant isolate 34(68%) followed by Staphylococcus species 28(56%) and Salmonella species 19(38%). The median total bacterial load obtained from the samples exceeds the acceptable value of less than 5.0 log10 CFU/cm2 on fresh meat. This indicates the need for improvement in the meat handling and processing chain to safeguard the public health against the risks of foodborne bacterial infections.

BMC Nursing

DOI: http://dx.doi.org/10.1186/s12912-023-01526-z

381(2023)

Therapeutic communication and its associated factors among nurses working in public hospitals of Gamo zone, southern Ethiopia: application of Hildegard Peplau's nursing theory of interpersonal relations

Abera Mersha[1]*, Abebe Abera[2], Temamen Tesfaye[2], Tesfaye Abera[3], Admasu Belay[2], Tsegaye Melaku[4],Misaye Shiferaw[5], **Shitaye Shibiru[1]**, **Wubshet Estifanos[1]** and Senahara Korsa Wake[6]

[1] School of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Arba Minch, Ethiopia

Abstract

Background: Therapeutic communication can assist nurses in achieving their goals. Effective nurse-patient communication can improve clinical outcomes and boosts patient satisfaction. But, there is an arming gap in therapeutic communication between nurses and patients in Ethiopia, which hinders the quality of nursing care. Some studies have been done on therapeutic and its barriers. Nevertheless, those studies did not fully address factors from different perspectives and were supported by nursing theories or models. Therefore, this study aimed to fill these gaps in the study setting. Methods: Institution-based cross-sectional study was conducted among 408 nurses working in public hospitals of Gamo zone from December 1, 2021, to January 30, 2022. Out of the six hospitals in the Gamo zone, three were selected by simple random sampling method. The data were collected by an interview-administered Open Data Kit survey tool and analyzed by SAS version 9.4. Descriptive statistics were computed and a generalized linear model was used to identify associated factors. Results: In this study, a standardized percentage of the maximum scale of therapeutic communication was 52.32%. Of the participants, 40.4% had high, 25.0% moderate, and 34.6% had low levels of therapeutic communication. Age, marital status, and qualification showed significant and positive relationships with the overall therapeutic communication. However, sex, working unit, nurse burnout, lack of empathy from nurses, challenging nursing tasks, lack of privacy, use of technical terms by nurses, lack of confidence in nurses, stress, unfamiliarity with the nursing job description, shortage of nurses, insufficient knowledge, lack of participation in decision making, and having contagious disease showed a significant and negative relationship with overall therapeutic communication. Conclusions: This finding indicates a gap in therapeutic communication between nurses and patients, and modifiable factors are identified. Therefore, giving opportunities for nurses to improve their qualifications, a special attention to nurses working in stressful areas, sharing the burden of nurses, involving nurses and patients in decision-making, and motivating and creating a positive working environment is vital to improving therapeutic communication.

BMC Public Health

DOI: http://dx.doi.org/10.1186/s12889-023-15751-3

808(2023)

The financial burden of out of pocket payments on medicines among households in Ethiopia: analysis of trends and contributing factors

Getahun Asmamaw Mekuria[1] and Eskinder Eshetu Ali[2]*

[1]Department of Pharmacy, Arba Minch University, College of Medicine and Health Sciences, Arba Minch, Ethiopia

Abstract

Background: In Ethiopia, out-of-pocket (OOP) payment is the key means of healthcare financing, and expenses on medicines are a crucial component of such payment. This study aims to investigate the financial implications of OOP payments on medicines for Ethiopian households. Methods: The study involved a secondary data analysis of the national household consumption and expenditure surveys of 2010/11 and 2015/16. The "capacity-to-pay" method was used to calculate catastrophic OOP medicine expenditures. The extent of economic status related to catastrophic medicine payment inequity was calculated using concentration index estimation. The impoverishment consequences of OOP payment on medicine were estimated using poverty headcount and poverty gap analysis methods. Logistic regression models were used to identify the variables that predict catastrophic medicine payments. Results: Medicines accounted for the majority of healthcare spending (> 65%) across the surveys. From 2010 to 2016, the total percentage of households facing catastrophic medicine payments decreased from 1% to 0.73%. However, the actual number of people expected to have experienced catastrophic medicine payments increased from 399,174 to 401,519 people. Payment for medicines pushed 11,132 households into poverty in 2015/16. The majority of disparities were explained by economic status, place of residence, and type of health services. Conclusion: OOP payment on medicine accounted for the majority of total health expenses in Ethiopia. A high medicine OOP payment continued to push households into catastrophic payments and impoverishment. Household seeking inpatient care, those with lower economic status and urban residents were among the most affected. Hence, innovative approaches to improve the supply of medicines in public facilities especially those in urban settings and risk protection mechanisms for medicine expenditures particularly for inpatient care are recommended.

BMC Medical Imaging

DOI: http://dx.doi.org/10.1186/s12880-023-01108-0

150(2023)

DMF-Net: a deep multi-level semantic fusion network for high-resolution chest CT and X-ray image de-noising

Tapan Kumar Nayak[1], Chandra Sekhara Rao Annavarappu[1], Soumya Ranjan Nayak[2] and **Berihun Molla Gedefaw[3]***

[3] Department of Health Informatics, Arba Minch University College of Medicine and Health Science, Arba Minch, Ethiopia

Abstract

Medical images such as CT and X-ray have been widely used for the detection of several chest infections and lung diseases. However, these images are susceptible to different types of noise, and it is hard to remove these noises due to their complex distribution. The presence of such noise significantly deteriorates the quality of the images and significantly affects the diagnosis performance. Hence, the design of an effective de-noising technique is highly essential to remove the noise from chest CT and X-ray images prior to further processing. Deep learning methods, mainly, CNN have shown tremendous progress on de-noising tasks. However, existing CNN based models estimate the noise from the final layers, which may not carry adequate details of the image. To tackle this issue, in this paper a deep multi-level semantic fusion network is proposed, called DMF-Net for the removal of noise from chest CT and X-ray images. The DMF-Net mainly comprises of a dilated convolutional feature extraction block, a cascaded feature learning block (CFLB) and a noise fusion block (NFB) followed by a prominent feature extraction block. The CFLB cascades the features from different levels (convolutional layers) which are later fed to NFB to attain correct noise prediction. Finally, the Prominent Feature Extraction Block(PFEB) produces the clean image. To validate the proposed de-noising technique, a separate and a mixed dataset containing high-resolution CT and X-ray images with specific and blind noise are used. Experimental results indicate the effectiveness of the DMF-Net compared to other state-of-the-art methods in the context of peak signal-to-noise ratio (PSNR) and structural similarity measurement (SSIM) while drastically cutting down on the processing power needed.

Malaria Journal

DOI: http://dx.doi.org/10.1186/s12936-023-04529-y

112(2023)

Diagnostic performance of NxTek™ Eliminate Malaria-Pf test for the detection of Plasmodium falciparum in school children with asymptomatic malaria

Abdissa Biruksew[1,2]* , **Ashenafi Demeke[4]**, Zewdie Birhanu[3] , Estifanos Kebede[1], Lemu Golassa[5] ,Evans Mantiri Mathebula[6] and Delenasaw Yewhalaw1[,2]

[4]Arba Minch Health Science College, Arba Minch, Ethiopia

Abstract

Background: One of the major roadblocks to the falciparum malaria elimination programme is the presence of a portion of the population, such as school children, with asymptomatic malaria infection. Targeting such reservoirs of infections is critical to interrupting transmission and enhancing elimination efforts. The NxTek™ Eliminate Malaria Pf test is a highly sensitive rapid diagnostic test (hsRDT) for the detection of HRP-2. However, knowledge gaps exist in Ethiopia on the diagnostic performance of hsRDT for the detection of Plasmodium falciparum in school children with asymptomatic malaria. Methods: A school-based cross-sectional study was conducted from September 2021 to January 2022 on 994 healthy school children (aged 6–15 years). Finger-pricked whole blood samples were collected for microscopy, hsRDT, conventional RDT (cRDT or SD Bioline Malaria Ag Pf/P.v), and QuantStudio™ 3 Real—Time PCR system (qPCR). The hsRDT was compared to cRDT and microscopy. qPCR and microscopy were used as reference methods. Results: The prevalence of Plasmodium falciparum was 1.51%, 2.2%. 2.2% and 4.52%, by microscopy, hsRDT, cRDT and qPCR, respectively. Using qPCR as reference, the sensitivity of hsRDT was higher (48.89%) than the microscopy (33.3%), and showed 100% specificity and a positive predictive value (PPV). Microscopy showed similar specificity and PPV as hsRDT. Using microscopy as a reference, the diagnostic performmances of both hsRDT and cRDT were similar. Both RDTs demonstrated identical diagnostic performances in both comparison methods. Conclusions: hsRDT has the same diagnostic performance as cRDT but improved diagnostic characteristics than microscopy for detection of P. falciparum in school children with asymptomatic malaria. It can be a useful tool for the national malaria elimination plan of Ethiopia.

PLoS ONE

DOI: http://dx.doi.org/10.1371/journal.pone.0287314

e0287314(2023)

The impacts of climate change on hydrological processes of Gilgel Gibe catchment, southwest Ethiopia

Zewde Alemayehu Tilahun[1]*, Yechale Kebede Bizuneh[1], Abren Gelaw Mekonnen[1]

[1]Dep't of Geography & Env'tal Studies, Arba-Minch University, Arba Minch, Ethiopia

Abstract

Climate change is a significant driver of water resource availability, affecting the magnitude of surface runoff, aquifer recharge, and river flows. This study investigated the impact of climate change on hydrological processes within the Gilgel Gibe catchment and aimed to determine the level of exposure of water resources to these changes, which is essential for future adaptability planning. To achieve this objective, an ensemble mean of six regional climate models (RCMs) from the coordinated regional climate downscaling experiment (CORDEX)- Africa was used to simulate future climatic scenarios. The RCMs outputs were then bias corrected using distribution mapping to match observed precipitation and temperature. The Soil and Water Assessment Tool (SWAT) model was used to assess the hydrological impacts of climate change on the catchment. The results indicated that the ensemble mean of the six RCMs projects a decline in precipitation and an increase in temperature under both the RCP4.5 and RCP8.5 representative concentration pathways. Moreover, the increases in both maximum and minimum temperatures are higher for higher emission scenarios, indicating that RCP8.5 is warmer than RCP4.5. The projected climate change shows a decrease in surface runoff, groundwater, and water yield, resulting in an overall decline of annual flow. This decline is mainly due to the reduction in seasonal flows driven by climate change scenarios. The changes in precipitation range from -11.2% to -14.3% under RCP4.5 and from -9.2% to -10.0% under RCP8.5, while the changes in temperature range from 1.7°C to 2.5°C under RCP4.5 and from 1.8°C to 3.6°C under RCP8.5. These changes could lead to reduced water availability for crop production, which could be a chronic issue for subsistence agriculture. Additionally, the reduction of surface water and groundwater could further exacerbate water stress in the downstream areas, affecting the availability of water resources in the catchment. Furthermore, the increasing demands for water, driven by population growth and socioeconomic progress, along with the variability in temperature and evaporation demands, will amplify prolonged water scarcity. Therefore, robust climate-resilient water management policies are indispensable to manage these risks. In conclusion, this study highlights the importance of considering the impact of climate change on hydrological processes and the need for proactive adaptation measures to mitigate the impacts of climate change on water resources.

PLoS ONE

DOI: https://doi.org/10.1371/journal.pone.0289746

e0289746(2023)

Assessment of liver function tests of women taking hormonal contraceptives at University of Gondar comprehensive specialized hospital and Family Guidance Association of Gondar (FGAE), 2022; a comparative cross-sectional study

Elias Chane[1], Habtamu Wondifraw[1], **Rishan Hadgu[2],** Alebachew Fasil[1]

[2] Department of Medical Laboratory Science, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Introduction Hormonal contraceptives are artificial preparations that contain artificial progestins and Ethinylestradiol; these preparations are utilized by women of reproductive age to prevent pregnancy. Roughly a billion women in the world use some form of contraceptive worldwide. Despite the utility of these preparations, they are linked with several adverse effects, including disturbances of liver functionality and integrity. However, previous studies conducted to assess the association between hormonal contraceptive utilization and liver function tests reported conflicting results, and the effects remained a matter of concern. Methods The study enrolled a total of 264 participants, who were allocated into two groups. One group of hormonal contraceptive users who use the medication for a minimum of six months: Depot medroxyprogesterone acetate (DMPA), combined oral contraceptives (COC), Norplant, and Implant users and another age-matched non-user control group in a ratio of 1:1. A semi-structured questionnaire was used to collect socio-demographic, behavioral, and clinical data. Five ml serum blood sample was collected for liver function test analysis on a Beckman Coulter Clinical Chemistry analyzer (DXC 700 AU). Independent t-test was used to compare liver function tests of hormonal contraceptive users and non-user controls, whereas ANOVA followed by a Bonferroni post hoc test was used for intra- (between classes of contraceptives) and inter-group (between each class of contraceptives an

ACS Symposium Series

DOI: http://dx.doi.org/10.1021/bk-2023-1440.ch008

1440(2023)

Applications of Polymeric Foams in Thermal Insulation

Melkamu Biyana Regasa[1],*and **Gada Muleta Fanta[2],***

[2]Department of Chemistry, College of Natural and Computational Sciences, Arba Minch University, P. O. Box. 21, Arba Minch, Ethiopia

Abstract

The demand for sustainable and suitable materials for comfortable human life in the modern world led to the discovery of polymeric foams that are porous, lightweight, mechanically stable, corrosion-resistant, and low-cost materials. These materials become the best alternatives as energy-saving materials, packaging, shock absorption, and structural materials in various technological applications. With this regard, in our daily life foamed polymers become ubiquitous indicating their potential technological applications. The unique properties of polymeric foamsmake themto be the promising functionalmaterials in various applications. The anomalous properties such as being relatively cheap, increased surface area, lightweight, flexible, and increased volume attributed for the workable technological application of polymeric foams.Therefore, this chapter presents a brief insight into the general background, historical development, preparation methods, classification, and applications of polymeric foams as insulating materials in buildings, sportswear, automotive engineering, the fishing industry, and packaging technology.

Heliyon

DOI: http://dx.doi.org/10.1016/j.heliyon.2023.e18587

e18587(2023)

Analyze of spatial extent and current condition of land use land cover dynamics for the period 1990–2020 Wayu-Tuka district, western Ethiopia

Jembere Bekere [a], Feyera Senbeta [b], Abren Gelaw [c]

[a] Environment & Natural Resource Mgt) Geography Department & Env'tal Studies, Arba Minch University, Ethiopia
[c] Environment & Natural Resource Mgt), Geography Department and Env'tal Studies, Arba Minch University, Ethiopia

Abstract

LULC variation has increased in many parts of the world recent years. Analyzing LULC is valuable to ability to grasp for spatial extent, patterns and impacts of the dynamics. This research examines the magnitudes and trends of LULC dynamics of Wayu-Tuka District, Western Ethiopia for a period of 1990–2020. Data were acquired from Landsat images (i.e, TM from 1990 to 2000, ETM+ from 2010 and OLI 2020). LULC classes were classified (from Landsat images) to develop land use land cover change maps for the study area. Landsat images were grouped via supervised classification method and maximum likelihood classifier (MLC). Accuracy scores and kappa a coefficient was used to confirm the accuracy categorized for LULC classes. Forest, settlement area, cultivated area, water body, and bare land are the main land use land cover categories identified in the study area. At the study district, forest coverage decreased progressively within the past three decades (1990–2020) from 12.4% in 1990 to 2.6% in 2020. The settlements, cultivated lands and water bodies have been explained by a average rate of 0.41% per year and forest land has been reduced by 0.33% per year. The study identified the major drivers of land use/land cover dynamics such as expansion of agricultural land, extraction of fuel woodland, illegal settlements and illegal logging was the key factors of LULC changes in the field of the study. In expressions of historical and current LULC, the analysis indicated that in the three decades years' viewpoint; changes in agriculture land expansion and expansion of settlement land have had a strong impact on the LULC dynamics. The few remaining forest area coverage of the District shall be completely vanished unless measures are taken to curb these declining trends. Therefore, relevant stakeholders should take integrated actions to rehabilitate degraded landscapes through afforestation and reforestation programmes.

International journal of surgery (London, England)

DOI: http://dx.doi.org/10.1097/JS9.0000000000000542

109 (2023)

Surgical intervention as a driver of new angiogenesis in tumors-time to consider minimally invasive surgeries?

Vimalraj Selvaraj, PhD[a],*, Saravanan Sekaran, PhD[a],*, **Sureh Kumar Rajamani Sekar, PhD[b],***

b College of Natural Sciences, Arba Minch University, SNNPR, Ethiopia

Abstract

Surgical resection remains the primary therapeutic approach for the overwhelming majority of patients diagnosed with loca-lized solid tumours. Angiogenesis is a crucial part of the recoveryprocess after surgery, but its tumour-promoting effects mightprovide a therapeutic difficulty. Consistent with this, numerouspro-angiogenic factors, including vascular endothelial growth factor (VEGF) and angiopoietin 2, were discovered to haveconsiderably raised plasma levels following surgical tumour excision. It is unclear whether minimally invasive surgery is preferable to open surgery in terms of avoiding the pro-angio- genesis response, and increasing levels of these pro-angiogenic factors seem to correspond with the amount of surgical wounds.These pro-angiogenic factors, which may originate from a wide variety of cell types including endothelial cells, cancer cells, fibroblasts, and immunological cells, tend to rise after surgery and stay at a high level for up to four weeks. The presence of these proteins not only helps sustain a tumour-promoting micro-environment but also shields tumour cells from the effects of standard chemotherapy. Anti-angiogenesis medicines have so been advocated for use in the immediate postoperative period, ahead of the administration of standard chemotherapy [1,2] Further research is needed on the long-term effects and safety concerns related to early postoperative anti-angiogenic therapy because of the possible impact on wound and anastomotic healing.

African Journal of Ecology

DOI: https://doi.org/10.1111/aje.13162

61(2023)

Diet composition and diurnal activity patterns of gelada baboon (Theropithecus gelada)

Berhanu Gosheme[a], Mesele Yihune[b]

[a] Department of Biology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Gelada baboons (Theropithecus gelada) are the only surviving species of the genus Theropithecus and endemic to the highlands of Ethiopia. The present study deals with feeding ecology and diurnal activity patterns of gelada (T. gelada) in Wof-Washa Forest, central Ethiopia. It was conducted from September 2016 to August 2017. Focal sampling technique for 10 min observation was employed to study the feeding ecology. Type of plant species consumed and parts eaten by gelada were recorded using binoculars during dry and wet seasons. On the other hand, data on diurnal activity patterns were collected using scan sampling technique. The activity patterns of bands under study were quantified by scanning at every 15-min interval from 06:00 to 18:00 h. A total of 11 plant species that belong to 10 families were foraged by gelada during the wet and dry seasons. Grass was the main food source for geladas that contributed about 81% and 68% of their diet during the wet and dry seasons, respectively, while Thymus schimperi was the least consumed plant species during both wet (0.5%) and dry (1%) seasons. Grass blades were the most preferable food items by almost all age and sex categories. Daily activities of gelada were mainly dominated by feeding during both seasons. Geladas spent 58% of their time on foraging activity during the wet season and 67.2% of their time spent during the dry season. Geladas mainly depend on grasses for their diet in the study area. Therefore, to implement successful management and conservation of the species, the area needs to be properly protected.

IET Software

DOI: https://doi.org/10.1049/sfw2.12061

17(2023)

Retracted: Robotic Process Automation use cases in academia and early implementation experiences (IET Software, (2022))

. Ankur Gupta[1], Purnendu Prabhat[1], Sahil Sawhney[1], Rajesh Gupta[1], Sudeep Tanwar[2], Neeraj Kumar[3], **Mohammad Shabaz[4]**

[4]Arba Minch University, Arba Minch, Ethiopia

Abstract

Retraction: [Ankur Gupta, Purnendu Prabhat, Sahil Sawhney, Rajesh Gupta, Sudeep Tanwar, Neeraj Kumar, Mohammad Shabaz, Robotic Process Automation use cases in academia and early implementation experiences, IET Software 2022 (https://DOI.org/10.1049/sfw2.12061)]. The above article from IET Software, published online on 19 May 2022 in Wiley Online Library (wileyonlinelibrary.com), has been retracted by agreement between the Editor-in-Chief, Hana Chockler, the Institution of Engineering and Technology (the IET) and John Wiley and Sons Ltd. This article was published as part of a Guest Edited special issue. Following an investigation, the IET and the journal have determined that the article was not reviewed in line with the journal's peer review standards and there is evidence that the peer review process of the special issue underwent systematic manipulation. Accordingly, we cannot vouch for the integrity or reliability of the content. As such we have taken the decision to retract the article. The authors have been informed of the decision to retract.

Indonesian Journal of Applied Linguistics

DOI: http://dx.doi.org/10.17509/ijal.v13i2.63085

13(2023)

The influence of K-12 language teachers' demographic profiles on authentic assessment practice

Hailay Tesfay Gebremariam[a], Abate Demissie Gedamu[b]

[a] Department of Ethiopian Languages and Literature (Amharic), College of Social Science and Humanities, Arba Minch University, Arba Minch, Ethiopia
[b] Department of English Language and Literature, College of Social Science and Humanities, Arba Minch University, Arba Minch, Ethiopia

Abstract

While much literature has been used to investigate authentic assessment practice in the field of education, particularly in the context of language classrooms, a study investigating the demographic profiles of teachers and their relation to authentic assessment practice in language classrooms is crucial and needs further exploration. To this end, the current study investigated the K-12 language teachers' demographic profiles in relation to their authentic assessment practice, in terms of gender, teaching experience, and educational status. The study included 282 K-12 teachers enrolled in a summer program in Ethiopia. The study design was a descriptive survey, and data were obtained via a questionnaire. Descriptive and inferential statistics were used to analyze the gathered data. Results showed that language teachers had significant differences (p?>.05) in classroom questioning and discussion (hereafter referred to as CQD), as well as substantial differences (p?>.05) in peer and self-assessment (hereafter referred to as PSA) and feedback process (hereafter referred to as FB). Additionally, significant differences (p <.05) were observed in the effect of gender, teacher experience, and educational status on all three subsections. The findings show that although language teachers had authentic assessment practice, there were no consistent results regarding the influence of their background information. These findings contribute to our understanding of how demographic profiles of language teachers affect authentic assessment practice in K-12 education. Based on the results of the study, recommendations have been made for further consideration.

Allergy: European Journal of Allergy and Clinical Immuno

DOI: http://dx.doi.org/10.1111/all.15807

78(2023)

Global, regional, and national burden of allergic disorders and their risk factors in 204 countries and territories, from 1990 to 2019: A systematic analysis for the Global Burden of Disease Study 2019

Yonas Derso Abtew[19] , Biniyam Demisse[112], Habtamu Esubalew[123]

[19]Department of Biomedical Science, Arba Minch University, Arba Minch, Ethiopia
[112]Department of Nursing, Arba Minch University, Arba Minch, Ethiopia
[123]Department of Public Health, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Asthma and atopic dermatitis (AD) are chronic allergic conditions, along with allergic rhinitis and food allergy and cause high morbidity and mortality both in children and adults. This study aims to evaluate the global, regional, national, and temporal trends of the burden of asthma and AD from 1990 to 2019 and analyze their associations with geographic, demographic, social, and clinical factors. Methods: Using data from the Global Burden of Diseases (GBD), Injuries, and Risk Factors Study 2019, we assessed the age-standardized prevalence, incidence, mortality, and disability-adjusted life years (DALYs) of both asthma and AD from 1990 to 2019, stratified by geographic region, age, sex, and socio-demographic index (SDI). DALYs were calculated as the sum of years lived with disability and years of life lost to premature mortality. Additionally, the disease burden of asthma attributable to high body mass index, occupational asthmagens, and smoking was described. Results: In 2019, there were a total of 262 million [95% uncertainty interval (UI): 224–309 million] cases of asthma and 171 million [95% UI: 165–178 million] total cases of AD globally; age-standardized prevalence rates were 3416 [95% UI: 2899–4066] and 2277 [95% UI: 2192–2369] per 100,000 population for asthma and AD, respectively, a 24.1% [95% UI: −27.2 to −20.8] decrease for asthma and a 4.3% [95% UI: 3.8–4.8] decrease for AD compared to baseline in 1990. Both asthma and AD had similar trends according to age, with age-specific prevalence rates peaking at age 5–9 years and rising again in adulthood. The prevalence and incidence of asthma and AD were both higher for individuals with higher SDI; however, mortality and DALYs rates of individuals with asthma had a reverse trend, with higher mortality and DALYs rates in those in the lower SDI quintiles. Of the three risk factors, high body mass index contributed to the highest DALYs and deaths due to asthma, accounting for a total of 3.65 million [95% UI: 2.14–5.60 million] asthma DALYs and 75,377 [95% UI: 40,615–122,841] asthma deaths. Conclusions: Asthma and AD continue to cause significant morbidity worldwide, having increased in total prevalence and incidence cases worldwide, but having decreased in age-standardized prevalence rates from 1990 to 2019. Although both are more frequent at younger ages and more prevalent in high-SDI countries, each condition has distinct temporal and regional characteristics. Understanding the temporospatial trends in the disease burden of asthma and AD could guide future policies and interventions to better manage these diseases worldwide and achieve equity in prevention, diagnosis, and treatment.

Environmental Research

DOI: http://dx.doi.org/10.1016/j.envres.2023.116553

116553(2023)

Novel visible-light-active P-g-CN-based α-Bi2O3/WO3 ternary photocatalysts with a dual Z-scheme heterostructure for the efficient decomposition of refractory ultraviolet filters and environmental hormones: Benzophenones

Abiyu Kerebo Berekute [a b e], Kuo-Pin Yu [a b], Yi-Hsueh Brad Chuang [c], Kun-Yi Andrew Lin [d]

[e] Department of Chemistry, College of Natural and Computational Sciences, Arba Minch University, Arbaminch, Ethiopia

Abstract

The ubiquitous and refractory benzophenone (BP)-type ultraviolet filters, which are also endocrine disruptors, were commonly detected in the aquatic matrix and could not be efficiently removed by conventional wastewater treatment processes, thus causing extensive concern. Herein, a novel ternary nanocomposite, P-g-CN/α-Bi2O3/WO3 (P-gBW), was successfully fabricated by mixing cocalcinated components and applied to the decomposition of BP-type ultraviolet filters. The dual-Z-scheme heterostructure of P-gBW enhances visible-light absorption, efficiently facilitates separation and mobility, and prolongs the lifetime of photoinduced charge carriers via double charge transfer mechanisms. The optimum 95 wt% P-gBW exhibited excellent photocatalytic activity, degrading 96% 4-hydroxy benzophenone (4HBP) within 150 min and 93% 2,2′,4,4′-tetrahydroxybenzophenone (BP-2) within 100 min under visible-light illumination, respectively. The pseudo-first-order rate constant of 4HBP (1.15 h−1) was 6.8-, 3.1-, 3.3- and 2.2-fold higher than those of WO3, P-g-CN, α-Bi2O3, and P-g-CN/α-Bi2O3, respectively, while that of BP-2 (1.71 h−1) was 5.2-, 2.2-, 3.2- and 1.5-fold higher, respectively. The improved photocatalytic degradation was attributed to efficient photoinduced charge carrier separation and migration and prevented the recombination of electron holes, as verified by photoluminescence, transient photocurrent response, and electrochemical impedance spectroscopy. Trapping experiments, electron paramagnetic resonance, and band energy position indicated an efficient dual-Z-scheme heterostructure.

World Journal of Engineering

DOI: http://dx.doi.org/10.1097/JS9.0000000000000530

109(2023)

Can surgery induce cancer recurrence or metastasis? Revisiting the relationship between anesthetic selection and outcomes in cancer surgery

Saravanan Sekaran [1], Vimalraj Selvaraj [1], Dhanraj Ganapathy [1], **Sureh K Rajamani Sekar [2]**

[2]College of Natural Sciences, Arba Minch University, SNNPR, Ethiopia

Abstract

The significance of surgery in the management of solid tumours cannot be overstated, as complete resection through surgery has the potential to offer a complete cure. After surgery, there is a notable occurrence of locoregional recurrence and distant metastasis, which pose substantial risks of morbidity and mortality. Surgical procedures and surgical stress may create a permissive environment for tumour growth and recurrence by modulating tumour immunity, shedding of cancer cells into lymphatic and blood circulation (micrometastasis), enhancing cancer cell adhesion in remote organs and activation of inflammatory and neuroendocrine stress pathways1. For instance, in a well-established animal model examining the impact of surgical stress and metastases, it implicated the suppression of natural killer (NK) cells induced by surgery in the development of postoperative metastases. Approximately 45% of cancer patients undergo surgical procedures to remove the cancerous tumour, and with over 60% of patients require anaesthesia2. The pharmacological impact of anaesthesia drugs may inadvertently facilitate disease recurrence or the advancement of metastatic disease. For example, volatile anaesthetics elevates HIF levels in tumour cells contributing to its protumorogenic ability and cytoprotection3. In humans, opioid analgesics inhibited humoral and cellular immune response and in rodents it promoted breast cancer growth. Apart from this, there are subtle differences in anaesthetic agents on its effect on cancer cells. Some promote cancer growth proving to be detrimental and others may be beneficial to patients. Colon cancer surgery shows improved survival rates when utilising propofol-based total intravenous anaesthesia compared to desflurane anaesthesia4. However, the molecular mechanisms behind such modulatory role of various anaesthetic agents are yet to be delineated.

World Journal of Engineering

DOI: http://dx.doi.org/10.1108/WJE-07-2021-0449

20(2023)

Simulating sediment yield by SWAT and optimizing the parameters using SUFI-2 in Bilate river of Lake Abaya in Ethiopia

Mesfin Amaru Ayele[a] and Tarun Kumar Lohani[b]

[a] Arba Minch Water Technology Institute, Arba Minch, Ethiopia
[b] Department of Hydraulic and Water Resources Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Purpose: Prediction of sediment yield for a particular river is essential to study the river morphology, agricultural land management and the lake/reservoir sedimentation investigation. The purpose of this research was to predict sediment yield by simulating and optimizing using model analysis from Bilate River. Design/methodology/approach: Continuous daily sediment produced was estimated using sediment rating curve analysis. Sediment yield was simulated with soil and water assessment tool (SWAT) and the parameters were optimized by using Sequential Uncertainty Fitting algorithm. A total of 15 years of monthly flow and sediment yield data was calibrated and validated during the course of time. Findings: Results evaluated through SWAT showed that the model performance was very good. From the model output prediction, the total measured and simulated sediment yield were 5.425 million ton/year and 5.538 million ton/year, respectively. The result indicates that there were high amount of soil loss resulting into sediment yield produced from the watershed per year which needs appropriate soil and water conservation techniques. Thus, the finding of this research work can provide an effective watershed/river basin management and environmental restoration. Originality/value: This paper is an original research work and all the referred sources are cited properly wherever deemed fit.

City and Environment Interactions

DOI: https://doi.org/10.1016/j.cacint.2023.100111

100111(2023)

Assessment of the drainage systems performance in response to future scenarios and flood mitigation measures using stormwater management model

Takele Sambeto Bibi [a b], Daniel Reddythta [b], Abdisa Sime Kebebew [c]

[b] Faculty of Water Supply and Environmental Engineering, AWTI, Arba Minch Univeristy, Arba Minch, P.O.Box 21, Ethiopia

Abstract

Urban Flooding represents a significant problem in developing urban areas caused by inadequate stormwater drainage systems, increased impervious surface areas, and climate change. The performance of drainage systems can be evaluated using simulation models such as the stormwater management simulation model (SWMM). In this study, the potential impacts of future design rainfall on the performance of stormwater management systems were assessed by altering a hyetograph derived from rainfall intensity duration curves from three climate models. In addition, the effects of continued urbanization on the systems have been simulated by changing the percentage of imperviousness from current land use conditions. According to the findings, existing drainage systems cannot manage the expected flooding risks caused by a slight change in future rainfall intensity under each climate model. As a result of urban development, increasing the imperviousness ratio from 10% to 70% has increased peak runoff from 51.3 to 82.4 m3/s, flooding volume amplified from 24,320.5 x103 to 33,647.4 x103 m3 (representing 38.4% of the increase), and flooded nodes risen from 64 to 196 (representing 67.12% of raise). Overall, flooding locations and magnitude were identified, while drainage systems failed to safely convey surface runoff at baseline conditions, implying that future flooding will be more intense. As a result, selected mitigation strategies should be considered to alleviate the flooding risks that disrupt the socio-economic environment and the resulting significant property and life losses in Dodola, Ethiopia.

Ethiopian Medical Journal

URL: https://www.ajol.info/index.php/emj/article/view/252331

61(2023)

Knowledge and perception of surgical informed consent among adult surgical patients in Arba Minch and Jinka General Hospitals, Southern Ethiopia

Tigabu Daniel[1]*, Yonas Abera[1] , Menaye Yihune[2]

[1]Department of Surgery, Arba Minch University college of Medicine and Health Science
[2]School of public health, Arba Minch University college of Medicine and Health Science

Abstract

Background: The surgical informed consent process and format are not uniform nationally and internationally. The objective of this study was to assess the knowledge and perception of adult patients towards the legal nature of surgical informed consent in Arbaminch and Jinka General Hospitals, South Ethiopia. Methods: Responses from 423 post-operative adult surgical patients were taken using pretested structured interviewer-administered questionnaires for five months. A hospital-based cross-sectional study of all adult surgical patients who were operated were involved before discharged from December 1 2021-April 30, 2022 in Arbaminch and Jinka general hospitals, Southern Ethiopia. Stratified sampling technique was used. The collected data entered into EPI-data version 3.1 and exported to SPSS (version 25) software for statistical analyses. A significant level was determined at a P-value <0.05 with 95% confidence interval. Results: A total of 423 adults with a response rate of 100% were included in the study. Of the respondent's consent, only 210 (49.6%) was taken by an operating surgeon, and the majority was taken by a general practitioner, nurse, and midwife. Surprisingly consent taken by the porter was 5(1.2%). Of the respondents, only 188(44.4%) had good knowledge and only 58 (13.7%) had a good perception regarding surgical informed consent. Patients exposed for consent signing previously, had 4.06 times higher knowledge than those unexposed (AOR=4.06, 95% CI:-(1.80, 4.492)). Those patients living in an urban area were well aware of surgical informed consent (AOR=0.246, 95% CI:- (0.212, 1.660)). Level of understanding of surgical informed consent, significantly increased for those informed by an operating surgeon (AOR=4.45, 95% CI:- (1.95, 5.09)). Conclusion: Majority of our patients had poor knowledge and poor perception regarding the legal nature of surgical informed consent. Living in urban, signing informed consent previously and consent taken by operating surgeon affected level of knowledge positively. The consent had to be taken at least by the operating surgeon

PLoS ONE

DOI: http://dx.doi.org/10.1371/journal.pone.0289917

e0289917(2023)

Impact of the use of GeneXpert on TB diagnosis and anti-TB treatment outcome at health facilities in Addis Ababa, Ethiopia in the post-millennium development years

Desalegn Addise GetahunID[1,2]*, Laura E. Layland[2], Achim Hoerauf[2,3], **Biniam Wondale[4]**

[4]Department of Biology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background GeneXpert is an effective and rapid molecular system used for tuberculosis (TB) diagnosis. It is expected to improve the detection rate and treatment outcomes needed to meet the sustainable development goals (SDG) and End TB strategy targets set for 2030. This study aimed to evaluate the impact of GeneXpert on diagnosis and anti-TB treatment outcomes in the post-millennium development goals (MDGs) in the capital city of Ethiopia. Hence, the global priority indicator based on the End TB Strategy for TB treatment success rate was met early in 2018 in Addis Ababa, Ethiopia, which was anticipated to be met by 2025. Methods A retrospective health facilities-based study was conducted in Addis Ababa, Ethiopia. Records of all TB cases diagnosed and treated in selected health facilities from January 1st, 2015 to December 31st, 2018 were reviewed and included in the study. Data analysis of descriptive and inferential statistics was conducted using SPSS version 20. Results The reviewed records have shown that a total of 45,158 presumptive pulmonary TB (PTB) cases had accessed TB diagnosis services. Of which, 28.9% (13072/45158) were tested by AFB microscopy and 71.1% (32086/45158) were tested by GeneXpert. During the study period, the coverage of Xpert MTB/RIF testing increased to 94.9% in 2018 compared to 1.6% in 2015. The number of presumptive PTB cases tested with the GeneXpert system showed a significant increase compared to smear microscopy. The odds of positivity were detected in males compared to females. The odds of detecting TB cases were much higher among study participants aged 15–44 years compared to younger than 15 years. Treatment success rate showed a relative improvement each year between 2015 and 2018 with a mean of 92.6%. Reduced odds of treatment successes were observed in age categories older than 35 years, and in TB/HIV co-infected patients. Increased odds of treatment successes were reported in the years between 2016 and 2018 compared to 2015. Conclusion Scaling up the Xpert MTB/RIF assay as a point-of-care test for presumptive TB cases in resource-limited settings would have a significant impact to meet the SDG and End TB strategy both in TB detection and treatment success rates.

Land Degradation and Development

DOI: http://dx.doi.org/10.1002/ldr.4826

34(2023)

Evaluate and analyze land cover change dynamics, driving force and their implications to biodiversity in the western escarpment of the Rift valley

Temesgen Dingamo[a], Serekebirhan Takele[b], Sebsebe Demissew[c], Zerihun Woldu[d]

[a] Biodiversity Research and Conservation Centre, College of Natural Science, Arba Minch University, Arba Minch, Ethiopia
[b] Department of Biology, College of Natural and Computational Sciences, Minch University, Arba Minch, Ethiopia

Abstract

Land use land cover (LULC) changes are caused by natural and human alterations of the landscape that could largely affect forest biodiversity and the environment. The study aimed to analyze LULC change dynamics and driving forces in the western escarpment of the rift valley of the Gamo Zone, Southern Ethiopia. Digital satellite images, which are downloaded from USGS, were analyzed using ERDAS Imagine (14) and Arc GIS 10.2 software and supervised image classification was used to generate LULC classification, accuracy assessment, and Normalized Difference Vegetation Index (NDVI). Drivers of LULC change were identified and analyzed. Four land classes were identified such as forest, farmland, settlement, and water-wetlands. Settlement and farmlands have increased by 8% and 6%, respectively. On the other hand, both forest and water-wetlands decreased by aerial coverage of 9% and 5%, respectively. The overall accuracy of the study area was 92.86%, 94.22%, and 94.3% with a kappa value of 0.902, 0.92, and 0.922, respectively. NDVI values ranged between −0.42 and 0.73. Agricultural expansion (31.4%), expansion of settlement (25.7%) and Fuelwood collection and Charcoal production (22.9%) were the main driving forces that affected the biodiversity of the vegetation in the study area. Integrated land use and policy to protect biodiversity loss, forest degradation and climate changes are deemed necessary.

Theoretical and Applied Climatology

DOI: http://dx.doi.org/10.1007/s00704-023-04510-4

153(2023)

Extreme hydroclimatic variability and impact of local and global climate system anomalies on extreme flow in the Upper Awash River basin

Sintayehu Yadete Tola[1,2] **,** Amba Shetty[2]

[1]Faculty of Water Supply and Environmental Engineering, Arba Minch Water Technology Institute, Arba Minch University, PO Box 21, Arba Minch, Ethiopia

Abstract

Extreme hydroclimatic variability in a changing climate and the possible causes of extreme hydrological variability are essential for effectively mitigating floods. The study aims to investigate the variability of extreme hydroclimatic conditions and the relationship between anomalies in extreme local precipitation, ENSO indicators (Southern Oscillation index (SOI), Niño 3.4, and multivariate ENSO index (MEI)), and extreme flow indices in the Upper Awash River basin, Ethiopia. The analysis used standardized anomaly index and coefficient of variation statistics to examine variability, the modified Mann-Kendall and Pettitt tests for trend and change point analysis, and Spearman's correlation test to explore relationships. The study revealed that the basin-wise extreme precipitation indices had less variability but higher variability spatially, while the extreme flow indices showed high variability. Furthermore, the basin experienced extreme wet to normal wet conditions in the 1990s compared to the 2000s. The maximum temperature increased significantly, while the minimum temperature decreased significantly (except at a few northwest stations), with a considerable shift in the 1990s and 2000s. Anomalies, extreme to normal wet conditions, and a decrease in extreme precipitation were consistent with the extreme flow at the basin outlet, Hombole station. However, the extreme flow indices at Melka Kunture increased significantly and shifted upward (2003/2005), and the anomalies in extremely wet and very wet precipitation in the northwest were possibly responsible for this change. The study also revealed that the annual wet and very wet days of precipitation strongly affected the extreme flow in the basin. The effect of annual wet day precipitation, annual maximum precipitation, and ENSO anomalies on extreme flow at the Hombole was significant. These findings enhance the understanding of extreme hydroclimatic variability and prospective flood predictability and aid flood risk management.

PLoS ONE

DOI: http://dx.doi.org/10.1371/journal.pone.0287703

e0287703(2023)

Effects of iron supplementation on cognitive development in school-age children: Systematic review and meta-analysis

Befikadu Tariku Gutema[1,2]*, Muluken Bekele Sorrie[1], **Nega Degefa Megersa[3],** **GesilaEndashaw Yesera[3], Yordanos Gizachew Yeshitila[3],** Nele S. Pauwels[4], Stefaan DeHenauw[2], Souheila Abbeddo[2]

[1]School of Public Health, Arba Minch University, Arba Minch, Ethiopia

[3] School of Nursing, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background Iron deficiency is negatively associated with children's cognitive development. Evidence showed that iron supplementation improves cognitive development. Nearly 50% of anemia is caused by iron deficiency. Anemia affects more school-age children, at an age where their brain development continues. The aim of this systematic review and meta-analysis is to review the evidence from published randomized controlled trials to evaluate the effects of iron supplementation on cognitive development and function among school-age children. Method Five databases including MEDLINE, EMBASE, Scopus, Web of Science and CENTRAL were used to search for articles on April 20th, 2021. The search was reconducted on October 13th, 2022 to retrieve new records. Studies were eligible if they included school children 6–12 years of age, were randomized controlled trials, and if they tested iron supplementation and measured cognitive development. Result Thirteen articles were included in the systematic review. Overall, iron supplementation significantly improved intelligence (standardized mean difference, 95% confidence interval) (SMD 0.46, 95%CI: 0.19, 0.73, P<0.001), attention and concentration (SMD 0.44, 95%CI: 0.07, 0.81, P = 0.02) and memory (SMD 0.44, 95%CI: 0.21, 0.67, P <0.001) of school-age children. There was no significant effect of iron supplementation on school achievement of school-age children (SMD 0.06, 95%CI: -0.15, 0.26, P = 0.56). In a subgroup analysis, iron-supplemented children who were anemic at baseline had had better outcomes of intelligence (SMD 0.79, 95%CI: 0.41, 1.16, P = 0.001) and memory (SMD 0.47, 95%CI: 0.13, 0.81; P = 0.006). Conclusion Iron supplementation has a significant positive effect on the intelligence, attention and concentration, and the memory of school-age children but there was no evidence on the effect of iron supplementation on their school achievement.

Earth Systems and Environment

DOI: http://dx.doi.org/10.1007/s41748-023-00346-0

7(2023)

SBAS-InSAR/GNSS Surface Deformation Assessment in Arid Environments of Najran, Saudi Arabia

Subalew Adem[1,2] , Anis Chaabani[1], Amro Elfeki[1], Lifu Zhang[3], Mohamed Elhag[1,3,4,5]

[2]Department of Geology, Faculty of Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

Multiple surface fissures were reported over the last few years within the Najran valley, southern Saudi Arabia. The earth fissures have been observed mainly in the vicinity of agricultural territories. This study maps the surface deformation of Najran valley using geodetic data and investigates the underlying mechanisms. Indeed, we use Interferometric Synthetic Aperture Radar (InSAR) technique with standard Sentinel-1 Geocoded UNWrapped interferogram (GUNW) products acquisition from 2016 to 2022 and processed by Advanced Rapid Imaging and Analysis (ARIA) project using InSAR Scientific Computing Environment (ISCE). We generate displacement time series using the Miami INsar Time series software in Python language (MintPy). The result shows a rate of subsidence within the Najran valley ranging between 0.2 and 0.6 cm/yr. We processed the Najran GNSS station with time series extended from 2017 to 2022 to validate the observed displacement field. We analyze groundwater variation and soil properties to interpret the results. This assessment verifies that the potential drivers of subsidence might be due to an excessive withdrawal of groundwater, with the potential contribution of other factors related to the sequence of drought and moisture in the soil layer. The presence of a fine-grained layer of soil (clay) suggests a potential impact on the observed deformation. The observed signal and potential underlying mechanism represent one of the classical problems in arid regions worldwide, our investigation is crucial to improve the environmental assessment of Najran valley, which may mitigate any potential future hazards.

SN Applied Sciences

DOI: http://dx.doi.org/10.1007/s42452-024-06435-7

178(2023)

Influence of grey wolf optimization feature selection on gradient boosting machine learning techniques for accurate detection of liver tumor

Malik Jawarneh[1], José Luis Arias-Gonzáles[2], Dattatray P. Gandhmal[3] , Rami Qays Malik[4] , Kantilal Pitambar Rane[5] , Batyrkhan Omarov[6] , Cosmena Mahapatra[7] , **Mohammad Shabaz[8]**

[8]Arba Minch University, Arba Minch, Ethiopia

Abstract

Malignant growth in liver results in liver tumor. The most common types of liver cancer are primary liver disease and secondary liver disease. Most malignant growths are benign tumors, and the condition they cause, essential liver disease, is the end result. Cancer of the liver is a potentially fatal disease that can only be cured by combining a number of different treatments. Machine learning, feature selection and image processing have the capability to provide a framework for the accurate detection of liver diseases. The processing of images is one of the components that come together to form this group. When utilized for the purpose of reviewing previously recorded visual information, the instrument performs at its highest level of effectiveness. The importance of feature selection on machine learning algorithms for the early and accurate diagnosis of liver tumors is discussed in this article. The input consists of images from a CT scan of the liver. These images are preprocessed by discrete wavelet transform. Discrete wavelet transforms increase resolution by compressing the images. Images are segmented in parts to identify region of interest by K Means algorithm. Features are selected by grey wolf optimization technique. Classification is performed by Gradient boosting, support vector machine and random forest. GWO Gradient boosting is performing better in accurate classification and prediction of liver cancer.

Natural Hazards Research

DOI: http://dx.doi.org/10.1016/j.nhres.2023.05.002

3(2023)

Filling data gaps using citizen science for flood modeling in urbanized catchment of Akaki

Abel Negussie Alemu [a b c], Alemseged Tamiru Haile [a], Andrew B. Carr [e], Mark A. Trigg [e], Getahun Kebede Mengistie [c d], Claire L. Walsh [f]

[b] Water Technology Institute, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Identifying and understanding the value of citizen science to improve flood modeling is of importance to flood risk management. However, there are few studies that explore the value of citizen science data, with most studies focusing on evaluating the accuracy of the data. This research articulates the added value of citizen science data in flood modeling studies. During flood events, citizen scientists measured river water levels at selected sites along a main reach of the Big Akaki River in Addis Ababa, Ethiopia. They also provided information to estimate water discharge of the ungauged tributaries. The data acquired was used to force a one-dimensional (1D) HECRAS flood model, and to evaluate the model's sensitivity to inputs and parameters. Varying the downstream boundary condition caused a significant difference in the simulated water level (up to 3.5 km upstream of the downstream boundary site). Correcting the Digital Elevation Model and consideration of river tributary flows in the model simulation resulted in an underestimation of the observed stage by 0.08 m. The sensitivity analysis also showed that results were more sensitive to the Manning roughness values of the channel than that of the floodplain. Finally, this study identifies future flood modeling data collection priorities (e.g. flow data for the tributary). The flood modeling of the study area would not have been realized without the citizen science data.

Tourism and Hospitality Research

DOI: http://dx.doi.org/10.1177/14673584221102699

23(2023)

Linking livelihood and biodiversity conservation in protected areas: Community based tourism development perspective from developing country

Henok Bekele Gidebo

Department of Tourism and Hotel Management, Arba Minch University, Ethiopia

Abstract

Balancing biodiversity conservation and community livelihoods is a major challenge for sustainable management of protected areas (PAs) in developing countries. Researchers and practitioners are looking at ways to resolve this challenge by connecting the livelihoods of people living near protected areas with conservation efforts. This study aims to assess community-based tourism development as a tool to link local livelihoods and biodiversity conservation in protected areas in developing county context. The study employs a mixed research approach with a descriptive research design. Structured questionnaires, focus group discussions and key informant interviews are used to collect data from local communities residing inside and adjacent areas of Nech Sar National Park in Ethiopia. The results reveal that the local communities around the national park are exposed to various shocks and vulnerability contexts such as poverty, food insecurity, and resource use conflict. Consumptive resource usage, recurring fire catastrophes, agricultural encroachment, and illegal fishing are all threatening the park's biodiversity conservation efforts. Despite the impact of tourism on their livelihoods is marginal, local grassroots have a positive attitude towards the development of community-based tourism. Community-based tourism development which provides alternative livelihood options to local grassroots around protected areas can play significant role in the conservation of biodiversity and alleviating poverty.

Sustainability and climate change

DOI: http://dx.doi.org/10.1089/scc.2023.0053

16(2023)

Vulnerability and Responses of Rural Households to Climate Variability: Agro-Climatic-Based Evidence from Southern Ethiopia

Eshetu Bichisa Bitana[a], Senbetie Toma Lachore[b]**, and Abera Uncha Utallo[a]**

[a] Department of Geography and Environmental Studies, Arba Minch University, Arba Minch, Ethiopia

Abstract

Like most of the sub-Saharan African countries, Ethiopia's economy is heavily dependent on rain-fed agriculture, which is extremely vulnerable to climate-related stresses. The exposure, sensitivity, and adaptive capacity of rural farm households' livelihoods to climate-induced stresses vary across agro-climatic zones, posing a challenge to climate-resilient development strategies. Accordingly, the objective of this study is to analyze the agro-climatic zone-specific vulnerability and responses of rural farm households to climate-induced shocks in the Damot Woyde District of southern Ethiopia. Using a multistage sampling technique, 346 rural farm household heads from two agro-climatic zones participated in the survey. Six focus group discussions, 27 key informant interviews, and personal observations were conducted to supplement survey data. The livelihood vulnerability index was used to assess the level of vulnerability of rural farm households to climate-related stresses. The findings reveal significant differences across agro-climatic zones in major components, indicators, and the three contributing factors to livelihood vulnerability (exposure, sensitivity, and adaptive capacity). Specifically, higher exposure to low adaptive capacity result in high vulnerability in the Kolla agro-climate zone whereas lower exposure with relatively higher adaptive capacity result in lower vulnerability in the Woina Dega agro-climate zone. Farmers adopt a variety of coping techniques to mitigate the negative consequences of climatic extremes, yet some of the response mechanisms, such as selling off livestock and productive assets, cause long-term problems for their livelihoods. These findings imply that developing agro-climate-based resilience-building adaptation strategies is critical for reducing farm households' vulnerability to climate-induced shocks

Epilepsy and Behavior

DOI: http://dx.doi.org/10.1016/j.yebeh.2023.109301

109301(2023)

Prevalence of anti-seizure medication nonadherence and its associated factors, among people with epilepsy in North Shewa, Ethiopia, 2021

Yerukneh Solomon [a], Yonas Teshome [a], Solomon Ejigu [b], **Mihret Bezabih** [c]

[c] Department of Public Health, Arba Minch College of Health Sciences, Arba Minch, Ethiopia

Abstract

Background: Epilepsy is a worldwide neurologic illness, characterized by recurrent unprovoked epileptic seizures and can affect people of all age groups. Patients who are receiving drug therapy for chronic diseases, such as epilepsy, must fit complex medication regimens into their everyday routines. Managing medication schedules may pose a significant burden on patients' lives. Anti-seizure medication choices should therefore be tailored to patients' factors that may limit medication use. The study aimed to determine the prevalence and Predictors of anti-seizure medication nonadherence among patients with epilepsy. Methodology: An institutional-based cross-sectional study was conducted among 352 people with epilepsy who were selected by systematic random sampling method at government hospitals in North Shewa Ethiopia. Data were collected by reviewing patients' charts and interviewing people with epilepsy by using structured and pretested questionnaires. Data obtained were encoded into EPI-INFO software and exported to SPSS version 25 for analysis. Logistic regression was employed to assess independent factors associated with medication non-adherence. Result: The prevalence of anti-seizure medication non-adherence was 40%. Being female [AOR = 3.37, 95%, CI: 1.84, 6.18], Divorced [AOR = 9.13, 95%, CI: 1.80, 46.34], Being jobless [AOR = 7.33, 95%, CI: 3.24, 16.56], Perceived poor social support [AOR = 2.73, 95%, CI: 1.28, 5.82], perceived stigma [AOR = 5.07, 95%, CI: 2.40, 10.68], polytherapy [AOR = 2.23, 95%, CI: 1.06, 4.71], drug side effects[AOR = 6.03, 95%, CI: 3.17, 11.45], buying medications [AOR = 5.81, 95%, CI: 3.63,16.79] and duration of stay on treatment [AOR = 4.31, 95%, CI: 1.863, 9.97] were significant predictors of anti-seizure medication non-adherence. Conclusion: Non-adherence to anti-seizure medication among people with epilepsy in the study area was relatively higher as compared with study reports from different parts of the country. Health and clinical, socio-economy, and patients' psychological mindset were among the determinant factors affecting the consistency of epilepsy treatment adherence. Enhanced professional, health education for patients as well as for society and financial support, are basic pillars to reduce the constraints of effective treatment.

Scientific African

DOI: http://dx.doi.org/10.1016/j.sciaf.2023.e01635

e01635(2023)

Analysis of rainfall and temperature variability for agricultural water management in the upper Genale river basin, Ethiopia

Mehari Shigute [a, b], Tena Alamirew [a, c], **Adane Abebe [d]**, Christopher E. Ndehedehe [e, f, *], Habtamu Tilahun Kassahun[e]

[d] Arba Minch Water Technology Institute, Arba Minch University, P. O. Box, Ethiopia

Abstract

A better understanding of climate-induced changes and support for adaptation strategies requires knowledged of the spatiotemporal dynamics of climatic variables. This study aims to assess long-term changes in annual and seasonal rainfall and temperature for agricultural water management in the upper Genale river basin, Ethiopia. To achieve this objective, long-term climate data from 13 stations between 1975 and 2018, as well as maximum and minimum temperatures for six stations were collected from the Ethiopian National Meteorological Service Agency (NMA). The characteristics of rainfall (onset, cessation, length of growing season, and crop water requirement) were assessed using the Coefficient of Variation (CV), Standard Rainfall Anomaly (SRA), and Precipitation Concentration Index (PCI). Additionally, the Mann–Kendall test and Sen's slope estimator were used to assess the trend and magnitude of changes in rainfall and temperature. The annual, winter, spring, summer and autumn CVs were 20%, 89%, 30%, 45%, and 32%, respectively. The standardized anomalies of annual and seasonal rainfall for the climate stations indicated that the basin had a drier season than a wet season. The mean length of the growing season in Belg and Kiremt ranged from 43 to 79 days and 38 to 170 days, respectively. On an annual, summer, and autumn season basis, most rainfall stations showed a non-significant trend. In contrast, in the spring season, rainfall showed a decreasing but statistically insignificant trend in all stations except Bensadaye, Bore, Telamokentise, and Yirba Muda stations. According to the analysis of the crop water requirements in the studied basin, supplemental irrigation is essential to reducing yield reduction and crop failure during spring and autumn. In these seasons, maize and sorghum varieties required supplementary irrigation up to 202 mm and 252 mm, respectively. Annual and seasonal maximum and minimum temperatures showed an increasing trend at all the stations except Hagre Selam station. Generally, there was a spatially and temporally variable trend in rainfall while the temperature trend was increasing irrespective of the temporal and spatial factors. Thus, this study contributes to a better understanding of climate change in the basin and these findings can be used in planning for adaptation measures against a changing climate.

Ethiopian Journal of Reproductive Health

DOI: https://doi.org/10.69614/ejrh.v15i4.665

15(2023)

Timely Initiation of Postpartum Contraceptive Utilization Among Women of Child Bearing Age in Arba Minch Town, Gamo Zone, Ethiopia

Mekbib Meshka[1] , Migbaru Debalkie, MSc.[1] , Bitew Mekonen, MSc.[1] , Aynalem Mencho, MSc.[1] , Zinash Tantu, MSc.[2]

[1]School of Nursing, Department of Comprehensive Nursing, Arbaminch University, Arba Minch, Ethiopia
[2]College of Nursing, Arba Minch University, Arba Minch, Ethiopia

Abstract

BACKGROUND: Most women have an average time to first postpartum ovulation of 45 days and can occur as early as 25 postpartum days (1). However, many women do not recognize that they are at a risk of pregnancy during this period. Most postnatal women are exposed to pregnancy by seven to nine months after delivery (2). OBJECTIVES: To assess the prevalence of timely initiation of postpartum modern contraceptive utilization and associated factors among women in child bearing age in Arba Minch Town health facilities. METHOD: An institutional based cross-sectional study was employed using pre-tested interviewer administered questions; 574 were interviewed. Systematic random sampling method was done from April 15 to May15, 2020. Bivariate and multivariate logistic regression analysis was done. P-value < 0.05 was used to consider as statically significant variables. RESULTS: The magnitude of timely initiation of postpartum contraceptive utilization was found to be 260 out of 574 women (45.3%) 95% [CI: 40.1-49.0].Educational level of respondents, (AOR=0.46; 95% [CI: 0.31-0.71], number of ANC visit [AOR=2.913,95% [CI:1.39-6.07], counseling of postpartum family planning after the last delivery (AOR=2.29,95% [CI:1.46-3.58], couple discussed (AOR=4.94,95%[CI:3.01-8.09], resumption of sexual intercourse (AOR=1.74, 95% [CI: 1.36-2.77] and return of menses (AOR=(6.6, 95% [CI:1.91-22.78) were significantly associated variables with timely initiation of postpartum contraceptive utilization. CONCLUSION: Timely initiation of modern contraceptive use in Arba Minch Town is observed in fewer than 50% of study participants. Therefore, it is crucial for the family planning program to actively integrate contraceptive education and services into antenatal and postnatal follow-up care.

Annals of Data Science

DOI: https://link.springer.com/article/10.1007%2Fs40745-021-00360-x

10(2023)

Impact of Exchange Rate on Ethiopian Trade Balance: Evidence from ARDL Model

Fassil Eshetu[1] , Nega Eshetu[2]

[1]Economics Department, School of Business and Economics, Arba Minch University, Arba Minch, Ethiopia
[2] Management Department, College of Business and Economics, Ambo University, Ambo, Ethiopia
Eshetu, Nega

Abstract

The government of Ethiopia has persistently devaluated its currency in which few studies attempted to examine the effect on the country's trade balance. Hence, this study examined the nexus between the real exchange rate and the trade balance of Ethiopia in the period between 1998 and 2020. The study employed the absorption, elasticity, and monetary approaches as a theoretical framework and the autoregressive distributed lag model as an analytical model. As descriptive analysis revealed, Ethiopia's export is primarily dominated by agricultural products whereas, the import is largely dominated by capital goods, consumer goods, and fuel. The regression results disclosed that devaluation improves short and long-term trade balance. However, there is no evidence of the J-curve phenomenon. Both home and foreign income are positively and significantly related with the improvement in the trade balance while money supply and government expenditure are negatively and significantly related with the improvement in the trade balance. Hence, promoting domestic economic growth, Birr devaluation, tight fiscal and monetary policy, and reduction of trade barriers would improve the trade balance of Ethiopia.

Water (Switzerland)

DOI: http://dx.doi.org/10.3390/w15152723

2723(2023)

Degradation of DDT by a Novel Bacterium, Arthrobacter globiformis DC-1: Efficacy, Mechanism and Comparative Advantage

Xiaoxu Wang [1], **Belay Tafa Oba [2]**, Hui Wang [1,*], Qing Luo [1,3,4,5,*], Jiaxin Liu [6], Lanxin Tang [6], Miao Yang [6],Hao Wu 1and Lina Sun [1]

[2]Department of Chemistry, College of Natural and Computational Sciences, Arba Minch University, Arba Minch, 21, Ethiopia

Abstract

A novel bacterium, Arthrobacter globiformis DC-1, capable of degrading DDT as its sole carbon and energy source, was isolated from DDT-contaminated agricultural soil. The bacterium can degrade up to 76.3% of the DDT at a concentration of 10 mg/L in the mineral salt medium (MSM) within 1 day of incubation. The effects of various environmental conditions, such as the concentration of DDT, temperature, pH and additional carbon sources, on its growth and biodegrading capacity of DDT were investigated in the MSM. The A. globiformis DC-1 strain could efficiently grow and degrade DDT at a wide range of concentrations, with the maximum growth and degradation rate at 10 mg/LDDT, followed by inhibitory effects at higher concentrations (20 and 30 mg/LDDT). Mesophilic temperatures (25–30 °C) and a pH of 7–7.5 were the most suitable conditions for the growth and biodegradation. The presence of carbon sources significantly increased the growth of the DC-1 strain; however, degradation was inhibited in the present of glucose, sucrose and fructose, and peptone was determined to be the most appropriate carbon source for A. globiformis DC-1. The optimal DDT degradation (84.2%) was observed at 10 mg/LDDT, peptone as carbon source in pH 7.5 at 30 °C with 1 day of incubation. This strain could also degrade DDE, DDD and DDT simultaneously as the sole carbon and energy source, with degradation rates reaching 70.61%, 64.43% and 60.24% in 10 days, respectively. The biodegradation pathway by A. globiformis DC-1 revealed that DDT was converted to DDD and DDE via dechlorination and dehydrochlorination, respectively; subsequently, both DDD and DDE transformed to DDMU through further dechlorination, and finally, after ring opening, DDMU was mineralized to carbon dioxide. No intermediate metabolites accumulation was observed during the GC/MS analysis, demonstrating that the A. globiformis DC-1 strain can be used for the bioremediation of DDT residues in the environment.

IET Power Electronics

DOI: http://dx.doi.org/10.1049/pel2.12488

16(2023)

Design of multi-input single output DC–DC converter with preserved output voltage under source-fault

M. Dhananjaya[1], B. Krishna Chaitanya[2], Thanikanti Sudhakar Babu[2], Devendra Potnuru[3], Belqasem Aljafari[4], Ramani Kannan[5,] **Tarun Kumar Lohani[6]**

[6]Faculty of Hydraulic and Water Resources Engineering, AWTI, Arba Minch University, Arba Minch, Ethiopia

Abstract

Multi-input converters play an important role in integrating the independent energy sources utilized in the grid-connected system and electric vehicle (EV) applications. In this scenario, several types of multi-input converters are presented in the literature. Most of the MICs are operated using a time-sharing scheme. This leads to a restricted duty cycle which limits the energy sources utilization and output voltage. To overcome the aforementioned limitations, a multi-input single-output (MISO) boost converter is proposed. It can improve the utilization of energy sources and output voltage with a reduction in the part count. To verify the feasibility of the proposed scheme, a 200 W prototype circuit is developed; simulation and experimental results are validated.

American Journal of Human Biology

DOI: http://dx.doi.org/10.1002/ajhb.23965

e23965(2023)

Mother's education and infant survival in Ethiopia

Endrias Liranso[1,2] **,** Fang Yang[3]

[2]Department of Sociology & Social Anthropology, Humanities & Social Sciences Faculty, Arba Minch University, Ethiopia

Abstract

Objective: Few studies in Ethiopia have explored the impact of the mothers' education on infant survival. Therefore, this study aimed to identify and analyze the proximate factors in the relationship between maternal education and infant survival in Ethiopia. Methods: This study used the nationally representative 2016 Ethiopian Demographic and Health Survey dataset. It analyzed a sample of 3831 newborn children using Cox regression models. Results: The findings revealed that infants born to educated mothers had lower odds of infant mortality than those born to mothers without formal education. Specifically, infants whose mothers had completed secondary school and had a better antenatal care attendance rate had 49.9% lower odds of infant mortality than those born to mothers with no formal education and a poor antenatal care attendance rate. Furthermore, infants whose mothers had at least some postsecondary education and who used delivery by health-care professionals, clean drinking water, and improved toilet facilities had 65.3%, 56.3%, and 68.6% lower odds of infant mortality, respectively, than those born to mothers with no formal education and who did not use those facilities. Conclusions: This study concluded that the mothers' educational disparity is intimately tied to infant mortality, and that access to formal education, mainly for women, increases infant survival in Ethiopia. Future research should focus on mothers without formal education who do not have access to antenatal care visits for safe pregnancy, delivery by health-care professionals, clean drinking water, and improved toilet facilities in Ethiopia and elsewhere in Sub-Saharan Africa.

Digital Threats: Research and Practice

DOI: http://dx.doi.org/10.1145/3611392

46(2023)

Single and Hybrid-Ensemble Learning-Based Phishing Website Detection: Examining Impacts of Varied Nature Datasets and Informative Feature Selection Technique

Kibreab Adane[a], Berhanu Beyene[b], **Mohammed Abebe**[a]

[a]Arba Minch University, Ethiopia

Abstract

To tackle issues associated with phishing website attacks, the study conducted rigorous experiments on RF, GB, and CATB classifiers. Since each classifier was an ensemble learner on their own; we integrated them into stacking and majority vote ensemble architectures to create hybrid-ensemble learning. Due to ensemble learning methods being known for their high computational time costs, the study applied the UFS technique to address these concerns and obtained promising results. Since the scalability and performance consistency of the phishing website detection system across numerous datasets is critical to combating various variants of phishing website attacks, we used three distinct phishing website datasets (DS-1, DS-2, and DS-3) to train and test each ensemble learning method to identify the best-performed one in terms of accuracy and model computational time. Our experimental findings reveal that the CATB classifier demonstrated scalable, consistent, and superior accuracy across three distinct datasets (attained 97.9% accuracy in DS-1, 97.36% accuracy in DS-2, and 98.59% accuracy in DS-3). When it comes to model computational time, the RF classifier was discovered to be the fastest when applied to all datasets, while the CATB classifier was discovered to be the second quickest when applied to all datasets.

Theoretical and Applied Climatology

DOI: http://dx.doi.org/10.1007/s00704-023-04569-z

154(2023)

Comparison and selection criterion of missing imputation methods and quality assessment of monthly rainfall in the Central Rift Valley Lakes Basin of Ethiopia

Sisay Kebede Balcha[1,2,3], Taye Alemayehu Hulluka[1,3], **Adane Abebe Awass[4]**, Amare Bantider[3,5], Gebiaw T. Ayele[6]

[4]Institute of Technology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Missing data is a common problem in all scientific research, and the availability of gap-free data is rare in most developing countries. Statistical and empirical methods are the most often used for the approximation of missing data. The performance of eight missing estimation methods was evaluated using PBIAS, RMSE, and NSE for stations located in the rift-bounded lakes system of Katar and Meki subbasins in Ethiopia. The multicriteria decision method of compromise programming was used to identify the best imputation method. Four homogeneity test methods were used to evaluate the homogeneity of the time series data. The Mann–Kendall trend test and Son's slope were used to locate the change and calculate the magnitude of the trend. Multiple linear regression and multiple imputation by chained equations were well performed at most stations. Alternatively, the modified version of IDWM based on spatial distance and elevation difference (IDWME&D3 for k=3) was ranked third at many stations. The inclusion of elevation differences between stations has improved the capability of the inverse distance weight method. However, the performance of all the missing estimation methods decreased as the percentage of missing data increased. Radius influences have no significant impact on the performance of missing imputation methods. Only Butajera station exhibited nonhomogeneity. Dagaga, Iteya, Bui, and Butajera stations all exhibited decreasing trends. Kulumsa and Ejerese-Lele stations presented an increasing trend in monthly rainfall. However, the rest station has shown no significant increasing or decreasing trends in monthly rainfall.

PLoS Neglected Tropical Diseases

DOI: http://dx.doi.org/10.1371/journal.pntd.0011363

e0011363(2023)

Subcutaneous mycoses: Endemic but neglected among the Neglected Tropical Diseases in Ethiopia

Wendemagegn Enbiale[1]*, **Alemayehu Bekele[2]**, Nigus Manaye[3], Fikre Seife[4], Zeyede Kebede[3], Filmon Gebremeskel[5], Johan van Griensven[6]

[2]Arba Minch University Collaborative Research and Training Center for Neglected Tropical Diseases, Arba Minch, Ethiopia

Abstract

Background Subcutaneous (deep) mycoses are a chronic infectious disease of the skin and underlying structures endemic in tropical countries. The disease has serious medical and socioeconomic consequences for patients, communities and health services in endemic areas. The inclusion of mycetoma and other subcutaneous mycoses in the list of Neglected Tropical Diseases by WHO highlights the need to assess the burden of these diseases and establish control programs where necessary. In Ethiopia no strategies can be devised because of a lack of epidemiologic information. To address this evidence gap, we performed a national rapid assessment of the geographic distribution of subcutaneous mycoses. Methodology We conducted a rapid retrospective assessment using hospital records to identify all suspected and confirmed cases of subcutaneous mycoses in 13 referral hospitals across the country between 2015 and 2022. In each hospital the logbooks were reviewed for diagnoses of subcutaneous mycosess, as diagnosed per routine practice. Descriptive analysis wasdone. Result From 13 hospitals we extracted 143 cases of subcutaneous mycoses, registered from July2018 to September 2022. 118 (82.5%) patients were diagnosed as mycetoma, 21 (14.7%) as chromoblastomycosis and the remaining 4 (2.8%) as sporotrichosis. The mean age ofpatients was 35.8 years (SD = 14.5). 101 (70.6%) patients were male and 96 (67.1%) patients were farmers. 64 (44.8%) cases were from the Tigray regional state. 56 (65.9%) patients had information on diagnostic microscopic evaluation: for mycetoma histopathologic evaluation and fine needle aspiration cytology had a higher positivity rate while for. chromoblastomycosis potassium hydroxide (KOH) staining had a better yield. The main clinical presentations were nodules, sinuses and infiltrative plaques on the skin. Radiologic findings of bone involvement was present in some. Conclusions Mycetoma and other subcutaneous mycoses are endemic in Ethiopia, with cases reported from almost all regions with the highest cases numbers reported from the northern part of the country. A routine program and systems should be developed to identify and document the burden of subcutaneous fungal infections in the country. Diagnosis and treatment guidelines should be developed.

International Arab Journal of Information Technology

DOI: http://dx.doi.org/10.34028/iajit/20/5/1

20(2023)

Establishing Cause-Effect Relationships from Medical Treatment Data in Intensive Care Unit Settings

Mohammed Abebe Yimer[1], Süleyman Sevinç[2] , Özlem Aktaş[2] , Ali Rıza Şişman[2]

[1]Faculty of Computing and Software Engineering, Arba Minch University, Ethiopia

Abstract

Various studies use numerous probabilistic methods to establish a cause-effect relationship between a drug and a disease. However, only a limited number of machine learning studies on establishing cause-effect relationships can be found on the internet. In this study, we explore machine learning approaches for interpreting large quantities of multivariate patient-based laboratory data for establishing cause-effect relationships for critically ill patients. We adopt principal component analysis as a primary method to capture daily patient changes after a medical intervention so that the causal relationship between the medical treatments and the outcomes can be established. Model validity and stability are evaluated using bootstrap testing. The model exhibits an acceptable significance level with a two-tailed test. Moreover, results show that the approach provides promising results in interpreting large quantities of patient data and establishing cause-effect relationships for making informed decisions for critically ill patients. If fused with other machine learning and probabilistic models, the proposed approach can provide the healthcare industry with an added tool for daily routine clinical practices. Furthermore, the approach will be able to support clinical decision-making and enable effective patient-tailored care for better health outcomes.

Environmental Monitoring and Assessment

DOI: http://dx.doi.org/10.1007/s10661-023-11484-3

866(2023)

Effect of climate change on reservoir water balance and irrigation water demand: a case of Gidabo irrigation project, Rift Valley Basin, Ethiopia

Tegegn TakeleMana[a] , Berhanu Wegayehu Abebe[a] , Samuel Dagalo Hatiye[b]

[a] Faculty of Meteorology and Hydrology, Arba Minch Water Technology Institute, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia
[b] Faculty of Water Resources and Irrigation Engineering, Arba Minch Water Technology Institute, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

The consequences of climate change on agriculture water demand are among the current and prospective challenges. The amount of water needed by crops is significantly affected by the regional climate. The influence of climate change on irrigation water demand and reservoir water balance components were examined. The results of seven regional climate models were compared, and the top-performing model was chosen for the study area. After model calibration and validation, the HEC-HMS model was used to forecast future water availability in the reservoir. The results show that under the RCP 4.5 and RCP 8.5 emission scenarios, the reservoir's water availability in the 2050s will decline by approximately 7% and 9%, respectively. The CROPWAT results showed that the required irrigation water might rise by 26 to 39% in the future. However, the water supply for irrigation may be drastically reduced due to the drop in reservoir water storage. As a result, the irrigation command area could drop up to 21% (2878.4 ha) to 33% (4502 ha) in future climatic conditions. Therefore, we recommend alternative watershed management techniques and climate change adaptation measures to endure upcoming water shortages in the area.

Tropical Medicine and Infectious Disease

DOI: http://dx.doi.org/10.3390/tropicalmed8070350

350(2023)

Comparison of Xpert MTB/RIF Ultra Results of Stool and Sputum in Children with Presumptive Tuberculosis in Southern Ethiopia

Yohannes Babo [1,*] , Bihil Seremolo [1], Mamush Bogale [1], Ahmed Bedru [1], Yasin Wabe [2], Haba Churako [3],Alemu Bilat [4], **Tamiru Degaga [5]**, Petra de Haas [6], Edine Tiemersma [6]and Degu Jerene[6]

[5]College of Medicine & Health Sciences, Arba Minch University, Arbaminch, Ethiopia

Abstract

The introduction of stool as a readily obtainable sample and the recently developed simple one-step (SOS) stool processing method on Xpert MTB/RIF Ultra (Xpert Ultra) offer an opportunity for TB diagnosis in children. We conducted this study in secondary health facilities in Ethiopia, which are the first-level referral facilities for childhood TB diagnosis and treatment, with the aim to determine if stool-based TB diagnosis can be performed with a reasonable level of concordance with sputum tests using Xpert MTB/RIF Ultra. Eligible children 0–14 years old with presumptive pulmonary TB were asked to provide stools in addition to routinely requested sputum samples. We determined the level of agreement between the stool and sputum test results. Of the 373 children included in the study, 61% were <5 years of age and 56% were male. Thirty-six children (9.7%) were diagnosed with TB, and all started treatment. The rate of concordance between stool and sputum was high, with a kappa value of 0.83 ($p < 0.001$). There were more Xpert Ultra positive results on stool (n = 27 (7.2%)) than on sputum/NGA (n = 23 (6.2%)). Laboratories in secondary hospitals can perform stool-based TB diagnosis in children, with high concordance between stool and sputum test results reaffirming the applicability of the SOS stool method.

Ethiopian Medical Journal

DOI: https://www.emjema.org/index.php/EMJ/article/view/2329/915

61(2023)

Treatment outcomes and associated factors among infants under 6-Month-Old with severe acute malnutrition in Hawassa University Comprehensive Specialized Hospital, Southern Ethiopia

Mohammed Nasir[1]*, Ermias Abebaw[2], **Muluken Ahmed[3]**, Bethlehem Birhanu[1], **Muluken Berhanu[3]**

[3]Pediatrics Department, Arba Minch University, Arba Minch, Ethiopi

Abstract

Background: Infants under the age of six months are considered to have severe acute malnutrition if their weight for length Z-score is below -3 standard deviations (SD) and/or they exhibit bilateral pitting edema. It is frequently diagnosed in infants under 6 months of age and is frequently associated with higher rates of morbidity and mortality in infants than in older children. The current study aimed to assess the treatment outcome of severe acute malnutrition and associated factors among infants under 6 months of age in Hawassa Comprehensive Specialized Hospital, southern Ethiopia Methods: An institution-based cross-sectional study was carried out from September to November 2021. A total of 261 records were evaluated between September 2007 and October 2021. After the data were collected, they were subject to EPI-data version 31 and then exported to STATA version 16 for analysis. Before exporting anthropometry data to Stata, Z scores of anthropometric measurements were calculated using WHO Anthro V3.2.2 software. Results: Our study included 261 infants with severe acute malnutrition who were admitted. The outcomes were cure, default, transfer out, non-respondent, death, and unknown with the rate of 57.2%,11.5%,9.2%, 4.2%, 14.2%, and 3.8%. respectively. Gestational age, pneumonia, Pre-lacteal feeding, and tuberculosis were significantly associated with mortality. Conclusions: The mortality from malnutrition was high in this study. While administering treatment for severe acute malnutrition to infants younger than 6 months, attention should be paid to infants who have pneumonia and tuberculosis. Counseling on the risk of Pre-lacteal feeding through health education is necessary.

The Lancet Rheumatology

DOI: http://dx.doi.org/10.1016/S2665-9913(23)00211-4

5(2023)

Global, regional, and national burden of rheumatoid arthritis, 1990–2020, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021

B .B . Shashamo , GBD 2021 Rheumatoid Arthritis Collaborators

Department of Nursing Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Rheumatoid arthritis is a chronic autoimmune inflammatory disease associated with disability and premature death. Up-to-date estimates of the burden of rheumatoid arthritis are required for health-care planning, resource allocation, and prevention. As part of the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2021, we provide updated estimates of the prevalence of rheumatoid arthritis and its associated deaths and disability-adjusted life-years (DALYs) by age, sex, year, and location, with forecasted prevalence to 2050. Methods: Rheumatoid arthritis prevalence was estimated in 204 countries and territories from 1990 to 2020 using Bayesian meta-regression models and data from population-based studies and medical claims data (98 prevalence and 25 incidence studies). Mortality was estimated from vital registration data with the Cause of Death Ensemble model (CODEm). Years of life lost (YLL) were calculated with use of standard GBD lifetables, and years lived with disability (YLDs) were estimated from prevalence, a meta-analysed distribution of rheumatoid arthritis severity, and disability weights. DALYs were calculated by summing YLLs and YLDs. Smoking was the only risk factor analysed. Rheumatoid arthritis prevalence was forecast to 2050 by logistic regression with Socio-Demographic Index as a predictor, then multiplying by projected population estimates. Findings: In 2020, an estimated 17·6 million (95% uncertainty interval 15·8–20·3) people had rheumatoid arthritis worldwide. The age-standardised global prevalence rate was 208·8 cases (186·8–241·1) per 100 000 population, representing a 14·1% (12·7–15·4) increase since 1990. Prevalence was higher in females (age-standardised female-to-male prevalence ratio 2·45 [2·40–2·47]). The age-standardised death rate was 0·47 (0·41–0·54) per 100 000 population (38 300 global deaths [33 500–44 000]), a 23·8% (17·5–29·3) decrease from 1990 to 2020. The 2020 DALY count was 3 060 000 (2 320 000–3 860 000), with an age-standardised DALY rate of 36·4 (27·6–45·9) per 100 000 population. YLDs accounted for 76·4% (68·3–81·0) of DALYs. Smoking risk attribution for rheumatoid arthritis DALYs was 7·1% (3·6–10·3). We forecast that 31·7 million (25·8–39·0) individuals will be living with rheumatoid arthritis worldwide by 2050. Interpretation: Rheumatoid arthritis mortality has decreased globally over the past three decades. Global age-standardised prevalence rate and YLDs have increased over the same period, and the number of cases is projected to continue to increase to the year 2050. Improved access to early diagnosis and treatment of rheumatoid arthritis globally is required to reduce the future burden of the disease. Funding: Bill & Melinda Gates Foundation, Institute of Bone and Joint Research, and Global Alliance for Musculoskeletal Health.

IET Software

DOI: http://dx.doi.org/10.1049/sfw2.12091

17(2023)

Retracted: Scientific programming using optimized machine learning techniques for software fault prediction to improve software quality (IET Software, (2023))

Muhammad Shafiq[1,] Fatemah H. Alghamedy[2] , Nasir Jamal[3] , Tahir Kamal[4] ,Yousef Ibrahim Daradkeh[5] , **Mohammad Shabaz[6]**

[6]Arba Minch University, Arba Minch, Ethiopia

Abstract

Retraction: [Muhammad Shafiq, Fatemah H. Alghamedy, Nasir Jamal, Tahir Kamal, Yousef Ibrahim Daradkeh, Mohammad Shabaz, Scientific programming using optimized machine learning techniques for software fault prediction to improve software quality, IET Software 2023 (https://DOI.org/10.1049/sfw2.12091)]. The above article from IET Software, published online on 6 January 2023 in Wiley Online Library (wileyonlinelibrary.com), has been retracted by agreement between the Editor-in-Chief, Hana Chockler, the Institution of Engineering and Technology (the IET) and John Wiley and Sons Ltd. This article was published as part of a Guest Edited special issue. Following an investigation, the IET and the journal have determined that the article was not reviewed in line with the journal's peer review standards and there is evidence that the peer review process of the special issue underwent systematic manipulation. Accordingly, we cannot vouch for the integrity or reliability of the content. As such we have taken the decision to retract the article. The authors have been informed of the decision to retract.

Natural Hazards

DOI: http://dx.doi.org/10.1007/s11069-023-06101-y

118(2023)

Flood inundation and risk mapping under climate change scenarios in the lower Bilate catchment, Ethiopia

Muluneh Legesse Edamo[1], Samuel Dagalo Hatiye[2] , Thomas T. Minda[3] , Tigistu Yisihak Ukumo[2]

[1] Faculty of Hydraulic and Water Resources Engineering, Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia
[2]Faculty of Water Resources and Irrigation Engineering, Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia
[3] Faculty of Meteorology and Hydrology, Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Future changes in temperature and precipitation may be exacerbated by climate change, and this could result in extreme hydrologic events like floods and droughts. The objective of this study was to assess how the future climate would affect flooding in Ethiopia's lower Bilate catchment. In order to simulate flood occurrences and maps for various climate scenarios, two hydraulic models—HEC-RAS and a semi-distributed physically based HEC-HMS hydrologic model—were utilized. For the baseline (1971–2000), mid-term (2041–2070), and long-term (2071–2100) cycles under the RCP4.5 and RCP8.5 scenarios, the bias-corrected data of five climate models were used. The baseline and future period stream flow data were used to produce the flood events for the 50- and 100-year return floods. Flood inundation area and depth were computed using the HEC-RAS model. The flood risk map of the catchment was developed by combining the flood vulnerability and hazard indexes. Future predictions showed that the catchment's maximum and minimum temperatures and average annual precipitation would rise, which also increase the yearly stream would flow. According to the RCP4.5 and 8.5 scenarios, the intensity of future floods will rise and inundate an area ranging from 88.5 to 161 ha considering the 50 and 100-year flood. The worst case scenario under RCP8.5 is the possible inundation of 161 hectares of the studied reach that could be inundated by a 100-year cycle flood. Climate change will make flooding more difficult in the 2050s and 2080s, yet an extreme and riskier flood may happen in the 2050s under the RCP8.5 scenario. The results of this study could aid non-governmental and governmental organizations in their efforts to better control flood risk in the lower Bilate catchment.

BMJ Open

DOI: http://dx.doi.org/10.1136/bmjopen-2023-072505

13(2023)

Risky sexual practice and associated factors among adult people living with HIV/AIDS in public hospitals of Kembata Tambaro Zone, Southern Ethiopia: A cross-sectional study

Zelalem Bekele [1], Ibsa Mussa [2], Yonas Assefa [3], Negash Abera [3], Ermias Woldie Amerga [3], Addisu Girma [1], **Awugchew Teshome Ayele [4], Melkamu Merid Mengesha [5 6]**

[4]Environmental Health Sciences, School of Public Health, Arba Minch University, Arba Minch, Ethiopia
[5]Epidemiology and Biostatistics Unit, School of Public Health, Arba Minch University, Arba Minch,

Abstract

Objective This study assessed the magnitude of risky sexual practices and associated factors among adult people living with HIV (PLHIV) attending antiretroviral clinics in public hospitals in Kembata Tembaro Zone, southern Ethiopia. Design A cross-sectional study was conducted. Setting A hospital-based study was conducted among adult PLHIV in the Kambata Tambaro Zone, southern Ethiopia. Participants 300 men and women aged 15 years and older who had been receiving HIV/AIDS care and support in four public hospitals participated in this study. Study outcome Risky sexual practice was the study outcome. It was defined based on responses to four items: multiple sexual partnerships, casual sex, consistent condom use and sex under the influence of alcohol. Risky sexual practice was defined based on a 'yes' response to any of the four items. Results Of the adult PLHIV who were sexually active in the 6 months preceding the survey, 75.7% (95% CI: 70.5% to 80.2%) engaged in at least one risky sexual practice, with 3.3% (95% CI: 1.8% to 6.1%) engaged in three or more. A positive attitude towards condom use and being on antiretroviral therapy for over 10 years were correlated with low odds of risky sexual practices. There was a higher likelihood of risky sexual behaviour among those who kept their HIV status secret and did not bring up using a condom before sexual contact. Whereas, those with a positive attitude towards condom use had a reduced risk of engaging in risky sexual practices. Conclusion A considerable proportion of adult PLHIV engage in risky sexual practices. Efforts directed at removing barriers to disclosing HIV status to partners and promoting condom use discussion among sexual partners could reduce the burden of risky sexual practices and the onward transmission of HIV.

PLoS ONE

DOI: http://dx.doi.org/10.1371/journal.pone.0288086

e0288086(2023)

Effect of conventional and household water treatment technologies on the removal of pesticide residues in drinking water, Jimma town, Southwestern, Ethiopia

Temima Jemal[1]*, Higemengist Astatke[1], **Amare Terfe[2], Seblework Mekonen[3]**

[2]Department of Environmental Health Science, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[3] Ethiopian Institute of Water Resources, Water and Health, Addis Ababa University, Addis Ababa, Ethiopia

Abstract

Water resources have been contaminated by pesticides due to the different activities of human beings. Different studies documented that advanced water treatment systems can eliminate pesticides while conventional and household treatment technologies are not well studied. The main aim of the present study is to determine the effect of conventional and household water treatment technologies on the removal of pesticide residue in drinking water. Water samples were collected from the Gibe River (intake point), from each treatment process, and from the distribution system. To determine the effect of the household water treatment process (solar disinfection and boiling), pesticides were spiked into distilled water and then passed through solar disinfection (SODIS) and boiling. The extraction of samples was conducted by following a low-density-based dispersive liquid-liquid microextraction procedure. The result of the study revealed that almost all studied pesticides except o´p-DDT were detected in water samples. Most pesticides that were detected in water samples from our study areas exceeded the maximum residue limits (MRLs), except for p,p'-DDE. The percent reduction of pesticide residue after post-chlorination by conventional water treatment ranges from 11.7% (from 70.83 μg/L to 62.54 μg/L) for p´p-DDD to 97.29% (5510.1μg/L to 149.5μg/L) for Dimethachlor, and the percent reduction of pesticide residue by SODIS and boiling ranges from 2.31% (o´p-DDT) to 54.45% (Cypermethrin) and 27.13% (γ-Chlordane) to 38.9% (p´p-DDE) respectively. This indicates that treatment technologies are important for the reduction of pesticides in water. Since studied pesticides are persistent and the resides were exceed MRL (have a health impact), monitoring of pesticides in treatment plant units is necessary and treatment technology improvement is important to allow further removal of pesticides.

Science of the Total Environment

DOI: https://doi.org/10.1016/j.scitotenv.2023.163662

163662(2023)

Using organo–mineral complex material to prevent the migration of soil Cd and As into crops: An agricultural practice and chemical mechanism study

Xuehao Zheng [a b c], Miaomiao Zhao [c], Lina Sun [b], Luge Rong [b], Bin Zhang [a], Fengjie Fan [a], Fangxi Zhang [a], Chengqiang Shu [a], Xiangyu Shi [d], Dan Zhao [c], Jianfeng Fu [c], Yuxin Zhang [e], Nan Dai [e], Dan Song [f], Hui Wang [b,] **Belay Tafa Oba [g]**, Hui Ding [c]

[g] College of Natural Science, Arba Minch University, Arba Minch, 21, Ethiopia

Abstract

The migration and transformations of Cd and As in soil are different, so it is difficult to simultaneously control them. In this study, an organo–mineral complex (OMC) material was prepared using modified palygorskite and chicken manure, the Cd and As adsorption capacities and mechanism of the OMC were explored, and the response of the crop to the OMC was clarified. The results show that the maximum Cd and As adsorption capacities of the OMC under pH values of 6–8 are 12.19 mg·g−1 and 5.07 mg·g−1, respectively. In the OMC system, the modified palygorskite contributed more to the adsorption of the heavy metals than the organic matter. Cd2+ may form CdCO3 and CdFe2O4, and AsO2− may form FeAsO4, As2O3, and As2O5 on the surfaces of the modified palygorskite. Organic functional groups such as hydroxyl, imino, and benzaldehyde groups can participate in the adsorption of Cd and As. The Fe species and carbon vacancy in the OMC system promote the conversion of As3+ into As5+. A laboratory experiment was conducted to compare five commercial remediation agents with OMC. Planting Brassica campestris in the OMC remediated soil with excessive contamination increased the crop biomass and decreased the Cd and As accumulation sufficiently to meet the current national food safety standards. This study emphasizes the effectiveness of OMC in preventing the migration of Cd and As into crops while promoting crop growth, which can provide a feasible soil management strategy for Cd[sbnd]As co-contaminated farmland soil.

eClinicalMedicine

DOI: https://doi.org/10.1016/j.eclinm.2023.102193

102193(2023)

Global, regional, and national incidence of six major immune-mediated inflammatory diseases: findings from the global burden of disease study 2019

M Woldemariam, GBD 2019 IMID Collaborators

Arba Minch University, Arba Minch, Ethiopia;

Abstract

Background: The causes for immune-mediated inflammatory diseases (IMIDs) are diverse and the incidence trends of IMIDs from specific causes are rarely studied. The study aims to investigate the pattern and trend of IMIDs from 1990 to 2019. Methods: We collected detailed information on six major causes of IMIDs, including asthma, inflammatory bowel disease, multiple sclerosis, rheumatoid arthritis, psoriasis, and atopic dermatitis, between 1990 and 2019, derived from the Global Burden of Disease study in 2019. The average annual percent change (AAPC) in number of incidents and age standardized incidence rate (ASR) on IMIDs, by sex, age, region, and causes, were calculated to quantify the temporal trends. Findings: In 2019, rheumatoid arthritis, atopic dermatitis, asthma, multiple sclerosis, psoriasis, inflammatory bowel disease accounted 1.59%, 36.17%, 54.71%, 0.09%, 6.84%, 0.60% of overall new IMIDs cases, respectively. The ASR of IMIDs showed substantial regional and global variation with the highest in High SDI region, High-income North America, and United States of America. Throughout human lifespan, the age distribution of incident cases from six IMIDs was quite different. Globally, incident cases of IMIDs increased with an AAPC of 0.68 and the ASR decreased with an AAPC of −0.34 from 1990 to 2019. The incident cases increased across six IMIDs, the ASR of rheumatoid arthritis increased (0.21, 95% CI 0.18, 0.25), while the ASR of asthma (AAPC = −0.41), inflammatory bowel disease (AAPC = −0.72), multiple sclerosis (AAPC = −0.26), psoriasis (AAPC = −0.77), and atopic dermatitis (AAPC = −0.15) decreased. The ASR of overall and six individual IMID increased with SDI at regional and global level. Countries with higher ASR in 1990 experienced a more rapid decrease in ASR. Interpretation: The incidence patterns of IMIDs varied considerably across the world. Innovative prevention and integrative management strategy are urgently needed to mitigate the increasing ASR of rheumatoid arthritis and upsurging new cases of other five IMIDs, respectively. Funding: The Global Burden of Disease Study is funded by the Bill and Melinda Gates Foundation. The project funded by Scientific Research Fund of Sichuan Academy of Medical Sciences & Sichuan Provincial People's Hospital (2022QN38).

Chemosphere

DOI: https://doi.org/10.1016/j.chemosphere.2023.138703

138703(2023)

Enhanced nutrient removal in agro-industrial wastes-amended hybrid floating treatment wetlands treating real sewage: Laboratory microcosms to field-scale studies

Mathieu Nsenga Kumwimba [a b c], Jinlou Huang [a b], Mawuli Dzakpasu [g], Fidelis Odedishemi Ajibade [b d e], Xuyong Li [a b], Edmond Sanganyado [h], **Awoke Guadie [i],** Engin Şenel [j], Diana Kavidia Muyembe [f]

[i] Department of Biology, College of Natural Sciences, Arba Minch University, 21, Arba Minch, Ethiopia

Abstract

The use of natural agro-industrial materials as suspended fillers (SFs) in floating treatment wetlands (FTWs) to enhance nutrient removal performance has recently been gaining significant attention. However, the knowledge concerning the nutrient removal performance enhancement by different SFs (alone and in mixtures) and the major removal pathways is so far inadequate. The current research, for the first time, carried out a critical analysis using five different natural agro-industrial materials (biochar, zeolite, alum sludge, woodchip, flexible solid packing) as SFs in various FTWs of 20 L microcosm tanks, 450 L outdoor mesocosms, and a field-scale urban pond treating real wastewater over 180 d. The findings demonstrated that the incorporation of SFs in FTWs enhanced the removal performance of total nitrogen (TN) by 20–57% and total phosphorus (TP) by 23–63%. SFs further enhanced macrophyte growth and biomass production, leading to considerable increases in nutrient standing stocks. Although all the hybrid FTWs showed acceptable treatment performances, FTWs set up with mixtures of all five SFs significantly enhanced biofilm formation and enriched the abundances of the microbial community related to nitrification and denitrification processes, supporting the detected excellent N retention. N mass balance assessment demonstrated that nitrification-denitrification was the major N removal pathway in reinforced FTWs, and the high removal efficiency of TP was attributable to the incorporation of SFs into the FTWs. Nutrient removal efficiencies ranked in the following order among the various trials: microcosm scale (TN: 99.3% and TP: 98.4%) > mesocosm scale (TN: 84.0% and TP: 95.0%) > field scale (TN: −15.0–73.7% and TP: −31.5–77.1%). These findings demonstrate that hybrid FTWs could be easily scaled up for the removal of pollutants from eutrophic freshwater systems over the medium term in an environmentally-friendly way in regions with similar environmental conditions. Moreover, it demonstrates hybrid FTW as a novel way of disposing of significant quantities of wastes, showing a win-win means with a huge potential for large-scale application.

Journal of Food Composition and Analysis

DOI: https://doi.org/10.1016/j.jfca.2023.105562

105562(2023)

Mineral contents and health risk assessment of sesame (Sesamum Indicum Linn) seeds grown in Ethiopia

Getu Kassaw[a], Tolera Seda Badessa[a], Dessie Ezez[a]

[a] Department of Chemistry, College of Natural and Computational Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

This study was aimed to determine the mineral contents and their hazardous level and associated health risk assessments in Sesame indicum Linn. seed samples grown in Ethiopia. To determine some selected metals (Na, Mg, Ca, K, Fe, Cu and Zn) in the samples, flame atomic absorption Spectrophotometer (FAAS) was used, and for the determination of phosphorus, Ultraviolet-Visible (UV-Vis) spectrophotometer was used. The health risk assessment via consumption of S. indicum Linn seed has been conducted through evolution of estimated daily intake (EDI), Target hazard quotient (THQ) and hazard index (HI) values. The estimated daily intake (EDI) levels for male adults varied between 0.0511 μg/kg/day to 0.829 μg/kg/day, whereas for female adults were 0.0471 μg/kg/day to 0.125 μg/kg/day. The values of target hazard quotient (THQ), hazard index (HI) for male and female adult consumers in the studied sites were less than one (<1), indicates that there is no serious health risk for adults by the ingestion of S. indicum Linn seed.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e18217

e18217(2023)

Delay in receiving emergency obstetric care and associated factors among mothers who gave birth in public hospitals of Bale and East Bale zones, Oromia region, South East Ethiopia: Facility based cross-sectional study

Derese Eshetu [a], **Zeleke Aschalew [b], Agegnehu Bante [b]**, Genet Fikedu [a], Mesfin Abebe [c], Degefa Gomora [a], Eden Silesh [e], Rediet Belay [e], Tewodros Getachew [d], Aregash Acha [e], **Abera Mersha [b]**

[b] School of Nursing, College of Medicine & Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Introduction: Delays in timely seeking care, failure to reach health institutions and receiving ineffective health care cause maternal mortality in developing countries. The three maternal delay was used to identify contributing factors to maternal death. There was limited data on the maternal delay in receiving emergency obstetric care services in the study area. Therefore, the aim of this study was to assess the magnitude of delay in receiving emergency obstetric care and associated factors among postnatal mothers in the Bale and east Bale zones. Methods: A facility-based cross-sectional study was conducted among 407 postnatal women from April 6 to May 6, 2022. A systematic random sampling technique was used to select study participants. The data were collected electronically using an Open Data Kit and exported to SPSS window version 25 for cleaning and analysis. Both bivariate and multivariable analyses were done by using a binary logistic regression model to identify factors associated with delay in receiving emergency obstetric care services. Statistical significance was declared at P-value < 0.05. Results: In this study, the magnitude of delay in receiving institutional delivery service utilization was 34.6% with [95% CI (30.0_39.5)]. Delay one was found to be statistically associated with maternal delay in receiving institutional delivery services (AOR = 2.07; 95% CI: 1.21, 3.53). Mothers with low monthly income had shown higher odds of delay (AOR = 1.79; 95% CI: 1.03, 3.10). Moreover, the delay in receiving emergency obstetric care was 89% less likely among mothers who had not been referred multiple times than among those who had been referred many times (AOR = 0.10; 95% CI: 0.06, 0.18). Conclusion: This study showed that the magnitude of the delay in receiving the utilization of emergency obstetric care services in the study area was high. Factors such as delay one, average monthly income and multiple referrals of mothers were found significant factors for delay in receiving care. Therefore, it is important to reduce delay in receiving institutional delivery by working on promoting road accessibility, transport mechanisms and building health education on key danger signs.

International journal of surgery (London, England)

DOI: http://dx.doi.org/10.1097/JS9.0000000000000514

109(2023)

Advancing postoperative pain management in humans with miRNA-based therapeutic strategies: lacunae that need to be addressed

Selvaraj, Vimalraj PhD[a]; Sekaran, Saravanan PhD[a]; **Rajamani Sekar, Suresh K. PhD[b]**

[b] College of Natural Sciences, Arba Minch University, Arba Minch, SNNPR, Ethiopia

Abstract

Inadequate postoperative pain management may negatively affect surgical recovery, quality of life, and healthcare costs. Current analgesics are ineffective because of poor strength, short duration of action, and addiction risk. MicroRNAs (miRNAs) are small non-coding RNAs that are also involved in regulating protein synthesis in neurons and glial cells, therefore, play a major role in the regulation of nociception. Since the discovery of RNA interference by Fire and Mello[1], there has been a surge in interest in medicines that target RNA. Several pharmaceutical companies have developed miRNA-based drugs to treat multiple illnesses[2]. In the context of postsurgical pain management, miRNA-based targeting is still in its infancy.

To begin, which miRNA should be targeted? We can return miRNA to its physiological state and shed light on the course and features of surgical pain by considering either mimic of downregulated miRNA or antagonists of overexpressed miRNA. For instance, after surgery, miR-183 and miR-146 levels drop in rodents[3]. Therefore, it is possible that miRNAs may also be involved in the development of postoperative neuropathic pain in humans, especially after mastectomies and thoracotomies. Studying miRNAs in these patient populations may provide insight into the mechanisms underlying postoperative neuropathic pain. It is possible that the efficacy of monogenic targeting molecules for the treatment of surgical pain is constrained by the activation of redundant signaling pathways during peripheral and central sensitization. MiRNA-based polygenic regulation could be a promising technique for reducing postoperative discomfort. Additionally, ‘non-target genes’ may be targeted with miRNAs to alleviate surgical discomfort. To prevent unintended consequences, it is important to pick appropriate miRNA mimics or anti-miRs with great care since miRNAs may activate genes or even bring pseudoactivity on their own.

The Lancet Haematology

DOI: https://doi.org/10.1016/S2352-3026(23)00160-6

10(2023)

Prevalence, years lived with disability, and trends in anaemia burden by severity and cause, 1990–2021: findings from the Global Burden of Disease Study 2021

M Woldemariam MSc, GBD 2019 IMID Collaborators

Department of Medical Laboratory Science Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Anaemia is a major health problem worldwide. Global estimates of anaemia burden are crucial for developing appropriate interventions to meet current international targets for disease mitigation. We describe the prevalence, years lived with disability, and trends of anaemia and its underlying causes in 204 countries and territories. Methods: We estimated population-level distributions of haemoglobin concentration by age and sex for each location from 1990 to 2021. We then calculated anaemia burden by severity and associated years lived with disability (YLDs). With data on prevalence of the causes of anaemia and associated cause-specific shifts in haemoglobin concentrations, we modelled the proportion of anaemia attributed to 37 underlying causes for all locations, years, and demographics in the Global Burden of Disease Study 2021. Findings: In 2021, the global prevalence of anaemia across all ages was 24·3% (95% uncertainty interval [UI] 23·9–24·7), corresponding to 1·92 billion (1·89–1·95) prevalent cases, compared with a prevalence of 28·2% (27·8–28·5) and 1·50 billion (1·48–1·52) prevalent cases in 1990. Large variations were observed in anaemia burden by age, sex, and geography, with children younger than 5 years, women, and countries in sub-Saharan Africa and south Asia being particularly affected. Anaemia caused 52·0 million (35·1–75·1) YLDs in 2021, and the YLD rate due to anaemia declined with increasing Socio-demographic Index. The most common causes of anaemia YLDs in 2021 were dietary iron deficiency (cause-specific anaemia YLD rate per 100 000 population: 422·4 [95% UI 286·1–612·9]), haemoglobinopathies and haemolytic anaemias (89·0 [58·2–123·7]), and other neglected tropical diseases (36·3 [24·4–52·8]), collectively accounting for 84·7% (84·1–85·2) of anaemia YLDs. Interpretation: Anaemia remains a substantial global health challenge, with persistent disparities according to age, sex, and geography. Estimates of cause-specific anaemia burden can be used to design locally relevant health interventions aimed at improving anaemia management and prevention. Funding: Bill & Melinda Gates Foundation.

Ethiopian Journal of Reproductive Health

DOI: http://dx.doi.org/10.69614/ejrh.v15i4.729

15(2023)

Sexual and Reproductive Health Services Utilization among Adolescents in South Ethiopia: Examining the Role of Stigma, Social Support, and Self-Efficacy

Negussie Boti Sidamo[1, 2], Amene Abebe Kerbo [1], Kassa Daka Gidebo [1], Yohannes Dibaba Wado [3]

[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University,

Abstract

INTRODUCTION: Despite the high burden of sexual and reproductive health (SRH) during adolescence and it associated negative consequences, relatively little attention has been given to the role of stigma, social support, and self-efficacy in adolescents' SRH services utilization. Therefore, this study aimed to examine the role of stigma, social support, and self-efficacy in adolescents' SRH services utilization in South Ethiopia. METHODS: A total of 1172 adolescents were selected using a multi-stage stratified random sampling method. Correlation analysis was performed to identify relationships between the variables. A structural equation model was used to examine the chain and single mediating roles of self-efficacy and perceived social support. RESULTS: This study found that the direct, indirect, and overall effects of SRH-related stigma on the utilization of SRH services were significant. A single mediation effect via perceived social support was -0.0017 [bootstrap 95% CI: -0.0026, -0.0007] and self-efficacy was -0.00123 [bootstrap 95% CI: (-0.0023, -0.0002)] in the association between SRH service utilization and SRH-related stigma. The chain mediation effect test showed that perceived social support and self-efficacy mediated the effect of SRH-related stigma on SRH service utilization, with a mediation effect score of -0.0025 [bootstrap 95% CI: (-0.0034, -0.0015)]. CONCLUSION: The association between SRH-related stigma and SRH service utilization was partially mediated by self-efficacy and perceived social support. The chain mediation effect test also confirmed that perceived social support and self-efficacy sequentially mediated the effect of SRH-related stigma on SRH service utilization. Therefore, designing comprehensive interventions that target “3S” stigma, social support, and self-efficacy may be effective in improving service utilization.

E3S Web of Conferences

DOI: http://dx.doi.org/10.1051/e3sconf/202339702006

02006(2023)

Optimizing the Structure and Parameters of Local Wastewater Disposal System Based on Flow Models

Victor Chupin[1], Maria Moroz[1],*, Roman Chupin[1], Victor Bober1, and **Agegnehu K. Yoshe[2]**

[2]Arba Minch University, Arba Minch, Ethiopia

Abstract

The paper investigates the issues of transporting wastewater from small settlements to centralized sewage treatment facilities, taking into account the use of various modes of transport. For each mode of transport we determined the dependences of life cycle costs on the amount of wastewater flow and its transportation over different distances. Taking into account these dependences we obtained the ranges for the use of road and pipeline transport and developed methods for optimizing the structure and parameters of local wastewater disposal systems.

Energy Conversion and Management: X

DOI: https://doi.org/10.1016/j.ecmx.2023.100493

100493(2023)

A comparative study on the effect of nano-additives on performance and emission characteristics of CI engine run on castor biodiesel blended fuel

Mishamo Tesfaye Lamore [a], Dinku Seyoum Zeleke [b], **Belayneh Yitayew Kassa [c]**

[c] Department of Automotive Engineering, Arba Minch University, P.O Box 21, Arba Minch, Ethiopia

Abstract

Biodiesel is a promising alternative fuel because of its renewable status, biodegradability, non-toxicity, and low pollution levels. However, other limitations such as high viscosity, low thermal energy content, poor atomization, greater densities, and higher (NOx) exhaust emissions hinder its adoption as a prospective diesel alternative. The current study focuses on comparing and analyzing the performance and emission effects of introducing single and hybrid cerium oxide (CeO2) and aluminum oxide (Al2O3) nanoparticles to a fuel blend of 20 % castor biodiesel and 80 % diesel (CB20) made from castor seed oil. The pulsed plasma in liquid technique, a straightforward one-step procedure, was used to create cerium oxide (CeO2) nanoparticles. When Al2O3 nanoparticles were added to the CB20, the cylinder pressure and rate of heat release increased. Therefore, in this study single and hybrid cerium oxide (CeO2) and aluminum oxide (Al2O3) nanoparticles are introduced. The tests were conducted on a single cylinder compression ignition engine at varied engine speeds between 1250 and 3200 rpm while keeping a constant engine load. Using a water bath and sonication, two concentrations of the nanoparticles—80 and 100 ppm—were introduced to the fuel blends, along with Tween 80 and span 80 surfactants to improve blend stability. Different tested fuel samples, including pure diesel CB0, CB20, CB20C100, CB20C80, CB20A100, CB20A80, CB20A40C40, and CB20A50C50, were examined for their physiochemical properties, such as density, viscosity, cloud point, pour point, flash point, and fire points, as well as engine performance parameters, including torque, power, fuel consumption, BTE, and EGT. CB20A50C50 and CB20A40C40 both had an average brake power that was higher than diesel fuel by 6.14 % and 1.25 percent, respectively. The average brake-specific fuel consumption decreased by 3.21 % to 8.29 % when using hybrid and single nano-additive blended fuels compared to CB20. CB20A50C50 exhibited a 20.38 % higher brake thermal efficiency than CB20. Notably, CB20C100 showed a 29.52 % reduction in HC and a 38.32 % reduction in CO, while CB20A50C50 demonstrated a 10.24 % decrease in NOx compared to CB20. Overall, the results of this study indicate that the generated fuel blends combining castor biodiesel and aluminum oxide/cerium oxide nanoparticles hold promise as alternate fuels for diesel engines, with positive impacts on engine performance and emissions

ACS Food Science and Technology

DOI: http://dx.doi.org/10.1021/acsfoodscitech.3c00064

3(2023)

Coffee Fruit Roasting: an Approach to Enhance Yield and Bioactivities of Ethanol Extracts from Coffee Husk

Korsa Mesfin[a], Feyera Gobena Gemechu[b]*, Tilahun Belayneh[c], Habtamu Admassu Tessema[b]

[a] Department of Food Engineering, Arba Minch University, Arba Minch, 1000/21, Ethiopia

Abstract

This study aims to investigate the effects of roasting dried coffee cherry on total phenol (TP), tannin, and flavonoid (TF) content and to examine the antioxidant and antimicrobial capacity of a coffee cherry husk-derived ethanol extract. Accordingly, the TP and TF content after different roasting regimens ranged from 9.00 to 123.49 mg GAE/g and 2.69 to 35.34 mg QE/g, respectively. The total tannin content decreased from 42.45 mg TAE/g to 0.27 mg TAE/g by the treatment. The DPPH radical and hydrogen peroxide scavenging capacities extended from 24.68 ± 0.05 to 93.83% and 14.45 to 76.07%, respectively, while the ferric reducing capacity increased from 10.85 to 47.02 mg AAE/g. An extract with increased TP and TF as well as stronger antioxidative activity was found to be produced by mild temperature (150 °C) roasting for 25 min or 180 °C for 10 to 15 min, after which the potency declines. The bacterial inhibition zones also increased from 7.03 to 21.30 mm and from 6.00 to 15.77 mm forE. coli and S. aureus, respectively. This study demonstrated that roasting degrades tannin and enhances the antioxidant and antibacterial properties of ethanol extracts of coffee husk.

SN Applied Sciences

DOI: http://dx.doi.org/10.1007/s42452-023-05484-8

264(2023)

Internet of things driven multilinear regression technique for fertilizer recommendation for precision agriculture

Praveen Kumar Kollu[1], Manoj L.Bangare[2], P.Venkata Hari Prasad[3], Pushpa M. Bangare[4] · Kantilal Pitambar Rane[5]· José Luis Arias-Gonzáles[6], Sachin Lalar[7], **Mohammad Shabaz[8]**

[8]Arba Minch University, Arba Minch, Ethiopia

Abstract

Food instability has been linked to infertility, health issues, accelerated aging, incorrect insulin regulation, and more. Innovative approaches increased food availability and quality. Agriculture environment monitoring systems need IoT and machine learning. IoT sensors provide all necessary data for agriculture production forecast, fertilizer management, smart irrigation, crop monitoring, crop disease diagnosis, and pest control. Precision agriculture may boost crop yields by prescribing the right water-fertilizer-paste ratio. This article presents IOT based fertilizer recommendation system for Smart agriculture. This framework uses IoT devices and sensors to acquire agriculture-related data, and then machine learning is applied to suggest fertilizer in the correct quantity and at the appropriate time. The data acquisition phase collects input data, including soil temperature, moisture, humidity, regions' weather data, and crop details. Features are selected using the Sequential Forward Floating Selection algorithm. Multilinear Regression performs data classification. The performance of SFSS-MLR is compared to Random Forest, C4.5, Naïve Bayes algorithm. SFSS MLR is better in accuracy, precision, recall and F1. The accuracy of SFSS MLR is 99.3 percent.

BMJ Open

DOI: http://dx.doi.org/10.1136/bmjopen-2023-072748

e072748(2023)

Perspectives of key decision makers on out-of-pocket payments for medicines in the Ethiopian healthcare system: A qualitative interview study

Getahun Asmamaw Mekuria[1], Daniel Legese Achalu[2], Dinksew Tewuhibo[3], Wondim Ayenew[4], Eskinder Eshetu Ali[5]

[1]Department of Pharmacy, College of Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Objective this study aimed to explore the perspectives of key decision makers on out-of-pocket (OOP) payment for medicines and its implications in the Ethiopian healthcare system. Design A qualitative design that employed audiorecorded semistructured in-depth interviews was used in this study. The framework thematic analysis approach was followed in the analysis. Setting Interviewees came from five federal-level institutions engaged in policymaking (three) and tertiary referral-level healthcare service provision (two) in Ethiopia. Participants Seven pharmacists, five health officers, one medical doctor and one economist who held key decision-making positions in their respective organisations participated in the study. Result Three major themes were identified in the areas of the current context of OOP payment for medicines, its aggravating factors and a plan to reduce its burden. Under the current context, participants' overall opinions, circumstances of vulnerability and consequences on households were identified. Factors identified as aggravating the burden of OOP payment were deficiencies in the medicine supply chain and limitations in the health insurance system. Suggested mitigation strategies to be implemented by the health providers, the national medicines supplier, the insurance agency and the Ministry of Health were categorised under plans to reduce OOP payment. Conclusion The findings of this study indicate that there is widespread OOP payment for medicines in Ethiopia. System level constraints such as weaknesses in the supply system at the national and health facility levels have been identified as critical factors that undermine the protective effects of health insurance in the Ethiopian context. Ensuring steady access to essential medicines requires addressing health system and supply constraints in addition to a well-functioning financial risk protection systems.

IET Software

DOI: http://dx.doi.org/10.1049/sfw2.12094

17(2023)

Retracted: Visualisation-based binary classification of android malware using vgg16

Aryan Marwaha[a], Rami Qays Malik[b], Shehab Mohamed Beram[c], Ali Rizwan[d], Kakarla Hari Kishore[e], Deepak Thakur[f], Tanya Gera[g], **Mohammad Shabaz[f]**

[f]Arba Minch University, Arba Minch, Ethiopia

Abstract

Retraction: [Aryan Marwaha, Rami Qays Malik, Shehab Mohamed Beram, Ali Rizwan, Hari Kishore Kakarla, Deepak Thakur, Tanya Gera, Mohammad Shabaz, Visualisation-based binary classification of android malware using vgg16, IET Software 2023 (https://DOI.org/10.1049/sfw2.12094)]. The above article from IET Software, published online on 23 January 2023 in Wiley Online Library (wileyonlinelibrary.com), has been retracted by agreement between the Editor-in-Chief, Hana Chockler, the Institution of Engineering and Technology (the IET) and John Wiley and Sons Ltd. This article was published as part of a Guest Edited special issue. Following an investigation, the IET and the journal have determined that the article was not reviewed in line with the journal's peer review standards and there is evidence that the peer review process of the special issue underwent systematic manipulation. Accordingly, we cannot vouch for the integrity or reliability of the content. As such we have taken the decision to retract the article. The authors have been informed of the decision to retract.

Nanotechnology

DOI: http://dx.doi.org/10.1088/1361-6528/acd060

305703(2023)

Highly stable graphene oxide/nylon membrane for molecular separation

Haftu Gebrekiros Alemayehu[1, 2, 3], Rshan Beyene Hailu[4] and Paulos Taddesse[5]

[3] Department of Chemistry, College of Natural Sciences, Arba Minch University, PO Box-21, Ethiopia
[4] Department of Hydraulics and Water Resource Engineering, Water Technology Institute, Arba Minch University, PO Box-21, Ethiopia
[5] Department of Physics, College of Natural Sciences, Arba Minch University, PO Box-21, Ethiopia

Abstract

Graphene oxide (GO), due to its one-atom-thick structure and enriched oxygenated functionalities, is a promising candidate material to develop nanofiltration membranes to tackle the current worldwide water shortage. However, the stability of the GO membrane in an aqueous environment and its long-term operation remains unresolved. These issues greatly affect the mass transfer in the GO membrane. Here, we fabricate an ultrathin GO membrane on a nylon substrate within 5 min with the help of vacuum filtration for molecular separation. Thus, GO/nylon membranes dried in an oven at temperatures of 70 °C show greater aqueous solution stability than those dried at room temperature. To validate the stability, both GO membranes were immersed in DI water for 20 d. As a result, the GO/nylon membrane dried at room temperature was completely detached from the substrate within 12 h, whereas the GO/nylon membrane that dried at 70 °C remained stable for more than 20 d without any physical damage. We suppose the enhanced stability is due to the thermally induced balance in electrostatic repulsion resulting in stabilizing of the GO membrane. This method improves the GO membrane's operating time, selectivity, and permeability. Therefore, the optimized GO/nylon membrane shows higher rejection of organic dyes (~100%) and good selectivity for sulfate salts such as Na2SO4 and MgSO4 (>80%). The membrane continuously operates for more than 60 h with only a 30% water permeability decline and 100% rejection of dyes. We believe that the drying of GO/nylon membranes at a moderate temperature is important for enhanced separation performance and stability. This drying technique can be applied to other applications.

Urban Climate

DOI: https://doi.org/10.1016/j.uclim.2023.101610

101610(2023)

Mapping of groundwater potential zones by integrating remote sensing, geophysics, GIS, and AHP in a hard rock terrain

Pradeep Kamaraj [a], **Muralitharan Jothimani [b]**, Banajarani Panda [c], Chidambaram Sabarathinam [d]

[b] Department of Geology, College of Natural and Computational Sciences, Arba Minch University, Ethiopia

Abstract

Groundwater is a life-sustaining resource that provides for society's daily water needs, supports industrial development, promotes agricultural activities, and maintains ecological balance. In groundwater resource studies, integrating remote sensing, geophysical data, and GIS tools play a critical role in monitoring, analyzing, and protecting groundwater resources for water resources development and management. This study used a comparative approach since it is less labour-intensive, inexpensive, and efficient. The potential groundwater zones were determined by integrating various data sources such as remote sensing, geophysical, and collateral data and using the Analytic Hierarchy Process (AHP) method. Fifteen different thematic layers, including geology, geomorphology, lineament density, topsoil resistivity, topsoil thickness, weathered zone resistivity, weathered zone thickness, first fractured resistivity, first fractured thickness, second fractured resistivity, second fractured thickness, slope, land use/land cover, drainage density, and rainfall, were mapped in this process. The results show that the northern part of the study area has a relatively higher response of groundwater potential zones than the southern portion. Agricultural areas near surface water bodies and forests, characterized by shallow to moderately weathered pediments and pediplains, exhibit favourable groundwater potential. The study identifies five distinct groundwater potential categories based on area coverage:very low (242.44 km2), low (147.52 km2), medium (241.72 km2), high (26.35 km2), and very high (18.51 km2). The predominant factors influencing the groundwater potentiality are top soil thickness, pediment as well as pediplain (shallow to moderately weathered), lithology (charnockite and fissile hornblende biotite gneiss), slope type (gentle), and rainfall (high). A very good correlation between the groundwater potential zones and the well yield aided in validation of the above findings.

PLoS ONE

DOI: http://dx.doi.org/10.1371/journal.pone.0285063

e0285063(2023)

Phenotypic and genotypic drug susceptibility patterns of Mycobacterium tuberculosis isolates from pulmonary tuberculosis patients in Central and Southern Ethiopia

Melaku Tilahun[1,2*], Teklu Wegayehu[1], Biniam Wondale[1], TewdrosTariku Gebresilase [2], Tesfaye Gebreyohannes[2], Abraham Tekola[2], Mekdes Alemu[2],Sebsib Neway[2], Bethlehem Adnew2, Maeruf Fetu Nassir[2], Yonas Kassahun[2],Abraham Aseffa[2], Kidist Bobosha[2]

[1]Department of Biology, College of Natural and Computational Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Introduction The persistence of tuberculosis (TB) infection in some patients after treatment has highlighted the importance of drug susceptibility testing (DST). This study aimed to determine the drug susceptibility patterns of Mycobacterium tuberculosis (M. tuberculosis) isolates from pulmonary TB (PTB) patients in Central and Southern Ethiopia. Methods A health institution-based cross-sectional study was conducted between July 2021 and April 2022. Sputum samples were collected from newly diagnosed smear microscopy and/or Xpert MTB/RIF-positive PTB patients. The samples were processed and cultivated in Lowenstein-Jensen (LJ) pyruvate and glycerol medium. M. tuberculosis isolates were identified using polymerase chain reaction (PCR) based region of difference 9 (RD9) deletion typing. Phenotypic DST patterns of the isolates were characterized using the BACTEC MGIT™ 960 instrument with SIRE kit. Isoniazid (INH) and Rifampicin (RIF) resistant M. tuberculosis isolates were identified using the GenoType® MTBDRplus assay. Results Sputum samples were collected from 350 PTB patients, 315 (90%) of which were culture-positive, and phenotypic and genotypic DST were determined for 266 and 261 isolates, respectively. Due to invalid results and missing data, 6% (16/266) of the isolates were excluded, while 94% (250/266) were included in the paired analysis. According to the findings, 14.4% (36/250) of the isolates tested positive for resistance to at least one anti-TB drug. Gene mutations were observed only in the rpoB and katG gene loci, indicating RIF and high-level INH resistance. The GenoType® MTBDRplus assay has a sensitivity of 42% and a specificity of 100% in detecting INH-resistant M. tuberculosis isolates, with a kappa value of 0.56 (95%CI: 0.36–0.76) compared to the BACTEC MGIT™ DST. The overall discordance between the two methods was 5.6% (14/250) for INH alone and 0% for RIF resistance and MDR-TB (resistance to both INH and RIF) detection. Conclusion This study reveals a higher prevalence of phenotypic and genotypic discordant INH-resistant M. tuberculosis isolates in the study area. The use of whole-genome sequencing (WGS) is essential for gaining a comprehensive understanding of these discrepancies within INH-resistant M. tuberculosis strains.

Environment, Development and Sustainabil

DOI: http://dx.doi.org/10.1007/s10668-023-03553-x

26(2023)

Do rural women realized land tenure security rights? South Wollo, Ethiopia

Asrat Mulat Asegie[1,] **Walelgn Kebede Ayele[1,2]**

[b]College of Business and Economics, Arba Minch University, P.O. Box: 21, Arba Minch, Ethiopia

Abstract

Land is a valuable resource, with economic, political, and cultural significance for the rural poor. Land rights are fundamental to eradicate poverty. Strengthening women's land rights is increasingly on national and international agendas. The previous studies fail to investigate the status of rural women in realizing their tenure security rights in the frame work of the revised proclamation no. 133/2006. This study analyzed the current status of rural women in realizing land tenure rights in the South Wollo Zone, Ethiopia. Data were collected from 198 sample households and 83 key informants selected following a multistage sampling technique. The data were analyzed using qualitative and quantitative techniques. The qualitative data were analyzed thematically. The results of the study reveal that 39% of rural women in the study area practiced the experience of transferring land tenure rights according to proclamation no. 133/2006. The study shows that 37.66% of respondents undertook different land right transfers in written form according to proclamation no. 133/2006 article 17(5–6) at land administration offices. Understanding the rights and obligations of transferring tenure rights is an important aspect of reducing land disputes among landholders. In the presence of land disputes, rural women use both formal and informal dispute resolution mechanisms. Therefore, the study concludes that large numbers of rural women realized their landholding and using rights. To better improve the tenure security of rural women, further awareness creation activities and counseling of women are imperative by the local government and other non-governmental organizations working of tenure security, sustainable land management, and women's land right.

Journal of Engineering (United Kingdom)

DOI: https://doi.org/10.1155/2023/6675523

2023(2023)

Prediction of Crop Yield by Support Vector Machine Coupled with Deep Learning Algorithm Procedures in Lower Kulfo Watershed of Ethiopia

Abebe Temesgen Ayalew[1] and Tarun Kumar Lohani[1]

[1]Faculty of Hydraulic and Water Resources Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Sensible and judicious utilization of water for agriculture in conjunction with prediction techniques increases the crop yield. Te Ethiopian economy relies on and is exclusively dependent on agricultural-based activities. Diferent soil compositions (nitrogen, phosphorous, and potassium), crop alternation, soil dampness, and climate conditions play an imperative contribution in cultivation. Te primary purpose of this study was to conduct a machine learning approach which can be practiced dynamically for efcient farming at a low cost. Te support vector machine (SVM) was applied as a machine learning procedure, whereas long short-term memory (LSTM) and the recurrent neural network (RNN) were considered as deep learning procedures. Te research comprised a model that is combined with machine learning procedures (ANN, random forest, and decision tree) to know efcient and appropriate crop types. Te planned model is improved through conducting deep learning methods incorporated to the existing practice for diferent crop condition. Pure data and related evidence are attained concerning the quantities of soil constituents desired through their expenditures distinctly. It delivers well precision as compared to the current model examining the specifed documents and assisting the local agronomists in forecasting diferent types of crop and gain benefts. In RNN, LSTM, and SVM algorithms, the accuracy is determined as 96% which is comparatively preferable as compared to other machine learning procedures under diferent feature and crop types. Te techniques are evaluated in terms of percentage in prediction accuracy. Te results generated are important for agrarians, experts, researchers, and local farmers to maximize the crop productivity and help to enhance agriculture and climate change-related decisions, especially in low-to-middle-income countries.

Advances in Meteorology

DOI: https://doi.org/10.1155/2023/1175426

2023(2023)

The Synergic Effects of Climate Variability on Rainfall Distribution over Hare Catchment of Ethiopia

Abebe Temesgen Ayalew

Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Climate analysis at relevant time scales is important for water resources management, agricultural planning, flood risk assessment, ecological modeling, and climate change adaptation. This study analyzes the spatiotemporal variability of climate on rainfall distribution for the Hare catchment of Ethiopia. Numerous hydroclimatic variables and scenarios were developed to assess the pattern of rainfall during different seasons. The average annual precipitation varies between -37.3%, +33.1%, and -38.2%, +61.2%, for RCP 4.5 and RCP 8.5, respectively. The anticipated declines in mean seasonal rainfall changes for the Bega and Belg seasons range from -69.6% to 88.4% and from -60.6% to 15.2% for RCP 4.5 and RCP 8.5, respectively. Climate models predict that the average periodic precipitation considered for the Kiremt season will vary from -12.1% to 1.33%. The Belg, Kiremt, and Bega seasons will likely see a 28.2%, 12.2%, and 22.6% drop in mean seasonal precipitation, respectively. The decrease in stream flow accompanied by the aforementioned climate scenarios (RCP 4.5 and RCP 8.5) can be as high as 19.6% and 6.7%, respectively. Also, the amount of discharge will reduce in the near future because of a substantial reduction in rainfall and a rise in evapotranspiration in the catchment. This decline in stream flow has its own effect on the future availability of water resources. The research finding is vital to environmental protection authority, decision makers, and scientific community to undertake climate change adaption techniques for rain scare areas. A program combined with multi-RCMs to evaluate climate change effects on hydrometeorology generated a novel approach to this research with appropriate adaptation mechanisms.

Aquatic Living Resources

DOI: https://doi.org/10.1051/alr/2023016

36(2023)

Marine protected areas for resilience and economic development

Fitih F. Hailu[1]*, Worku T. Bitew[2]*, Tsegaye G. Ayele[3] and **Simon D. Zawka[1]**

[1]Arba Minch University, Department of Mathematics, Arba Minch, Ethiopia

Abstract

In this research, we attempt to give a comparative analysis of the space allocation of multiple-use marine protected areas (MPAs) including but not limited to the introduction of aquaculture in the area. Specifically, we consider the case where there is a need to develop MPAs for the conservation of the environment and ecological diversity. There is also a prevailing call for the establishment of aquaculture activities within the area to meet societal demands. Although aquaculture has negative externalities on MPAs, it helps to reduce the pressure on the capture fishery and increases the supply of fish. We develop a deterministic bioeconomic model that describes the transition dynamics and interrelationships of the systems. We find an optimal aquaculture size relative to the optimal size of MPAs that maximizes the overall economic and ecological benefits. Using numerical methods we determine the trajectory of optimal solutions, the recovery rate of the stocks in and outside the MPAs, and the expansion rate of the aquaculture. Sensitivity analysis was also performed to see the effect of a change in the parameters on the optimal solutions. The numerical results show that MPAs are resilient after the implementation of aquaculture. Moreover, the effectiveness of the optimized management system mainly depends on the cooperative planning between the capture fishery and aquaculture managers.

Geoinformatics for Sustainable Urban Development

DOI: http://dx.doi.org/10.1201/9781003331001-18

9781003331001 (2023)

Assessment of Flood Susceptibility in Hare River Catchment, Rift Valley, Southern Ethiopia, Using Geospatial and Drainage Morphometric Analysis

Jothimani, Muralitharan[a]; Gunalan, Jagadeshan[a]; Getahun, Ephrem[a]; Abebe, Abel[a]; Desalegn, Meseret[a]

[a] Department of Geology, College of Natural Sciences, Arba Minch University, Ethiopia

Abstract

This study was conducted in the Hare River basin in Southern Ethiopia and part of the Rift Valley. In this area, climate-related hazards such as floods affect human life and the region's economy. The morphometric drainage study is essential for river catchment evaluation, flood risk analysis, watershed priority, and catchment management. The study aims to determine the importance of the six watersheds that are part of the Hare River catchment. As a result of the use of GIS tools, toposheets, and Shuttle Radar Topographic Mapper-Digital Elevation Model (SRTM-DEM) data, the boundary of the Hare River sub-watershed and its drainage system were determined. Six sub-watersheds have been identified within the current study area. Morphometric variables such as linear, area, and relief were defined using the conventional formula. Flooding risk is directly related to the following morphometric factors: drainage frequency, bifurcation ratio, stream density and texture, circularity ratio, and form factor. Hence, higher ranks were assigned to high values of the above-mentioned parameters. Furthermore, flood risk is inversely proportional to the compactness coefficient, overland flow length, and elongation ratio. As a result, the higher ranking was accorded to parameters with lower values, as mentioned above. The calculated compound factor values were classified into three categories, namely high priority (2.78–2.89) (WS-2 and 4), medium priority (2.90–3.89) (WS-1, 3 and 6), and low priority (3.90–4.33) (WS-5). In the Hare River catchment, using remotely sensed data, GIS techniques, morphometric drainage assessment, and sub-watershed prioritisation is highly effective in identifying areas at risk of flooding. As a result of the present study, planners and decision-makers may be able to identify flood-prone areas and implement flood control structures in the study area.

Journal of Computer Networks and Communications

DOI: http://dx.doi.org/10.1155/2023/8840168

2023(2023)

Maximum Entropy Principle Based on Bank Customer Account Validation Using the Spark Method

Xiaorong Qiu, [1]Ye Xu, [1]Yingzhong Shi, [1]S. Kannadhasan Deepa, [2] and **S. Balakumar**[3]

[3]Faculty of Electrical and Computer Engineering, Arba Minch University, Arba Minch, 21, Ethiopia

Abstract

Bank customer validation is carried out with the aim of providing a series of services to users of a bank and fnancial institutions. It is necessary to perform various analytical methods for user's accounts due to the high volume of banking data. Tis research works in the feld of money laundering detection from real bank data. Banking data analysis is a complex process that involves information gathered from various sources, mainly in terms of personality, such as bills or bank account transactions which have qualitative characteristics such as the testimony of eyewitnesses. Operational or research activities can be greatly improved if supported by proprietary techniques and tools, due to the vast nature of this information. Te application of data mining operations with the aim of discovering new knowledge of banking data with an intelligent approach is considered in this research. Te approach of this research is to use the spiking neural network (SNN) with a group of sparks to detect money laundering, but due to the weakness in accurately identifying the characteristics of money laundering, the maximum entropy principle (MEP) method is also used. Tis approach will have a mapping from clustering and feature extraction to classifcation for accurate detection. Based on the analysis and simulation, it is observed that the proposed approach SNN-MFP has 87% accuracy and is 84.71% more functional than the classical method of using only the SNN. In this analysis, it is observed that in real banking data from Mellat Bank, Iran, in its third and fourth data, with a comprehensive analysis and reaching diferent outputs, there have been two money laundering cases.

Green Energy and Technology

DOI: http://dx.doi.org/10.1007/978-3-031-33610-2_16

(2023)

Performance Evaluation and Comparison of Mixed-Mode Natural Convection Solar Dryer With and Without Solar Air Heater for Green Banana Flour Production

Betelihem Zemedkun Lodamo[a], Kamil Dino Adem[b] **& Fiseha Kedir Jemal**[c]

[a] Department of Mechanical Engineering, Arba Minch Institute of Technology, Arba Minch University, Arba Minch, Ethiopia
[c] Department of Electro – Mechanical Engineering, College of Engineering and Agro-industrial Technology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Non-conventional energy supplies are critical for current and future generations to meet their energy needs. Electricity is expensive and creates many supply interruptions. The goal of this study is to model and simulate a natural convection mixed-mode solar greenhouse drier with a solar air collector (SAC) for green banana drying. A dynamic model of heat and mass transfer was developed, and a thin layer-drying model was chosen, and this system of non-linear partial differential equations was numerically solved using MATLAB/Simulink software to investigate the drying performances of the mixed-mode natural convection solar greenhouse dryer. A software simulation was used to compare the performance of the greenhouse dryer with and without SAC. The maximum air temperature, maximum product temperature, and maximum cover temperature were found to be 33 °C, 46 °C, and 78 °C without a solar air collector and 34 °C, 54 °C, and 79 °C with a solar air collector, respectively. Within the first 2 days, the moisture ratio of green bananas dropped from 1.58% (db) to 0.2% (db) with solar air collector then gradually dropped over the next days. As a result, the greenhouse solar dryer with solar air heater has an excellent performance for drying fruits in less time.

Cogent Social Sciences

DOI: http://dx.doi.org/10.1080/23311886.2023.2235782

9(2023)

Adoption and impacts of conservation agriculture on smallholder farmers' livelihoods in the case of Arba Minch Zuria district of Southern Ethiopia

Teklebirhan Alemnew Gebeyehu

[a] Department of Economics, Arba Minch University, Arba Minch, Ethiopia

Abstract

The primary objective of this study was to evaluate the impact of conservation agriculture (CA) practice on farmers' livelihood status and examine factors influencing the adoption of CA practice in Arba Minch Zuria district of Southern Ethiopia. The logistic regression model result revealed that gender, education level, credit access, access to extension service, household size, marital status, income, and cooperating group membership were crucial factors in influencing the likelihood of farmers adopting conservation agriculture practices. Moreover, the Propensity Score Matching (PSM) result indicated that the return from maize grain productivity and farmers' annual income was comparatively higher in conservation agriculture practice than conventional agriculture practice. Thus, this study recommended promoting CA practice as a livelihood-enhancing technology in areas experiencing low yields and annual income.

Research in Mathematics

DOI: http://dx.doi.org/10.1080/27684830.2023.2215037

10(2023)

Equivalent Conditions of Normal Autometrized L-algebra

Gebrie Yeshiwas Tilahun[a], Radhakrishna Kishore Parimi[a] and Mulugeta Habte Melesse[a]

[a] Department of Mathematics, Arba Minch University, Arba Minch, Ethiopia

Abstract

In this paper, we discuss the properties of some elements in autometrized algebra. We also introduce some properties of normal autometrized algebra. Furthermore, we obtain normal autometrized l-algebras among the normal autometrized semialgebras satisfying several conditions and discussing some of its properties. We also prove that a normal autometrized semialgebra satisfying certain conditions is a lattice and distributive. Finally, we establish an equivalent condition between normal autometrized l-algebra and representable autometrized algebra with some conditions. We also prove that in a normal autometrized l-algebra satisfying some conditions, there exists a subset which is a convex normal subalgebra.

Cogent Food and Agriculture

DOI: http://dx.doi.org/10.1080/23311932.2023.2270251

9(2023)

The dromedary camel (Camelus dromedarius) feed resources and utilization practices in Borana Plateau, southern Ethiopia

Roba Jiso[1]*, Yisehak Kechero[1] and Asrat Guja[1]

[1]Department of Animal Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Although camel production is the primary source of revenue for pastoralists and agro-pastoralists in the Borana, a number of issues affect camel performance in the area, with one of the most pressing being feed availability. Camel production often involves optimizing available feed availability, which is considered to be the principal limiting factor in a free-browsing environment. The purpose of this study was to investigate the feed resources that are available for dromedary camels (Camelus dromedarius) and their utilization practices in the Borana Plateau, southern Ethiopia. A household survey questionnaire, a focused group discussion, and key informant interviews were utilized to collect data from 364 camel herders in nine kebeles in the districts of Yabello, Elwaye, and Gomole. The results show that browsing trees and shrubs (53.3%) were the most commonly known feed resources accessible in the study's areas, followed by herbaceous feed resources (42.3%). The total dry matter (DM) available was 1379.59 tons less than the total dry matter required for camels, which was 5242.71 tons. The total dry matter balance was −3863.12 tons along the studied districts, which was below the requirements. Camel feed is scarce all year, and the survey results show that 90.9% of respondents do not conserve camel feed in any way. Furthermore, 89.6% stated that they have received no training in feed conservation measures. This finding highlighted the significance of raising herder awareness of fundamental feed management and conservation techniques.

International Journal of Mathematics and Mathematical Sciences

DOI: http://dx.doi.org/10.1155/2023/6620669

2023(2023)

A Numerical Approach for Diffusion-Dominant Two-Parameter Singularly Perturbed Delay Parabolic Differential Equations

Solomon Woldu Worku[1] and Gemechis File Duressa[2]

[1]Department of Mathematics, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

A numerical scheme is developed to solve a large time delay two-parameter singularly perturbed one-dimensional parabolic problem in a rectangular domain. Two small parameters multiply the convective and diffusive terms, which determine the width of the left and right lateral surface boundary layers. Uniform mesh and piece-wise uniform Shishkin mesh discretization are applied in time and spatial dimensions, respectively. The numerical scheme is formulated by using the Crank-Nicolson method on two consecutive time steps and the average central finite difference approximates in spatial derivatives. It is proved that the method is uniformly convergent, independent of the perturbation parameters, where the convection term is dominated by the diffusion term. The resulting scheme is almost second-order convergent in the spatial direction and second-order convergent in the temporal direction. Numerical experiments illustrate theoretical findings, and the method provides more accurate numerical solutions than prior literature.

Frontiers in Health Services

DOI: http://dx.doi.org/10.3389/frhs.2023.1203179

3(2023)

Membership dropout rates and associated factors in a community-based health insurance scheme in southern Ethiopia: a mixed method study

Haile,Yosef[a],Abdulkadir,Hanan[a];Shewangizaw,Misgun[a];Meskele,Simeon[b];Temesgen,Kidus[a];Haile, Temesgen[c];**Niguse, Daniel[d]**;Hailegebreal, Samuel[e];Biratu, Getahun Gorfu[f]

[a] Department of Public Health, School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[b] Department of Biomedical Sciences, School of Medicine, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[d] Department of Health Informatics, School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Dropout from community-based health insurance (CBHI) membership is a common problem in low-income countries, even if its implementation leads to substantial improvement in the utilization of essential health services. Few studies have addressed the factors contributing to dropout rates in southern Ethiopia. Therefore, the purpose of this study was to determine the rate of CBHI dropout in southern Ethiopia as well as any contributing factors. Methods: This mixed-method cross-sectional study was conducted among 460 randomly selected CBHI-enrolled households at the Arba Minch Health and Demography Surveillance System site from November 1, 2021, to April 30, 2022. The quantitative data were collected by an open data kit (ODK). using an interviewer-based structured questionnaire and analyzed using Statistical Package for the Social Sciences (SPSS) version 25.0. Multivariable logistic regression was applied to identify significant variables. The qualitative data were used to support the quantitative findings and were gathered through in-depth interviews (by the CBHI coordinator and three purposively selected health extension workers) and focus group discussions (in two randomly selected villages). The qualitative data were analyzed using thematic analysis. Finally, triangulation was used to present both the quantitative and qualitative findings. Results: This study found that 92 (21.5%) people stopped their community-based health insurance membership. The presence of sick adults [AOR = 0.281, 95% CI (0.136–0.581)], trust of participants in the contracted health facilities [AOR = 0.227, 95% CI (0.121–0.436)], and poor knowledge of the participants [AOR = 5.518, 95% CI (1.526–19.950)] were significant predictors. Conclusion: The magnitude of the dropout rate was high in this study when compared with the national target. The absence of a sick adult, the absence of trust among participants, and the poor knowledge status of the participants were significant predictors. We suggest that the health facility managers, the CBHI coordinating office, and the district health office give priority to implementing a wide range of knowledge improvement activities and a transparent system in public health facilities. Studies with longitudinal research designs are called for at a wide range of national levels to address the limitations of this study.

Environment, Development and Sustainability

DOI: http://dx.doi.org/10.3389/frhs.2023.1203179

2023(2023)

Evaluation of possible health risks associated with groundwater pollution at Kombolcha, a north-central Ethiopian industrial town in the Awash River basin

Mohammed, Nurye[a]; **Aragaw, Tamru Tesseme[b]**,Gnanachandrasamy, Gopalakrishnan[c]

[b] Faculty of Water Supply and Environmental Engineering, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Groundwater contamination from intensive agricultural and industrial activity can lead to deteriorated drinking water quality that poses serious health threats for humans. The intention of the study was to appraisal the level of groundwater pollution and the potential risks it could pose to the residents of Kombolcha Town, an area with significant industrial and agricultural activity. Samples were obtained from seventeen groundwater wells in August 2021 and examined with standard methods. The groundwater comprehensive and indices for irrigation were calculated to evaluate the appropriateness of water quality for various purposes. A USEPA model was applied to estimate human health risks from polluted groundwater. Results revealed that all hydrogeochemical characteristics and heavy metals, with the exception of chromium, were within Ethiopian and World Health Organization drinking water guideline. Groundwater quality pollution index results for drinking demonstrated that 5.88% of water samples were evaluated as very good, whereas 94.12% of water samples were rated excellent. Ca-HCO_3 facies make up 53% of samples, and Ca–Mg–Cl facies account for the remaining samples. Total non-carcinogenic risks to health for males extended from 0.35 to 2.39, for women from 0.38 to 2.59, and for children from 0.49 to 3.38. Cancer risks ranged from 0 to 1.6×10^{-3} for men, 0 to 1.74×10^{-3} for females, and 0 to 2.24×10^{-3} for children. These results indicate that children in this region suffer more risks for health than adults. The study concluded that to safeguard water quality, reduce threats to health, and more efficiently use the groundwater resource, prompt and efficient actions on agricultural and industrial practices must be taken in the research area.

Journal of Parasitology Research

DOI: http://dx.doi.org/10.1155/2023/9945998

2023(2023)

Seasonal Prevalence and Status of Anthelmintic Resistance of Goats' Gastrointestinal Nematodes, Mirab Abaya, Southern Ethiopia

Behailu Negash,[1] **Wasihun Seyoum ,[2]** and Desie Sheferaw[3]

[2] Arba Minch University, College of Agriculture, Arba Minch, Ethiopia

Abstract

Goats are an important source of livelihood especially for smallholder communities. But gastrointestinal nematodosis is the greatest threats of goat production. A repeated cross-sectional and field experimental study design was conducted from December 2020 to August 2021 in Mirab Abaya district, with the aim of seasonal prevalence gastrointestinal nematode infection and assessment of anthelmintic resistance. A systematic random sampling strategy was used to select the study goats. The overall prevalence of gastrointestinal nematode infections of goats in the study area was 57.9% (95% CI: 54.4-61.4), of which 48.7% (95% CI: 43.7-53.7) and 67.2% (95% CI: 62.3-71.7) accounted to dry and wet seasons, respectively. The multivariable logistic regression analysis showed that season, age, sex, and flock size were significantly ($p<0.05$) influenced the prevalence of gastrointestinal nematode infection of goats. The number of eggs per gram of faeces (EPG) was ranged from 100 to 2500. The overall mean egg per gram of faeces (EPG) was 461.1±20.9. The mean EPG of wet season (532.7±28.6) was higher than the dry season (362.3±29.1). From faecal culture, 552 nematode larvae were recovered, and the most commonly identified nematode genera were Haemonchus (36.4%) that followed by Trichostrongylus (28.1%), Oesophagostomum (15.4%), Bunostomum (11.4), Teladorsagia (5.4%), and Strongyloides (3.0%) species. From the anthelmintic resistance test in the field, the percentage reduction and 95% confidence limit of albendazole were 96% (84.2-99.0) and 97.0% (84.6-99.4) in dry and wet seasons, respectively. Here, the lower limit of 95% CI was less than 90% both in dry and wet seasons; and hence, albendazole was suspected for resistance development by gastrointestinal nematode. From a pooled faecal culture that collected from albendazole-treated goats, Haemonchus species was recovered. Therefore, due attention shall be by animal health professionals in the area in the use of albendazole. Animal health extension work to create awareness of how anthelmintic is used is helpful in reducing the risk. Changing the type of anthelmintic drug after using for some period will minimize the risk of anthelmintic resistance development.

IEEE Access

DOI: http://dx.doi.org/10.1109/ACCESS.2023.3301564

11(2023)

Efficient Assamese Word Recognition for Societal Empowerment: A Comparative Feature-Based Analysis

Naiwrita Borah[1], Udayan Baruah[2], Mahesh Tr 1(Senior Member, Ieee), Vinoth Kumar V [3](Member, Ieee), D. Ramya Dorai[4], and **Jonnakuti Rajkumar Annad[5]**

[5]Arba Minch University, Sawla Campus, Department of Electromechanical Engineering, Arba Minch, 4400, Ethiopia

Abstract

The preservation and digitization of historical data are crucial for ensuring the continuity and accessibility of information over successive generations. The present study investigates the utilization of machine learning methodologies in the identification of Assamese words, focusing specifically on their distinctive visual characteristics. The main aim of this project is to improve word recognition technologies in Indic languages, specifically focusing on Assamese, in order to preserve and provide access to Assamese literature for future generations. The classification procedure entails the examination of 19 shape-related attributes through a range of machine learning algorithms, such as Logistic Regression, Decision Trees, Random Forest, Support Vector Machine (SVM) with various kernels, K Nearest Neighbors, and Gradient Boosting. The assessment of the model involves the utilization of various metrics such as Accuracy, Precision, Kappa, F1-score, Model Build Time, and Model Run Time to evaluate the computational efficiency. Additionally, the metrics of Area under the Curve (AUC) and Receiver Operating Characteristic (ROC) are also considered in the evaluation process. Out of the four datasets analyzed, Dataset 3 exhibits the highest level of performance. It is worth noting that Gradient Boosting demonstrates the highest level of accuracy, reaching 96.03% for conventional machine learning appraoches. Logistic Regression and SVM with RBF kernel closely trail behind, achieving accuracies of 95.64% and 95.60% respectively. Furthermore, the research conducted in this study also employs multiple layers of Convolutional Neural Networks (CNN), resulting in a remarkable recognition accuracy of 97.3%. This finding demonstrates that the CNN model and the proposed feature-set are in close proximity to one another in terms of the evaluation metrics.

Frontiers in Applied Mathematics and Statistics

DOI: http://dx.doi.org/10.3389/fams.2023.1255672

9(2023)

Parameter-uniformly convergent numerical scheme for singularly perturbed delay parabolic differential equation via extended B-spline collocation

Hassen, Zerihun Ibrahim[a]; **Duressa, Gemechis File[b]**

[a] Department of Mathematics, Arba Minch University, Arba Minch, Ethiopia

Abstract

This paper presents a parameter-uniform numerical method to solve the time dependent singularly perturbed delay parabolic convection-diffusion problems. The solution to these problems displays a parabolic boundary layer if the perturbation parameter approaches zero. The retarded argument of the delay term made to coincide with a mesh point and the resulting singularly perturbed delay parabolic convection-diffusion problem is approximated using the implicit Euler method in temporal direction and extended cubic B-spline collocation in spatial orientation by introducing artificial viscosity both on uniform mesh. The proposed method is shown to be parameter uniform convergent, unconditionally stable, and linear order of accuracy. Furthermore, the obtained numerical results agreed with the theoretical results.

Keywords: artificial viscosity; blending function; extended cubic B-spline collocation scheme; implicit Euler method; parabolic convection-diffusion; singularly perturbed delay differential equations

Journal of Groundwater Science and Engineering

DOI: http://dx.doi.org/10.26599/JGSE.2023.9280021

11(2023)

Determination of groundwater potential distribution in Kulfo-Hare watershed through integration of GIS, remote sensing, and AHP in Southern Ethiopia

Edmealem Temesgen[1], Demelash Wendmagegnehu Goshime[1], Destaw Akili[1]

[1]Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Identification of groundwater potential areas (GPA) is important in regions facing surface water scarcity, as it assists in effective planning and utilization of groundwater for various purposes. This study employs the methods of remote sensing (RS), geographic information system (GIS) model, and analytical hierarchy process (AHP), multi-criteria decision analysis (MCDA) to locate and map the prospective groundwater areas in the Kulfo-Hare watershed. Seven significant groundwater influencing factors were selected for the determination of groundwater potential in the area: Geology, land use/land cover (LULC), soil, rainfall, slope, drainage density, and lineament density. By applying a five-class classification scheme (very low, low, moderate, high, and very high), the GIS models were used to define the distribution of groundwater potential areas in terms of area coverage (km2), percentage and mapping. The results show that the groundwater potential (GWP) distribution in the research region is as follows: 9.7% (6 035.9 ha) classified as very high GWP, 29.6% (18 606 ha) classified as high, 24.5% (15 245 ha) classified as moderate, 18.1% (11 431 ha) as low and 18.1% (11 492 ha) very low GWP, on the basis of the weighted overlay evaluation. Although a few regions are identifies as extremely low GWP, most of the study area is characterized by very high to moderate GWP. These findings provide valuable insight for sustainable groundwater planning by the government bodies, decision-makers, and private sectors.

Keywords: Groundwater potential zone; Multi-criteria decision; Normalization; Pairwise; Weighed overlay analysis

Frontiers in Public Health

DOI: http://dx.doi.org/10.3389/fpubh.2023.1141544

11(2023)

Voluntary blood donation knowledge, attitude, and practice among adult populations of Hosanna Town, South Ethiopia: a community-based cross-sectional study

Abdulhakim Mussema[1]*, Solomon Gebre Bawore[1],Tewodros Abebaw[2], Wegayehu Tadese[2], Melsew Belayineh[2],Abel Yirga[2], **Tofik Mohammed[3]** and Abdurezak Mohammed Seid[1]

[3] Department of Internal Medicine, Arba Minch University, Arba Minch, Ethiopia

Abstract

Introduction: Even though blood donation has increased in the past decades, it remains a challenge worldwide. An adequate blood supply can only be assured through voluntary blood donation. There is inadequate information on the level of blood donation practice in the current study area. This study aimed to assess the knowledge, attitude, practice, and associated factors toward voluntary blood donation among Hosanna town adult populations. Methods: A cross-sectional study was conducted from 1 May 2022 to 30 June 2022, on a total of 422 adult populations of Hosanna town. A simple random sampling technique was used to select the study subjects. Data were collected by face-to-face interviews using a structured pre-tested questionnaire. The levels of knowledge, attitude, and practice of participants toward voluntary blood donation were measured using a set of questions. Data were analyzed using SPSS version 25. Chi-square and odds ratios were calculated, and the results were presented with words and tables. Results: In this study, a total of 422 participants enrolled with a response rate of 96.6%. Of the total respondents, 204 (48.3%), 209 (49.5%), and 123 (29.15%) study participants had good knowledge, favorable attitude, and experience of blood donation, respectively. Participants' sex being male and having favorable attitudes were found to have significant associations with blood donation practice. Furthermore, it was found that male participants were more than two and a half times more likely to donate blood than female participants (AOR: 2.53; 95% CI: 1.54, 4.15). Those who had favorable attitudes were found more than three and a half times more likely to donate blood than those having unfavorable attitudes (AOR: 3.54; 95% CI: 1.32, 9.46) Conclusion and recommendations: A large proportion of adult populations had poor knowledge, unfavorable attitudes, and low practice toward voluntary blood donation. Therefore, local and national blood banks and transfusion agencies should design strategies that can be implemented to improve the knowledge or attitude of the adult population and motivate the population to donate blood voluntarily.

Keywords: attitude; Ethiopia; Hosanna; knowledge; practice; voluntary blood donation

Clean Air Journal

DOI: http://dx.doi.org/10.17159/caj/2023/33/2.16488

33(2023**)**

Technical article Developing and testing a PM2 5 low-cost sensor in Ethiopia under ambient and indoor air pollution conditions

Dingemanse, Johannes Dirk[a],Tademe, Afework[b]

[a] Faculty of Water Supply and Environmental Engineering, Water Technology Institute, Arba Minch University, Ethiopia
[b] Faculty of Electrical and Computer Engineering, Institute of Technology, Arba Minch University, Ethiopia

Abstract

PM25 low-cost sensors are a promising trend for low-income countries, where the PM25 associated burden of disease is high and few measurement instruments are available. Commercially available Sensor Systems (SSys) are relatively affordable and easy to use. They are, however, not designed for or evaluated in contexts characterized by much biomass burning, regular power interruptions and/or low internet coverage, typical for low-income countries. Alternatively, local teams can build a sensor system with PM25 sensors from Original Equipment Manufacturers (OEM). Existing African OEM projects depend on international partners and funding. This puts the affordability for local teams without funding into question. Furthermore, field comparisons of such sensors for ambient concentrations and indoor settings are rarely conducted in low-income contexts. In Arba Minch, Ethiopia, we developed a sensor system (SPSA) with the OEM Sensirion SPS30 and other components, together with an Arduino microprocessor, with LoRaWAN data transmission. We used the hardware and software in multiple configurations. The SPSA was used in 14 contexts typical for Ethiopia. During these tests we encountered problems that were easily solved by maintenance on location. On seven locations we collocated the SPSA with itself, gravimetric instruments and/or SSys. Amongst SPSA we found coefficients of determination (R^2) of at least 0.98 for three ambient and one indoor location. The accuracy in comparison with the gravimetric method was 16% under ambient and 13% under indoor circumstances. This is lower than the internationally required 25%. The R^2 in comparison to two SSys was 0.91-0.98 under ambient and 0.88-1.00 under indoor circumstances. The SPSA is a versatile sensor system that can be used in both ambient and indoor air pollution circumstances. Local development without international partners and funding resulted in local experience gaining, low costs, local ownership, and the possibility of tailoring the system to local needs regarding power and connectivity.

Frontiers in Veterinary Science

DOI: http://dx.doi.org/10.3389/fvets.2023.1198212

10(2023)

Nutritional quality of indigenous legume browse in southern Ethiopia: farmers' preference and correlation of local valuation of feed value with scientific indicators

Abraham, Getachew[a].Kechero, Yisehak[a];Andualem, Dereje[b]

[a] Department of Animal Science, College of Agricultural Sciences, Arba-Minch University, Arba Minch, Ethiopia

Abstract

Introduction: Developing a technology for fodder trees and shrubs tailored to farmers' preferences is best done with their input, perceptions, and interests in mind. Objective: The research aimed to determine farmer preferences for indigenous legumes, fodder trees, and shrubs (ILFTS) and to examine the relationship between feed valuation and scientific parameters. Methods: A focus group discussion (FGD) was conducted with 10 farmers in each agroecological zone to determine the benchmarks for the preference ratings. The respondent farmers used the preference score sheet to rate all ILFTS on an individual basis. Twenty farmers with extensive experience in ILFTS took part in the preference score rating of each plant species in each agroecosystems. Dry matter (DM), organic matter (OM), ash, crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL), metabolizable energy (ME) and condensed tannin (CT) content of the samples were determined. The standard two-stage in vitro Tilley and Terry method was used to measure the in vitro dry matter digestibility (IVDMD) and in vitro organic matter digestibility (IVOMD) of samples. Digestible organic matter in dry matter (DOMD) and ME values were estimated using standard models. Analysis of variance (ANOVA) was used to analyze the variation among the species in agroecosystems. Tukey HSD tests were used for mean separation. Results and discussions: Farmers evaluated the ILFTS using a variety of parameters, according to the study (feed value, growth rate, biomass output, compatibility, and multifunctionality). The farmers' ILFTS preference score on the evaluation criteria differed considerably ($p<0.05$) with species in agroecosystems. The CP, ash, and ME values of ILFTS in the study were moderate to high although exhibited a wide variation among the species in agroecosystems. The CP content was above the minimum requirement (8%) to support the normal function of rumen microorganisms. Moreover, CP content exhibited a positive significant correlation with IVDMD, IVOMD, and DOMD, unlike CT and ADL which exhibited a negative significant correlation. Conversely, the DM, OM, CP, IVDMD, IVOMD, DOMD, and ME were shown a positive significant correlation with farmers' feed value preference score, unlike the ADL and CT which exhibited a negative significant correlation. Conclusions: Farmers' indigenous knowledge of feed value is therefore relevant for judging the nutritive value of the ILFTS and could complement the scientific indicators

Journal of Maternal-Fetal and Neonatal Medicine

DOI: http://dx.doi.org/10.1080/14767058.2023.2234067

36(2023)

Modern contraceptive use and associated factors among reproductive-age women in Ethiopia: multilevel analysis evidence from 2019 Ethiopia mini demographic and health survey

Samuel Hailegebreal[a], **Temesgen Dileba Kale[b], Girma Gilano[b], Yosef Haile[b]** and Atsedu Endale Simegn[c]

[b] School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Despite the high fertility and population growth rates, the use of modern contraceptives remains low in low- and middle-income countries. Different pocket-sized studies on the use of modern contraceptive methods conducted in various parts of Ethiopia have been extremely varied and ambiguous. Therefore, this study aimed to assess modern contraceptive use and its associated factors in women of reproductive age in Ethiopia. Methods: Cross-sectional data from the Ethiopia Interim Demographic Health Survey (EMDHS) 2019 in a stratified, two-stage, and cluster sampling study. Multilevel binary logistic regression analysis was used to fit the associated factors. The interclass correlation (ICC), median odds ratio (MOR), proportional change variance (PVC), and deviance were used for model comparison and fitness. The adjusted odds ratio (AOR) with 95% confidence interval (CI) was used to identify the significant factors of modern contraceptive use. Result: The multilevel analysis demonstrated that Orthodox religion [AOR = 1.7; 95%CI: 1.4–2.10] protestant religion [AOR = 1.2; 95%CI: 0.93–1.62], married [AOR = 4.2; 95%CI: 1.93–9.07], primary education [AOR = 1.5; 95%CI: 1.26–1.76], secondary education [AOR = 1.36; 95%CI: 1.04–1.77 [AOR = 1.89; 95%CI: 1.37–2.61], middle [AOR = 1.4; 95%CI: 1.14–1.73], rich [AOR = 1.3; 95%CI: 1.06–2.68] were positively associated with modern contraceptive utilization, while the age group of 40–49 [AOR = 0.45, 95% CI: 0.34–0.58], and high community poverty [AOR = 0.62; 95%CI: 0.46–0.83] were negatively associated with modern contraceptive utilization. Conclusion: The prevalence of modern contraception in Ethiopia remains low. Maternal age, religion, maternal education, marital status, wealth index, region, and community poverty were significant predictors of modern contraceptive utilization in Ethiopia. Governments and non-governmental organizations should expand their public health programs to poorer communities to increase the use of modern contraception in the country.

Keywords: EDHS; Ethiopia; Modern contraceptives; multilevel; reproductive age; Women

Cogent Food and Agriculture

DOI: https://doi.org/10.1080/23311932.2023.2216042

9(2023)

Extraction and characterizations of omega 3-fatty acid from cat fish collected from Arba Minch Chamo Lake

Birhanu Zeleke Tilinti[1]*, Tewodros Birhanu Ayichiluhim[1], Alemu Mekonnen Tura[1] and Ramesh Duraisamy[1]

[a] Chemistry Department, College of Natural and Computational Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Fish oil is a nutrient-dense dietary product that contains long-chain omega-3 polyunsaturated fatty acid which is used to prevent and reduce type II diabetes, coronary heart disease, stroke, excessive blood pressure, and other cholesterol-related health issues. This study's main goal is to use a solvent to extract omega-3 fatty acids from fish oil. The extraction of omega-3-fatty acid was carried out at a speed of 4000rpm, temperature 60 ^{o}C, pH 6.5, 70-minute extraction period and a ratio of Methanol: Chloroform (2:1 v/v %). The extracted samples were characterized by proximate value and the result was found to be moisture content of (0.933 (Formula presented.)), Organic dry matter (53.11%), ash content (1.18 (Formula presented.)) total protein (0.96),Insoluble matter(0.01), acid value (14.96 (Formula presented.)), peroxide value (22.433 (Formula presented.)),Refractive index(1.414), Saponification value (99.3 (Formula presented.) 31.2), Fat% 43.7 (Formula presented.), iodine value (31.72 (Formula presented.)), Density Value(0.975 (Formula presented.), % free fatty acid (0.846), pH (6.233 (Formula presented.)), value specific gravity (1.31 (Formula presented.)). The instrumental characterization was performed by using GC-MS, for the analysis of the FFA profiles and functional constitutions; we used UV-Visible and FTIR spectroscopy. To maintain compliance with commercial specifications and food standards, it is crucial to quantify proximate composition. With a ratio of 1.325 to 2.567, the high quantities of unsaturated fatty acids and low levels of saturated fatty acids imply that the oils and fatty acids have low cholesterol levels overall. Ratio for economic evaluation is necessary to ensure that by-products have a bright future and may be turned into new goods with a significant value addition.

Keywords: Extraction; fish oil; Omega 3-fatty acid and proximate studies

Lecture Notes in Networks and Systems

DOI: http://dx.doi.org/10.1007/978-981-99-1909-3_20

681 (2023)

Effect on Compressive Strength of Portland Pozzolana Cement on Adding Admixtures Using Machine Learning Technique

Prafful Negi[a], Vinod Balmiki[a], Awadhesh Chandramauli[a], Kapil Joshi[b], **Anchit Bijalwan[c]**

[c] Adjunct Prof, Faculty of Electrical and Computer Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Although concrete is one of the most common building materials used today, determining the precise concrete compressive strength is still difficult due to the extremely complicated interplay between its composition. The paper shows designing of M40 concrete and then finds the change in compressive strength of concrete on adding admixtures. First admixture used by us is, ground granulated base furnace. We replace cement with GGBS with 5, 20, and 35% of cement. We make 6 cubes sample of each case and then test 3 cubes sample of each case on 7 day and other 3 cubes samples on 28 days. Second admixture used by us is sugar. Here we didn't replace cement with sugar but taken certain percentage of total weight of cement. We have taken.01,.05,.08, and.1% of weight of cement. In this also we had made 6 cube samples of each case and then test 3 cubes samples of each case for 7 days and remaining cubes are tested on 28 days. Finally, we compared normal concert compressive strength, concrete formed by using GGBS and then concrete made using sugar admixture. In order to determine the concrete workability and determine the impact of the admixture on the workability of the concrete, we again undertake slump tests in both circumstances. In between, we also discussed the problem of input accuracy and output relationship during the processing of data using machine learning techniques.

Keywords: Admixtures; Concrete; Granulated blast furnace slag (GGBS); Sugar

International Journal of RF and Microwave Computer-Aided Engineering

DOI: http://dx.doi.org/10.1155/2023/9533725

2023(2023)

A High-Frequency Planar-Configured Millimeter-Wave MIMO Antenna for Fifth-Generation NR Operations

Tiwari, Poonam[a].;Gahlaut, Vishant[a]:Kaushik, Meenu[b].;Shastri, Anshuman[c].;Siddiqui, Gulman[a].;**Singh, Bhupender[d]**

[d] Department of Water Supply and Environmental Engineering, Arba Minch University, Arba Minch Amu.edu.et, Ethiopia

Abstract

This article presents a simple planar millimeter-wave (mm-wave) multiple input multiple output (MIMO) antenna with four closely spaced radiating elements. The antenna is intended to enhance the bandwidth for 5G new radio (NR) applications and also cover the industrial Ka-band (26.5-40 GHz), Q-band (30-50 GHz), and U-band (40-60 GHz) frequency ranges. The antenna is designed using Rogers RT/duroid 5880 substrate with a size of 25×26×1.6 mm3. The proposed antenna consists of four identical radiating elements with two of them positioned in a linear configuration facing each other, while the other two elements are placed opposite to the first two, which improves isolation between the elements. Across the entire operating frequency range (26-60 GHz), the antenna demonstrated excellent performance, including 34 GHz wide bandwidth, high isolation of >25 dB, nearly omnidirectional radiation patterns, high gain of 11.1 dB with a high radiation efficiency of 94%, low envelope correlation coefficient (ECC) of 0.0068, and high diversity gain (DG) of 9.967 dB. The simulated findings exhibit a strong positive correlation with the experimental results. The proposed MIMO antenna design is a promising solution for 5G NR applications.

Cogent Engineering

DOI: http://dx.doi.org/10.1080/23311916.2023.2283297

10(2023)

Numerical groundwater modelling under changing water abstraction in Weyib watershed, Ethiopia

Mesfin Reta Aredo[1]*, Tarun Kumar Lohani[1] and Abdella Kemal Mohammed[1]

[1] Faculty of Hydraulic and Water Resources Engineering, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Groundwater is the primary source of water supply in Ethiopia. The study area was challenged due to increasing water demand, uneven water resource distribution, and noticeable changes in groundwater levels. The study focused on the examining of existing abstraction and future water demand scenarios on groundwater balance in the Weyib watershed using the WetSpass-M and MODFLOW-2005 models. The input datasets, such as aquifer properties, observed groundwater heads, hydrogeology, groundwater recharge, the Digital Elevation Model (DEM), and hydrological data were used. Datasets were prepared to better represent subsurface hydrology and its future demand effects evaluated using calibrated steady-state numerical groundwater modeling. The WetSpass-M and MODFLOW-2005 models depicted good performances during the simulations of groundwater recharge and groundwater budget under existing abstractions and estimated demand scenarios, respectively. The mean annual groundwater recharge estimated was 177.66 mm/year. The existing groundwater abstraction was 34,686.39, estimated short-term and long-term water demand scenarios were 72,113.61 and 93,795.57 m^3/day, respectively. The upstream area has the highest groundwater head and recharge, while decreasing as it approaches the Weyib watershed outlet. During the outflow groundwater budget, the groundwater abstractions increased as expenses of river leakage and head dept. bounds increased. Moreover, the increasing groundwater withdrawal would reduce groundwater heads, and the estimated future water demand scenarios would substantially impact the groundwater budget, which would also have an impact on the watershed hydrology and ecosystem.

Keywords: abstraction; groundwater modelling; MODFLOW-2005; water demand scenarios; Weyib watershed

International Journal of River Basin Management

DOI: http://dx.doi.org/10.1080/15715124.2023.2264268

(2023)

Identifying groundwater prospect zones through earth observation techniques in Bilate watershed, Rift Valley Lakes Basin, Ethiopia

Yilma, Demisachew[a];Hatiye, Samuel Dagalo[a];Hussien, Behailu[a];Suryabhagavan, Karuturi Venkata[b]

[a] Water Resources Research Center, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Groundwater is one of the most valuable natural resources gifted to mankind, especially in surface water-scarce locations. Most parts of Ethiopia dependent on the amenity for common needs, irrigation, etc. The lack of a scientific approach to its exploitation and management makes the resource underutilized. Therefore, Remote sensing (RS) and Geographic information systems (GIS) were utilized to decipher potential groundwater zones (PGWZ) existing in the Bilate watershed of the nation to economize, speed up and technicalize the system. The ground truth of the results obtained was verified to confirm the reliability of the techniques used. Through RS, optical and microwave data were obtained, while GIS was helpful in collecting information on water points mapping and 2D resistivity survey in locating the aquifers. In particular, resistivity studies revealed both pyroclastic and rhyolite intrusions that act as water barriers and the basaltic and ignimbrite rocks that favour aquifer affluence. During the process of identification and quantification of PGWZ in the watershed, the analytical hierarchy process (AHP), weighted linear combination (WLC), and digital elevation model (DEM) were employed in thematic layer formation, reclassification, overlay analysis and map production. As a result, five PGWZ having very high (19.8%), high (35.3%), moderate (22.6%), low (19.3%), and very low (2.9%) prospects were identified. Similarly, over 75% of the area was moderate to high category in PGWZ. The accuracy of the qualitative groundwater inventory was 92.64 per cent. Thus, combining high-resolution optical/microwave data and GPS information with the AHP model has ascertained the accuracy of the PGWZ identified. So ultimately, the present work lays the foundation for the use of advanced spatial techniques in finding natural resources useful for the welfare of the nation and its populace.

Keywords: 2D resistivity; AHP; Bilate watershed; GPS; groundwater potential; sentinel data

Cogent Social Sciences

DIO: http://dx.doi.org/10.1080/23311886.2023.2281047

9(2023)

The Choices of Livelihood Diversification Strategies and Determinant Factors Among the Peri-Urban Households in Amhara Regional State, Ethiopia

Tadele Alamneh[1]*, Melkamu Mada1 and Tora Abebe[1]

[1]Department of Economics, College of Business and Economics, Arba Minch University, Arba Minch, Ethiopia

Abstract

Diversification of livelihoods is crucial to address poverty and food insecurity and improve the welfare of peri-urban people. However, there has been insufficient research exploring livelihood diversification strategies and their determinants in peri-urban areas. This study investigates livelihood diversification strategies and their determinants among peri-urban households in Injibara, Burie, and Gish Abay towns in the Amhara region, Ethiopia. The study used both primary and secondary data, with 393 households included through a multi-stage sampling procedure. Data were collected through interviews, focus group discussions, and field observations. Descriptive and inferential statistics along with a multinomial logit model were employed. The results showed that on-farm alone (36.1%), on-farm plus non-farm (17.5%), on-farm plus off-farm (24.5%), and a combination of on-farm plus non-farm plus off-farm (21.9%) activities were the most pertinent livelihood strategies in the study area. The multinomial logit model results revealed that dependency ratio, land size, distance from the marketplace, access to extension services, exposure to shock, access to training, and cooperative membership were the major determinants of livelihood diversification strategies. Moreover, poor infrastructural development, absence of technical support, inadequate skill training, and lack of awareness are constraints to livelihood diversification in the area. Thus, a comprehensive development plan that enhances successful livelihood diversification is found to be imperative. Therefore, policies and actions aimed at strengthening the livelihoods of peri-urban communities should focus on expanding peri-urban infrastructure, enhancing capacity-building efforts, and stakeholder cooperation.

Keywords: diversification; livelihood; MNL; non-farm; off-farm; on-farm

Global Business Review

DOI: https://doi.org/10.1177/09721509231160381

2023(2023)

Income Diversification, Bank Volatility Risk and Performance in Low- and Middle-income African Countries: Evidence from Normal and Crisis Periods

Mohammed Adem

Department of Accounting and Finance, Arba Minch University, Arba Minch, Ethiopia

Abstract

Using panel data from 2000 to 2019 for low-income and middle-income African countries, this study examined what determines income diversification and its impact on bank risk and performance. Based on the system's generalized method of moments and least square dummy variable results, high volatility risk, profitability, cost efficiency and high GDP encourage banks to diversify their income. While having lower leverage, a high net interest margin, and during inflationary times, banks are less encouraged to pursue income diversification. Moreover, income-diverse approaches improve profitability in regular and crisis periods for low-income and middle-income countries. However, income diversification does not lower volatility risks during crisis times. The study shows that increasing the cost efficiencies, higher liquidity and leverage ratios positively affects profitability and reduces volatility risk during the non-crisis period. The net interest margin positively influences risk during and after a crisis. The results show that GDP positively connects to a bank's profitability. The link between profitability and inflation varies based on the analysis's emphasis (i.e., before, during or after the crisis) and income level (i.e., low income or middle income). This study's results have significant implications for bankers, regulators and the banking literature on the determinant, merits and risks of income diversification.

Keyword: **s**ynamic panel model; financial crisis; income diversification; low-and middle-income countries; performance; volatility risk

HIV/AIDS - Research and Palliative Care

DOI: http://dx.doi.org/10.2147/HIV.S436787

15(2023**)**

Isoniazid Preventive Therapy Uptake and Its Effect on Tuberculosis Incidence Among People Living with HIV in Illubabor and Buno Bedelle Zones, South-West Ethiopia, 2022: A Retrospective Cohort Study

Gebremeskel Mulatu [1] , Maycas Gembe [1] , Jiregna Chalchisa [1] , Tigist Teklu [1] , Worke Yismaw 1 ,Debela Dereje [1] , **Habtamu Wondmagegn[2]**

[2]Department of Anatomy, School of Medicine, Arba Minch University, Arba Minch, Ethiopia

Abstract

Introduction: Tuberculosis (TB) remains the leading cause of death among human immune deficiency virus (HIV) patients. Based on the 2020 global TB report, Ethiopia was among the 30 high TB and TB/HIV burden countries. This study filled gaps regarding IPT uptake in the study area and representative sample determination for assessing TB incidence and its predictors at public health facilities in Illubabor and Buno Bedelle zones, south-west Ethiopia. Methods: This retrospective cohort study was conducted among people living with HIV (PLHIV) who were on antiretroviral therapy (ART) at public health facilities in Illubabor and Buno Bedelle zones, south-west Ethiopia. Both isoniazid preventive therapy (IPT) exposed and unexposed PLHIV were followed from the date of ART initiation until the date of TB diagnosis of the most recent visit prior to the end of follow-up. The Cox proportional hazard model was employed to identify variables that predicted the incidence of TB at a P value of <0.05. Results: Data were collected on 421 PLHIV, with a response rate of 97.4%. The median (interquartile range (IQR)) age of the study participants was 32 (28–40) year. The incidence rate of pulmonary TB was 3.1 per 1000 person-months (95% CI: 2.4–3.9). The incidence rate of TB among IPT-exposed PLHIV was 1.45 per 1000 person-months, but it was 6.2 per 1000 person-months in the unexposed group. Patient's residence, IPT exposure, baseline ART adherence, baseline hemoglobin level, baseline CD4+ cell, recent hemoglobin level, recent CD4+ cell, recent BMI, and recent WHO HIV clinical stage were independently associated with the incidence of TB. Conclusion: Healthcare professionals working in ART clinics should routinely assess HIV-positive individuals for changes in clinical indicators and environmental exposures like living conditions, which will help HIV-positive individuals in reducing their risk for TB. Likewise, patients attending ART clinics should receive counseling on a regular basis.

Keywords: isoniazid preventive therapy; people living with HIV; tubercul

Differential Equations and Dynamical Systems

DOI: 10.1007/s12591-023-00645-y

2023(2023)

Uniformly Convergent Numerical Scheme for Solving Singularly Perturbed Parabolic Convection-Diffusion Equations with Integral Boundary Condition

Hailu, Wondimagegnehu Simon[a].;**Duressa, Gemechis File[b]**

[a] Department of Mathematics, Arba Minch University, Arba Minch, 21, Ethiopia

Abstract

The singularly perturbed parabolic convection-diffusion equations with integral boundary conditions and a large negative shift are studied in this paper. The Crank-Nicolson finite difference scheme for the temporal direction and the non-standard finite difference scheme for the spatial direction are applied to formulate a parameter-uniform numerical method. The Simpson's integration rule is used to handle the integral boundary condition. The Richardson extrapolation technique is applied to enhance the order of convergence of the spatial variable. The stability and uniform convergence analysis of the proposed method are studied. The method is shown to be uniformly convergent with a quadratic order of convergence in both temporal and spatial directions. Two test examples are considered to verify the validity of the proposed numerical scheme. The obtained numerical results confirm the theoretical estimates, also provide more accurate results and a higher order of convergence than methods available in the literature.

Keywords: Integral boundary condition; Large negative shift; Non-standard finite difference method; Parabolic convection-diffusion equations; Singularly perturbed problem

Journal of Chemistry

DOI: http://dx.doi.org/10.1155/2023/3246851

2023(2023)

Hydrochemical Characterization and Water Quality Assessment for Drinking and Irrigation Purposes Using WQI and GIS Techniques in the Upper Omo River Basin, Southern Ethiopia

Tesema, Adimasu[a];Jothimani, Muralitharan[a];Abebe, Abel[a] ;.Gunalan, Jagadeshan[a].;Getahun, Ephrem[a].;Karuppannan, Shankar[b]

[a] Department of Geology, College of Natural and Computational Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Groundwater is an important source of drinking water and irrigation in Ethiopia's present study area of the upper Omo River catchment. The present study area has an increasing demand for high-quality groundwater. Extensive irrigation and urban expansion are ongoing in the study area, seriously compromising groundwater quality. A study was conducted in Ethiopia's upper Omo River catchment to assess groundwater's suitability for drinking water and agricultural purposes. In total, 58 water samples were collected for this study. Based on the WHO and Ethiopian standards for assessing water quality, the study's results have been analyzed and compared. The groundwater's primary ion and physicochemical properties were plotted using GIS technology. Based on the results of the hydrochemical analysis, three water quality index (WQI) zones were identified: excellent (58.82%), good (35.29%), and poor (5.88%). From the Piper diagram plots, five different types of water were identified as Ca-HCO3, Na-HCO3, mixed Ca-Na-HCO3, NaCl, and CaCl, out of the total of fifty-eight samples collected from the study area. The present study found that in the area, most water samples are suitable for drinking, except for a few parameters above the standards for drinking water set by the World Health Organization and Ethiopian drinking water quality standards. Except for the three samples, EC, SAR, and PI data indicate that most of the area's water samples are suitable for irrigation. Water quality indices, irrigation water quality methods, and GIS techniques are crucial for assessing water quality based on the study.

IEEE Access

DOI: http://dx.doi.org/10.1109/ACCESS.2023.3286936

11(2023)

Cluster-Based Protocol for Prioritized Message Communication in VANET

Saha, Sanchari[a];Kumar, V. Vinoth[b, c];Niveditha V.R.[d];Kannan, Velmurugan Athiyoor[e];Gunasekaran K.[f];**Venkatesan, Krishnamoorthy[g]**

[g] Arba Minch University, Units of Basic Sciences, Department of Mathematics, Sawla Campus, Arba Minch, 4400, Ethiopia

Abstract

VANET can support a wide range of time-sensitive applications. The communication and computational overheads for these computations are minimal, and there are numerous requirements that must be met. Because of the mobility of vehicles, some traditional MANET routing protocols may not be suitable for the VANET. Aside from its usual use in urban environments, various applications on VANETs have emerged in recent years for rescue, military, communication, security systems. VANETs are entirely wirelessly connected via nodes, which typically have dynamic topologies. When it comes to road safety applications for VANETs, alert communication must be done in a quick manner so that the vehicles receive warning messages without any delay. Based on clustering approach, a protocol is proposed in this paper to communicate emergency messages in less time. The proposed protocol allows storage of non-urgent information temporarily, so that emergency messages are communicated quickly.

Keywords: Cluster-head; cluster-member; data dissemination; prioritization; VANET

Cogent Engineering

DIO: 10.1080/23311916.2023.2276517

10(2023)

Design of an Adaptive Fuzzy Sliding Mode Control with Neuro-Fuzzy system for control of a differential drive wheeled mobile robot

Tilahun, Aderajew Ashagrie[a];Desta, Tilahun Weldcherkos[a];Salau, Ayodeji Olalekan[b, c].;Negash, Lebsework[d]

[a] Department of Electrical and Computer Engineering, Arba Minch University (AMU), Arba Minch, Ethiopia

Abstract

This paper presents the design of a novel trajectory tracking control strategy and the development of a mathematical model for a non-holonomic differential-drive wheeled mobile robot. The proposed control system utilizes a dual-loop approach, where the inner loop controls the dynamics by employing Adaptive Fuzzy Sliding Mode Control (AFSMC), and the outer loop, handles kinematics by utilizing an Adaptive Neuro-Fuzzy Inference System;(ANFIS). The ANFIS is employed to minimize the error between the actual and desired velocities, providing a desired input for the inner loop. Meanwhile, the AFSMC is used to effectively control the system dynamics. The use of these dual-loop controllers considerably improves the system's overall efficiency. The inner controller compensates for dynamic disturbances, while the outer controller manages velocity errors. We integrate the actuator dynamics and the chopper effect of the wheels in the dynamics modeling, which helps to increase the models accuracy. MATLAB was used to implement the controller, while circular and eight-shaped trajectories were generated to assess the performance of the proposed controller. In addition, a comparative analysis of different controllers such as PID, SMC, AFSMC, and AFSMC with ANFIS was presented. The simulations were conducted under uncertainties, and the proposed controller is better than other controllers at tracking desired trajectories. The Lyapunov stability analysis is employed to verify the stability of the proposed controller. This paper shows that the proposed dual-loop controller is stable and more robust to internal parameter variation and external disturbance for the examined system. In general, the AFSMC with ANFIS is superior in trajectory tracking for the examined system compared to other controllers.

Keywords: AFSMC; ANFIS; differential drive mobile robot; sliding mode control; trajectory tracking control

Optics Continuum

DOI: http://dx.doi.org/10.1364/OPTCON.502349

2(2023)

Steady-state entanglement in a hybrid optomechanical system enhanced by optical parametric amplifiers

Kibret, Abraham Abebe[a, b];Derge, Tewodros Yirgashewa[a];Tesfahannes, **Tesfay Gebremariam[c]**

.[c] Department of Physics, Faculty of Natural Science, Arba Minch University, P. O. Box 21, Arba Minch, Ethiopia

Abstract

In this paper, we investigate the degree of steady-state entanglement using a hybrid optomechanical system, where the separate cavities contain a degenerate optical parametric amplifier (DOPA). Particularly, under the linearization approximation, the steady-state entanglement is quantified through logarithmic negativity. The bipartite entanglement between cavity-mechanical oscillator modes and two cavity modes is analyzed through the applicable choice of nonlinear gain of OPA, optical cavity detuning, and cavity-cavity coupling strength. It is found that the steady-state entanglement increases with the nonlinear gain of OPA medium and normalized detuning. We further emphasize the influence of cavity-cavity coupling parameter on the bipartite entanglement, and the generation of entanglement can be transferred entirely due to the coupling strengths. The main contribution of coupling parameters on the entanglement of the two modes of mechanical oscillators significantly altered and increased. The observed possibility of transferring the emerging entanglement of the states of light in the two cavities to the modes of the accompanying mechanical oscillators is expected to be a valuable asset in the practical realization of quantum information processing.

Communications in Computer and Information Science

DOI: http://dx.doi.org/10.1007/978-3-031-31327-1_13

1800(2023**)**

Offline Handwritten Amharic Character Recognition Using Few-Shot Learning

Samuel, Mesay[a]**.**; Schmidt-Thieme, Lars[b].; **Sharma D.P.**[a]; Sinamo, Abiot[d]; **Bruck, Abey**[a]

[a] Faculty of Computing and Software Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Few-shot learning is a demanding and challenging problem in machine learning aimed at learning from only fewer labeled training examples. It has become an active area of research due to deep learning requiring huge amounts of labeled dataset, which is not easy practically. Learning from fewer examples is also an important attempt towards learning like humans. Few-shot learning has proven a very good promise in different areas of machine learning applications, particularly in image classification. As it is a recent technique, most researchers focus on understanding and solving the issues related to its concept by focusing only on common image datasets like Mini-ImageNet and Omniglot. Few-shot learning also opens an opportunity to address low resource languages like Amharic. Hence in the current study, it is used to address offline handwritten character recognition for Amharic language. Particularly, prototypical networks, the popular and simpler type of few-shot learning, is implemented as a baseline. Using the opportunities explored in the nature of Amharic alphabet having columnwise and rowwise characters' similarities, a novel way of augmenting the training episodes is proposed. According to the study's experimental result, it was observed that the proposed method outperformed the baseline method in 1-shot setting. This study has implemented few-shot learning for Amharic characters for the first time. More importantly, the findings of the study open new ways of examining the influence of training episodes in few-shot learning, which is one of the critical issues requiring further exploration. The datasets used for this study are collected from native Amharic language writers using an Android App developed as a part of this study.

Keywords: Amharic; Character Recognition; Deep Learning; Few-shot Learning; Handwritten; Prototypical Networks; Training Episode

Journal of Applied Animal Research

DOI: http://dx.doi.org/10.1080/09712119.2023.2274956

51(2023)

Morphological descriptors of indigenous chickens: as a selection guide

Chebo, Chencha[a, b].;Melesse, Aberra[b];Betsha, Simret[b]

[a] Department of Animal Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

The visual morphologies in animals are associated positively or negatively with production, adaptation, and behavioral characteristics. For rural farmers with limited records, these features are considered reliable phenotypic markers. Thus, this study was intended to explore the unique morphological features of indigenous chickens as a farmer's selection guide. A total of 1,060 adult chickens from four rural districts were investigated for nine morphological traits. The single-comb type, supposed to be of good fertility, was the most prevalent. Yellow and white shanks were predominant, followed by gray, greenish-yellow, green, and black pigmentations. Crested and silky chickens were more frequent in highland areas, whereas naked-neck chickens were observed in lowlands. Chickens of the lowlands have brighter, more uniform plumage colors and yellow shank, beak, and earlobe colors. On the other hand, the highland and mid-altitude chickens are characterized by dark, colorful combinations of various feather colors: laced plumage, white shank, rose, and deformed rose combs. Moreover, multiple correspondence analyses revealed that morphological features have special associations with districts. Thus, the observed morphological heterogeneity of the indigenous chickens can be used as a good indicator of selective breeding. Therefore, the associations of these characteristics with productivity qualities could be confirmed by quantitative and molecular tools.

Keywords: indigenous chickens; Morphological features; selection indicators

Frontiers in Public Health

DOI: http://dx.doi.org/10.3389/fpubh.2023.1256499

11(2023)

Sick child's feeding practices and associated factors among mothers with sick children aged less than 2 years in Gamo zone, southern Ethiopia. Does the participation of fathers contribute to improving nutrition? A facility-based cross-sectional study

Hailu, Feven Masresha[a];Kefene, Simegn Wagaye[b];Sorrie, Muluken Bekele[a];Mekuria, Misgun Shewangezaw[a];Guyo, Tamirat Gezahegn[b].

[a] School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[b] Department of Public Health, Arba Minch College of Health Sciences, Arba Minch, Ethiopia

Abstract

Background: Children's nutritional status can decline rapidly during or after a common childhood illness unless additional nutritional requirements associated with the illness are considered. Therefore, this study was aimed at assessing a sick child's feeding practices and associated factors among mothers who have sick children under 2 years of age in southern Ethiopia. Methods: A facility-based cross-sectional study design was employed from 1 April 2022 to 30 April 2022. Data were collected through the questionnaire, entered into an open data kit (ODK), and exported into Statistical Packages for Social Sciences (SPSS) version 25.0 for analysis. A systematic random sampling technique was used to select study participants. Bivariable and multivariable logistic regression analyses were used to identify factors associated with sick child feeding practices. An adjusted odds ratio (AOR) with 95% confidence intervals (CIs) was used to determine the strength of the association. Statistical significance was declared at a p-value of <0.05. Results: The overall magnitude of mothers' good sick child feeding practices was determined to be 45.0% (95% CI: 41.03, 48.97%). Being urban residents, being employed, having antenatal care (ANC) visits, having postnatal care (PNC) visits, counseling about child feeding, and fathers' involvement in sick child feeding increased the likelihood of sick child feeding practices by 4.4, 2.10, 2.31, 3.54, 2.11, and 2.54 times, respectively. Conclusion: Sick child feeding practices were associated with having antenatal or postnatal visits, counseling about child feeding, and fathers' involvement in sick child feeding practices. Therefore, strengthening infant and young child feeding practices by showing special concern for the father's involvement is important to improve mothers' sick child feeding practices.

Keywords: childhood illness; Ethiopia; feeding practice; infant and young child feeding; sick child

Geology, Ecology, and Landscapes

DOI: http://dx.doi.org/10.1080/24749508.2023.2245188

2023(2023)

Identification of Suitable Solid Waste Disposal Site by Using GIS Based Multi Criteria: a Case Study of Adama Town, Ethiopia

Gebremedhin, Eyerus Gebregiorgis[a];Tekile, Andinet Kebede[b,] **Reddythota, Daniel**[a]

[a] Faculty of Water Supply and Environmental Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

The objective of this research was to investigate existing waste disposal practices and to determine the optimally suitable and acceptable disposal site for Adama town, Ethiopia. The pertinent restrictions identified to realize the objective were slope, river proximity, road, soil type, environmentally sensitive areas, protected zone, and settlement proximity. The criteria were weighted in the GIS environment and then, based on appropriateness of dumping places, the region was classified to different suitability zones. The primary stage solid waste collection is carried out by small and micro enterprises (SMEs) and their service covers more than three-fourth of the households of the town. The waste which is not collected by SMEs is mainly disposed of in environmentally sensitive places. According to the results, only 8.64% (939 ha) of the total area is highly suitable, 27.83% (3026 ha) is completely unsuitable and the remaining 63.53% (6908 ha) is moderately suitable. Four municipal solid waste disposal sites with minimum destructive effects and the lowest environmental impacts are identified to be suitable for Adama Town. Thus, the use of GIS for suitable dumping site location was effective, and the findings will be valuable in maintaining healthy environment and public by realizing dumping plants on the identified site.

Keywords Adama; dumping site; GIS; proximity; solid waste

Journal of Asian and African Studies

DOI: http://dx.doi.org/10.1177/00219096231192309

2023(2023)

Forgotten and Exploited: The Plight of Migrant Female Domestic Workers Interrelated to Human Rights Violation in Ethiopian Towns

Lombebo Tagesse[a]; Kassahun Asres[b] and Annabel S. Erulkar[c]

[a]Department of Sociology and Social Anthropology, Arba Minch University, Ethiopia

Abstract

This study aims to investigate the experiences of migrant female domestic workers (FDWs) in relation to social exclusion, policy exclusion, and human rights violations in the studied area. The pragmatic paradigm, with an embedded design, was employed as the dominant approach. Convenience sampling was used to gather a sample of domestic workers who are not officially recorded. A total of 130 participants took part in the quantitative study, and 28 participated in the qualitative study. Quantitative data were analyzed using the SPSS software, while qualitative data were analyzed thematically. The results indicate that migrant FDWs are marginalized and excluded from the country's labor laws, and the Council of Ministers has delayed issuing laws to protect them. As a result, most respondents do not have legally binding work contracts and instead have contractual arrangements that are drafted by brokers and favor employers. This leads to various human rights abuses, including the denial of the right to education and access to health care. In addition, employers were found to be reluctant to send their employees to school, and some even fired employees due to their illnesses. These experiences have led to mental health issues such as low self-esteem, feelings of despair and insecurity, and resentment toward employers and society at large. Therefore, it is recommended that the government and stakeholders take steps to advocate for the rights of FDWs and initiate programs to raise social awareness and inclusion in labor laws.

Keywords : female domestic workers; human rights violence; Marginalization

IEEE Access

DOI: http://dx.doi.org/10.1109/ACCESS.2023.3339564

11(2023)

Prediction of Water Quality Using SoftMax-ELM Optimized Using Adaptive Crow-Search Algorithm

Chakravarthy, S. R. Sannasi[a];Bharanidharan N.[b];Venkatesan, Vinoth Kumar[b];**Abbas, Mohamed[c];**Rajaguru, Harikumar[a];Mahesh T.R.[d];Venkatesan, Krishnamoorthy[e]

[e] Arba Minch University, Sawla Campus, Units of Basic Sciences, Department of Mathematics, Arba Minch, 4400, Ethiopia

Abstract

Water is a predominant source in the survival and development of all human lives. On top of all, predicting water quality is a significant one since water is essential in regulating our human body. In recent days, the advent of machine learning techniques has been supporting a lot in water quality prediction. Accordingly, Adaptive Crow Search Optimized SoftMax-Extreme Learning Machine (AdCSO-sELM) is proposed to improve the ELM performance by making the flight length adaptively with respect to the iterations. Here, the research novelty lies in making the CSOA parameters as a dynamic one which in turn provides promising ELM performance. Finally, the proposed AdCSO-sELM provides a superior accuracy of 96.54% for classifying water potability using the Kaggle dataset.

Keywords: Crow search algorithm; extreme learning machine; neural network; optimization; water quality

2023 International Conference on Information and Communication Technology for Development for Africa, ICT4DA 2023

DOI: http://dx.doi.org/10.1109/ICT4DA59526.2023.10302227

(2023)

Hadiyyissa Automatic Speech Recognition Using Deep Learning Approach

Shamore, Selamu[a].;**Gure, Amin Tuni[b];Yimer, Mohammed Abebe[b].**

[b]Arba Minch University, Faculty of Computing and Software Engineering, Arba Minch, Ethiopia

Abstract

Speech Recognition focuses on developing advanced technologies that can recognize and translate spoken language into text. Automatic Speech Recognition (ASR) is an Artificial Intelligence (AI) technology that captures human voice from a mi-crophone and analyzes it based on spoken words to comprehend natural language. In Ethiopia, ASR models have been developed for specific local languages such as Amharic, Tigrigna, Wolaytta, and Afaan Oromo, but there has been a lack of research on ASR models for the Hadiyyisa language, which is also spoken in Ethiopia. The research study designed and developed an ASR model for the Hadiyyisa language. The researchers collected data from native speakers of the Hadiyyisa language and used Python programming to design and develop the deep learning model for the Hadiyissa ASR model. Different methods and techniques were used in the study to achieve the research objectives and complete the entire research process. The proposed model utilized deep learning algorithms including RNN, LSTM, BiLSTM, and CNN, along with suitable feature extraction techniques such as Mel Frequency Cepstral Coefficients (MFCC). The accuracy of the proposed ASR model was evaluated through experimentation, which demonstrated that the BiLSTM model outperformed the other deep learning models with an overall accuracy of 90.95 % Based on the experimental evidence, the proposed model was found to be better suited for ASR for the Hadiyyisa language.

Keywords: Automatic Speech Recognition; Convolutional Neural Network; Deep Learning; Hadiyyisa language; Mel Frequency Cepstral Coefficient; Speech recognition

BioMed Research International

DOI: http://dx.doi.org/ 10.1155/2023/4083442

2023(2023)

Evidence-Based Practice and Its Associated Factors among Health Professionals Working at Public Hospitals in Southwest Ethiopia

Shibabaw, Adamu Ambachew[a].;Chereka, Alex Ayenew[a];Walle, Agmasie Damtew[a];Demsash, Addisalem Workie[a];Kebede, Shimels Derso[b];Gebeyehu, Ayenew Sisay[c];Tizie, Sefefe Birhanu[c];**Mamo, Daniel Niguse[d]**;Kassie, Sisay Yitayh[a]

[d] Department of Health Informatics, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

Introduction. “Evidence-based practice” (EBP) is the process of incorporating clinical expertise and taking patient values and preferences into consideration when making clinical decisions. It is used to describe the provision of high-quality patient care. Objective. This study is aimed at assessing evidence-based practice and associated factors among health professionals working at public hospitals in Illu Aba Bora and Buno Bedele Zones, Oromia Region, Southwest Ethiopia, in 2022. Methods. An institution-based cross-sectional study design was conducted from May 8 to June 20 at public hospitals in Illu Aba Bora and Buno Bedele Zones, Oromia Region, Southwest Ethiopia. A total of 423 health professionals were included, using proportional allocation and simple random sampling. The data were collected using a self-administered questionnaire. Data was entered using EpiData version 4.6, and the collected data was cleared, arranged, coded, and then analyzed using Statistical Package for the Social Sciences version 26. Descriptive statistics and bivariable and multivariable analyses of logistic regression with AOR (95% CI) were performed at $p < 0\ 05$. Result. The study revealed that 36.2% of health professionals had good evidence-based practice. The factors found to be significantly associated with good EBP include having training in EBP (AOR = 5 43; 95% CI: 4.323, 9.532), good knowledge (AOR = 1 91; 95% CI: 1.065, 3.541), a favorable attitude (AOR = 1 91; 95% CI: 1.884, 2.342), and work experience greater than 5 years (AOR = 1 58; 95% CI: 1.482, 2.437). Conclusion. The evidence-based practice of health professionals was poor. Evidence-based practice should included in the curriculum, and also planned trainings need to be delivered to all health professionals, inorder to enhancing their knowledge as well as their attitudes by motivating them to increase evidence-based practice.

International Journal of Forestry Research

DOI: http://dx.doi.org/10.1155/2023/8831715

2023(2023)

Socioeconomic Drivers of Land Use and Land Cover Change in Western Ethiopia

Bekere, Jembere[a].;Senbeta, Feyera[b].;**Gelaw, Abren**[a]

[a] Department of Geography and Environmental Studies, Arba Minch University, Arba Minch, Ethiopia

Abstract

A variety of socioeconomic and environmental drivers have contributed to changes in LULC around the world in recent years. This study examines the socioeconomic drivers that accelerated LULC in western Ethiopia. The data were generated from terrestrial satellite images primary and secondary sources. Primary data sources include household surveys, field observations, group discussions, interviews, key informants, and interpreting remote sensing data. Secondary data were reviewed mainly from relevant literature both published and unpublished materials. Landsat images were classified using the supervised classification technique and maximum likelihood classifier using arc GIS 10.3 to create LULC maps of the study area. Accuracy score and kappa coefficient were used to confirm the accuracy of the classified LULC, and agricultural land, settlement, bare land, forest land, and water body were the main LULC classes in the district. Forest cover in three decades (1990-2020) in the study area decreased from 12.1% in 1990 to 2.6% in 2020. The data were also analyzed using a descriptive model, Pearson correlation, and binary logistic regression. The independent variables (age and gender) show a Pearson's positive correlation with the drivers of LULC dynamics; that is, as these independent variables increase, the drivers of LULC dynamics also increase, whereas educational status and land holding size show a negative correlation. This shows that the drivers of the anthropogenic forces of LULC dynamics decreased as the number of educated populations and the size of land holdings increased, and vice versa. Then, the binary logistic regression model examined the relationship between the dependent and the major socioeconomic (independent) variables. Logistic regression was performed to determine how independent variables and the drivers of LULC (natural forces or anthropogenic forces) change and the model was statistically significant ($x^2 = 23.971$, df = 5, $P < 0.001$). The model explained 13.9% (Nagelkerke R^2) of the variance in the drivers of LULC dynamics and correctly classified 66.1% of the cases. The study found that age, gender, and educational status largely determine the drivers of LULC dynamics and have the greatest chance of determining the anthropogenic forces. Therefore, relevant stakeholders should take integrated measures to reduce the drivers of LULC dynamics through landscape restoration.

Cogent Social Sciences

DOI: http://dx.doi.org/10.1080/23311886.2023.2277349

2023(2023)

The impact of livelihood diversification as a climate change adaptation strategy on poverty level of pastoral households in southeastern and southern Ethiopia

Beyene, Baro[a, b].;Tilahun, Mesfin[c, d];**Alemu, Mebratu**[b]

[b] Department Economics, Arba Minch University, Arba Minch, Ethiopia

Abstract

The purpose of this study was, therefore, to examine the determinants of poverty depth in pastoral households, and the impact of adopting livelihood diversification on the poverty level of households in the Arero district of Borena Zone and Rayitu district of Bale Zone, Ethiopia. A multistage sampling technique was used, and 396 households were selected from the Arero and Rayitu Districts. The cost of basic needs (CBN) approach was used to determine the study areas. Accordingly, the absolute poverty line was determined to be 10,881.26 Birr per adult per annum. Based on the poverty line, 34.6 % of the sample households were in the poor category. The Foster-Greer-Thorbecke index results indicated that the poverty incidence, poverty gap, and poverty severity were 34.6, 9.28, and 3.62, respectively. Two econometric models were used for the analysis, namely the Tobit and Multinomial Endogenous Switching models. The results of the Tobit logistic regression revealed that the age of the household head, household size, and distance to the nearest market significantly increased the poverty level of the pastoral households. However, livestock size as measured by tropical livestock unit and frequency of extension contact significantly decreased the poverty depth of pastoral households. On the other hand, the output of the multinomial endogenous switching regression model showed that the joint adoption of non-farm activities and crop production had a decreasing and significant impact on the poverty level of pastoral households. Therefore, policies that promote livelihood diversification of pastoral communities are critical to lowering the poverty level of pastoral households in semi-arid areas.

Advances in Civil Engineering

DOI: http://dx.doi.org/10.1155/2023/5577851

2023(2023)

Enhancing Understanding of Hydrologic Processes in the Shafe Watershed, Ethiopia

Mada, Zerihun Makayno[a];Nannawo, Abera Shigute[b]

[a] Faculty of Hydraulics and Water Resources Engineering, Arba Minch Water Technology Institute, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia
[b] Faculty of Water Resources and Irrigation Engineering, Arba Minch Water Technology Institute, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Research on the combined impact of watershed attributes on streamflow is crucial in water resources planning and management, particularly due to the strong link between landscape modification and watershed attributes. However, identifying critical watershed attributes remains a challenge. This study focuses on investigating the impact of watershed attributes on streamflow in the Hare catchment of Ethiopia's rift valley lakes basin. The Soil and Water Assessment Tool (SWAT) rainfall–runoff model was used, calibrated, and validated against observed discharge data to identify remedial measures for streamflow generation. The model's performance was evaluated using criteria such as R^2, NSE, PBIAS, and RSR, which yielded satisfactory values. The study found significant changes in land cover, with forest and shrub land declining and agricultural land expanding. Comparing mean annual streamflow between 1998, 2009, and 2021, streamflow at 2021 land use and land cover increased by 13.03% compared to 2009, which had already increased by 16.05% compared to 1998. The study also examined the impact of climate variations by manipulating meteorological data length and average slope. Overall, this study provides valuable insights into the relationship between watershed attributes and streamflow, emphasizing the importance of considering land cover changes and climate variations for effective water resource management in the Hare catchment.

Cogent Food and Agriculture

DOI: http://dx.doi.org/10.1080/23311932.2023.2238460

9(2023)

Rural farm households' food security and the role of livelihood diversification in enhancing food security in Damot Woyde District, Southern Ethiopia

Bitana, Eshetu Bichisa[a].;Lachore, Senbetie Toma[b];**Utallo, Abera Uncha**[a]

[a] Department of Geography and Environmental Studies, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Food insecurity becomes severe in areas where agriculture is households' sole income source. Accordingly, this study looked into food security and the role of livelihood diversification in the Damot Woyde district in Southern Ethiopia. Data were gathered using a structured survey questionnaire, focus group discussion, key informants interview and field observation. The household food balance model (HFBM) and HFIAS (household food insecurity access scale) methods were employed to assess food security (availability and access respectively). The data was analyzed using Simpson's index of diversity, binary logistic regression, multiple linear regression, and the independent sample t-test. The findings revealed that 69% of Woina Dega and 77% of Kolla (HFBM) households were food insecure. HFIAS also showed that only 22.2% of Woina Dega and 11.5% of Kolla households have been food secure. But in other, households, 26.6% of Woina Dega and 36% of Kolla were severely food insecure. Both the binary logistic and linear regression results indicated that livelihood diversification has a positive and important influence on food security in the study area. Hence, we posit that livelihood income diversification lessens the threats of food shortages in rural farm households.

Keywords: Damot Woyde; food security; livelihood diversification; rural households; Southern Ethiopia

Journal of Water and Climate Change

DOI: http://dx.doi.org/10.2166/wcc.2023.361

14(2023)

Drought characterization and severity analysis using GRACE-TWS and MODIS datasets: a case study from the Awash River Basin (ARB), Ethiopia

Yitea Seneshaw Getahun [a,*], Ming-Hsu Li[b], Yi-Ying Chen[c] and **Tewoderos Addisu Yate[d]**

[d] Meteorology and Hydrology Faculty, Water Technology Institute, Arba Minch University, Ethiopia

Abstract

Drought is the utmost highly devastating phenomenon in Ethiopia because of societies that are reliant on rainfall-dependent agriculture; thus, it is crucial to characterize drought at the basin scale using new developments in remote sensing products and recently proposed drought indices. This study aimed to quantify drought in the Awash River Basin (ARB) using drought indices of the Standardized Precipitation Index (SPI), Standardized Precipitation Evapotranspiration Index (SPEI), Evaporative Demand Drought Index (EDDI), Evaporative Stress Index (ESI), and Water Storage Deficit Index (WSDI). The Mann–Kendall test analysis of annual and seasonal terrestrial water storage (TWS) showed a significant increase from 2002 to 2017 that is beneficial for developmental activities in the ARB. GRACE showed a record high extreme drought that persisted for 15 months was noticed from 2005/01 to 2006/03 with a total water storage deficit of 411.8 mm with a peak shortage of 46.24 mm in 2005/03, representing severe terrestrial water shortage in the ARB. This GRACE-TWS-based quantified extreme water shortage in 2005/30 can be used as a threshold for adaptation. Overall, this study provides a reliable outcome that will be vital for the establishment of climate change adaptation pathways in the future for viable water resources management to minimize the disastrous impacts of drought in the AR.

Keywords: drought characteristics, drought indices, drought severity, GRACE, MODIS, TWSA

Veterinary Parasitology: Regional Studies and Reports

DOI: http://dx.doi.org/10.1016/j.vprsr.2022.100814

14(2023)

Mange: Epidemiology and ivermectin efficacy in goats and application of zero-inflated negative binomial regression in Uba Debre Tsehay, southern Ethiopia

Chernet Lebene [a], **Ephrem Tora [b]**

[b]Department of Animal Sciences, College of Agriculture, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Mites are one of the most common and widely distributed ectoparasites of goats in Ethiopia, contributing to major burdens in livestock productivity in the country. Between February 2021 and July 2021, this study was conducted to estimate the prevalence of mange mites, assess the potential risk factors, identify the species infesting goats, and evaluate the efficacy of ivermectin in naturally infested goats in the Uba Debere Tsehay district of Gofa Zone, Southern Ethiopia. A cross-sectional study, longitudinal field efficacy, and questionnaire survey were conducted. A total of 384 goats suspected of having mange were scraped for mite prevalence and count. The mite count data were analyzed using zero-inflated negative binomial (ZINB) models with explanatory variables. The ZINB models indicated that a substantial proportion of the observed zero mite count reflected a failure to detect mites in suspected goats, meaning that the estimated true prevalence was much higher than the apparent prevalence as calculated using a simple proportion of nonzero mite counts. Overall prevalence of mange was 21.87% (84/384) in the study areas. Sarcoptes species (21.09%) and Demodex species (0.78%) were the mite genera identified in this study. Among goats with poor, medium, and good body conditions, mite prevalence was 36.3%, 12.3%, and 10.9%, respectively. Both the prevalence and intensity of infestation were significantly associated with body condition scores, but other risk factors were not. The questionnaire survey indicated that 85.94% of the participants preferred to use modern treatment options (ivermectin 1%, injection) and 76.56% (98/128) respondents replied that ivermectin treatment is effective. Wilcoxon rank-sum test analysis shows that there was significantly ($P < 0.05$) fewer mites counted on goats treated with ivermectin than on untreated goats at each count up to day 56 after treatment. No live mites were found on any treated animal on days 28 and 56. Mixed ANOVA indicated that there was a significant difference within treatment groups. This study showed that mites are one of the constraints to goat production in the study area and ivermectin was highly effective against Demodex and Sarcoptes mites in goats. Hence, there is a need to create awareness about the impact of mange on goat production, and appropriate ivermectin treatment against mites should be implemented.

Fuel

DOI: http://dx.doi.org/10.1016/j.fuel.2022.125814

331(2023)

Co-pyrolysis of hydrothermally pre-treated microalgae residue and polymeric waste (plastic/tires): Comparative and dynamic analyses of pyrolytic behaviors, kinetics, chars, oils, and in-situ gas emissions

Kumar, Akash[a];Yan, Beibei[a, b];Cheng, Zhanjun[a, b].Tao, Junyu[c].;Hassan, Mahdi[d];Li, Jian[a];Kumari, Lata[e];**Oba, Belay Tafa[a, f];A**borisade, Moses Akintayo[a];Jamro, Imtiaz Ali[a];Chen, Guanyi[c]

[f] College of Natural Science, Arba Minch University, Arba Minch, 21, Ethiopia

Abstract

Biomass and polymeric wastes are becoming more problematic economically and environmentally. Their co-pyrolysis could be a cost-effective and environmentally preferable alternative for reducing waste quantities and gas emissions, as well as recovering valuable oils, chars, and gases. This study aimed to dynamically characterize the co-pyrolysis of hydrothermally treated Chlorella sorokiniana residue (CSR) and waste polymers (polystyrene (PS) and waste tires (WT)) based on their pyrolytic behaviors, kinetics, interaction effects, bio-chars, bio-oils, and in-situ evolved gasses characteristics. The devolatilization of CSR mainly occurred between 150 and 500 °C, while the decomposition of WT and PS appeared between 200–550 °C and 300–550 °C, respectively. The average activation energy was 179.25, 222.82, and 223.12 kJ/mol for the CSR, WT, and PS devolatilization, respectively. The TG-FTIR-detected functional groups included C[sbnd]H[sbnd] (stretching vibration), C[sbnd]H[sbnd] (in-plane & out-of-plane bending vibration), C[dbnd]C, CO_2, O[sbnd]H, C[dbnd]O, COOH, C[sbnd]O, and NH_3. The TG-MS-detected pyrolytic products were CHO^+, CH_3O^+, $C_2H_3O^+$, $C_3H_3O^+$ $C_3H_6O^+$, $C_4H_3O^+$, $C_5H_6O^+$, $COOH^+$, NH_3^+, aliphatic, and aromatic hydrocarbons. Moreover, the pyrolytic oil was found to be more stable, with significantly fewer N- and O-containing compounds. It seemed that the inclusion of PS and WT in CSR pyrolysis reduce the additional fuel processing requirements to transform liquid yields into useful fuel. This research findings provide theoretical and practical insights into the control and application potential as well as the limitations of the high-value energy and products derived from the co-pyrolysis of CSR, PS, and WT.

International Journal of Hydrology Science and Technology

DOI: http://dx.doi.org/10.1504/IJHST.2021.10042159

15(2023)

The study of climate change related drought risk using weather research and forecasting model over Eastern Africa, Ethiopia

Anil Kumar Medikonda[a]; **Anirudh Bhowmick[b]**

[b] Faculty of Meteorology and Hydrology, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

As the drought research serves potential benefits to the management of its allied sectors, it demands research reasons for climate changes over Eastern Africa. The research paper mainly aims to forecast the drought years using WRF model dataset. For selected meteorological parameters, MBE, RMSE and MAE, have been computed and compared to estimate the correlation with the WRF model with Belg season and the Kirmet season in Ethiopia. The research paper discusses various primary causes for the formation of long and large-scale drought in the Arba Minch and Chencha region during the study period 2001–2010. The research expounds how these less to moderate and extreme conditions can be attributed to the combinational occurrence of La Nina with negative and positive Indian Ocean dipole (IOD) and Hybrid El Nino with NAO and ElNino-Modoki. As Ethiopia is a rainy agriculture-based country, the study is promising for the farmer's fraternity in many dimensions including successful drought forecasting.

Keywords:drought; EastAfrica low-level jet; ElNino; hybrid ElNino; Indian Ocean dipole; IOBM; IOD; MODOKI; North Atlantic oscillations; QBO; sea-surface temperature; SST; tele-connections; weather research and forecasting; WRF

Journal of Engineering (United Kingdom)

DOI: http://dx.doi.org/10.1155/2023/3077902

2023(2023)

A Study on the Abrasion Resistance of Hydraulic Structures with Different Repair Mortar

Melesse, Getinet[a].;Kaske Kassa, Hibretu[b] .;Geta, Minale[b].;Simachew, Tigist[b;].;Mamo, Tewodros[b].;Mengesha, Adal[b].;**Asale, Tegegn**[a]**.**

[a] Faculty of Civil Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

One of the main problems with hydraulic structures is that floating silt, gravel, ice sand, boulders, and other materials circulating over a concrete surface have an abrasive effect that causes hydraulic structures to abrade. Abrasion causes concrete to degrade, which could eventually expose the reinforcing to corrosion. In addition to section loss, reinforced concrete hydraulic structures' endurance may also be a problem. Repair mortars are used to restore surfaces that have been abraded. The suitability of various repair materials for use as a repair layer on concrete surfaces is examined in this study. In order to apply different repair mortars to concrete specimens and subject them to abrasive forces, this work employs an experimental methodology. The ASTM C 1138 standard was followed for testing the abrasion resistance of the samples repaired using repair mortars underwater. Both silica fume mortar and polymer-modified mortar were employed in the study as forms of repair mortar. For each type of repair mortar, three cylindrical concrete specimens were cast, along with control specimens. Hence, nine cylindrical concrete samples in total were employed in this study. In order to quantify the effect of abrasion and, consequently, to assess the efficacy of various repair materials, abrasion volume loss was measured. Important findings about each type of repair material's resistance to underwater abrasion are included in the study. The findings show that in terms of abrasion resistance underwater, the polymer-modified mortar performs better than the silica fume mortar.

Applied Vegetation Science

DOI: http://dx.doi.org/10.1111/avsc.12720

26(2023)

Ssessing removal methods for controlling Dichrostachys cinerea encroachment and their impacts on plant communities in an East-African savannah ecosystem

Utaile, Yonas Ugo[a, b].;Honnay, Olivier[a]; **Cheche, Simon Shibru**[c];Helsen, Kenny[a]

[b] Department of Forestry, Arba Minch University, Arba Minch, Ethiopia
[c] Department of Biology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Questions: Woody plant encroachment is known to adversely affect the biodiversity and functioning of savannah ecosystems, yet removal strategies have been shown to have variable success. Here, we evaluated the effectiveness of three woody removal methods or treatments for controlling the leguminous thorny shrub Dichrostachys cinerea, and assessed plant community responses following removal. Location: Savannah plains of Nech Sar National Park, South-Ethiopian rift valley. Methods: Based on a total of seventy-two 10 m × 10 m experimental plots spread across six blocks, we carried out: (a) stump burning; (b) stump application with glyphosate herbicide; and (c) mechanical uprooting on D. cinerea, and monitored the number, height, and thickness of resprouts and the number of resprouting stumps for two consecutive years. In addition, we surveyed all vascular plant species per plot for each removal method and control. Results: We found that the uprooting treatment resulted in a higher number of resprouting stumps and lower number of resprouts, and a smaller resprout height and diameter. The fire treatment showed the greatest reduction in the number of resprouting stumps and resprouts, whereas glyphosate treatment showed intermediate results although resprout height and diameter were significantly greater compared with the uprooting treatment. Whereas plant species richness and diversity were higher in the fire treatment, they were adversely affected in the uprooting treatment. Conclusion: Our results demonstrate that none of the woody removal methods were effective enough to completely eradicate D. cinerea from the field trials after only one intervention, suggesting the need for follow-up management actions considering their impacts on both woody encroachment and biodiversity restoration.

Keywords: fire; glyphosate herbicide; Nech Sar National Park; resprouting; savannah plains; uprooting; woody removal

Applied and Environmental Soil Science

DOI: http://dx.doi.org/10.1155/2021/5510587

2023(2023)

Effectiveness of Community-Based Soil and Water Conservation in Improving Soil Property in Damota Area, Southern Ethiopia

Mamush Masha, [1,2] Teshome Yirgu,[2] Mulugeta Debele,[2] and Mengie Belayneh[1,2]

[2]Department of Geography and Environmental Studies, Arba Minch University, Arba Minch, Ethiopia

Abstract

Soil and water conservation (SWC) is being advocated as an integral part of agricultural land management as it not only controls/minimizes soil erosion but also restores/rehabilitates the degraded lands. The purpose of this study was to evaluate the impact of soil and water conservation practices in improving soil fertility in the agricultural landscapes of the Damota area, southern Ethiopia. Forty-eight soil samples (both disturbed and core samples) were collected from the conserved and adjacent nonconserved plots. The significance analysis test was performed using analysis of variance. The result of the study showed that higher mean values of soil physicochemical properties were observed in the conserved plot than its nonconserved counterpart. The mean differences of organic carbon, total nitrogen, cation exchange capacity, and exchangeable K+ and Ca2+ between conserved and nonconserved plots were statistically significant at the $P < 0.01$ level. Besides, available phosphorous and bulk density were significant at $P < 0.05$, but the effect of SWC practices was not found significant on soil texture, soil pH, and exchangeable Na+ and Mg2+ content of the soil in the Damota area. Community-based soil and water conservation practices have improved the soil fertility in agricultural landscapes, although significant results have been observed in some fertility indicators. Therefore, strengthening the implementation of conservation measures by participating in all stakeholders is recommended. Supporting physical structures by agronomic and vegetative measures and continued maintenance can bring better results.

Lecture Notes in Networks and Systems

DOI: http://dx.doi.org/10.1007/978-981-19-9225-4_29

608(2023)

Improving Amharic Handwritten Word Recognition Using Auxiliary Task

Mesay Samuel Gondere[a], Lars Schmidt-Thieme[b], **Durga Prasad Sharma**[a] & Abiot Sinamo Boltena[c]

[a] Faculty of Computing and Software Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Amharic is one of the official languages in the Federal Democratic Republic of Ethiopia. It uses an Ethiopic script derived from Ge'ez which is an ancient and currently a liturgical language. Amharic is also one of the most widely used literature-rich languages in Ethiopia. There are very limited innovative and customized research works in Amharic optical character recognition (OCR) in general and Amharic handwritten text recognition in particular. In this study, Amharic handwritten word recognition was investigated. State-of-the-art deep learning techniques including convolutional neural networks together with recurrent neural networks and connectionist temporal classification (CTC) loss were used to make the recognition in an end-to-end fashion. More importantly, an innovative way of complementing the loss function using the auxiliary task from the row-wise similarities of the Amharic alphabet was tested to show a significant recognition improvement over a baseline method. The findings of this study promote innovative problem-specific solutions as well as open insights into generalized solutions that emerge from problem-specific domains.

Keywords: Amharic handwritten recognition; Auxiliary task; Convolutional recurrent neural networks; Handwritten word recognition

Journal of Maternal-Fetal and Neonatal Medicine

DOI: http://dx.doi.org/10.1080/14767058.2023.2183760

36(2023)

Understanding the association of mass media with the timing of antenatal care in Ethiopia: an impression from the 2016 Ethiopia demographic and health survey

Gilano, Girma[a].;Hailegebreal, Samuel[a];Sako, Sewunet[a];Seboka, Binyam Tariku[b]

[a] Department of Health Informatics, School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Introduction: Although the timing of antenatal care has a high potential of reducing maternal and child health problems and can be improved through different mass media exposure, it has been overlooked and remained a major life-costing delinquent issue. Therefore, the aim of this study is to identify the relationship between mass media exposure and ANC for further insight. Methods: We used the 2016 Ethiopian Health and Demography (EDHS) data. EDHS is a community-based cross-sectional survey that applies a two-stage stratified cluster sampling and it is a country-representative. We included 4740 reproductive-age women with complete records in EDHS dataset in this study. We excluded records with missing data from the analysis. We used ordinal logistic regression followed by generalized ordinal logistic to examine mass media relationships with timely antenatal care (ANC). We presented data using numbers, mean, standard deviations, percent or proportions, coefficient of regression, and 95% confidence interval. All analyses were performed using STATA version 15. Result: We examined the data of 4740 participants for the history of timely initiation of ANC and found 32.69% (95% CI = 31.34, 34.03) timely ANC. Factors such as watching television (TV) less than once a week [coef. = −0.72, CI: −1.04, −0.38], watching TV at least once a week [coef. = −0.60, CI: −0.84, −0.36], listening to radio [coef. = −0.38, CI: −0.84, −0.25], and use internet every day[coef. = −1.37, CI: −2.65, −0.09], are associated with the timely ANC. Conclusion: Despite its association with improving the timing of ANC, our findings showed mothers need additional support on the use of the media and the timing of ANC. In addition to the mass media, other covariates such as educational status, family size, and husband's desire affected the timely ANC imitation. These need attention during implementation to avert the current. This is also an essential input for policy and decision-makers. The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

Keywords: Antenatal care; Ethiopia; factors; timing of antenatal care

Frontiers in Global Women's Health

DOI: http://dx.doi.org/10.3389/fgwh.2023.992750

4(2023)

Fasting blood glucose, blood pressure and body mass index among combined oral contraceptive users in Chencha town Southern Ethiopia, 2019

Kofole, Zelalem[a].;Haile, Diresbachew[b];Solomon, Yerukneh[c].

[a] Department of Biomedical Sciences, School of Medicine, College of Health Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: The use of contraceptives has become prevalent among women in Ethiopia. Oral contraceptive use has been suggested to trigger changes in glucose metabolism, energy expenditure, blood pressure, and body weight, among various populations and ethnic groups. Objective: To elucidate the pattern of fasting blood glucose, blood pressure, and body mass index among combined oral contraceptive pills users compared to controls. Methods: An institution-based cross-sectional study design was employed. A total of 110 healthy women using combined oral contraceptive pills were recruited as cases. Another 110 healthy age and sex-matched women not using any hormonal contraceptives were recruited as controls. A study was conducted between October 2018 and January 2019. Data obtained was entered and analyzed using IBM SPSS version 23 software packages. One-way ANOVA was used to identify the variation of variables in relation to the duration of use of the drug. The P-value of < 0.05 at the 95% confidence level was statistically significant. Results: Fasting blood glucose level among oral contraceptive users (88.55 ± 7.89 mg/dl) was higher than fasting blood glucose level among oral contraceptive non-users (86.00 ± 9.85 mg/dl) with a p-value of 0.025. The mean arterial pressure of oral contraceptive users (88.2 ± 8.48 mmHg) was relatively higher than their counterparts (86.0 ± 6.74 mmHg), with a p-value of 0.04. Comparatively the body weight and body mass index among oral contraceptive users were 2.5% and 3.9% higher than non-users with a p-value of 0.03 and 0.003, respectively(5). Utilization of oral contraceptive pills for prolonged period of time seemed to be a significant predictive factor for higher mean arterial pressure and body mass index with $p < 0.001$and $p < 0.05$ respectively. Conclusions: Use of combined oral contraceptives was associated with higher fasting blood glucose (+2.9%), mean arterial pressure (+2.5%), and body mass index (3.9%) compared to controls. 2023 Kofole, Haile and Solomon.

International Journal of Food Science

DOI: http://dx.doi.org/10.1155/2023/9947841

2023(2023)

Naturally Occurring Plant Food Toxicants and the Role of Food Processing Methods in Their Detoxification

Urugo, Markos Makiso[a].; **Tringo, Tadele Tuba[b]**

[b] College of Engineering and Agro-Processing Technology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Some plant foods evolve defense mechanisms to protect themselves from predators by producing inherent chemicals as secondary metabolites such as cyanogenic glycosides, glycoalkaloids, glucosinolates, pyrrolizidine alkaloids, and lectins. These metabolites are beneficial for the plant itself but toxic to other organisms, including human beings. Some of these toxic chemicals are believed to have therapeutic benefits and are therefore used to protect against chronic health complications such as cancer. Inversely, short- and long-term exposure to significant amounts of these phytotoxins may end up with chronic irreversible negative health problems in important organ systems, and in severe cases, they can be carcinogenic and fatal. A systematic literature search of relevant published articles indexed in Google Scholar®, PubMed®, Scopus®, Springer Link®, Web of Science®, MDPI®, and ScienceDirect databases was used to obtain the necessary information. Various traditional and emerging food-processing techniques have been found to considerably reduce most of the toxicants in the food to their safest level. Despite their ability to preserve the nutritional value of processed foods, emerging food processing methods have limited application and accessibility in middle- and low-income countries. As a consequence, much more work is recommended on the implementation of emerging technologies, with additional scientific work on food processing methods that are effective against these naturally occurring plant food toxicants, particularly pyrrolizidine alkaloids.

Frontiers in Reproductive Health

DOI: http://dx.doi.org/10.3389/frph.2023.1097727

5(2023)

Knowledge of danger signs in pregnancy and their associated factors among pregnant women in Hosanna Town, Hadiya Zone, southern Ethiopia

Mesele, Tiruye Tilahun[a].;Syuom, Asmra Tesfahun[a];**Molla, Eshetie Amare[b]**

[b] Department of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Danger signs in pregnancy can warn of maternal health problems. In developing African countries, including Ethiopia, the rate of maternal mortality is high. There is little knowledge of danger signs during pregnancy and their associated factors at the community level in the study area. Methods: A community-based, cross-sectional study was conducted to assess knowledge about danger signs among pregnant women in Hosanna Zuria Kebeles between 30 June and 30 July 2021. A simple random sampling method was used to select eligible pregnant women. The sample size was proportionally allocated based on the number of pregnant women in each kebele. Data were collected in face-to-face interviews using a pretested questionnaire. The descriptive results were presented as proportions, whereas the analytic results were presented as adjusted odds ratios (AOR). Results: The prevalence of good knowledge of danger signs in pregnancy was 259/410 (63.2%, 95% confidence interval (CI) 58.3–67.8). The most common known danger signs during pregnancy were severe vaginal bleeding (n = 227, 55.4%), followed by blurred vision (n = 224, 54.6%). In the multivariable analysis, the age of the respondent (AOR = 3.29, 95% CI 1.15–9.38), the tertiary education of the mother (AOR = 5.40, 95% CI 2.56–11.34), and the number of live births (AOR = 3.95, 95% CI 2.08–7.48) were statistically significant factors. Conclusion: There was an adequate prevalence of knowledge of danger signs in pregnancy among pregnant mothers compared with different studies in Ethiopia and different countries. Advanced maternal age, the respondent's level of education, and the number of live births were found to be independent determining factors for the level of knowledge on danger signs in pregnancy among pregnant mothers. Health facilities and healthcare providers should focus on antenatal care and the age and parity of the mother when giving information about danger signs in pregnancy. The Ministry of Health should provide reproductive health services in rural areas and encourage education for women. Further studies need to be conducted and include danger signs in the three trimesters using a qualitative study design.

Keywords: danger signs; Ethiopia; Hadiya Zone; knowledge; pregnancy

Integrated Blood Pressure Control

DOI: http://dx.doi.org/10.2147/IBPC.S397760

(2023)

Blood Pressure Examination Habit and Its Determinants Among Civil Servants in Arba Minch Town: A Cross-Sectional Study – Using Hurdle Poisson Regression Model

Legisso, Tesfahun Zewde[a].;Mamo, Bereket Getachew[a];Bimrew, Abebaw Miskir[a];Fikadu, Teshale[b, c]

[a] Department of Statistics, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia
[b] Department of Public Health, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Hypertension is a common non-communicable disease detected through blood pressure measurement that makes periodic health examinations crucial for the detection, prevention, and timely treatment. Objective: To assess the frequency of blood pressure examination and its determinant among civil servants in Arba Minch Town, south Ethiopia. Methods: From February to March 2020 an organization-based cross-sectional study design was employed among civil servants in Arba Minch town. Data were collected from 580 randomly selected civil servants using a well-structured questionnaire. Hurdle Poisson regression model was conducted to identify determinants of frequency of blood pressure examination using R version 4.0.2. Results: A total of 407 (70.2%) civil servants had never examined their blood pressure within a year before the study time. The mean frequency of blood pressure examination was 0.71 with a standard deviation of 1.46. The hurdle Poisson regression analysis indicates age above 40 years (IRR = 6.11, $p < 0.001$), elevated blood pressure (IRR = 1.48, $p < 0.001$), no family history of hypertension (IRR = 0.59, $p < 0.001$) had significant effects on the expected number of non-zero counts blood pressure examination. And education status (OR; 2.39, $p < 0.05$), poor knowledge about hypertension, not getting advice from health professionals (OR = 8.93, $p < 0.001$), and age above 40 years had significant effects on not taking blood pressure examination. Conclusion: The frequency of blood pressure examinations among civil servants was found to be low. This study reveals age, elevated blood pressure, family history of hypertension, getting advice, and knowledge on hypertension were found to be determinants of the frequency of blood pressure examination. Thus, concerned health authorities and medical workers should work on these factors to prevent and detect hypertension among apparently healthy civil servants.

Keywords: Arba Minch; blood pressure examination; Ethiopia; hurdle Poisson regression; hypertension

Informatics in Medicine Unlocked

DOI: http://dx.doi.org/10.1016/j.imu.2022.101145

36(2023)

Attitude towards tele rehabilitation-based therapy services and its associated factors among health professional working in specialized teaching hospitals in Amhara region, Northwest Ethiopia

Sidelil, Habile[a];Demissie, Adina[b];Demissie, Getu Debalkie[c];Fikade, Berhanu[b];**Hailegebreal, Samuel[d].**;Tilahun, Binyam[b]

[d] Arba Minch University, College of Medicine and Health Sciences, School of Public Health Department of Health Informatics, Ethiopia

Abstract

Background: Tele-rehabilitation is part of Tele-health (TH) which provides a rehabilitation service at a distance through using telecommunication technology. The lack of skilled staff, accessibility concerns, high transportation costs, lengthy waiting times, and mobility issues make face-to-face rehabilitation treatment difficult. Therefore, this study aimed to assess attitudes and its associated factors of health professionals towards TR services. Method: An institutional-based cross-sectional study design was conducted among 408 health professionals from March to April 2021. A simple random sampling technique was applied to select study participants. Epi-data 3.1 versions software was used for data entry, and SPSS version 20 was used for the analysis. A bi-variable and multivariable logistic regression was used to determine factors associated with the attitude of health professionals towards tele-rehabilitation. Result: A total of 408 participants enrolled in the study, with a response rate of 95.5%. The majority 285(69.9%) of health professionals had good attitude towards tele rehabilitation-based treatment services. Good knowledge of tele rehabilitation [AOR = 1.76, 95%, CI: 1.078, 2.879], digitally literate [AOR = 1.74, 95%, CI: 1.028, 2.954], perception on security and privacy [AOR = 0.56, 95%,CI: 0.333, 0.944], and owns smart mobile phone [AOR = 1.9,95%,CI: 1.007, 3.781] were significantly associated with attitude towards tele rehabilitation service. Conclusion: In this study the majority of the respondents had a good attitude towards tele rehabilitation services. Having own mobile, knowledge towards tele rehabilitation, digital literacy, perception on security and privacy to rehabilitation were found to be factors associated with attitude towards tele rehabilitation service. Therefore, the government and other responsible entities should consider enacting systems and strategies to encourage the use of mobile technologies for the management of disability, chronic diseases and for rural patients.

Keywords: Attitude; Digital literacy; Health professional; Tele-rehabilitation

Recent Advances in Electrical and Electronic Engineering

DOI: http://dx.doi.org/10.2174/2352096515666220513111522

16(2023)

Information Leakage Tracking Algorithms in Online Social Networks

Zhang, Yusong[a];**Shabaz, Mohammad[b]**.;Beram, Shehab Mohamed[c]

[b] Arba Minch University, Arba Minch, Ethiopia

Abstract

Aim: To explore information leakage tracking algorithms in online social networks and solve the problem of information leakage in the current online social network, a deterministic leaker tracking algorithm based on digital fingerprints is proposed. Background: The basic working principle of the algorithm is that the platform uses plug-ins to embed unique user-identifying information before users try to obtain digital media such as images and videos shared by others on the platform. Objective: Because the scale of users in social networks is extremely large and dynamic, while en-suring the uniqueness of digital fingerprints, it is also necessary to ensure the coding efficiency and scalability of digital fingerprint code words. Methods: Simulation experiments show that 10 experiments are performed on 10,000–100,000 nodes, the Hamming distance threshold is set to 3, and the length of the hash code and the binary random sequence code are both 64 bits. Results: The proposed digital fingerprint fast detection scheme exhibits better performance than conventional linear search. Conclusion: An index table based on hash code and user ID is established and combined with community structure to improve the detection efficiency of digital fingerprints.

Keywords: digital fingerprint; Leaker tracking; neighbour hash; online social networks (OSNs); social network; trust model

Journal of Water and Climate Change

DOI: http://dx.doi.org/10.2166/wcc.2022.201

14(2023)

A pragmatic approach to the combined effect of climate change and water abstraction on Lake Ziway water balance, Ethiopia

Ashagre, Hailemariam Molla[a];Hatiye, Samuel Dagalo[b];Goshime, Demelash Wondimagegnehu[b].

[a] Faculty of Hydraulic and Water Resource Engineering, Arba Minch Water Technology Institute, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia
[b] Faculty of Water Resources and Irrigation Engineering, Arba Minch Water Technology Institute, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Climate change and ongoing human activity have been threatening Ethiopia's Lake Ziway's water balance. However, few studies have been conducted to investigate the combined effects of climate change and water withdrawal on the lake's water balance using climate change and water withdrawal for irrigation. We used high-resolution multiple climate models and Representative Concentration Pathways (RCP) scenarios to assess the impact of climatic variables for two future periods: 2021-2050 and 2051-2080. Rainfall and temperature data biases were corrected using power transformation and variance scaling methods, respectively. The Hydrologiska Byråns Vattenbalansavdelning (HBV) hydrological model was employed to simulate surface inflow into Lake Ziway from the Meki and Katar sub-catchments. The FAO CROPWAT model was used to estimate the irrigation water demand of major crops grown in the study area. The results indicate that future temperatures and wet season runoff levels are expected to rise. Under the worst climate change scenario, climate change and water withdrawal from the lake for agriculture may cause the lake level to drop by 25 cm per year, resulting in a 10 km^2 surface area and 101 Mm^3 volume reductions. Therefore, implementing preventive measures, proper planning and careful monitoring of lake water use is advised.

Keywords: Climate change; HBV-Model; Lake Ziway; RCP; Water abstraction; Water balance

International Journal of Geo-Engineering

DOI: https://doi.org/10.1186/s40703-023-00197-8

14 (2023)

Subgrade soil stabilization using the Quicklime: a case study from Modjo-Hawassa highway, Central Ethiopia

Hailu Regasa[1], Muralitharan Jothimani[1]* and Yonas Oyda[1]

[1]Department of Geology, College of Natural and Computational Sciences, Arba Minch University, Po Box- 21, Arba Minch, Ethiopia

Abstract

This study examined the index properties, strength, and swelling pressure by mixing the Quicklime with five soil samples taken from the Meki-Abossa road section part of the Modjo- Hawassa highway. The main goal of this study was to provide more insight into the effects of Quicklime stabilization on the Atterberg limit like (LL, LP, and PI), OMC, MDD, CBR, and CBR swell percent of subgrade soil along the selected route alignment. Five disturbed samples were collected from the Meki-Abossa Road section to achieve the objectives. The samples were collected using the open pit sampling method with an average 1-1.5 m depth. Laboratory works were carried out for natural sub-grade soil and soil mixed with Quicklime. The natural sub-grade soil was classed as A-7-5 (38) by AASHTO and MH & CH by USCS, with a maximum LL of 75, PI of 41.6, MDD of 1.59, and OMC of 28, with CBR values less than five and CBR swell>2%. The recommended lime (4%, 6%, and 8%) was mixed with the subgrade material. The result shows that the soil treated with Quicklime 4%, 6%, and 8% improved or lowered the untreated expansive soil plasticity index by 18.5%, 28.9%, and 23.8%, respectively, and increased OMC by 15.2% and reduced MDD by 18.23%. On the other hand, CBR values of the treated soil were increased by an average of 56.9%, with lower swelling potential decreases by 93.3%, higher workability, and stabilized soils were feasible to be used as subgrade material.

Keywords: Expansive soil stabilization, California bearing ratio, Maximum dry density, Quicklime

PLOS ONE

DOI: https://doi:10.1371/journal.pone.0284505

18(2023)

Prevalence, severity and associated risk factors of anemia among human immunodeficiency virus-infected adults in Sawla General Hospital, Southern Ethiopia: A facility-based cross-sectional study

Rishan Hadgu [1], Ahmed Husen [1], Esayas Milkiyas [1], Niguse Alemayoh [1], Robel Zemoy [1], Azene Tesfaye [1], Dagimawie Tadesse [1], Aseer Manilal [1], Aklilu Alemayehu [1]

[1]Department of Medical Laboratory Sciences, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Anemia is a significant public health problem in HIV/AIDS patients worldwide. This study is aimed to determine the prevalence of anemia and its risk factors among HIV-infected adults in Sawla General Hospital, southern Ethiopia.

Methods: A facility-based cross-sectional study involving HIV-infected adults was conducted in ART clinic of Sawla General Hospital from April 01 to May 31, 2019. A systematic random sampling technique was employed to recruit the study participants. Socio-demographic and clinical data were collected using a structured questionnaire and checklist. Hemoglobin concentration from venous blood was determined by HemoCue® 301 analyzer. Descriptive and inferential statistics, by Statistical Package for Social Science version 26.0, were applied; p-values ≤ 0.05 in the multivariable logistic regression analysis were considered statistically significant.

Results: A total of 220 HIV-infected adults participated in this study. The prevalence of anemia was 38.6%, from which 90.6, 7.1, and 2.3% are mild, moderate, and severe anemia, respectively. Anemia among HIV-infected adults was significantly associated with CD4 cell count below 200 cells/mm3 (AOR: 4.32; 95% CI: 2.10-8.86), clinical stage III or above (AOR: 4.20; 95% CI: 1.06-16.62), five or more years duration of HIV infection (AOR: 2.32; 95% CI: 1.08-4.94) and BMI below 18.5 kg/m2 (AOR: 3.82; 95% CI: 1.83-8.00).

Conclusion: Anemia is a moderate public health problem among the study population. Longer duration of HIV infection, advanced clinical stage, lower CD4 cell count, and BMI are risk factors for anemia. Therefore, early ART enrolment for HIV-infected adults with nutritional support and rigorous monitoring of CD4 cell count are essential to lower the prevalence.

BMC Plant Biology

DOI: http://dx.doi.org/10.1186/s12870-023-04645-6

23(2023)

Diversity of Arbuscular Mycorrhizal fungi under different agroforestry practices in the drylands of Southern Ethiopia

Nebiyou Masebo [1], Emiru Birhane [3 4 5], **Serekebirhan Takele [2]**, Zerihun Belay [6], Juan J Lucena [7], Araceli Pérez-Sanz [8], Agena Anjulo [9]

[2]Department of Biology, Arba Minch University, Arba Minch, P.O. Box 138, Arbaminch, Ethiopia

Abstract

The conversion of an agroforestry based agricultural system to a monocropping farming system influences the distribution and composition of arbuscular mycorrhizal fungi (AMF). The aim of this paper was to analyze AMF species diversity, spore density, and root colonization across different agroforestry practices (AFP) in southern Ethiopia. Soil and root samples were collected from homegarden, cropland, woodlot, and trees on soil and water conservation-based AFP. AMF spores were extracted from the soil and species diversity was evaluated using morphological analysis and root colonization from root samples. The AMF spore density, root colonization and composition were significantly different among the AFP ($P < 0.05$). In this study, 43 AMF morphotypes belonging to eleven genera were found, dominated by *Acaulospora* (32.56%), followed by *Claroideoglomus* (18.60%). Home gardens had the highest spore density (7641.5 spore100 g^{-1} dry soil) and the lowest was recorded in croplands (683.6 spore100 g^{-1} dry soil). Woodlot had the highest root colonization (54.75%), followed by homegarden (48.25%). The highest isolation frequency (63.63%) was recorded for *Acaulospora scrobiculata*. The distribution of AMF species and diversity were significantly related to soil total nitrogen and organic carbon. The homegarden and woodlot AFP were suitable for soil AMF reserve and conservation.

JAMA Oncology

DOI:https://doi.org/10.1001/jamaoncol.2023.2960

(2023)

The Global, Regional, and National Burden of Adult Lip, Oral, and Pharyngeal Cancer in 204 Countries and Territories

A Systematic Analysis for the Global Burden of Disease Study 2019

Abstract

Importance Lip, oral, and pharyngeal cancers are important contributors to cancer burden worldwide, and a comprehensive evaluation of their burden globally, regionally, and nationally is crucial for effective policy planning.

Objective To analyze the total and risk-attributable burden of lip and oral cavity cancer (LOC) and other pharyngeal cancer (OPC) for 204 countries and territories and by Socio-demographic Index (SDI) using 2019 Global Burden of Diseases, Injuries, and Risk Factors (GBD) Study estimates.

Evidence Review The incidence, mortality, and disability-adjusted life years (DALYs) due to LOC and OPC from 1990 to 2019 were estimated using GBD 2019 methods. The GBD 2019 comparative risk assessment framework was used to estimate the proportion of deaths and DALYs for LOC and OPC attributable to smoking, tobacco, and alcohol consumption in 2019.

Findings In 2019, 370 000 (95% uncertainty interval [UI], 338 000-401 000) cases and 199 000 (95% UI, 181 000-217 000) deaths for LOC and 167 000 (95% UI, 153 000-180 000) cases and 114 000 (95% UI, 103 000-126 000) deaths for OPC were estimated to occur globally, contributing 5.5 million (95% UI, 5.0-6.0 million) and 3.2 million (95% UI, 2.9-3.6 million) DALYs, respectively. From 1990 to 2019, low-middle and low SDI regions consistently showed the highest age-standardized mortality rates due to LOC and OPC, while the high SDI strata exhibited age-standardized incidence rates decreasing for LOC and increasing for OPC. Globally in 2019, smoking had the greatest contribution to risk-attributable OPC deaths for both sexes (55.8% [95% UI, 49.2%-62.0%] of all OPC deaths in male individuals and 17.4% [95% UI, 13.8%-21.2%] of all OPC deaths in female individuals). Smoking and alcohol both contributed to substantial LOC deaths globally among male individuals (42.3% [95% UI, 35.2%-48.6%] and 40.2% [95% UI, 33.3%-46.8%] of all risk-attributable cancer deaths, respectively), while chewing tobacco contributed to the greatest attributable LOC deaths among female individuals (27.6% [95% UI, 21.5%-33.8%]), driven by high risk-attributable burden in South and Southeast Asia.

Conclusions and Relevance: In this systematic analysis, disparities in LOC and OPC burden existed across the SDI spectrum, and a considerable percentage of burden was attributable to tobacco and alcohol use. These estimates can contribute to an understanding of the distribution and disparities in LOC and OPC burden globally and support cancer control planning efforts.

Asian-Pacific Journal of Second and Foreign Language Education

DOI: 10.1186/s40862-023-00203-7

8 (2023)

Effects of students' self-reflection on improving essay writing achievement among Ethiopian undergraduate students: a counterbalanced design

[1]Hailay Tesfay Gebremariam and [1]Dagnew Mache Asgede

[1]College of Social Science and Humanities, Arba Minch University, Arba Minch, Ethiopia

Abstract

Refection in education has seen an upsurge in research interest since as reported by Dewey (How we think, Prometheus Books, Bufalo, 1991) ground-breaking work, which plays an integral role in fostering students' self-refection and demonstrable learning skills. However there have not been enough studies to determine whether writing instruction from the perspective of self-refection before action improves undergraduate students' essay writing achievement. This article investigates the efects of Ethiopian university-undergraduate students' self-refection before action on their essay writing achievement through the mediation of teaching writing instruction. The study's methodology involved two phases of intervention in a counterbalanced design. The participants were 47 male and female students aged 19–22, from Arba Minch University. They were assigned to a control group and an experimental group using the matched sampling technique. During the frst phase, the experimental group (Group A) was instructed to engage in self-refection-based course activities over a period of two months while the control group was not. In the second phase Group B was engaged in self-refection-based course activities over a period of two months while Group A was kept under control. To collect data, preliminary students' self-refection was provided using an open-ended questionnaire, and pre- and posttests of writing were given to both groups. Mean and standard deviation statistics were applied after the thematic analysis of the qualitative data. Additionally, a univariate analysis of variance was performed to answer the query regarding the impact of self-refection on students' essay writing performance. The findings demonstrated that, despite the students encountering numerous difficulties during their essay writing exercises; the self-refection-based instruction had a significant positive impact on the participants' essay-writing achievement. In conclusion, the findings have some implications for teaching essay writing instructions.

Keywords: Counterbalanced design, Essay writing, Self-refection, Self-refection based instruction, Undergraduate students

Boundary Value Problems

DOI: 10.1186/s13661-023-01730-5

44 (2023)

Analysis of mathematical model involving nonlinear systems of Caputo–Fabrizio fractional differential equation.

Shiferaw Geremew Kebede[1]* and Assia Guezane Lakoud[2]

[1]Mathematics Department, College of Natural Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

In this paper, we consider a mathematical model of a coronavirus disease involving the Caputo–Fabrizio fractional derivative by dividing the total population into the susceptible population S(t), the vaccinated population V(t), the infected population I(t), the recovered population R(t), and the death class D(t). A core goal of this study is the analysis of the solution of a proposed mathematical model involving nonlinear systems of Caputo–Fabrizio fractional differential equations. With the help of Lipschitz hypotheses, we have built sufficient conditions and inequalities to analyze the solutions to the model. Eventually, we analyze the solution for the formed mathematical model by employing Krasnoselskii's fixed point theorem, Schauder's fixed point theorem, the Banach contraction principle, and Ulam–Hyers stability theorem.

Keywords: Caputo–Fabrizio fractional derivative; fixed point theorems; Existence; Uniqueness; Stability of solution

Energy Reports

DOI: https://doi.org/10.1016/j.egyr.2023.01.081

9 (2023)

Identification of small-scale hydropower potential sites using geographic information system and hydrologic modeling technique: Awata river, Genale Dawa basin, Ethiopia

[1]Dagim Chuluke Areri and [2]Takele Sambeto Bibi

[1]Department of Hydraulic Engineering, Institute of Water Technology, Arba Minch University, Ethiopia
[2]Department of Water Supply and Environmental Engineering, Institute of Water Technology, Arba Minch University, Ethiopia

Abstract

Small-scale hydropower is a significant source of renewable and inexpensive energy. This study was carried out to identify suitable potential sites for small-scale hydropower for the generation of electricity along the Awata River in Ethiopia. Primary and secondary data collected from various sources were used in the present study to achieve its objective. After the consistency of rainfall was checked and areal rainfall was estimated using the Theissen polygon method, the rainfall–runoff relationship was simulated using HEC-HMS. The head of each identified site was estimated by using GIS to overlay the DEM and stream network starting at the outlet. To estimate the discharge, the flow duration curve was developed. HEC-HMS performance was evaluated using Nash–Sutcliffe efficiency (NSE), Mean Absolute Error (MAE), Percent Bias (PBIAS), and coefficient of determination (R^2). During calibration, the values were 0.82, 4.39, −2.93, and 0.83, and during validation, the values were 0.76, 5.35, 6.25, and 0.76. The identified sites were ranked using an analytical hierarchy process based on a ratio of five criteria. There are twenty-eight sites identified, with estimated power output and energy output of 45.26 MW and 198.79 GWh at 50% and 6.74 MW and 53.23 GWh at 90%, respectively. The overall rank indicated that the selected site code 29 is ranked first and can be used for the implementation of a small hydropower plant. As a result, the design of all the components of small hydropower plants will be required to implement and generate energy for rural areas in future development.

Keywords: Flow duration curve, *Rainfall–runoff simulation*, Small hydropower plant, *HEC-HMS model Awata rivers*

Journal of Herbal Medicine

DOI: https://doi.org/10.1016/j.hermed.2023.100760

42 (2023)

Ethnobotanical study of medicinal plants of Lake Abaya basin, Southern Ethiopia

[1]Dikaso Unbushe and [2]Seyoum Getaneh

[1]Department of Biology, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Introduction: Ethnobotanical study was conducted in lake Abaya basin, southern Ethiopia. The study aimed at documenting indigenous and local knowledge and use of traditional medicinal plants for treating human and livestock ailments.

Methods: A survey was conducted among purposively selected traditional healers and randomly selected herbal medicine practitioners of the local communities. Guided field observations, semi-structured interview, group discussions and market survey were used for ethnobotanical data collection. Preference and direct matrix rankings including descriptive and inferential statistics were used to analyse the data.

Results: Seventy-one medicinal plant species belonging to 64 genera and 36 families were used as remedies for human and livestock ailments. Among these, 51 were reported for human, 13 for livestock ailment treatments and seven for both. Most of them were collected from the wild. The most frequently used plant parts were leaves followed by roots. The largest numbers of remedies were used to treat abdominal disorders. The major routes of administration include oral, dermal and nasal. Leucas *abyssinica* ranked first and most effective to cure abdominal disorder followed by Lepidium sativum and Stephania *abyssinica*. Moringa *stenopetala* was most preferred multipurpose plant by local people. Agricultural expansion was the major threatening factor followed by firewood consumption.

Conclusions: Traditional healers apply diversified traditional medicinal plants for healthcare of the community and domestic animals. However, traditional medicinal plants and the associated indigenous knowledge of local community were under threat. Thus, public awareness and community-based management need to be encouraged to maintain indigenous ethnomedicinal knowledge of the study area.

Current Microbiology

DOI: https://doi.org/10.1186/s40703-023-00197-8

634 (2023)

Recent Advances in Metagenomic Approaches, Applications, and Challenge

[1]**Niguse K. Lema**, [2]Mesfin T. Gemeda & [3]Adugna A. Woldesemayat

[1]Department of Biotechnology, Arba Minch University, Arba Minch, Ethiopia

Abstract

Advances in metagenomics analysis with the advent of next-generation sequencing have extended our knowledge of microbial communities as compared to conventional techniques providing advanced approach to identify novel and uncultivable microorganisms based on their genetic information derived from a particular environment. Shotgun metagenomics involves investigating the DNA of the entire community without the requirement of PCR amplification. It provides access to study all genes present in the sample. On the other hand, amplicon sequencing targets taxonomically important marker genes, the analysis of which is restricted to previously known DNA sequences. While sequence-based metagenomics is used to analyze DNA sequences directly from the environment without the requirement of library construction and with limited identification of novel genes and products that can be complemented by functional genomics, function-based metagenomics requires fragmentation and cloning of extracted metagenome DNA in a suitable host with subsequent functional screening and sequencing clone for detection of a novel gene. Although advances were made in metagenomics, different challenges arise. This review provides insight into advances in the metagenomic approaches combined with next-generation sequencing, their recent applications highlighting the emerging ones, such as in astrobiology, forensic sciences, and SARS-CoV-2 infection diagnosis, and the challenges associated. This review further discusses the different types of metagenomics and outlines advancements in bioinformatics tools and their significance in the analysis of metagenomic datasets.

Revista Brasileira de Botanica

DOI: http://dx.doi.org/10.1007/s40415-023-00953-1

46 (2023)

Predicting the potential geographical distribution of Osyris quadripartita Decn.(Santalaceae) in Ethiopia under climate change scenarios

Zeleke Assefa Getaneh[1,2], Sebsebe Demissew[1], Zerihun Woldu[1], Ermias Aynekulu[3]

[2]Department of Biology, College of Natural Sciences, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Climate change is a key factor that affects the geographical distribution of species globally. As a result, species are forced to change their suitable habitats. Understanding how climate change impacts species distribution is crucial to conserving species. This study aims to project the current and future potential distribution of Osyris quadripartita Decn under a climate change scenario in Ethiopia. O. quadripartita is an evergreen, dioecious and highly branched shrub or small tree with economic, ecological and cultural importance. The plant is indigenous to Ethiopia, and also widespread throughout Africa and southern Asia to China. Twenty-two environmental variables were used as predictor variables. Seventy spatially rarefied occurrence points were used as occurrence data. Representative Concentration Pathway (RCP) 4.5 (intermediate) and RCP 8.5 (maximum greenhouse gas emission scenarios) for the years 2050 and 2070 were used to predict future habitat suitability. Twelve bioclimatic variables and one topographic layer were selected and used in this study after a correlation analysis. Variables relating to precipitation (Bio17, Bio16, Bio19 and Bio14) and temperature (Bio6 and Bio1) were more important in predicting the distribution of O. quadripartita. The result revealed that the suitable habitats for the distribution of species decreased from the current 14.4% (16,363,005 hectares) to 11.9% (13,437,831 ha) and 11% (12,565,372 ha) under RCP 8.5 for the years 2050 and 2070, respectively, which depicts the shrinkage of suitable areas as a result of climate change. Therefore, it needs timely intervention by responsible bodies and stakeholders to conserve plant species in the changing climate.

BMC Pregnancy and Childbirth

DOI: http://dx.doi.org/10.1186/s12884-023-05414-x

96 (2023)

Determinants of maternal healthcare utilisation among pregnant women in Southern Ethiopia: a multi-level analysis

Mekdes Kondale Gurara[1],**Veerle Draulans**[1], **Jean-Pierre Van Geertruyden**[1] **&** Yves Jacquemyn

[1]Department of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Despite efforts to make maternal health care services available in rural Ethiopia, utilisation status remains low. Therefore, this study aimed to assess maternal health care services' status and determinants in rural Ethiopia. Methods: The study used quasi-experimental pre- and post-comparison baseline data. A pretested, semi-structured, interviewer-administered questionnaire was used to collect data. A multilevel, mixed-effects logistic regression was used to identify individual and communal level factors associated with utilisation of antenatal care (ANC), skilled birth attendance (SBA), and postnatal care (PNC). The adjusted odds ratio (AOR) and corresponding 95% confidence intervals (CI) were estimated with a p-value of less than 0.05, indicating statistical significance. Results: Seven hundred and twenty-seven pregnant women participated, with a response rate of 99.3%. Four hundred and sixty-one (63.4%) of the women visited ANC services, while 46.5% (CI: 42–50%) of births were attended by SBA, and 33.4% (CI: 30–36%) had received PNC. Women who reported that their pregnancy was planned (aOR = 3.9; 95% CI: 1.8–8.3) and were aware of pregnancy danger signs (aOR = 6.8; 95% CI: 3.8–12) had a higher likelihood of attending ANC services. Among the cluster-level factors, women who lived in lowlands (aOR = 4.1; 95% CI: 1.1–14) and had easy access to transportation (aOR = 1.9; 95% CI: 1.1–3.7) had higher odds of visiting ANC services. Moreover, women who were employed (aOR = 3.1; 95% CI: 1.3–7.3) and attended ANC (aOR = 3.3; 95% CI: 1.8–5.9) were more likely to have SBA at delivery. The likelihood of being attended by SBA during delivery was positively correlated with shorter travel distances (aOR = 2.9; 95% CI: 1.4–5.8) and ease of access to transportation (aOR = 10; 95% CI: 3.6–29) to the closest healthcare facilities. Being a midland resident (aOR = 4.7; 95% CI: 1.7–13) and having SBA during delivery (aOR = 2.1; 95% CI: 1.2–3.50) increased the likelihood of attending PNC service. Conclusions: Overall, maternal health service utilisation is low in the study area compared with the recommended standards. Women's educational status, awareness of danger signs, and pregnancy planning from individual-level factors and being a lowland resident, short travel distance to health facilities from the cluster-level factors play a crucial role in utilising maternal health care services. Working on women's empowerment, promotion of contraceptive methods to avoid unintended pregnancy, and improving access to health care services, particularly in highland areas, are recommended to improve maternal health service utilization.

The L-ancet Rheumatology

DOI: http://dx.doi.org/10.1016/S2665-9913(23)00232-1

634 (2023)

Global, regional, and national burden of other musculoskeletal disorders, 1990–2020, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021

B B Shashamo, GBD 2021 Other Musculoskeletal Disorders Collaborators

Department of Nursing, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Musculoskeletal disorders include more than 150 different conditions affecting joints, muscles, bones, ligaments, tendons, and the spine. To capture all health loss from death and disability due to musculoskeletal disorders, the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) includes a residual musculoskeletal category for conditions other than osteoarthritis, rheumatoid arthritis, gout, low back pain, and neck pain. This category is called other musculoskeletal disorders and includes, for example, systemic lupus erythematosus and spondylopathies. We provide updated estimates of the prevalence, mortality, and disability attributable to other musculoskeletal disorders and forecasted prevalence to 2050. Methods: Prevalence of other musculoskeletal disorders was estimated in 204 countries and territories from 1990 to 2020 using data from 68 sources across 23 countries from which subtraction of cases of rheumatoid arthritis, osteoarthritis, low back pain, neck pain, and gout from the total number of cases of musculoskeletal disorders was possible. Data were analysed with Bayesian meta-regression models to estimate prevalence by year, age, sex, and location. Years lived with disability (YLDs) were estimated from prevalence and disability weights. Mortality attributed to other musculoskeletal disorders was estimated using vital registration data. Prevalence was forecast to 2050 by regressing prevalence estimates from 1990 to 2020 with Socio-demographic Index as a predictor, then multiplying by population forecasts. Findings: Globally, 494 million (95% uncertainty interval 431–564) people had other musculoskeletal disorders in 2020, an increase of 123·4% (116·9–129·3) in total cases from 221 million (192–253) in 1990. Cases of other musculoskeletal disorders are projected to increase by 115% (107–124) from 2020 to 2050, to an estimated 1060 million (95% UI 964–1170) prevalent cases in 2050; most regions were projected to have at least a 50% increase in cases between 2020 and 2050. The global age-standardised prevalence of other musculoskeletal disorders was 47·4% (44·9–49·4) higher in females than in males and increased with age to a peak at 65–69 years in male and female sexes. In 2020, other musculoskeletal disorders was the sixth ranked cause of YLDs globally (42·7 million [29·4–60·0]) and was associated with 83 100 deaths (73 600–91 600). Interpretation: Other musculoskeletal disorders were responsible for a large number of global YLDs in 2020. Until individual conditions and risk factors are more explicitly quantified, policy responses to this burden remain a challenge. Temporal trends and geographical differences in estimates of non-fatal disease burden should not be overinterpreted as they are based on sparse, low-quality data. Funding: Bill & Melinda Gates Foundation.

Modeling Earth Systems and Environment

DOI: http://dx.doi.org/10.1007/s40808-023-01765-8

9 (2023)

Applications of statistical and AHP models in groundwater potential mapping in the Mensa river catchment, Omo river valley, Ethiopia

Wubshet Genjula[1], Muralitharan Jothimani[1], Jagadeshan Gunalan[1], Abel Abebe[1]

[1]Department of Geology, College of Natural and Computational Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Despite its potential for drinking, domestic/non-domestic use, and agricultural development in Ethiopia, groundwater is underutilized. By employing a geospatial tools analytical hierarchy approach and statistical models, this study evaluated the potential groundwater zone of the Mensa River watershed in the Omo River Valley, Ethiopia. This study identified seven significant groundwater potential influencing parameters and mapped them based on remote sensing, field and secondary data: geology, lineament density, land use/land cover, slope, drainage density, soil type, and rainfall. Based on the significance of the seven thematic maps as judged by professional judgment and a review of the pertinent literature, weights were assigned to each in the AHP model. The weighted thematic factors were integrated to create a composite map of potential groundwater zones using a weighted linear combination approach. According to the results of the analytical hierarchy process models, 7% and 21% of the research region contain zones with very high and high groundwater potential, respectively. This zone consists of low drainage, high lineament, and medium trachyte rocks in the study area's central, western, and southern regions. An analysis of the spatial relationships between well/spring sites and seven groundwater conditioning parameters was conducted using a frequency ratio model. According to the frequency ratio model, 4% and 10% of the research area have very high and high groundwater potentials, primarily in the northern and northwest regions, with limited coverage in the centre. Using the area under-curve approach, the analytical hierarchy process and frequency ratio models identified likely groundwater zones with 70.5% and 60% accuracy. According to the sensitivity analysis results, groundwater's potential relies mainly on LU/LC, precipitation, and soil type. The integrated approach of the present study's outcome may be helpful for hydrogeologists, planners, and administrators in the study area for managing groundwater resources sustainably.

Reproductive Health

DOI: https://doi.org/10.1186/s12978-023-01678-w

20 (2023)

Suboptimal birth spacing practice and its predictors among reproductive-age women in Sub-Saharan African countries: a multilevel mixed-effects modeling with robust Poisson regression

Kusse Urmale Mare[1]* , Kebede Gemeda Sabo[1] , Ahmed Adem Mohammed[1] **, Simeon Meskele Leyto[2]** , Getahun Fentaw Mulaw[3] , Tsion Mulat Tebeje[4] , Setognal Birara Aychiluhm[5] , Oumer Abdulkadir Ebrahim[5] , Abel Gebre Wuneh[5] and Beminate Lemma Seifu[5]

[2]Department of Anatomy, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background Despite the availability of exempted family planning services, a significant proportion of women in African countries continue to experience inadequately spaced pregnancies. To the authors' knowledge, evidence of suboptimal birth intervals at the SSA level is lacking and previous studies have been limited to specific geographic area. Therefore, this analysis was aimed to estimate the pooled prevalence of suboptimal birth spacing and its predictors among childbearing women in SSA. Methods Pooled DHS data from 35 SSA countries were used and a weighted sample of 221,098 reproductive-age women was considered in the analysis. The survey across all countries employed a cross-sectional study design and collected data on basic sociodemographic characteristics and different health indicators. Forest plot was used to present the overall and country-level prevalence of suboptimal birth spacing. Multilevel mixed-effects models with robust Poisson regression were fatted to identify the predictors of suboptimal birth spacing. Akaike's and Bayesian information criteria and deviance were used to compare the models. In a multivariable regression model, a p-value less than 0.05 and an adjusted prevalence ratio with the corresponding 95% CI were used to assess the statistical significance of the explanatory variables. Results The pooled prevalence of suboptimal birth spacing among women in SSA was 43.91% (43.71%-44.11%), with South Africa having the lowest prevalence (23.25%) and Chad having the highest (59.28%). It was also found that 14 of the 35 countries had a prevalence above the average for SSA. Rural residence [APR (95% CI)=1.10 (1.12– 1.15)], non-exposure to media [APR (95% CI)=1.08 (1.07–1.11)], younger maternal age [APR (95% CI)=2.05 (2.01– 2.09)], non-use of contraception [APR (95% CI)=1.18 (1.16–1.20)], unmet need for family planning [APR (95% CI)=1.04(1.03–1.06)], higher birth order [APR (95% CI)=1.31 (1.28–1.34)], and desire to have at least six children [APR (95% CI)=1.14 (1.13–1.16)] were the predictors of suboptimal birth spacing practice. Conclusion More than four out of ten reproductive-age women in SSA countries gave birth to a subsequent child earlier than the recommended birth spacing, with considerable variations across the countries. Thus, interventions designed at enhancing optimal birth spacing should pay particular attention to young and socioeconomically disadvantaged women and those residing in rural regions. Strengthening community health programs and improving accessibility and availabilities of fertility control methods that ultimately impacts optimal reproductive behaviors is crucial to address contraceptive utilization and unmet need.

Keywords: Multilevel modeling, Reproductive-age women, Predictors, Robust Poisson regression, Suboptimal birth spacing, Sub-Saharan Africa

BMC Psychiatry

DOI: https://doi.org/10.1186/s12888-023-04673-4

218(2023)

Determinants of post-traumatic stress disorder among survivors of road traffic accidents in dessie comprehensive specialized hospital North-East Ethiopia

Geleta Mussa Yimer[1], Yonas Fissha Adem[2]* and **Yosef Haile[3]**

[3]Department of Public Health, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Post-traumatic stress disorder is the most common mental disorder occurring among survivors of road traffic accidents. However, it remains under-explored and is not taken into account in the health policies of Ethiopia. Therefore, this study aimed to identify determinant factors of post-traumatic stress disorder among survivors of road traffic accident patients in Dessie Comprehensive Specialized Hospital, North-East Ethiopia.

Methods: A facility-based unmatched case–control study design was employed from February 15 to April 25, 2021, in Dessie Comprehensive Specialized Hospital, with a total sample size of 139 cases and 280 controls selected by using a simple random sampling technique. Data were collected by pretested, interview with a structured questionnaire. The data were entered using Epi-Info, then exported and analyzed using STATA. The bi-variable and multivariable binary logistic regression model was used to identify determinant factors of post-traumatic stress disorder among survivors of road traffic accident. Adjusted odds ratio with a 95% confidence level was used as a measure of association. Variables with a p-value less than 0.05 were considered as statistically significant.

Result: A total of 135 cases and 270 controls participated in this study, with a response rate of 97% and 96%, respectively. In the final multivariable analysis, being male [AOR = 0.43, 95% CI: 0.32–0.99], primary educational status [AOR = 3.4, 95% CI: 1.04–11], presence of personal psychiatric history [AOR = 2.12, 95% CI: 1.17–3.92], presence of fracture [AOR = 2.41, 95% CI: 1.2–4.8], witness of death [AOR = 2.25, 95% CI: 1.26–4.30], presence of comorbidity [AOR = 2.29, 95% CI: 1.28–4], good social support [AOR = 0.71, 95% CI: 0.12–0.68] were significantly associated with post-traumatic stress disorder among survivors of road traffic accident patients.

Conclusion: PTSD following road traffic accidents is common. A multi-disciplinary approach was therefore essential in the management of road traffic accident survivors at the orthopedic and trauma clinics. Patients with poor social support, bone fracture, witnessed death, comorbidity, and females should be routinely screened for post-traumatic stress disorder in all road traffic accident survivors.

BMC Nutrition

DOI: https://doi.org/10.1186/s40795-023-00674-4

18 (2023)

Colostrum avoidance practice and associated factors among mothers of infants less than six months in Chencha District: cross-sectional study

Tekle Buche Asaro[1], **Befkadu Tariku Gutema[2] and Haymanot Nigussie [2*]**

[2]School of Public Health, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Colostrum avoidance is failure to feed first breast milk to a newborn baby for the first 2 to 3 days after delivery. The problem of avoiding colostrum is prevalent in Ethiopia. But it is not adequately addressed yet. Therefore, the purpose of this study was to assess prevalence of colostrum avoidance practices and associated factors among mothers of infants aged less than six months; and to explore barriers for colostrum feeding in ChenchaZuria District.

Methods: A community-based cross-sectional study supplemented with a qualitative study was conducted in August 2020. The quantitative data were collected from 674 mothers selected by systematic sampling using a structured questionnaire. Both bi-variable and multi-variable binary logistic regression analysis was used to identify factors associated with the colostrum avoidance practices. The statistical significance was declared at a p-value < 0.05. The qualitative data were collected using in-depth interviews from breastfeeding mothers and thematic analysis was done manually.

Result: The prevalence of the colostrum avoidance practice was 15.3% (95% CI: 11.4%- 18.2%). Late initiation of breastfeeding (AOR 4.15 95% CI 2.51–6.84), giving pre-lacteal feeding (AOR 3.16 95% CI 1.93–5.15), not using of postnatal care (PNC) service (AOR 1.79 95% CI 1.05–3.04), and having poor maternal knowledge regarding colostrum. (AOR 1.88 95% CI 1.14–3.08) were factors significantly associated with the colostrum avoidance practices. And in the qualitative part, cultural beliefs and misconceptions, community influence, and complementary feeding practices were found to be facilitators for the colostrum avoidance.

Conclusion: About one in seven mothers practiced colostrum avoidance. Factors that contributed to the colostrum avoidance practices were breastfeeding initiation, pre-lacteal feeding, PNC utilization, and maternal knowledge regarding colostrum. Thus, efforts to prevent colostrum avoidance practices should focus on strengthening and promoting PNC services utilization, timely initiation of breastfeeding, and improving awareness creation activities on the importance of colostrum feeding and risks of pre-lacteal feeding.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e22769

9 (2023)

Comparative in vitro evaluation of five Commelina forage species on ruminal fermentation and methanogenesis

Kebede Gelgelo [a], **Yisehak Kechero** [a], Dereje Andualem [b]

[a]Arba Minch University, College of Agricultural Sciences, Department of Animal Sciences, P O Box 21, Gamo Zone, Arba Mincch, Ethiopia

Abstract

In vitro gas measurement study was known to be a helpful tool for investigating the nutritional quality of feed for ruminant animals. This research was conducted to explore the ruminal fermentation and methane emission potential, and their variability pattern with changing seasons and altitudes for Commelina species, using in vitro test. Samples of the species were collected from different altitudes and seasons and used for the in vitro degradability study. Five species (C.africana, C. albescence, C. benghalensis, C. imberbis and C. diffusa), two altitudes (low and mid), and two seasons (wet and dry) were arranged in a 5 × 2 x 2 factorial manner in a completely randomized design, with three repeats of each treatment. In vitro gas and methane production as well as methane to total gas ratio were all meaningfully ($P < 0.001$) affected by season and altitude with the highest values observed in wet season and mid altitudes. At 24 h incubation, 44.76 and 37.82 ml/200 mg DM of total gas production was noted for wet and dry seasons respectively, while 39.77 and 47.38 ml/200 mg DM was recorded for low and mid altitudes respectively. Average gas production from immediately fermentable fractions (a) for wet season (4.21 ml) was reasonably ($P < 0.001$) higher than those for dry season (2.16 ml). Midlands (5.04 ml) had higher ($P < 0.001$) 'a' value than lowlands (2.77 ml). Both methane production and methane to total gas ratio exhibited a tangible decrease ($P < 0.001$) from wet season to dry season. 4.88 ml/200 mg DM and 6.52 ml/200 mg DM methane records were recorded for lowlands and midlands respectively. It appears that Commelina species contain nutrients that degrade in vitro, highlighting their potential supplement value for animals. The promising gas production potential added to its low methanogenic coefficient relative to the other species makes C. diffusa to the preferred supplement for poor-quality roughages followed by C. benghalensis and C. imberbis and the rest species being least preferred. But further nutrient analysis, minerals, secondary metabolites and the like, was required. And, in vivo trials must be conducted to strengthen the implications of this study.

Scientific Reports

DOI: http://dx.doi.org/10.1038/s41598-023-48407-8

21370 (2023)

Molecular epidemiology and drug sensitivity of Mycobacterium tuberculosis in homeless individuals in the Addis Ababa city, Ethiopia

Tsegaye Shamebo[1], BalakoGumi[2], **Aboma Zewude[3,6]**, FikruGashaw[5],Temesgen Mohammed[4,6], MuseGirma[2] , Betselot Zerihun[3] , MelakGetu[3] , Sindew Mekasha[3] , MuluworkGetahun[3] , **BiniamWondale[6]** , Beyene Petros[1] & GobenaAmeni[2,4]*

[6]Arba Minch University, Araba Minch, Ethiopia

Abstract

Although homeless segment of the society could be the hotspots for tuberculosis (TB) transmission, there is little data on TB in homeless individuals in Ethiopia. The objective of this study was to investigate the molecular epidemiology and drug sensitivity of Mycobacterium tuberculosis (M. tuberculosis) isolated from homeless individuals in Addis Ababa, Ethiopia. The study was conducted on 59 M. tuberculosis isolates, which were recovered by the clinical screening of 5600 homeless individuals and bacteriological examination of 641 individuals with symptoms of pulmonary tuberculosis (PTB). Region of difference-9 (RD9) based polymerase-chain reaction (PCR), Spoligotyping and 24-loci Mycobacterial Interspersed Repetitive Unit-Variable Number Tandem Repeat (MIRU-VNTR) typing were used for genotyping of the isolates. In addition, drug sensitivity test was performed on the isolates using BD Bactec Mycobacterial Growth Inhibition Tube (MGIT) 960. Fifty-eight of the 59 isolates were positive by spoligotyping and spoligotyping International type (SIT) 53, SIT 37, and SIT 149 were the dominant spoligotypes; each consisting of 19%, 15.5%, and10.3% of the isolates, respectively. The majority of the isolates (89.7%) were members of the Euro-American (EA) major lineage. MIRU-VNTR identified Ethiopia_3, Delhi/CAS, Ethiopia_2, TUR, X-type, Ethiopia_H37Rv-like strain, Haarlem and Latin-American Mediterranean (LAM) sub lineages. The proportion of clustering was 77.6% (45/58) in spoligotyping while it was 39.7% (23/58) in 24-loci MIRU-VNTR typing. Furthermore, the proportion of clustering was significantly lowered to 10.3% (6/58) when a combination of spoligotyping and 24-loci MIRU-VNTRplus was used. The recent transmission index (RTI) recorded by spoligotyping, 24-loci MIRU-VNTR typing, and a combination of the two genotyping methods were 58.6%, 27.6% and 5.2%, respectively. Young age and living in groups were significantly associated with strain clustering ($P < 0.05$). The drug sensitivity test (DST) result showed 8.9% (4/58) of the isolates were resistant to one or more first line ant-TB drugs; but multidrug resistant isolate was not detected. Clustering and RTI could suggest the transmission of TB in the homeless individuals, which could suggest a similar pattern of transmission between homeless individuals and the general population. Hence, the TB control program should consider homeless individuals during the implementation of TB control program.

CAAI Transactions on Intelligence Technology

DOI: https://doi.org/10.1049/cit2.12204

8 (2023)

Energy efficient indoor localisation for narrowband internet of things

[1]Ismail Keshta, [2]Mukesh Soni, [3]Mohammed Wasim Bhatt, [4]Azeem Irshad, [5]Ali Rizwan, [6]Shakir Khan, [7]Renato R. [8]Maaliw III, [9]Arsalan Muhammad Soomar, **[10]Mohammad Shabaz**

[10]Arba Minch University, Arba Minch, Ethiopia

Abstract

There are an increasing number of Narrow Band IoT devices being manufactured as the technology behind them develops quickly. The high co-channel interference and signal attenuation seen in edge Narrow Band IoT devices make it challenging to guarantee the service quality of these devices. To maximise the data rate fairness of Narrow Band IoT devices, a multi-dimensional indoor localisation model is devised, consisting of transmission power, data scheduling, and time slot scheduling, based on a network model that employs non-orthogonal multiple access via a relay. Based on this network model, the optimisation goal of Narrow Band IoT device data rate ratio fairness is first established by the authors, while taking into account the Narrow Band IoT network: The multi-dimensional indoor localisation optimisation model of equipment tends to minimize data rate, energy constraints and EH relay energy and data buffer constraints, data scheduling and time slot scheduling. As a result, each Narrow Band IoT device's data rate needs are met while the network's overall performance is optimised. We investigate the model's potential for convex optimisation and offer an algorithm for optimising the distribution of multiple resources using the KKT criterion. The current work primarily considers the NOMA Narrow Band IoT network under a single EH relay. However, the growth of Narrow Band IoT devices also leads to a rise in co-channel interference, which impacts NOMA's performance enhancement. Through simulation, the proposed approach is successfully shown. These improvements have boosted the network's energy efficiency by 44.1%, data rate proportional fairness by 11.9%, and spectrum efficiency by 55.4%.

AIP Conference Proceedings

DOI: https://doi.org/10.1063/5.0178521

2936 (2023)

The effect of joint deformations on the nonlinear behavior of retrofitted reinforced concrete structures

[A]Lami Sileshi Dereje; [B]Marina Igorevna Rynkovskaya; **[C]Gizachew Megersa Dabi; [C]Tewodros Temede Baza**; [D]Ebisa Katama Nagassa; [B]Njoroge Dennis Mbuthia

[C] Arba Minch University, P.O. Box 21, Arba Minch, SNNPR, Ethiopia

Abstract

In traditional frame analysis, beam-column joints are assumed as rigid and designed only for gravity load, yet they experience significant shear deformations and contribute significant story drifts during earthquakes. Although retrofitted reinforced concrete connection models are present in the literature for the finding of single assemblages; there is a retrenchment in the study of the full-frame analysis procedures simulating the nonlinear behavior of joints in addition to other expected failure. The objective of this study is to investigate the effect of joint deformations on the nonlinear behavior of retrofitted reinforced concrete structures by comparing the experimental study with the numerical study. Thus, two existing exterior beam-column joint retrofitting solutions: Carbon Fiber Reinforced Polymer (CFRP) and steel jacketing are selected for comparison. Mainly, selected retrofitting methods are compared under some specific failure parameters to investigate the best retrofitting method which enhances the failure of joints in the nonlinear zone under cyclic load imposed. In this paper, proper experimental study databases have been collected for a clear comparison of the proposed methodology. From the collected experimental study database, two exterior beam-column specimens with the same cross-section & reinforcement detailing and different retrofitting methods were selected to investigate the best option of joint rehabilitation. As per the result, the proposed strengthening solutions could partially upgrade the seismic capacity of the joints. Both the experimental study and numerical model shows that steel jacketing could enhance deformation and increase load-carrying capacities. But, the seismic capacity of the beam-column joint didn't significantly affected by Carbon Fiber Reinforced Polymer wrapping.

IBMC Plant Biology

DOI: https://doi.org/10.1186/s40703-023-00197-8

634 (2023)

Physical activity status among adolescents in Southern Ethiopia: A mixed methods study

[1]Eshetu Andarge Zeleke,[2]**Teshale Fikadu,**[3]**Muluken Bekele,**[3]**Negussie Boti Sidamo,**[3]**Kidus Temesgen Worsa**

[3]School of Public Health, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Adolescents physical activity is associated with current and future health benefits, reduction of cardio-vascular risk factors, improved bone mineral density, and mental health. The aim of the current study is to assess physical activity status and its factors among adolescents in Arba Minch and Jinka towns, Southern Ethiopia.

Methods: The study was conducted on 1255 randomly selected schools adolescents of Arba Minch and Jinka town by employing a mixed method. The qualitative data was obtained by Focus Group Discussion. Multiple linear regressions were done to identify factors affecting physical activity. Codes, sub-categories, and main categories were derived from the transcripts and presented in narrative ways to describe adolescent student's perception on physical activity, its barriers and facilitators by comparing with quantitative findings.

Results: The mean physical activity level was 2.08 (95% CI: 2.04–2.12). A student's self-perception about being physically active, being a member of a sport or fitness team, and engaging in after-school activity to earn money, being older, sex, a self-perception of being healthy, higher levels of vegetable and fruit consumption, having someone who encouraged physical activity, perceiving one's family as being active, self-perception of not being overweight and attending schools that have a sports/playground were factors associated with physical activity. The qualitative finding showed a related finding. Poor awareness on the recommended physical activity, benefits of physical activity, lack of interest, restrictions from family members, peers and the community, uncomfortable environment were barriers to physical activity.

Conclusion and recommendation: The physical activity level of adolescents was low. Age, sex, a positive self-perception about PA and general health, and perception about one's family PA, healthy eating practice, and the presence of role model were associated factors. Lack of self-motivation, interest and family restrictions were barriers to physical activity. PA promotion should be made by incorporating PA into school health programs and strengthening the existing school curriculum.

PLOS ONE

DOI: https://doi.org/10.1371/journal.pone.0294324

18(2023)

Determinants of plant community along environmental gradients in Geramo forest, the western escarpment of the rift valley of Ethiopia

Zeleke Assefa Getaneh [1,2]*, Sebsebe Demissew[1], Zerihun Woldu[1], Ermias Aynekulu [3]

[2]College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Detailed information on plant community types, distribution, and their relationships with various environmental gradients is crucial for understanding forest dynamics and sustainable forest management because plant community types are influenced by various environmental factors. Thus, this study was conducted to investigate plant community types and species diversity in relation to various environmental gradients in Geramo Forest, which is a remnant forest in the western escarpment of the Rift Valley of Ethiopia. Vegetation data were collected in 96 nested plots (20 × 20 m2 and five 1 ×1 m2) laid systematically at a distance of 250 m along 16 line transects, which were laid 300 m apart. Environmental and disturbance variables were also collected from each main plot. Agglomerative hierarchical cluster analysis and Canonical correspondence analysis (CCA) with R software were used to identify plant community types and analyze the relationship between plant community types and environmental variables, respectively. The Shannon Wiener diversity index was used to compute species diversity among community types. Five significantly different ($p \leq 0.001$) plant community types were identified. The CCA results showed that species diversity and community composition among different community types were significantly influenced by altitude, disturbance, soil organic carbon, slope, soil available phosphorus, and pH, which revealed the compounded effect of various environmental factors on species richness, diversity, and evenness among plant community types. The study also identified a significant level of anthropogenic disturbance and a strong reliance of the local community on the forest in the research area. Therefore, it is recommended that sustainable forest conservation interventions be implemented through awareness creation and the promotion of community-based approaches.

BMC Women's Health

DOI: http://dx.doi.org/10.1186/s12905-023-02649-w

501(2023)

Extended postpartum intimate partner violence and its associated factors: community-based cross-sectional study design

Lema Fikadu Wedajo[1]*, **Abera Mersha Mamo[2],** Solomon Seyife Alemu[1] **and Bezawit Afework Mesn[3]**

[2]Departments of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[3] Departments of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Intimate partner violence is a global problem that threatens mothers. It has multidimensional consequences but has not gained attention from scholars after childbirth.

Objective: To assess the prevalence of extended postpartum intimate partner violence and its associated factors.

Method:A community-based cross-sectional study design was employed among 570 postpartum mothers in Arba Minch Town, Southern Ethiopia, from May 21st to June 21st, 2022. A pretested, face-to-face interviewer-administered structured questionnaire was used. Bivariable and multivariable logistic regression analyses were used. The level of statistical significance was declared at $P < 0.05$ with a 95% CI.

Results: Overall, the prevalence of extended postpartum intimate partner violence was 45% (95% CI: 40.89, 49.20). Participants whose husband has no formal education (AOR = 3.62; 95%CI: 1.32, 9.90) and only secondary education (AOR = 2.96; 95%CI: 1.56, 5.48), husband alcohol consumption (AOR = 1.73; 95%CI: 1.06, 2.80), husband dominance in decision-making (AOR = 1.94; 95%CI: 1.13, 3.33), husband disappointment in the gender of the baby (AOR = 2.13; 95%CI: 1.28, 3.56), previous history of intimate partner violence (AOR = 5.71; 95%CI: 3.59, 9.07), and low social support (AOR = 4.37; 95%CI: 2.53, 7.55) were significantly associated factors.

Conclusions and recommendations: The prevalence of extended postpartum intimate partner violence was found to be high. Thus, increasing awareness of husbands with no formal education and having lower academic achievement, incorporating maternal social support assessment into maternity and child health care; teaching on alcohol reduction behavior and gender roles; and screening of mothers during the prenatal period should be given.

Heliyon

DOI: http://dx.doi.org/10.1016/j.heliyon.2023.e21632

e21632 (2023)

Assessment of soil mulching field management, and deficit irrigation effect on productivity of watermelon varieties, and AquaCrop model validation

[a]Gebeyhu, Birara , [b]Markos, Genet

[a]Faculty of Water Resources and Irrigation Engineering, Arba Minch Water Technology Institute, Arba Minch University The institution will open in a new tab, Arba Minch, Ethiopia
[b]Faculty of Water Resources and Irrigation Engineering, Arba Minch Water Technology Institute, Arba Minch UniversityThe institution will open in a new tab, Arba Minch, Ethiopia

Abstract

Watermelon productivity in the Arba Minch irrigation scheme has been hampered by water scarcity, with only the Lady Bells watermelon variety being cultivated in the area. This challenge can be mitigated by adopting water-saving irrigation techniques and selecting water stress-resistant varieties. Hence, this study aimed to investigate the combined impact of soil mulching and deficit irrigation on the productivity of various watermelon varieties and validate the AquaCrop model. The experiment employed a randomized complete block design with two levels of water application (100 % SMD and 50 % SMD), two mulching practices (non-mulching and mulching), and four watermelon varieties: Lady Bells (V1), Green Pearl (V2), Kaolack (V3), and Koloss (V4). Soil physical properties and crop-related data were used to calibrate the AquaCrop model. Straw mulching, on average, conserved 64.50 mm and 262.75 mm of water under 100 % and 50 % water application levels, respectively. The minimum and maximum land productivity averages were 6.2 tonsha−1 (T13) and 17.6 tonsha−1 (T2), while water productivity ranged from 5.2 kgm−3 (T1) to 12.4 kgm−3 (T10). Lady Bell watermelon varieties displayed high sensitivity to water stress, with a 1.27 yield response factor under non-soil mulching treatment with 50 % water application. The mean benefit-cost ratio varied from 1.52 (T13) to 2.90 (T10). The average values of RMSE, NSE, and R2 for the AquaCrop model were 0.70, 0.65, and 0.80, respectively, indicating the model's acceptability in predicting the effects of mulching and deficit irrigation on watermelon productivity. Overall, the use of straw mulching combined with 50 % deficit irrigation, particularly for Green Pearl varieties, emerged as the most productive watermelon cultivation method in the Arba Minch region when facing limited irrigation water. Future research will focus on assessing the impact of deficit irrigation during various watermelon growth stages.

Frontiers in Global Women's Health

DOI: https://doi.org/10.3389/fgwh.2023.1056488

4(2023)

Prevalence of hepatitis B infection and its associated factors among pregnant mothers attending antenatal care at public hospitals at Hararghe, Eastern Ethiopia

Abbas Umer[1] , Zelalem Teklemariam[2] , Firayad Ayele[2] * and **Melkamu Merid Mengesha[3]**

[3]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Despite Emails and websites being widely used for communication, collaboration, and day-to-day activity, not all online users have the same knowledge and skills when determining the credibility of visited websites and email content. As a result, phishing, an identity theft cyber-attack that targets humans rather than computers, was born to harvest internet users' confidential information by taking advantage of human behavior and hurting an organization's continuity, reputation, and credibility. Because the success of phishing attacks depends on human behavior, using the Health-Belief Model, the study's objective is to examine significant factors that influence online users' security behavior in the context of Email and website-based phishing attacks. The model included eight predictor variables and was validated using quantitative data from 138 academic staff. The study findings exhibit that 4 out of 8 predictor variables, namely Perceived-Barriers, Perceived-Susceptibility, Self-efficacy, and Security-Awareness, are statistically significant in determining users' security behavior. The study's outcome is to assist in the appropriate design of both online and offline content for cyber security awareness programs, focusing on Email and website-based phishing attacks. Reserved.

Keywords: Confidential data; Health belief model; Online user; Phishing attack; Security behavior

International Journal of Information Science and Management

DOI: 10.22034/ijism.2022.1977800.0

21(2023)

Email and Website-Based Phishing Attack: Examining Online Users Security Behavior in Cyberspace Environment

Adane, Kibreab[a], Beyene, Berhanu[b]

[a] Faculty of Computing & Software Engineering, Arba Minch University Institute of Technology, Arba Minch, Ethiopia

Abstract

Despite Emails and websites being widely used for communication, collaboration, and day-to-day activity, not all online users have the same knowledge and skills when determining the credibility of visited websites and email content. As a result, phishing, an identity theft cyber-attack that targets humans rather than computers, was born to harvest internet users' confidential information by taking advantage of human behavior and hurting an organization's continuity, reputation, and credibility. Because the success of phishing attacks depends on human behavior, using the Health-Belief Model, the study's objective is to examine significant factors that influence online users' security behavior in the context of Email and website-based phishing attacks. The model included eight predictor variables and was validated using quantitative data from 138 academic staff. The study findings exhibit that 4 out of 8 predictor variables, namely Perceived-Barriers, Perceived-Susceptibility, Self-efficacy, and Security-Awareness, are statistically significant in determining users' security behavior. The study's outcome is to assist in the appropriate design of both online and offline content for cyber security awareness programs, focusing on Email and website-based phishing attacks.

Keywords: Confidential data; Health belief model; Online user; Phishing attack; Security behavior

Geology, Ecology, and Landscapes

DOI: http://dx.doi.org/10.1080/24749508.2021.1944798

7(2023)

Impacts of habitats and seasons on mammalian diversity and distribution in the Faragosa-Fura landscape, Gamo Zone, Southern Ethiopia

Berhanu Gebo[a], Serekebirhan Takele[a] & Simon Shibru[a]

[a] Department of Biology, College of Natural and Computational Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

In Ethiopia, most of the studies on mammals have focused on single species and protected areas. This survey investigated the impacts of habitats and seasons on the medium and large-sized mammalsâ€™ diversity and distribution in a human-dominated landscape. This survey was conducted using 36 systematically distributed transect lines within stratified habitat types. A total of 685 records belonging to 21 species, six orders, and 13 families were identified, including globally vulnerable Panthera leo, Panthera pardus, and Hippopotamus amphibious. Overall, Papio anubis and Chlorocebus aethiops were the dominant species recorded in the area. Except for three species, all species encountered in the three habitats are subsets of the species recorded in the grassland. The species record frequency was highest in the forest. The dry season characterized by a higher frequency of records but by lower species richness than the wet season. In general, the study area is potential for mammalian species conservation in Ethiopia.

Keywords: distribution; Diversity; mammalsâ€™; relative abundance; species richness

Water (Switzerland)

DOI: http://dx.doi.org/10.3390/w15020238

15(2023)

Citizen Science for Water Quality Monitoring in the Meki River, Ethiopia: Quality Assurance and Comparison with Conventional Methods

Wudinesh Zawuga Babiso [1],*, Kinfe Kassa Ayano [1], Alemseged Tamiru Haile [2], **Demissie Dawana Keche [3]**, Kishor Acharya [4] and David Werner [4]

[1]Department of Water Supply and Environmental Engineering, Arba Minch Water Technology Institute (AWTI), Arba Minch University, Arba Minch P.O. Box 21, Ethiopia
[3]Water Resources Research Center, Arba Minch Water Technology Institute (AWTI), Arba Minch University, Arba Minch P.O. Box 21, Ethiopia

Abstract

A lack of water quality information for many water bodies around the world makes it difficult to identify global change and discover early signs of myriad threats to freshwater resources. This problem is widely seen in Ethiopia due to absence of regular monitoring. Citizen science has a great potential to fill these gaps in water quality data, but there is concern about the accuracy of data collected by citizen scientists. Moreover, there is a gap to engage citizen scientists in water quality monitoring, and there is still insufficient awareness of how citizen scientists can become part of a collaborative scheme. This study aimed to evaluate the accuracy of water quality collected by citizen scientists and characterize the water quality of the Meki River with the involvement of citizen scientists. The suitability of the river water for irrigation was evaluated using a combination of citizen science and conventional water quality data collection methods. Water temperature, turbidity, ammonia, phosphate, nitrate, nitrite, total alkalinity, total hardness, and pH were analyzed by both citizen scientists and in a conventional laboratory. The citizen scientists' data, expressed as percent of synthetic standard solution concentrations, indicated good agreement for selected water quality parameters: 123.8 ± 24.7% for PO_4^{3-}, 115.6 ± 6.3% for NO_3^-, 105.8 ± 7.4% for pH, and 133.3 ± 23.6% for NH_4^+. Thus, citizen scientists can monitor and collect water quality data accurately. From the results, the Meki River water can be used for irrigation, but pollution sources should be controlled to reduce further quality deterioration as the population increases.

Keywords: citizen science; validation; irrigation; LaMotte color strips; water quality

International journal of surgery (London, England)

DOI: https://doi.org/10.1097/js9.0000000000000010

109(2023)

Repurposing cholesterol lowering drugs in the treatment and management of monkeypox

Saravanan Sekaran [1], **Suresh Kumar R Sekar [2]**

[2]College of Natural Sciences, Arba Minch University, SNNPR, Ethiopia

Abstract

While the likelihood of monkeypox (MPX) becoming a pandemic, very little is known about the virus. The smallpox-like symptoms caused by the MPX virus are less severe. Given the current possibility of a pandemic, it is crucial that any negative impacts of a MPX epidemic on public health be kept to a minimum. At the time of writing this letter, Centre for Disease control and Prevention has reported 77,092 confirmed cases across the globe in more than 89 countries. According to Centre for Disease control and Prevention, there is currently no cure for MPX infections; nevertheless, most patients recover after receiving supportive care, such as rehydration. MPX virus and Smallpox virus share genetic similarity and there is evidence to suggest that smallpox vaccination provides some protection against MPX, leading to a more favorable clinical presentation. To prevent high risk individuals, two vaccines namely JYNNEOS and ACAM2000 are used against MPX1. Among several pharmacological interventions suggested, antiviral drugs Brincidofovir and Tecovirimat show promising therapeutic effects. It inhibits the production of protein required for extracellular virus production2. Clinical trials of these antivirals are currently underway and may take a longtime to decipher its effectiveness and safety.

International Journal of Food Science

DOI: https://doi.org/10.1155/2023/6666635

2023(2023)

Phytochemical Screening and Multivariate Analysis on Physicochemical and Nutraceutical Value of Kocho from False Banana (Enset)

Tewodros Birhanu[a], Tesfaye Adiko[a], and Ramesh Duraisamy[a]

[a] Department of Chemistry, College of Natural Sciences, Arba Minch University, SNNPR, Ethiopi

Abstract

Enset (Ensete ventricosum) is one of Ethiopia's most important food crops. The objective of the present study is to evaluate (using multivariate analysis) the effect of fermentation time, varietal differences, and treatment with gammicho on the physicochemical and nutraceuticals of kocho obtained from false banana in highly cultivated areas such as Disa Kera and Koysha Gorta of Dawro zone, Loma Woreda, South Nations' Nationalities People Regions, Ethiopia. The analyses were carried out for fresh and fermented (with and without local starter, gammicho) enset kocho varieties (Meazia and Katania) harvested in two locations. Statistical analysis of the acquired data was performed using Minitab software version 19. It was discovered that each factor influenced significantly ($p \leq 0.05$) the qualities of kocho independently and with interaction. After four months of fermentation with gammicho, various parameters such as fat (1.69 to 0.62%), fiber (11.46 to 2.79%), pH (6.50 to 3.00), and moisture were dramatically decreased (9.34 to 2.8%). On the other hand, some dietary elements in both kinds were reduced with increasing fermentation time, including ash (2.07 to 3.57%), protein (3.08 to 5.52%), and carbs (71.87 to 84.55%). The results of this study suggest that Meazia has superior physicochemical and nutritional qualities over Katania.

Infection and Drug Resistance

DOI: https://doi.org/10.2147/IDR.S405802

16(2023)

Measles Outbreak Investigation in Garda Marta District, Southwestern Ethiopia, 2022: Community-Based Case-Control Study

Silas Bukuno [1,] Agunie Asholie [2], **Zeleke Girma [3]** , Yusuf Haji [2]

[3]Department of Public Health, School of Public Health, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: A measles outbreak can occur in the presence of an increased number of unvaccinated children; however, the vaccine was available many decades ago, and it is the foremost cause of child mortality, claiming 568 lives (mostly children) worldwide each day. The investigation was aimed at assessing the magnitude and identifying contributing factors for the measles outbreak in the Garda Marta District of Gamo Zone, Southwestern Ethiopia. Methods: From January 20 to February 10, 2022, a descriptive and unmatched case–control study was used to describe the measles outbreak and identify the associated risk factors for measles infection. The descriptive analysis employed all 140 cases from the line list, while the case–control study used 51 cases and 102 controls to investigate factors associated with measles infection. Epi-data version 4.6.0.6 was used to code and enter data, which was then exported to SPSS version 27 for analysis. A standardized questionnaire was used to collect data. To declare statistical significance for the association, multivariable logistic regression with an adjusted odds ratio (AOR) and 95% CI was used. Results: From a total of 140 measles cases reported from October 12, 2021, to March 09, 2022, 75 (54%) were females. Marta Laddo kebele was most affected (104 cases). Being unvaccinated (AOR: 2.84, 95% CI: 1.10–7.32), having a travel history (AOR: 4.24, 95% CI: 1.61–11.15), having a contact history (AOR: 6.34, 95% CI: 2.35–17.40), being unaware of the mode of transmission (AOR: 2.68, 95% CI: 1.16–6.37), and having moderate acute malnutrition (AOR: 4.44, 95% CI: 1.74–11.31) were factors significantly associated with the measles outbreak. Conclusion: Being unvaccinated, travel history to measles outbreak area, contact history, knowledge of caretakers/mothers on the mode of transmission, and acute malnutrition were associated with the measles outbreak in the district. Therefore, strengthening routine measles immunization, mounting vaccination awareness and nutritional screening are recommended.

Mobile Information Systems

DOI: 10.1155/2023/2952410

2023(2023)

Design of NULLMAC Protocol for Mobile Ad Hoc Network Using Adaptive Antenna Array

Mahendrakumar Subramaniam ,[1] Vanitha Krishnan ,[2] **Chunchu Rambabu ,[3]** Gokul Chandrasekaran ,[4] and Neelam Sanjeev Kumar[5]

[3]Department of Electrical and Mechanical Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Usually, omnidirectional radiation pattern antenna is used in the mobile ad hoc network (MANET) which causes neighbor node interference, consumes more power, and supports only limited range of transmission. To overcome these problems, smart antennas are used. A lot of medium access control (MAC) protocols are proposed using smart antennas. Existing works addressed various problems such as hidden terminal problem, hidden beam problem, deafness of nodes, and head of line blocking problem. However, certain factors including determination of weight vector and conveying it to the neighbor nodes for distortion-free transmission are not considered. In this study, nullifying MAC (NULLMAC) framework is proposed using an adaptive antenna array (AAA) for improving network performance in MANET. NULLMAC framework uses channel information for achieving high throughput and spatial reuse through integrated physical and MAC layer. Before the transfer of data packets, the receiver initially determines its weight vector and conveys it to the transmitter through control packets. Then, the transmitter computes its weight to nullify the dynamic receivers present in the neighborhood region to find the desired receiver. Beamformer weights are determined through channel coefficients between a transmitter-receiver pair to establish distortion-free transmission. Extensive simulations are performed using OPNET integrated with MATLAB. NULLMAC framework achieves 27.22% more throughput and 40.46% increase in signal-to-noise ratio.

Infection and Drug Resistance

DOI: 10.2147/IDR.S407092

16(2023)

Community-Acquired Urinary Tract Infection Among Sexually Active Women: Risk Factors, Bacterial Profile and Their Antimicrobial Susceptibility Patterns, Arba Minch, Southern Ethiopia

Mohammed Seid,[1] Mesafint Markos,[1] Addis Aklilu,[1] Aseer Manilal,[1] Abdurezak Zakir,[1] Teshome Kebede,[2] Kebede Kulayta,[3] Gessila Endashaw[4]

[1]Department of Medical Laboratory Science, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia;
[2]Arba Minch General Hospital, Arba Minch, Ethiopia;
[3]Department of Medical Laboratory Science, Arba Minch College of Health Sciences, Arba Minch, Ethiopia;
[4]Department of Nursing, Arba Minch University, Arba Minch College of Health Sciences, Arba Minch, Ethiopia

Abstract

Background: Globally, urinary tract infections (UTIs) are a common health issue among women. Investigating risk factors associated with culture-proven UTIs and the antimicrobial resistance profile of uropathogens would provide insight into planning prevention and control measures. Objective: To identify the risk factors associated with UTIs among sexually active women and determine antimicrobial susceptibility patterns of uropathogenic bacterial isolates. Methods: A case-control study was conducted from February to June 2021, involving 296 women (62 case group and 234 control group in a ratio of 4:1). Cases were defined as culture-confirmed UTIs, and controls were non-UTIs. A semi-structured questionnaire was used to collect demographic, clinical, and behavioral data. The antimicrobial susceptibility test was done by the Kirby-Bauer disc diffusion method. The data were analyzed using SPSS version 25. Bivariable and multivariable logistic regressions were used to identify risk factors, and the strength of association was measured by adjusted odds ratios and a 95% confidence interval used at P-values < 0.05. Results: The results revealed that recent coitus and frequency of coitus more than three times per week (P=0.001) were independent predictors of UTIs. Swabbing from back to front, a history of UTI and a delay in voiding were also independent predictors (P < 0.05). On the other hand, a daily water intake of 1 to 2 litres reduced the risk of UTI (P= 0.001). The predominant uropathogenic isolate was Escherichia coli (35.48%). Over 60% of isolates were resistant to cotrimoxazole, penicillin, cephalosporin, and fluoroquinolones. The most effective antibiotics included piperacillin-tazobactam, aminoglycosides, carbapenem, and nitrofurantoin. 85% and 50% of isolates were MDR and ESBL producers, respectively. Conclusion: The finding indicates the importance of public intervention targeting the identified risk factors and the resistance phenotype to reduce the burden of UTIs with antimicrobial resistance in the study area.

Cogent Economics and Finance

DOI: https://doi.org/10.1080/23322039.2023.2199596

11(2023)

Impact of Urban expansion on income of evicted farmers in the peri-Urban areas of Amhara Regional State, Ethiopia: Endogenous switching regression approach

Tadele Alamneh[1], Melkamu Mada[1] & Tora Abebe[1]

[1] Department of Economics, College of Business and Economics, Arba Minch University, Arba Minch, Ethiopia

Abstract

The rate of urbanization in the Amhara region has apparently increased over the past three decades and is now higher than that of any other region in Ethiopia. As cities expand, peri-urban farmers in the region are being compelled to abandon their landholdings, which is their life-long asset. Therefore, the aim of this study is to investigate the impact of urban expansion on the income of evicted peri-urban farmers in Injibara, Burie and Gish Abay cities of the Amhara regional state, Ethiopia. Using stratified sampling technique, primary data was collected from 393 households (197 evicted and 196 non-evicted). The endogenous switching regression model was employed to examine the impact of urbanization on the income of evicted farmers. The model's output of ATT revealed that evicted farmers had a substantial reduction in yearly income of 9202.36 Ethiopian Birr as compared to their counterfactuals. In other words, eviction diminishes the annual income of evicted farmers by 26.73%. Furthermore, ATU results also confirmed that non-evicted farmers' income would have decreased by 4666.78 Birr if they had chosen to be evicted, proving that eviction might have a negative impact on farmers' income at any circumstance. Therefore, this study suggests that the government conduct a comprehensive socioeconomic and demographic evaluation before evicting indigenous farmers and that an alternative strategy be developed to mitigate the negative effects of eviction on peri-urban farmers.

Biological Rhythm Research

DOI: https://doi.org/10.1080/09291016.2023.2210566

54(2023)

Relationships between circadian preference and diurnal training times of Slovak Men's Volleyball League

Pavol Pivovarnicek, Jaroslav Popelka, Dusan Tadeas Plaskur, **Efrem Kentiba[b] &** Mikulas Hank

[b] Department of Sports Science, Arba Minch College of Teachers' Education, Arba Minch, Ethiopia

Abstract

The aim of study was to identify the relationships between the circadian preference and diurnal training times of elite volleyball players (n = 78). The Morningness-Eveningness Questionnaire (MEQ) was used to identify circadian preference, resulting in a point score. Diurnal training times were divided: morning training time (MTT), intermediate training time (ITT) and evening training time (ETT). One-way ANOVA showed a relationship between circadian preference and diurnal training time documented by point score differences in the MEQ between MTT, ITT and ETT ($p < 0.01$). A higher ($p < 0.01$) point score value in the MEQ was recorded in the MTT compared to the ETT. No difference was found between MTT and ITT and ITT and ETT ($p > 0.05$). The results of the study show the importance of the relationship between circadian preference and typical training times during the day. The influence of training time on the development of circadian preference will need to be verified experimentally.

Keywords: Circadian preferencediurnal training timeelite sportmorningness-eveningness questionnairevolleyball players

Frontiers in Microbiology

DOI: https://doi.org/10.3389/fmicb.2023.1196610

14(2023)

Effect of the bacterial community assembly process on the microbial remediation of petroleum hydrocarbon-contaminated soil

Xuehao Zheng [1,2,3]*, **Belay Tafa Oba [4]**, Chenbo Shen[5], Luge Rong[6], Bin Zhang[1,2,3,] Ling Huang[1], Lujie Feng[1], Jiani Liu[1], Tiantian Du[1] and Yujie Deng[1]

[4] College of Natural Science, Arba Minch University, Arba.Minch, Ethiopia

Abstract

Introduction: The accumulation of petroleum hydrocarbons (PHs) in the soil can reduce soil porosity, hinder plant growth, and have a serious negative impact on soil ecology. Previously, we developed PH-degrading bacteria and discovered that the interaction between microorganisms may be more important in the degradation of PHs than the ability of exogenous-degrading bacteria. Nevertheless, the role of microbial ecological processes in the remediation process is frequently overlooked. Methods: This study established six different surfactant-enhanced microbial remediation treatments on PH-contaminated soil using a pot experiment. After 30 days, the PHs removal rate was calculated; the bacterial community assembly process was also determined using the R language program, and the assembly process and the PHs removal rate were correlated. Results and discussion: The rhamnolipid-enhanced Bacillus methylotrophicus remediation achieved the highest PHs removal rate, and the bacterial community assembly process was impacted by deterministic factors, whereas the bacterial community assembly process in other treatments with low removal rates was affected by stochastic factors. When compared to the stochastic assembly process and the PHs removal rate, the deterministic assembly process and the PHs removal rate were found to have a significant positive correlation, indicating that the deterministic assembly process of bacterial communities may mediate the efficient removal of PHs. Therefore, this study recommends that when using microorganisms to remediate contaminated soil, care should be taken to avoid strong soil disturbance because directional regulation of bacterial ecological functions can also contribute to efficient removal of pollutants.

Frontiers in Public Health

DOI: https://doi.org/10.3389/fpubh.2023.1122041

11(2023)

Multilevel analysis of factors for intimate partner violence during pregnancy in Gammo Goffa Zone, South Ethiopia: A community based study

Mesfin Mamo Utaile[1,2*] , Ahmed Ali Ahmed[2] , Alemayehu Worku Yalew[2]

[1]Department of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Intimate partner violence during pregnancy is a public health problem that can affect both maternal and fetal life. However, its prevalence and associated factors have not been well studied and understood in Ethiopia. Hence, this study was conducted to assess the individual and community-level factors associated with intimate partner violence during pregnancy in Gammo Goffa Zone, South Ethiopia. Methods: A community-based cross-sectional study was conducted among 1,535 randomly selected pregnant women from July to October 2020. Data were collected using an interviewer-administered, standardized WHO multi-country study questionnaire and analyzed using STATA 14. A two level mixed-effects logistic regression model was used to identify factors associated with intimate partner violence during pregnancy. Results: The prevalence of intimate partner violence during pregnancy was found to be 48% (95% CI: 45–50%). Factors affecting violence during pregnancy were identified at the community and individual levels. Access to health facilities (AOR = 0.61; 95% CI: 0.43, 0.85), women feeling isolated from the community (AOR= 1.96; 95% CI: 1.04, 3.69), and strict gender role differences (AOR= 1.45; 95% CI: 1.03, 2.04) were among higher-level factors found to be significantly associated with intimate partner violence during pregnancy. Low decision-making power was found to increase the odds of experiencing IPV during pregnancy (AOR= 2.51; 95% CI: 1.28, 4.92). Similarly, maternal education, maternal occupation, living with the partner's family, current pregnancy intended by the partner, dowry payment, and presence of marital conflict were among the individual- level factors found to increase the odds of experiencing intimate partner violence during pregnancy. Conclusions: The prevalence of intimate partner violence during pregnancy was high in the study area. Both individual and community-level factors had significant implications on maternal health programs related to violence against women. Socio-demographic and socio-ecological characteristics were identified as associated factors. Since it is a multifaceted problem, special emphasis has to be given to multi-sectoral approaches involving all responsible bodies to mitigate the situation.

Keywords: Ethiopiaintimate partnermixed-effectpregnancyviolence

Journal of Soils and Sediments

DOI: https://doi.org/10.1007/s11368-023-03467-1

23(2023)

Responses of anaerobic ammonia-oxidizing bacteria and methane-oxidizing archaea communities from different tillage modes in paddy fields

Shuang Zhou, Si Shen, Kaiwen Pan, Belayneh Azene**, Awoke Guadie**[C], Xinhua He, Jian Zhang, Dalu Guo, Zijie Yu & Hongyan Luo

[C]Department of Biology, College of Natural Sciences, Arba Minch University, Arba Minch 21, Ethiopia

Abstract

Purpose: The process of anaerobic ammonium (anammox) and methane oxidation reactions with nitrite as an electron acceptor is of great significance for the global carbon and nitrogen cycle. This study aims to explore the effects of different tillage modes on the abundance and community structure of anammox bacteria and anaerobic methane-oxidizing archaea (ANME-2d), and anaerobic methane-oxidation rate in paddy fields to manage the paddy fields sustainably and reduce the greenhouse gas emissions. Methods: The abundance and community structure of anammox bacteria and ANME-2d, and anaerobic methane-oxidation rate were investigated in a 0–100 cm depth of paddy soil under three tillage modes: conventional paddy-upland rotation tillage (CT), combing ridge with no-tillage (RNT), and flooded paddy fields (FPF). Result: The highest abundance of anammox bacteria was recorded under RNT (2.35 × 105 − 6.01 × 106 gene copies g−1 dry soil). The 16S rRNA gene copy numbers of ANME-2d archaea under CT, RNT and FPF were 3.68 × 105 − 2.20 × 106, 4.92 × 105 − 3.54 × 106 and 5.79 × 105 − 5.19 × 106 gene copies g−1 dry soil, respectively. The community compositions of anammox bacteria varied with tillage modes. In the CT mode, three species namely: Candidatus (Ca). Brocadia fulgida, Ca. Brocadia anammoxidans, and Ca. Kuenenia were detected, while Ca. Brocadia fulgida, Ca. Brocadia I and Ca. Brocadia II species were detected in the RNT. Two species of Ca. Brocadia fulgida and Ca. Jettenia were detected in the FPF. The species Ca. Brocadia was dominant and found in all tillage modes. All of the sequences in the three tillage modes were ANME-2d. The net methane-oxidation rate in RNT was two times higher than the other two tillage modes. Conclusion: Our findings demonstrated that RNT mode increased the abundance of anammox bacteria and ANME-2d, improved soil fertility and increased the net methane-oxidation rate of the soil. This study thus provides a reliable practice for expanding RNT to rice cultivation for mitigation of greenhouse gas emissions.

Keywords: Anaerobic ammonia oxidationANME-2d archaeaGreenhouse gas Methane oxidationPaddy fieldTillage modes

Toxicology Reports

DOI: https://doi.org/10.1016/j.toxrep.2023.01.004

10(2023)

Analysis of physicochemical attributes, contamination level of trace metals and assessment of health risk in mango fruits from Southern region Ethiopia

Dessie Ezez[1], Mitiku Belew[1]

[1]Department of Chemistry, College of Natural and Computational Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Heavy metal pollution has become one of the most threats that can endanger human health due to accumulation and consumption of fruits. Our study was aimed to evaluate physicochemical quality parameters, level of heavy metals, and assessment of health risks of lead (Pb), Manganes (Mn), zinc (Zn), iron (Fe), copper (Cu), chromium (Cr), and cadmium (Cd) in mango fruits from Arba Minch, Wolaita Sodo, and Damote Gale study areas. Quality parameters such as, total soluble solid, moisture, ash, titratable acidity, pH, total sugar, reducing sugar and non-reducing sugar, fat and fiber content of mango fruit were ranged between 15.68° and 18.92°B, 81.080–84.320 %,g, 4.040-4.080, 11.56-12.95%, 10.07-12.54%, 1.60-3.83%,0.397-0.673%, and 1.338-2.375% 0.283–1.030 %, 0.311–0.366 mg/100 g, 4.040–4.080, 11.56–12.95 %, 10.07–12.54 %, 1.60–3.83 %,0.397–0.673 %, and 1.338–2.375 % respectively. The average levels of metals in mango fruits were in the range Fe (1.166–1.486 mg/kg), Cu (0.019–0.198 mg/kg), Mn (0.121–0.239 mg/kg), Zn (0.134–0.321 mg/k), Pb (0.035–0.097 mg /kg) and Cd (0.193 mg/kg). Chromium is not detected in our study, because its level is below the detection limit. On average within metals, the highest level was obtained in Fe in the range 1.166–1.486 mg/kg, whereas the minimum level was determined in Pb from 0.035 to 0.097 mg/kg. The EDI values of accumulated elements in mango fruits follows the increasing order as; Fe > Zn > Mn > Cu > Cd > Pb. Except Damot Gale sample in moderate range, the values of total carcinogenic risks (TCR) in all metals were less than 1 × 10−6, which is considered to be safe. All THQ and HI values were < 1, which indicates that the accumulated metals did not contribute risk for human health. The present study clearly indicated that the consumption of mango fruits in the studied areas does not pose any health hazard associated with any of the selected heavy metals.

Keywords: Health riskHeavy metalPhysicochemical attributePollutio

Animal Science Journal

DOI: https://doi.org/10.1111/asj.13823

94(2023)

Near-infrared spectroscopy for rapid evaluation of winter cereals and Italian ryegrass forage mixtures

Haruna Gado Yakubu, **Alemayehu Worku**[b], Róbert Tóthi, Tamás Tóth, Szilvia Orosz, Hedvig Fébel, László Kacsala, Balázs Húth, Richárd Hoffmann, George Baza

[b]Department of Animal and Range Science, College of Agricultural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Near-infrared (NIR) spectroscopy was employed to determine the differences between forage mixtures of winter cereals and Italian ryegrass and to evaluate fermentation characteristics of mixed silages. Forages were harvested on five phases (Cuts 1–5), with 1 week interval (n = 100). The yield of the last harvest (Cut 5) was ensiled and analyzed on four different days (D0, D7, D14, and D90) (n = 80). Principal component analysis based on the NIR data revealed differences according to the days of harvest, differences between winter cereals and Italian ryegrass forages, and differences in the fermentation stages of silages. The partial least square regression models for crude protein (CP), crude fiber (CF), and ash gave excellent determination coefficient in cross-validation (R2CV > 0.9), while models for ether extract (EE) and total sugar content were weaker (R2CV = 0.87 and 0.74, respectively). The values of root mean square error of cross-validation were 0.59, 0.76, 0.22, 0.31, and 2.36 %DM, for CP, CF, EE, ash, and total sugar, respectively. NIR proved to be an efficient tool in evaluating type and growth differences of the winter cereals and Italian ryegrass forage mixtures and the quality changes that occur during ensiling.

Keywords: chemical compositionchemometricsforage evaluationNIR technologyquality assessment

Infection and Drug Resistance

DOI: https://doi.org/10.2147/IDR.S402244

16(2023)

Antibacterial Activity Against Multidrug-Resistant Clinical Isolates of Nine Plants from Chencha, Southern Ethiopia

Aseer Manilal[1], Kuzhunellil Raghavanpillai Sabu[2], Azene Tsefaye[1] , Teklu Teshome[3], Addis Aklilu[1] , Mohammed Seid[1], Gebre Kayta[1], Amanuel Albene Ayele[4] & Akbar Idhayadhulla

[a]Department of Medical Laboratory Sciences, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[b]Department of Chemistry, College of Life Sciences, Arba Minch University, Arba Minch, Ethiopia
[c]Department of Biomedical Science, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: The diminishing efficacy of antibiotics currently in use and the emergence of multidrug-resistant bacteria pose a grave threat to public health worldwide. Hence, new classes of antimicrobials are urgently required, and the search is continuing. Methods: Nine plants were chosen for the current work, which are collected from the highlands of Chencha, Ethiopia. Plant extracts containing secondary metabolites in various organic solvents were checked for antibacterial activity against type culture bacterial pathogens and MDR clinical isolates. The broth dilution technique was used to evaluate the minimum inhibitory and minimum bactericidal concentrations of highly active plant extracts, and time-kill kinetic and cytotoxic assays were performed using the most active plant extract. Results: Two plants (C. asiatica and S. marianum) were highly active against ATCC isolates. The EtOAc extract of C. asiatica produced the highest zone of inhibition ranging between 18.2±0.8–20.7±0.7 and 16.1±0.4–19.2±1.4 mm against Gram-positive and Gram-negative bacteria, respectively. The EtOH extract of S. marianum displayed zones of inhibition in the range of 19.9±1.4–20.5 ±0.7 mm against the type culture bacteria. The EtOAc extract of C. asiatica effectively curbed the growth of six MDR clinical isolates. The MIC values of C. asiatica against the Gram-negative bacteria tested were 2.5 mg/mL, whereas the corresponding MBC values were 5 mg/mL in each case. The MIC and MBC values were the lowest in the case of Gram-positive bacteria, ie, 0.65 and 1.25 mg/ mL, respectively. A time-kill assay showed the inhibition of MRSA at 4 × MIC and 8 × MIC within 2 hours of incubation. The 24 h LD50 values of C. asiatica and S. marianum corresponding to Artemia salina were 3.05 and 2.75 mg/mL, respectively. Conclusion: Overall results substantiate the inclusion of C. asiatica and S. marianum as antibacterial agents in traditional medicines

Keywords: AntimicrobialChenchaCytotoxicityDrug resistancePlant extractSecondary metabolites

Adsorption Science and Technology

DOI: https://doi.org/ 10.1155/2023/4048676

2023(2023)

Predicting the Adsorption Efficiency Using Machine Learning Framework on a Carbon-Activated Nanomaterial

Prasad, K., Ravi Kumar, V., Kumar, R.S., Rajesh, A.S., Rai, A.K., Al-Ammar, E.A., Wabaidur, S.M., Iqbal, A., **Dawit Kefyalew**[9]

[9]Department of Automotive EngineeringArba Minch Institute of Technology (AMIT)Arba Minch UniversityEthiopia

Abstract

Due to the excessive use of paracetamol (PCM), a significant amount of its metabolite has been released into the surroundings, and its removal from the surroundings must happen quickly and sustainably. Multicomponent adsorption modelling is difficult because it is challenging to anticipate the relationships among the adsorbates in this artificial intelligence-based modelling, a choice among different algorithms. Utilizing various algorithms, many studies assessed the single and binary adsorption of paracetamol on activated carbon. The present study implements that the effectiveness of PCM adsorption on a carbon-activated nanomaterial was predicted using an artificial neural network, a machine learning technology. As a factor of adsorbent particle size, adsorbent dosage, training time, and starting concentrations, the adsorption capacity for each medicinal ingredient was examined. SEM was used to analyze a nanomaterial that had been chemically altered with orthophosphoric acid (FTIR). To determine the residual proportion of PCM in solvent, batch adsorption of PCM was then carried out at various operation conditions, including contact time, temperatures, and initial dosage. The adsorption effectiveness of paracetamol on carbon-activated nanoparticle was calculated using experimental results. Thus, by using machine learning framework, the adsorption efficiency of paracetamol on a carbon-activated nanomaterial was predicted.

Journal of Degraded and Mining Lands Management

DOI: https://doi.org/10.15243/jdmlm.2023.102.4179

10(2023)

Existential threats to pastoralism in an arid environment: the fate of Gujii pastoralists in Southern Ethiopia

Mekuria Haleke Guye[1,3]*, Abiyot Legesse[2], Yimer Mohammed[2]

[1] Department of Geography and Environmental Studies, Arba Minch University, Arba Minch, Ethiopia

Abstract

The pastoralists of Gujii have faced numerous risks, with their pastoralism system facing serious challenges. With the technically inconsistent and timely unmanaged interventions, several pastoral households are facing unreserved challenges. As a result, the future of pastoralists appears to be in great danger. The objective of this study was to investigate the ongoing challenges of Gujii pastoralism, as well as the fate of pastoralists in southern Ethiopia who are suffering from unrelenting drought. Ethiopian Meteorological Agency provided monthly rainfall and temperature data from 1986 to 2016. A household survey was conducted with 340 household heads randomly chosen from the study area to examine the challenges of the pastoralists have been facing. Moreover, a key informant interview and a focus group discussion were employed to collect qualitative data. Each watershed unit held one round of focus group discussions, with an average of 7-10 participants. The coefficient of variation (CV) was used to detect the temporal variability of seasonal rainfall and temperature. To detect trends, the Mann Kendall (MK) and Sen's slope estimator were used to determine the trends and magnitude of the change. Political and tenure insecurity seriously affected the pastoral system in different ways. Autumn and spring had high variability in rainfall, with CV = 48.76% and 32.43%, respectively. Both winter and spring temperatures show a significant increase at (a = 0.1). Climate variability has made the already fragile pastoral households even more vulnerable. Pastoralist's future would be difficult with all of these problems, and its resilience would be doubtful. As a result, in order to ensure the pastoral's long-term survivability, the government.

Keywords: coefficient of variationMann Kendallpastoralistsrainfall variability

Frontiers in Surgery

DOI: https://doi.org/10.3389/fsurg.2023.1177647

10(2023)

Post-operative pulmonary complications after thoracic and upper abdominal procedures at referral hospitals in Amhara region, Ethiopia: a multi-center stud

Biruk Adie Admass[1*], **Birhanu Yilma Ego[2]**, Hailu Yimer Tawye[1], Seid Adem Ahmed[1]

[2]Department of Anesthesia, College of medicine and health sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Thoraco-abdominal surgery cuts through muscle, disrupting the normal structure and function of the respiratory muscles, resulting in lower lung volumes and a higher risk of developing post-operative pulmonary complications (PPC). PPC remains an important cause of post-operative morbidity and mortality and impacts the long-term outcomes of patients after hospital discharge. This study was aimed at determining the incidence and factors associated with postoperative pulmonary complications among patients who underwent thoracic and upper abdominal surgery in the Amhara region of Ethiopia. Methods: A multi-center follow-up study was conducted from April 1, 2022, to June 30, 2022, at comprehensive specialized hospitals in Amhara regional state, northwest Ethiopia. 424 patients were consecutively included in this study, with a response rate of 100%. A chart review and patient interview were used to collect data. A logistic regression analysis was performed to assess the strength of the association of independent variables with postoperative pulmonary complications.The crude odds ratio (COR) and adjusted odds ratio (AOR) with the corresponding 95% confidence interval were computed. Variables with a p-value of <0.05 were considered statistically significant predictors of the outcome variable. Results: The incidence of postoperative pulmonary complication was 24.5%. Emergency procedures, preoperative SpO2 < 94%, duration of surgery >2 h, patients with a nasogastric tube, intraoperative blood loss >500 ml and post-operative albumin <3.5 g/dl were factors associated with pulmonary complications. The most common complications were pneumonia (9.9%) followed by respiratory infection (4.2%). Conclusion: The incidence of postoperative pulmonary complication after thoracic and upper abdominal surgery remains high. Preoperative SpO2, duration of surgery, patients having a nasogastric tube, intraoperative blood loss and post-operative albumin were factors associated with post-operative pulmonary complications.

Keywords: anestheticspulmonary complicationrespiratory failurethoracic surgeryupper abdominal surgery

Journal of Chemistry

DOI: https://doi.org/10.1155/2023/8199000

2023(2023)

Hydrogeochemical Characterization and Appraisal of Groundwater Quality in Yisr River Catchment, Blue Nile River Basin, Ethiopia, by Using the GIS, WQI, and Statistical Techniques

Abebaw Demelash[a], **Abunu Atlabachew[b], Muralitharan Jothimani[c], Abel Abebe[c]**

[b]Faculty of Water Resources and Irrigation Engineering, Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

[c]Department of Geology, College of Natural and Computational Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Groundwater is a primary drinking, agricultural, domestic, and nondomestic water source in Ethiopia's Yisr River watershed of the Blue Nile River basin. There has been no systematic investigation of the hydrogeochemical properties of groundwater in the research area. The study investigated the hydrogeochemical parameters of groundwater in the catchment to find out if it is fit for drinking and irrigation. A total of 26 samples of groundwater were collected and analyzed for seventeen parameters, including pH, temperature, EC, TDS, TH, K+, Na+, Ca2+, Mg2+, Fe2+, Cl-, HCO3-, CO32-, SO42-, F-, PO42-, and NO3-. The data were processed and evaluated using integrated hydrogeochemical techniques, including individual ionic signatures, interionic ratios, and multivariate statistical methods, such as multiple correlation analysis, principal component analysis, and hierarchical cluster analysis. The water quality index (WQI) and Na%, PI, RSC, SAR, EC, TDS, and MH were used to judge the quality of water for drinking and irrigation, respectively. The box plot diagram shows the dominant ions in descending order of Ca2+ > Mg2+ > Na+ > K+ and HCO32- > Cl- > SO42- > NO3- > F- for cations and anions, respectively. The chemical composition of shallow wells and springs indicates freshwater. At the same time, the deep groundwater wells are brackish. The two-factor loadings (principal component analysis) were used to explain the existence of anthropogenic and geogenic sources. Three clusters are identified in the dendrogram. The third cluster has the most significant linkage distance among all the clusters. This means that the groundwater sample in this cluster is geochemically different from the other two clusters, and that this cluster is made up of only deep wells. Water quality indices showed that water quality ranged from excellent to very poor, with the majority (53.85%) being excellent and 26.9% being good. The results of the calculated indices for agricultural water quality indicated that the water quality in most collected samples was in the good and excellent categories; however, the EC, RSC, MH, and TDS indices in deep groundwater wells were found to be hazardous. The findings of this study are useful for understanding groundwater sustainability for various reasons. However, they are also helpful in supporting water management and protection in the future.

Advances in Materials Science and Engineering

DOI: https://doi.org/10.1155/2023/5487193

2023(2023)

Effect of Load on Tribological Characteristics of H-AlSi24Cu3.8Mg0.8 Alloy under Dry, Lubricated, and Coated (a-c: H) Sliding Conditions

M. Peeru Naik, K. T[a]. Balaram Padal[a], **Muralidhar Avvari[b]**

[b]Faculty of Mechanical Engineering, AMiT Arba Minch University, Arba Minch, Ethiopia

Abstract

This paper presents the new route of fabrication of H-AlSi24Cu3.8Mg0.8 alloy, assisted by ultrasonic vibration stirring and squeeze casting (UVSS). The primary objective of this investigation is to establish the tribological characteristics of the prepared aluminium alloy under dry, lubricated, and coated sliding conditions. Oil SAE20W40 is used as a lubricant and diamond-like carbon (DLC) is used as a coating. Under a load between 20 N and 50 N, a linear reciprocating tribometer (LRT) with a ball-on-plate geometry is used. Alloy was examined using an optical microscope, scanning electron microscope with EDS, 3D surface profilometer, Brinell hardness tester, and tensometer for pre- and postcharacterization of alloy, surface, and worn tracks. The DLC-coated condition yields the lowest wear and coefficient of friction.

Ethiopian journal of health sciences

DOI: https://doi.org/10.4314/ejhs.v33i1.6

33(2023)

Decision to Delivery Interval, Perinatal Outcome and Factors Following Emergency Cesarean Section in Southern Ethiopia

Kassaw Beyene[1] , Kassahun Fekadu[1] , Manaye Yihun [2] , Yosef Alemayehu[1] , Dagninet Alelign[3] , Gedife Ashebir[2] , Biresaw Wassihu [4] , Abrham Debeb[5]

[1]Department of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[3]Departement of Medical laboratory, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: The interval between the decision for an emergency cesarean section and the delivery of the fetus should be made within 30 minutes. In a setting like Ethiopia, the recommendation of 30 minutes is unrealistic. Decision to delivery interval should, therefore, be considered as vital in improving perinatal outcomes. This study aimed to assess the decision to delivery interval, its perinatal outcomes, and associated factors. Methods: A facility-based cross-sectional study was employed, and a consecutive sampling technique was used. Both the questionnaire and the data extraction sheet were used, and data analysis was done using a statistical package for social science version 25 software. Binary logistic regression was used to assess the factors associated with decision to delivery interval. P-value < 0.05 level of significance with a 95% Confidence interval was considered statistically significant. Results: Decision-to-delivery interval below 30 minutes was observed in 21.3% of emergency cesarean sections. Category one (AOR=8.45, 95% CI, 4.66, 15.35), the presence of additional OR table (AOR=3.31, 95% CI, 1.42, 7.70), availability of materials and drugs (AOR=4.08, 95% CI, 1.3, 12.62) and night time (AOR=3.08, 95% CI, 1.04, 9.07) were factors significantly associated. The finding revealed that there was no statistically significant association between prolonged decisions to delivery interval with adverse perinatal outcomes. Conclusions: Decision-to-delivery intervals were not achieved within the recommended time interval. The prolonged decision to delivery interval and adverse perinatal outcomes had no significant association. Providers and facilities should be better equipped in advance and ready for a rapid emergency cesarean section.

Keywords: Decision to delivery intervalEmergency cesarean sectionperinatal outcomesSouthern Ethiopia

Open Biotechnology Journal

DOI: https://doi.org/10.2174/18740707-v17-230223-2022-17

17(2023)

Effects of Indigenous and Commercial Rhizobia on Growth and Nodulation of Soybean (Glycine max L) under Greenhouse Condition

Mulugeta Desta[1] ,Ayele Akuma[2] ,**Metadel Minay[3]** ,Zekeria Yusuf[1] , * Open Moda[l] and Kassa Baye[1]

[c]Southern Agricultural Research Institute, Arba Minch Agricultural Research Center, Arba Minch, Ethiopia

Abstract

Background: Soybean (Glycine max L.) is the most vital grain legume crop rich in protein and oil. The inoculation of rhizobia with soybean plays a very important role in increasing soil fertility via its contribution to biological nitrogen fixation. Objective: This study focuses on the evaluation of indigenous and commercial rhizobia on soybean nodulation and growth parameters. Methodology: Soil samples were collected from five districts for nodule trapping. The rhizobia were isolated using 'plant induction following the standard procedures. The greenhouse experiments were arranged in a completed randomized design with three replications and two control units. The data were collected for plant height, nodule number, nodule dry weight, shoot dry weight, root length; root dry weight, total nitrogen and nitrogen-content. Results: The entire isolates were found gram-negative, without absorbing congo-red and did not grow on peptone glucose agar media. Slow grower isolates turned bromothymol blue with yeast extract mannitol agar medium into a moderately deep blue color but fast grower changed to yellow color. All isolates were tested on the sand induced nodule and were significantly superior to the negative control in terms of plant height, shoot dry weight, and nodule dry weight. The shoot dry weight of soybean rhizobial isolates on the sterilized sand experiment was ranging from 1.6 to 2.2g per plant and it was a highly significant correlation to the nodule number, nodule dry weight and root dry weight. Conclusion: The indigenous isolates were highly competent to all commercial rhizobia. This study encourages further evaluation of the field and molecular characteristics.

Keywords: Dry weightIndigenous isolateNitrogen contentNodule numberRhizobiaSandy soil

Journal of Crop Improvement

DOI: https://doi.org/10.1080/15427528.2022.2074932

37(2023)

Genetic diversity of Ethiopian potato (Plectranthus edulis (Vatke) Agnew) genotypes using simple sequence repeat markers

Meseret Fanta[a], Firew Mekbib[b], Adugna Wakjira[c] & Zerihun Tadele[d]

[a]Department of Plant Science, College of Agricultural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Plectranthus edulis is among the most ancient and native tuber crops in Ethiopia, which is mainly cultivated by smallholder farmers. Being an orphan crop, it has not received due research attention. To tackle major crop-production constraints through breeding, knowledge of its genetic diversity is a prerequisite. Thus, the current study was carried out to assess the nature and extent of genetic diversity in 130 genotypes using 20 cross-transferable expressed sequence tag-simple sequence repeat (EST-SSR) markers developed from a related species, Plectranthus barbatus. Among the 20 SSR markers, 15 were transferable to Plectranthus edulis, from which 14 polymorphic markers were used for diversity analysis. A total of 101 alleles were detected, with a mean of 7.2 alleles per locus. Allele frequency ranged from 0.23 to 0.54, with mean value of 0.40. Polymorphic information content (PIC) ranged from 0.54 to 0.84, with a mean of 0.70, indicating a high level of informativeness. The Nei's genetic distance ranged from 0.026 to 0.247, with the highest similarity being between Wolaita and Gamo Gofa populations. About 97% of the genetic variation was attributable to differences within populations; only 3% was attributable to variation among populations. The Neighbor-Joining cluster analysis grouped the 130 genotypes into three clusters. In general, the EST-SSR markers were effective in identifying genetic diversity in Ethiopian potato. This information can help to identify parental lines for crossing and exploiting the existing variability through selection.

Informatics in Medicine Unlocked

DOI:https://doi.org/10.1016/j.imu.2023.101228

38(2023)

Knowledge and attitude toward evidence-based medicine and associated factors among health science students in Mettu University southwest Ethiopia: A cross-sectional study

Adamu Ambachew Shibabaw [a], Agmasie Damtew Walle [a], Sisay Maru Wubante [b], Fikadu Wake Butta [a], Addisalem Workie Demsash [a], Melaku Molla Sisay [d], Shimels Derso Kebede [d], Muluken Belachew Mengistie [e], **Daniel Niguse Mamo [c]**

[c] Department of Health Informatics, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

Introduction: Evidence-based medicine (EBM) is "the process of systematically seeking, examining, evaluating, and utilizing current research findings as the basis for clinical decision-making by combining both individual clinical competence and client choice".

Objective: This study aimed to assess the knowledge and attitude toward EBM and its associated factors among health science students in Mettu University.

Methods:A cross-sectional survey was conducted using a random sample of health science students in Mettu University from November to December 2022. Multivariable logistic regression analyses were used to identify the factors associated with the knowledge and attitude toward EBM. Adjusted odds ratio (AOR) with 95% confidence interval and $P \leq 0.05$ was used to quantify strength of association between variables.

Results:Out of 423 health science students 415 completed the questionnaire (with a 98.1% response rate). Overall, 49.4% (205/415) of respondents had a favorable attitude toward EBM and 50.6% (208/415) had good knowledge of EBM. The majority 61.1% (253/415) of participants had internet access. Only 12.0% (50/415) of respondents had received EBM-related training. Respondent's EBM training was associated with knowledge of EBM were 2.7 times (AOR 2.70, 95% CI 1.38, 5.31), those who understood sensitivity were 3.0 times (AOR 3.09, 95% CI 1.76, 3 0.60), those who understood odds ratio were 2.0 times (AOR 2.08, 95% CI 1.35, 2.38), Aware of PubMed were 1.9 times (AOR D1.96, 95% CI 1.03, 3.73), and Owned smart-phone or PC were 3.6 times (AOR 3.67, 95% CI 3.20, 4.31). Good EBM knowledge was 3.0 times (AOR 3.01, 95% CI 2.05, 3.12), Aware of PubMed resources to make clinical decisions was 2.9 times (AOR 2.99, 95% CI 3.20, 3.61), and Participants owned a smartphone or personal computer were 3.2 times (AOR 3.23, 95% CI 3.05, 3.57) were predictors of positive attitude.

Conclusions: This study demonstrates a lack of formal EBM training and awareness of basic concepts of EBM among health science students. Health science students' attitude toward EBM were 49.4% to enhance EBM knowledge and skills, formal teaching of EBM courses should be integrated into medical education.

Advances in Chemical Pollution, Environmental Management and Protection

DOI: https://doi.org/10.1016/bs.apmp.2022.11.004

9(2023)

Chapter Thirteen - Utilization of constructed wetlands for dye removal: A concise review

Fidelis Odedishemi Ajibade [a b c], Oluwaseyi Aderemi Ajala [d e], **Hailu Demissie [c f]**, Kayode Hassan Lasisi [a c g], Temitope Fausat Ajibade [a c g], Bashir Adelodun [h i], Pankaj Kumar [j], Nathaniel Azubuike Nwogwu [k], Adedamola Oluwafemi Ojo [l], Olawale Olugbenga Olanrewaju [m], James Rotimi Adewumi [a]

[f] Department of Chemistry, Arba Minch University 1000, Arba Minch, Ethiopia

Abstract

Water discharges from the textile industry are the main environmental concern and the chemicals it carries. Industrial fields such as textile, rubber, paint, leather, paper, cosmetics and dyeing systematically use toxic dyes, causing severe pollution of water and environmental problems, which in turn threaten human health, aquatic life and the environment. Constructed wetlands (CWs) are low-energy, environmentally friendly, and natural treatment systems. CWs are well known for their ability to remove suspended solids, nutrients, and biological oxygen demand from domestic wastewater. It has been demonstrated that CWs can remove dye from textile wastewater. CWs harbour a great variety of microbial communities that enhance the efficacy of removing contaminants from wastewater. This chapter reviewed the classification of dye and the role of phytoremediation in the decontamination of dye-containing wastewater. Overall, this chapter essentially presents an overview of the concepts of different kinds of CW for dye removal.

International Journal of Ecology

DOI: https://doi.org/10.1155/2023/6192340

2023(2023)

Physical and Economic Valuation for Nontimber Forest Products (NTFPs) of Surra Government Plantation in the Upper Hare-Baso Rivers Catchment, Southwestern Ethiopia

Genesha Mada[1], Agena Anj[2]Abren Gelawulo[2],

[1]Department of Geography & Environmental Studies, Arba-Minch University, Arba Minch, Ethiopia

[2]Environment & Natural Resource Management, Department of Geography & Environmental Studies in Arba-Minch University, Arba-Minch, Ethiopia

Abstract

The study aimed to estimate the physical and monetary values for nontimber forest products (NTFP) of the Surra government plantation in the upper Hare-Baso rivers catchment of Gamo highlands, southwestern Ethiopia. The Surra government plantation was established in the mid-1980s and consisted of C. lusitanica, E. globulus, and P. radiata tree species, which were planted side by side. Because of food insecurity, forest proximity communities/inhabitants relied on extracting NTFP such as litter and fodder for income and livestock feed despite none of them being physically and monetarily accounted for. The plot method and stock change approach were applied to determine sample plots and collect litter data, respectively, while the active market price was used to account for monetary correspondences. Fodder data were acquired via integration of animal unit month (AUM), livestock carrying capacity, animal unit equivalent (AUE/TLU), quality of pasture (poor), and proper use factor (30%). Its monetary price data were collected from the local market. The gross total production of litter and grass/fodder was 158,614.90 kg and 284,076 kg per/year, respectively, while the corresponding monetary values were ETB 206,169.40 and ETB 255,669, respectively. However, the "proper use factor"-based physical value of fodder/grass was 85,224 kg per/year, and its corresponding monetary value was ETB 76,701. The average physical value (volume) of grass production/year during the wet and dry seasons was 56.67 kg and 96.67 kg, and its mean monetary price/kg was ETB 1.4 and 1.2, respectively. It was concluded that the fodder/grass data collected via the integrated approach reduced the accounting errors, and the data were more precise. Accounting for the economic values of litter and fodder embedded in the market price upscaled the accounting quality and was more indicative of ground facts. Therefore, this study contributed a fresh accounting approach to the field of NTFP accounting.

Cogent Education

DOI: https://doi.org/10.1080/2331186X.2022.2163087

10(2023)

TEFL trainees' attitude to and self-efficacy beliefs of academic oral presentation

Abate Demissie Gedamu[1] &Tesfaye Habtemariam Gezahegn[1]

[1]College of Social Sciences and Humanities, Department of English Language & Literature, Arba Minch University, Arba Minch, Ethiopia

Abstract

An oral presentation is an essential skill for successful academic and professional careers. Trainees' attitudes and self-efficacy beliefs about oral presentation play significant roles in their oral presentation development in a foreign language context. Accordingly, this study aimed to explore TEFL trainees' attitudes to and self-efficacy beliefs of oral presentation and the association between the two variables. A concurrent mixed-methods design was adopted to address the research questions. A systematic random sampling technique was employed to select 150 M.A. trainees at post course works from four public universities in Ethiopia. However, only 123 (82%) filled out and returned attitude and self–efficacy beliefs scale questionnaires. Besides, five trainees were randomly selected for retrospective interviews. Mean scores, standard deviation, Pearson product-moment correlation, ANOVA and Post hoc methods were utilized to analyze quantitative data, while thematic verbal descriptions were employed to analyze the qualitative data. The questionnaires and interviews showed that TEFL trainees had highly favorable attitudes toward oral presentation. Although the results from the questionnaire indicated the trainees had high self-efficacy beliefs towards oral presentation, the interview revealed they had middling confidence in an oral presentation due to their poor English language proficiency, as English is a foreign language to them. Moreover, a positive and significant moderate correlation was found between the trainees' attitudes to and self-efficacy beliefs of oral presentations.

Materials Research Express

DOI: https://doi.org/10.1088/2053-1591/acb1a2

10(2023)

Computational study on the impact of Nb doping on electronic structure, magnetic and optical properties of hexagonal bilayer BN

Mesikerem Mesele Debebe[1] and Sintayehu Mekonnen Hailemariam[1]

[1]Departement of Physics, Arba Minch University, Arba Minch, Ethiopia

Abstract

We investigate the impact of Niobium (Nb) doping on the electronic structure, and magnetic and optical properties of the bilayer hexagonal boron nitride (BL hBN) using spin-polarized density functional theory (DFT). The calculated values of formation energy reveal the structural stability of Nb-doped BL hBN. The structural parameter analysis indicates the bond length and lattices constant of BL hBN increase due to Nb doping. In addition, it is found that the energy band gap of BL hBN is reduced from 5.1 eV to 3.9 eV due to 5.5% of Nb doping. Moreover, the obtained magnetic moment of 2 μB and 4 μB for Nb concentrations of 5.55% and 11.11% respectively, indicate the turning of the paramagnetic behavior of pure BL hBN to ferromagnetic. Besides, we have also found that the first and second nearest neighboring (NN) magnetic interaction between two dopants (Nb atoms) is ferromagnetic. Whereas, the third nearest neighbor interaction is antiferromagnetic. More interestingly, using mean field theory together with spin-polarized DFT ferromagnetic transition temperature (T*c*) of 367 K is obtained for 11.11% of Nb-doped BL hBN. Furthermore, a significant enhancement of the absorption coefficient due to Nb doping in both the visible and mid-to-far-infrared regions was observed. Based on those results, we suggest that Nb-doped BL hBN is a good candidate material for nanoelectronics, spintronics, and optoelectronics applications.

Global Public Health

DOI: https://doi.org/10.1080/17441692.2023.2185798

18(2023)

The challenge of dealing with non-AIDS comorbidities for people living with HIV: Perspectives and experiences of patients and healthcare providers

Julia Maria van Koeveringe [1], Elizabeth Liaño Callahan [1], **Mala George [2], Teklu Teshome Russo [2], Biruk Seifu [3],** Mark Spigt [4]

[2]Department of Biomedical Sciences, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[3]Department of Pharmacology, Arba Minch University, Arba Minch, Ethiopia.

Abstract

As the cohort of People Living with HIV (PLHIV) ages, so does the spectrum and burden of non-AIDS define HIV-associated conditions (NARC). PLHIV are likely to need different and increased healthcare services. It requires health systems to adapt to this disease trend and conform to a chronic care model, which respects the distinct needs of the ageing population. In this article, we explore the lived experiences of PLHIV and their healthcare providers in managing the challenges of dealing with NARC in Arba Minch, Southern Ethiopia. This study utilises interpretative substantive methods, encompassing qualitative interviews and Focus Group Discussions. The Normalisation Practice Theory (NPT) guided the semi-structured questions concerning routine screenings and current models of HIV care for ageing individuals. The main structural challenges in providing adequate geriatric care included: (i) the lack of awareness of the risk of NARCs; (ii) the absence of blended care; (iii) an HIV-centred approach exclusive of multidisciplinary care; and (iv) financial constraints. In an era with increasing NARCs, traditional HIV care models must adapt to the emerging challenges of a 'greying' and growing population.

Keywords: HIV; comorbidities; geriatric assessment; model of care.

Journal of Nano materials

DOI: https://doi.org/10.1155/2023/5723730

2023(2023)

Study of Friction and Wear Behavior of Graphene-Reinforced AA7075 Nano composites by Machine Learning

I. S. N. V. R. Prasanth, Prabahar Jeevanandam, P. Selvaraju, K. Sathish, S. K. Hasane Ahammad, P. Sujatha, M. Kaarthik, S. Mayakannan, **Bashyam Sasikumar[1]**

[1]Faculty of Mechanical and Production EngineeringArba Minch UniversityArba MinchEthiopiaamu.edu.et

Abstract

In this research, the friction and wear of AA7075 nanocomposites reinforced with graphene and graphite were studied. Graphene's inclusion dramatically enhanced the material's mechanical characteristics, friction, and wear resistance. AA7075 is strengthened with less graphene, and AA7075, reinforced with more graphite, exhibits similar wear and friction behavior. Wear rate and coefficient of friction predictions for AA7075-graphene nanocomposites were made using five machine learning (ML) regression models. ML simulations reveal that the wear and friction of AA7075-graphene composites are most sensitive to the proportion of graphene presence, the loadings, and the hardness.

IEEE Access

DOI: https://doi.org/10.1109/ACCESS.2023.3258407

11 (2023)

Smart Decision-Making and Communication Strategy in Industrial Internet of Things

Kesavan Gunasekaran; V. Vinoth Kumar; A. C. Kaladevi; C. Rohith Bhat; **Krishnamoorthy Venkatesan**[1]

[1]Department of MathematicsUnits of Basic Sciences Arba Minch University, Sawla Campus, Arba Minch, Ethiopia.

Abstract

Smart machine-machine (M2M) interactions, such as those enabled by the Internet of Things (IoT), have enabled people and machines to communicate and make decisions together. Furthermore, these systems have become increasingly important in the commercial and industrial sectors over the previous two decades. The Industrial Internet of Things (IIoT) is a smart system comprising engineering equipment which can connect to one another to improve manufacturing operations. This task would become more complicated if the amount of energy used by the IIoT ecosystems, as well as the amount of network traffic they generate, increased dramatically. Consequently, decision-making processes during communication are essential for autonomous interaction in critical IoT infrastructure. Smart factories employ communication technology to track and gather information in real-time to enhance the output, effectiveness, and predictability while lowering the overall cost of vital operations. In this context, Industry 4.0 not only limits to addresses the issues of integrating technologies, but it also focuses on data collection, dissemination, utilization, and organization and also improves the delivery of the solution or services quicker with more sustainability. This study intends to create an NF-based communication system for IIoT platforms to leverage those benefits. The proposed model includes smart decision-making procedures to deal with communication issues. Compared with the many methods already in use, the suggested mechanism's functional viability in the automated system is found to be optimal. Outcomes from simulations reveal that the suggested method has improved the accuracy and communication reliability of the IIoT platforms in comparison with the previous methods. Aside from these, the suggested model keeps the throughput of the local automation unit at 96.03% and the throughput of the production hall at 95.58% on average while maintaining the lowest average PLR of about 26.48%.

SAGE Medicine Open

DOI: https://doi.org/10.1177/20503121231158214

11 (2023)

Prevalence of leftover medicines, disposal practices, and associated factors in Arba Minch Town, Southern Ethiopia

Getahun Asmamaw[1], Tewodros Agedew[1], Besrat Tesfaye[1], Samrawit Sasamo[1], Saude Gena[1], Melkamu Argeta[1] and Aynoshe Adio[1]

[1]Department of Pharmacy, Arba Minch University, Arba Minch, Ethiopia

Abstract

Objective:The increased prevalence of leftover medicines in the community is currently a global concern due to the detrimental effects on the environment and health. However, several developing countries have failed to give sufficient consideration to the issue. The primary purpose of this study was to describe the prevalence of leftover medicines, disposal practices, and the factors affecting those in households in Arba Minch Town, Southern Ethiopia.Methods:A community-based, descriptive cross-sectional study was conducted among households in Bere Edigetber and Nech Sar of Arba Minch town, from June 25 to August 27, 2022. Data were gathered through face-to-face interviews with revalidated structured questionnaires. A multistage sampling technique was utilized to select each household.Results:Three hundred forty-eight households agreed to participate in a study, resulting in a 94.8% response rate. Of the study participant, 172 (49.4%) of the households had leftover medicines, with antibiotics being the most common (64% of 172). Subsidy of symptoms and saving for later use were two frequently cited reasons for the presence of leftover medicines in the house. Throwing leftover medicines in household garbage was the preferred method of disposal (>60%). Only 0.1% of respondents considered returning leftover medicines to healthcare facilities or professionals. A binary regression analysis identified four predictors for having leftover medicines. Medicines obtained without prescription were the strongest predictor (odds ratio = 3.7; $p < 0.001$), followed by higher family monthly income (odds ratio = 2.5; $p = 0.005$), those waived paying for medicine (odds ratio = 0.294; $p = 0.049$), and those used medications for acute diseases ($p = 0.048$; odds ratio = 0.450). Respondents who had prior information on safe medicine disposal were 2.3 ($p = 0.04$) more likely to dispose of possessed leftover medicines rather than keep them for future use.Conclusions:This study revealed a high prevalence of leftover medicines and their improper disposal in Arba Minch town. The preferred methods of leftover medicine disposal in this study deviate from conventional standards. Significant factor variables that predict having leftover medicines are attributed to purchasing medicine without a prescription, higher family monthly income, those waived paying for medicine, and those who used medications for acute diseases. Prior knowledge of proper disposal practices predicated the decision to dispose of on-hand leftover medicines or keep them for future use. These findings would be critical in developing strategies to reduce leftover medicines and promote proper disposal practices.

African Geographical Review

DOI: http://dx.doi.org/10.1080/19376812.2021.1997610

42(2023)

Intraregional resettlement scheme and livelihood perspectives in Southwestern Ethiopia: challenges and prospects

Alemayehu Abera Shumi[a], Teshome Yirgu Bayou[b] & Abera Uncha Utallo[b]

[b] Department of Geography and Environmental Studies, Arba Minch University, Arba Minch, Ethiopia

Abstract

This study investigates the livelihood perspectives of resettlers, challenges and prospects of intra-regional resettlement scheme in Chewaka district of Ethiopia. Through multistage sampling procedure, 384 households were selected from sample kebeles for household survey. Descriptive and inferential statistics along with Household Food Balance Model have been employed to analyze data. The results revealed that resettlement scheme had brought substantial changes on livelihood of the resettled communities. It is successful in rescuing human life, improving livelihood assets and ensuring food security for most of the settlers. The study suggests urgent attention on improving infrastructures and environment conservations for betterment of livelihoods. Abbreviations: BZARDO: Buno Bedelle Zone Agriculture and Rural Development Office; DAs: Development Agents; TM: Thematic Mapper: ETM+: Enhanced Thematic Mapper Plus; NMSA: National Meteorological Service Agency; SNNPR: Southern Nations, Nationalities and Peoples Region.

Keywords: ChewakaIntra-regionallivelihoodsprospectsresettlement

Advances in Materials Science and Engineering

DOI: https://doi.org/10.1155/2023/9637728

2023(2023)

Influence of Metallic Particles on Properties of Aluminium Composites through Taguchi Technique

B. Venkatesh, Anantha Raman Lakshmipathi, T. Prakash, Pothamsetty Kasi V. Rao, Rajesh Verma, N. Nagabhooshanam, **Simon Yishak**[4]

[4]College of Engineering and Argo-Industrial Technology, Sawla Campus, Arba Minch University, Arba Minch, Ethiopia

Abstract

In this work, aluminium composites have been evaluated in terms of their characteristics and behaviour. Stirring metallics and a specific quantity of ceramic-derived silicon nitride resulted in AA6061 composites (Si3N4). The mechanical, corrosion, and tribological properties of composites were investigated. Tensile, corrosion, and hardness characteristics have been improved in composites with a constant weight percent of ceramic and advanced metallic fortification. The improved hardness of the composite has decreased wear and friction. Furthermore, by using ceramic strengthening with the metal, the impact strength of the composites was condensed. In addition to the research, the design of experiments method was used to optimize the important wear test elements such as reinforcement %, applied stress, sliding distance, and speed. Analysis of variance was used to find the most significant testing features and its interface with wear performance and the friction coefficient of the composite specimen.

Lecture Notes on Data Engineering and Communications Technologies

DOI: http://dx.doi.org/10.1007/978-3-031-24475-9_61

158(2023)

Phishing Website Detection with and Without Proper Feature Selection Techniques: Machine Learning Approach

Kibreab Adane[a], Berhanu Beyene[b]

[a]Faculty of Computing and Software Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Indeed, successful phishing website attempts could result in catastrophic data loss, login credential compromise, ransomware infection, and financial loss. It also significantly hampers the competitiveness and productivity of online users and internet-dependent organizations unless an intelligent anti-phishing solution is devised. Due to detecting fresh phishing website attacks with maximum accuracy by discovering hidden patterns from complex datasets is shown to be an intrinsic property of M- Learning approaches, the study conducted rigorous experiments on four purposely selected efficient supervised M-Learning algorithms before and after applying five widely used proper feature selection techniques such as Recursive Feature Elimination, Pierson Correlation Coefficient, Principal Component Analysis, Uni-variate Feature Selection, and Mutual Information. The proposed study was conducted to balance the research gaps and scientific disputes in the rigorously reviewed studies. The study's final outcome is a proposal for an intelligent phishing website model that yields higher accuracy, faster response times, and fewer average misclassification rates. The study also explored the feature selection techniques that had more, less, and no contributions to enhancing each classifier's accuracy. As compared to the remaining classifiers, the Cat-Boost Classifier attained superior phishing website detection accuracy (97.46%), F1-score (97.49%), a lower average misclassification rate (2.54%), and acceptable train-test computational time (7 s) after using the UFS technique. On the other hand, the PCA technique failed to enhance the accuracy of the Cat-Boost, Gradient-Boost, and Random Forest Classifiers due to scoring less accuracy than the accuracy reached before using proper feature selection techniques. To obtain more promising results, in future work, phishing website detection is expected to be carried out using a Hybrid proper feature selection technique, huge datasets, proper deep learning algorithms, and proper model hyper-parameters.

Keywords: Cat-BoostFeature selection techniqueMachine learningMIPCAPCCPhishing website detectionRFEUFS

Indian Chemical Engineer

DOI: https://doi.org/10.1080/00194506.2022.2144485

65(2023)

Carbon dioxide removal from biogas through sorption processes using natural and activated zeolite adsorbents

Elshaday Mulu[b], Milton M. M'Arimi, Rose C. Ramkat & Elsabet Mulu

[b]Faculty of Mechanical and Production Engineering, Arba-minch University, Arba Minch, Ethiopia

Abstract

Natural zeolite is among the low-cost materials that can be used to remove contaminants in biogas. The cleaning of biogas increases its energy density and reduces possible negative effects. The current study aimed to upgrade biogas using natural zeolites. The activation of natural zeolite was done using sodium hydroxide. The adsorbent samples were characterised using an XRF machine, while the biogas samples were analysed using Shimadzu gas chromatography and a portable digital gas detector. The effect of zeolite-to-water ratio on the carbonation process was investigated. In addition, the effects of biogas flow rate, adsorbent dose and contact time on the dry adsorption process were studied. The maximum CO2 uptake of zeolite was 4.8 and 0.2 mmol/g by dry adsorption and wet carbonation process, respectively. The results indicate that surface adsorption favoured by a low Si2O3/Al2O3 ratio was more prominent than carbonation that requires high basic oxides. The results showed that an increase in the dose of activated clay from 2.5 to 35 g increased the removal efficiency of CO2 from 11.2% to 79.8%, while the CO2 uptake decreased from 4.8 to 2.5 mmol/g. Furthermore, the experimental data fitted best to pseudo-first-order kinetics and the Bohart-Adams model for the breakthrough curve.

International Journal of Food Science

DOI: https://doi.org/10.1155/2023/3404674

2023(2023)

Evaluation of Proximate, Phytochemical, and Heavy Metal Content in Black Cumin and Fenugreek Cultivated in Gamo Zone, Ethiopia

Alemu Mekonnen Tura[1], Markos Dele Debisa[1], Etalema Desta Tulu[1], Birhanu Zeleke Tilinti[1]

[1]Arba Minch University, College of Natural and Computational Sciences, Department of Chemistry, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Spices have been recognized to have medicinal properties. Among several spices and medicinal plants, black cumin and fenugreek are very common. Geographical, climatic, and cultivating soil type can change the chemical composition of these spices. The objective of this work is to determine proximate, phytochemical, and heavy metal content in black cumin and fenugreek cultivated in the Gamo zone, Ethiopia. The proximate composition (moisture, ash, fiber, fat, protein carbohydrate, and gross energy) was determined; their content (%) in black cumin is 6.98±0.12, 5.02±2.9, 6.90±0.21, 32.1±0.68, 20.9±0.09, 34.1±0.73, and 498±4.4, respectively, and 6.30±0.35, 4.27±0.17, 9.36±0.25, 12.8±0.41, 30.8±0.09, 46.1±0.52, and 422±1.6, respectively, in fenugreek. The total means of phenolic flavonoids and alkaloids in black cumin are 193±5.3 mg GAE/100 g, 87.6±4.3 mg QE/100 g, and 69.4±4.7 mg AE/100 g, respectively, and 382±11 mg GAE/100 g, 123±3.6 mg QE/100 g, and 37.6±2.2 mg AE/100 g, respectively, in fenugreek. In black cumin and fenugreek collected from Kamba, Daramalo, and Dita woredas, nine heavy metals were determined by using FAAS. The total mean concentrations in mg/kg for detected heavy metals (Fe, Zn, Cu, Mn, and Co) in black cumin are 78.5±5.9, 27.3±1.5, 3.06±0.26, 8.47±0.22, and 10.1±0.37, respectively, and Cr, Ni, Pb, and Cd were not detected in black cumin. Similarly, the concentrations of Fe, Zn, Cu, Mn, Co, and Ni in fenugreek are 168±5.2, 14.8±0.20, 4.76±0.1, 13.7±0.40, 3.66±0.21, and 2.12±0.03, respectively, and Cr, Pb, and Cd were not detected in fenugreek. All the results of determined parameters were compared to previous studies, and the values were in agreement with slight variations. Therefore, black cumin and fenugreek cultivated in the Gamo zone were free from heavy metal toxicity.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e12865

9(2023)

Supervisors' and supervisees' perception and perceived practice of a process-oriented thesis written feedback: The case of Ethiopian universities

Tesfaye Habtemariam Gezahegn[1], Abate Demissie Gedamu[1]

[1]Department of English Language and Literature, Arba Minch University, Arba Minch, Ethiopia

Abstract

Feedback has a significant effect on the quality of the thesis a supervisee writes. However, this largely depends on the supervisors' and supervisees' feedback practice and perception. Thus, this study aimed to assess the supervisors' and supervisees' perception and practice of the process-oriented thesis written feedback from four perspectives: the function, focus, nature, and adjustment required. To do this, the study used questionnaires and interview data collected from English as a Foreign Language (EFL) thesis supervisors and supervisees were selected through a proportional random sampling technique from four Ethiopian universities. The study revealed that (1) supervisors and supervisees have a good perception of the four aspects of process-oriented effective written feedback despite some variations in the mean values among the sub-categories of effective written feedback. (2) It was also discovered that supervisors were practicing process-oriented effective written feedback to a required extent and supervisees agree their supervisors do so. However, interestingly, (3) there was a significant difference between supervisors' and supervisees' perceptions on the one hand and supervisors' reported practice and supervisees' views about their supervisors' practice of effective written thesis feedback on the other.

Keywords: Feedback perceptionFeedback practiceProcess-oriented feedbackThesis feedbackWritten feedback

Advances in Materials Science and Engineering

DOI: 10.1155/2023/5657609

2023(2023)

Experimental Investigation on Incorporation of Zinc-Ferrite Nanocoated Baffles for Improving the Performance of Field Power Electrical Transformer Integrated with a Solar Air Heater

Nithiyananthan Kannan, N. Vasantha Gowri, T. Muralikrishna, Avinash Kumar, F. Mary Anjalin, M. Ramesh, B. Muthuraj, **Habtewolde Ababu Birhanu**[5]

[5]Faculty of Mechanical Engineering, Arba Minch Institute of Technology, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Solar energy is the most accessible, eco-friendly, and renewable energy source available to meet the world's expanding energy needs. Solar collectors are commonly utilized to convert solar energy directly into heat for purposes ranging from house heating to timber seasoning and crop drying. The purpose of this research is to design a modified solar air heater (SAH) with a baffle plate and to examine the performance due to the provision of zinc-ferrite nanocoated baffles. The entire system is mounted over a transformer for effective cooling and also produces hot air for industrial requirements. A flat plate collector and a centrifugal blower were used in the experiment. Maximum output air temperatures of 55°C, 62°C, and 72°C were measured for collectors without baffles, baffled collectors, and inverted baffled collectors, respectively. It was also found that the thermal efficiency of flat plate collectors without baffles was 36%, with baffles, it was 44%, and with inverted baffles it was 54%. This study shows that inverted SAH with zinc-ferrite nanocoated baffle plates works better than SAH without baffle plates or with baffle plates in the normal position.

Infection and Drug Resistance

DOI: https://doi.org/10.2147/idr.s411162

16(2023)

Bacteriological Quality and Antimicrobial Resistant Patterns of Foodborne Pathogens Isolated from Commonly Vended Street Foods in Arba Minch Town, Southern Ethiopia

Dagninet Alelign [1], Manaye Yihune [2], Muluken Bekele [2], Yisiak Oumer [1], Kassaw Beyene [3], Kaleb Atnafu [1]

[1]Department of Medical Laboratory Sciences, Arba Minch University, Arba Minch, Ethiopia.

[2]School of Public Health, Arba Minch University, Arba Minch, Ethiopia.

[3]Department of Midwifery, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Ready-to-eat foods sold by street vendors act as potential sources for the spread of various foodborne infectious diseases. Thus, local determination of the level of foodborne bacterial pathogens and their antimicrobial resistance pattern is essential.

Methods: A community-based cross-sectional study was conducted from September 5th, 2022 to December 31th, 2022. The required data were collected by a structured questionnaire and observation checklist. Randomly selected street-vended foods were aseptically collected, and the bacteriological quality was assessed by using culture techniques. Different biochemical tests were used to identify and characterize bacterial isolates. The antimicrobial-resistant test for isolated foodborne bacterial pathogens was carried out by using the Kirby-Bauer disc diffusion method. The data were analyzed using SPSS version 22.

Results: A total of 34.2% (113/330) with a 95% CI of 29.1-39.4 of commonly consumed street-vended foods were identified as having unsatisfactory total mean aerobic bacterial counts (>105 CFU/g; 4.3 × 105 CFU/g). The mean total Enterobacteriaceae, coliform, and staphylococcal counts were found to be 1.4 × 105 CFU/g, 2.4 × 104 CFU/g, and 3.4 × 104 CFU/g, respectively. A total of 12.7% (42/330) of foodborne pathogens were recovered attributed to Staphylococcus aureus (31, 9.4%), Salmonella species (6, 1.8%), and E. coli O157:H7 (5, 1.5%). 6.5% and 16.1% of isolated S. aureus were found to be methicillin-resistant and multidrug-resistant (MDR), respectively. Additionally, 33.3% of Salmonella isolates and 40% of E. coli O157:H7 isolates were found to be MDR.

Conclusion: Street-vended foods in this setting have a considerable number of unsatisfactory bacterial qualities, along with drug-resistant foodborne pathogens. Thus, more effective health education and training for vendors, regular inspections of vending sites, and regular surveillance of drug resistance patterns of foodborne pathogens are all essential.

Keywords: Arba Minch; Ethiopia; bacteriological quality; street-vended foods.

Veterinary Medicine International

DOI:https://doi.org/10.1155/2023/6238754

2023(2023)

Prevalence, Contamination Level, and Associated Factors of Methicillin-Resistant Staphylococcus aureus in Raw Cow Milk at Selected Districts of Gamo Zone, Southern Ethiopia

Edget Abayneh Alembo [1], Tomas Tonjo Torka [2]

[1]College of Agricultural Science, Animal and Health Science Department, Arba Minch University, Arba Minch, Ethiopia.
[2]Dita District Livestock and Fishery Department, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Staphylococcus aureus is pathogenic bacterium contaminating milk and milk products causing bacterial food poisoning. In the current study sites, there is no information on methicillin-resistant Staphylococcus aureus. Thus, the current study sought to assess the risk factors that contribute to the contamination of raw cow milk, the bacterial load, and the prevalence of methicillin-resistant Staphylococcus aurous. A cross-sectional study was conducted, January to December, 2021, on randomly selected 140 milk samples from selling point of Arba Minch Zuria and Chencha districts. Fresh milk samples were processed and tested for bacterial load, bacterial isolation, and methicillin susceptibility patterns. Questionnaire survey was conducted on 140 producers and collectors to assess hygienic factors attributed to contamination of raw cow milk with Staphylococcus aureus. The overall prevalence of S. aureus was 42.1% (59/140) (95% confidence interval (CI): 34.80-51.40%). About 15.6% (22/140) of the milk samples assessed had the viable count and total S. aureus count higher than 5log cfu/mL with 5.3 + 1.68 and 1.36 + 1.7log cfu/ml-1 bacterial loads, respectively. The rate of isolation of S. aureus was significantly high in milk from highland than lowland (p=0.030). The multivariable logistic regression revealed that educational status (OR: 6.00; 95% CI: 4.01-8.07), picking one's nose while working on milk (OR: 1.41; 95% CI: 0.54-2.25), cleaning the milk can (OR: 4.5; 95% CI: 2.61-5.17), hand washing activities (OR: 3.4; 95% CI: 1.670-6.987), check for abnormal milk (OR: 2; 95% CI: 1.55-2.75), and container for milk (OR: 3; 95% CI: 0.12-0.67) were risk factors significantly associated with the occurrence of S. aureus in milk. In conclusion, the highest rate of resistance was observed to ampicillin (84.7%) and cefoxitin (76.3%). All isolates are resistant to at least two types of antimicrobial drugs, while 65.0% of the isolates were found to be multidrug-resistant. The higher prevalence, high load, and antimicrobial resistance of S. aureus indicate the higher public health risk due to the widespread consumption of raw milk in the area. Furthermore, consumers in the study area should be aware of the risks associated with consuming raw milk.

Cogent Education

DOI: https://doi.org/10.1080/2331186X.2023.2211467

10(2023)

Effects of peer-editing on L2 writing achievement among secondary school students in Ethiopia

Sirak Sahle[1], Yirga A. Siawk[2] & Hailay T. Gebremariam[2]

[1]Kamba Secondary School, Arba Minch University, Kamba, Ethiopia
[2]Ethiopian Languages and Literature (Amharic), College of Social Science and Humanities, Arba Minch University, Arba Minch, Ethiopia

Abstract

Although the effects of peer-editing techniques have been studied from a variety of perspectives, the results when applied to second- or foreign-language students' writing performance are rarely favorable. The current study looked into the effect of peer-editing on the writing achievement of L2 learners. To achieve the goal, data were collected using a quasi-experimental design. The study's 11th grade participants were divided into two groups using simple random sampling. One of the participant groups was an experimental group that attended L2 writing lessons with peer-editing, while the other group was a control group that was allowed to continue the lesson as usual. Over the course of five weeks, two very different groups received sixteen hours of instruction. A pre- and post-test was given to both groups. The data collected through the writing test was analyzed using the independent sampling t-test and MANOVA. Although there were no statistically significant differences between the two groups in the pre-test results, the post-test results revealed a statistically significant difference at $\alpha = 0.05$ level. The findings of this study indicated that, when compared to high school students who received writing instruction in a controlled group, those who learned writing achievements through the peer-editing pedagogical strategy improved their writing achievement. These findings add to our understanding of how peer-editing affects the outcomes of L2 writers.

Environmental Monitoring and Assessment

DOI:https://doi.org/10.1007/s10661-022-10781-7

195(2023)

Impacts of climate change on IDF curves for urban stormwater management systems design: the case of Dodola Town, Ethiopia

Takele Sambeto Bibi [1], **Nebiyu Waliyi Tekesa [2]**

[2]Faculty of Meteorology and Hydrology, Arba Minch Water Technology Institute, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia

Abstract

Climate change impacts are one of the global challenges that change the intensity and frequency of rainfall. The Dodola town has previously experienced rainfall-induced flooding effects, and future floods may be more frequent and severe due to possible variations in rainfall intensity due to climate change. In this study, the rainfall intensity–duration–frequency (IDF) curves are updated for the design of urban stormwater drainage infrastructures under climate change to reduce flooding risks. To assess the variations in the rainfall intensity, the future IDF curves for the periods (2020–2100) and two GCMs (CanESM2 and HadGEM2-ES) were derived and compared to the current IDF curves. It was found that rainfall intensities for future climate conditions will differ from the current period for all durations and return periods. The comparison results show that the relative change between future rainfall intensities and historic rainfall ranges from 1.5 to 30.6%, 2.48 to 42.6%, and 3.7 to 23.24% for 2020–2040, 2041–2070, and 2071–2100, respectively. The IDF relationships revealed that as a result of climate change, urban flooding will increase in the future. This study will help to better understand the impacts of climate change on rainfall IDF relationships, as well as have implications for the design of current and future stormwater management systems in Dodola, Ethiopia.

Keywords: Climate changeIDF curvesRainfall intensityStormwater management systems

Advances in Civil Engineering

DOI: https://doi.org/10.1155/2023/3085842

2023(2023)

NSF (Nylon Synthetic Fiber) Effectiveness in Stabilizing Weak Subgrade Soil: An Experimental Investigation

Tarekegn Shumetie Demsie[a], Markos Tsegaye Beyene[b], **Abuye Boja Lemma**[a], Esayas Alemayehu[b]

[a]Department of Civil Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Improvement in subgrade soil has always been an area of concern for highway and geotechnical engineers. Weak subgrade soil results in a greater thickness of the pavement layer, which increases the cost of pavement construction. It further leads to large deformations, which in turn cause continuous deterioration of the paved surface. To solve this problem, various engineering solutions and soil improvement mechanisms were previously proposed. This study was designed to investigate the stabilization of weak subgrade soil with nylon synthetic fiber (NSF) in a compromising combination. Previously, some investigations used a lower fiber content with a higher fiber length, whereas others used a lower fiber length with a higher fiber content. However, this investigation was uniquely designed to stabilize weak subgrade soil with the consideration of appropriate fiber length (10 mm and 20 mm) and content (0.5%, 1%, 1.5%, and 2.5%). The engineering properties of the soil, the effect of NSF on weak subgrade soil, various fiber content and aspect ratios, and the optimum content and critical fiber aspect ratio were investigated in a laboratory. The effect of fibers on compaction, CBR values, and CBR swell values has also been studied. Laboratory results on the modified compaction tests showed that maximum dry density (MDD) was increased with the increment of fiber content, whereas optimum moisture content (OMC) remained constant. The soaked CBR and CBR swell values of natural soil were 1.80% and 8.95%, respectively. Due to reinforcement, the percentage increase in soaked CBR value at the optimum NSF content is 265.3, 310.0, 282.8, and 342.2 for aspect ratios of 33.33, 66.67, 25, and 50, respectively, with reference to natural soil. Also, the percentage decrease in swelling is 34.7, 52.75, 43.55, and 36.9, respectively. Moreover, the CBR value increases with the increase in aspect ratio by keeping the diameter constant and decreases with the increase in aspect ratio by keeping the length constant. It was also observed that increasing the length and diameter of NSF further increased the CBR value of reinforced soil. This increment was substantial at a fiber content of 1.5% for an aspect ratio of 50 (length = 20 mm, diameter = 0.4 mm). There was also a decrease in the CBR swelling value with an increase in fiber content. Finally, this investigation concluded that the use of NSF is a solution to weak soils with regard to moisture and performance problems.

Diabetes, Metabolic Syndrome and Obesity

DOI: https://doi.org/10.2147/dmso.s404788

16(2023)

Assessment of Electrolyte Imbalance and Associated Factors Among Adult Diabetic Patients Attending the University of Gondar Comprehensive Specialized Hospital, Ethiopia: A Comparative Cross-Sectional Study

Bruktawit Eshetu [1] , Abebaw Worede[2] , Alemie Fentie[3] , Elias Chane[2] , Getnet Fetene [2] , Habtamu Wondifraw[2] , Mahider Shimelis[3] , Mahider Girma[4] , **Rishan Hadgu[5]** , Kassaw Demeke [6] , Alebachew Fasil[2]

[5]Department of Medical Laboratory Science, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Introduction: Electrolyte imbalance refers to altered electrolyte levels that predominantly affect diabetic patients due to hyperglycemia which rise plasma osmolality and impaired renal function, contributing to a change in electrolyte level. Therefore, this study aimed to assess the prevalence of electrolyte imbalance and its associated factors among diabetic patients and healthy control groups attending the University of Gondar Comprehensive Specialized Hospital.

Patients and methods: A comparative cross-sectional study was conducted on 130 diabetic patients and 130 diabetes-free controls. Sociodemographic, behavioral and clinical data were collected using a structured questionnaire. After measuring anthropometric parameters, 5mL of the blood sample was collected. Electrolytes were measured based on ion-selective electrode methods. Fasting blood glucose, and creatinine were measured by spectrophotometric enzyme hexokinase, and Jaffe reaction methods, respectively. The data was entered into Epi-data version 4.6 and analyzed using STATA version 14. Mann-Whitney U-tests and independent t-tests were used for comparison. Multiple logistic regression analysis was done to determine the factors associated with electrolyte imbalances. P-value <0.05 was considered statistically significant.

Result: The overall prevalence of electrolyte imbalance among diabetic patients and controls were 83.07% and 52.31%, respectively. The mean of Na+ and the median level of Mg2+ and Ca2+ were significantly decreased. However, the mean level of Cl- was significantly increased in diabetic patients as compared to control groups. In multivariable logistic regression: alcohol consumption AOR = 3.34 [1.02-10.9], no formal education AOR = 5.38 [1.14-25.4], hyperglycemia AOR = 6.32 [2.04-19.5], and urbanization AOR = 5.6 [1.44-22.3] showed significant association with electrolyte imbalance.

Conclusion: Diabetic patients have more likely to develop electrolyte imbalance than control groups. Diabetic participants showed significantly reduced Na+, Mg2+, and Ca2+ levels and significantly increasing CI- levels when compared to control groups. Hyperglycemia, alcohol drinking habits, urbanization, and no-formal education were statistically significantly associated with electrolyte imbalance.

Keywords: Ethiopia; associated factors; diabetes mellitus; electrolyte imbalance.

New Microbes and New Infections

DOI: https://doi.org/10.1016/j.nmni.2023.101083

51(2023

Magnitude and associated factors of bacterial urinary tract infections among paediatric patients in Arba Minch, southern Ethiopia

Ali Kedir Elale[1] , Aseer Manilal[1] , Dagimawie Tadesse[1] , Mohammed Seid [1] , Amanuel Dubale[1]

[1]Department of Medical Laboratory Science, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Bacterial urinary tract infections (UTI) commonly occur in children; if left untreated, they may result in severe consequences such as uro-sepsis and renal damage. This study aimed to determine the bacterial profile, antimicrobial susceptibility patterns and associated factors among paediatric patients suspected of urinary tract infections in Arba Minch General Hospital (AMGH). An institution-based cross-sectional study was conducted from 01 October 2020 to 31 January 2021. A convenient sampling technique was used to recruit the participants; data were collected using a pre-tested questionnaire. To quantify the bacteria (as per the Kass count, >105CFU/ml), midstream urine samples were streaked onto bacteriological media. Isolates were identified by following standard procedures. The antibiotic susceptibility test was performed as per the Kirby–Bauer disc diffusion technique. Data were analyzed using SPSS software. Out of the 246 children included, 38 (15.4%) were found to be positive for significant bacteriuria. Isolates of Escherichia coli, 9/38 (23.7%), and Staphylococcus aureus, 9/38 (23.7%), were the most predominant. The majority of Gram-negative bacterial (GNB) isolates showed resistance towards amoxicillin-clavulanate (89.5%), ampicillin (84.6%), and ceftazidime (81%). Likewise, 76.9 and 76.5% of Gram-positive bacteria (GPB), respectively, had shown resistance towards co-trimoxazole and tetracycline. Multi-drug and extensively drug resistance were detected respectively in the case of 68.4 and 15.8% of the total isolates; ESBL production was found in 57.1% of GNB, whereas 55.6% of S. aureus were methicillin-resistant S. aureus (MRSA). The process of un-circumcision was significantly associated with UTI [(adjusted odds ratio= 3.578; 95% confidence interval: 1.263 – 10.13; p=0.016)].

Keywords: Antimicrobial susceptibility patternsassociated factorsbacterial uropathogenschildrenEthiopiaUTI

All Life

DOI: https://doi.org/10.1080/26895293.2022.2163303

16(2023)

Evaluation of Calpurnia aurea leaf extracts as natural insect repellents for stored product insect pests in Ethiopia

Berhanu Hiruy[1] & Emana Getu[1]

[1]Department of Biology, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

The repellency of solvent extracts of Calpurnia aurea leaves was evaluated on the maize weevils and the red flour beetles. Nine-cm Whatman number 1 filter paper that is partitioned into treatment, neutral and non-treatment portions was used for the experiment. Each solvent extract treatment was applied at 2.5, 5 and 10% rates. Insects were released in the neutral portion, while the untreated part served as a control. A choice bioassay experimental method that is laid down in a completely randomized design within three replications was used. 5 and 10% rates of the polar solvent extracts of Calpurnia aurea leaves induced significantly ($p < 0.05$) higher percentage weevils and beetles repellency (≥50.00%) at 2 days after treatment than non-polar and partial polar solvent extract treatments and the untreated check. 10% dosage of Calpurnia aurea leaves' polar solvent extract treatments caused 100% weevils and beetles repellency three days after treatment. Consequently, the polar solvent extracts of the tested plant were potent and could be used at 5 and 10% rates for the maize weevils and the red flour beetles' management under farmers' maize storage conditions. Nevertheless, their impact on cost-effectiveness, natural enemies and human beings needs additional study.

Journal of Food Quality

DOI: https://doi.org/10.1155/2023/1917972

2023(2023)

Nutritional Enhancement of Bread Produced from Wheat, Banana, and Carrot Composite Flour

Masresha Gebeyehu Ewunetu[a], Alemneh Yazie Atnafu[b], Wondemagegn Fikadu[b]

[a] Department of Food Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

The physicochemical and sensory evaluation of the bread produced from the composite flours of wheat, carrot, and banana was determined. Five bread samples were produced from the proportion of wheat/carrot/banana composite flours in the ratio 90%: 5%: 5% (blending ratio one), 80%: 10%: 10% (blending ratio two), 70%: 15%: 15% (blending ratio three), and 60%: 20%: 20% (blending ratio four), and 100% wheat was the control sample. The proximate composition of moisture, ash, crude fat, crude fiber, and beta-carotene contents of the composite bread increased significantly. The values of moisture%, ash%, crude fiber%, crude fat%, and β-carotene μg/100 g ranged from 29.92 ± 0.01-33.23 ± 0.0158, 0.67 ± 0.03-1.66 ± 0.01, 1.99 ± 0.01-6.47 ± 0.01, 1.127 ± 0.01-3.2 ± 0.01, and 0.13 ± 0.01-73.51 ± 0.01, respectively. The values of crude protein%, carbohydrate%, and caloric value (kcal) ranged from 10.02 ± 0.01-8.01 ± 0.01 and carbohydrate ranged from 47.42 ± 0.03 - 56.27 ± 0.01, 47.42 ± 0.03 - 56.27 ± 0.01, and 275.30 ± 0.06-250.55 ± 0.07, respectively. The mean of sensory scores varied with the increased addition of carrot and banana flours to the wheat flour. There was no significant difference in the overall acceptability of the bread for all the samples, except the control. The mean of sensory scores, however, showed that consumers preferred the bread from blending ratio four (60%: 20%: 20%) but bread from the composite flours of substitution for both carrot and banana flours was well accepted. The general objective of this project is to enhance the nutritional value of bread by adding carrot and banana flour to wheat flour. The study has shown that bread of acceptable quality can be produced from composite flour of wheat, carrot, and banana, which would increase nutrition and prevent malnutrition.

Geology, Ecology, and Landscapes

DOI: https://doi.org/10.1080/24749508.2023.2202436

(2023)

Impacts of land use/land cover change on wetland ecosystem services of Lake Abaya-Chamo Wetland, Rift Valley of Ethiopia

Tariku Zekarias[a] & Abren Gelaw[a]

[a] Department of Geography and Environmental Studies, Arba Minch University, Arba Minch, Ethiopia

Abstract

Wetlands in Ethiopia provide multiple ecosystem services; they are highly affected because of Natural processes, anthropogenic activities, and limited policy attention. It aimed this study at analyzing the ecological benefits and drivers of the degradation of the Abaya-Chamo lake-wetland. A questionnaire survey of 304 Household Heads, focus group Discussion, and Landsat imagery was used. Landsat images from the last 30 years (1990-2019) were also used to identify vegetation indices and turbidity in the study area. Normalized difference vegetation, water, and turbidity indices were used for image interpretation. Mean, it used correlation and regression for data analyses. Abaya-Chamo lake-wetland offers fish, fodder, irrigation, farmland, rainfall, habitat, tourism, aesthetics, recreation, carbon sink, air quality, and climate control services. The area showed siltation-led raising turbidity and a loss of 48.9% of its swamp area from 1990 to 2019. Farm expansion, siltation, invasive plants, open access and overuse of resources, lack of legal framework, and rapid population growth were the main drivers of wetland degradation. Invasive plants result in dwindling aquatic resources, economic and tourism benefits, and changes in local climate, rapidly depleting water and lake-wetland. Thus, the government should formulate a clear policy and legal framework for the sustainable management of wetlands.

Keywords: Wetland degradationecosystem servicesedimentationturbidityAbaya-chamo lake

SAGE Open Medicine

DOI: https://doi.org/10.1177/20503121231153511

11(2023)

Preconception care in sub-Saharan Africa: A systematic review and meta-analysis on the prevalence and its correlation with knowledge level among women in the reproductive age group

Demelash Woldeyohannes [1] [2], Yohannes Tekalegn [3], Biniyam Sahiledengle [3], **Zeleke Hailemariam [4]**, Desta Erkalo [1], Abraham Zegeye [5], Habtamu Tamrat [6], Akililu Habte [1], Aiggan Tamene [1], Fitsum Endale [1], Biruk Ertiban [5], Tekle Ejajo [1], Lolamo Kelbiso [7], Lombamo Liranso [8], Fikreab Desta [1], Dejene Ermias [1], Lillian Mwanri [9], Joanne C Enticott [2]

[4]Department of Public Health, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Objective: Preconception care is aimed to promote optimal health in women before conception to reduce or prevent poor pregnancy outcomes. Although there are several published primary studies from sub-Saharan African countries on preconception care, they need to quantify the extent of preconception care utilization, the knowledge level about preconception care, and the association among women in the reproductive age group in this region. This systematic review and meta-analysis aimed to estimate the pooled utilization of preconception care, pooled knowledge level about preconception care, and their association among women in the reproductive age group in sub-Saharan Africa.

Methods: Databases including PubMed, Science Direct, Hinari, Google Scholar, and Cochrane library were systematically searched for relevant literature. Additionally, the references of included articles were checked for additional possible sources. The Cochrane Q test statistics and I 2 tests were used to assess the heterogeneity of the included studies. A random-effect meta-analysis model was used to estimate the pooled prevalence of preconception care, knowledge level of preconception care, and their correlation among reproductive-aged women in sub-Saharan African countries.

Results: Of the identified 1593 articles, 20 studies were included in the final analysis. The pooled utilization of preconception care and good knowledge level about preconception care among women of reproductive age were found to be 24.05% (95% confidence interval: 16.61, 31.49) and 33.27% (95% confidence interval: 24.78, 41.77), respectively. Women in the reproductive age group with good knowledge levels were greater than two times more likely to utilize the preconception care than the women with poor knowledge levels in sub-Saharan African countries (odds ratio: 2.35, 95% confidence interval: 1.16, 4.76).

Conclusion: In sub-Saharan African countries, the utilization of preconception care and knowledge toward preconception care were low. Additionally, the current meta-analysis found good knowledge level to be significantly associated with the utilization of preconception care among women of reproductive age. These findings indicate that it is imperative to launch programs to improve the knowledge level about preconception care utilization among women in the reproductive age group in sub-Saharan African countries.

Keywords: Preconception care; knowledge level; sub-Saharan Africa; systematic review and meta-analysis; utilization.

Frontiers in Education

DOI: https://doi.org/10.3389/feduc.2023.1145195

8(2023)

Primary school teachers' assessment for learning practice for students' learning improvement

Hailay Tesfay Gebremariam[a]*, Abate Demissie Gedamu[a]

[a] College of Social Science and Humanities, Arba Minch University, Arba Minch, Ethiopia

Abstract

Assessment for learning practice and learning improvement are the two vital variables in this study. This article explores primary school teachers' assessments for learning practices for student learning improvement. The participants (n = 242) were selected through a cluster random sampling techniques for a questionnaire survey from the target primary schools to meet the research objective of this study. Among the total participants 15 teachers for an in-depth interview, and five for informal conversations were randomly selected through purposive sampling. The data collected through closed-ended questionnaire were analyzed using mean, standard deviation, analysis of variance and post-hoc methods. To analyze the qualitative data acquired through interview and informal conversation, thematic verbal descriptions were employed. Conversely, the findings indicated that the primary school teachers had highly positive classroom environments practice, moderate positive learning intentions and success, feedback in assessment practices, and self- and peer-assessment practices toward learning assessment. Although, the findings from the quantitative data showed that the primary school teachers had high and moderate assessments for learning practice, the interviews revealed that they had low confidence in learning practice assessments owing to challenges faced during practice. These overall challenges relate to transparency, experience, training, school problems, and preference reliance. Finally, based on the study's implications, recommendations are made for future directions of studies that will allow better comprehension of the assessment for learning practice in relation to the students' learning improvement.

Keywords: Assessment for learning frameworkassessment for learning practicelearning improvementprimary school teachersstudents' learning progress

Cogent Food and Agriculture

DOI: https://doi.org/10.1080/23311932.2023.2209998

9(2023)

Assessment of commelina species feed use in Konso Zone, Southern Ethiopia: Identification, seasonal characterization, and altitudinal distribution

Kebede Gelgelo[a], Yisehak Kechero[a] & Dereje Andualem[b]

[a] College of Agricultural Sciences, Department of Animal Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Searching for low-cost, readily available non-conventional feeds is viewed as an alternate measure and solution in resolving feed-related difficulties. This study was conducted to investigate Commelina species feed use in Konso zone, Southern Ethiopia, by identifying available species and characterize seasonal and altitudinal distribution. The data were gathered through focus group discussions and interviews with 195 households drawn randomly from 15 villages. Five Commelina spp.; Commelina benghalensis, Commelina imberbis, Commelina diffusa, Commelina albescens, and Commelina africana were identified in the study area. C. diffusa was available year-round (88.71%) at low and mid altitudes, whereas all others show diminishing pattern with dry season. C. benghalensis, C. imberbis and C. diffusa were found in low and mid altitudes, whereas C. africana and C. albescence were found only in low altitude. Availability and distribution of commelina spp. in the study area shows variability with seasonal and altitudinal changes. The wider feed usage by livestock keepers across all the corners of the area, combined with the species' proclivity to grow as friendly alley crops on farmland, suggests that the value of C. benghalensis and C. imberbis may extend beyond feed use. Agricultural experts must transfer intercropping trend of C. benghalensis, and C. imberbis with food crops to farmers who lack it. Nutritional quality of the species should be conducted to have a clear picture about feed value of the plants.

Keywords: Altitudinal distribution Commelina species EthiopiabFeed usebKonso

Advances in Materials Science and Engineering

DOI: https://doi.org/10.1155/2023/2290515

2023(2023)

Comprehensive Characterization of Soils with Analytical and Numerical Simulation for Bearing Capacity and Settlement Requirements of the Footing

Defaru Katise Dasho[a], Biratu Bezabh Aga[b]

[a] Faculty of Civil Engineering, AMIT, Arba Minch University, P.O. Box. 21, Arba Minch, Ethiopia

Abstract

Characterization and analysis of foundation material are basic concerns of geotechnical activities to have safety for the structure and users as well. Particularly, it is quite important for the areas of lagging experiences with a lack of equipment and accessibility to investigate the subsurface conditions sufficiently. This study was designed for comprehensive soil investigations through analytical and Plaxis 2D simulation by considering square footing in Bule Hora town, Southern Ethiopia. Considering the investigation depth up to 5.0 m, fourteen soil samples at 1.5 m and 3.0 m depths (two samples from seven pits) were collected, and physical and engineering properties were investigated. Grain and consistency results indicated that soils lying between low to high plastic silt regions. Undrained shear strength (Cu) ranges from 49.5 - 64.30 and 52.40-103.10 kN/m2 at 1.5 m and 3.0 m depth, respectively. An average allowable bearing capacity of 145.35 kN/m2 with a settlement of 40.77 mm at 1.5 m depth and 191.41 kN/m2 with a settlement of 47.84 mm at a depth of 3.0 m using the analytical method whereas 122.72 kN/m2 was obtained with the settlement of 30.57 mm at a depth of 1.5 m and 155.11 kN/m2 with 29.08 mm at depth of 3.0 m using Plaxis 2D analysis. The results of bearing capacity and settlement analyzed by the numerical method are lower than the analytical method, which confirms that comparatively, Plaxis 2D analysis gives a better output in selected square footing of shallow foundations. In conclusion, Plaxis was a preferable analysis tool for a shallow foundation, square footing, using inputs of the exhaustively investigated actual condition of soils specifically in Bule Hora town.

Critical Care Research and Practice

DOI: https://doi.org/10.1155/2023/4977612

2023(2023)

Knowledge Regarding Mechanical Ventilation and Practice of Ventilatory Care among Nurses Working in Intensive Care Units in Selected Governmental Hospitals in Addis Ababa, Ethiopia: A Descriptive Cross-Sectional Study

Kedir Abdureman Hassen [1] , Micheal Alemayehu Nemera [2] , Andualem Wubetie Aniley [3] , **Ararso Baru Olani [4]** , Sofoniyas Getaneh Bedane [5]

[4]College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Introduction. Mechanical ventilation (MV) is a backbone and major supportive modality in intensive care units (ICUs) even though it has side effects and complications. Knowledge of nurses about mechanical ventilators and good practice of nursing care for the ventilated patient plays a crucial role in improving the effectiveness of mechanical ventilation, preventing harm, and optimizing the patient outcome. This study intended to assess the knowledge regarding MV and the practice of ventilator care among nurses working in the ICU. Method. A descriptive cross-sectional study design was conducted. All nurses working in the intensive care unit of selected governmental hospitals were included in the study. The data were collected from March 1 to 30, 2021 with structured and pretested self-administered questionnaires. The collected data were evaluated with SPSS version 26 software. The variables, which have an independent association with poor outcomes, were identified based on OR, with 95% CI and a p value less than 0.05. Results. Of 146 nurses who participated in the study, 51.4% were males. About 71.4% had a BSc in nursing and 57.5% of them had training related to MV. More than half (51.4%) of nurses had poor knowledge regarding MV and the majority (58.9%) of them had poor practice in ventilatory care. The educational level (AOR, 5.1; 95% CI, 1.190-22.002) was positively associated with knowledge. Likewise, the educational level (AOR 5.0 (1.011-24.971)) and work experience (AOR 4.543 (1.430-14.435)) were positively associated with the practice of nurses. Conclusions. Knowledge regarding mechanical ventilators and the practice of ventilatory care among nurses in the selected public hospitals was poor. The educational levels were found statistically associated with both the knowledge and practice of nurses. To improve nursing care offered for MV patients, upgrading the educational level of intensive care nurses plays a vital role.

Advances in Public Health

DOI: https://doi.org/10.1155/2023/1996608

2023(2023)

Cataract Prevalence and Its Associated Factors among Adult People Aged 40 Years and above in South Ari District, Southern Ethiopia

Temesgen Wolde Kentayiso[a], Agune Ashole Alto[b], Zeleke Abebaw[a], **Direslgne Miskerc, Wanzahun Godana Boynito[c]**

[c] School of Public Health, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background. Cataract is the leading cause of blindness in Ethiopia. However, the treatment was only surgery; the expected person could not use the surgical service. So far, the World Health Organization's goal of 2,000 people using the treatment out of a million people could not be met. Objective. The aim of this study was to assess the prevalence of cataract and factors associated with among adult people aged 40 years and above in South Ari district of South Omo Zone, Ethiopia. Method. A community-based cross sectional study was conducted in South Ari district of South Omo Zone, Ethiopia; samples were selected using simple random sampling and eye examination. Data were collected using pretested structured questionnaires. Data quality was ensured by daily supervision completeness and consistency. The data were coded, entered, and cleaned by using Epi.info version 7 and were analyzed by using SPSS version 20. Bivariate and multivariable analysis was carried by binary logistic regression. Significances were declared by using a p value of <0.05 and AOR of confidence intervals. Result. In this study, the prevalence of cataract was found to be 7.8% (95% CI: 5.0-10.6). There is an increased chance of developing cataract among females (AOR 3.52; 95% CI: 1.39-8.83), individuals with known history of hypertension (AOR 4.5; 95% CI 1.56-13.21), adults aged 70-79 years (AOR 5.07 95% CI: 1.09-23.62), and adults aged 80 years and above (AOR 6.01; 95% CI: 1.29-27.92). Conclusions. Cataract prevalence was found to be high among the study participants. Age, sex, and known history of hypertension were factors associated with cataract.

International Journal of Food Properties

DOI: https://doi.org/10.1080/10942912.2023.2173229

26(2023)

Phytochemical analysis of Withania somnifera leaf extracts by GC-MS and evaluating antioxidants and antibacterial activities

Dessie Ezez[a], Natinael Mekonnen[a] & Molla Tefera[a]

[a] Department of Chemistry, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Many people in developing countries mainly depend on medicinal plants like Withania somnifera and their products for healthcare. In this study, reflux and maceration extraction methods were applied to investigate total phenolic (TPC) and flavonoid contents (TFC); and antioxidant properties of Withania somnifera extracts toward DPPH and hydrogen peroxide (H2O2) were studied. Highest TPC was detected with methanol extracts with value of 198.24 ± 1.16 mg GAE/g and TFC of 31.52 ± 0.91 mg QE/g. The minimum amount of TPC was observed in aqueous extract (101.41 ± 1.07 mg GAE/g) and the TFC in ethyl acetate extract 9.72 ± 1.32 mg QE/g. The maximum value of DPPH radical scavenging was estimated in maceration methanol extract 81.98 ± 0.49% and value of H2O2 was obtained in maceration acetone extract 76.18 ± 1.06%. The major identified molecules were Heptasiloxane,1,1,3,3,5,5,7,7,9,9,11,11,13,13-tetradecamethyl-(50.04%), and trans-2,4 Dimethylthiane, S, S- dioxide (4.09%) The broad spectrum of antibacterial activity was observed in Escherichia coli reflux methanol extract. In both extraction techniques methanol was the best extracting solvent for phenolic and flavonoid contents as antioxidants as well as antibacterial activities

Keywords: Antibacterial Antioxidant Flavonoid polyphenol Withania somnifera

International Journal of Environmental Science and Technology

DOI: https://doi.org/10.1007/s13762-022-04012-2

20(2023)

Effects of organo-mineral complexes on Cd migration and transformation: from pot practice to adsorption mechanism

X.Zheng[1] , M. Zhao[1], **B.T.Oba[1,2]** , H. Ding[1]

[2]College of Natural Science, Arba Minch University, Arba Minch, 21, Ethiopia

Abstract

Cadmium (Cd) contamination in agricultural soil challenges food security and threats human health. Although it has been demonstrated that organo-mineral complexes (OMCs) are capable of adsorbing heavy metals in a stable medium, the practice of using OMCs to stabilize Cd in soil, and the crop response to OMCs are not yet clear. In this study, two separate but interrelated experiments were carried out using artificial OMCs made from modified palygorskite and compost. Compared with the recommended fertilization treatments (NPK+ chicken manure), OMCs increased the biomass, root development, and seed quality of Brassica napus. Moreover, the OMC treatment transformed the bioavailable Cd to Fe–Mn oxide-bound Cd in the rhizosphere, resulting in a significantly reduction in Cd accumulation in Brassica napus. Further tube experiments revealed that Cd adsorption by OMCs was heterogeneous chemical adsorption, and the Cd2+ was stabilized as CdCO3 and CdFe2O4 crystals on the surface of palygorskite. The presence of phenols, aldehydes, hydroxyls, and hydrocarbons in OMCs enhanced the Cd stabilization. From pot to tube, this research demonstrated the practical application of OMCs in stabilizing Cd at various scales, and described the potential of OMCs in increasing agricultural yields while limiting Cd migration.

Keywords: Adsorption Bioavailable cadmium Contaminated agricultural soil Crop yield Organo-mineral complexes

Aquaculture and Fisheries

DOI: https://doi.org/10.1016/j.aaf.2023.03.001

9(2023)

Optimal effort, fish farming, and marine reserve in fisheries management

Temesgen B. Getahun [a], Worku T. Bitew [b], Tsegaye G. Ayele [c], **Simon D. Zawka** [a]

[a] Department of Mathematics, Arba Minch University, Arba Minch, Ethiopia

Abstract

In this paper, we develop a bioeconomic model to determine an optimal wild catch harvest and freshwater commercial aquaculture production in a lake that uses cages or floating rafts. Although off-bottom aquaculture activities have less impact on the environment compared to on-bottom aquaculture, it has negative externalities. It takes away the fishing area and hence creates pressure in the open-access fishing ground. It also changes the nutrient and ecological composition of the environment. We recommend the implementation of a reserved area to minimize the impact of fishing and aquaculture activities. The reserve also helps in improving the habitat and restocking the fish population which is declining rapidly. We determine the optimal sizes of the aquaculture and reserve and the optimal effort level that maximizes social welfare. We illustrate our findings using numerical simulations and perform an analysis of the optimal solutions with respect to biological and economic parameters involved in the model.

Keywords: Optimal effort Marine reserve Aquaculture production Growth rate

Journal of Water and Climate Change

DOI: https://doi.org/10.2166/wcc.2022.249

14(2023)

Assessment of future climate change impact on water balance components in Central Rift Valley Lakes Basin, Ethiopia

Sisay Kebede Balcha; **Adane Abebe Awass**[d]; Taye Alemayehu Hulluka;Amare Bantider;Gebiaw T. Ayele

[d] Institute of Technology, Arba Minch University, P.O. BOX. 21, Arba Minch, Ethiopia

Abstract

This study aims to assess the impact of climate change on the water balance component of the Katar and Meki watersheds of the Central Rift Valley Lakes Basin, Ethiopia. The semi-distributed soil and water assessment tool hydrological model and multiple regional climate model outputs were used to assess climate change impacts on water balance components and stream flow. Future climate scenarios were developed under a representative concentration pathway (RCP 4.5 and 8.5) for the 2040s (2021-2050) and 2070s (2051-2080). The study found that future annual and seasonal rainfall will show increasing and decreasing trends but that they are statistically insignificant. Furthermore, future temperatures show a significant increase in the subbasins. For the applied scenarios, an increasing and decreasing trend of future rainfall and increased temperatures would decrease the water yield by 4.9-15.3% at the Katar subbasin and 6.7-7.4% at the Meki subbasin. Furthermore, annual water yields will increase in the range of 0.38-57.1% and 6.57-49.9% for the Katar and Meki subbasins, respectively. The findings of this study will help basin planners, policymakers, and water resource managers develop appropriate adaptation strategies to mitigate the negative effects of climate change in the rift-bound lake system.

Keywords: Bias correctionCentral Rift Valley Lakes BasinClimate change impactWater balanceWater yield

Journal of Plant Nutrition

DOI: https://doi.org/10.1080/01904167.2023.2209109

46(2023)

Yield and quality response of cassava (Manihot esculenta Crantz) to nitrogen and potassium fertilizer rates at Arba Minch, Southern Ethiopia

Zerihun Sinta[a] & Yetinayet Dansa[a]

[a] College of Agricultural Science, Arba Minch University, Arba Minch, Ethiopia

Abstract

Cassava (Manihot esculenta Crentz) is one of the most important root crops in tropical regions of the world. However, little or no study was carried out to determine the optimum rates of nitrogen (N) and potassium (K) for better cassava root yield. N and K fertilizers are the major factors limiting the growth and yield of cassava. Thus, this experiment evaluated the effect of N and K fertilizer rates on the growth, and yield of cassava. Four levels of N (0, 46, 92, and 138 kg N ha−1) and three levels of K (0, 60, and 120 kg K ha−1) were arranged in factorial combination in a randomized complete block design (RCBD) with three replications. The results revealed that the main effects of N fertilizer influenced all the studied parameters, while the main effect of K affected number of tubers per plant and tuber diameter. Interaction effect of N and K influenced fresh tuber yield of cassava. The highest fresh tuber yield of cassava was achieved from 92 kg N ha−1, whereas the lowest fresh tuber yield of cassava was obtained from the control plant. The economic analysis showed that higher net benefit and marginal rate of return were obtained from the application of 92 kg N ha−1, reflecting that it could be an optimum N for cassava yield in the study area.

Keywords: Cassava nitrogen potassium yield

Archives of Agronomy and Soil Science

DOI: https://doi.org/10.1080/03650340.2022.2146100

69(2023)

Pyrolytic synthesis and performance efficacy comparison of biochar-supported nanoscale zero-valent iron on soil polluted with toxic metals

Moses Akintayo Aborisade, Aixi Feng**, Belay Tafa Oba**[c], Akash Kumar, Ashenafi Yohannes Battamo, Menglu Huang,Daying Chen, Yongkui Yang, Peizhe Sun & Lin Zhao

[c] Colleage of Natural Science, Arba Minch University, Arba Minch Ethiopia.

Abstract

Toxic and hazardous metals such as cadmium (Cd) and Lead (Pb) can cause cancer in humans; hence, reducing their bioavailability in the soil is crucial for human health and environmental safety. In this study, biochar modified with nanoscale zero-valent iron (nZVI-BC) was synthesized from low-cost adsorbent waste materials and iron (iii) oxide (Fe2O3) via carbothermal reduction process for stabilization of Pb and Cd in the soil. Furthermore, an evaluation of treatment efficiency on exposure health hazards for both carcinogenic and non-carcinogenic risks was done. The results revealed that nZVI-modified eggshell biochar was able to reduce the concentration bioavailable of Pb and Cd in soil by (69–75%) and (62–65%), and reduce the toxicity leaching of Pb and Cd by (53–66%) and (68–75%), respectively. The treatments reduced carcinogenic risk (CR) and hazard index (HI) in children and adults by 35–47% for Pb and 25–36% for Cd, respectively. Hence, this study proposes a new way to reduce and modify environmental wastes to make nZVI-supported biochar that can remediate toxic metals from the soil, improve soil nutrients, reduce human exposure health risks, and enhance the environment's health.

Keywords: Remediation exposure risk environmental health toxic metals soil

Heliyon

DOI:https://doi.org/10.1016/j.heliyon.2023.e12955

9(2023)

Evaluation of climate change, urbanization, and low-impact development practices on urban flooding

Takele Sambeto Bibi [a], Kefale Gonfa Kara [b]

[a]Arba Minch University, Institute of Water Technology, Department of Water Supply and Sanitation Engineering, P.O.Box 21, Arba Minch, Ethiopia

Abstract

The Personal Computer Storm Water Management Model was used in this study to evaluate the potential impacts of climate change, urbanization, and low-impact developments (LIDs) on urban flooding in Robe town, Ethiopia. To achieve the objective, four scenarios were developed in order to simulate changes in peak runoff, inundated volume, and the performance of existing drainage systems. The findings revealed that as urbanization increased from 10% to 70%, the inundated volume of nodes and peak runoff increased from 35,418 to 52,118 × 103 m3 and 89.4–111.96 m3/s, respectively. Furthermore, the peak runoff in response to climate change is increased by 46.9%, 34.8%, and 37.5%, respectively, as a result of the Rossby Centre Regional Climate Model version 4 (RCA4), Regional Atmospheric Climate Model (RACMO22T), and the hydrostatic version of the regional model (REMO2009). Overall, the findings showed that existing drainage systems were unable to collect and convey the amplified inundation from different simulated scenarios, and the Welmel sub-city to roundabout was threatened by increased flooding, causing significant damage to properties and infrastructure. The implemented LIDs are capable of reducing the expected peak runoff, flooding magnitude, and flooded junctions in climate change and urbanization scenarios; however, combining both mitigation measures can further reduce the study area. The implementation of a mitigation strategy with adequate drainage systems will be required to mitigate the flooding risks in Robe town.

Keywords: Climate changeLow-impact developmentPCSWMMUrban floodingUrbanization

BioMed Research International

DOI: https://doi.org/10.1155/2023/9361075

2023(2023)

Incidence and Predictors of Pressure Ulcers among Adult Patients in Intensive Care Units at Arba Minch and Jinka Hospitals, Southern Ethiopia

Lankamo Ena Digesa [1] , Ararso Baru [1] , Alemayehu Shanko [2] , Mekidim Kassa [3] , Zeleke Aschalew [1] , Fikre Moga [1] , Bereket Beyene [1] , Tegegn Mulatu [1]

[1] School of Nursing, College of Medicine and Health Sciences, Arba Minch University, Ethiopia.
[2]School of Medicine, College of Medicine and Health Sciences, Arba Minch University, Ethiopia.
[3]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Ethiopia.

Abstract

Introduction. The incidence of a pressure ulcer in intensive care units (ICU) is significantly higher than in noncritical care settings. The patients in the ICU are the most vulnerable group to disruption of the skin's integrity. Prior studies in Ethiopia failed to evaluate pressure ulcers in intensive care units and were limited to general wards. The purpose of this study was to identify the incidence and predictors of pressure ulcers in adult patients admitted to intensive care units in Southern Ethiopia. Methods. A single-arm prospective open cohort of 216 patients was used to determine the presence of a pressure ulcer in the intensive care units from June 2021 to April 2022. A consecutive sampling was used until the sample size was reached. The data were collected using a structured questionnaire and analyzed using Stata 14. A cumulative incidence of a pressure ulcer was computed. The life table was used to estimate the cumulative survival. A multivariable Cox proportional hazard regression was used to identify independent predictors of a pressure ulcer. An adjusted hazard ratio with a 95% CI was used to measure the degree of association; a P value ≤ 0.05 was considered significant. Results. Twenty-five patients developed a pressure ulcer (PU), making a cumulative incidence of 11.57%. Out of 25 incident cases of pressure ulcers, four-fifths (80%) of the study patients developed PU within 6 days of their admission to the ICUs. The incidence rate was 32.98 PU per 1000 person-days of ICU stay. Pressure ulcers were most commonly found on the sacrum, followed by the shoulder. Among the incident cases, 52% were stage 2 ulcers. The presence of friction or shearing forces, as well as being 40 years of age or older, was independently associated with pressure ulcers. Conclusion. The overall cumulative incidence of the pressure ulcer was lower than that in other studies but occurred at a faster rate. Age (40 years of age or older) and the presence of friction or shearing forces were the main predictors of pressure ulcers in the intensive care units. Therefore, nurses working in ICUs should continually anticipate the risk of a pressure ulcer. Moreover, special attention should be given to patients of advanced ages. Furthermore, monitoring the installation of a mattress, keeping bed linens unwrinkled, and keeping patients in a proper position on a bed to prevent or reduce friction or shearing forces are very crucial in the prevention of pressure ulcers

Lecture Notes in Civil Engineering

DOI: http://dx.doi.org/10.1007/978-981-19-1862-9_6

256(2023)

Applications of Geospatial Technologies and Wetspass Model in Groundwater Recharge Estimation in Sana River Catchment, Kembata Tembaro Zone, Southern Ethiopia

Deginet Danebo[a], Abunu Atilebachew[b], Abel Abebe[a] & Muralitharan Jothimani[a]

[a] Department of Geology, Arba Minch University, Arba Minch, Ethiopia
[b] Faculty of Water Resources and Irrigation Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Estimating groundwater recharge is critical for water resource appraisal and management. In the present study WetSpass model and GIS tools were used to determine water balance components' temporal and spatial changes (surface runoff, actual evapotranspiration, and groundwater recharge) in the Sana watershed Kembata Tembaro Zone, Southern Ethiopia. In the current study, biophysical and hydro-meteorological parameters such as land use/cover, soil texture, elevation, and slope were included in the model. The data mentioned above sets were calibrated per the Wetspass model requirements. The spatial–temporal variation of the mean annual rainfall of 1358.6 mm was segmented into 20.6% (280 mm) of surface runoff (Qo), 59.76%(811.6 mm) of actual evapotranspiration, and 19.65% (267 mm) of water that annually recharges the groundwater system, according to the model results. The model's results show that the area's hydro-meteorological and biophysical variance controls the temporal and geographical variability of the catchment's water balance components. The current study provides policymakers and water resource experts with critical information on groundwater availability for sustainable development in the present study area.

Keywords: Ethiopia; Groundwater recharge; Kembata tembaro zone; Sana catchment; Wetspass model

Health Services Research and Managerial Epidemiology

DOI:https://doi.org/10.1177/23333928231166671

10(2023)

Minimum Dietary Diversity and Associated Factors Among Pregnant Women Living in Arba Minch Health and Demographic Surveillance Sites, Southern Ethiopia, 2022

Bezawit Afework Mesfin [1] , Abinet Teshome Argaw [2] , Firdawek Getahun Negash [3] , Dagninet Alelign Emiru [4] , Adisalem Damtei Aserese [5] , Girum Yihun Matebe [6]

[1]Department of Midwifery, Arba Minch University College of Medicine and Health Sciences, Ethiopia.
[2]Department of Biomedical Sciences, Arba Minch University College of Medicine and Health Sciences, Ethiopia.
[3]Department of Epidemiology, Arba Minch University College of Medicine and Health Sciences School of Public Health, Arba Minch, Ethiopia.
[4]Department of Medical Laboratory Science, Arba Minch University College of Medicine and Health Sciences, Ethiopia.
[5]School of Public Health Department of Human Nutrition, Arba Minch University College of Medicine and Health Sciences School of Public Health, Ethiopia.

Abstract

Background: Worldwide 1.2 billion women suffer from micronutrient deficiency. Feeding diversified foods during pregnancy prevents pregnancy complications such as severe anemia, low birth weight, and birth defects. However, the status of minimum dietary diversity and associated factors among pregnant women were not explored in the study area; therefore, this study was conducted at the Arba Minch Health and Demographic Surveillance Sites (AMHDSS).
Method: A community-based cross-sectional study was conducted from December 19, 2021, to October 30, 2022, on randomly selected 635 pregnant women. The data were collected through face-to-face interviews, and measurements of mid-upper arm circumference using a tablet; then exported to Statistical Package for Social Sciences version 25. Descriptive statistics were used to describe the characteristics of the study participants and presented by text, figures, and tables. Binary logistic regression was used to determine factors associated with pregnant women MDD-W. Independent variables with a P-value < .05 were considered as associated factors.
Findings: 98.2% of the pregnant women responded to this survey, more than half, (53.3%) of them achieved MDD-W, and 24.2% of the pregnant women were undernourished. The MDD-W was associated with household food security (AOR = 0.55, CI: .36, .83), meal frequency, (AOR = 1.62, CI: 1.1, 2.5), house ownership (AOR = 0.52, CI: .29, .9), ownership of banana farms (AOR = 1.7, CI: 1.02, 2.8), antenatal follow-up (ANC) (AOR = 1.9, CI: 1.1, 3.3), and occupational status (AOR = 6, CI: 2.1, 17.6).
Conclusion: The MDD-W outcome in this study was higher than that in other studies. The MDD-W is associated with, ANC follow-up, meal frequency, living in a food-secured household, ownership of a house, and pregnant women's merchant occupation. For optimal pregnancy outcomes; the AMHDSS and stakeholders might need to work in collaboration to increase ANC coverage and meal frequency for pregnant women. In addition, micronutrient supplementation, and increasing the availability/production capacity of food-insecure households are expected.

Keywords: minimum dietary diversity; pregnancy nutrition; pregnant woman.

JMIR Public Health and Surveillance

DOI:https://doi.org/10.2196/39744

9(2023)

Understanding Child Wasting in Ethiopia: Cross-sectional Analysis of 2019 Ethiopian Demographic and Health Survey Data Using Generalized Linear Latent and Mixed Models

Girma Gilano[1], Samuel Hailegebreal[1], Sewunet Sako[1], Firehiwot Haile[2] , Kasarto Gilano[3] , Binyam Tariku Seboka[4] , Kefita Kashala[5]

[1] Department of Health Informatics, School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Southern Nation Nationalities Peoples' Region, Arba Minch, Ethiopia
[2] Department of Public Health, School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Southern Nation Nationalities Peoples' Region, Arba Minch, Ethiopia

Abstract

Background: Wasting is an immediate, visible, and life-threatening form of undernutrition in children aged <5 years. Within a short time, wasting causes recurrent sickness, delayed physical and mental growth, impatience, poor feeding, and low body weight. The long-term consequences of wasting and undernutrition are stunting, inability to learn, poor health status, and poor work performance. Wasting remains a public health problem in Ethiopia. According to the World Health Organization, countries have to reduce undernutrition including child wasting to below 5% by 2025. Ethiopia is attempting to attain national and international targets of undernutrition while struggling with many problems. Objective: This study aimed to identify the prevalence and associated factors of wasting to provide information for further renewing policy commitments. Methods: We used community-based, cross-sectional data from the Ethiopian Mini Demographic and Health Survey. The survey was conducted in 9 regions and 2 city administrations. Two-stage cluster sampling was used to recruit study participants. In the first stage, enumerations areas were selected, and 28-35 households per enumeration area were selected in the second stage. Our analysis included 2016 women with children aged <5 years from the 2019 EMDHS data set. We dropped incomplete records and included all women who fulfilled the eligibility criteria. We used multilevel ordinal regression using Generalized Linear Latent and Mixed Models (GLLAMM) and predicted probability with log-likelihood ratio tests. Fulfilling the proportional odds model's assumption during the application of multilevel ordinary logistic regression was a cumbersome task. GLLAMM enabled us to perform the multilevel proportional odds model using an alternative method. Results: In our analysis, wasting was 7.68% (95% CI 6.56%-8.93%). Around 26.82% of mothers never used antenatal care for their current child. Most mothers (52.2%) did not have formal education, and 86.8% did not have postnatal care for their children. Additionally, half (50.93%) of the mothers have ≥6 household members. Wasting was associated with feeding diverse foods (coefficient 4.90, 95% CI 4.90-4.98), female sex of the household head (–40.40, 95% CI –40.41 to –40.32), home delivery (–35.51, 95% CI –35.55 to –35.47), first (16.66, 95% CI, 16.60-16.72) and second (16.65, 95% CI 16.60-16.70) birth order, female child (–12.65, 95% CI –12.69 to –12.62), and household size of 1 to 3 (10.86, 95% CI 10.80-10.92). Conclusions: According to the target set by World Health Organization for reducing undernutrition in children aged <5 years to below 5% by 2025, child wasting of 7.68% in Ethiopia should spark an immediate reaction from the government and stakeholders. Informed policy decisions, technology-based child-feeding education, and food self-sufficiency support could improve the current challenges. Additional effort is important to improve low maternal education, family planning, awareness of sex preferences, women empowerment, and maternal health services.

Reviews in Agricultural Science

DOI: http://dx.doi.org/10.7831/ras.11.0_36

11(2023)

Alternative Techniques of Irrigation Water Management for Improving Crop Water Productivity

Ligalem Agegn Asres

Faculty of Water Resources and Irrigation Engineering, Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

The pressure on water resources is due to different factors that affect agricultural development for food security. Large agricultural lands are not irrigated because of limited water resources and poor irrigation water management. This results in poor crop water productivity. Therefore, this paper focused on finding alternative techniques of irrigation water management to solve the problems of poor irrigation water management for crop water productivity for diverse crop species. Although there are different options for saving and managing irrigation water to improve crop water productivity, deficit irrigation in different mechanisms, drip irrigation, pitcher irrigation and surface mulch were some of the innovative techniques of irrigation water management. Accordingly, stage-wise deficit irrigation was better than deficit irrigation throughout the growing season for improving yield productivity. Considering the furrow irrigation system, alternate furrow irrigation is better to save water and improve crop water productivity than fixed furrow irrigation. On the other hand, drip irrigation is better performed to improve crop water productivity than conventional irrigation systems. Furthermore, pitcher irrigation system and deficit irrigation with mulch had better performance than conventional furrow irrigation to save irrigation water and improve crop water productivity. Therefore, the alternative techniques of irrigation water management to improve crop water productivity are the best option for food security in areas of water scarcity. Particularly, deficit irrigation, alternate irrigation, drip irrigation with mulching and pitcher irrigation are alternatively recommended for implementation in the areas of water scarcity for sustainable development.

Keywords: alternative techniques; crop water productivity; deficit irrigation; irrigation water management; water saved

SAGE Open Medicine

DOI: https://doi.org/10.1177/20503121221150104

(2023)

Prevalence of inappropriate drug dose adjustment and associated factors among inpatients with renal impairment in Africa: A systematic review and meta-analysis

Debalke Dale [1], Getahun Asmamaw [1], Teshale Etiso [1], Zebenay Bussa [1]

[1]Department of Pharmacy, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Objective: There is a high prevalence of inadequate dose adjustment among inpatients with renal insufficiency worldwide. There is, however, a paucity of studies that summarizes the topic in the African context. Therefore, this study aims to summarize the prevalence of inappropriate drug dose adjustment (IDDA) and associated factors among inpatients with renal impairment in Africa. Methods: A literature search for English-language articles was conducted using reputable databases such as PubMed/MEDLINE, Google Scholar, and Science Direct. The search was carried out between 3 February and 3 March of 2022. All published articles that were online at the time of data collection were considered. Observational studies that examined the prevalence of IDDA for any type of drug in renal impairment as a primary or secondary outcome were included in our analysis. Statistical software such as Open Meta Analyst and Review Manager were used to examine outcome measures. I^2 statistics, Logit event rate, and Der Simonian and Laird's random effect models were also used. Results: Seven articles were qualified for the systematic review and meta-analysis. All included studies comprised a total of 1918 patients. A total of 5072 prescriptions were assessed, and 1879 (37%) of them had at least one drug that required a dose adjustment. The pooled prevalence of IDDA among adult patients with renal impairment was 13.7% (95% confidence interval (CI) = 7.9%–19.5%) in Africa. Based on the number of prescriptions containing medications that required dose adjustment, the pooled prevalence accounts for 39.3% (95% CI = 24.1%–54.4%) (932/1879). Factors associated with inappropriate drug prescribing and usage concerning renal function were the number/types of prescribed medicines (most common), age, stage of renal impairment, comorbidity, and unemployment. Conclusions: In this study, IDDA practice appears to be a common challenge among inpatients with renal insufficiency in Africa. The number and type of medications prescribed, age, stage of renal impairment, comorbidity, and unemployment were factors associated with inappropriate drug prescribing and use. In addition to expanding such studies, hospitals across Africa must conduct research on the clinical outcomes of IDDA practices in patients with renal impairment.

Keywords: Africa; drug dose adjustment; inappropriate prescribing; renal impairment

Engineering Review

DOI: http://dx.doi.org/10.30765/er.1900

42(2023)

An energy efficient coverage guaranteed greedy algorithm for wireless sensor networks lifetime enhancement

Berhan Oumer Adame[1]*, Eyayaw Zewdu [1], Ayodeji Olalekan Salau [2, 3]

[1]Department of Electrical and Computer Engineering, Arba Minch Institute of Technology, Arba Minch University, Arba Minch, Ethiopia

Abstract

One of the most significant difficulties in Wireless Sensor Networks (WSNs) is energy efficiency, as they rely on minuscule batteries that cannot be replaced or recharged. In battery-operated networks, energy must be used efficiently. Network lifetime is an important metric for battery-powered networks. There are several approaches to improve network lifetime, such as data aggregation, clustering, topology, scheduling, rate allocation, routing, and mobile relay. Therefore, in this paper, the authors present a method that aims to improve the lifetime of WSN nodes using a greedy algorithm. The proposed Greedy Algorithm method is used to extend the network lifetime by dividing the sensors into a number of disjoint groups while satisfying the coverage requirements. The proposed Greedy algorithm has improved the network lifetime compared to heuristic algorithms. The method was able to generate a larger number of disjoint groups.

Fermentation

DOI: https://doi.org/10.3390/fermentation9030258

9(2023)

Antibacterial and Immunostimulatory Activity of Potential Probiotic Lactic Acid Bacteria Isolated from Ethiopian Fermented Dairy Products

Seyoum Gizachew [1], Wannes Van Beeck [2] , Irina Spacova [2] , Max Dekeukeleire [2] , Ashenafi Alemu [3] , Wude Mihret Woldemedhin [3] , Solomon H. Mariam [4] , Sarah Lebeer [2],* **and Ephrem Engidawork [1],***

[1]Pharmacy Doctor of Philosophy Arba Minch University

Abstract

Lactic acid bacteria (LAB) form a group of bacteria to which most probiotics belong and are commonly found in fermented dairy products. Fermented foods and beverages are foods made through desired microbial growth and enzymatic conversions of food components. In this study, 43 LAB were isolated from Ethiopian traditional cottage cheese, cheese, and yogurt and evaluated for their functional and safety properties as candidate probiotics. Twenty-seven isolates, representative of each fermented food type, were selected and identified to the species level. Limosilactobacillus fermentum was found to be the predominant species in all samples studied (70.4%), while 11.1% of isolates were identified as Lactiplantibacillus plantarum. All 27 isolates tested showed resistance to 0.5% bile salt, while 26 strains were resistant to pH 3. The LAB isolates were also evaluated for antagonistic properties against key pathogens, with strain-specific features observed for their antimicrobial activity. Five strains from cottage cheese (Lactiplantibacillus plantarum 54B, 54C, and 55A, Lactiplantibacillus pentosus 55B, and Pediococcus pentosaceus 95E) showed inhibitory activity against indicator pathogens that are key causes of gastrointestinal infections in Ethiopia, i.e., Escherichia coli, Salmonella enterica subsp. enterica var. Typhimurium, Staphylococcus aureus, Shigella flexneri, and Listeria monocytogenes. Strain-specific immunomodulatory activity monitored as nuclear factor kappa B (NF-κB) and interferon regulatory factor (IRF) activation was documented for Lactiplantibacillus plantarum 54B, 55A and P. pentosaceus 95E. Antibiotic susceptibility testing confirmed that all LAB isolates were safe concerning their antibiotic resistance profiles. Five isolates (especially Lactiplantibacillus plantarum 54B, 54C, and 55A, Lactiplantibacillus pentosus 55B, and P. pentosaceus 95E) showed promising results in all assays and are novel probiotic candidates of interest for clinical trial follow-up.

Keywords: traditional fermented dairy products; lactic acid bacteria; antimicrobial activity; NF-κB; interferon regulatory factors; probiotics; Ethiopia

IET Communications

DOI: https://doi.org/10.1049/cmu2.12538

17(2023)

Aspect-based sentiment analysis employing linguistics content over social media for Web of Things

Latika Jindal[1], Sumit Kumar[2], Chetna Kaushal[3], Manisha Bhende[4], Anuradha Thakare[5], and **Mohammad Shabaz[6]**

[6]Hydraulic and Water Resources Engineering Arba Minch UniversityArba Minch Ethiopia

Abstract

The above article from IET Communications, published online on 12 November 2022 in Wiley Online Library (wileyonlinelibrary.com), has been retracted by agreement between the Interim Editor-in-Chief, Jian Ren, the Institution of Engineering and Technology (the IET) and John Wiley and Sons Ltd. This article was published as part of a Guest Edited special issue. Following an investigation, the IET and the journal have determined that the article was not reviewed in line with the journal's peer review standards and there is evidence that the peer review process of the special issue underwent systematic manipulation. Accordingly, we cannot vouch for the integrity or reliability of the content. As such we have taken the decision to retract the article. The authors have been informed of the decision to retract.

Nutrition, Metabolism and Cardiovascular Diseases

DOI: https://doi.org/10.1016/j.numecd.2023.07.040

34(2023)

Association between urbanization and metabolic syndrome in low- and middle-income countries: A systematic review and meta-analysis

Phenias Nsabimana [1], Olivier O Sombié [2], Nele S Pauwels [3], **Wanzahun Godana Boynito [4]**, **Eshetu Zerihun Tariku [4]**, Hilda Vasanthakaalam [5], Stefaan De Henauw [6], Souheila Abbeddou [6]

[4]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Aims: The prevalence of metabolic syndrome (MetS) is on the rise in an increasingly urbanized world. The study aimed to review the association between urbanization and MetS in low- and middle-income countries (LMICs).

Data synthesis: A comprehensive search of five databases (MEDLINE, Web of Science, Scopus, EMBASE, and CENTRAL) was performed in January 2022 and updated in October 2022. Peer-reviewed studies that met the eligibility selection criteria were included. Search terms were used for the main concepts which are MetS, dietary patterns, and urbanization in LMICs. Study selection was done in two stages and in duplicate. Random effects models were used to calculate the overall pooled prevalence and main study-level characteristics. Out of 9,773 identified studies, nineteen were included in the systematic review and meta-analysis. The studies were done on 313,644 participants (149,616 urban and 164,028 rural). The pooled risk ratio (RR, 95% confidence interval) of MetS between urban and rural dwellers was RR = 1.24; 95%CI [1.15, 1.34] (I^2 = 96.0%, P < 0.0001). A relatively higher prevalence of MetS among urban than rural residents has been observed, especially with the International Diabetes Federation criteria (RR = 1.54; 95%CI [1.21, 1.96]; I^2 = 65.0%), and in the population in India (RR = 2.19; 95%CI = 1.24, 3.88, I^2 = 85%). Overall, the role of dietary patterns in the development of MetS was inconsistent, and few studies showed a lower risk of MetS with adherence to recommended healthy dietary patterns.

Conclusions: There was an association between urbanization and the high prevalence of MetS. Interventions and policies to reduce the risk of MetS are needed.

Keywords: Dietary pattern; Low- and middle-income countries; Metabolic syndrome; Nutrition transition; Urbanization.

Scientific reports

DOI: https://doi.org/10.1038/s41598-023-40386-0

13(2023)

Author Correction: Genetic structure analysis and identifying key founder inbred lines in diverse elite sub-tropical maize inbred lines

Melaku Gedil [1], Abdoul-Raouf Sayadi Maazou [2 3], **Degife A Zebire [2 4]**, Ana Luísa Garcia-Oliveira [5 6], Nnanna Unachukwu [7], César Petroli [8], Sarah Hearne [8], Leslie A Everett [9], Soon-Kwon Kim [10 11], Abebe Menkir [2]

[4]Department of Plant Science, College of Agricultural Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Understanding the genetic relationships between the key founder inbred lines and derived inbred lines could provide insight into the breeding history and the structure of genetic diversity of the available elite inbred lines with desirable target traits. The maize improvement program at the International Institute of Tropical Agriculture (IITA) analyzed the pedigree information of 623 sub-tropical maize inbred lines generated at the IITA maize breeding program to identify the key founder inbred lines. We also used 5032 SNP markers to assess the genetic similarities of the founder inbred lines with their progenies subsequently developed for specific target traits. The results of pedigree analysis and SNP markers-based similarity scores identified 20 key founder inbred lines with significant contributions to the development of drought tolerant, early maturing, productive, *Striga* resistant, provitamin A enriched, and quality protein maize inbred lines. In our breeding program, line TZMi501 belonging to a flint heterotic group (HGA), and TZMi407-S and TZMi214, representing the dent heterotic group (HGB), were identified as the most useful founder inbred lines. The 623 inbred lines were consistently separated into four clusters based on Ward's hierarchical clustering, structure, and principal component analyses, with the 20 founder inbred lines spread into all clusters. The founder inbred lines were more genetically related to the productive inbred lines but showed genetic divergence from the provitamin A enriched inbred lines. These results provide a better understanding of the breeding history of the sub-tropical maize inbred lines to facilitate parental selection aligned to existing heterotic groups for use in breeding programs targeting the improvement of essential traits in maize.

Health & Social Care in the Community

DOI: https://doi.org/10.1155/2023/2577721

2023(2023)

Awareness, Willingness to Join, and Affordability of Social Health Insurance among Public Employees in Arba Minch Town, South Ethiopia

Bahiru Mulatu Kebede [1], Muluken Bafa Bassa [2], Mintesinot Melka Gujo[3], Alemayehu Desalegn Hailu[4,5], Anagaw Derseh Mebratie[6], Markos Manote Domba[7], **Aleme Mekuria Belachew**[1] and Berhane Tassew Woldehanna[6]

[1]Nursing Department, Arba Minch College of Health Sciences, SNNPR, Arba Minch, Ethiopia

Abstract

Background. As part of the efforts being made to achieve universal health coverage, Ethiopia plans to introduce a social health insurance scheme for the formal sector. Although the contribution will be collected as 3% of an employee's gross salary from both the employee and employer, there is a concern that the premium may not be affordable for the majority of civil servants and that there could be limited interest in joining the scheme. As a result, the purpose of this study was to assess public servants' awareness, willingness to join, and affordability of social health insurance in Arba Minch, south Ethiopia. Methods and Materials. A cross-sectional study design was used with 713 randomly chosen public employees from Arba Minch town from January 1 to 30, 2019. The survey participants were selected based on a multistage stratified random sampling method. Descriptive statistics were used to summarize awareness and affordability of the scheme, and both bivariate and multivariable logistic regressions were used to examine factors driving the outcome variables. Variables that had a p value of less than 0.25 in bivariate analysis were changed to multivariate analysis, and a p value of less than 0.05 was cutoff point for multivariate analysis. The odds ratio and 95% CI were used to report the findings. Result. In this study, 692 people voluntarily participated, which corresponds to a response rate of 97%. As the results revealed, 347 (50.1%) respondents had never heard of SHI before, 607 (87.7%) were able to afford the 3% of gross salary per month as a scheme premium, and 254 (36.7%) were willing to join the scheme. Working sector, regularly listening for health information through mass media, and social network participation were significantly associated with awareness of the SHI scheme. Also, educational status, family size, and net income were found to be significant factors associated with the affordability of the SHI scheme. On the other hand, awareness of SHI, family size, regularly listening for health information, and participation in social networks were significantly associated with willingness to join SHI during multivariate analysis. Conclusion. Half of the participants were unaware of social health insurance, suggesting that the program is not well known. Although only one-third of respondents were willing to join and pay for the program, the majority were able to afford the proposed contribution of 3% of gross wages per month.

Journal of Applied Microbiology

DOI: https://doi.org/10.1093/jambio/lxad237

134(2023)

Characterization of potential probiotic starter cultures of lactic acid bacteria isolated from Ethiopian fermented cereal beverages, Naaqe, and Cheka

Seyoum Gizachew [1 2], Wannes Van Beeck [2], Irina Spacova [2], Max Dekeukeleire [2], Ashenafi Alemu [3], Wude Mihret [3], Sarah Lebeer [2], **Ephrem Engidawork** [1]

[1]Pharmacy Doctor of Philosophy Arba Minch University

Abstract

Aims: To test the in vitro probiotic potential and starter culture capacity of lactic acid bacteria (LAB) isolated from Naaqe and Cheka, cereal-based Ethiopian traditional fermented beverages.

Methods and results: A total of 44 strains were isolated from spontaneously fermented Ethiopian cereal-based beverages, Naaqe and Cheka with 24 putatively identified as LAB and 14 identified up to the species level. The species Limosilactobacillus fermentum (6/12; 50%) and Weissella confusa (5/12, 41.67%) were the predominant species identified from Naaqe, while the two Cheka isolates were L. fermentum and Pediococcus pentosaceus. Six LAB strains inhibited eight of the nine gastrointestinal indicator key pathogens in Ethiopia, including Escherichia coli, Salmonella enterica subsp. enterica var. Typhimurium, Staphylococcus aureus, Shigella flexneri, and Listeria monocytogenes. Three of the LAB isolates exhibited strain-specific immunostimulation in human monocytes. Based on these probiotic properties and growth, six strains were selected for in situ evaluation in a mock fermentation of Naaqe and Cheka. During primary fermentations, L. fermentum 73B, P. pentosaceus 74D, L. fermentum 44B, W. confusa 44D, L. fermentum 82C, and Weissella cibaria 83E and their combinations demonstrated higher pH-lowering properties and colony-forming unit counts compared to the control spontaneous fermentation. The same pattern was also observed in the secondary mock fermentation by the Naaqe LAB isolates.

Conclusions: In this study, we selected six LAB strains with antipathogenic, immunostimulatory, and starter culture potentials that can be used as autochthonous probiotic starters for Naaqe and Cheka fermentations once their health benefit is ascertained in a clinical trial as a next step.

Keywords: Cheka; Naaqe; antimicrobial activity; lactic acid bacteria; nuclear factor kappa B; probiotic starter cultures; traditional cereal beverages.

Pediatric Health, Medicine and Therapeutics

DOI: https://doi.org/10.2147/phmt.s436022

14(2023)

Clinical Characteristics, Treatment Outcome and Associated Factors of Epilepsy Among Children at Hospitals of North-West Ethiopia

Mohammed Nasir [1], Ermias Abebaw [2], **Muluken Ahmed [3]**, Daniel Bekele Ketema [4]

[3]Pediatrics Department, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Epilepsy is an important cause of neurological morbidity in children and adolescents. Clinical parameters are the main diagnostic tools, especially in developing countries. Although cost-effective treatments for epilepsy are available, studies have shown that uncontrolled seizures can occur in many patients.

Objective: To assess clinical characteristics, treatment outcomes, and associated factors for controlled epilepsy among children with epilepsy who underwent follow-up at the Debre Markos Comprehensive Specialized Hospital, North-west Ethiopia from October 28, 2020, to April 28, 2021.

Methods: An institutional-based retrospective cohort study was conducted from October 28, 2020, to April 28, 2021. A total of 385 participants who fulfilled the inclusion criteria were included in the study. A pretested, structured, interviewer-administered questionnaire with a chart review was used to collect data. The data were entered into the Epi-data software version 4.4.2.1 and then exported to the Stata version 14 statistical package for analysis. Descriptive statistics were used to describe the sociodemographic and clinical characteristics, treatment profiles, and treatment outcomes of patients with epilepsy. Bivariate and multivariate analyses were used to identify factors associated with treatment outcomes.

Results: The most frequent type of seizure among the 385 respondents was Generalized-tonic-clonic seizures (88.1%). The proximate cause of seizures was identified in 15% of patients, of whom 45 had a perinatal history (8.8%), head injury (3.6%), and CNS infection (2.3%). One-third of patients had poor seizure control. Caregiver relationship (father AOR=0.58; 95th CI:0.35,0.97) and poor adherence (AOR=2.97; 95th CI:1.82, 4.86) were significantly associated with treatment outcome.

Conclusion: One-third of children with epilepsy have poor seizure control. Poor adherence to treatment is implicated in poor control. Counseling caregivers on proper treatment and adherence to anti-epileptic medication is recommended to improve treatment outcome in children.

Keywords: Ethiopia; children; epilepsy; seizure; treatment outcome.

Condensed Matter Physics

DOI: http://dx.doi.org/10.48550/arXiv.2305.15954

26(2023)

Computational study of structural, elastic, electronic, phonon dispersion relation and thermodynamic properties of orthorhombic CaZrS3 for optoelectronic applications

Mulugetta Duressa Kassa[1], Menberu Mengesha Woldemariam[2], Nebiyu Gemechu Debelo[3]

[1]Arba Minch University · Department of Physics

Abstract

Chalcogenide perovskites offer superior thermal and aqueous stability as well as a benign elemental composition compared to organic halide perovskites for optoelectronic applications. In this study, the structural, electrical, elastic, phonon dispersion, and thermodynamic features of the orthorhombic phase of chalcogenide perovskite CaZrS3 (space group Pnma) were examined by first principles calculations utilizing the plane wave pseudopotentials (PW-PPs) in generalized gradient approximations (GGA). The ground state properties such as lattice parameters, unit cell volume, bulk modulus, and its derivative were calculated and are in a good agreement with existing findings. The mechanical properties such as bulk modulus, shear modulus, Young's modulus and elastic anisotropy were calculated from the obtained elastic constants. The ratio of bulk modulus to shear modulus confirms that the orthorhombic phase of CaZrS3 is a ductile material. The absence of negative frequencies in phonon dispersion curve and the phonon density of states give an indication that the structure is dynamically stable. Finally, thermodynamic parameters such as free energy, entropy, and heat capacity were calculated with variation in temperature. The estimated findings follow the same pattern as previous efforts.

Health Care for Women International

DOI: https://doi.org/10.1080/07399332.2022.2161549

45(2023)

Dangers associated with assuming robustness of scale reliability and validity: Psychometric properties of the Barkin Index of Maternal Functioning with Ethiopian mothers

Selamawit Gebeyehu [1], Yordanos Gizachew Yeshitila [2], Yilma Chisha [1], Be'emnet Tekabe [1], Robert Trevethan [3]

[1]School of Public Health, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia.
[2]School of Nursing, College of Medicine and Health Science, Arba Minch University, Arba Minch, Ethiopia.

Abstract

This study was conducted to assess the psychometric properties of the Barkin Index of Maternal Functioning (BIMF) in an Ethiopian context. Data were obtained from 202 women with a child less than 1 year of age. Narrow standard deviations characterized responses to most BIMF items, but a handful of items had wider standard deviations associated with bimodality. Most interitem correlations were < |.15|, and 13 of the 20 BIMF items did not load satisfactorily on any factor in exploratory factor analyses. Two factors emerged from the remaining items, one with three items and the other with four. Although poor reliability results relating to internal (interitem) and temporal consistency could be attributed to limited variability in the data, a number of concerns are raised about the BIMF itself, including its content validity, instructions, response options, and usefulness in healthcare settings. Suggestions are made for improving the assessment of maternal functioning in Ethiopia and other contexts. More generally, this research demonstrates that researchers should not assume that the psychometric properties and appropriateness of scales will remain robust when those scales are used in contexts that differ from the contexts in which they were created.

AIP Advances

DOI: https://doi.org/10.1063/5.0133408

13(2023)

Density functional theory study of $Zn_{(1-x)}Fe_xSe$: Electronic structure, phonon, and magnetic properties

Kunsa Haho Habura[1], Mesfin Asfaw Afrassa[2], Fekadu Gashaw Hone[3]

[1]Arba Minch University

Abstract

In this article, density functional theory is used to explore the electronic structure, phonon, and magnetic properties of Zn(1−x)FexSe (for x = 0%, 6.25%, 12.5%, 25%, and 50%). The electronic structure, phonon properties, and magnetic properties of the systems were examined using the generalized gradient approximation (GGA) and with Hubbard correction (GGA + U), where U is a Hubbard parameter. The calculated lattice parameter is 5.65 Å, which is quite close to the experimental lattice parameter of ZnSe, 5.66 Å. In this study, the GGA+U provides a better bandgap approximation (Eg = 1.3708 eV) than the GGA (Eg = 1.229 eV), which is consistent with experimental results and values previously reported. According to our results, the iron-doped zinc selenide exhibits antiferromagnetic coupling for a percentage of substitution greater than 12.5%. In addition, for an iron substitution of 12.5% with the distance between dopant atoms exceeding 5.6364 Å, it tends to exhibit ferromagnetic properties. Therefore, the iron-doped zinc selenide manifests the dilute magnetic semiconductor and can be considered to enhance its applications in the field of spintronics and magneto-optical devices based on further experimental results.

Veterinary Medicine: Research and Reports

DOI: https://doi.org/10.2147/vmrr.s389738

14(2023)

Detection of Antibodies Against Brucellosis and Associated Risk Factors in Cross Breed Dairy Cattle in Smallholder Farmers, Southern Ethiopia

Mesfin Shurbe [1], Abreham Wondimu [1], Nebiyu Eshetu [1], Wasihun Seyoum [1], Ephrem Tora [1], Bekahegn Simeon [1], Tesfaye Rufael [2], Melaku Sombo [2]

[1]Department of Animal Science, College of Agriculture Sciences, Livestock and Fishery Research Center, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: A cross-sectional study was conducted in selected districts of Gamo zone, southern Ethiopia over a period of November 2019 and September 2020 to estimate seroprevalence and associated risk factors and assess knowledge and practices of smallholder farmers about bovine brucellosis. Two districts and four kebeles from each district were purposively selected, and individual animals were sampled using a simple random sampling technique. A total of 384 sera samples were collected, and concurrently, 236 dairy cattle owners were interviewed. The samples were tested for antibodies against *Brucella* using both Rose Bengal Plate test and Complement Fixation test following OIE standard protocol. Risk factors associated with bovine brucellosis were analyzed using univariate and multivariate logistic regressions.

Results: The survey result has shown that 95% and 97% of the small holder farmers did not know the cause and symptoms of bovine brucellosis, respectively, and the majority have engaged in risky practices. Eight (2.08%) of the collected serum samples were positive with screening test (RBT) and only six (1.5%) were positive with confirmatory test (CFT). Multivariable logistic regression analysis showed a statistically significant association between herd sizes and the disease. The seropositivity of the disease is higher in small-sized herds followed by medium-sized herds.

Conclusion: The seroprevalence of bovine brucellosis was found to be at a low percentage with confirmatory tests even if there was a presence of associated risk factors for the disease in the study area. Again, the results suggest that smallholder farmers have poor knowledge and risky practices, which expose them to the disease. Awareness creation about the disease is of paramount importance even if the prevalence was low in this serological study. The implementation of a test and slaughter program before the disease becomes widespread, along with the testing of new stock before introduction to the farms is recommended.

Keywords: brucellosis; seroprevalence.

Transnational Corporations Review

DOI: https://doi.org/10.1016/j.tncr.2023.100006

15(2023)

Determinants of foreign direct investments inflows into developing countries

Ezo Emako[1], Seid Nuru[1] and Mesfin Menza[1]

[1]Economics Department, Arba Minch University, Arba Minch, Ethiopia

Abstract

FDI in developing countries remains weak. However, FDI can play an important role in the development of these countries which often have a low level of investment. Therefore, the objective of this study is to identify the factors that affect FDI inflows into developing countries. We used the Driscoll and Kraay model and Factor Analysis for a panel of 53 developing countries from 1996 to 2019 to achieve this aim. The findings reveal that FDI inflows into developing countries are primarily affected by institutional quality. Political stability and regulatory quality are two institutional elements that have a favourable and large effect on FDI inflows into developing countries, but Voice and Accountability have a negative and significant effect. To attract more FDI, developing countries should invest heavily in infrastructure and ensure political stability with an effective legal system, and enact language policies that allow one or two foreign languages to be officially recognised.

Keywords: Determinants; developing countries; foreign direct investment; inflows; institutions

Applied and Environmental Soil Science

DOI: https://doi.org/10.1155/2021/5510587

2021(2023)

Effectiveness of Community-Based Soil and Water Conservation in Improving Soil Property in Damota Area, Southern Ethiopia

Mamush Masha[1], **Teshome Yirgu[2], Mulugeta Debele[2]**, Mengie Belayneh[1]

[2]Department of Geography and Environmental Studies, Arba Minch University, Arba Minch, Ethiopia

Abstract

Soil and water conservation (SWC) is being advocated as an integral part of agricultural land management as it not only controls/minimizes soil erosion but also restores/rehabilitates the degraded lands. The purpose of this study was to evaluate the impact of soil and water conservation practices in improving soil fertility in the agricultural landscapes of the Damota area, southern Ethiopia. Forty-eight soil samples (both disturbed and core samples) were collected from the conserved and adjacent nonconserved plots. The significance analysis test was performed using analysis of variance. The result of the study showed that higher mean values of soil physicochemical properties were observed in the conserved plot than its nonconserved counterpart. The mean differences of organic carbon, total nitrogen, cation exchange capacity, and exchangeable K^+ and Ca^{2+} between conserved and nonconserved plots were statistically significant at the $P < 0.01$ level. Besides, available phosphorous and bulk density were significant at $P < 0.05$, but the effect of SWC practices was not found significant on soil texture, soil pH, and exchangeable Na^+ and Mg^{2+} content of the soil in the Damota area. Community-based soil and water conservation practices have improved the soil fertility in agricultural landscapes, although significant results have been observed in some fertility indicators. Therefore, strengthening the implementation of conservation measures by participating in all stakeholders is recommended. Supporting physical structures by agronomic and vegetative measures and continued maintenance can bring better results.

The American Journal of Clinical Nutrition

DOI: https://doi.org/10.1016/j.ajcnut.2023.11.005

119(2023)

Effectiveness of intermittent iron and high-dose vitamin A supplementation on cognitive development of school children in southern Ethiopia: a randomized placebo-controlled trial

Befikadu Tariku Gutema[1], Bruno Levecke [2], **Muluken Bekele Sorrie**[1], **Nega Degefa Megersa** [4], **Tadiwos Hailu Zewdie** [5], **Gesila Endashaw Yesera** [4], Stefaan De Henauw [6], Amina Abubakar [7],Souheila Abbeddou [6]

[1]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch,
[4]School of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[5]School of Medicine, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Iron is an essential mineral whose deficiency results in cognitive alteration, impaired emotional behaviors, and altered myelination and neurotransmission. In animal models, it has been shown that vitamin A (VA) could affect cognition.

Objectives: The study aimed to evaluate the effectiveness of intermittent iron and VA supplementation on cognitive development of schoolchildren, and to assess the interaction between these supplementations.

Methods: Considering a 2 × 2 factorial design, 504 children were randomly assigned to 1 of the 4 arms: placebo VA and placebo iron supplement; high-dose vitamin VA and placebo iron supplement; iron supplement and placebo VA; and iron and high-dose vitamin VA supplements. Cognitive development was assessed using Raven's Coloured Progressive Matrices, digit span, Tower of London, and visual search tasks.

Results: The mean [± standard deviation (SD)] age of the enrolled children was 9.6 (±1.6) y. One-fifth of the children had iron deficiency or anemia, whereas 2.9%, 3.9%, and 12.1% of children had low iron stores, iron deficiency anemia, and VA deficiency, respectively. Intermittent iron supplementation did not result in any significant improvement of children's cognitive development and had a negative effect on the performance index of the visual search task compared with placebo (-0.17 SD, 95% confidence interval: -0.32, -0.02). Effects were evident among children with stunting, thinness, or children coming from under stimulating home environments. High-dose VA supplementation resulted in a significant improvement of digit span z-score with a mean difference of 0.30 SD (95% confidence interval: 0.14, 0.46) compared with placebo VA. VA had a more beneficial impact for girls, children infected with helminths, and those from food secure households.

Conclusion: In a population where the prevalence of iron deficiency is low, intermittent iron supplementation did not have any or negative effect on the child's cognitive development outcomes. Conversely, VA supplementation improved the child's working memory.

Keywords: cognitive development; iron supplementation; schoolchildren; vitamin A supplementation.

Human Behavior and Emerging Technologies

DOI: https://doi.org/10.1155/2024/2158432

2024(2023)

Effects of video-based health education on birth outcomes and anemia status of mothers in Dirashe District South Ethiopia: cluster randomized controlled trial

Wanzahun Godana Boynito[1], Ousmane Diongue[2], **Kidus Temesgen**[1], **Yordanos Gizachew Yeshitila**[3], **Godana Yaya Tessema**[4], Marielle De Souza[2], Stefaan De Henauw[5], **Adama Diouf**[2], Souheila Abbeddou[5]

[1]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[3]School of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[4]Department of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia

Abstract

Background: Exclusive breastfeeding (EBF) of infants during the first 6 months of their life is strongly recommended. Video-based communication is an innovative method that could promote EBF. The present study is aimed at assessing the effectiveness of video-based intervention in promoting breastfeeding practices from birth to 6 months postpartum. This was evaluated through maternal reports, as well as EBF of infants at 3 and 5 months of age, using the deuterium oxide dose-to-mother (DTM) technique. **Methods:** In a cluster randomized community trial, 16 communities were assigned to receive a video-based behavior change communication (Video-Health) or standard health care messages (Control). Pregnant women in their first trimester (12 ± 2 weeks) were enrolled and followed up, together with their infants, until 6 months postpartum. Data on breastfeeding practices were collected by questionnaire, monthly, in all the participants (n = 508). Human milk intake (HMI) and nonmilk oral intake (NMOI) were measured in a subsample of 60 mother–infant pairs at 3 and 5 months postpartum using DTM. Mixed models and logistic regression were used to examine the difference in continuous and discrete breastmilk practices between the intervention and the control arms, respectively. **Results:** The majority of mothers initiated breastfeeding early (92.1%), 82.4% reported colostrum feeding, and 17.5% provided prelacteal feeding. No significant differences were found between Video-Health and Control arms ($p > 0.05$). The intervention significantly improved reported EBF rates at 4 and 5 months postpartum ($p < 0.05$). DTM results showed that the proportion of women practicing EBF was 50%–67% less than reported at 3 months for both arms and at 5 months in the intervention arm. The intervention did not significantly affect measured EBF at 3 and 5 months postpartum but did improve HMI at 3 months. Non significant differences in NMOI were observed at 3 months, but at 5 months, there was a significant difference between the study arms.

Conclusions: Video-based behavior change communication did not result in significant improvements in reported breastfeeding practices, except for a higher reported adherence to EBF beyond 3 months. Additionally, the intervention had no effect on EBF as measured by the DTM. Early introduction of non-breastmilk foods and liquids persisted, despite self-reported EBF extending up to 6 months postpartum.

Food Science & Nutrition

DOI: https://doi.org/10.1002/fsn3.3760

12(2023)

Enhancement of nutritional quality and shelf life of fish products (powder & chapatti) via fortifying with orange-fleshed sweet potato

Habtamu Birhanu Mekonnen [1], Tewodros Birhanu Aychiluhm [1]

[1]Department of Chemistry (Food and Sugar Technology Stream), College of Natural and Computational Sciences Arba Minch University Arba Minch Ethiopia.

Abstract

Despite its high protein, fat, and mineral contents, fish contains trace amounts of carbohydrates and vitamins, notably vitamin A. The perishable nature of fresh fish makes it challenging to store for a prolonged time, necessitating the use of additives to enhance its shelf life, nutritional, and other quality aspects. Sweet potatoes are the preferred option to blend with fish due to their cost and abundance. This study aims to prepare fortified fish powder and make food products (chapatti) using it. Fish powder and sweet potato powder were prepared by drying them in an oven at 60°C and 45°C, respectively. The two dried samples were then ground and mixed in various ratios, followed by analyzing their nutritional and other parameters using standard methods. Vitamin A and beta-carotene levels were analyzed using HPLC and UV-Vis spectroscopy techniques, respectively. The findings indicated that the outcomes displayed enhanced nutrition and extended storage capacity. The amount of beta-carotene (876.12 ± 14.76 to 3182.4 ± 123.1 μg/100 g) and carbohydrates (4.49 ± 1.02 to 52.31 ± 0.21) increased. The packed fortified flour is safe for human consumption for up to 90 days, as per the International Commission for Microbiological Specifications for Foods. The chapatti made from fortified flour was also deemed acceptable by the panelists.

Keywords: beta-carotene; chapatti; fish powder; fortification; sweet potato.

Annals of Medicine and Surgery

DOI: https://doi.org/10.1097/ms9.0000000000001291

12(2023)

Evidence-based management of adult traumatic brain injury with raised intracranial pressure in intensive critical care unit at resource-limited settings: a literature review

Kanbiro Gedeno [1], Derartu Neme [2], Bedru Jemal [2], Zemedu Aweke [2 3], **Astemamagn Achule [1], Kuchulo Geremu [1]**, Tesfanew Bekele Uddo [4]

[1]Department of Anesthesia, College of Medicine and Health Science, Arba Minch University, Arba Minch.

Abstract

Background: In underdeveloped countries, there is a greater incidence of mortality and morbidity arising from trauma, with traumatic brain injury (TBI) accounting for 50% of all trauma-related deaths. The occurrence of elevated intracranial pressure (ICP), which is a common pathophysiological phenomenon in cases of TBI, acts as a contributing factor to unfavorable outcomes. The aim of this systematic review is to analyze the existing literature regarding the management of adult TBI with raised ICP in an intensive critical care unit, despite limited resources.

Methods: This systematic review was performed in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis protocol. Search engines such as PubMed, the Cochrane database, and Google Scholar were utilized to locate high-level evidence that would facilitate the formation of sound conclusions.

Result: A total of 11 715 articles were identified and individually assessed to determine their eligibility for inclusion or exclusion based on predetermined criteria and outcome variables. The methodological quality of each study was evaluated using recommended criteria. Ultimately, the review consisted of 51 articles.

Conclusion: Physical examination results and noninvasive assessments of the optic nerve sheath diameter (ONSD) via sonography are positively associated with elevated ICP, and are employed as diagnostic and monitoring tools for elevated ICP in resource-limited settings. Management of elevated ICP necessitates an algorithmic approach that utilizes prophylactic measures and acute intervention treatments to mitigate the risk of secondary brain injury.

Keywords: critical care; head injury; hyperosmolar therapy; hyperventilation; intracranial hypertension.

Integrated Pharmacy Research and Practice

DOI: https://doi.org/10.2147/iprp.s401888

12(2023)

Factors Affecting Inventory Management Performance of Tracer Medicines Across Primary Health Care Units, Gamo Zone, Southern Nations Nationalities and People's Region, Ethiopia

Aynoshe Adio Alemu [1], Teferi Gedif Fenta [2], Dawit Teshome Gebregeorgise [2]

[1]Department of Pharmacy, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Inventory management ensures access to tracer medicines (TMs) for priority health-care needs. Factors that impede its performance across primary health-care units (PHCUs) are less explored in Ethiopia. The current study assessed factors affecting the inventory management performance of TMs across PHCUs, Gamo zone.

Methods: A cross-sectional survey was conducted in 46 PHCUs between April 1 and May 30, 2021. The data were collected using document review and physical observation. A stratified simple random sampling was employed. The data were analyzed by SPSS version 20. The results were summarized as mean and percentage. Pearson's product-moment coefficient and ANOVA were employed at a 95% CI. The correlation test established the relationships between dependent and independent variables. ANOVA test compared the performance between PHCUs.

Results: The inventory management performance of TMs across PHCUs is below the standard. On average stock according to the plan is 18%, the stock-out rate is 43%, the inventory accuracy rate is 78.5%, and availability across PHCUs is 78%. 72.3% of visited PHCUs fulfill storage condition criteria. Inventory management performance decreases downward the levels of PHCUs. There is a positive correlation between the availability of TMs and supplier order fill rate, $r = 0.82$, $p < 0.01$; between the availability of TMs and report accuracy, $r = 0.54$, $p < 0.001$; and between TMs stocked according to the plan and supplier order fill rate, $r = 0.46$, $p < 0.01$. The inventory accuracy was significantly different between primary hospitals and health posts ($p = 0.009$, 95% C.I = [7.57, 60.93]); and health centers and health posts ($p = 0.016$, 95% CI = [2.32, 25.97]).

Conclusion: The inventory management performance of TMs is below the standard. It is attributable to supplier performance, the quality of the report, and performance variation across PHCUs. These result in the interruption of TMs in PHCUs.

Keywords: PHCUs; TMs; inventory management; performance.

The International Journal of Gynecology & Obstetrics

DOI: https://doi.org/10.1002/ijgo.15244

164(2023)

Frequency of digital vaginal examination and associated factors among mothers admitted to labor and delivery wards in public health facilities of Arba Minch town, southern Ethiopia

Bezawit Afework [1], Gebremaryam Temesgen Birgoda [1], Hawi Leul [1], Lamrot Girma [1], Tariku Bekelcho [2]

[1]Department of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.
[2]Department of Emergency Medicine and Critical Care, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Objective: To assess the frequency of digital examination and its associated factors among laboring mothers in public health facilities in Arba Minch town, southern Ethiopia. Digital vaginal examination (DVE) is the commonly applied clinical assessment method used to discover the progress of labor and delivery. However, frequent DVE may not be free of risk for maternal and neonatal health, and pain during intrapartum care.

Methods: An institution-based descriptive cross-sectional study was employed from May 3 to July 6, 2022. Study participants were selected by a serial sampling method. Data were entered into epi data version 7.2 and exported to SPSS v.25 for data analysis. Binary and multivariate logistic regression analyses were employed to assess associations between study variables. Statistical significance was declared at a P value less than 0.05.

Results: A total of 374 women responded to the interview, making a response rate of 98.4%. In all, 230 (61.5%) of the laboring mothers underwent five or more DVE. Being a primipara, being in latent phase at admission, having augmentation of labor, prolonged labor, being admitted with intact membranes, and vacuum delivery showed significant associations with frequent DVE.

Conclusion: Frequency of DVE among laboring mothers is relatively high in the study area. The frequent DVE were mainly caused by healthcare provider's interventions to shorten the time of labor. Emphasis on training and monitoring the practice of healthcare givers would be helpful to mitigate this problem.

Keywords: Arba Minch town; delivery; digital vaginal examination; labor progress; laboring mother; southern Ethiopia; vagina.

Environmental Research

DOI: https://doi.org/10.1016/j.envres.2023.117790

242(2023)

Groundwater potential delineation using geodetector based convolutional neural network in the Gunabay watershed of Ethiopia

Asnakew Mulualem Tegegne[1], Tarun Kumar Lohani[1], Abunu Atlabachew Eshete[1]

[1]Arba Minch Water Technology Institute, Arba Minch University, Arba Minch, Ethiopia

Abstract

Groundwater potential delineation is essential for efficient water resource utilization and long-term development. The scarcity of potable and irrigation water has become a critical issue due to natural and anthropogenic activities in meeting the demands of human survival and productivity. With these constraints, groundwater resource is now being used extensively in Ethiopia. Therefore, an innovative convolutional neural network (CNN) is successfully applied in the Gunabay watershed to delineate groundwater potential based on the selected major influencing factors. Groundwater recharge, lithology, drainage density, lineament density, transmissivity, and geomorphology were selected as major influencing factors during the groundwater potential of the study area. For dataset training, 70% of samples were selected and 30% were used for serving out of the total 128 samples. The spatial distribution of groundwater potential has been classified into five groups: very low (10.72%), low (25.67%), moderate (31.62%), high (19.93%), and very high (12.06%). The area obtains high rainfall but has a very low amount of recharge due to lack of proper soil and water conservation structures. The major outcome of the study showed that moderate and low potential is dominant. Geodetoctor results revealed that the magnitude influences on groundwater potential have been ranked as transmissivity (0.48), recharge (0.26), lineament density (0.26), lithology (0.13), drainage density (0.12), and geomorphology (0.06). The model results showed that using a convolutional neural network (CNN), groundwater potentiality can be delineated with higher predictive capability and accuracy. CNN based AUC validation platform showed that, 81.58% and 86.84% were accrued from the accuracy of training and testing values, respectively. Based on the findings, the local government can receive technical assistance for groundwater exploration, and sustainable water resource development in the Gunabay watershed. Finally, the use of a detector-based deep learning algorithm can provide a new platform for industrial sectors, groundwater experts, scholars, and decision-makers.

International Journal of General Medicine

DOI: https://doi.org/10.2147/IJGM.S419118

16(2023)

Health Related Quality of Life and Associated Factors Among Adult Patients with Rheumatic Heart Disease Patients in Ethiopia

Mohammed Nasir [1], Konno Taddesse [2], **Muluken Ahmed [3]**, Zeleke Argaw [2], Tigistu Gebreyonnis Gebretensaye [2], Sura Markos [4]

[3]Pediatrics Department, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Quality of life (QOL) is defined as "individuals" perceptions of their position in life. Rheumatic heart disease (RHD) is a consequence of severe, single, or recurrent bouts of acute rheumatic fever. To improve overall patient outcomes, there is currently a greater emphasis on assessing the QOL of these patients. The purpose of this study is to assess the QOL of adult RHD patients who had followed up at St Peter and Tikur Anbessa Hospital, Ethiopia.

Methods: An institutional-based cross-sectional study done at St Peter and Tikur Anbessa Hospital, Ethiopia from March 1-June 30/2021 in adult RHD patients. The sample size was 297. Socio-demographic and clinical data were collected using a structured questionnaire. The Amharic version of Short form-36 (SF-36) was used to assess the QOL. A logistic regression model was used to identify associated factors.

Results: The study included 297 patients. The majority are female (71%), and half of them are aged between 18-30 years of age. Of the patiends, 81.1% had no comorbidity, and 15.8% had interventions. RHD affects all domains and summary scores of short form 36 QOL parameters compared to normative values. Age, marital status, place of residence, presence of comorbidity, number of medications, and whether an intervention was done are associated with the QOL of these patients.

Conclusion: RHD patients had poor QOL assessed by SF-36. It affects all domains and summary score of short form 36 QOL parameters. Old age, divorce, living in rural areas, associated comorbid conditions, and no intervention done are associated with poor QOL. Identification and treating comorbid conditions and intervention may improve QOL.

Keywords: Ethiopia; QOL; RHD; health-related quality of life; quality of life; rheumatic heart disease.

Waste Management & Research

DOI: https://doi.org/10.1177/0734242x231187522

42(2023)

Healthcare waste management practice and associated factors among healthcare workers in public healthcare facilities of Southwest Shewa Zone, Oromia regional state, Ethiopia

Takele Achalu Dengela [1 2], **Mende Mensa Sorato [3]**

[3]Department of Pharmacy, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Poor management of waste can cause serious disease to healthcare personnel, cleaners, waste handlers, patients and the public. An observation-supported cross-sectional study was conducted to assess healthcare waste (HCW) management practice and professional, management and resource availability-associated factors among healthcare workers of 23 public health facilities in Southwest Shewa Zone, Oromia regional state, Ethiopia, 2021. A total of 424 health workers participated in this study. The level of proper healthcare waste management (HCWM) practice was 38.4%. Lack of knowledge on different methods of healthcare waste treatment (adjusted odds ratio (AOR): 0.101, 95% confidence interval (CI) (0.042, 0.242, $p < 0.05$)), lack of knowledge about the types of healthcare waste (AOR: 0.136, 95% CI (0.039, 0.481, $p < 0.05$)), lack of knowledge on the use of different colour-coded waste bin and safety box (AOR: 0.145, 95% CI (0.040, 0.520, $p < 0.05$)), and healthcare workers who had no training/orientation on HCWM practice (AOR: 0.396, 95% CI (0.245, 0.639, $p < 0.05$)) were less likely to practice effective HCWM compared to their counterparts. The current HCWM practices in studied health facilities was inadequate. Professional knowledge and availability of training were independently associated with HCWM practice. Therefore, regular orientation during employment and on-job training on HCWM practice, regular monitoring and supervision of HCWM are important. Further research should be conducted on the area of HCWM, and its associated environmental impacts by using more strong methods and wider health facilities.

Keywords: Healthcare waste; South West Shewa Zone; healthcare waste management practice; knowledge of healthcare workers.

Health & Social Care in the Community

DOI: https://doi.org/10.1155/2023/2076963

11(2023)

Health-Related Quality of Life between Insured and Uninsured Households at Rural Communities of Southwestern Ethiopia: A Comparative Cross-Sectional Study

Serawit Lakew[1], Tesfahun Mekene[2], Tesfaye Feleke[3]

[1]Maternal-Reproductive Health Nursing, School of Nursing, Arba Minch University, College of Medicine and Health Sciences, Arba Minch, Ethiopia
[2]Health Services Management, School of Public Health, Arba Minch University, College of Medicine and Health Sciences, Arba Minch, Ethiopia
[3]Health Education (MPH), School of Public Health, Arba Minch University, College of Medicine and Health Sciences, Arba Minch, Ethiopia

Abstract

Background. Community-based health insurance (CBHI) is one of the strategies among others to be used for the achievement of universal health coverage (UHC) through providing financial protection to the citizens of a country. The schemes have been seen as effective in reducing out-of-pocket (OOP) payments and improving access to the healthcare services. This study tried to assess health-related quality of life between members and nonmembers of the scheme in rural southwest Ethiopia. *Study Method*. A community-based comparative cross-sectional study was conducted between the insured and uninsured populations. A standardized WHOQOL-BREF questionnaire was used. Cross-tab and frequency table analysis were done to tabulate for monovariable and bivariable analysis. Multiple linear regressions were employed to determine associations by adjusting for potential confounders. The association decision was made after fitted assumptions and adjustments done by modeling. *Results.* About six hundred thirty-four (634) households completed the survey with a response rate of 97.2%. More than 90% of the participants were illiterate and elementary education completed and farmers. Most uninsured family members claimed that they had difficulty affording annual payments 72.5%, $P < 0.001$. Willingness to pay was higher for insured members of households (72.2%), $P < 0.001$. Being insured had experienced a higher quality of life than uninsured, β (95% CI), 4.15 (2.52, 5.77), and $P < 0.001$. Marital status other than married had lower quality of life experiences than married alone, β (95% CI), −6.83 (−9.75, −3.92), and $P < 0.001$. Male respondents were experiencing lower quality than females, β (95% CI), −2.49 (−4.25, −0.72), and $P = 0.006$. Family number of the household and quality of life had positive linear relations, β (95% CI), 0.87 (0.43, 1.31), $P < 0.001$. *Conclusions and Recommendations*. Being insured had positive implications for quality of life. Inhabitants have to be encouraged to the scheme membership.

Journal of Ethnopharmacology

DOI: https://doi.org/10.1016/j.ibneur.2023.08.1275

15(2023)

In vitro and in vivo anti-seizure activity of hydro methanolic extract and fractions of Pterolobium stellatum

Samson Salile [1], Hamin John Lee [3], Paul Sewes Frederick Alberts [4], Teferra Abula [2], Joseph Valentino Raimondo [3], Gary Stafford [4]

[1] Arba Minch University, Pharmacy, Arba Minch, Ethiopia

Abstract

Ethnopharmacological relevance: In Ethiopia, the whole plant juice of Pterolobium stellatum is used to treat seizures and epilepsy. Aim of the study: To investigate the antiseizure activity of hydromethanolic crude extract and fractions collected from leaves of P. stellatum using both in vitro, and in vivo seizure models in mice. Materials and methods: Fresh leaves of P. stellatum were collected from Awash Melka, Addis Ababa, Ethiopia. An 80% crude methanol extract was further fractionated to produce petroleum ether, chloroform, butanol, and aqueous fractions. Anti-seizure activity of the crude extract and fractions (petroleum ether, chloroform, butanol, and water) were assessed at a concentration of 0.7 mg/ml using the in vitro 0 Mg2+ model of seizures in mouse brain slices prepared from 14- to 21-day-old C57BL/6 mice. The maximal electroshock seizure (MES) model and the pentylenetetrazol (PTZ) seizure model for seizures were performed on male BALB/c mice using 400 mg/kg and 800 mg/kg of crude 80% methanol extract, as well as the four fractions described above. Diazepam and phenytoin were used as positive controls for PTZ and MES test respectively. Results: Addition of 0.7 mg/ml of crude 80% methanol extract of P. stellatum prevented the onset of SLEs in most brain slices in the 0 Mg2+in vitro model of seizures, with similar efficacy to diazepam (3μM). The same extract at 400 and 800 mg/kg was efficacious in reducing the hindlimb extension time in the MES model and delaying the onset of myoclonic convulsions in the PTZ model, although not to the same extent as phenytoin (10 mg/kg) or diazepam (5 mg/kg). The chloroform and water fractions of the crude extract also showed significant anti-seizure activity across all three models whilst the non-polar petroleum ether and butanol fractions did not. The UPLC-MS analysis indicated the presence of gallic acid, ellagic acid, kaempferol, myricitrin, isoquercitrin and quercitirin in the crude extract. Gallic acid and ellagic acid were observed in chloroform fraction and in the water fraction ellagic acid, kaempferol, myricitrin and isoquercitrin were detected. Conclusion: The crude hydromethanolic extract of P. stellatum has significant anti-seizure activity. The chloroform and aqueous fractions have antiseizure activity. The extracts have previously identified compounds with anticonvulsant activity which indicates the antiseizure potential of the plant.

Journal of Environmental and Public Health

DOI: https://doi.org/10.1155/2023/7778240

2023(2023)

Integrated Methods for Household Greywater Treatment: Modified Biofiltration and Phytoremediation

Tolossa Waqkene [1], Seid Tiku Mereta [2], **Amare Terfe [3]**, Wuhib Zeine Ousman [2]

[3]Department of Environmental Health Science, College of Medicine and Health Sciences, Arba Minch University, P.O. Box 21, Arba Minch, Ethiopia.

Abstract

Most countries around the world have experienced water scarcity in recent decades as fresh water consumption has increased. However, untreated wastewater is routinely discharged into the environment, particularly in developing countries, where it causes widespread environmental and public health problems. The majority of wastewater treatment method publications are heavily focused on high-income country applications and, in most cases, cannot be transferred to low and middle-income countries. An experimental study was conducted to evaluate the performance efficiency of pilot-scale physicochemical and biological treatment methods for the treatment of household greywater in Jimma, Ethiopia. During the experiment, grab samples of greywater were taken from the combined treatment system's influent and effluent every 7 days for 5 weeks and analyzed within 24-48 hours. Temperature, DO, EC, turbidity, TDS, and pH were measured on-site, while BOD, COD, TSS, TP, TN PO_4^{-3}-P, NO_3-N, NH_4-N, Cl^-, and FC were determined in the laboratory. During the five-week pilot-scale combined treatment system monitoring period, the combined experimental and control system's mean percentage reduction efficiencies were as follows: turbidity (97.2%, 92%), TSS (99.2%, 97.2%), BOD_5 (94%, 57.4%), COD (91.6%, 54.7%), chloride (61%, 35%), TN (68.24, 42.7%), TP (71.6%, 38.7%), and FC (90%, 71.1%), respectively. Similarly, the combined experimental and control systems reduced PO_4^{-3}-P (12.5 ± 3 mg/L), NO_3-N (4.5 ± 3 mg/L), and NH_4-N (10.19 ± 2.6 mg/L) to PO_4^{-3}-P (3.5 ± 2.6 mg/L, 7.5 ± 1.6 mg/L), NO_3-N (0.8 ± 0.5, 3.6 ± 2.3 mg/L), and NH_4-N (7 ± 2.9 mg/L, 15.9 ± 3.9 mg/L), respectively. From the biofiltration and horizontal subsurface flow constructed wetland combined systems, the experimental combined technology emerged as the best performing greywater treatment system, exhibiting remarkably higher pollutant removal efficiencies. In conclusion, the combined biofiltration and horizontal subsurface flow constructed wetland treatment system can be the technology of choice in low-income countries, particularly those with tropical climates.

Open Access Journal of Contraception

DOI: https://doi.org/10.2147/OAJC.S387836

14(2023)

Knowledge, Attitude and Associated Factors Towards Vasectomy Among Married Men in Arba Minch Town, Southern Ethiopia, 2021; A Cross-Sectional Study

Yesuneh Dejene Wolde [1], Momina Ali [2], **Feleke Gebremeskel [3], Gebresilasea Gendisha Ukke [4],** Rediet Gebreselassie [1], Minychil Demelash [1], Abebaw Kebede [5], Mickiale Hailu [2]

[3]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia. [4]Department of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Vasectomy is a safe and effective permanent contraceptive method. In Ethiopia, this method underutilized since the focus has been on contraceptive methods available for women rather than men. Few studies have examined this method in Ethiopia so far, so it is important to note that there is a lack of data about the method in the study area regarding married men's knowledge and attitudes toward vasectomy.

Methods: A community-based cross-sectional study conducted from May 2 to June 2, 2021, at Arba Minch town. A simple random sampling technique used to select 624 study participants. Data collected via the face-to-face interview technique using a semi-structured and pretested questionnaire. Data entered in EpiData 3.1, cleaned, and analyzed using SPSS for Windows version 25.0. Descriptive statistics and bivariable and multivariable logistic regression analyses were performed. An adjusted odds ratio (AOR) with 95% CI and a p-value < 0.05 estimated to identify statistically significant variables associated with knowledge and attitude towards vasectomy.

Results: From the total of 624 study subjects, 600 had completed the questionnaire, giving a response rate of 96.2%. From those who heard about vasectomy (36.8%), only 60.6% of men had good knowledge, and 48.4% had a positive attitude towards vasectomy. Men's knowledge of vasectomy was significantly associated with college or university attendance (AOR = 4.05, 95% CI: 1.720-9.521), age 31-40 years (AOR = 2.308, 95% CI: 1.081-4.929), and age ≥41 years (AOR = 2.671, 95% CI: 1.159-6.156). Age ≥41 years (AOR=4.735 95% CI 2.015-11.129), age of last child (AOR=3.868 CI 1.554-9.632) and discussing family planning with wife (AOR=2.821 95% CI 1.559-5.105) were significantly associated with attitude of men towards vasectomy.

Conclusion: In this study area, six out of ten and half of the married men had good knowledge and a positive attitude towards vasectomy, respectively.

Keywords: Arba Minch; knowledge; vasectomy.

PLOS Digital Health

DOI: https://doi.org/10.1371/journal.pdig.0000345

2(2023)

Machine learning modeling for identifying predictors of unmet need for family planning among married/in-union women in Ethiopia: Evidence from performance monitoring and accountability (PMA) survey 2019 dataset

Shimels Derso Kebede [1], **Daniel Niguse Mamo [2]**, Jibril Bashir Adem [3], Birhan Ewunu Semagn [4], Agmasie Damtew Walle [5]

[2]Department of Health Informatics, College of Medicine and health sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Unmet need for contraceptives is a public health issue globally that affects maternal and child health. Reducing unmet need reduces the risk of abortion or childbearing by preventing unintended pregnancy. The unmet need for family planning is a frequently used indicator for monitoring family planning programs. This study aimed to identify predictors of unmet need for family planning using advanced machine learning modeling on recent PMA 2019 survey data. The study was conducted using secondary data from PMA Ethiopia 2019 cross-sectional household and female survey which was carried out from September 2019 to December 2019. Eight machine learning classifiers were employed on a total weighted sample of 5819 women and evaluated using performance metrics to predict and identify important predictors of unmet need of family planning with Python 3.10 version software. Data preparation techniques such as removing outliers, handling missing values, handling unbalanced categories, feature engineering, and data splitting were applied to smooth the data for further analysis. Finally, Shapley Additive exPlanations (SHAP) analysis was used to identify the top predictors of unmet need and explain the contribution of the predictors on the model's output. Random Forest was the best predictive model with a performance of 85% accuracy and 0.93 area under the curve on balanced training data through tenfold cross-validation. The SHAP analysis based on random forest model revealed that husband/partner disapproval to use family planning, number of household members, women education being primary, being from Amhara region, and previously delivered in health facility were the top important predictors of unmet need for family planning in Ethiopia. Findings from this study suggest various sociocultural and economic factors might be considered while implementing health policies intended to decrease unmet needs for family planning in Ethiopia. In particular, the husband's/partner's involvement in family planning sessions should be emphasized as it has a significant impact on women's demand for contraceptives.

BMC Pediatrics

DOI: http://dx.doi.org/10.1186/s12887-023-04147-2

23(2023)

Magnitude and associated factors of acute kidney injury among preterm neonates admitted to public hospitals in Bahir Dar city, Ethiopia 2022: cross-sectional study

Sayih Mehari[1,2]*, Silenat Muluken[2] , Asmare Getie1 and Amare Belachew[2]

[1] College of Medicine and Health sciences, School of Nursing, Arbaminch University, Arba Minch, Ethiopia

Abstract

Background: Acute kidney injury is an independent risk factor for morbidity and mortality in critically ill neonates. Although the magnitude of preterm neonates is high and a major risk for acute kidney injury, there is a paucity of information regarding the magnitude and associated factors of acute kidney injury among preterm neonates in the study area. Therefore, the aim of this study was to assess magnitude and associated factors of acute kidney injury among preterm neonates admitted to public hospitals in Bahir Dar city, Ethiopia, 2022.MethodsAn institutional-based cross-sectional study was conducted among 423 preterm neonates admitted to public hospitals in Bahir Dar city from May 27 to June 27, 2022. Data were entered into Epi Data Version 4.6.0.2 transferred to Statistical Package and Service Solution version 26 for analysis. Descriptive and inferential statistics were employed. A binary logistic regression analysis was done to identify factors associated with acute kidney injury. Model fitness was checked through Hosmer-Lemeshow goodness of fit test. Variables with a p-value < 0.05 were considered as statistically significant in the multiple binary logistic regression analysis.

Result: Out of 423 eligible, 416 neonatal charts were reviewed with a response rate of 98.3%.This study revealed that the magnitude of acute kidney injury was 18.27% (95% CI = 15–22). Very low birth weight (AOR = 3.26; 95% CI = 1.18–9.05), perinatal asphyxia (AOR = 2.84; 95%CI = 1.55–5.19), dehydration (AOR = 2.30; 95%CI = 1.29–4.09), chest compression (AOR = 3.79; 95%CI = 1.97–7.13), and pregnancy-induced hypertension (AOR = 2.17; 95%CI = 1.20–3.93) were factors significantly associated with the development of neonatal acute kidney injury.

Conclusion: Almost one in five admitted preterm neonates developed acute kidney injury. The odds of acute kidney injury were high among neonates who were very low birth weight, perinataly asphyxiated, dehydrated, recipients of chest compression, and born to pregnancy-induced hypertensive mothers. Therefore, clinicians have to be extremely cautious and actively monitor renal function in those neonatal population in order to detect and treat acute kidney injury as early as possible.

International Journal of Pharmacology

DOI: https://doi.org/10.3923/ijp.2023.769.783

19(2023)

Magnitude of Post-Caesarean Wound Infections in Three Public Hospitals in Southern Ethiopia

[1]Teshome Kebede, [1]Aseer Manilal, [1]Mohammed Seid, [2]Mheret Tesfaye, **[3]Dereje Tolessa**, **[1]Addis Akiilu**,**[1]Abdurezak Zakir, [1]Gebere Keyta, [4]Kebede Kulyta**, [5]Mohamed A. El-Sheikh and [6]Akbar Idhayadhulla

[1]Department of Medical Laboratory Sciences, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[3]School of Medicine, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[4]Department of Medical Laboratory Science, Arba Minch College of Health Sciences, Arba Minch, Ethiopia

Abstract

Background and Objective: Post-caesarean wound infections, caused mainly by drug-resistant pathogens, is a maternal health concern leading to increased morbidity and extended hospital stays. The objective of this study was to determine the prevalence of post-caesarean wound infections, bacteriological profile, antimicrobial susceptibility patterns and associated factors among women suspected of post-caesarean wound infections attending three public hospitals in Ethiopia.

Materials and Methods: A cross-sectional study was undertaken in three public hospitals in Southern Ethiopia among pregnant women who had undergone caesarean section (CS). A total of 204 women who were clinically diagnosed with infected wounds within 30 days of follow-up were included in the bacteriological analysis. The data were collected using a pre-tested questionnaire. The Kirby-Bauer disk diffusion method was used to determine the antimicrobial susceptibility profile.

Results: Of the 204 samples, 85.78% were culture-positive, yielding 203 bacteria. *Staphylococcus aureus* was the predominant isolate (n = 65, 32%). Overall, 70.4% (n = 143) of isolates were multi-drug resistant, including *S. aureus*, vancomycin-resistant enterococci, extended-spectrum beta-lactamases producers and carbapenem-resistant enterobacterial. Parity, previous CS, diabetes mellitus and emergency CS were significantly associated.

Conclusion: The study shows a high prevalence of wound infections and a bewildering increase in multi-drug resistance, posing a significant maternal health concern. Targeted hospital infection prevention and control strategies and effective surveillance can help to minimize the severity.

International Journal of Environmental Health Research

DOI: https://doi.org/10.1080/09603123.2023.2229771

34(2023)

Metal distribution and human health risk assessment in legumes crops (chickpea, lentils and peas) from Belesa districts, Ethiopia

Fekadu Muche [1], **Dessie Ezez** [2], Atnafu Guadie [1], Molla Tefera [1]

[2]Department of Chemistry, College of Natural Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Accumulation of heavy metals in food is a major concern for humans' health. This study was aimed at determining the levels of Cu, Fe, Mn, Ni and Zn in chickpea, lentil and pea samples and evaluating the health risk for consumers. The concentrations (in mg/kg) of Cu, Fe, Mn, Zn, and Ni were varied from 23.6-48, 67.7-132.3, 15-26.5, 37.6-68.2, and 25.5-33.3 in chickpea, 39.8-80.5, 116.1-180.5, 12.1-21.6, 36.4-57.2, and 25.4-34.1 for lentil and 32-64.2, 51.6-100.0, 6.3-15, 25.3-42.5, and 25.5-48.5 for peas, respectively. Pearson correlation verified that strong positive correlations were observed between Cu and Zn in lentils, Ni and Mn, Fe with Cu and Mn in peas. Target hazard quotients (THQ) except Ni in all samples, Cu in lentil and pea were < 1 and the hazard index (HI) values of all heavy metals were greater than 1, thus an appropriate strategy is required to reduce exposure to heavy metals.

Keywords: Ethiopia; Legume; health risk; heavy metal.

Cogent Education

DOI: https://doi.org/10.1080/2331186X.2023.2267937

10(2023)

Modified guided-discovery methods in physics laboratories: Pre-service teachers' conceptual and procedural knowledge, views of nature of science, and motivation

Adisu Daniel[1], Desta Gebeyhu[2], Shimeles Assefa[2] &Tsedeke Abate[3]

[1] Arbaminch College of Teachers Education, Ethiopia

Abstract

Although laboratory work is considered a significant factor in helping students develop their science process skills and cultivate alternative knowledge construction, there are still gaps in the selection, integration, and implementation of the basic elements in physics laboratories. In this study, three modified guided discovery and conventional methods in integration with different forms of laboratories, the explicit approach of process skills, and the implicit approach to the nature of science were implemented. This study aimed to explore pre-service teachers' views towards nature of science (NOS), pedagogical and forms of laboratory orientation, practice of science process skills (PS), and motivation. The groups were also compared in terms of the dependent and selected covariate variables. This study employed a tandem design Phase III with a quasi-experimental approach. Purposive and random sampling were used to select study participants. It was found that pre-service physics teachers had naïve views towards NOS and PS before and after the intervention. However, after the intervention, there were changes in pedagogy and forms of laboratory orientation, PS practice, and motivation. The groups were also significantly different in conceptual and procedural knowledge and motivation, but similar in views of NOS. In addition, the groups were not significant for covariate variables. Generally, this study indicates that modified guided-discovery methods in physics laboratories have made differences in procedural and conceptual knowledge, motivation, and practicing process skills. It was suggested that physics teachers and physics laboratory curricula employ a variety of learning models and integrate basic components to assist and improve students' learning.

Keywords: modified guided-discovery motivation physics laboratory pedagogical and forms of laboratory orientation nature of science and process skills

Mechanical Engineering

URL:https://www.researchgate.net/publication/379480112_Modified_soft_rough_modules_and_their_approximations

41(2023)

Modified soft rough modules and their approximations

Srinivasan Vijayabalaji[1], Shanmugam Kalaiselvan[1], **Natesan Thillaigovindan[2]** and Bijan Davvaz[3]

[2]Department of Mathematics, Natural Sciences College,Abaya Campus Arba Minch University

Abstract

This paper introduces the idea of pull back and push out on soft module homomorphism. Exact sequence on soft modules is also studied. Rough module approximations and related results are investigated. Hybrid structures of soft modules and rough modules namely soft-rough modules (respectively modified soft- rough modules) over soft-rough rings (respectively modified soft-rough rings) are introduced and an interesting result that every modified soft-rough module of modified soft-rough ring is a soft- rough module of soft-rough ring, but not vice-versa is established. The paper is completed with the illustration of a decision-making problem in modified soft-rough module environment.

Keywords: SR-rings, SR-module, MSR-ring, MSR-module, soft modules homomorphism, exact sequence of soft modules.

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e23821

10(2023)

Multi-purpose reservoir operation oncomitant with estimating hydropower potential using multifarious hydrological models

Yordanos Mekuriaw Meskr [1], Abdella Kemal Mohammed [1], Abebe Temesgen Ayalew [1], Tarun Kumar Lohani [1]

[1]Water Technology Institute, Arba Minch University, P.O. Box. 21, Arba Minch, Ethiopia.

Abstract

The research aims at determining the optimal release rule to increase the capacity of Rib reservoir. The reservoir inflow using HBV-light hydrological model embracing optimal reservoir operation through HEC-ResSim model were used to prepare an optimum operational plan. The potential of the river for hydropower generation prioritise the demand at a specified level regarding storage capacity (m^3), level of reservoir (m), and the relation between inflow and outflow of the reservoir. From the model performance features, the coefficient of correlation (R2) and Nash Sutcliffe Efficiency (NSE) were determined to be, respectively, 0.77 and 0.73 for calibration and 0.72 and 0.70 for validation. The Sobol approach was used for detailed sensitivity analysis of DROP model parameters based on the performance of C2M on outflows and volumes. The results suggest that the threshold coefficient characterizing the demand-controlled release level is the most significant parameter. According to the simulation's findings, the reservoir's average regulated release is calculated to be 22.86 m^3/s, and its average monthly hydropower output is 6.73 MW. Average annual hydropower energy was estimated as 58.955 GW h/year and mean annual inflow of reservoir volume of water to be 223.54 Mm^3. This volume of water is adequate to accommodate total annual irrigation demand, environmental obligation, and other respective requirements in the downstream. The demand for hydropower and irrigation and supply from reservoir capacity can be counterbalanced from the simulated result without any hindrance.

Keywords: HBV-Light; HEC-ResSim; Hydropower; Reservoir operation; Rib watershed.

Journal of the Knowledge Economy

DOI: http://dx.doi.org/10.1007/s13132-023-01422-6

15(2023)

Multivariate Generalized Autoregressive Conditional Heteroscedasticity Modeling of the Relationship Between Major Economic Indicators in Ethiopia

Daba Ketema Huriso[1], **Belay Belete Anjullo[2], Yilikal Tesfaye Haile[2]** & Derbachew Asfaw Teni[3]

[2]Department of Statistics, Arba Minch University, Arba Minch, Ethiopia

Abstract

We model the relationship between major economic indicators in Ethiopia. We obtained 28 years of data from the National Bank of Ethiopia (NBE) for the period between 1991 and 2018, these data have been transformed into quarterly data. It was seen that there are upward trend and volatility clustering in the data. Multivariate Generalized Autoregressive Conditional Heteroscedasticity (MGARCH) models were employed for volatility modelling with the specific interest in identifying the trend and the impact of macroeconomic variables on economic growth. Results from Dynamic Conditional Correlations (DCC (1,1))-GARCH model showed the sum of ARCH and GARCH effect was 0.672. This implied volatility is neither permanent nor explosive, that is a shock to volatility in one period will not lead to greater volatility in the next period. It was also found that the estimated association parameter between consumer price index which is proxy for inflation and real gross domestic product was -0.557, this shows negative association between inflation and real gross domestic product. Furthermore; volatility on exchange rate and money supply has a significant positive association with volatility on real gross domestic product and inflation. NBE should be cautious in controlling the money supply to control the problem of inflation, since the increase in money supply increases inflation, and inflation affects economic growth.

Asthma Research and Practice

DOI: https://doi.org/10.1186/s40733-023-00091-1

9(2023)

Nonadherence to antiasthmatic medications and its predictors among asthmatic patients in public hospitals of Bahir Dar City, North West Ethiopia: using ASK-12 tool

Teshome Bitew Demelash [1], **Getahun Asmamaw [2]**, Liknaw Workie Limenh [3], Yeniewa Kerie Anagaw [4], Wudneh Simegn [5], Wondim Ayenew [6]

[2]Department of Pharmacy, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Globally, adequate asthma control is not yet achieved. The main cause of uncontrollability is nonadherence to prescribed medications.

Objectives: The objective of this study is to assess asthmatic patients' non-adherence to anti-asthmatic medications and the predictors associated with non-adherence.

Methods: An institution-based cross-sectional study was conducted in three governmental hospitals in Bahir Dar city from September 5 to December 12, 2021. The data was collected using the Adherence Starts with Knowledge-12 tool (ASK-12). Systematic random sampling was applied to select study participants. Bivariable and multivariable logistic regression analyses were used to identify predictors of non-adherence. All statistical tests were analyzed using STATA version 16. P-values less than 0.05 were considered statistically significant.

Results: A total of 422 asthmatic patients were included in the study. Most of the study participants (55.4%) did not adhere to their prescribed anti-asthmatic medicines. The educational status of the study participants (AOR = 0.03, 95% CI = 0.00-0.05), family history of asthma (AOR = 0.13, 95% CI = 0.04-0.21), and disease duration that the patients were living with (AOR = 0.01, 95% CI = 0.00-0.01) were the predictors of non-adherence to anti-asthmatic medications.

Conclusions: The level of nonadherence to treatment among patients with asthma was high. Religion, educational status of study participants, family history of asthma, and duration of the disease were the predictors of non-adherence of asthmatic patients to their antiasthmatic medications. Therefore, the Ministry of health, health policy makers, clinicians, and other healthcare providers should pay attention to strengthening the adherence level to antiasthmatic medications, and country-based interventions should be developed to reduce the burden of non-adherence to anti-asthmatic medications.

Keywords: Asthma; Bahir Dar; Ethiopia; Non-adherence.

IET Communications

DOI: https://doi.org/10.1049/cmu2.12513

19(2023)

Object detection and recognition using deep learning-based techniques

Preksha Sharma[1], Surbhi Gupta[1], Sonali Vyas[2] and **Mohammad Shabaz[3]**

[3]Arba Minch University, Arba Minch, Ethiopia

Abstract

Object detection has received a lot of academic attention in recent years because of its tight association with video analysis and picture interpretation. With the fast growth of deep learning, more powerful tools capable of learning semantic, high-level, and deeper features are being offered to address difficulties in traditional architectures. These models react differently in terms of network design, training approach, and optimization function, among other things. This study describes multiple deep learning models and their characteristics for object detection in pictures and videos. Convolutional Neural Networks (CNN), models based on region proposal, and models based on regression/classification are the many deep learning approaches. The study also discusses how deep learning approaches differ from one another and their weaknesses in comparison to the prior model. Face identification, pedestrian detection, autonomous driving, and other applications of object detection are also explored in this work. From the study, it was found that object recognition is a group of tasks for recognizing items in digital pictures. R-CNNs, or Region-based Convolutional Neural Networks, are a class of algorithms for tackling object localization and recognition problems that are optimized for model performance. You Only Look Once, or YOLO is a second family of object identification systems geared for speed and real-time application.

Contemporary Pragmatism

DOI: http://dx.doi.org/10.1163/18758185-bja10066

20(2023)

Organ Trafficking in Africa: Pragmatist Ethical Reconsiderations

Belayneh Taye[1], Abayneh Atnafu[1], **Yihenew Wubu Endalew[2]**, Sisay Demissew Beyene[3]

[2]Department of Political Sciences, Faculty of Social Sciences and Humanities, Arba Minch University, Arba Minch, Ethiopia

Abstract

This article focuses on examining the situation of organ trafficking in Africa from the aspect of pragmatist ethics. In the mainstream thought, the broader ethical dilemma of organ trafficking is viewed within the moral contestation of altruism as a rule for organ procurement and the resulting worldwide organ shortage. The incapability of altruistic transplant orthodoxy to serve as an applicable foundation for a public policy is considered as a reason for organ trafficking. In fact, to battle organ trafficking, utilitarian-inclined studies suggest organ selling, compensated donations, and non-directed paid donations as practical alternatives. However, when investigating the context of organ trafficking in Africa, the issue goes beyond the mere moral dilemma of altruism and organ shortage. In the region, organ trafficking is rooted within more systemic, structural, socio-economic, and political problems, grounded in the abuse of transplantation, and connected to transplant tourism and migration, which needs a pragmatic multimodal solution than the earlier mainstream pathways. In pragmatist ethics, the moral assessment and solutions to the underlying problems depend on the context wherein the moral problem arises. Pragmatist ethics does not stick to absolute moral theories; instead, it focuses on the relevant assessment of the felt moral problem in a given context and aims at seeking solutions afresh. Thus, in the subsequent sections, this article looks at the context of organ trafficking in Africa and reassesses it by incorporating it into the ethical debates of transplantation and organ procurements and trading. The final part of this article reflects on solutions with the reconsideration of the context of transplantation and organ trafficking in the region.

Frontiers in Public Health

DOI: https://doi.org/10.3389/fpubh.2022.1064896

10(2023)

Patient safety knowledge, attitude and practice among undergraduate health science students in South West Ethiopia

Tofik Mohammed [1], Emebet Woldearegay [2], Shemsu Kedir [3], Kemal Ahmed [4], Masrie Getnet [5], Esayas Kebede Gudina [2]

[1]Department of Internal Medicine, College of Medicine and Health Science, Arbaminch University, Arba Minch, Ethiopia.

Abstract

Background: Patient safety is minimizing the risk of unnecessary damage associated with healthcare to a minimum. It has been linked as a global precedence area where substantial knowledge gaps exist. Knowledge, attitude, and practice of the healthcare providers toward patient safety have a great influence on the delivery of safe patient care. Regardless of this, the issue has not been adequately addressed in Ethiopia.

Objective: The main aim of this study was to assess the knowledge, attitude, practice, and factors associated with patient safety practice among undergraduate health science students at Jimma University Institute of Health.

Methods: An institution-based cross-sectional study design was conducted from May to November 2021. Data were collected from 678 undergraduate health science students using a pretested, structured and self-administered questionnaire. EPI data 3.1 was used for data entry, and SPSS version 25 was used for analysis. A binary logistic regression model was utilized to identify factors associated with outcome variables. An adjusted odds ratio with a 95% confidence interval and $P < 0.05$ were computed to determine the level of significance.

Results: Of the total students, only 293 (43.2%) and 308 (45.4%) had good knowledge and positive attitudes toward patient safety, respectively. Moreover, only 135 (19.9%) of the students had good practices regarding patient safety. Year of study [AOR = 3.75, 95% CI: (2.3, 9.3)], duration on practical attachment [AOR = 2.6, 95% CI: (1.2, 5.9)], and knowledge about patient safety [AOR = 2.9, 95% CI: (1.9, 3.4)] were associated with better patient safety practices.

Conclusion: In the current study the practice of patient safety among health science students was low and less than half of the students had good knowledge and favorable attitudes toward patient safety. Patient safety practices were influenced by the length of the clinical attachment, the study year, and the knowledge of patient safety. This calls for patient safety courses to be included in training curricula of undergraduate health sciences students.

Keywords: Ethiopia; attitude; knowledge; patient safety; practice; undergraduate students.

Pediatric Health, Medicine and Therapeutics

DOI: https://doi.org/10.2147/phmt.s401461

14(2023)

Pediatric Guillain-Barré Syndrome in a Resource Limited Setting: Clinical Features, Diagnostic and Management Challenges, and Hospital Outcome

Mulugeta Sitot Shibeshi [1], **Adane Alto Mengesha [2]**, Kefyalew Taye Gari [1]

[2]Department of Pediatrics and Child Health, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Guillain-Barré syndrome (GBS) is an acute immune-mediated peripheral neuropathy with a highly variable clinical course and outcome. There remain diagnostic and treatment challenges in resource limited settings. This study aimed to describe the clinical presentation, diagnostic and management challenges, and hospital outcome of children with GBS in southern Ethiopia.

Methods: A retrospective chart review of children aged ≤14 years who were admitted with a diagnosis of GBS to Hawassa University Comprehensive Specialized Hospital from 2017 to 2021 was done. Medical records of 102 children who fulfilled the Brighton Criteria for GBS were reviewed, and data on demographic, clinical characteristics, investigation findings, treatment, and outcome were collected. Logistic regression analysis was done to determine factors associated with mortality.

Results: The mean age of the study subjects was 7.25±3.91 years and 63.7% were male. Antecedent event was present in 48% of the cases, and the most common triggering factor was upper respiratory tract infection (63.8%). The mean Hughes disability score was 4.23±0.54, 4.48±0.71, and 4.03±0.86 at admission, nadir and discharge from hospital, respectively. Cranial nerve involvement was present in 27.5% of patients and bulbar palsy was the most common finding. Dysautonomia was observed in 57.8% of the participants. Sixty-three patients (61.8%) needed ICU care but only 43 of them (68.3%) were admitted to ICU. Similarly, 31 patients (30.4%) required respiratory support but only 24 of them (77.4%) were on mechanical ventilator. No patient had nerve conduction study. Only 5.9% of patients received IVIG. Thirteen patients (12.7%) died of GBS and the presence of respiratory failure was the only determinant of mortality [AOR = 11.40 (95% CI: 1.818, 71.52), p = 0.009].

Conclusion: There is a gap in the diagnosis and management of children with GBS; and mortality from the disease is higher than reports from other settings.

Keywords: Guillain–Barre syndrome; outcome; resource limited setting.

Journal of Environmental and Public Health

DOI: https://doi.org/10.1155/2023/7503426

2023(2023)

Pesticide Residues and Effect of Household Processing in Commonly Consumed Vegetables in Jimma Zone, Southwest Ethiopia

Amare Terfe [1], Seblework Mekonen [2], Temima Jemal [3]

[1]Department of Environmental Health Science, College of Medicine and Health Sciences, Arba Minch University, P.O.Box 21, Arba Minch, Ethiopia.

Abstract

The long-term and indiscriminate use of pesticides has resulted in serious health effects. Aside from that, developing countries do not have any monitoring systems in place to prevent the consumption of high levels of pesticides in foods. Therefore, this study aimed to determine pesticide residues and the effect of processing in commonly consumed vegetables in the southwestern part of Ethiopia. In total, 12 samples of 1 kg of each type of vegetable were collected from selected markets. Moreover, as a solution to pesticide residue problems in vegetables, the effect of different processing methods such as washing, peeling, boiling, and their cumulative effect was studied. In the analytical procedure, the modified Quick, Easy, Cheap, Effective, Rugged, and Safe (QuEChERS) extraction with florisil as a cleanup sorbent was used and the identification of pesticides was done by using gas chromatography with an electron capture detector (GC-ECD). The parent *p,p'*-DDT was detected at a concentration of 0.015 mg/kg in potato samples from the Serbo market and a concentration of 0.516, 0.232, 0.174, and 1.512 mg/kg in Merkato, Kochi, Serbo, and Shebe onion samples, respectively. P`*p*-DDT is detected at a high concentration compared to its metabolites (*p,p'*-DDE and *p,p'*-DDD), which is an indication of recent use. DDT and its metabolites, other organochlorines (lindane, *γ*-chlordane, dimethachlor, and heptachlor), and pyrethroids (cypermethrin and deltamethrin) exceeded the recommended limits by FAO and WHO in multiple samples of potato, onion, and cabbage. The processing result showed that washing, boiling, and the combination of the two revealed a 100% reduction in *o,p'*-DDT, and *p,p'*-DDT pesticides detected in cabbage. In conclusion, multiple residues were detected in the three vegetables studied, indicating that pesticides were applied intensively. Pesticide levels were reduced by home processing procedures, which is important for consumer safety.

Frontiers in Epidemiology

DOI: https://doi.org/10.3389/fepid.2023.1305074

3(2023)

Plasmodium falciparum remains the dominant parasite affecting children despite decades of implementing vector control in two villages of Wolaita Zone, Southwest Ethiopia

Shimels Elias [1], Fekadu Massebo [1]

[1]Department of Biology, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: Malaria is still a significant public health concern, and its prevention and control measures have different impacts in different areas. This study assesses the prevalence of malaria and the effectiveness of routine malaria control programmes such as indoor residual spray (IRS) in two Ethiopian villages.

Methods: The Kebeles (villages) were purposefully selected based on their malaria prevalence rates. A parasitology survey was conducted in Fango-Gelchecha pre- and post-IRS implementation, whereas in Shochora-Abela it was only conducted post-IRS implementation. The IRS was implemented as part of the routine malaria control programme in August 2017. Every fourth house from the village registration list was systematically selected, resulting in a sample of 300 households per village. A total of 3,075 individuals were enrolled for malaria testing using microscopy.

Results: After three to four months of application of IRS in August 2017, 59 malaria cases were confirmed, resulting in an overall prevalence of 1.9% (95% CI: 1.5-2.5). Of the positive cases, 18 cases (0.59%: 95% CI: 1.3-1.8) were from Shochora-Abela village, and 41 cases (1.33%: 95% CI: 1.1-1.3) were from Fango-Gelchecha. About age categories, the prevalence of malaria was 10.1% (95% CI: 5.9-15.9) among children under five, 4.7% (95% CI: 3.3-6.4) in children aged 5-14, and only 0.32% (95% CI: 0.13-0.67) in the age group 15 and above. Overall, P. falciparum was the dominant malaria parasite, accounting for 69.5% (95% CI: 56.1-80.8), while P. vivax malaria accounted for 30.5% (95% CI: 19.2-43.8). The malaria prevalence in Fango-Gelchecha village was 3.1% (95% CI: 2.3-4.0) before IRS and 2.6% (95% CI: 1.8-3.5) after IRS application. In the village of Shochora-Abela, the prevalence of malaria post-IRS was 1.2% (95% CI: 0.7-1.9), but the prevalence prior to IRS was not evaluated.

Conclusions: Plasmodium falciparum is the predominant parasite in the villages, mainly affecting children under five. Therefore, protecting young children should be the top priority for reducing infection burdens.

Keywords: Humbo district; IRS; Plasmodium falciprum; Wolaita Zone; malaria prevalence.

Veterinary Medicine: Research and Reports

DOI: https://doi.org/10.2147/vmrr.s401079

14(2023)

Prevalence, Risk Factors and Control Practices of Livestock Hirudiniasis in Mirab Abaya District, Southern Ethiopia

Wasihun Seyoum [1], Chilotaw Ejigu [1], Ephrem Tora [1]

[1]Department of Animal Science, College of Agricultural Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Purpose: Hirudiniasis is a disease in people and animals who have been infested by blood sucking leeches. In Ethiopia, it is a neglected disease, causing significant economic loss in the livestock industry. In the study area, information on livestock Hirudiniasis is very limited. Therefore, this study was conducted to assess livestock owners' awareness, knowledge, and control practices toward leech infestation, and to estimate the prevalence and associated risk factors of livestock Hirudiniasis.

Methods: A cross-sectional study was carried out from February to September 2022 on domestic animals randomly selected from livestock owners of Mirab Abaya district, Southern Ethiopia. In total, 384 domestic animals were sampled and examined for the presence of leech infestation. A questionnaire survey was carried out on 150 livestock owners.

Results: This study discovered a 13.54% (52/384) overall prevalence of livestock Hirudiniasis in the study area and the highest prevalence was observed in cattle (22.14%), followed by sheep (10%), goats (8.65%), and equines (5%). *Limnatis nilotica* was the only leech species identified in the study area. The occurrence of livestock Hirudiniasis was significantly higher in the dry season (OR=3.16, $p<0.05$), around bodies of water (OR=10.88, $p<0.01$), in extensive production systems (OR=3.81, $p<0.05$), and in adult (OR=2.58, $p<0.05$) and poor body condition animals (OR=9, $p<0.01$). However, the species and sex of domestic animals were not significantly associated with Hirudiniasis. The questionnaire showed 61.33% and 35.33% of respondents had knowledge about leech infestations in domestic animals and its zoonotic impacts, respectively. Manual removal and traditional medicine are common control measures taken by livestock owners against Hirudiniasis.

Conclusion: The present study showed that leeches were prevalent and significantly affects the health and productivity of livestock in the study area. Hence, cost-effective parasitic control measures need to be implemented to address the setback.

Keywords: Ethiopia; Hirudiniasis; leech; livestock; prevalence; risk factors.

IET Communications

DOI: https://doi.org/10.1049/cmu2.12530

17(2023)

Development of intrusion detection system using machine learning for the analytics of Internet of Things enabled enterprises

Raghavendra S.[1], Dharmesh Dhabliya[2], Dipannita Mondal[3], Batyrkhan Omarov[4], Krishnan Sakthidasan Sankaran[5] Anishkumar Dhablia[6], Sushovan Chaudhury,[7] **Mohammad Shabaz[8]**

[8]Hydraulic and Water Resources Engineering, Arba Minch University, Arba Minch, Ethiopia

Abstract

Internet of Things (IoT) is a smart network for connecting everything to the internet. In an IoT network, things and devices can talk to each other wirelessly because they use smart but small sensors. It is possible for IoT devices to talk to each other without the help of a person. The IoT communicates with other objects/things and collaborates with other objects to come up with new applications or services. The rapid growth of network infrastructure has made the landscape more vulnerable. More and more viruses are being made specifically for security devices, and this is a big problem. There are so many devices out there, and they do not have any real protection. Machine learning algorithms have the capability of learning from previously available malware or intrusion data and then apply that learning on upcoming threats. This has shown significant results. This article presents feature selection and machine learning enabled method for classification of intrusion data set. PCA is used for feature selection. Machine learning algorithms namely—KNN, Bayesian Classifier and ID3 are used for classification. KNN with PCA is performing better on parameters like accuracy, sensitivity and specificity.

Scientific Reports

DOI: https://doi.org/10.1038/s41598-023-39974-x

13(2023)

Energy efficient IRS assisted 6G network for Industry 5.0

Ashu Taneja[1], Shalli Rani[1], Saleem Raza[2], Amar Jain[3], **Shebnam M. Sefat[4]**

[4]Electrical and Computer Engineering Department, Arba Minch Institute of Technology, Gamo Gofa, Ethiopia

Abstract

The real-world applications are more prone to difficulties of challenges due to fast growth of technologies and inclusion of artificial intelligence (AI) based logical solutions. The massive internet-of-things (IoT) devices are involved in number of Industry 5.0 applications like smart healthcare, smart manufacturing, smart agriculture, smart transportation. Advanced wireless techniques, customization of services and different technologies are experiencing a major transformation. The desire to increase the communication reliability without adding energy overhead is the major challenge for massive IoT enabled networks. To cope up with the above challenges, Industry 5.0 requirements need to be monitored at the remote level which again adds on the communication challenge. Use of relays in 6G based wireless networks is denied due to high requirement of energy. Therefore, in this paper, Intelligent reflecting surfaces (IRSs) assisted energy constrained 6G wireless networks are studied. To provide seamless connection between the communicating mobile nodes, IRS with an array of reflecting elements is configured in the system set up. A use-case scenario of IRS enabled network in Internet-of-Underwater things (IoUT) for smart ocean transportation is also provided. The IRS assisted wireless network is evaluated for target rates achieved. A power consumption model of the IRS supported system is also proposed to optimise the energy efficiency of the system. Further, the paper evaluates the impact of number of reflecting elements *N* on the IRS and the phase resolution *b* of each element on the system performance. The energy efficiency improves by 20% for IRS with $$N=100$$ N = 100 with $$b=2$$ b = 2 over IRS with $$b=1$$ b = 1.

IET Software

DOI: https://doi.org/10.1049/sfw2.12061

13(2023)

Robotic Process Automation use cases in academia and early implementation experiences

Ankur Gupta[1], Purnendu Prabhat[1], Sahil Sawhney[1], Rajesh Gupta[2], Sudeep Tanwar[2], Neeraj Kumar[3] and **Mohammad Shabaz[4]**

[4]Arba Minch University, Arba Minch, Ethiopia

Abstract

Robotic Process Automation (RPA) has emerged as a new sub-domain in software-based automation. RPA-based software bots promise to alleviate the tedium in labor-intensive tasks involving manual and repetitive operations. Therefore, RPA finds wide adoption across industries and domains. In this paper, RPA use cases for academia and document early implementation experiences are examined. The authors believe that the ease of implementation of RPA bots and their potential benefits shall facilitate the deployment of RPA across institutions resulting in efficient data collation and analysis while helping drive operational efficiency. However, while RPA bot development encompasses low complexity, maintenance and long-term seamless operation require significant software engineering effort, which must be factored in by institutions looking to adopt RPA for automation.

Keyword: datasets, gaze detection, neural networks, text tagging

IET Software

DOI: https://doi.org/10.1049/sfw2.12091

17(2023)

Scientific programming using optimized machine learning techniques for software fault prediction to improve software quality

Muhammad Shafiq[1] Fatemah H. Alghamedy[2] Nasir Jamal[3] Tahir Kamal[4] Yousef Ibrahim Daradkeh[5] **Mohammad Shabaz[6]**

[6]Arba Minch University, Arba Minch, Ethiopia

Abstract

The amount of time and money required to finish a software project and distribute the final product increases when there are bugs in the programme. Software procedures like defect monitoring and repair may be both costly and time-consuming to complete. Because it is difficult to locate and correct every defect in a product, it is essential that the negative effect of those defects be minimized in order to provide a result that is of better overall quality. The process of identifying troublesome sections of software code is known as software defect prediction. This paper presents an optimized machine learning- enabled model for software fault prediction to improve software quality. PC1 data set is fed as input data in this model. Important features are selected by ant colony optimization (ACO) technique. Selected features are fed as input to support vector machine. Training and testing of SVM is performed by PC1 data set. Performance of ACO SVM Ant Colony Optimization Support Vector Machine is compared with SVM, Naive Bayes classifier and K-Nearest Neighbour classifier. The performance of ACO-based SVM is better for software fault classification and prediction. KEYW ORDS natural language processing, text analysis.

Open Access Journal of Contraception

DOI: https://doi.org/10.2147/OAJC.S411924

14(2023)

Socio-Ecological Analysis of Barriers to Access and Utilization of Adolescent Sexual and Reproductive Health Services in Sub-Saharan Africa: A Qualitative Systematic Review

Negussie Boti Sidamo [1,2], Amene Abebe Kerbo [1], Kassa Daka Gidebo [1], Yohannes Dibaba Wado [3]

[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia.

Abstract

Background: In sub-Saharan African countries (SSA), despite the efforts to enable adolescents to access sexual and reproductive health (SRH) services, there are limited systematic review studies that comprehensively synthesize barriers to accessing services using a social-ecological model. Therefore, this review was conducted to fill this gap.

Methods: This study protocol was registered in the PROSPERO database (CRD42022259095). We followed PRISMA guideline to conduct this review. PubMed, Google Scholar, Embase and African Journal Online databases were used. Two authors individually screened articles. Only qualitative articles published in the English in last 10 years were included in this review.

Results: From the total of 4890 studies, 23 qualitative studies fulfilled the eligibility criteria. Those studies were from 11 SSA countries. This review finding revealed that inadequate information about the services, the incorrect perception about services, low self-esteem, fear of being noticed by family members, and financial constraints are barriers at the intrapersonal level. Unsupportive families and lack of open communication between adolescent-parent about sexuality issues were interpersonal barriers to access. Lack of provider competency, provider attitude, an unsupportive environment, physical inaccessibility of services, and shortage of medicine, and supplies were identified as institutional-level barriers. Moreover, community-level barriers like community stigma, social, religious, and gender norms within the society were identified as the main barriers to accessing services for adolescents.

Conclusion: This review finding reveals that the main barriers to access SRH services for adolescents living in SSA are misperception about services, low self-esteem to access services, financial constraints, unsupportive families, community stigma and social norms, unsupportive environments in health facilities, healthcare provider behavior, poor competency, being judgmental attitude, and breaking privacy and confidentiality. This study finding calls for new approach like a multi-pronged that works with service providers, with community, with families, and with adolescent to improve SRH services utilization of adolescent.

Keywords: adolescents; barriers; qualitative systematic review; sexual and reproductive health services; socio-ecological model; sub-Saharan Africa.

Chemistry Select

DOI: https://doi.org/10.1002/slct.202202080

8(2023)

Solution Behavior of Bovine Skin Gelatin in the Presence of Cationic Gemini Surfactants

Dr. Farah Ansari[1], Hira Lal[1], Mohammad Osama[1], Prof. Mohd. Akram[1], **Prof. Kabir-ud-Din[2]**

[2]Department of Chemistry, Arba Minch University, P.O. box no. 25, Arba Minch, Ethiopia

Abstract

The biophysical interaction between gelatin and cationic biodegradable C_m−E2O−C_m gemini surfactants (C_m represents alkyl chain where m=12, 14 and 16; E2 and O denote two ester groups and ethylene oxide, respectively) was analyzed utilizing a multi-technique approach. The electronic absorption spectroscopy, far-UV CD and pyrene micro polarity data evinced the formation of a complex between the concerned geminis and the biopolymer. Interestingly, the intrinsic fluorescence spectra do not exhibit concentration dependent behavior with respect to the surfactants giving an impression of poor interaction of gelatin with the geminis. Thereafter, the bulk solution properties, viz. foaming stabilities, viscosities and emulsion stabilities were measured to analyze the effect of binding. All the results combined together led to the inference of significant interaction between gelatin and the gemini surfactants which influence their physicochemical properties.

Research in Mathematics

DOI: https://doi.org/10.1080/27684830.2023.2259687

10(2023)

Some results on fuzzy ℓ-ideals and fuzzy ℓ-filters in ℓ-group

Taye Sisay Tadesse[1], Kishore Parimi Radhakrishna[1], Melesse Mulugeta Habte[1] and Lishan Liu[2]

[1]Department of Mathematics, Arba Minch University, Arba Minch, Ethiopia

Abstract

In this paper, we study the concept of fuzzy ℓ-ideals and fuzzy ℓ-filters of an ordered group. We provide several characterizations for fuzzy ℓ-ideals and fuzzy ℓ-filters in different perspective. We observe that for any fuzzy convex sub ℓ-group we can find a fuzzy ℓ-ideal and a fuzzy ℓ-filter containing it. Finally, for any fuzzy convex sub ℓ-group can be expressed as the intersection of some fuzzy ℓ-ideals and fuzzy ℓ-filters containing it.

Advances in Civil Engineering

DOI: https://doi.org/10.1155/2023/3581727

2023(2023)

Study on Mechanical Behavior of Fully Encased Composite Slender Columns with High-Strength Concrete Using FEM Simulation

Getinet Melesse[1], Samuel Jima[1], Tegegn Asale[1], Yayesew Moges[2], Hibretu Kaske Kassa[2]

[1]School of Civil Engineering, Institute of Technology, Arbaminch University, Arba Minch, Ethiopia

Abstract

The most common types of composite columns used in high-rise structures are concrete-filled steel tubes (CFSTs) and concrete-encased steel (CES) that are either entirely or partially encased in concrete. The attempt of this study is to develop a suitable constitutive model addressing the behavior of fully encased composite slender columns with high-strength concrete subjected to axial loading. The nonlinear finite element (FE) package ABAQUS version 6.14-2 is used to study the response of fully encased composite (FEC) slender columns. The finite element analysis (FEA) results are validated with experimental data extracted from previous experiments. Then, the parametric study is conducted on rectangular FEC columns with different shapes of encased steel encasements to investigate the axial load-carrying capacities, axial deformation, ductility, load-deformation behavior, and confinement of FEC columns. The governing parameters for the current study are the high strength of concrete (90 MPa, 100 MPa, and 120 MPa), shapes of encased steel sections (circular, I-shaped, and rectangular steel encasements), and spacing of tie bars (50 mm, 100 mm and 150 mm). 6–21% of load increment is observed by changing the concrete compressive strength. A comparison is also made between the results of reinforced concrete and FEC slender columns and 2–11% of load increment is recorded by changing the shape of structural steel and keeping other parameters constant. The results of calibrated finite element models revealed that closely spaced tie bars resulted in a good ductility of FEC column with high-strength concrete (HSC). Significant enhancements in the axial load capacity are observed in the case of FEC slender columns than in RC slender columns of the same size and shape. Ductility and residual strength after the failure of FEC columns are also observed to increase significantly with the adoption of tubular structural steel sections. However, increasing the concrete strength results in the reduction of this ductility.

St. Theresa Journal of Humanities and Social Sciences

URL: https://www.researchgate.net/publication/376409749_The_Effects_of_Meaning-focused_Feedback_on_Students'_Essay_Writing_An_Experimental_Study

9(2023)

The Effect of Meaning-focused Feedback on Students' Essay Writing: An Experimental Study

Endelibu Goa[1], Milkias Darza[1], Tesfaye Alemu[1] and Zeleke Arficho[2]

[1]Department of English Language and Literature, Arba Minch University, Ethiopia

Abstract

The purpose of the paper was to look for the effects of Meaning-focused feedback on learners' writing performance. Ninety students from two sections were set in experimental and control group. Random sampling was employed to assign the subjects of the study. Data collection tool contained writing component rubrics, writing achievement pretest and posttest and was analyzed by independent samples t-test. The finding showed that learners developed their writing performance after experiment. Writing achievement results portrayed statistically significant differences between experimental and control group which favor towards implementing meaning-focused feedback in improving students' essay writing achievement in content, organization, cohesion and vocabulary components.

Keywords: Meaning-focused feedback, Essay writing, writing achievement, Writing components

Advances in Condensed Matter Physics

DOI: https://doi.org/10.1155/2023/9332399

2023(2023)

The First-Principles Investigation of Structural Stability, Mechanical, Vibrational, Thermodynamic, and Optical Properties of $CaHfS_3$ for Optoelectronic Application

Mulugetta Kassa[1], Nebiyu Debelo[2], Menberu Woldemariam[2]

[1]Arba Minch University

Abstract

In this study, the structural, electronic, elastic, phonon vibration, thermodynamic features, and optical properties of the orthorhombic phase of (space group *Pnma*) $CaHfS_3$ were examined by first-principles calculations utilizing the plane wave ultrasoft pseudopotentials in generalized gradient approximations (GGAs) and with Hubbard on-site correction (DFT + U). To improve the value of the band gap, the exchange correlation potential is also approximated with Hubbard correction (GGA + U). The equilibrium state properties such as lattice parameters, unit cell volume, bulk modulus, and its derivative were calculated and are in good agreement with the existing data. The mechanical properties such as bulk modulus, shear modulus, Young's modulus, and elastic anisotropy were determined from the obtained elastic constants. The ratio of bulk modulus to shear modulus confirms that the orthorhombic phase of $CaHfS_3$ is a ductile material. In addition, the longitudinal sound velocity, transverse sound velocity, and Debye temperature for $CaHfS_3$ have been computed. The absence of negative frequencies in the phonon dispersion curve and the phonon density of states confirm that $CaHfS_3$ in the orthorhombic phase is dynamically stable. The thermodynamic parameters such as free energy, entropy, and heat capacity were examined with variations in temperature. Finally, the absorption coefficient, dielectric constant, energy loss function, reflectivity, and refractive index are discussed in detail in the spectral range 0–1.6 Ry (21.77 eV). The polarizations along (100), (010), and (001) directions significantly show different optical responses.

Sustainable Development

DOI: https://doi.org/10.1002/sd.2483

31(2023)

The role of permaculture in the integration of indigenous and modern agricultural knowledge: Evidence from Konso, Ethiopia

Tariku Sagoya Gashute[1], Tefera Kagnalew Hale[1]

[1]Department of Civics and Ethical Studies, Arbaminch University, Arba Minch, Ethiopia

Abstract

The modern and indigenous agricultural knowledge have own strength and deficiencies. The modern agriculture with its technological advents has the capability for boosting production. However, it has environmentally hostile externalities. On the other hand, IK of agriculture is nature friendly and organic in its production. However, it is slow to meet the growing need for food because of demographic stress and emerging preferences. Therefore, both sides need innovative responses to capitalize on their strength and avoid limitations. One of the alternatives is to integrate the two systems. Based on this rationale, this study explored the integrative role of permaculture in bridging indigenous and modern agricultural knowledge. Purposive sampling was applied for the selection of the research area and participants. The research approach followed was qualitative. Interview, FGD and observation were used for data collection. Thematic and narrative analysis was used for data analysis. The finding of the study indicated that farmers in the study area were receptive of some of the knowledge from modern agriculture such as improved seeds and some methods such as pest control. But at the same time, they are suspicious about some sides such as the impact of fertilizers, the effectiveness of some improved seed, and concerned about the disappearance of important local seeds. Though it was not deeply implemented those who have the exposure were positive about permaculture, for its philosophy is consistent with their IK. Therefore, if properly implemented permaculture can play important bridging role in the integration of indigenous and modern farming.

Solid State Communications

DOI: https://doi.org/10.1016/j.ssc.2023.115255

371(2023)

The study of structural, electronic, and optical properties of Ti- substituted CaZr1-xTix S3 (x=0.00, 0.25, 0.50, 0.75, and 1.00) for optoelectronic applications: Using GGA and GGA+U

Mulugetta Kassa[1], Nebiyu Debelo[2] , Menberu Woldemariam[2]

[1]Arbaminch University, Arba Minch, Ethiopia

Abstract

In this study, we examined an orthorhombic phase, CaZr1−xTixS3 (x = 0.00, 0.25, 0.50, 0.75, 1.00) (space group Pnma (62)) with B-site Zr substituted by Ti (25%Ti, 50%Ti, 75%Ti) using density functional theory, with the help of a plane wave ultra-soft Pseudopotentials (PW-USPPs) in a generalized gradient approximation (GGA) and with Hubbard onsite correction (DFT + U). The equilibrium state properties such as lattice parameters, unit cell volume, bulk modulus, and its derivative are calculated. The change in concentration of Ti affects the bulk modulus and its derivatives which results in variations in the compressibility and hardness of the material. It is found that CaZr1−xTixS3 with different concentrations of Ti shows a tuned direct band gap located at Γ-symmetry point. The band gap values decrease as impurity concentration increases. The band gap values of CaZr1−xTixS3 (for 0.25, 0.50, 0.75, and 1.00) lie in the optimal energy range (1.0–1.6 eV). Moreover, it is observed that CaZr1−xTixS3 (x = 0.00, 0.25, 0.50, 0.75, 1.00) has a good optical response from the visible to ultraviolet energy range. The results predict these materials may be used in solar cell applications and optoelectronic devices.

Annals of Medicine and Surgery

DOI: https://doi.org/10.1097/ms9.0000000000001560

86(2023)

Tranexamic acid for the prevention and treatment of postpartum hemorrhage in resource-limited settings: a literature review

Kanbiro Gedeno Gelebo [1], Hailemariam Mulugeta [2], Addisu Mossie [3], Kuchulo Geremu [1], Bahiru Darma [1]

[1]Department of Anesthesia, College of Medicine and Health Science, Arba Minch University, Arba Minch.

Abstract

Introduction: Postpartum haemorrhage is a major cause of maternal morbidity and mortality worldwide. Early recognition and appropriate treatment are crucial for managing postpartum haemorrhage.

Objectives: This literature review aimed to evaluate the efficacy of tranexamic acid in the prevention and treatment of postpartum haemorrhage in resource-limited settings.

Search methods: This literature review was conducted based on the Preferred Reporting Items for Systematic Review and Meta-analyses (PRISMA) guidelines. A computerized systematic search of the MEDLINE (PubMed), Google Scholar, and Cochrane databases using a combination of the following Medical Subject Headings (MeSH) terms for PubMed: [(obstetric haemorrhage OR postpartum haemorrhage OR massive obstetric haemorrhage) AND (tranexamic acid OR antifibrinolytic drugs) AND (prophylaxis OR prevention) AND (management OR treatment) AND (resource-limited settings OR resource-limited area OR developing countries)] to find articles published in English since 2010.

Selection criteria: Studies on the obstetric population who underwent vaginal or caesarean delivery, comparing the use of tranexamic acid versus placebo (or no treatment) for treatment (or prevention) of postpartum haemorrhage with the outcome of postpartum haemorrhage rate, blood transfusion requirements, uterotonics requirements, hysterectomy, or mortality were included.

Result: In total, 5315 articles were identified. Following the elimination of duplicates, the methodological quality of 15 studies was evaluated independently, with eligibility determined based on the inclusion and exclusion criteria, as well as outcome variables. Finally, eight articles were included in the review.

Conclusion: This review provides evidence that the administration of tranexamic acid has the potential to decrease the need for blood transfusion, incidence of postpartum haemorrhage, demand for supplementary uterotonics, and maternal morbidity and mortality with marginal adverse effects. Healthcare systems must develop and implement interventions that involve the use of tranexamic acid for the treatment of postpartum haemorrhage in resource-limited settings.

Keywords: blood transfusion; postpartum haemorrhage; resource-limited setting; tranexamic acid

IET Software

DOI: https://doi.org/10.1049/sfw2.12094

17(2023)

Visualization-based binary classification of android malware using vgg16

Aryan Marwaha[1] Rami Qays Malik[2], Shehab Mohamed Beram[3], Rizwan Ali[4], Kakarla Hari Kishore[5], Deepak Thakur[1], Tanya Gera[1], **Mohammad Shabaz[6]**

[6]Arba Minch University Arba Minch Ethiopia

Abstract

Android has gained many patrons these past years due to its great UI as well as affordable price. This grabbed the unwanted attention of various cyber criminals (also known as malware authors), and they saw it as their lucrative target. These lingering malwares around the internet made it hard for the users to distinguish effectively between these malwares and the benign applications. To counteract this loathsome conduct, many approaches or methods were introduced. In this manuscript a visualization-based binary classification architecture for android malware with the help of VGG16 (VBBCAM using VGG16) was introduced. The DREBIN dataset as the dataset in this experiment was used. The architecture converted the application binaries in 15 distinct combinations to create 15 distinct RBG images and were used as separate models. These models were then compared in order to sort the best one out of all. After experimentation, the observations were recorded in a table, and the results were compared with respect to each image combination. An accuracy of 90.57% and an F1 score value of 86.74% (from AC + AM image combination) were achieved. Hence, a conclusion was reached that the AC + AM model was the best with a total execution time of 1498.77 s.

Keywords: Android (operating system), software performance evaluation

Heliyon

DOI: https://doi.org/10.1016/j.heliyon.2023.e23234

10(2023)

Water quality assessment of Elgo river in Ethiopia using CCME, WQI and IWQI for domestic and agricultural usage

Duop Chan Kujiek [a], **Zenebe Amele Sahile [b]**

[B]Faculty of Water Supply and Environmental Engineering, Arba Minch University, P.O. Box. 21, Arba Minch, Ethiopia

Abstract

The increasing demand for water due to the escalation in population and aggressive agricultural activities for drinking and irrigation purposes in the rural areas of Ethiopia has put tremendous stress on water requirements. The Elgo River in southern Ethiopia is deteriorating due to sedimentation, soil erosion, stormwater runoff, and anthropogenic activities. Elgo village faces water shortages and a lack of safe drinking water. The purpose of this research was to identify the extent of pollution in Elgo River water using the Canadian Council of Ministers of the Environment (CCME), Water Quality Index (WQI), and Irrigation Water Quality Index (IWQI). A total of 12 water samples were collected from 3 river sampling sites for the dry and wet seasons to test the physicochemical and biological parameters. Results obtained were: turbidity (46.5–156) NTU, color (103.65–606.5) TCU, EC (182–268) μS/cm, TDS (192.5–275.5) mg/l, TSS (680–2774) mg/l, Ca2+ (22–45) mg/l, Mg2+ (19.5–23.5) mg/l, Cl- (10.5–16.65) mg/l, and SO42- (17.18–47) mg/l for both the dry and wet seasons, respectively. The CCME WQI revealed that the overall results were 38.38 for the dry season and 36.6 for the wet season for drinking water parameters. The CCME WQI categorization indicates that the Elgo River water is classified as poor, with results ranging from 0 to 44. For irrigation purposes 10, parameters such as SAR, PS, PI, MAR, KI, RSC, EC, SSP, TH, and %Na were examined to compute indices using the IWQI model. The overall result of water quality indicated that IWQIs of 81.4 and 62.14 are good for the dry season and poor for the wet season, respectively. This research provides a thorough analysis through modelling to determine the suitability of water for different purposes for the tribal and backward communities of the area.

Keywords: WQI IWQI Elgo river Ethiopia

Journal of Pentecostal Theology

DOI: https://doi.org/10.1163/17455251-bja10033

32(2023)

Women in the Ethiopian Pentecostal Movement

Daniel Worku Kebede[1]

[1]Arba Minch University, Arba Minch, Ethiopia

Abstract

In the early 1960s a Pentecostal movement broke out in Ethiopia and formed the *Mulu Wongel* (the Full Gospel) Church throughout the country. During the free-spirited revival at the early stage of the movement and when the church was closed during the socialist regime, women enjoyed key ministerial and leadership positions. However, women ministers were sidelined when peace was restored and an organized body was established. This article is mainly interested in uncovering women's role in the history of Ethiopian Pentecostal revival and its aftermath based on the information gained from main participants of the movement and important secondary documents. It also underlines the eventual achievement of ministerial equality between men and women despite problems that are still hindering women's involvement in the higher ministerial posts.

Keywords: women; Pentecostalism; ministry; home chapels