

**Hawassa University**  
**Office of Vice President for Research and**  
**Technology**



**Abstracts of Research Articles**  
**Published by Hawassa**  
**University Academic Staff in**  
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**Volume 4**

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**University Academic Staff in 2020**

**Compiled by**  
**Mulye Girma (Ph.D.)**  
**Rahmeto Abebe (Associate Prof)**

**Volume 4**

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## **Foreword**

Hawass University has eight colleges (i.e., College of Agriculture, College of Business and Economics; College of Education; College of Law and Governance; College of Social Sciences and Humanities; College of Natural and Computational Sciences; College of Medicine and Health Sciences; Wondo Genet College of Forestry and Natural resources) and Institutes (i.e., the Institute of Technology; Institute of Policy and Development Research and Institute of Sidama Studies ). The university has diverse and highly educated academic staff who are participating in teaching and research activities in these colleges and institutes. This book compiles abstracts of research articles published by the Academic staff of Hawassa University in 2020 in different local and international academic journals. This compiled abstract is the fourth volume published by the office of the Vice President for Research and Technology Transfer. The fifth volume of this book is finalized, and it will become public soon.

The abstracts included in this volume will be rich resources for academic staff, graduate students, undergraduate students, researchers working in governmental and non-governmental organizations. The book also provides a bird's eye view of diverse research topics with brief details about objectives, methods, analysis, and findings.

I want to convey my deepest appreciation and gratefulness to the academic staff of Hawassa University for their unreserved effort to participate in conducting research and sending their published abstracts to our office. I would also like to thank the staff who participated in compiling abstracts. I would promise you that Hawassa university provides the necessary assistance for academic staff to carry out their research as one of the research Universities selected by the Ministry of Science and Higher Education. Together, we will secure the objective to be one of the research universities' centers, and the university is moving from teaching toward a greater emphasis on research.

Thank you

Tafesse Matewos (Ph.D.)

Vice President for Research and Technology Transfer

Hawassa University

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# Institute of Technology

**Mulugeta, L. (2021). Productivity improvement through lean manufacturing tools in Ethiopian garment manufacturing company. *Materials Today: Proceedings*, 37, 1432–1436.**

## **Abstract**

The major purposes of the use of lean production are to increase productivity, improve product quality, reduce inventory, reduce lead time and eliminate manufacturing waste or non-value-added activities. Case study garment manufacturing company follows the conventional production system and is facing problems concerning, long production lead times, poor line balancing, long transportation and material movement, etc. The main objective of this research is to enhance productivity by minimizing and eliminating problems and wastes found in company and increase market competency by using different lean manufacturing tools like; motion study, work standardization through time study, and line balancing. In the investigation, high work-in-process, poor line balancing, high cycle time and production lead time, unbalance work distribution/assignment, in the company have been found out. After implementation of some lean tools, results observed involve, cycle time is reduced to 32.73%, cycle time is balanced with takt time, work stations are reduced to 14, through time study; SAM of product is standardized to 41 min., production lead time is reduced by 11.8% and productivity is increased by 16.66%. The implementation of the new manufacturing practices can lead to better product quality and greater participation by workers in efforts to improve manufacturing processes, the products, and the company as a whole. It is also examined its impact on the profit of the company by producing quality products and timely delivery, as well customer satisfaction.

**Keywords:** Garment manufacturing, Lean manufacturing, Line balancing, Productivity improvement, Work standardization



**Sivaraj, M., Rajkumar, S., Tesfie, N., & Mulugeta, L. (2020). Effect of Particle Size Distribution and Mixing Homogeneity on Microstructure and Hardness of Sintered Al-TiC Nano Composites.**

**Abstract**

Aluminum matrix infused with titanium carbide (TiC) particles was prepared by means of powder metallurgy process. The effect of TiC addition on microstructure, hardness and electrical conductivity of as-sintered Al-TiC with 2  $\mu\text{m}$  and  $\leq 200$  nm reinforcement were investigated. Microstructure studies reveal the even distribution of TiC particles in the aluminium matrix. With increasing addition of TiC, the hardness of composites increased after the 10% and suddenly reduced because the composites reduce its resistance and create more sites for crack initiation. Hardness and electrical conductivity of composites have been varied based on particle size variation of TiC.

**Keywords:** Microstructure, Al-TiC, Hardness, Density, Metal Matrix Composites & Electrical Conductivity

**Arulmurugan .B1 , S. Rajkumar2 , Lijalem Mulugeta3 & Nega Tesfie4 (2020). Investigation on Effect of Turbulence Intensity and Rib Tabulator in Moisture Diffusion Through Membrane**

**Abstract**

The principal aim of the present work is to study the maximum amount of moisture diffuses through membrane in ventilation ducts with the emphasis of Computational Fluid Dynamics. For thermal comfort reasons, indoor air-conditions around 25°C temperatures and 10 g / kg humidity ratio are the accepted set points. However, the Southern China and other Southeast Asian countries have a long summer season with a daily average temperature of 30°C, and humidity ratio above 17.6 g / kg. Outdoor relative humidity often exceeds 80 % continuously for a dozen of days, leading to mildew growth on wall and furniture surfaces, which affects people's life seriously. Conditioning ventilation air typically requires 20-40 % of the thermal load for commercial. The exchange of moisture between exhaust hot humid air and incoming cold dry air can reduce loads on air conditioning unit to a large extent. The moisture exchange between the two air streams (hot and cold) can be achieved by placing a PVAL / PVDF membrane between the two streams. The objective of the current work is to establish the best practices for Computational Fluid Dynamics

(CFD) simulation and validate the results with experimental data available in the literature. The moisture transfers through the membrane would be modelled using source / sink terms for moisture mass and energy transfer. A number of mesh sensitivity and turbulence models are to be considered for best practice establishment. Optimization is carried out by using Rib Turbulator and varying the turbulence intensity at inlet. The computation results have been compared with the experimental data available in the literature. Gambit software is used for geometry creation and mesh generation. FLUENT is used for solving 3D Navier-Stokes equations and for post-processing.

**Keywords:** Moisture Diffusion; CFD Simulation; Thermal Load; Rib Turbulator; Membrane

**Rajkumar, S., Lijalem, M., Aklilu, T., & Mohanavel, V. (2020). Prediction and Estimation of Electroplating Characteristics, Corrosion Rate of Zinc Coated Mild Steel Coupling. *Carbon*, 100, 0–25.**

### **Abstract**

This present research work is taken to estimate the corrosion rate of zinc coated mild steel coupling with using of Design of Experiments (DOE). Now a day's mild steel materials are simply corroded in the all medium including atmospheric conditions. Overcome of this planed to applying the zinc coating on the mild steel material. In this study considered of normal use of mild steel coupling for the industrial applications. Main goal of this study to evaluate the Coating thickness ( $\mu\text{m}$ ), Change of mass (g) and Corrosion rate (mm/y) of the coupling after coating. The L16 Orthogonal array of Taguchi analysis is engaged to find the response values. The different process parameters are considered for to analysis of electroplating characteristics, corrosion rate. Process parameters are namely current density (0.3 amps/  $\text{dm}^2$ , 0.5 amps/  $\text{dm}^2$ , 0.7 amps/  $\text{dm}^2$  and 0.9 amps/  $\text{dm}^2$ ), concentration of Zinc (10 g/L, 12 g/L, 14 g/L and 16 g/L), coating time (45 min, 60 min, 75 min and 90 min) and temperature (20 oC, 30 oC, 40 oC and 50 oC). Key words: Change of mass; Taguchi; Electroplating; Corrosion rate; DOE; Coupling.

**Asfaw, N. T. (2020). Wear Analysis of Cam and Follower Using Finite Element Method. *International Journal of Mechanical and Production Engineering Research and Development***

**Abstract**

A particular type of contact condition, known as cam and follower contact, exists in the direct valve train system of an engine and is partly responsible for wear. The wear analysis of cam and follower contact system are analyzed with respect to the cam angle and the pressure angle and finite element modeling of cam and follower assembly is done using the ABAQUS analysis software. The contact pressure, von mises' stresses are calculated theoretically and the ABAQUS results are presented in contour plot and numerically. The results showed that the cam rotational angle and the pressure angle had an effect on the contact pressure, on stress distribution and also plays a great role on the surface wear of the contact. The results also showed that the contact pressure, von mises stress and the wear increases with of cam rotational angle and the wear increases linearly with the contact pressure. Based upon the theoretical analyses and ABAQUS analysis, a theoretical model for evaluating the tribological performance of the valve train was developed. A multi-aspect comparison between theoretical and ABAQUS results was made. A good agreement between theoretical and ABAQUS analysis results showed that the model provided a reliable prediction of the tribological characteristics of the cam/roller follower. Three critical portions of the cam could be identified these are the cam basic surface region, cam flank and cam lobe region. The most critical region is the cam lobe region.

**Keywords:** Cam, Follower, Grey Cast Iron, Surface Wear, Finite Element Method, Abaqus

**Tadesse, A., Tesfie, N., Kidane, H., Tefera, D., & Tadesse, K. (2020). Simulation and Experimental Analysis of Solar Dryer For Molding Sand Using Matlab. *Simulation*, 62(10).**

**Abstract**

Silica sand is sand that is used for molding processes. When a catalyst is added to it, it develops the bonding characteristics of the raisin, which binds the silica sand together. Its moisture content (17.24% initial and 0.5% final moisture content) is extremely critical sand additive that can be greatly impact casting quality. In this study flat plate solar collector was used because, it is the most important type of solar collector and it is simple in design, has no moving parts and requires little maintenance. The analysis of heat transfer coefficient (losses) through flat plate collector was

discussed and the techniques that used to reduce these losses also mentioned (by using insulation). This paper presents performance evaluation of solar dryer for silica sand. In the dryer, the heated air from a separate solar collector is passed through a tray, and at the same time, vertical blackened wall of the drying chamber, which is exposed to solar radiation. The results obtained during the test period revealed that the temperatures, moisture removed, drying rate and drying efficiency through drying chamber were decreasing during its upraise path.

**Keywords:** Silica Sand; Temperature; Moisture; Drye; Flat plate collector

**Kidane, H., Tesfie, N., & Tadesse, A. T. K. (2020). Time Series Forecasting the Quantity of Municipal Solid Waste Generation Using Linear Regression Integrated with Moving Average in Mekelle City-Ethiopia.**

### **Abstract**

In highly populated areas like urban areas municipal solid waste (MSW) increases from time to time and it becomes serious issue recently. So it very important to make prediction of the wastes for designing and preparing enough land fill or any other mechanism used to store wastes , to hire enough man power and management system and preparing materials necessary etc. which are used to control the municipal solid waste .In this study Moving Average and linear regression method was used to forecast the municipal solid waste of mekelle city. Thus, the obtained equation used to forecast was,  $Y=0.757808 \cdot X+4.29$  equation found used to forecast the proposed wastes. The Mean Average Percentage Error (MAPE), Root Mean Square Error (RMSE) was used as performance indicators for comparison between predicted and actual data Thus the result of the indicators showed acceptable error (very small error) and this indicated there good agreement between predicted and actual data .

**Keywords**— Forecasting; Linear Regression; Moving Average; Municipal solid waste

**Rajkumar, S., Teklemariam, A., & Mekonnen, A. (2020). Prediction of Surface Roughness in CNC Turning Process using Adaptive Neural Fuzzy Inference System.**

**Abstract**

This paper presents the methodology of surface roughness inspection in CNC Turning process. Adaptive Neural Fuzzy Inference System classifier utilizes to predict the high accuracy roughness value with insisting of surface roughness image. The vision system captures the image and determines the mean value by using ANFIS algorithm. Training sets variables speed, depth of cut, feed rate and mean value are feed as the input and manual stylus probe surface roughness value feed as the output. After the simulation process, the testing input performed and finally getting the vision measurement value. This higher accuracy (above 95%) and low error rate (below 4%) can be achieved by using the ANFIS classifier, which is predominantly helpful for the industry to measure the surface roughness. Assign the quality of the product by evaluating the manual stylus probe and vision measurement value.

**Keywords:** CNC Turning; Al6063; Adaptive Neural Fuzzy Inference System classifier; Stylus Instrument.

**Kidane, H., & Tekel, G. (2020). Design and Analysis of 5 kW wind Turbine Blade for Rural and Remote Areas Institutions in Ethiopia: Case of Degua Warren Kebele. *J Appl Mech Eng*, 9, 334.**

**Abstract**

Small wind turbine has great role in rural and remote areas in which the electric accesses from the grid is difficult. In this paper, horizontal axis wind turbine blade which has capacity of 5 kW was designed and verified with the help of the blade element momentum theory. Using this theory, the twist angle and chord length for each section the mid radius and the local tip speed ratio blade were calculated. Lift force is the main force for operating the wind turbine to produce useful power. Thus, Maximum lift-to-drag ratio is criterion for choosing the air foil family. Here SG air foil family were selected because they specifically designed for small wind turbine.

**Keywords:** Small wind turbine; Blade element momentum theory; Remote areas; SG family

**Rajamoni, R., & Rajkumar, S. (2020). Analysis of Tensile and Compression Strength on Magnesium Hydroxyapatite Composite for Biomedical Implants. *European Journal of Molecular & Clinical Medicine*, 7(10), 75–83.**

#### **Abstract**

This paper focuses on the biomedical implants of bone plates with biodegradable Magnesium composites. ZK30 Mg alloy metal matrix reinforced with five weight fractions of Hydroxyapatite (HAP), have been fabricated using powder metallurgy manufacturing process followed by hot extrusion process. Properties such as Tensile and compression tests were investigated. Scanning Electron Microscopy (SEM) techniques were used for surface fracture analysis. The results obtained shows that the maximum ultimate tensile strength was attained at ZK30 Mg alloy while the least was noted for ZK30/10wt%HAP. In addition, ZK30/2wt%HAP shows a higher ultimate compressive strength. The SEM images of tensile specimen displays ductile fracture for ZK30 Mg alloy and quasi cleavage fracture for Mg composite whereas the compressive specimen indicates ductile fracture for ZK30 Mg alloy and Mg composites. The composite exhibited excellent mechanical properties thereby it can be used for biomedical implants of Bone plates.

**Keywords:** Magnesium Hydroxyapatite Powder Metallurgy mechanical properties Implants

**Muthuraman, S., Sivaraj, M., & Rajkumar, S. (2021). Performance analysis of compression ignition (CI) engine using biodiesel. *Materials Today: Proceedings*, 37, 1422–1426.**

#### **Abstract**

Biodiesel as a by-product of sustainable and renewable diesel attracts the attention of researchers around the world. Studies show that B20 cannot change. This paper aims to evaluate the performance of the engine using pure biodiesel and its mixture. In addition, Jatropha curcas diesel and methanol super-pure diesel blends are used to show the impact on overall engine performance in terms of fuel consumption (BSFC) and thermal braking performance (BTE). From the results, it can be seen that the specific fuel consumption for B100 has changed to 14%. The thermal properties of the brakes are estimated to be higher than B30, while B100's B100 (24%) is close to Jatropha (JOME) diesel fuel (24.5%)

**Sadik, T., Muthuraman, S., Sivaraj, M., & Rajkumar, S. (2021). Experimental evaluation of mechanical properties of polymer matrix composites reinforced with date palm frond fibers from Oman. *Materials Today: Proceedings*, 37, 3372–3380.**

#### **Abstract**

In this study, date palm fronds (DPF) were collected from Sultanate of Oman and treated with NaOH solution. Polymer matrix composite laminates reinforced with DPF fibers of different weight ratio were prepared using vacuum bagging technique. These laminates were subjected to several tests to study their mechanical properties like tensile strength, bending strength, impact strength and hardness. The optimum process parameters for producing the composites with improved mechanical properties were found out by employing the Taguchi method as optimization technique. The scanning electron microscopy (SEM) images of tensile test fractured specimens were studied to interpret the characteristics of DPF fibers.

**Keywords:** DPF fibers, Polymer matrix composites, Vacuum bagging, Mechanical properties, Flexural test

**Loganathan, M., Dinesh, S., Vijayan, V., Ranjithkumar, M., & Rajkumar, S. (2020). Experimental Investigation of Tensile Strength of Fiber Reinforced Polyester by Using Chicken Feather Fiber. *Journal of New Materials for Electrochemical Systems*, 23(1), 40–44.**

#### **Abstract**

In this experimental study essentially focused to the tensile and yield strength of composites of different percentage of Pure Jute fiber with Chicken feather fiber. The major participation of these compositions is pure Jute and minor variations created by the Chicken feather fiber on the basis of weight. There are two variations created for the investigation one is based on four different (A, B, C & D) percentage variation of fiber used and on that each percentage of Chicken feather fiber variations based on five different length of fiber (2mm, 4mm, 6mm, 8mm & 10mm) used for the composites. For these different conditions of composite produced and tensile and yield strength measured from testing and compared.

**Keywords:** Chicken feather fiber, Pure jute, Fiber composite, Tensile strength, Yield strength

**Loganathan, M., Dinesh, S., Vijayan, V., Karuppusamy, T., & Rajkumar, S. (2020). Investigation of Mechanical Behaviour on Composites of Al6063 Alloy with Silicon, Graphite and Fly Ash. *Journal of New Materials for Electrochemical Systems*, 23(1), 36–39.**

#### **Abstract**

In this investigation depend on composites of Al6063 alloy mechanical properties enhancement by mixing the Silicon (Si), Graphite (Gr) and Fly ash. In this case four combinations of specimens were created for investigation. 90% of Al6063 alloy and 5% of Silicon maintained for all the specimens. Graphite used from 1% to 4% with one percentage of incremental and Fly ash from thermal power stations added from 4% to 1% with one percentage of decrement in composite composition. Ultimate tensile strength, yield strength, percentage of elongation and hardness were mainly focused to study.

**Keywords:** Al6063, Silicon, Graphite, Fly ash, Mechanical properties

**Rajkumar, S. (2020). Achieving Effective Learning Habits: Practical and Realistic Methods. *Journal of Seybold Report ISSN NO, 1533, 9211.***

#### **Abstract**

The diction study means the effort to acquire knowledge. The paper is an effort to suggest few effective ways of studying. Students face a lot of difficulties in learning therefore, this paper suggests 10 effective ways to enhance learning and help the students to reach their goals. Learning is not only important for a student, but also for a teacher, professor, scientist or researcher. The effective ways which are carefully calibrated by responses from students will help to learn quickly, efficiently and effectively.

**Keywords:** Learning habits, effective learning, music, diet for learning, timetable.

**Rajkumar, S. (2021). Influence of temperature on flat-wise tensile strength of Al3003 honeycomb sandwich panels. *Materials Today: Proceedings*, 37, 1938–1942.**

#### **Abstract**

Due to high specific modulus, the demand for lightweight structures made of sandwich panels is ever increasing in many Industrial sectors. Numerous research efforts have been taken by various researchers in this area in terms of weight and cost optimization. Sandwich panels consist typically



of two thin face sheets and a lightweight thicker core and the core is joined with the face sheet by adhesive bonds. These panels find wide application in public transport industry, aeronautical sectors, tooling machines, serigraphy and building industries. The bond strength between face sheet and the core depends essentially on the method of manufacture and the geometrical characteristics of the core. Flat-wise tensile tests are recommended to evaluate the bond strength as well as maximum temperature to which the panels can be exposed during service. The results of tensile tests are used in selecting resin materials for engineering applications. Tensile properties frequently are included in material specifications to ensure quality. This paper discusses the experimental method for assessing the Flat-wise tensile tests and the results obtained for sandwich panels bonded with different resins.

**Keywords:** Honeycomb sandwich panel, Adhesive bonding, Flat-wise tensile test

**Arulmurugan, B., Kumar, M. S., Balaji, D., Sathish, S., Rajkumar, S., Arivazhagan, N., Naiju, C., & Manikandan, M. (2020). *Investigation on the Effect of Pulsed Frequency on Microstructure and Hardness of Alloy C-2000 by Current Pulsing* (No. 0148–7191). SAE Technical Paper.**

## **Abstract**

The objective of the study is to investigate the effect of current pulsation frequency on the weld bead microstructure, segregation and hardness of Hastelloy C-2000 weldments. Bead on Plate (BoP) welds were made by using Pulsed Current Gas Tungsten Arc Welding method (PCGTAW) at eleven different frequencies. The weld bead width and depth of penetration was measured with the help of Dinolite macro analyzer. The microstructure of weldments are further examined through optical microscope and Scanning Electron Microscopy (SEM) to identify the type of grain, grain coarsening and extent of the Heat Affected Zone (HAZ). The grain structure turn into finer and equiaxed in all cases and there was an optimum frequency range over which the significant grain refinement was observed. Microsegregation of alloying elements were computed with the aid of Energy Dispersive X-ray Spectroscopy (EDS). Vickers Hardness Tester was used to measure the hardness of the weld samples at ambient conditions. The same optimum frequency range matched with maxima in hardness. The excellent blend of metallurgical characteristics and hardness was realized for the weldments fabricated with 20Hz pulse frequency.

**Georgise, F. B., Jarso, B. B., & Mindaye, A. T. (2020). Model development for coffee processing plant location selection by using AHP method: Case of Guji Zone, Ethiopia. *Cogent Business & Management*, 7(1), 1848110.**

### **Abstract**

It is very difficult to find a suitable location for a coffee processing plant from many alternatives. This research-developed a model by Analytic hierarchy pair wise that gives full information for a coffee processing plant to select a suitable location from alternatives as its objective. The main location factors were analyzed by the Analytic Hierarchy Process (AHP) wise method to rank candidate alternative locations. The questionnaire analysis mainly used Statistical Packaging Social Software (SPSS) and AHP method for weighting and ranking alternative locations according to the evaluation of location criteria priority values. The discussion addressed as the misallocation has an impact on selecting a suitable location before, and it is good to follow this developed model. It is inevitable for the society to update with the growth model and generally pre-coffee processing plant owners are facing problems in selecting a suitable location from alternatives in a Guji Zone. The proposed model has three main sequential stages that focus on reducing the time to decide on a new suitable location. Thus, it reduces the effort for searching and deciding the best location for pre-coffee processors. The result is summarized in the framework model that can lead users to understand the current status and the trend concerning the models and factors used in the primary coffee processing plant location selection decision. This research has proposed a suitable solution for the location problems. Finally, the recommendation was given to coffee processing actors and responsible government offices

**Keywords:** Coffee, Coffee processing plant, Location, Location factors, AHP method, Model

**Georgise, F. B., & Mindaye, A. T. (2020). Kaizen implementation in industries of Southern Ethiopia: Challenges and feasibility. *Cogent Engineering*, 7(1), 1823157.**

### **Abstract**

Continuous improvement strategies are the way of making small incremental improvements in the organization processes. These organizations are in a constant need to maintain a low cost of quality, reduce waste, trim production lines, and speed up manufacturing to achieve a maintain competitiveness. Companies both from developed and developing countries are striving to acquire the habit of improvement using Kaizen, as well as to focus on a customer-driven strategy to

improve productivity. The quality of products and services are continuously amassing marginal improvements over time. Kaizen, a Japanese concept that calls for continuous improvement has introduced in Ethiopia to strengthen organization performance through productivity and quality improvement. Even though, the interest in Kaizen implementation has been elapsed twenty years officially, the fruits of implementation rarely observed. This paper examines the acceptability and feasibility of Kaizen among organization in Southern Nation sand Nationality and People Regional State. A survey of 71 stakeholders and 24 pilot enterprises conducted out using questionnaire, interview, and observation in Region. The study revealed that participants demonstrated willingness to implement Kaizen. However, the study revealed some challenges confronting the feasibility of Kaizen practices. The results of the study have shown that Kaizen is acceptable and suitable among organizations under the study though its feasibility is very challenging. The study also found that the executives of the enterprises did not seem to be committed to the Kaizen teamwork. Though vital for continuous improvement, the front line workers are rarely invited to participate in teamworks.

**Georgise, F. B., & Mindaye, A. T. (2020). Technologies for Storage & Warehouse Management of Coffee Beans in Ethiopia.**

### **Abstract**

The European Union (EU) has recently established maximum limits for Ochratoxin A (OTA) in roasted and soluble coffee as well as for green coffee. Some countries have already established national limits for OTA in green coffee. Cup quality is a complex characteristic which depends on a series of factors such as the species or variety, environmental conditions, agronomical practices, processing systems, storage conditions, industrial processing, beverage preparation and taste of the consumer. This research was carried out to assess coffee storage & warehousing operations along the supply chain coffee from farmers/ cooperative warehouse up to Ethiopian Commodity Exchange (ECX) and Ethiopian Agricultural Commodities Warehouse Service Enterprise (EACWSE) branch warehouse as a case study in Sidama & Gedio Zones. The study employed descriptive analysis in assessing warehousing practices and problems of Coffee supply chain. Site observations and semi structured research were employed as research data collection. Interview questions were sent to various stakeholders, who gave their views on various warehousing practices and problems in accordance with how such problems impacted or influence their work.

All the warehouses are substandard. The warehouses situations accelerate quality deteriorations due to moisture loss. This condition creates disputes and source of conflict because of coffee weight loss and compensation schemes between the top management and store managers. The field result demonstrates a lower level of material handling equipment uses. The warehouse operations are highly labour based. It was recommended that there should be effective strategy in adopting the FIFO principle, regulating trucks, introduction of weighbridge to speed up offloading process at the warehouses. The Coffee production and distribution traceability need to be supported by information communication technologies such as RFID.

**Keywords:** Coffee, Supply chain, Storage, Warehouse.

**Georgise, F; Assefa, B; and Bekele, H (2020). Design of Alternative Warehouse Layout for Efficient Space Utilization: A Case of Modjo Dry Port. Advances in Industrial Engineering and Management**

### **Abstract**

Warehousing is the glue for supply chain coordination. This function has become more important in dry port management in landlocked countries. Ethiopia is one of the landlocked countries use dry ports to mitigate related challenges. Modjo dry port is one of the largest and currently more than 95% of freights flow and first dry port. The flows of unstuffed containers in terminal increase the influences the warehouse operation, the existing dedicated volume of warehouse becomes beyond the dedicated capacity of the warehouse. The layout of the warehouse is not standardized for the flow of freight inside the warehouse. Therefore, the study intends to propose the modified scenarios for the existing warehouse layouts for the reduction of congestion from the warehouse and this, in turn, reduces congestion from the terminal of the dry port. The primary and secondary data were collected to accomplish the study. The primary data were collected by field observation, field survey and secondary data was collected by documented data of dry port. Using analytical hierarchical procedure the Modjo dry port should have to use the layout IV, II, I and III those have the composite weight of 31.63%, 29.199 %, 26.997 %, and 12.17% respectively as well as AHP factors like suitability for travel, store space, proximity to inspection area, and accessibility for forklift scores 7.93%, 51.47%, 5.41%, and 35.19% of priority vector respectively for the selection of alternative layouts. Therefore, Modjo dry port and terminal should have to use pallet racks as per the alternative layout proposed.

**Keywords:** Dry Port, Warehouse, Layout Design, Space Utilization

**Georgise, F. B., Heramo, A. H., & Bekele, H. (2020). Improving Automotive Service Through E-Logistics: A case of Moenco Hawassa, Ethiopia. *International Journal of Economics and Management Systems*, 5.**

## **Abstract**

E-logistics is relatively a new industry has been gained momentum since the emergence of computerized global market and internet in particular E-Commerce. The integration of IT with logistics management is becoming a prerequisite for good logistic management hence the development of E-logistics. The purpose of this study was to determine the effects of E-logistics on logistics performance in order to improve automotive service industry by taking up this technology. The problems have been observed in automotive service was traditional way of service, longer lead times and low customer service level, which highly affects the customer; results major economic impact on the company. So these existing problems can be rectified by using E-logistics that can serve to increase integration of operation and customer service level. In order to meet the key objectives of the research, qualitative and quantitative methods and combination of primary and secondary sources of data have been used. Primary data was collected using observation, interview and questionnaires. A majority of the respondents were being selected from the departments who were directly involved in administering of E-logistics within the company. After the fieldwork, the data was coded and tabulated by use of tables and charts. Data analysis was done using Statistical Package for Social Sciences (SPSS version 25.0). The results provided support for the conceptual frame work, the E-logistics has a positive influence on the performance of the company and adopt it in order to be more competitive in the service business.

**Keywords:** E-logistics, E-commerce, IT, Automotive service improvement, Hawassa

**Bolka, M., & Emire, S. (2020). Effects Of Coffee Roasting Technologies On Cup Quality And Bioactive Compounds of Specialty Coffee Beans. *Food Science & Nutrition*, 8(11), 6120–6130.**

### **Abstract**

The effects of drum, fluidized bed, and traditional type of coffee roasting technologies on the cup quality and bioactive compounds of Yirgacheffe, Harar, and Sidama variety specialty coffee beans grown in Ethiopia were investigated at light, medium, and dark degree of roast from 150°C to 200°C for 7 to 15 min. No significant differences in cup quality were detected among the roasted coffee varieties disregard of the type of roasters. Varietal difference was found to have significant ( $p < .05$ ) effect on caffeine content of the coffee beans. A significant reduction in trigonelline and total chlorogenic acids content of the coffee beans was observed during roasting process, with darker roasts attaining the least values. Drum roaster was found to be the best type of coffee roaster for specialty coffee beans at medium degree of roast with the highest cup quality, optimum bioactive compounds content, and minimum acrylamide formation. However, traditional roaster resulted at the least average cup score of 80% among the three coffee samples and the highest acrylamide content of 2.306 mg/L for Yirgacheffe coffee sample at light degree of roast. There are still some bottlenecks that need to be addressed via advancements using novel food processing technologies in order to devise the next generation of coffee processing.

**Alemayehu, A. A., Muluneh, A., Moges, A., & Kendie, H. (2020). Estimation of Sediment Yield And Effectiveness of Level Stone Bunds to Reduce Sediment Loss in The Gumara-Maksegnit Watershed, Nile Basin, Ethiopia. *Journal of Soils and Sediments*, 20(10), 3756–3768.**

### **Abstract**

#### **Purpose**

Soil erosion is one of the most significant environmental problems in the Ethiopian highlands. The study was conducted in the main Gumara-Maksegnit watershed and at the sub-catchment scale with and without soil and water conservation (SWC) measures to estimate event-based sediment yield and evaluate the effectiveness of level stone bunds on sediment reduction.

#### **Materials and methods**

The runoff volume and peak discharge were recorded manually with the help of a time series of pictures using the DOERR digital camera. The sediment concentration was determined from manual runoff samples and grid-based soil samples were collected at 162 points. The slope map and satellite image were obtained from the USGS Earth Explorer database with 30-m and 15-m spatial resolutions, respectively. Finally, all six-model factors were combined using the raster calculator in map algebra through the MUSLE framework. The paired t test parametric procedures were applied to test whether the means of event-based predicted and observed sediment yield values are different.

## Result and discussion

The average event-based observed and estimated sediment yields were 0.5581 and 0.4031 Mg ha<sup>-1</sup> for the Gumara-Maksegnit watershed, 0.5125 and 0.4194 Mg ha<sup>-1</sup> for the treated (with SWC) sub-catchment, and 1.0694 and 1.0150 Mg ha<sup>-1</sup> for the untreated (without SWC) sub-catchment, respectively. The observed and estimated sediment losses within the main watershed and sub-catchments were not significantly different. However, comparing the treated and untreated sub-catchments, the sediment losses were highly significantly different and the stone bunds have a capacity for reducing sediment loss by 58.8%. In general, the MUSLE model performed well to estimate sediment yield in the study area with R<sup>2</sup> values of 0.62, 0.72, and 0.7 and NSE values of 0.53, 0.71, and 0.34 for treated, untreated, and the main Gumara-Maksegnit watershed, respectively.

## Conclusion

The results showed that stone bunds have a capacity for reducing sediment loss by 58.8% as compared with untreated sub-catchment. Therefore, successful implementation of stone bunds in the study area, as well as similar agro-ecologies, has a great benefit to enhance land productivity. Meanwhile, the MUSLE model was well suited for reliable applications of sediment yield estimation in the study area.

**Girmay, G., Moges, A., & Muluneh, A. (2020). Estimation of Soil Loss Rate Using The Usle Model For Agewmariayam Watershed, Northern Ethiopia. *Agriculture & Food Security*, 9(1), 1–12.**

## **Abstract**

### **Background**

Soil erosion and nutrient depletion threaten food security and the sustainability of agricultural production in sub-Saharan Africa. Estimating soil loss and identifying hotspot areas support combating soil degradation. The aim of this paper is to estimate the soil loss rate and identify hotspot areas using USLE model in the Agewmariam watershed, northern Ethiopia.

### **Methods**

Rainfall erosivity factor was determined from annual rainfall, soil erodibility factor from soil data, slope length and gradient factor were generated from DEM, cover factor and conservation practice factor obtained from land use cover map. Finally, the parameters were integrated with ArcGIS tools to estimate soil loss rates of the study watershed.

### **Results**

Mean annual soil loss rates were estimated to be between 0 and 897 t ha<sup>-1</sup> year<sup>-1</sup> on flatter and steeper slopes, respectively. The total annual soil loss was 51,403.13 tons from the watershed and the annual soil loss rate of the study area was 25 t ha<sup>-1</sup> year<sup>-1</sup>. More than 33% of the study areas were above tolerable soil loss rate (11 t ha<sup>-1</sup> year<sup>-1</sup>). The spatial risk categorization rate was 67.2% severe (> 51 t ha<sup>-1</sup> year<sup>-1</sup>), 5.4% very high (31–50 t ha<sup>-1</sup> year<sup>-1</sup>), 5.8% high (19–30 t ha<sup>-1</sup> year<sup>-1</sup>), 3.2% moderate (12–18 t ha<sup>-1</sup> year<sup>-1</sup>) and 18.3% slight (0–11 t ha<sup>-1</sup> year<sup>-1</sup>).

### **Conclusion**

The results showed that the severity of erosion occurred on the steep slope cultivation, absence of conservation measures, and sparse nature of the vegetation cover. This area required immediate action of soil and water conservation which accounts for about 33.5% of the total watershed.

**Girma, R., Abraham, T., & Muluneh, A. (2020). Quantitative Evaluation of Watershed Attributes for Water Resources Management in The Rift Valley Lakes Basin, Ethiopia: A Case From Tikur Wuha River Watershed. *Applied Water Science*, 10(8), 1–15.**

## **Abstract**

Characterization of watershed hydrological process is vital for sustainable water resource management. The principal goal of this study was to investigate the inference of drainage attributes on basic hydrological processes using spatial-based morphometric analysis on Tikur Wuha river watershed. The result obtained indicated that the area was characterized with fifth-order stream. Drainage area with higher stream order has lower infiltration capacity, and the shorter stream



lengths were associated with the steepness of the area which affects water flow. Based on  $N_u$  value, sub-watersheds were categorized in the active erosion stage (SW7) and matured topography development (SW6). The interpretation from watershed geometry identified circular areas most susceptible to rapid hydrological response (SW11). Hydrological process and underlying materials are mainly correlated with the drainage texture parameter, and the lower the values indicated less rocky terrain and very high infiltration capacity which contributes toward less erosion (SW11). Relief parameters such as  $R_r$  value indicate the rate of stream flow and are well used in sediment yield estimation. The findings of this investigation will provide core information for water resource planning and further studies like identification of groundwater potential zones; flood risk assessment; erosion-prone area prioritization; and to select suitable sites for the construction of water harvesting structures.

**Smith, J., Nayak, D., Datta, A., Narkhede, W. N., Albanito, F., Balana, B., Bandyopadhyay, S. K., Black, H., Boke, S., & Brand, A. (2020). A Systems Model Describing the Impact of Organic Resource Use on Farming Households In Low To Middle Income Countries. *Agricultural Systems*, 184, 102895.**

### **Abstract**

We present a new systems model that encompasses both environmental and socioeconomic outcomes to simulate impacts of organic resource use on livelihoods of smallholder farmers in low to middle income countries. It includes impacts on soils, which in many countries are degrading with long term loss of organic matter. Many farmers have easy access to animal manures that could be used to increase soil organic matter, but this precious resource is often diverted to other purposes, such as fuels, also resulting in loss of the nutrients needed for crop production. This model simulates impacts of different management options on soil organic matter turnover, availability of water and nutrients, crop and animal production, water and energy use, labour requirements and household income and expenditure. An evaluation and example application from India are presented and used to illustrate the importance of considering the whole farm system when developing recommendations to help farmers improve their soils.

**Keywords:** Whole farm system modelling, Organic resource use, Farm livelihood, Nitrogen use efficiency, Soil water, Carbon sequestration

**Muluneh, A. (2020). Impact of Climate Change on Soil Water Balance, Maize Production, And Potential Adaptation Measures in The Rift Valley Drylands of Ethiopia. *Journal of Arid Environments*, 179, 104195.**

### **Abstract**

The dominant effect of climate change in Africa will be in altered water balances. The objectives of this study were: 1) to assess the impact of climate change on soil water balance and maize production, 2) to evaluate the effect of tied-ridges and increased fertilizer use as potential adaptation options during 2021–2050 & 2066–2095 periods. The MarkSimGCM daily weather generator was used to generate projected climate data using the outputs from ECHAM5 and ensemble mean of six GCMs. AquaCrop model was used for modeling soil water balance and evaluating adaptation options. During the 2021–2050 & 2066–2095 projection periods, the maize growing season (March–September) reference evapotranspiration (ET<sub>o</sub>) increased by 5% and 14%, respectively. During the two projected periods, there was a decrease in runoff & transpiration and an increase in evaporation. The maize yield projected to decrease by about 9% during both periods. The combined effect of tied ridges and increased fertilizer under elevated CO<sub>2</sub> concentration increased the crop yield by almost 90% during the 2021–2050 climate projection periods. The yield increase was a result of decreased evaporation and runoff and an increase in transpiration from tied ridges and increased soil fertility as well as carbon dioxide (CO<sub>2</sub>) fertilization effect.

**Keywords:** AquaCrop, Climate change, Climate change adaptation, Maize yield, Soil water balance

**Kefelegn, A., & Gebre, A. (2020). Performance of Self-compacting Concrete Used in Congested Reinforcement Structural Element. *Engineering Structures*, 214, 110665.**

### **Abstract**

Self-Compacting Concrete (SCC) is a concrete which can be placed under its own weight without any means of vibration. Furthermore, it can be handled without segregation and bleeding. This research compares the structural performance of congested reinforcement beams cast with Self Compacting Concrete (SCC) and identical beams cast with Vibrated Concrete (VC). In this research, beam specimens with same geometric cross-section, length, and stirrup configuration and different longitudinal reinforcement ratios were casted. A total of six beams (four cast with SCC

and two cast with VC) are tested in the experimental investigation under monotonic mid-span concentrated loading. The test results showed that SCC performed better in congested reinforcement beam than the referenced VC. The study also indicated that the difference in mix composition of SCC from that of VC has no effects on the service load deflection response of reinforced concrete beam.

**Keywords** Self-Compacting Concrete, Vibrated concrete, Congested reinforcement, Mix composition, Service load-deflection

**Kaushik, R., Mahela, O. P., Bhatt, P. K., Khan, B., Padmanaban, S., & Blaabjerg, F. (2020). A Hybrid Algorithm for Recognition of Power Quality Disturbances. *IEEE Access*, 8, 229184–229200.**

### **Abstract**

An algorithm making use of hybrid features of Hilbert transform (HT) and Stockwell transform (ST) to identify the single-stage and multiple (multi-stage) power quality disturbances (PQDs) is introduced in this manuscript. A power quality index (PI) and time location index (TLI), based on the features computed from the voltage signal by the use of HT and ST are proposed for recognition of the PQDs. Four features extracted from the PI and TLI are considered for classification of the PQDs achieved using decision tree driven by rules. The algorithm is tested on the PQDs generated with the help of mathematical models (in conformity with standard IEEE-1159). Performance is evaluated on 100 data set of every disturbance computed by varying various parameters, and efficiency is found to be greater than 99%. It is established that an algorithm is effective for recognition of PQ events with an efficiency greater than 98% even in the presence of high-level noise. Algorithm is faster compared to many reported techniques and scalable for application to voltages of all range. Results are validated through comparison with the results of the algorithms reported in the literature. Performance of the algorithm is effectively validated on the practical utility network. This algorithm can be effectively implemented for designing the power quality (PQ) monitoring devices for the utility grids.

**Kulshrestha, A., Prakash Mahela, O., Gupta, M. K., Khan, B., Haes Alhelou, H., & Siano, P. (2020). Hybridization of the Stockwell Transform and Wigner Distribution Function to Design a Transmission Line Protection Scheme. *Applied Sciences*, 10(22), 7985.**

### **Abstract**

The complexity of power system networks is increasing continuously due to the addition of high capacity transmission lines. Faults on these lines may deteriorate the power flow pattern in the network. This can be avoided by the use of effective protection schemes. This paper presents an algorithm for detecting and classifying faults on the transmission network. Fault detection is achieved by utilizing the fault index, which depends on a combination of characteristics extracted from the current signal by the application of the Stockwell transform and Wigner distribution function (WDF). Various faults are categorized using the quantity of phases with a faulty nature. The fault events like phase to-ground (L-G), two phases (LL), two phases to-ground (LL-G), and three phases to-ground (LLL-G) are investigated in this study. The performance of the algorithm designed for the protection scheme is tested for the variations in the impedance during the fault event, variations in the angle of the fault incidence, different fault locations, the condition of the power flow in the reverse direction, the availability of noise, and the fault on the hybrid line consisting of two sections of underground cable and the overhead line. The algorithm is also analyzed for discriminating switching incidents from fault cases. A comparative study is used to establish the superiority of the proposed technique as compared to the Wavelet transform (WT) based protection scheme. The performance of the protection technique is established in MATLAB/Simulink software using a test network of the transmission line with two terminals.

**Keywords:** Fault; Power system; Stockwell transform; Transmission line protection; Wigner distribution function

**Singh, P., Khan, B., Alhelou, H. H., & Mahela, O. P. (2020). Impressions of remote area electrification on social and economic indicators [J]. *AIMS Energy*, 8(6), 1045–1068.**

### **Abstract**

The development of any country depends on the electrification of rural regions as most of the population is residing in rural areas. Development is counted in terms of per capita energy consumption as well as even distribution of electricity. This paper presents an investigation of the impact of rural electrification on lighting, studying, energy expenditure, and income. Data has been

collected from southern region rural villages. Some villages are connected and some are nonconnected with the grid. To estimate the decision probability of getting connected from households, electrified and non-electrified villages are evaluated. These observations are used to determine the impact of electrification of rural areas on resultant indicators. The authors observed a minor positive effect on home study and income, whereas a major effect on lighting usage. Finally, the potential improvements in the socio-economical status of rural people by improved lighting are highlighted.

**Keywords:** rural electrification; electrification impact assessment; propensity score; matching algorithms

**Pachauri, R. K., Mahela, O. P., Sharma, A., Bai, J., Chauhan, Y. K., Khan, B., & Alhelou, H. H. (2020). Impact of Partial Shading on Various PV Array Configurations and Different Modeling Approaches: A Comprehensive Review. *IEEE Access*, 8, 181375–181403.**

### **Abstract**

Since the last decade, partial shading conditions (PSCs) and its adverse influences on photovoltaic (PV) system performance have received due attention. It motivates researchers to explore methods to diminish/disperse the shading effects and/or novel PV array configurations to sustain under PSCs. To diminish the effects of PSCs, this article presents a comprehensive review of various PV array configuration models for PV systems and metaheuristic approaches for shade dispersion effectively. Different PV array modeling approaches are identified, emphasizing their benefits, inadequacies and categorized according to vital features such as shade dispersion and improved performance in terms of efficiency; fill factor (FF), and maxima power, minimized power losses (PL) primarily. Besides these various PV array configurations such as hybrid, reconfigured, mathematical/game puzzle based advanced configurations are uniquely discussed with the existing configurations. In the current scenario, the metaheuristic algorithms are explored and widely accepted by researchers due to the less wire length requirement for PV array reconfiguration. This article discusses and deliberates recent developments in methods of solar PV performance enhancement that deserves further study. Overall, the present study is helpful for academicians and researchers in the committed solar power installation area.

**Mahela, O. P., Shaik, A. G., Khan, B., Mahla, R., & Alhelou, H. H. (2020). Recognition of Complex Power Quality Disturbances Using S-Transform Based Ruled Decision Tree. *IEEE Access*, 8, 173530–173547.**

## **Abstract**

Deteriorated quality of power leads to problems, such as equipment failure, automatic device resets, data errors, failure of circuit boards, loss of memory, power supply issues, uninterrupted power supply (UPS) systems generate alarm, corruption of software, and heating of wires in distribution network. These problems become more severe when complex (multiple) power quality (PQ) disturbances appear. Hence, this manuscript introduces an algorithm for identification of the complex nature PQ events in which it is supported by Stockwell's transform (ST) and decision tree (DT) using rules. PQ events with complex nature are generated in view of IEEE-1159 standard. Eighteen different types of complex PQ issues are considered and studied which include second, third, and fourth order disturbances. These are obtained by combining the single stage PQ events such as sag & swell in voltage, momentary interruption (MI), spike, flicker, harmonics, notch, impulsive transient (IT), and oscillatory transient (OT). The ST supported frequency contour and proposed plots such as amplitude, summing absolute values, phase and frequency-amplitude obtained by multi-resolution analysis (MRA) of signals are used to identify the complex PQ events. The statistical features such as sum factor, Skewness, amplitude factor, and Kurtosis extracted from these plots are utilized to classify the complex PQ events using rule-based DT. This is established that proposed approach effectively identifies a number of complex nature PQ events with accuracy above 98%. Performance of the proposed method is tested successfully even with noise level of 20 dB signal to noise ratio (SNR). Effectiveness of the proposed algorithm is established by comparing it with the methods reported in literature such as fuzzy c-means clustering (FCM) & adaptive particle swarm optimization (APSO), Wavelet transform (WT) & neural network (NN), spline WT & ST, ST & NN, and ST & fuzzy expert system (FES). Results of simulations are val...

**Mahela, O. P., Khan, B., Alhelou, H. H., & Tanwar, S. (2020). Assessment of Power Quality in The Utility Grid Integrated With Wind Energy Generation. *IET Power Electronics*, 13(13), 2917–2925.**

### **Abstract**

The ever increasing wind energy penetration into the utility grid causes challenges in the power quality (PQ) of the electrical supply. Therefore, this work proposed PQ assessment in the utility grid which is interfaced with the wind energy generation using Stockwell's transform (ST) under various operating events. The experimental set-up for assessing the PQ included an emulated wind generator synchronised with the utility grid at the point of common coupling. The current and voltage measurements are carried out using PQ analyser associated with WTVIEWER application software. The recorded signals of the voltage waveforms are assessed using ST to detect the various PQ issues related to the grid integration and wind generator's outage. To investigate the effects of various types of loads on the PQ, the same events are carried out. Various PQ disturbances are successfully detected using the proposed algorithm. Performance of the proposed algorithm is also tested on the grid integrated solar photovoltaic (PV) system to investigate and compare the PQ disturbances associated with the grid integrated solar PV system.

**Gebre, F. M., Khan, B., & Alhelou, H. H. (2020). Analyzing Low Voltage Ride Through Capability of Doubly Fed Induction Generator Based Wind Turbine. *Computers & Electrical Engineering*, 86, 106727.**

### **Abstract**

Doubly-fed induction generators (DFIGs)-based wind turbine (WT) are the major sources of renewable energy generation around the world. The low voltage ride-through (LVRT) capability of such sources must be improved to keep them connected with the grid during faults. Due to its sensitivity to the grid disturbances, proper arrangements should be made to keep DFIG connect to the grid. Therefore, this paper implements the crowbar resistance protection scheme on the practical 153MW ADAMA-II wind farm, situated in Ethiopia, for enhancing the LVRT of WT. The dynamic performance of the DFIG-based WT incorporated with the crowbar resistance is analyzed and compared under steady-state and symmetrical grid disturbances. To show the effectiveness of the proposed scheme, the dynamic performance is analyzed and compared with

the existing capacitor bank system by observing various parameters. For modeling and simulation purposes, MATLAB/Simulink software is utilized in this research study. The results verify the superiority of the proposed LVRT capability in practice.

**Agajie, T. F., Khan, B., Alhelou, H. H., & Mahela, O. P. (2020). Optimal Expansion Planning of Distribution System Using Grid-Based Multi-Objective Harmony Search Algorithm. *Computers & Electrical Engineering*, 87, 106823.**

### **Abstract**

To meet the future power demand, distribution systems (DSs) need to be optimally planned. In this paper, an optimal expansion planning approach of DS is suggested. The capability of the existing DS is evaluated and load forecasting for next ten years is performed. Further, the load flow analysis by using backward-forward sweep algorithm is performed. Results show that existing networks would not be able to meet the future demand and due to this, voltage drop (VD) and power losses might be increased. Therefore, DS expansion planning is carried out considering future demand growth and distributed generation (DG) placement using grid dependent multi-objective harmony search algorithm (GrMHSA). The implementation of GrMHSA optimization technique reduces the total losses as well as VD for the targeted year. A practical Debre Markos (D/M) distribution network of Ethiopia is used for illustrating the superiority of the proposed technique and verifies its effectiveness.

**Keywords:** Distribution network planning, Load forecasting, Least-square method, Backward-forward sweep load flow, Power loss minimization



**Rathore, B., Mahela, O. P., Khan, B., Alhelou, H. H., & Siano, P. (2020). Wavelet-Alienation-Neural-Based Protection Scheme for STATCOM Compensated Transmission Line. *IEEE Transactions on Industrial Informatics*, 17(4), 2557–2565.**

### **Abstract**

The custom power devices play important role for enhancing the power transfer capacity of transmission system. However, these devices introduce challenges of under reach or over reach, in the protection of transmission system. This article introduces a novel, protection algorithm based on wavelet-alienation-neural technique for STATCOM-compensated transmission system. For detecting and classifying faults, approximate coefficients are computed from the postfault quarter cycle current waveforms. Fault index, which is summation of alienation coefficients (computed by approximate coefficients) of both the buses, is computed and compared with the threshold magnitude for detecting and classifying the different faults. For the determination of fault location, artificial neural network is applied, with input as three-phase approximate coefficients, evaluated from the voltage and current signals over a time duration of a quarter cycle. Robustness of the developed scheme has been validated for various faults at different locations with varying fault impedances and angles of fault incidence.

**Ali, S., Bhargava, A., Singh, R., Mahela, O. P., Khan, B., & Alhelou, H. H. (2020). Mitigation of Power Evacuation Constraints Associated With Transmission System Of Kawai-Kalisindh-Chhabra thermal power complex in Rajasthan, India [J]. *AIMS Energy*, 8(3), 394–420.**

### **Abstract**

Transmission system of the Rajasthan state, India is used to transfer power from the centralized generating stations to load centers. There is a thermal complex in the Kota region which includes four thermal power stations (TPS). These are Kawai Super Critical TPS (SCTPS), Chhabra TPS, Chhabra SCTPS, and Kalisindh TPS. Existing transmission system is not sufficient to evacuate power from this thermal complex during the contingency conditions. Hence, restructuring of the existing power network is required to mitigate the power evacuation constraints from this thermal complex. This research presents an optimized design for the restructuring of the transmission network associated with this thermal complex to mitigate power evacuation constraints. This is achieved by analysing the various possible options of the creation of various 400/220 kV GSS or 220/132 kV GSS in the region. Research also considered replacement of the existing ICTs at the

thermal power stations by ICTs of higher ratings. The strength of the proposed restructured power system network is tested during various contingency conditions so that the power system network always takes care of power evacuation from the thermal complex and avoids the requirement of backing down the generation. Modified network is tested using the load flow study as well as a short circuit study. Results of these studies established that creation of 400/220 kV GSS at Sangod will be technically most feasible, effective and sufficient to mitigate the power evacuation constraints 395 AIMS Energy Volume 8, Issue 3, 394–420. associated with the thermal complex. The study is performed using the MiPower software.

**Keywords:** Power evacuation constraint; Load flow study; Short circuit study; Thermal power plant; Transmission system; Utility grid

**Kiros, S., Khan, B., Padmanaban, S., Haes Alhelou, H., Leonowicz, Z., Mahela, O. P., & Holm-Nielsen, J. B. (2020). Development of Stand-Alone Green Hybrid System for Rural Areas. *Sustainability*, 12(9), 3808.**

## **Abstract**

Despite the tremendous efforts exhibited by various utilities around the world during the past few years, there are still exceedingly many remote regions unreachable by the electrical grid. For those regions, the enormous available potential of renewable energy resources is believed to be useful for the development of a stand-alone power supply system. This paper presents the modeling of a stand-alone hybrid system for the remote area of Ethiopia. A comparison of the economic performance of various scenarios of a stand-alone photovoltaic (PV)-wind hybrid system, with battery storage and diesel as a backup for electrifying remote rural areas, is presented. Therefore, a practical example, Kutur village of Awlio kebele of the Axum district, Ethiopia (which is 30 km away from the closest national grid) is considered for this research. Two electric load scenarios are estimated by considering the set of incandescent and efficient lamps for lighting for the 120 existing households. The above-mentioned solar radiation and wind speed are then used as an input to simulate the hybrid set-up for the high and low load estimation using HOMER software. The simulation result shows that the net present costs (NPC) corresponding to the high and low load scenarios is \$262,470 and \$180,731, respectively. Besides, an essential load forecasting is performed to see the effect of the increase in electric demand of the community on the required investment to install a stand-alone hybrid set-up. The NPC after load forecasting is found to be

more than three folds of the NPC required for the reference year. In both cases, the simulation results indicate that using a stand-alone PV-wind hybrid system with battery storage and a diesel generator as a backup for electrifying Kutur village is cost-effective and comparable against the cost required for electrifying the village by extending the grid. [View Full-Text](#)

**Keywords:** Grid access; hybrid PV-wind; Battery storage; Diesel generator; HOMER

**Yogee, G. S., Mahela, O. P., Kansal, K. D., Khan, B., Mahla, R., Haes Alhelou, H., & Siano, P. (2020). An Algorithm for Recognition of Fault Conditions in The Utility Grid With Renewable Energy Penetration. *Energies*, 13(9), 2383.**

### **Abstract**

Penetration level of renewable energy (RE) in the utility grid is continuously increasing to minimize the environmental concerns, risk of energy security, and depletion of fossil fuels. The uncertain nature and availability of RE power for a short duration have created problems related to the protection, grid security, power reliability, and power quality. Further, integration of RE sources near the load centers has also pronounced the protection issues, such as false tripping, delayed tripping, etc. Hence, this paper introduces a hybrid grid protection scheme (HGPS) for the protection of the grid with RE integration. This combines the merits of the Stockwell Transform, Hilbert Transform, and Alienation Coefficient to improve performance of the protection scheme. The Stockwell Transform-based Median and Summation Index (SMSI) utilizing current signals, Hilbert Transform-based derivative index (HDI) utilizing voltage signals, and Alienation Coefficient index (ACI) utilizing voltage signals were used to compute a proposed Stockwell Transform-, Hilbert Transform-, and Alienation-based fault index (SAHFI). This SAHFI was used to recognize the fault conditions. The fault conditions were categorized using the number of faulty phases and the proposed Stockwell Transform and Hilbert Transform-based ground fault index (SHGFI) utilizing zero sequence currents. The fault conditions, such as phase and ground (PGF), any two phases (TPF), any two phases and ground (TPGF), all three phases (ATPF), and all three phases and ground (ATPGF), were recognized effectively, using the proposed SAHFI. The proposed method has the following merits: performance is least affected by the noise, it is effective in recognizing fault conditions in minimum time, and it is also effective in recognizing the fault conditions in different scenarios of the grid. Performance of the proposed approach was found to be superior compared to the discrete wavelet transform (DWT)-based method reported in the

literature. The study was performed using the hybrid grid test system realized by integrating wind and solar photovoltaic (PV) plants to the IEEE-13 nodes network in MATLAB software.

**Keywords:** Alienation coefficient; Fault recognition; Hilbert transform; Protection scheme; Renewable energy; Stockwell transform; Utility grid

**Singh, P., Khan, B., Mahela, O. P., Haes Alhelou, H., & Hayek, G. (2020). Managing Energy Plus Performance in Data Centers and Battery-Based Devices Using an Online Non-Clairvoyant Speed-Bounded Multiprocessor Scheduling. *Applied Sciences*, 10(7), 2459.**

### **Abstract**

An efficient scheduling reduces the time required to process the jobs, and energy management decreases the service cost as well as increases the lifetime of a battery. A balanced trade-off between the energy consumed and processing time gives an ideal objective for scheduling jobs in data centers and battery based devices. An online multiprocessor scheduling multiprocessor with bounded speed (MBS) is proposed in this paper. The objective of MBS is to minimize the importance-based flow time plus energy (IbFt+E), wherein the jobs arrive over time and the job's sizes are known only at completion time. Every processor can execute at a different speed, to reduce the energy consumption. MBS is using the tradition power function and bounded speed model. The functioning of MBS is evaluated by utilizing potential function analysis against an offline adversary. For processors  $m \geq 2$ , MBS is  $O(1)$ -competitive. The working of a set of jobs is simulated to compare MBS with the best known non-clairvoyant scheduling. The comparative analysis shows that the MBS outperforms other algorithms. The competitiveness of MBS is the least to date.

**Keywords:** Multiprocessor system; Online non-clairvoyant scheduling; Weighted flow time; Potential analysis; energy efficiency

**Ram Ola, S., Saraswat, A., Goyal, S. K., Sharma, V., Khan, B., Mahela, O. P., Alhelou, H. H., & Siano, P. (2020). Alienation Coefficient and Wigner Distribution Function Based Protection Scheme for Hybrid Power System Network With Renewable Energy Penetration. *Energies*, 13(5), 1120.**

### **Abstract**

The rapid growth of grid integrated renewable energy (RE) sources resulted in development of the hybrid grids. Variable nature of RE generation resulted in problems related to the power quality (PQ), power system reliability, and adversely affects the protection relay operation. High penetration of RE to the utility grid is achieved using multi-tapped lines for integrating the wind and solar energy and also to supply loads. This created considerable challenges for power system protection. To overcome these challenges, an algorithm is introduced in this paper for providing protection to the hybrid grid with high RE penetration level. All types of fault were identified using a fault index (FI), which is based on both the voltage and current features. This FI is computed using element to element multiplication of current-based Wigner distribution index (WD-index) and voltage-based alienation index (ALN-index). Application of the algorithm is generalized by testing the algorithm for the recognition of faults during different scenarios such as fault at different locations on hybrid grid, different fault incident angles, fault impedances, sampling frequency, hybrid line consisting of overhead (OH) line and underground (UG) cable sections, and presence of noise. The algorithm is successfully tested for discriminating the switching events from the faulty events. Faults were classified using the number of faulty phases recognized using FI. A ground fault index (GFI) computed using the zero sequence current-based WD-index is also introduced for differentiating double phase and double phase to ground faults. The algorithm is validated using IEEE-13 nodes test network modelled as hybrid grid by integrating wind and solar energy plants. Performance of algorithm is effectively established by comparing with the discrete wavelet transform (DWT) and Stockwell transform based protection schemes.

**Keywords:** Alienation coefficient; Hybrid power system network; Protection; Power system fault; Solar energy; Wind energy; Wigner distribution function

**Mahela, O. P., Khan, B., Alhelou, H. H., & Siano, P. (2020). Power Quality Assessment and Event Detection in Distribution Network With Wind Energy Penetration Using Stockwell Transform and Fuzzy Clustering. *IEEE Transactions on Industrial Informatics*, 16(11), 6922–6932.**

#### **Abstract**

Power quality (PQ) is a vital issue in the present power systems integrated with large renewable energy sources since more power electronics devices are incorporated in the system. This article proposes a novel method for assessing PQ associated with wind energy integration. This method is effective to recognize PQ issues in power systems with high penetration of wind energy with a low computational burden. Furthermore, it detects different operational issues in the distribution network. Stockwell transform (S-transform) is utilized to decompose the voltage signal and calculate the S-matrix. To assess the PQ, a plot is developed from this matrix. The features of this matrix such as mean, standard deviation, and maximum deviation are further utilized for detecting the operational issues such as wind speed variation, islanding, synchronization, and outage of the wind generation by using clustering with fuzzy C-means. A modified IEEE 13-bus test system is utilized to validate the proposed method, which is also supported by hardware and real-time digital simulator results. The quality of power is graded with the help of a proposed PQ index under various operational events with different levels of wind energy penetration. The proposed method is effective for the identification and grading of different operational events in terms of PQ and recognizing a wide range of PQ issues with a high share of wind energy. The performance of the proposed scheme is established by comparing its results with other approaches.

**Aliye, M. A., Aliye, M. A., Aga, A. O., Tadesse, T., & Yohannes, P. (2020). Evaluating the Performance of HEC-HMS and SWAT Hydrological Models in Simulating the Rainfall-Runoff Process for Data Scarce Region of Ethiopian Rift Valley Lake Basin. *Open Journal of Modern Hydrology*, 10(04), 105.**

#### **Abstract**

A number of physically-based and distributed watershed models have been developed to model the hydrology of the watershed. For a specific watershed, selecting the most suitable hydrological model is necessary to obtain good simulated results. In this study, two hydrologic models, Soil and Water Assessment Tool (SWAT) and Hydrological Engineering Centre-The Hydrologic Modeling System (HEC-HMS), were applied to predict streamflow in Katar River basin, Ethiopia. The

performances of these two models were compared in order to select the right model for the study basin. Both models were calibrated and validated with stream flow data of 11 years (1990-2000) and 7 years (2001-2007) respectively. Nash-Sutcliffe Error (NSE) and Coefficient of Determination ( $R^2$ ) were used to evaluate efficiency of the models. The results of calibration and validation indicated that, for river basin Katar, both models could simulate fairly well the streamflow. SWAT gave the model performance with the  $R^2 > 0.78$  and  $NSE > 0.67$ ; and the HEC-HMS model provided the model performance with the  $R^2 > 0.87$  and  $NSE > 0.73$ . Hence, the simulated streamflow given by the HEC-HMS model is more satisfactory than that provided by the SWAT model.

**Keywords:** HEC-HMS, SWAT, Katar River Basin, Peak Flow, Rainfall-Runoff Simulation

**Girma, R., Gebre, E., & Tadesse, T. (2020). Land Suitability Evaluation for Surface Irrigation Using Spatial Information Technology in Omo-Gibe River Basin, Southern Ethiopia.**

### **Abstract**

Irrigation would provide farmers with sustained livelihoods and improve their general well-being. The aim of this study was to evaluate the suitability of the land for surface irrigation using GIS based weighted overlay analysis of individual parameters for better utilization of land resources. Factors considered included physical land features (land use/land cover, soil and slope), and proximity to water sources. Based on soil depth, 82.4% of the study area is potential suitable for the intended uses; the drainage class scores 70% suitability; 80% the soil texture was clay dominant hence it was moderately suitable for surface irrigation. Considering the terrain, 11.75% of the basin is suited for irrigation practice. The LULC classification revealed that, 54.42% was found to be highly suitable and 16.7% is found to be unsuitable. In reference to river proximity, around 81% of the area could be highly recommended for the intended use. Excluding the national parks, 71% (7% is S1 and 64% is S2) is suitable for the intended use. Hence, future surface irrigation development is feasible. Based on the findings, to increase the land area to be irrigated; an appropriate drainage provision and cost wise land leveling should be taken into consideration, further land suitability analysis for other types of irrigation and water source should be carried out. The study result could assist policy makers for better decisions during the development of irrigation projects in Omo-Gibe river basin.

**Keywords:** Land suitability • Surface irrigation • Weighted overlay • ArcGIS • Pair-wise comparison

**Guye, M. E. (2020). Extraction, Characterization and Optimization of pectin from Banana peel by using Acid Extraction. *International Journal of Chemical Engineering and Processing*, 6(2), 27–48.**

### **Abstract**

This paper basically focused on the production of pectin from banana peel, an agricultural waste. The production process used in this work was raw material collection from Hawassa City, and characterizing the raw material for its physic-chemical composition. The raw material was prepared and grinded to a averageparticle size of 0.25mm after drying at a constant temperature of 600C. The extraction of oil from the banana peel was conducted using a solvent extraction using ethanol. After separating oil from banana peel powder cake, cake was dried at 600C in oven until constant weight was obtained. The design of experiment was conducted using software called Design Experiment 7.0.0. byBox Behnken methodwith a total experimental runs of 17 and the corresponding yield of pectin was analyzed using ANOVA. The factors in this stage were banana peel to ethanol ratio, residence time and pH at the corresponding operating range of 1:1, 1:1.5, 1:2; 60min, 90min, 120min; and 1, 2, 3; respectively.The maximum yield obtained was 20% at average particle size 0.25 mm, extraction time of 1 hour, pH of 2 and banana peel filtrate to ethanol ratio of 0.5w/v.

Whereas the minimum percentage pectin yield from banana peel was 11% obtained at average particle size of 0.25 mm, extraction time 2 hour, at pH of 3 and banana peel filtrate to ethanol ratio 0.75 w/v. qualitative and quantitative analysis of extracted pectin werealso done. FT-IR analysis shows the presence of functional group of carbohydrate, carbonyl, alkene, aromatic, alkane, aliphatic amine, carbocyclic, alcohol and methyl ester which is highly close to pectin reported in literature. Another analytical technique for characterizing pectin was also done by GC-MS and it is observed that the pectin extracted in this work is high in methyl ester which highly fits with the commercial pectin.

**Key words:** Banana peel, Pectin, Galacturonic acid, Filtrate, Methyl ester pectin



**Bati, T. B., & Workneh, A. W. (2021). Evaluating integrated use of information technologies in secondary schools of Ethiopia using design-reality gap analysis: A school-level study. *The Electronic Journal of Information Systems in Developing Countries*, 87(1), e12148.**

### **Abstract**

The purpose of this study was to examine the level of readiness of Ethiopian secondary education systems in terms of access to technologies and preparedness in skills and motivation for the integrated use of information communication technologies (ICT) for quality education. To serve this end, a Design-Reality Gap Analysis approach was employed. Relevant data were collected from teachers, students, and school leaders through a questionnaire survey, and the result was cross-examined against the national goals and strategies. The Design-Reality Gap Analysis of integrated use of ICT in classroom teaching in Ethiopian secondary schools thus far revealed fewer successes and widespread challenges in the country's discourse to achieve the 2016-2020 national targets. The study showed that students have better access to mobile phones and other technologies at home and outside of schools. Major school-level factors for the gap observed were delay in implementation of a nationwide e-cloud based ICT infrastructure, lack of coordination for the pedagogical use of ICT, and insufficient capacity building training for teachers and school leaders. This suggests the importance of a strategy that integrates inside- and outside of schools ICT resources and services for improved use of ICT in student learning.

**Mamaye, M., Kiflie, Z., Feleke, S., & Yimam, A. (2020). Evaluation of Soda Delignification And Single-Stage Hydrogen Peroxide Bleaching For The Ethiopian Sugarcane Bagasse For Paper Production. *Sugar Tech*, 1–12.**

### **Abstract**

The present study investigated the Ethiopian sugarcane bagasse during its delignification via the sulfur-free soda pulping process and bleaching by the single-stage hydrogen peroxide process. The multilevel categoric experimental design was used to assess the effects of the three independent process variables (pulping temperature, NaOH concentration and time) on the pulp yield and kappa number, during the soda pulping process. The effect of the independent bleaching variables (bleaching temperature, time and H<sub>2</sub>O<sub>2</sub> concentration) on the pulp yield, brightness and whiteness was assessed by using the response surface methodology (central composite experimental design). The soda pulps from the Ethiopian sugarcane bagasse were of varying yield and kappa number

and hence were classified according to the sugarcane bagasse providing the highest pulp yield (pulp-SA) with 88.07% and that providing the lowest pulp yield (pulp-SB) with 85.17%. Their corresponding kappa numbers were 16.73 and 8.27, respectively. The brightness and whiteness for the pulp-SA were 62.02% and 84.43%, respectively, whereas for the pulp-SB, the corresponding values were 71.86% and 90.47%, respectively. The study further shows that the paper produced from the pulp-SA had higher mechanical properties. Thus, the promising valorization of the Ethiopian sugarcane bagasse for paper production using the adopted methodology, namely the soda pulping and single-stage hydrogen peroxide bleaching routes, is validated.

**Mamaye, M., Kiflie, Z., Feleke, S., & Yimam, A. (2020). Evaluation and Optimization of Kraft Delignification and Single Stage Hydrogen Peroxide Bleaching for Ethiopian Sugarcane Bagasse. Journal of Natural Fibers, 1–13.**

### **Abstract**

The current study investigated the Ethiopian sugarcane bagasse during its delignification using the Kraft pulping process and bleaching by single stage hydrogen peroxide process. The multilevel categoric experimental design was used to appraise the effects of the independent process variables (temperature, NaOH concentration, and time) on the pulp yield and kappa number during the Kraft pulping process. The central composite experimental design of response surface methodology was used to appraise the effects of independent bleaching variables (bleaching temperature, H<sub>2</sub>O<sub>2</sub> concentration, and time) on the pulp yield, brightness, and whiteness during the bleaching process. The optimal pulp yield was 38.41% with 17.68 kappa number. The bleached pulp yield for the pulp with kappa number of 17.68 and the pulp with kappa number of 8.41 were 84.12% and 83.91%, respectively. The brightness and whiteness for the pulp with kappa number of 17.68 were 61.92% and 85.36%, respectively. Similarly, for the pulp with a kappa number of 8.41, the brightness and whiteness were 68.35% and 91.43%, respectively. Paper from the pulp with kappa number of 17.68 has higher tensile, burst, and tear strength. The study shows the promising utilization of the Ethiopian sugarcane bagasse for paper production via the Kraft delignification and single stage hydrogen peroxide bleaching.

**Naba, W., Moges, A., & Gebremichael, A. (2020). Evaluating the Effect Of In-Situ Rainwater Harvesting Techniques On Maize Production In Moisture Stress Areas Of Humbo Woreda, Wolaita Zone, Southern Ethiopia. International Journal of Agricultural Research, Innovation and Technology (IJARIT), 10(2355-2020–1339), 71–79.**

### **Abstract**

The study was conducted to investigate the effect of different in-situ water harvesting structures as soil moisture conservation techniques under maize crop production in Abela Sippa kebele Wolaita zone, Ethiopia where rainfall variation is affecting agriculture with prolonged dry spells during critical crop growth stages. The experiment was laid out in a Randomized Complete Block Design, with three replications and four treatments. The four treatments used in the study were; Control, Targa, Tie-ridge and Zai pits. Findings from this study revealed that maize grain yield and yield components, such as, grain yield, dry matter biomass, and cob length were highly significant ( $p < 0.05$ ) on Targa. Soil-moisture content over the crop growing season at dry spell periods was significantly higher in Targa and Tie ridges than the control. Maize yield of (7150 kg ha<sup>-1</sup>), (6190 kg ha<sup>-1</sup>), (4500 kg ha<sup>-1</sup>) and (4900 kg ha<sup>-1</sup>) was obtained from Targa, Tie ridge, Zai pits and Control, respectively. Targa and Tie ridge treatments recorded higher net returns (29712 and 25164 kg ha<sup>-1</sup>) than Control (20370 kg ha<sup>-1</sup>) and Zai (14350 kg ha<sup>-1</sup>) treatments. The results revealed that the in-situ rainwater harvesting techniques could play great role in improving crop yield in dry periods. However, the utilization of the technology is surrounded by various constraints. The major constraints include labour, cost, lack of knowledge and crops planted on bunds. The findings suggest that Targa structure improved water availability during the growing season, thereby protecting crops from dry periods and it needs minimum cost, less labor power ,and easily constructed by local farmers (not require complicated knowledge).

**Keywords:** In-situ Rainwater harvesting; Farmers' perception; Soil moisture; Maize yield

**Dagnachew, M., Kebede, A., Moges, A., & Abebe, A. (2020). Land Use Land Cover Changes and Its drivers in Gojeb River Catchment, Omo Gibe Basin, Ethiopia. *Journal of Agriculture and Environment for International Development (JAEID)*, 114(1), 33–56.**

## **Abstract**

Land use land cover (LULC) changes are inherently spatial and dynamic with high spatiotemporal variability resulted from complex human-environmental interactions. Current extents, rates and intensities of LULC changes are driving unprecedented changes in ecosystems functions and environmental processes at local, regional and global scales. The study was conducted to assess LULC changes and its drivers using remote sensing (RS) and geographic information system (GIS) in Gojeb River Catchment, Ethiopia. The satellite images at different reference years (1978, 1987, 2001 and 2015) were obtained from Landsat images. Supervised classification with maximum likelihood algorithm was applied for image processing and change analysis. The LULC classes identified were cropland, forestland, shrubland, swamp, and woodland. The study found that the catchment has undergone significant LULC changes. The major changes were expansion of cropland at the expense of other LULC classes at the rate of 29.56% in 1978, 38.91% in 1987, 46.62% in 2001 and 52.74% in 2015. It has gained about 160,736.08 ha with an annual average increment of 4,344.22 ha. Conversely, forestland has undergone reductions at an annual rate of 9,030.0 ha between 1978 and 1987. The conversions of other classes to cropland are mainly associated with more demand for crop production. On the other hand, the conversion of relevant part of forest land to other classes could be due to vegetation degradation. Hence, the conversion of forestland to other land use classes could be attributed to the highly demand of agricultural land, firewood, charcoal, timbers and housing materials. The major driving forces which should be considered in sustainable watershed management were population growth and government induced settlements. Provision of modern alternative sources of energy, agricultural inputs and promoting non-agricultural sectors are also other considerations for the community sustainable livelihood. It is critical to follow holistic view and management of the catchment for successful integrated watershed management endeavours.

**Dagnachew, M., Kebede, A., Moges, A., & Abebe, A. (2020). Effects of Climate Variability on Normalized Difference Vegetation Index (NDVI) in the Gojeb River Catchment, Omo-Gibe Basin, Ethiopia. *Advances in Meteorology*, 2020.**

## **Abstract**

Vegetation dynamics have been visibly influenced by climate variability. The Normalized Difference Vegetation Index (NDVI) has been the most commonly used index in vegetation dynamics. The study was conducted to examine the effects of climatic variability (rainfall) on NDVI for the periods 1982–2015 in the Gojeb River Catchment (GRC), Omo-Gibe Basin, Ethiopia. The spatiotemporal trend in NDVI and rainfall time series was assessed using a Theil–Sen (Sen) slope and Mann–Kendall (MK) statistical significance test at a 95% confidence interval. Moreover, the residual trend analysis (RESTREND) method was used to investigate the effect of rainfall and human induction on vegetation degradation. The Sen’s slope trend analysis and MK significant test indicated that the magnitude of annual NDVI and rainfall showed significant decrement and/or increment in various portions of the GRC. The concurrent decrement and/or increment of annual NDVI and rainfall distributions both spatially and temporarily could be attributed to the significant positive correlation of the monthly ( $R_{\text{NDVI-RF}} = 0.189$ , ) and annual ( $R_{\text{NDVI-RF}} = 0.637$ , ) NDVI with rainfall in almost all portions of the catchment. In the GRC, a strongly negative decrement and strong positive increment of NDVI could be derived by human-induced and rainfall variability, respectively. Accordingly, the significant NDVI decrement in the downstream portion and significant increment in the northern portion of the catchment could be attributed to human-induced vegetation degradation and the variability of rainfall, respectively. The dominance of a decreasing trend in the residuals at the pixel level for the NDVI from 1982, 1984, 2000, 2008 to 2012 indicates vegetation degradation. The strong upward trend in the residuals evident from 1983, 1991, 1998 to 2007 was indicative of vegetation improvements. In the GRC, the residuals may be derived from climatic variations (mainly rainfall) and human activities. The time lag between NDVI and climate factors (rainfall) varied mainly from two to three months. In the study catchment, since vegetation degradations are mainly caused by human induction and rainfall variability, integrated and sustainable landscape management and climate-smart agricultural practices could have paramount importance in reversing the degradation processes.

**Dagnachew, M., Moges, A., Kebede, A., & Abebe, A. (2020). Effects of Soil and Water Conservation Measures on Soil Quality Indicators: The case of Geshy subcatchment, Gojeb river catchment, Ethiopia. *Applied and Environmental Soil Science*, 2020.**

## **Abstract**

Land degradation is a global negative environmental process that causes the decline in the productivity of land resources' capacity to perform their functions. Though soil and water conservation (SWC) technologies have been adopted in Geshy subcatchment, their effects on soil quality were limitedly studied. The study was conducted to evaluate the effects SWC measures on soil quality indicators in Geshy subcatchment, Gojeb River Catchment, Ethiopia. A total of 54 soil samples (two treatments—farmlands with and without SWC measures three slope classes three terrace positions three replications) were collected at a depth of 20 cm. Statistical differences in soil quality indicators were analyzed using multivariate analysis of variance (ANOVA) following the general linear model procedure of SPSS Version 20.0 for Windows. Means that exhibited significant differences were compared using Tukey's honest significance difference at 5% probability level. The studied soils are characterized by low bulk density, slightly acidic with clay and clay loam texture. The results revealed that farmlands with SWC measures had significantly improved soil physical (silt and clay fractions, and volumetric soil water content (VSWC)) and chemical (pH, SOC, TN, C : N ratio, and Av. phosphorus) quality indicators as compared with farmlands without SWC measures. The significantly higher VSWC, clay, SOC, TN, C : N ratio, and Av. P at the bottom slope classes and terrace positions could be attributed to the erosion reduction and deposition effects of SWC measures. Generally, the status of the studied soils is low in SOC contents, TN, C : N ratio, and Av. P (deficient). Thus, integral use of both physical and biological SWC options and agronomic interventions would have paramount importance in improving soil quality for better agricultural production and productivity.

**Tesfaye, T. W., Dhanya, C., & Gosain, A. (2020). Modeling the Impact of Climate Change on The Environmental Flow Indicators Over Omo-Gibe Basin, Ethiopia. *Modeling Earth Systems And Environment*, 6, 2063–2089.**

## **Abstract**

The study focuses on climate change impacts on the environmental flow indicators from hydrologic method point of view using IWMI's Global Environmental Flow Calculator and Indicators of Hydrologic Alteration. It also discusses how the changes in flow magnitude and duration of annual extreme conditions, timing of annual extreme water condition, frequency and duration of high and low pulses, rate and frequency of water condition changes will affect the ecosystem. Climate change disturbs the ecology by directly affecting the functions of individual organisms (growth and behavior), modifying the population (size and age structure), and altering the ecosystem structure, functioning (e.g., decomposition, nutrient cycling, water flows, and species composition and species interactions) and its distribution within landscapes (Gitay et al., 2002). Ecosystem regime shifts can occur naturally and by anthropogenic factors (Muenich et al. in *Ecol Model* 340:116–125, 2016). Climate change effects on flow regime are expressed by different indicators such as mean annual runoff, mean river discharge, low and high flows, mean seasonal discharge, and changes from permanent to intermittent flow or vice versa. Understanding of changes in flow regimes is important for the well-being of humans and freshwater-dependent biota with respect to water and habitat availability (Döll and Schmied in *Environ Res Lett* 7(1):14037, 2012). Even though the basin is rich in fish species, peoples living in lower Omo-Gibe basin and Turkana region are undertaking a traditional fishing culture. Wildlife in the parks, pastoralist communities using the flood recession farming and livestock farming are dependent on the river. The environmental flow that sustains these activities is inevitably necessary for the survival of the biodiversity. Understanding of the flow variability helps to protect the freshwater biodiversity and maintenance of goods and services that the river provides.

**Mathewos, M. (2020). Assessment of Selected Soil Physicochemical Properties on Different Land-Use Systems and Landscape Positions at Hamesa watershed, Wolayita zone, Southern Ethiopia. *Journal of Soil Science and Environmental Management*, 11(3), 122–130.**

### **Abstract**

The investigation was undertaken at Hamesa watershed of Wolayita Zone with the aim to assess the consequences of land-use systems and topography on the physical and chemical properties of selected soils. Surface soil samples taken at 0-15 and 15-30 cm depths from three land-use systems (enset, grassland and maize fields) were collected under three slope positions (upper, middle and lower). Both the clay and bulk density increased with depth, while total nitrogen (N), OC, available P and micro-nutrients (Fe, Zn, Mn, and Cu) decreased. On the landscape positions, increase in exchangeable Ca and K, pH, bulk density and available Mn down the slope was observed; whereas total N, OC, available P and available Fe showed decreasing trend down the slope. At 0-15 cm soil depth, grassland soils exhibited higher bulk density and lower porosity as a result of livestock movement which was compacted. Grasslands had higher OC and TN compared to the other two land-use systems, due to the accumulation of humus in the root system in the grassland. Application of household refuses and manure contribute to increasing available P, TN, Zn, Ca and K contents in enset farmland. On the contrary, maize land use had lower CEC, K, PBS, Mg, TN and OC, which might be due to crop removal, erosion phenomena, and excessive tillage activities. These results suggest that for sustainable crop production, proper management practices should be in place by considering different slope positions and land-use systems.

**Key words:** Land use system, slope position, physical, chemical soil properties.

**Endris, J., & Govindan, N. (2020). Single-stage Coloration and Multiple Finishing of Cotton With Eucalyptus Leaves Extracts. *Journal of Natural Fibers*, 1–15.**

### **Abstract**

Eucalyptus plant leaves contain many chemical constituents that are responsible for different functional finishing and dyeing. An eco-friendly natural dyeing and multifunctional finishing has been formulated from extracts of eucalyptus leaves. The formulation is designed by design expert software by considering many factors that affect the dyeing and finishing behavior. Both dye material and essential oil were extracted by using water and ethanol as solvent by Soxhlet



extraction instrument. The extraction efficiency percentage was higher in the case of ethanol extraction in ethanol (32.78%) than that of extraction in water (26.17%). Water-extracted material used as a dyeing media for cotton fabric gives a yellow color to the substrate with optimum K/S value. The essential oil extracted by ethanol was used as an antibacterial agent, insect repellent, and aroma treatment. The essential oil has a great influence on the bacterial growth for both gram-negative and gram-positive bacteria, and shows 100% bacterial reduction percentage for both types of bacteria. Essential oil extracted from *Eucalyptus Globulus* leaves have a great repellent rate for insects to the extent of 90% and aroma intensity of 72%, and good durability.

**Solomon, D., Kiflie, Z., & Van Hulle, S. (2020). Using Box–Behnken Experimental Design to Optimize The Degradation Of Basic Blue 41 Dye By Fenton Reaction. *International Journal of Industrial Chemistry*, 1–11.**

#### **Abstract**

Degradation of a Basic Blue 41 dye using Fenton reagent was examined at laboratory scale in batch experiments using Box–Behnken statistical experiment design. Dyestuff, hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) and ferrous ion ( $\text{Fe}^{2+}$ ) concentrations were selected as independent factors. On the other hand, color and chemical oxygen demand (COD) removal were considered as the response functions. The value of coefficient of determination ( $R^2$ ) for both color and chemical oxygen demand removal with values 0.98 and 0.99 shows the best agreement between predicted value and experimental values. Perturbation plots indicated that iron dosage has the most effect on both color and COD removal. Normalized plot of residuals also indicated that the models were adequate to predict for both responses. Color and COD removal increased with increasing  $\text{H}_2\text{O}_2$  and  $\text{Fe}^{2+}$  concentrations up to a certain level. High concentrations of  $\text{H}_2\text{O}_2$  and  $\text{Fe}^{2+}$  did not result in better removal of color and COD due to hydroxyl radical being gradually consumed by both oxidant and catalyst. Percent color removal was higher than COD removal indicating the production of colorless compounds. The second-order polynomial model revealed optimal process factor ratio. The ratio of  $\text{H}_2\text{O}_2/\text{Fe}^{2+}/\text{dyestuff}$  which gives a complete color removal and 95% COD removal was found to be 1195 mg/L/90 mg/L/255 mg/L.

**Solomon, D., Kiflie, Z., & Van Hulle, S. (2020). Integration of Sequencing Batch Reactor and Homo-Catalytic Advanced Oxidation Processes for The Treatment of Textile Wastewater. *Nanotechnology for Environmental Engineering*, 5(1), 1–13.**

### **Abstract**

It is unusual to observe completely treated textile wastewater in Ethiopia. It is impossible to get better quality of treated effluent with a single treatment stage. Therefore, in this study the removal of COD and color was carried out on a wastewater which was obtained from acrylic fiber processing textile industry using a single-stage Fenton oxidation, single-stage sequencing batch reactor (SBR) and also with the integration of SBR with Fenton oxidation. Optimum amount of process factors was used for both Fenton oxidation and SBR treatment stages. The combination of SBR and Fenton oxidation was revealed better removal efficiency than single SBR-stage treatment. The effluent obtained from SBR at steady-state conditions indicated a maximum COD and color removal of 74.1% and 64.6%, respectively. The effluent obtained from Fenton followed by SBR (Fenton + SBR) at steady-state conditions was indicated a maximum COD and color removal efficiency of 86.3% and 84%, respectively. The effluent obtained from SBR followed by Fenton (SBR + Fenton) for three Fenton oxidation experimental runs indicated a maximum COD and color removal of 80.2% and 73.6%, respectively. Among the three wastewater treatment schemes, chemical treatment before biological stage (Fenton + SBR) was the best treatment option and also showed better quality of effluent.

**Girma, R., & Gebre, E. (2020). Spatial Modeling of Erosion Hotspots Using GIS-RUSLE Interface in Omo-Gibe River Basin, Southern Ethiopia: Implication for soil and water conservation planning. *Environmental Systems Research*, 9(1), 1–14.**

### **Abstract**

Soil degradation due to soil erosion is one of the major environmental threats in developing countries. In resource limited conditions, computing the spatial distribution of soil erosion risk has become an essential and practical mechanism to implement soil conservation measures. This study aimed to assess the spatial distribution of soil loss in Omo-Gibe river basin using the integration of computer-based RUSLE and ArcGIS 10.7.1 to identify areas that require erosion prevention priority. Once raster layer of the input parameters was created, overlay analysis was carried to

assess the spatial distribution of soil loss. The estimated annual soil loss varies from 0–279 t ha<sup>-1</sup> yr<sup>-1</sup> with a mean annual soil loss of 69 t ha<sup>-1</sup> yr<sup>-1</sup>. The empirical analysis also confirmed that the basin losses a total of about 89.6 Mt of soil annually. Out of the total area; 7% was in very sever class, 4.8% was found in the sever and 8.7% was categorized in very high range. The remaining area were ranging from low to high erosion risk class. The influence of the combined LS factor for soil loss is significant. It was observed that small area of the Omo-Gibe basin contributed for the significant amount of soil loss. The finding of this study is in a good agreement with previous studies. Compared to the country permissible soil loss rate, 26% of the entire basin significantly exceeds the country threshold value (TSL = 18 t ha<sup>-1</sup> yr<sup>-1</sup>). As a result, precedence and immediate attention should be given to those erosion prone areas. The study output could deliver watershed management experts and policy makers for better management implementation and resource allocation based on the local context.

**Redi, M., Thillaigovindan, N., Dananto, M., & Hawasa, E. (2020). A Bilevel Fuzzy Goal Programming Approach for Two-Stage Production Planning Problems. *Int. J. Open Problems Compt. Math*, 13(3).**

## **Abstract**

Water is an important ingredient for both agricultural and processing industries to transform agricultural products for domestic consumption. Due to competitions for fresh water among the three sectors, the tradeoff analysis to satisfy much of the consumption demands with little stress on the already aggravated water conflicts is highly desirable. To serve the purpose, the problem is modeled as a two-stage production (TSP) problem in which dynamic inventory control operation (DICO) is introduced as mass balance equation and solved using bilevel fuzzy goal programming (BL-FGP) approach. In TSP, a first stage decision is undertaken before values of random variables are known and then, a second-stage decision using recourse action is made after the random events have happened and their values are known, in order to minimize penalties that may appear due to any infeasibility. By decomposing the multi-stage production planning (MSPP) into a sequence of finite number of TSP, a search for the optimal decision is made while the optimal solutions in the previous steps are used as inputs to the current stage and are updated progressively.<sup>34</sup> Mekonnen Redi, Natesan Thillaigovindan and Mihret Dananto This process continues to sequentially solve

the problem until the final two-stage sub-problem is optimized. The model is tested with data from agro-processing industry zones in Gidabo watershed of Central Rift Valley Basin (Ethiopia).

**Keywords:** Agro-processing, Bilevel fuzzy goal programming, Dynamic inventory control, Optimal water allocation, Two-stage production. 2020 Mathematics Subject Classification: 90C29.

**Teshome, A., Halefom, A., Teshome, M., Ahmad, I., Taddele, Y., Dananto, M., Demisse, S., & Szucs, P. (2021). Soil erosion modelling using GIS and revised universal soil loss equation approach: A case study of Guna-Tana landscape, Northern Ethiopia. *Modeling Earth Systems and Environment*, 7(1), 125–134.**

### **Abstract**

An attempt has been made in this study to quantify the soil loss rate in Guna-Tana Landscape, Ethiopia. A Digital Elevation Model (12 m by 12 m spatial resolution), rainfall data over 10 years, soil, and land cover/land use extracted were used as an input to calculate soil loss rates. GIS-based RUSLE factors were integrated and analyzed in the ArcGIS 10.3 platform form. The results showed that 12-monthly loss of soil in the study area ranges from zero in the lower, middle, upper, and steeper slope parts of the watershed to 4735 t/ha/year with a mean annual soil loss of 3627.5 t/ha/year. The overall annual soil loss in the study area is 14,335,517.8 tonnes. Approximately 681.21 ha of the area is within the extreme and very extreme erosion clusters which demand immediate controlling measures.

**Du, N., Li, M., Zhang, Q., Ulsido, M. D., Xu, R., & Huang, W. (2021). Study on the Biogas Potential of Anaerobic Digestion of Coffee Husks Wastes in Ethiopia. *Waste Management & Research*, 39(2), 291–301.**

### **Abstract**

The poorly controlled discharge of coffee husks in Ethiopia causes severe environmental pollution and is a waste of resources. The volatile solid and carbon content in coffee husks waste indicates that it is rich in organic matter and has huge potential to produce biogas. This study investigated the feasibility of coffee husks to produce biomass through anaerobic digestion, based on temperature, initial pH, inoculum/substrate (I/S) ratio and carbon/nitrogen (C/N) ratio. The study demonstrated that the maximum production of biogas and methane reached 3359.6 ml and 2127.30 ml, respectively, under the conditions of mesophilic temperature ( $35\pm1^{\circ}\text{C}$ ), an initial pH

of 7, an I/S ratio of 0.75 and a C/N ratio of 30. Based on this result, the effects of trace elements ( $\text{Fe}^{2+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Co}^{2+}$ ) on biogas production and methane content were also explored. Compared with the group with no addition of trace elements, the experiment adding trace elements had significant enhancement effects on the production of biogas and methane, in which  $\text{Fe}^{2+}$  played a leading role ( $p < 0.05$ ).  $\text{Fe}^{2+}$  promoted the hydrolysis and acidification of coffee husks, resulting in the production of a series of intermediates such as volatile fatty acids and the other kinds of dissolved organic matter. Furthermore, the cooperation of  $\text{Ni}^{2+}$ ,  $\text{Co}^{2+}$  and  $\text{Fe}^{2+}$  enhanced the activity of the enzyme system in methanogens, promoting methane production. The results in this paper show that coffee husks have clear biogas potential through anaerobic digestion, and its effective utilization could fulfill the dual purpose of solid waste reclamation and local environmental protection in Ethiopia.

**Keywords:** Coffee husks, Anaerobic digestion, Biogas and methane production, Influence factors, Trace elements

**Halefom, A., Khare, D., Sisay, E., Teshome, A., Worku, T., Tadesse, D., & Dananto, M. (2020). Conceptual Analysis of Urban Water Management Considering Climate Change Scenarios. *World News of Natural Sciences*, 28, 51–66.**

## **Abstracts**

Since the trends of adverse climate change and integrated urban water management have continued in the twenty-first century, governments and other institutions seek reliable predictions as water resource requirements arise. Although uncertainty is never cut off from the need for a probabilistic movement, through current developments in science and the technology of hydrological modeling on urban water management analysis, researchers can improve the ability to create realistic scenarios that will benefit the water sector it adapts to these changes. Model studies on the combined effects of climate change and the water sector have found that the change can be significant, depending on scenarios and the assumptions of climate change, as well as the degree of urban development. In this work, conceptual analysis of urban water management has been applied to several scenarios of climate change in order to obtain new insights and uncertainties.

**Keywords:** Climate change management modeling urban water

**Nigusie, A., & Dananto, M. (2021). Impact of Land Use/Land Cover Change on Hydrologic Processes in Dijo Watershed, Central Rift Valley, Ethiopia. *International Journal of Water Resources and Environmental Engineering*, 13(1), 37–48.**

### **Abstract**

The aim of this study was to assess the impact of land use / land cover changes on the hydrological process in the central valley basin of Ethiopia, from 1985 to 2018 and evaluate historical land use/land cover change using satellite image. Satellite images were classified by supervised classification technique with maximum likelihood. SWAT model were used to simulate hydrological processes in the watershed. The result of the study shows that barren lands, agricultural and settlement lands were expanded by 7 and 64%; whereas, forestlands, water bodies, shrub and grasslands were declined by 13, 57 and 41% respectively over the past three decades. The calibrated and validated SWAT model used also showed that there has been good agreement between simulated and observed streamflow on monthly basis. Streamflow evaluation due to LULC change influence showed that mean monthly simulated streamflow was increased by 10.84% between the years 1985 and 2003, also increased from the year 2003 to 2018 by 9.3% in wet months; whereas, decreased by 8.23 and 11.4% between 1985-2003 and 2003-2018 in dry months. Therefore, hydrological process of the watershed was highly influenced by LULC changes and it requires integrated watershed management techniques.

**Key words:** Digital image processing, Gis, hydrologic process, landsat image.

## College of Business and Economics

**Regasa, D. G., Diro, B. A., Tadesse, E. D., & Buta, M. N. (2020). Access to Financial Services and Innovation: Firm-level data for Ethiopia. *Innovation and Development*, 1–16.**

### **Abstract**

Using World Bank's Ethiopian Enterprise Survey round of 2011 and 2015 data from Ethiopian manufacturing and service firms, this paper identifies the effect of financial services on the innovation strategies of firms. We find a strong positive correlation between firm's access to external finance and its innovative activities. Our preferred specification, the instrumental variable estimator, suggests that a 1% rise in external financing source in the firm's total fund increases the propensity to innovate the firm's operation by about 2%. In a similar spirit, credit-constrained firms have about 24% lower incidence of innovation compared to credit unconstrained firms. We find that the results are substantially robust across alternative econometric specification. The results also remain consistent for the individual components of innovation index such as product, process, organizational, marketing and R&D innovation activities.

**Keywords:** external finance, innovation, Ethiopia, Instrument, variable

**Teshome, A., Hailu, S., Habte, E., Deribe, Y., & Amsalu, B. (2020). Factors Affecting the Profitability of Smallholder Common Bean Producers in Central Rift Valley of Ethiopia. *Ethiopian Journal of Agricultural Sciences*, 30(3).**

### **Abstract**

Common bean is one of the major pulse crops which played an important role in the Ethiopian national economy and to farmers as food and cash income. Ethiopia ranked third in common bean production in Eastern and Southern Africa. The country exported 40 percent of its total common bean production in 2010. Despite the wide dissemination of improved common bean varieties and its economic importance, there is a dearth of information on the profitability of smallholder farmers from common bean production. Most of the previous studies on common bean did little on the profitability of smallholder bean producers. This study is designed with the aim of assessing the profitability status of smallholder common bean producers and factors correlated with it. Sample bean producers were selected randomly using simple random sampling. The cross-sectional data

collected from sampled households are analyzed using descriptive statistics and Ordinary Least Square (OLS). The result of the study shows that the mean common bean gross margin and net farm income was 13486 and 8127 Birr/ha respectively. Distance from the nearest market, Age, Family size, off farm income and fertilizer source are the factors influencing the profitability of smallholder common bean producers negatively. However, Gender, farm experience, group membership and target market channel had a positive significant influence on smallholder based common bean production profitability. Therefore, in order to enhance the profitability of smallholder households, among others, it is important to improve access to input and output market and collective actions by farmers. There is also a need to minimize the gender gap in the profitability through affirmative action such as the provision of special credit and access to modern technologies by female farmers.



## College of Social Sciences & Humanities

**Alambo, F. I. (2020). Agroforestry-based Livelihoods in the Face Of Cultural and Socio-economic Dynamics in Rural Gedeo, Southern Ethiopia. *Journal of Rural and Community Development*, 15(3).**

### **Abstract**

This paper analyzes the vulnerability contexts of the agroforestry-based livelihoods of smallholders in rural Gedeo, Southern Ethiopia. Being extracted from a broader study that investigated the livelihood and food security situations within the Indigenous agroforestry system of the Gedeo people, the paper sheds light on the broader cultural and socio-economic contexts in which the livelihood system under consideration operates. The study employed a mixed-methods research approach (i.e., household survey, key-informant interviews, focus group discussions, field observations, and secondary analysis). The study revealed that the agroforestry-based livelihood of smallholders in rural Gedeo is situated on identifiable vulnerability contexts: population pressure; gradual erosion of Indigenous knowledge, social values, beliefs, norms; market influences; crop diseases; the decline of productions (mainly Enset, coffee, livestock); and seasonality of production, price and labor markets. Being under the pressure of the aforementioned factors, this livelihood system is emerging less and less rewarding for the smallholders and transitioning in a direction that endangers the sustainability of the agroforestry system. Innovative approaches need to be designed to improve the livelihood outcomes that the smallholders derive from this agricultural system, thereby ensuring its sustainability. However, as there is a growing resource constraint in the study area (mainly farmland), the smallholders need to be enabled to diversify their livelihoods towards off-farm and non-farm activities.

**Keywords:** Agroforestry system, Gedeo, Livelihoods, Sustainability, Vulnerability contexts

**Mohamed, A., & Worku, H. (2020). Urban Land Cover and Morphometric Analysis for Flash Flood Vulnerability Mapping And Riparian Landscape Conservation In Kebena River Watershed, Addis Ababa. *Applied Geomatics*, 1–14.**

## **Abstract**

Addis Ababa city has a degraded stream ecosystem and redundant flash flooding that can destroy the existing urban infrastructure and utilities. This research aimed to map flash flood vulnerability of the Kebena watershed inside Addis Ababa and evaluate the status of the riparian landscape. Methodologically, the study employed the Biophysical Composition Index (BCI) to detect impervious surfaces and the Normalized Difference Vegetation Index (NDVI) to classify the vegetation cover. The Arc-hydro tool was used to identify micro-watersheds and measure the morphometric factors, then principal component analysis (PCA) identified the surrogate factors. Fuzzy overlay analysis combined land cover and morphometric analysis results to produce the final flash flood vulnerability map. Moreover, riparian buffering at 15, 30, and 90 m distances were defined to measure the degree of imperviousness, greenness, and vulnerability to flash flooding. Accordingly, 969 ha of land was depicted within the watershed as flash flood vulnerable areas. These areas are primarily found in the southeastern and southwestern parts where impervious land cover prevailed, and the northwestern portion which has extremely rugged terrain and has a sparse vegetation cover. For all buffering distances, the proportion of impervious surface is greater than the vegetation cover. Even within 15 m buffering distance, which was set as the national urban planning standard. It is concluded that Kebena watershed is vulnerable to flash floods as the riparian landscape is dominated by impervious and depleted vegetation cover. Therefore, integrated geospatial and statistical techniques are helpful to devise a method for sustainable riparian landscape monitoring.

**Mohamed, A., & Worku, H. (2020). Simulating Urban Land Use and Cover Dynamics Using Cellular Automata and Markov Chain Approach in Addis Ababa And The Surrounding. *Urban Climate*, 31, 100545.**

### **Abstract**

Efficient Land Use and Land Cover (LULC) monitoring and management require awareness of previous dynamics, current trends, and predictions of future developments. Understanding such an urban dynamics is, thus, necessary to deliberate a proper urban growth management approach. The study is aimed to simulate the LULC dynamics and develop a scenario-based LULC prediction for sustainable urban growth planning and management in the case of Addis Ababa and the surrounding area. The research employed a hybrid Cellular Automata, Markov chain (CA-Markov) and Multi-criteria Analytical Hierarchy Process (AHP) modeling approach. Accordingly, the research depicted continuous historical increment of Built-up spaces by consuming other ecologically valuable LULC classes. The quantitative measures of landscape metrics confirmed the benefit of Ecologically Sensitive Scenario (ESS) modeling as compared to Business As Usual Scenario (BAUS) as it keeps the dynamism of the city region more sustainable. ESS modeling enables an urban system to grow into a better way by making built-up augmentation relatively mild and controlling water bodies, forests and cultivated land losses. Therefore, this scenario-based simulation of the LULC dynamics providing decision-making options for those who strive for sustainable urban growth planning and management not only in the study region but also other similar cities.

**Keywords:** Ca-Markov model, multi-criteria AHP method, LULC, GIS, Addis, Ababa

**Li, C., & Menuta, F. (2020). A Review of Patrik Svensson, Big Digital Humanities: Imagining a Meeting Place for the Humanities and the Digital, Ann Arbor: University of Michigan Press, 2016, 279 pages, ISBN 978-0-472-07306-1 (hardcover). *A Journal of Literary Studies and Linguistics*, 10, 173–182.**

### **Abstract**

Patrik Svensson's book on Big Digital Humanities: Imagining a Meeting Place for the Humanities and the Digital is a scholarly work that questions several concepts in the state of the art and proposes alternatives while, at the same time, creating a splendid academic dialogue. The author focuses on the Big scope of the Digital Humanities so that the field can accommodate the diverse scholars from the different disciplines.

## College of Law and Governance

**Bekri. M Jemal (2020). The Depoliticisation of Two Competing Nationalisms and The Introduction of Democratic Meritopianism as a possible way out for Ethiopia. Journal of Contemporary African Studies**

### **Abstract**

This article is a critical appraisal of the development and performance of two competing nationalisms – Ethiopian and ethnic nationalisms. It assesses why the current system espoused by ethnic politics is a danger to peaceful and harmonious co-existence and state survival and what should be done about it. It starts with the identification of a problem: if the Ethiopian version of federalism continues to be applied within the context of politicisation of ethnicity it will always be a source of ethnic hostility by generating ethnic grievances of real or perceived injustices. Both variants of nationalism are threats to the continuation of the state and the achievement of viable development. After a politico-historical comparative analysis based on observation and secondary data of Ethiopian nationalism (the thesis) and ethnic nationalism (the anti-thesis), a third individual based democratic Meritopianism (the synthesis) rooted in universal human values like individual rights rather than the politicisation of primordial identities is suggested.

**Keywords:** Ethiopia, Ethiopianism, Ethnic politics, competing nationalism, democratic Meritopianism .

**Dessalegn, B. (2020). Establishment, Breakup, and Amalgamation of Ethnic Local Governments in Ethiopia: Towards Understanding the Legal And Political Matrix. *International Journal on Minority and Group Rights, 1(aop), 1–27.***

### **Abstract**

Ethiopia's ethnic federalism manages the diversity problem by giving ethnic territorial homelands to the constituent ethnic groups. This, in ethnically diverse regions, has meant the establishment of ethnically defined local governments. However, as the clear mismatch between available local governments and the number of constituent ethnic communities demonstrate, many are left without a local government of their own – resulting in rife inter-communal tensions. This has also proved to be a fertile ground for competing ethnic nationalisms to flourish and proliferate at sub-regional levels. As a result, some local governments were broken apart after their establishment to arrest

ethnic conflicts that followed while others were amalgamated to maintain regional territorial integrity. By using the SNNP region as a case study, this article argues that the political atmosphere, propelled by political exigencies, dictates the establishment, breakup, and amalgamation of ethnically defined local governments, while constitutional principles are side-lined.

## College of Education

**Beyene, W. M., Mekonnen, A. T., & Giannoumis, G. A. (2020). Inclusion, Access, and Accessibility of Educational Resources in Higher Education Institutions: Exploring The Ethiopian Context. *International Journal of Inclusive Education*, 1–17.**

### **Abstract**

The right of persons with disabilities for equal access to education and educational resources is enshrined by international and country-specific anti-discrimination laws. Taking the Ethiopian context as an example, this paper sought to identify barriers of access to educational resources and explored ways for removing them. Seventeen students with visual impairments studying at Hawassa University were selected for semi-structured interviews. Moreover, five individuals working at the disability centre and the university library were interviewed. The results of the interviews were analysed thematically using the International Classification of Functioning, Disabilities and Health (ICF) as a framework. Access and accessibility problems that emanate from the learners' diverse background, lack of educational resources in alternative formats, lack of institutional tools (policy, procedure, guidelines, etc.) to bridge the gap between law and practice, and the digital divide were among the problems identified and discussed. At the end, the paper showed how libraries, revitalised as learning and information commons, could help to ensure the accessibility of educational resources and help learners with disabilities to acquire skills that may help them in their studies and their future undertakings.

**Keywords:** Inclusive education, Digital accessibility, Educational resources

**Biewer, G., Ayalew, A. T., Sona, B. D., Adane, D. T., Obolla, S. S., & Ludago, T. B. (2020). From Community-Based Rehabilitation (CBR) Services To Inclusive Development. A study on Practice, Challenges, and Future Prospects of CBR in Gedeo zone (southern Ethiopia). 5, 209.**

### **Abstract**

The purpose of this article is to explain the practice, challenges and future prospects of community-based rehabilitation (CBR) in Gedeo zone, a district of nearly one million inhabitants in the south of Ethiopia. The study used a mixed methods design. The quantitative part of the study involved 138 parents and care givers selected by convenient sampling technique. In addition, a total of 22

(seven female and 15 male) research participants were purposively selected from various categories: one head of zone labor and social affairs, three heads of district labor and social affairs, three representatives of associations of PWDs, 11 parents, two CBR heads, and two CBR social workers. Questionnaires and interviews were used as tools of data collection. The data were analyzed using both descriptive and thematic analysis. The finding indicated that there was no well-established CBR service provision for PWDs in Gedeo zone to ensure full participation and successful adjustment in the community. The article also revealed that a lack of trained manpower, following the charity model of CBR, and a failure to understand the modern essence of CBR were some of the major challenges that hindered the implementation of CBR service in Gedeo zone. Based on the findings, we recommend the establishment of rehabilitation centers in combination with community services in various districts of the zone. CBR requires centers with skilled staff, able to empower local people in the community to develop inclusive structures. Furthermore, we suggest that the practice of CBR in Gedeo zone should empower CBR workers in community-based inclusive development.

**Basha, T., Engida, T., & Tesfaye, M. (2020). Educational Practices and Challenges of Students With Hearing Impairment in Arba Minch College of Teachers Education, South Ethiopia. *Turkish International Journal of Special Education and Guidance & Counselling (TIJSEG)* ISSN: 1300-7432, 9(1), 36–49.**

## **Abstract**

This study was aimed at assessing educational practices and challenges of students with hearing impairments in Arba Minch College of Teachers' Education in SNNPR, Ethiopia. In order to obtain a comprehensive understanding academic practices and challenges and ways of improving that impede students with hearing impairments in integration setting. Qualitative research approach of case study design was used to analyze the data. Purposive sampling was employed to select a total of 28 participants; 6 students with hearing impairments, 4 hearing peers, 12 instructors, 4 department heads and 2 college deans. The qualitative data were obtained via interviews, focus group discussion and observation. The finding revealed that there is high communication barrier between teachers and students with hearing impairments. This communication barrier contributed for poor academic performances. The findings of the study



revealed that, there is academic achievement gap between students with hearing impairments and hearing students. In addition, limitations of sign language skills, lack of planned financial fund and material support, absence of sign language interpretation, lack of hearing aids were the identified practice and challenges of students with hearing impairments. The study suggested that college administration and teachers can play a critical role in enabling students with hearing impairments to become meaningful participants in education system and society.

**Keywords:** Educational practices, Challenges, Integration, Hearing impairment

**Mandefro, E. (2020). Identifying improvements in supervision practices in Ethiopian primary schools: A pragmatic perspective. *Issues in Educational Research*, 30(3), 866–882.**

### **Abstract**

This article scrutinises the gaps in supervision practices in primary schools in Ethiopia. It examines the support being provided to teachers by supervisors, in three areas, teaching principles, teaching methods, and professional development. A mixed-methods design was used with questionnaires and semi-structured interviews. Questionnaires were completed by 382 in-service postgraduate diploma primary school principals and supervisors in the Department of Educational Leadership and Management at Hawassa University, Ethiopia in the 2018-2019 academic year. Semi-structured interviews were conducted with 12 purposively selected senior principals and supervisors. Results showed deficiencies in supports provided by supervisors to teachers in the three areas. The study suggests that in teaching and learning activities, supervisory support plays a very significant role in empowering teachers and contributing to improvements. So, the quality of teaching depends to some extent on the quality of supervision practices. Therefore, the Ethiopian government and stakeholders should give greater attention to improving the competency of supervisory staff, who are vital assets in striving for better quality education.

## **Institute of Policy and Development Research**

**Dejene, M., & Semela, T. (2020). The ‘Problem Represented To Be’ in the Social Protection Policy Regimes of Ethiopia. 47(3), 511–530.**

### **Abstract**

Policy analysis needs to go beyond the conventional ‘problem solving’ approach to interrogating ‘problem representations’ within policy documents. Numerous studies on social protection in Ethiopia, and in sub-Saharan Africa at large have been confined to studying the impact of policy interventions. Studies that aimed to scrutinize policy documents for their ‘problematization’ of issues and ‘problem representations’ in the Foucauldian sense are in dearth. This study used document analysis as a method and Bacchi’s (2009a) ‘What is the Problem Represented to be’ (WPR) model as its analytic frame to interrogate the ‘problem representations’ of the Developmental Social Welfare Policy (DSWP) and the present Social Protection Policy of Ethiopia. The findings suggest that though there is improvement from the earlier to the current policy, ‘problem representations’ of both were limited in terms of what they could deliver, for they were framed by targeting theory, having the ‘resource scarcity’ excuse. This was mainly reflected in the policy regimes’ ‘problematization’ of issues and ‘subjectification’ of beneficiaries.

**Keywords:** Ethiopia, Social protection policy, Problematization, Subjectification, Contestations

**Lemma, M. D., & Cochrane, L. (2020). Social Protection Implementation Issues in Ethiopia: Client Households’ Perceived Enablers and Constrainers of the Productive Safety Net Program. *Societies*, 10(3), 69.**

### **Abstract**

Social protection programs need to be suited to the specific context within which they are implemented. To minimize barriers and constraints in implementation, program design needs to integrate and respond to the views of client households and potential beneficiaries, ideally with on-going feedback mechanisms to better respond both to constrainers and to enablers. In order to provide evidence regarding constrainers and enablers in Ethiopia’s safety net program, we conducted a household survey to assess policy-backed efforts for social protection service delivery.

This paper outlines client households' perceived enablers and constrainers regarding the implementing of the Productive Safety Net Program, Africa's second largest safety net. The findings suggest that client households have identified enablers and constrainers from their lived experience that could be used as a feedback mechanism and as input for future program design. The findings could foster better outcomes in program implementation.

**Keywords:** social protection; Ethiopia; program implementation; enablers; constrainers; client households

**Cochrane, L. (2020). Synthesis of Evaluations in South Sudan: Lessons Learned for Engagement in Fragile and Conflict-Affected States. *Journal of Humanitarian Affairs*, 2(1), 21–34.**

## **Abstract**

South Sudan is one the largest recipients of official development assistance. Given the complexity of the operational environment, there is a need to learn from the lessons gained to-date. This article seeks to enable better-informed decision making based on a synthesis from humanitarian and development evaluation reports, which offer insight for engagement in other fragile and conflict-affected states. Experimental methods were utilised to identify evaluation reports. The synthesis finds that projects would be better designed if they allocated time and resources to obtain additional information, integrated systems thinking to account for the broader context, and engaged with the gendered nature of activities and impacts. Implementation can be strengthened if seasonality is taken into account, if modalities are more flexible, and if a greater degree of communication and collaboration between partners develops. Sustainability and long-term impact require that there is a higher degree of alignment with the government, longer-term commitments in programming, a recognition of trade-offs, and a clear vision and strategy for transitioning capacities and responsibilities to national actors. While actors in South Sudan have been slow to act on lessons learned to-date, the lessons drawn from evaluation reports in South Sudan offer direction for new ways forward, many of which have been concurrently learned by a diverse set of donors and organisations.

**Cochrane, L., & Legault, D. D. (2020). The Rush for Land and Agricultural Investment in Ethiopia: What We Know and What We Are Missing. *Land*, 9(5), 167.**

### **Abstract**

More than a decade has passed since the triple crises of food, energy and finance in the period 2007–2008. Those events turned global investor interest to agriculture and its commodities and thereafter the leasing of tens of millions of hectares of land. This article reviews and synthesizes the available evidence regarding the agricultural investments that have taken place in Ethiopia since that time. We use a systematic review approach to identify literature from the Web of Science and complement that with additional literature found via Google Scholar. Qualitative and quantitative methods are used to analyze the available literature. In so doing, we raise questions of data quality, by analyzing the evidence base used by many studies (the Land Matrix database) and compare it with data we obtained from the Government of Ethiopia. We find that while the Land Matrix is the largest available database, it appears to present only a fraction of the reality. In critically assessing the literature, we identify areas that have been under-researched or are missing from the literature, namely assessments of gendered impacts, the role of diaspora and domestic investors, interdisciplinary approaches (e.g., integrating climate change, biodiversity, and water), and studies that move beyond technical assessment, such as looking at the impacts on traditional knowledge and socio-cultural systems.

**Keywords:** Ethiopia; Land grab; Land grabbing; Large-scale land acquisition; Foreign direct investment; Agricultural investment

## College of Medicine and Health Sciences

**Deressa, A. T., Desta, M. S., & Belihu, T. M. (2020). Vaccination status and associated factors among street children 9–24 months old in Sidama Region, Ethiopia. *Annals of Global Health*, 86(1).**

### Abstract

#### Background:

Childhood non-vaccination can have different short-and long-term negative outcomes on their health. In Ethiopia, in addition to low coverage of full vaccination, street children were among the neglected part of the community who were missed during planning and reporting vaccination coverage. Moreover, there is no related research conducted on this title specifically.

#### Objective:

The objective of the study was to assess the vaccination status and its associated factors among street children 9–24 months old in Sidama zone.

#### Methods:

Community-based cross-sectional study design was conducted in four selected towns of Sidama region, southern Ethiopia. The convenience sampling method was applied to involve mothers of street children younger than two years during the study period. Data entry was done with EpiData version 3.1 and exported to SPSS22 for analysis. Bivariate and multivariable logistic regression analysis were performed to identify factors associated with immunization status of street children.

#### Results:

A significant number (26 [24.3%]) of the street children younger than two years were not vaccinated. Those mothers who are  $\leq 20$  years old ( $P = 0.014$ , AOR = 0.216, 95% CI: 0.064–0.732) and who gave birth at home ( $P = 0.029$ , AOR = 0.292, 95% CI: 0.097–0.879) had less odds of vaccinating their child than those older than 20 and who gave birth at health facility respectively.

## Conclusion:

A significant number of the street children in this study are not fully vaccinated. Mothers aged <20 years and home births were significantly associated with non-vaccination status.

**Belihu, T. M., & Deressa, A. T. (2020). Postnatal Care within One Week and Associated Factors among Women Who Gave Birth in Ameya District, Oromia Regional State, Ethiopia, 2018: Cross Sectional Study. *Ethiopian Journal of Health Sciences*, 30(3).**

## Abstract

**BACKGROUND:** Globally recorded large number of maternal and neonatal deaths are related to complications during pregnancy, childbirth and post-partum. Most neonatal deaths occur during the first week of life. It is also evidenced that the level of postnatal care utilization in Ethiopia is very low. This study aimed to assess postnatal care utilization within one week and associated factors among women who had given birth in the last six weeks in Ameya district, Oromia, Ethiopia.

**METHODS:** Cross sectional study design was employed on 332 study participants who were selected by systemic sampling method and interviewed using structured questionnaires. The data were analyzed using SPSS version 23.0. Bivariate and multivariate logistic regression analysis was used to identify the associated factors with the outcome variable. Figures, tables and sentences were used for the presentation of descriptive statistics.

**RESULT:** The finding revealed that the proportion of postnatal care utilization within one-week in the study area is 25.3%. Partner occupation[AOR=5.575, 95% CI= (1.071, 29.023)], mothers who had complication during labor and delivery[AOR=7.841, 95% CI= (2.287, 26.879)], distance from mothers to health facilities[AOR=5.127, 95% CI= (1.149, 22.878)] and awareness on postnatal care within one week services[AOR=4.161, 95% CI= (1.300, 13.314)] were the main contributing factors of postnatal care utilization within one-week.

**CONCLUSION:** Postnatal care utilization within one-week is very low (25.3%). Partner occupation, complication during labor and delivery, distance from health facilities and awareness on postnatal care within one week service were the associated factors.

**Mengesha, M. G., Ayana, B., Belay, M. M., Zewde, W., & Peter, J. (2020). Management of Idiopathic Clubfoot By Ponseti Method: Tikur Anbessa Specialized Hospital Five Year Experience. *Ethiopian Medical Journal*, 58(Supplement 03).**

### **Abstract**

**Methods:** A five-year retrospective study was conducted. Data analysed with SPSS version 24 and result summarized by texts, tables, and figures. The association between initial Pirani score and number of casts was assessed using the Pearson correlation coefficient with the level of significance set at  $P < 0.05$ .

**Results:** A total of 526 patients with mean age at presentation of 15.3 weeks were included. Male account for 387 (73.6%). More than two-third (70.7%) were born in the health facilities. Nearly half of them (47%) had bilateral involvement followed by right side (27.5%). In average, 5.94 corrective casts were needed to correct the deformity. According to Pearson correlation coefficient, a positive correlation was observed among number of casts to correct the deformity with initial pirani score and age at presentation ( $r = 0.225$ ,  $p < 0.001$ ;  $r = 0.178$ ,  $p < 0.001$ ). Among 587 feet for which tenotomy performed, only 186 tenotomy (31.7%) was done appropriately according to the criteria (HFCS  $> 1$  and MFCS = 0).

**Conclusions:** Ponseti method of club foot treatment is effective in treating idiopathic club foot in our setup. Close monitoring of tenotomy decision based on pirani scoring should be made by consultant orthopedic surgeon in order to prevent unnecessary tenotomy.

**Key words:** Idiopathic Clubfoot, Ponseti treatment, Number of casting, Pirani scoring system

**Hailu, S., & Gebreyohanes, M. (2020). Prevalence of Delayed Presentation of Open Long Bone Fracture Patients at Two Ethiopia Tertiary Hospitals. *Ethiopian Medical Journal*, 58(Supplement 03).**

### **Abstract**

**Background:** Clinical experience shows majority of patients with open long bone fracture present late in Ethiopia, and is associated with poor outcome.

**Objective:** *The aim of this study is to assess prevalence of delay in hospital presentation among patients with open long bone fractures.*

**Methods:** *This is a prospective observational sub-study of the ongoing Open Fracture Irrigation Study (OFIS), which is a randomized control trial (RCT) being conducted at Tikur Anbessa and Hawassa University Hospitals. The data is extracted from OFIS data registry into Microsoft excel, which was then exported to SPSS version 25 for analysis.*

**Result:** A total of 301 open long bone lower extremity fractures were included. Men accounted for about 85% with mean age of 32 years. The most common mechanism of injury was road traffic incidents in 171 patients (57%) followed by gunshot in 50 (16.6%). Majority (71%) were Gustilo-Anderson grade III. About 85% of open fractures did not present to hospital within the Lancet Commission on Global Surgery recommended 2 hours' time frame. Similarly, once the patient presented into the hospital, more than 65% were not operated within 24 hours of their presentation.

**Conclusion:** *This study shows that there is a significant delay among open long bone fracture in our set up in both time from trauma to hospital presentation and arrival to operation. We recommend further study to identify factors responsible for open long bone fracture delayed presentation.*

**Key word:** *open fracture, delayed presentation, Tikur Anbessa Specialized Hospital, Hawassa University Comprehensive Specialized Hospital*

**Mengesha, M. G., & Wamisho, B. L. (2020). Ring Tourniquet Syndrome: A Prospective Study on Predisposing Factors, Treatment Techniques and Outcomes In Ethiopia. *Ethiopian Medical Journal*, 58(Supplement 03).**

## **Abstract**

**Background:** Ring tourniquet syndrome is not uncommon and patients will present with pain, swelling, ischemia, and finger wounds related to previous ring removal attempts. It may be due to application of undersized ring or related to swelling around a previously well-fitted ring.

**Objective:** This study aimed to describe epidemiologic features, predisposing conditions, and treatment outcomes of strangulated fingers.

**Methodology:** In this prospective observational study, we enrolled consecutive patients who presented to any of the three selected emergency departments at Tikur Anbessa Specialized



Hospital, Alert trauma center and Hawassa University Comprehensive Specialized Hospital with ring tourniquet syndrome between January 01, 2017 and December 31, 2019. Data collected after getting ethical clearance.

**Result:** Among 33 patients enrolled, 52 % were female and the mean age was 24 (1.5 - 56) years. Eleven (33%) presented after wearing undersized ring, 7(21%) had trauma to the ipsilateral hand, wrist and/or forearm, and 7(21%) were psychiatric. The mean duration of ring incarceration was 3 days (4 hours – 3 weeks). Thirty-one patients (93%) reported previous attempt of removal of the constricting agent. Twenty-two patients (69%) required destruction of the constricting object and 5 patients (15%) need ray's amputation of the finger. There were no reported major complications.

**Conclusion:** Ring tourniquet syndrome is not uncommon in our setting, and since most of the incarcerated rings required ring-destructive technique, the health personnel need to be had at least ring or k-wire cutter.

**Key words:** *strangulated finger, ring incarceration, Tourniquet Syndrome, ring devices,*

**Simachew, Y., Zerfu, T., & Alemu, W. (2020). Treatment Outcomes and Predictors of Recovery from Severe Acute Malnutrition Among Children Aged 6–59 Months Attending an Outpatient Therapeutic Program in Wenago District, Southern Ethiopia. *Nutrition and Dietary Supplements*, 12, 189–200.**

## **Abstract**

**Background:** The outpatient therapeutic program (OTP) of children with severe acute malnutrition (SAM) brought the treatment approach closer to the community. In spite of the high coverage and accessibility, a low recovery rate of OTP is often reported. Thus, the aim of this study was to assess the treatment outcomes and identify predictors of recovery among children aged 6– 59 months with SAM enrolled to OTP in Wenago district, Southern Ethiopia.

**Methods:** A facility-based cross-sectional study was conducted by assessing health records and interviewing mothers of 554 children, who were treated between July 2017 and February 2018. A single stage cluster sampling was used to enroll the study participants. The data were coded and entered into EpiData version 3.1, and analyzed by SPSS version 20. Binary logistic regression was used to identify predictors of recovery. All statistical tests in this study were

declared significant at  $P < 0.05$ .

**Results:** The recovery, average weight gain rate and length of stay were 70.4%, 3.9 g/kg/day and 6.67 weeks, respectively. The adjusted odds ratios to recovery of children who were treated with amoxicillin, born from a mother whose age at first marriage was > 18 years, from a food secured household and had access to safe water sources were (AOR=3.97, 2.75, 3.21 and 2.96; 95% CI= 2.32, 6.78, 1.54, 4.93, 1.86, 5.52, and 1.61, 5.45), respectively. Conversely, children from households with three under-5 year olds had a 86% (AOR=0.14; 95% CI 0.05, 0.38) less risk of recovery as compared to children from households with only one under-5-year-old child.

**Conclusion:** The recovery rate, average daily weight gain and length of stay in the program were not within the acceptable sphere standards. Provision of amoxicillin, numbers of under-5-year-old children in the house, maternal age at first marriage, a source of water and food security status were independently associated with recovery from SAM under OTP.

**Keywords:** Outpatient therapeutic program, Treatment outcome, Severe acute malnutrition, Wenago district

**Bedaso, A., Kedi, G., Ebrahim, J., Tadesse, F., Mekonnen, S., Gobena, N., & Gebrehana, E. (2020). Prevalence and Determinants Of Post-Traumatic Stress Disorder Among Road Traffic Accident Survivors: A prospective survey at selected hospitals in southern Ethiopia. BMC Emergency Medicine, 20(1), 1–10.**

## **Abstract**

### **Background**

Post-traumatic stress disorder (PTSD) is prevalent among road traffic accident survivors (RTA), yet the psychological welfare of the persons has largely been ignored as health care professionals focus more on managing physical injuries. Many literatures from other parts of the world have addressed the issue of post-traumatic stress disorder among road traffic accident survivors, but such studies are mostly unavailable in sub-Saharan Africa, especially in Ethiopia. Therefore, this study examined the prevalence and determinants of PTSD among RTA survivors attending selected hospitals in southern Ethiopia.

## **Methods**

Institution based cross-sectional study design was employed from April 1/2018-Sep 30/2019. Data were collected from a sample of consecutively selected 423 RTA survivors through an interviewer-administered technique. A pre-tested post-traumatic stress disorder Checklist-Specific version (PCL-S) tool was used to screen PTSD. Data were entered and analysed using SPSS 22 software. A logistic regression model was fitted to identify determinants of PTSD. An adjusted odds ratio (AOR) with a 95% confidence interval was computed to determine the level of significance with a *p*-value of less than 0.05.

## **Result**

A total of 416 participants were included in the study and the response rate was 98.6%. The prevalence of probable PTSD among RTA survivors was 15.4% (64). After adjusting for the effects of potential confounding variables; time since accident (30–90 days) (AOR = 0.33; 95%CI (0.15, 0.73), history of previous road traffic accident (AOR = 2.67; 95%CI (1.23, 5.77), depressive symptoms (AOR = 2.5, 95% CI (1.10, 6.10)) and common mental disorder (AOR = 12.78, 95% CI (5.56, 29.36)) were significant determinants of PTSD.

## **Conclusion**

The prevalence of probable PTSD in the current study was high (15.4%). Time since accident, history of a previous road traffic accident, having depressive symptoms and common mental disorder were significant determinants of PTSD. RTA survivors attending adult Emergency and orthopedic clinics need to be screened for PTSD and get appropriate management

**Tilahun, A., Yoseph, A., & Dangisso, M. H. (2020). Utilization and Predictors of Long Acting Reversible Contraceptive Methods Among Reproductive Age Women in Hawassa city, South Ethiopia: A community based mixed methods. *Contraception and Reproductive Medicine*, 5(1), 1–11.**

## **Abstract**

### **Background**

Long acting reversible contraceptive methods are highly effective, safe and provide uninterrupted protection to women for 3 to 12 years, yet are little used in the Ethiopia. Assessment of the utilization and predictors of long acting reversible contraceptive methods assist health planners to prioritize promotion strategies, and is a fundamental step for intervention. Therefore, this study aimed to assess the utilization and predictors of long acting reversible contraceptives among reproductive age women in Hawassa city, South Ethiopia; 2019.

### **Methods**

A community-based cross-sectional study was conducted using a mixed method among the sample of 660 reproductive age women in Hawassa city, South Ethiopia from January 1–30, 2019. We have used a systematic and purposive sampling technique to select the study participants. A structured interview-administrated questionnaire and focus group discussion were used to collect the data. The data were entered using Epi data version 3.1 and analyzed using SPSS version 20. Chi-square ( $X^2$ ) test was used to determine the overall association between explanatory and outcome variables. The variables were entered into the multivariable model using the backward stepwise regression approach. Bi-variable and multivariable logistic regression analyses were conducted. The qualitative data were analyzed using a manual thematic analysis technique.

### **Results**

The overall utilization of long acting reversible contraceptive methods was 22% (95% CI = 19.50–25.50%). Among this, 17.5 and 4.5% of women utilized the implants and IUCD, respectively. Good knowledge (AOR = 4.0; 95% CI = 1.66–9.60;  $P = 0.001$ ) and positive attitude (AOR = 7.9; 95% CI = 3.84–16.10;  $P = 0.001$ ) of women about LARC methods were positively associated with utilization of LARC methods. The odds of utilizing LARC methods increased 8.2 times for women who have no desire to have a child (AOR = 8.2, 95% CI = 3.13–21.30) as compared to those who

have the desire to have a child. The discussion of women about LARC methods with providers (AOR = 4.1; 95% CI = 1.24–5.24) and husbands (AOR = 2.7; 95% CI = 1.02–7.20) were positively associated with utilization of LARC methods. These findings were supported by the individual, institutional and socio-cultural qualitative findings.

## **Conclusions**

The utilization of LARC methods far below the national target (22 V 40%) in the study area. Good knowledge and positive attitude about LARC methods, no desire to have a child, discussion with husbands and providers were major predictors of the LARC methods utilization. Increasing knowledge and positive attitude of the women about LARC methods using various methods of health education should be considered.

**Tsegaye, B., Yoseph, A., & Beyene, H. (2020). Prevalence and Factors Associated With Intestinal Parasites Among Children of Age 6 To 59 Months in, Boricha district, South Ethiopia, in 2018. BMC Pediatrics, 20(1), 28.**

## **Abstract**

### **Background**

Intestinal parasites are the commonest cause of childhood diarrhea and malnutrition in Ethiopia. Information about intestinal parasites is the first fundamental step for designing intervention strategies against them. Hence, health planners can maximize their efforts. Information is scarce about intestinal parasites among children of under-five years of age in Boricha district. Therefore, this study aimed at assessing prevalence and factors associated with intestinal parasites among children of age 6 to 59 months in Boricha district, South Ethiopia.

### **Methods**

A community based analytical cross sectional study was conducted among 624 children of age 6 to 59 months from January 1 to 30; in 2018. We have utilized two stage stratified sampling method. Firstly, simple random sampling was used to select sample Kebeles. Secondly, systematic random sampling method was used to select the study participants. Structured and interviewer administrated questionnaire was used to collect data. Parasitological examination of children's

stool was conducted microscopically. Data were entered into Epi-info, exported and analyzed by SPSS version 22. Logistic regression analysis was conducted to identify association between explanatory variables and outcome variable. Adjusted Odds Ratio (AOR) with 95% confidence interval (95%CI) was computed, and  $P$ -value  $< 0.05$  was considered as statistically significant. Descriptive statistics was presented using texts, tables and figures.

## **Result**

A total of 622 participants were included in the analysis which makes a response rate of 99.9%. Prevalence of intestinal parasites was 48.7% (95%CI, 44.8–52.6) in this study. Higher family size (AOR = 2.7, 95%CI = 1.5–5.0), medium family size (AOR = 2.3, 95%CI, 1.3–4.2), absence of latrine facility in the household (AOR = 2.9, 95% CI = 1.6–5.3), unable to put on shoes (AOR = 3.5, 95%CI = 2.2–5.7), and eating raw vegetables (AOR = 2.6, 95%CI = 1.6–4.7) were factors positively associated with intestinal parasites in this study.

## **Conclusion**

Overall prevalence of intestinal parasites was almost high. Latrine facility, family size, shoes wearing habit and eating raw vegetables were significantly associated with intestinal parasites. Family planning service, sanitation and hygiene practices should be intensified through community education. Activate support of deworming program should be considered. Moreover, policy makers should give priority on creating awareness to prevent intestinal parasite.

**Yoseph, A., & Beyene, H. (2020). The High Prevalence of Intestinal Parasitic Infections is Associated With Stunting Among Children Aged 6–59 Months In Boricha Woreda, Southern Ethiopia: A Cross-Sectional Study. *BMC Public Health*, 20(1), 1–13.**

## **Abstract**

### **Background**

Prior studies reported controversial results about the association between intestinal parasitic infections and childhood under-nutrition. We investigated the association of intestinal parasitic infections with under-nutrition among children aged 6–59 months in Boricha Woreda, Southern Ethiopia.

### **Methods**

This community-based prospective cross-sectional study was carried out from January 1–30, 2019 among 622 children aged 6–59 months. A two-stage stratified sampling procedure was used. Data were collected using a structured, face-to-face interviewer-administered questionnaire and standard anthropometric measurements. The stool specimens were collected using standard technique and examined for the existence and species of intestinal parasites using direct wet mount, Kato Katz and staining technique. We have entered data using Epi Data 3.1 and WHO Anthro software and all analyses were conducted using SPSS version 20. The descriptive analyses were done to find descriptive measures for the socio-demographic and other important variables. Multivariable logistic regression analysis was used to identify factors associated with under-nutrition. Adjusted odds ratios (AORs) with a 95% confidence interval (CI) were computed to assess the presence and strength of associations.

## **Results**

The total prevalence of intestinal parasitic infection was 48.7% (95% CI, 44.77–52.62). Approximately one-fourth (22%) of the children were infected with moderate intensity infections. Prevalence of stunting, underweight, wasting were 39.3, 24 and 11.6%, respectively. The prevalence of stunting among children infected with the intestinal parasite (59.4%) was significantly higher than the prevalence in non-infected children (20.6%) ( $p < 0.001$ ). The absence of sanitation facility, living in medium and large family size, lack of shoes wearing practice, consuming raw vegetables and fruits were positively associated with intestinal parasitic infections. The presence of intestinal parasitic infections was positively associated with stunting (AOR = 2.18, 95% CI: 1.36–3.50) but not with wasting (AOR = 0.58, 95% CI: 0.3–1.13) and underweight (AOR: 0.92, 95% CI = 0.55–1.54).

## **Conclusions**

Under-nutrition and intestinal parasitic infections were serious public health concerns. Consolidating the prevailing water, sanitation and hygiene packages and routine deworming of children aged 6–59 months may aid to decrease the burden of both stunting and intestinal parasitic infection in children. Also, improving modern contraceptive methods utilization to reduce family size is recommended.

**Badego, B., Yoseph, A., & Astatkie, A. (2020). Prevalence and Risk Factors of Hypertension Among Civil Servants In Sidama Zone, south Ethiopia. *PloS One*, 15(6), e0234485.**

## **Abstract**

### **Introduction**

Hypertension is the leading cause of death and disability in adult populations globally. Its prevalence is increasing rapidly in Ethiopia. Studies conducted to date address different population categories. However, there is lack of data on the prevalence and risk factors of hypertension among civil servants working in various sectors and levels.

### **Objective**

To assess the prevalence and risk factors of hypertension among civil servants in Sidama Zone, south Ethiopia.

### **Methods and materials**

An institution-based cross-sectional study was conducted from March 1–30, 2019 on a sample of 546 civil servants selected randomly from different departments of Sidama Zone Administration. Data were collected using structured, face-to-face interviewer-administered questionnaire and standard physical measurements. The data were entered using Epi Data 3.1 and analyzed using SPSS version 20. Multivariable logistic regression analysis was used to identify factors associated with hypertension. Adjusted odds ratios (AORs) with 95% confidence interval (CI) were computed to assess the presence and strength of associations.

### **Results**

A total of 546 civil servants responded resulting in a response rate of 94.9%. The prevalence of hypertension was 24.5% [95% CI: 23.3% - 25.6%]. The identified risk factors of hypertension were male sex (AOR 4.31[95% CI: 1.84–10.09]), moderate current alcohol consumption (AOR: 4.85; [95% CI: 1.73–13.61]), current khat chewing (AOR 2.97[95% CI: 1.38–6.40]), old age (AOR: 4.41[95% CI: 1.19–16.26]), being obese (AOR 5.94 [95% CI: 1.26–27.86]) and central obesity (AOR 3.57 [95% CI: 1.80–7.07]).



## Conclusions

One in four civil servants are hypertensive. Different demographic, behavioral and metabolic factors increase the odds of hypertension among civil servants. Prevention and control of hypertension shall involve promotion of healthy lifestyles such as weight management, regular physical activity and quitting or cutting down on harmful use of substances such as alcohol and khat.

**Gitore, W. A., Ali, M. M., Yoseph, A., Mangesha, A. E., & Debiso, A. T. (2020). Prevalence of Soil-Transmitted Helminthes and Its Association With Water, Sanitation, Hygiene Among Schoolchildren and Barriers For Schools Level Prevention In Technology Villages of Hawassa University: Mixed design. *PloS One*, 15(9), e0239557.**

## Abstract

### Background

Soil-transmitted helminths (STH) remain one of the most common causes of morbidity among children in Ethiopia. Assessment of the magnitude of STH and its association with water, sanitation, and hygiene (WASH) and identify barriers for school-level prevention assist public health planners to prioritize promotion strategies and is a basic step for intervention. However, there is a lack of evidence on the prevalence of STH and its association with WASH and barriers for school-level prevention among schoolchildren.

### Objective

To assess the prevalence of STH and its association with WASH and identify barriers for school level prevention in technology village of Hawassa University; 2019.

### Methods

An institution-based analytical cross-sectional study was conducted on a sample of 1080 schoolchildren from September 5 to October 15, 2019. A two-stage cluster and purposive sampling technique were used to draw the study participants. A pretested, structured questionnaire, observation checklist, and in-depth interview were used to collect the data. Two grams of stool samples were collected from each study participant and examined using direct wet mount and Kato-Katz technique. Data were entered into Epi Info version 7 and analyzed using SPSS version 25. Both bi-variable and multivariable logistic regression analyses were done. Qualitative data were analyzed using thematic content analysis method by Atlas-Ti software and presented in narratives.

## Results

The overall prevalence of STHs was 23.1% (95% CI = 21.4, 27.6). The identified predictors of STHs were large family size (AOR = 2.03; 95% CI = 1.53–3.99), absence of separate toilet room for male and female (AOR = 3.33; 95% CI = 1.91–5.79), toilet not easy to clean (AOR = 2.17; 95% CI = 1.44–3.33), inadequate knowledge about STHs (AOR = 2.08; 95% CI = 1.07–3.44) and children who had travelled greater than 100 meters to access toilet (AOR = 3.45; 95% CI = 2.24–8.92). These results were supported by the individual, institutional, socio-economic and cultural qualitative results.

## Conclusion

The STHs was moderate public health concerns. Reinforcing the existing fragile water, sanitation and hygiene programs and regular deworming of schoolchildren may support to reduce the burden of STHs. Also, increasing modern family planning methods utilization to decrease family size is recommended.

**Gemeda, E. Y., Kare, B. B., Negera, D. G., Bona, L. G., Derese, B. D., Akale, N. B., Kebede, K. M., Koboto, D. D., & Tekle, A. G. (2020). Prevalence and Predictor of Cervical Cancer Screening Service Uptake Among Women Aged 25 Years and Above in Sidama Zone, Southern Ethiopia, Using Health Belief Model. *Cancer Control*, 27(1), 1073274820954460.**

## Abstract

Cervical cancer is the fourth most common cancer affecting women worldwide, and the second leading cancer in Ethiopia. Screening gives protective benefits associated with a reduction in the incidence of invasive cervical cancer and mortality. However, the level of cervical cancer screening uptake is not well document in the country. This study aimed to determine the prevalence and predictors of cervical cancer screening service uptake among women aged 25 years and above in Sidama zone, southern Ethiopia, 2019. A cross-sectional study was conducted among 838 women aged 25 and above years by using an interviewer-administered questionnaire. Multi-stage sampling technique was employed to identify households with women age of 25 and above years who were residing in the selected kebele for more than 6 months. Descriptive and multivariable logistic regression done. P-value <0.05 was considered as significant and presented by adjusted odds ratio (AOR) with 95% C.I. This study showed that among 838 women, only 17.8% (95%CI, 15.2%-20.5%) have undergone for cervical cancer screening. Being age of 35-39 (AOR = 5.2, 95% CI = 2.6-10.6), College and above Educational level (AOR = 3.8, 95% CI = 1.5-9.6), Ever had HIV test (AOR = 2.8, 95% CI = 1.82-4.4) and high perceived self-efficacy (AOR = 4.4, 95% CI = 1.527-12.84) were significant predictors for cervical cancer screening service uptake. The

magnitude of cervical cancer screening uptake among women aged 25 years and above was lower than that of the recommended coverage of the target group by the national guideline. Age of women, educational status of women, ever had HIV test, and high perceived self-efficacy were important factors of cervical cancer screening service uptake. So it is very crucial improving cervical cancer screening uptake, through creating awareness and educating women, about the advantage of screening in early detection and management of cervical cancer screening utilization

**Keywords:** Cervical cancer screening, Cancer screening, Cancer, Health belief model, Sidama

**Gebretsadik, A., Hagos, H., & Tefera, K. (2020). Outcome of Uterine Rupture and Associated Factors in Yirgalem General and Teaching Hospital, Southern Ethiopia: A cross-sectional study. *BMC Pregnancy and Childbirth*, 20, 1–7.**

## **Abstract**

**Background:** The occurrence of uterine rupture has dropped significantly in high income countries. It continues, however, to be a major public and clinical health problem in low income countries including Ethiopia. **Aim of this study** was to assess management outcomes of uterine rupture and associated factors in Yirgalem General and Teaching Hospital in South Ethiopia. **Methods:** Institution-based cross-sectional study was conducted to examine medical records of women with uterine rupture between January 1, 2012, and December 31, 2017. Data were collected based on a checklist. Descriptive statistics and logistic regression analyses were performed. **Results:** Incidence of uterine rupture was 345 in 13,500 live births (25.5 in 1000 live births) in the study period. Of these, 331 cases were included. Poor maternal outcome occurred in 224 (67.7%) women. There were 13 (3.7%) maternal deaths and 320 (96.7%) stillbirths. Wound site infection (131; 39.6%) and anemia (129; 39%) were the most common post-operative complications. Prolonged duration of labor (more than 24 h) (adjusted odds ratio (aOR) 3.6; 95% CI 1.7–7.4), women with sepsis on admission (aOR 2.9; 95% CI 1.4–6.1), hemoglobin level < 7 g/dl prior to surgical intervention (aOR 4.5; 95% CI 1.1–17.8), delayed surgical intervention after hospitalization (4 h or more before surgery) (aOR 3.8; 95% CI 1.8–8), women who did not receive blood transfusion (aOR 4.0; 95% CI 2.1–7.9) and prolonged intraoperative time (aOR 5.5; 95% CI 2.8–10.8) were all factors associated with poor maternal outcome of uterine rupture. **Conclusion:** Poor maternal outcome of uterine rupture was high in the study area as compared to other studies.

Proper management of anemia, prompt surgical treatment, proper labor progress monitoring, surgical skills, improved infection prevention, maximizing blood transfusion availability and improving the quality of maternal healthcare all play a significant role in reducing uterine rupture and enhancing the chance of good outcomes.

**Keywords:** Uterine rupture, Outcome, Ethiopia

**Hailu, K., & Gebretsadik, A. (2020). Determinants of Gonorrhea and Syphilis Infections Among Pregnant Women Attending Antenatal Clinic At Dilla University Referral Hospital, Ethiopia: Unmatched Case-Control Study. *Women's Health, 16*, 1745506520940095.**

## **Abstract**

### **Objective:**

This study was designed to determine the risk factors associated with gonorrhea and syphilis infections among pregnant women attending antenatal care clinic at Dilla University Referral Hospital.

### **Method:**

A hospital-based unmatched case-control study (64 cases and 128 controls) with 1:2 ratios was conducted from 29 January 2018 to 20 June 2018, at the antenatal care clinic of the Dilla University Referral Hospital. Venous blood and vaginal swab were collected to screen for gonorrhea and syphilis. A pretested interviewer-administered questionnaire was used to gather data on sociodemographic and predisposing factors. Logistic regression analysis used to identify risk factors for sexually transmitted infections among pregnant women at 95% confidence interval and  $p$ -value  $< 0.05$ .

### **Result:**

A total of 64 cases of syphilis or gonorrhea were identified with a mean age of 26 years ( $\pm 4.1$  years.). Of those cases, 40 were syphilis seropositive and the remaining were gonorrhea cases. Lower educational status (adjusted odds ratio = 2.4, 95% confidence interval: 1.1–4.9), age of first sex  $< 18$  years (adjusted odds ratio = 2.8, 95% confidence interval: 1.3–5.9), history of abortion (adjusted odds ratio = 3.1, 95% confidence interval: 1.4–6.6), and having two or more

sexual partners in the past year (adjusted odds ratio = 2.5, 95% confidence interval: 1.1–5.7) were significantly associated with gonorrhea and syphilis infection.

### **Conclusion:**

Demographic, behavioral, and obstetric factors are associated with the occurrence of syphilis or gonorrhea among pregnant women. Strengthening the existing antenatal care services, providing health education on risk factors, and prioritizing women with the risk characteristics and initiation of gonorrhea and syphilis screening during antenatal care are mandatory.

**Keywords** Ethiopia, Gonorrhea and syphilis infection, Pregnant women, Risk factor

**Muluneh, A. A., Kassa, Z. Y., Siyoum, M., Gebretsadik, A., Woldeyes, Y., & Tenaw, Z. (2020). Determinants of Sub-Optimal Birth Spacing in Gedeo Zone, South Ethiopia: A Case–Control Study. *International Journal of Women’s Health*, 12, 549.**

### **Abstract**

#### **Background**

Birth spacing is key in ensuring the health of mothers and their children as well as determining population growth. Most of the mothers in developing nations including Ethiopia have been practicing short inter-birth intervals. There is a paucity of studies concerned with suboptimal birth spacing among women in reproductive age in the study area.

#### **Purpose**

This study aims to identify the determinants of sub-optimal birth spacing among reproductive-age women in Gedeo zone, South Ethiopia.

#### **Materials and Methods**

A community-based unmatched case–control study was undertaken among 814 reproductive-age women in Gedeo zone, South Ethiopia from October 1 to November 30, 2018. Cases were women practiced suboptimal/short birth intervals (<33 months), whereas controls were women practiced inter-birth intervals of 33 months and more. A structured interviewer-administered questionnaire was used. A stratified, two-stage cluster sampling technique was used. EpiData version 3.1 and SPSS version 22 were used for data entry and analysis, respectively. Bivariate and multivariable

logistic regression analyses were computed. P-value <0.05 was considered as statistically significant. All ethical procedures were considered.

## Results

Women's educational status, AOR (95% CI) =0.6 (0.43, 0.96), age at first marriage, AOR (95% CI) = 0.9 (0.85, 0.99), distance from the nearest health facility, AOR (95% CI) = 1.4 (1.04, 1.94), wealth index, AOR (95% CI) = 4.1 (2.66, 6.19), and postnatal care utilization after the previous birth, AOR (95% CI) = 0.4 (0.25, 0.53) were statistically significant with suboptimal birth spacing.

## Conclusion

Women's educational status age at first marriage, distance from the nearest health facility, wealth index and postnatal care utilization after the previous birth were the determinants of suboptimal birth spacing.

**Keywords:** Suboptimal birth spacing, Gedeo, Reproductive age women

**Koboto, D. D., Deribe, B., Gebretsadik, A., Ababi, G., Bogale, N., Geleta, D., Gemechu, L., & Mengistu, K. (2020). Quality of Life Among Breast Cancer Patients Attending Hawassa University Comprehensive Specialized Hospital Cancer Treatment Center. *Breast Cancer: Targets and Therapy*, 12, 87.**

## Abstract

### Background

Breast cancer affects the overall quality of life (QOL) among its survivors. Limited evidence is available about the QOL among cases. Therefore, this study was intended to assess the quality of life of breast cancer patients attending the cancer treatment center at Hawassa University Comprehensive Specialized Hospital, Hawassa, southern Ethiopia.

### Methods

An institution-based cross-sectional study was conducted among breast cancer patients attending cancer treatment at the Hawassa University Comprehensive Specialized Hospital between April and June, 2019. All breast cancer patients attending treatment the center were included in the study by universal sampling. Data were collected using a structured questionnaire containing demographic data, patient clinical factors and Quality of Life Instrument (WHOQOL)-BREF

version 3.0. The collected data were entered into EpiData software version 3.1 and analyzed using SPSS Version 20.0. Descriptive statistics were presented in tables.

## Results

A total of 259 respondents with a mean age of (SD) 44.89 (12.56) participated in study. The mean score of overall global health scale was 75.3 (SD±17.1) with the mean health satisfaction was 12.43 (SD±3.98). The highest mean score was observed in environmental domain, 93.31 (SD±19.76), despite social domain being very low, 36.69 (SD±7.62). Most of the participants were highly satisfied with the health care service that was provided, with a mean score of 16.1 (SD±3.1). In contrast, the majority of study participants were disappointed with the need for any medical treatment, body appearance, luxurious activities, and sexual life, with mean scores of 8.93 (SD±3.68), 8.74 (SD±4.26), 9.1 (SD±4.22), and 8.1 (SD±4.14), respectively.

## Conclusion

Breast cancer patients in southern Ethiopia suffered from poor social and psychological support that, in turn, highly affected their life value. Therefore, due attention should be given to enhance social and psychological support for breast cancer patients as a whole.

**Keywords:** Breast cancer, Quality of life, Domains of QOL, Hawassa

**Gebretsadik, A., Melaku, N., & Haji, Y. (2020). Community Acceptance and Utilization of Maternal and Community-Based Neonatal Care Services Provided by Health Extension Workers in Rural Sidama Zone: Barriers and Enablers: A Qualitative Study. *Pediatric Health, Medicine and Therapeutics*, 11, 203.**

## Abstract

### Purpose

This study assessed the community acceptance and utilization of maternal and community-based neonatal care services, its barriers, and enablers in southern Ethiopia, 2019.

### Methods

An exploratory qualitative study was conducted among mothers, health extension workers, their supervisors and coordinators in four districts of Sidama Zone, Hawassa University Demographic Surveillance Site. An in-depth interview has been carried out with eight health extension workers

and eight program coordinators and supervisors, while four focus group discussions were held with eligible mothers. Digital recording was applied to record the interview and discussion followed by transcription and thematic analysis through open code.

## Results

Study findings reveal that services provided by health extension workers at community level for mothers and their children are highly appreciated and recognized by the community. Most of the communities are free from wrong perception regarding the practices. Their performance was better in focused antenatal care, but postnatal care and community-based neonatal care were reported to be insignificant. Knowledge and skills of HEWs was based on their extended experiences. The challenges and opportunities include workload, road inaccessibility, poor supervision, inadequate drugs and equipment supply, shortage of man power and budget at health posts, distance and topography factors of homes from health posts making the visits more difficult, etc. To improve uptake of the services, increasing the number of health extension workers in the health post, supportive supervision, continuous essential drugs and medical supplies were suggested by participants.

## Conclusion

This study shows that services provided by health extension workers for mothers and their neonates are highly appreciated by the community, and there is better change in focused antenatal care services, but postnatal care and sick newborn care are still low. Therefore, maternal and neonatal programs should focus on the postnatal home visits and sick newborn care through solving identified barriers.

**Keywords:** Knowledge of HEWs, Community-based neonatal care, Performance, Improvement, Sidama, Ethiopia



**Abdo, A. A., Hinderaker, S. G., Tekle, A. G., & Lindtjørn, B. (2020). Caesarean Section Rates Analysed Using Robson's 10-Group Classification System: A cross-sectional study at a tertiary hospital in Ethiopia. *BMJ Open*, 10(10), e039098.**

## **Abstract**

**Objective** The aim of this study was to assess the caesarean section (CS) rates using Robson's 10-Group Classification System among women who gave birth at Hawassa University Referral Hospital in southern Ethiopia.

**Design** Cross-sectional study design to determine CS rate using Robson's 10-Group Classification System.

**Setting** Hawassa University Referral Hospital in south Ethiopia.

**Participants** 4004 women who gave birth in Hawassa University Referral Hospital from June 2018 to June 2019.

**Results** The 4004 women gave birth to 4165 babies. The overall CS rate was 32.8% (95% CI: 31.4%–34.3%). The major contributors to the overall CS rates were: Robson group 1 (nulliparous women with singleton pregnancy at term in spontaneous labour) 22.9%; group 5 (multiparous women with at least one previous CS) 21.4% and group 3 (multiparous women without previous CS, with singleton pregnancy in spontaneous labour) 17.3%. The most commonly reported indications for CS were 'fetal compromise' (35.3%) followed by previous CS (20.3%) and obstructed labour (10.7%).

**Conclusion** A high proportion of women giving birth at this hospital were given a CS, and many of them were in a low-risk group. Few had trial of labour. More active use of partogram, improving fetal heartbeat-monitoring system, implementing midwife-led care, involving a companion during labour and auditing the appropriateness of CS indications may help to reduce the CS rate.

**Alemayehu, T., Ayalew, S., Buzayehu, T., & Daka, D. (2020). Magnitude of Cryptococcosis among HIV Patients in sub-Saharan Africa countries: A systematic review and meta-analysis. *African Health Sciences*, 20(1), 114–121.**

## **Abstract**

**Background:** *Cryptococcus* is encapsulated opportunistic yeast that causes life threatening meningoencephalitis of patients with human immunodeficiency virus (HIV). The magnitude of *Cryptococcosis* among HIV patients varies from 1-10% in Western countries as opposed to almost a one third of HIV-infected individuals in sub-Saharan Africa where it is associated with high mortality.

**Methodology:** By using key terms “*Cryptococcosis* among HIV patients in sub-saharan Africa countries”, articles that published in different journals from 2010-2017 searched on Pub-Med and Google scholar database. Those freely accessible and included the prevalence of *Cryptococcosis* in the result section, their PDF file was downloaded and the result extracted manually and presented in table. Articles that did not report the prevalence of *Cryptococcosis*, with a study design other than cross sectional, or a sample size less than 100, and those duplicated in the same study area and period by the same authors were excluded. The article selection followed the PRISMA guidelines and meta-analysis was performed using OpenMeta(analyst).

**Results:** The overall pooled magnitude of *Cryptococcosis* among HIV patients in sub saharan African countries was 8.3% (95%CI 6.1-10.5%). The highest prevalence was from Uganda (19%) and the least was from Ethiopia at 1.6%. There was 87.2 % of substantial heterogeneity among the studies with p-value<0.001. The symmetry of the forest plot showed that there was little publication bias. The most commonly used method for diagnosis of *Cryptococcosis* was lateral flow assay and latex agglutination test and culture was the least method employed.

**Conclusion:** The overall pooled magnitude of *Cryptococcosis* is high among HIV patients in sub-Saharan African countries. The studies showed substantial heterogeneity, and little publication bias. Most of the studies relied on LFA & LA that showed the scarcity of facilities for fungal culture. Therefore, paying attention to screening HIV patients; those with signs and symptoms of meningitis may help to reduce the loss of HIV patients.

**Keywords:** *Cryptococcosis*; sub-Saharan African; HIV; meta-analysis.

**Alemayehu, T., & Hailemariam, M. (2020). Prevalence of Vancomycin-Resistant Enterococcus in Africa In one Health Approach: A systematic review and meta-analysis. *Scientific Reports*, 10(1), 1–10.**

## **Abstract**

Vancomycin-resistant enterococci are a global challenge currently as reported by the World Health Organization. It is also important to recognize that combating antimicrobial resistance needs to recognize the interconnections between people, animals, plants and their shared environment in creating public health, the so-called One Health approach. Although the presence of VRE has been described in many regions of the world, there is a lack of comprehensive data indicating their prevalence of in Africa. Therefore, this study aimed to aggregate the result of studies describing VRE reported across multiple regions in Africa. A literature search was conducted on PubMed, Google scholar, and Hinari with the term “Vancomycin resistance enterococcus in Africa” on August 1–3, 2019. All available articles were downloaded to “Endnote version 7.1” then to Microsoft Word 2013. Articles determined to meet our criteria for the review was extracted to Microsoft Excel 2013. Those articles that reported the prevalence of vancomycin resistance *Enterococcus* obtained from all sample types and published from 2010 to 2019 in the English language were included for the review. A meta-analysis was conducted with OpenMetaAnalyst version R.3.1.0 software. The effect size was determined using a binary random effect model and statically significant considered when  $p < 0.05$ . Heterogeneity determined with the inconsistency index. A leave one out analysis used to perform the sensitivity analysis. There were 151 articles identified from the database searches; of this, 36 articles included after extensive review with two independent authors. Out of 4073 samples collected, 1488 isolates identified with an overall pooled prevalence of VRE 26.8% (95% CI; 10.7–43.0%) in Africa with a one-health perspective. The analysis showed that considerable heterogeneity among the studies ( $I^2 = 99.97\%$ ;  $p < 0.001$ ). Subgroup analysis in-country, African region, laboratory method, year of publication, and sample source showed that a high prevalence was identified from South Africa (74.8%), South African regions (74.8%), PCR (959.2%), 2010–2015 years (30.3%) and environmental (52.2%), respectively. This meta-analysis indicates that there was a high-pooled

prevalence of vancomycin-resistant enterococci in African. A lot should be done to prevent and control the transmission of vancomycin resistance enterococci to a human being from the environment in the continent.

**Wachamo, D., Geleta, D., & Woldesemayat, E. M. (2020). Undiagnosed Hypertension and Associated Factors Among Adults in Hawela Tula Sub-City, Hawassa, Southern Ethiopia: A Community-Based Cross-Sectional Study. *Risk Management and Healthcare Policy*, 13, 2169.**

## **Abstract**

### **Background**

Hypertension (HTN) is a major public health problem and often it is unnoticed. Undiagnosed HTN may lead to a high burden of cardiovascular diseases and complications such as stroke and heart attack. In this study, we aimed to assess the prevalence and associated factors of undiagnosed HTN.

### **Methods**

From February to June 2019, a community-based cross-sectional study was conducted on 383 randomly selected adults in Hawela Tulla Sub-city, Hawassa, southern Ethiopia. Data were collected by pretested questionnaires, and physical measurements of weight, height and blood pressure were collected through standardized procedures adapted from WHO STEPS survey tools. Data entry and analysis were carried out using SPSS version 23 statistical software. Descriptive analysis and logistic regression models were used to describe the results. Logistic regression analysis results were declared statistically significant if the *P*-value was below 0.05 and the 95% CI did not cross the null value.

### **Results**

The prevalence of undiagnosed HTN among the respondents was 12.3%. Only 152 (39.7%) of the study population knew the symptoms of HTN. Males (adjusted odds ratio [AOR] =2.5, 95% CI: 1.2, 5.2; *P*=0.016), people with a family history of HTN (AOR=2.7, 95% CI: 1.0, 7.0; *P*= 0.044), people who chewed khat (AOR=4.6, 95% CI: 2.0, 10.2; *P*<0.001), overweight or obese individuals (AOR=3.5, 95% CI: 1.7, 7.3; *P*=0.001) and people with diabetes mellitus (AOR=3.2, 95% CI: 1.1, 9.3; *P*=0.036) had a higher risk of undiagnosed HTN than their counterparts.

## Conclusion

Identification of people with the risk factors of undiagnosed HTN and delivering health education to reduce the risky behaviors could reduce the burden and consequences of HTN. Integrating interventions at the community level may be important.

**Keywords:** Undiagnosed HTN, Health-seeking behavior, Hawassa city, Ethiopia

**Dana, E., Asefa, Y., Hirigo, A. T., & Yitbarek, K. (2020). Satisfaction and its Associated Factors of Infants' Vaccination Service Among Infant Coupled Mothers/Caregivers at Hawassa city public health centers. *Human Vaccines & Immunotherapeutics*, 1–8.**

## Abstract

Studies conducted on caregivers' satisfaction on child vaccination services were very scarce including the study area. Therefore, this study was aimed to assess satisfaction and associated factors in vaccination service among infant coupled mothers/caregivers attending at public health centers. A cross-sectional study was conducted on 404 infant coupled mothers/caregivers from 15 March to 15 April 2018 in the selected health centers of Hawassa city, Southern Ethiopia. A systematic random sampling technique was applied to collect relevant data through exit interview with an interviewer-administered structured questionnaire. The overall proportion of the mothers/caregivers who satisfied with their children immunization service was 76.7%. In addition, 89.7%, 77.1%, 77.2%, 65.8%, and 68.3% were satisfied with conveniences of waiting area, cleanliness of immunization rooms, distance from nearby health center, service providers approach and waiting time to get service, respectively. In addition, caregivers living closer to health centers were 5.9 times more likely to be satisfied than their counterparts, the adjusted odds ratio and 95% confidence interval [AOR and 95%CI : 5.9(1.6–22.4)]. Caregivers who waited for  $\leq 30$  minutes to get service were 7.3 times more likely to be satisfied than those waited for  $> 30$  minutes [AOR and 95% CI: 7.3(3.9–13.6)]. The study indicated the overall satisfaction of caregivers concerning vaccination service to be suboptimal. Maternal/caregivers satisfaction plays a great role to follow vaccination schedule properly and completeness of immunization service for their infants.

**Hirigo, A. T., & Teshome, T. (2020). The Magnitude of Undiagnosed Diabetes and Hypertension Among Adult Psychiatric Patients Receiving Antipsychotic Treatment. *Diabetology & Metabolic Syndrome*, 12(1), 1–10.**

## **Abstract**

### **Background**

Patients with severe mental illness (SMI) are at increased risk of developing non-communicable diseases that could cause significantly lower life expectancy when compared to the general population. This study aimed to assess the magnitude and predictors of undiagnosed type-2 diabetes and hypertension among adult patients with SMI on antipsychotic treatments.

### **Methods**

A hospital-based cross-sectional study was conducted on 237 psychiatric patients from January to June 2019 at Hawassa University Comprehensive Specialized Hospital, Hawassa, Southern Ethiopia. All relevant information was collected using a structured interviewer-administered questionnaire with a systematic random sampling technique. A total of 4–5 mL of overnight fasting venous blood was collected from each patient. Serum lipid profiles and fasting blood sugar (FBS) were measured using the A25™ BioSystem Random Access chemistry analyzer. To identify predictors of hyperglycemia and raised blood pressure, multiple linear regression analysis was done using SPSS version 23. Statistical significance was set at  $p$  value  $< 5\%$ .

### **Results**

From 247 patients with SMI approached, 237 (58.2% male and 41.8% females) were take part in the study giving a response rate of 95.9%. The overall 31.2% (95%CI: 24.1–37.6) and 27.8% (95%CI: 23.2–33.4) of patients had hyperglycemia and raised BP. The magnitude of prediabetes and type-2 diabetes was 24.9% (95%CI:19.4–30.4), and 6.3% (95% CI: 3.4–10.1), respectively. While the magnitude of prehypertension and hypertension was 23.2% (95%CI: 17.3–29.5) and 4.6% (95%CI: 2.1–8.0), respectively. In multiple linear regression analyses: age, HDL-cholesterol, physical activity and Triglyceride/HDL-cholesterol ratio were positively correlated with FBS. While, HDL-cholesterol, waist circumference, physical activity, total cholesterol/HDL-c ratio, and body mass index were positively correlated with systolic and diastolic blood pressures.

## Conclusion

The findings indicate a need to assess blood glucose and blood pressure at baseline before the commencement of any antipsychotic therapy and during therapeutic follow up to manage any increasing trends. Moreover, close monitoring of patients with severe mental illness on antipsychotic therapy is exclusively recommended.

**Tesfaye, S., Tariku, M., & Hirigo, A. T. (2020). Postpartum Left Ovarian Vein Thrombosis. *SAGE Open Medical Case Reports*, 8, 2050313X20962637.**

## Abstract

Left ovarian vein thrombosis is a very rare and infrequent thrombotic condition that mainly occurs in the postpartum or postoperative period. We report a case of a 25-year-old para-1 woman who presented with 2 weeks of postpartum fever and dull aching abdominal pain more on the left side. Before operation, the diagnosis was left adnexal mass secondary to questionable ovarian cyst torsion and she underwent laparotomy. Her intraoperative findings revealed a firm left broad ligament mass with extension to retroperitoneum and it was difficult to demarcate the proximal end. Moreover, on the second day of postoperation, abdominal Doppler ultrasound indicated enlargement of the left ovarian vein that was filled with thrombi having hypoechoic and intermediate echogenicity. After the confirmation of left ovarian vein thrombosis, the case was treated with anticoagulants and broad-spectrum antibiotics and then well improved. Our case climaxes an instant diagnosis and therapeutic significance concerning ovarian vein thrombosis to early manage/avert complications. Besides, the ovarian vein thrombosis diagnosis requires a high index of suspicion for a case presented with fever and abdominal pain.

**Keywords** Postpartum, Left ovarian vein thrombosis, Doppler ultrasound, Laparotomy

**Eshetu, D., Kifle, T., & Hirigo, A. T. (2020). Knowledge, Attitudes, and Practices of Hand Washing among Aderash Primary Schoolchildren in Yirgalem Town, Southern Ethiopia. *Journal of Multidisciplinary Healthcare*, 13, 759.**

## **Abstract**

### **Background**

Hand washing is a simple, convenient, and cost-effective means to limit the transmission of communicable diseases. Improving the practice of hand washing is vital to decrease hygiene-related morbidity and mortality, particularly in developing countries. As such, this study aimed to assess knowledge, attitudes, and practices of hand washing among schoolchildren in Aderash primary school, Yirgalem town.

### **Methods**

A cross-sectional study was conducted on 279 schoolchildren from March to May 2019. A pretested structured questionnaire was applied to collect all relevant information using simple random sampling. Data entry and clearance was done with Epi-Info version 7 and exported to SPSS version 20 for analysis. Adjusted ORs with 95% CI were used to assess statistically significant variables ( $p < 0.05$ ).

### **Results**

Overall, 62.7% of schoolchildren had adequate knowledge of hand washing, 61.3% exhibited positive attitudes toward hand washing and 39.1% had good hand-washing practices. Over three quarters (89%) of them had good knowledge of washing hands with soap. About 24%, 56.6%, 9.3%, 6.5%, and 3.6% of children reported washing hands after defecation, before meals, after meals, after work, and after play, respectively. In addition, 73.8% of them reported washing hands with soap if their hands looked dirty or smelled bad. Urban dwelling increased knowledge of hand washing of 1.3-fold (95% CI 1.2–2.85).

### **Conclusion**

Even though >60% of children had adequate knowledge and exhibited positive attitudes toward hand washing, proper hand-washing practices was <40%. Therefore, much effort should be



directed toward improving children's understanding of the benefits of proper hand washing in schools.

**Keywords:** Knowledge, Attitude, Hand-washing practice, Primary school children, Yirgalem

**Tsehay, S., Hassen, F., Hirigo, A. T., Abiy, Z., & Desta, K. (2020). Blood Transfusion-Transmissible Malaria and Its Cost Analysis In Hawassa Regional Blood Bank, Southern Ethiopia. *SAGE Open Medicine*, 8, 2050312120936930.**

## **Abstract**

### **Background:**

Blood transfusion is an intervention used to save life particularly for those patients who survive only with receiving blood. Establishing effective diagnostic test menus concerning the screening of transfusion-transmissible infections in the blood banks play a vital role to safeguard recipients from transfusion-transmissible infections.

### **Objective:**

The aim of this study was to assess blood transfusion-transmissible malaria and its screening cost analysis in Hawassa regional blood bank, Hawassa, Southern Ethiopia.

### **Methods:**

An institutional-based cross-sectional study was conducted from April to May 2018 among 414 voluntary blood donors. Each participant's blood sample was screened for most transfusion-transmissible infections using antigen/antibody tests, while rapid diagnostic test and microscopy were used for malaria screening and confirmation. In addition, the cost screening of transfusion-transmissible infections was calculated using activity-based costing method.

### **Results:**

The overall seropositivity of transfusion-transmissible infections was 7.0% and the positivity rate of hepatitis B virus, syphilis, and *Plasmodium falciparum* was 5.6%, 1.0%, and 0.5%, respectively. The cost per test of each transfusion-transmissible infection was US\$5.04 for human immunodeficiency virus, US\$4.61 for hepatitis B virus, US\$5.11 for hepatitis C virus, and

US\$4.75 for syphilis, while the cost per test of malaria rapid diagnostic test was US\$4.74 and this is comparatively lower than the cost per test of other transfusion-transmissible infections except for hepatitis B virus. In addition, total cost of laboratory incurred for transfusion-transmissible infections screening is estimated to be US\$213,634.5 per year, while it becomes US\$265,537.5 if the malaria screening cost is added. This means 19.54% of the total cost of laboratory incurred per year or US\$51,903.

#### Conclusion:

The positivity rate of malaria parasites among voluntary blood donors was 0.5%, and it might be increased if the study was conducted in high transmission seasons. A cost of malaria screening is comparatively lower than costs of other transfusion-transmissible infections except for hepatitis B virus. Therefore, the screening of malaria parasites should be considered as one of the test menus of transfusion-transmissible infections in blood banks, especially in malaria-endemic areas.

**Keywords:** Cost analysis, transfusion-transmitted infections, Malaria, Donors, Blood screening, Hawassa blood bank

**Eshetu, D., Kifle, T., Agaje, B. G., & Hirigo, A. T. (2020). Seropositivity of West Nile Virus Among Acute Febrile Patients in Southern Ethiopia. *Infection and Drug Resistance*, 13, 1491.**

#### Abstract

##### Background

West Nile virus (WNV) is one of the widely distributed arboviruses in the world, and it is a pathogen of both humans and animals. The evidence that supports the prevalence of the WNV infection in Ethiopia is very scarce. Hence, this study aimed to assess the seropositivity of WNV among patients with acute febrile illness.

##### Methods

This health institution-based descriptive cross-sectional study was conducted on 532 acute febrile patients from May to August 2016 in Arba Minch Zuria district selected public health facilities, Southern Ethiopia. A pre-structured questionnaire was used to collect socio-demographic and

clinical related information of the participants through convenient sampling techniques. In addition, trained nurses who were working in the health centers were responsible for interviewing acute febrile patients. About 5 mL of venous blood was collected aseptically from each of the study participants for the screening of the WNV immunoglobulin G (IgG) and immunoglobulin M (IgM) antibodies using indirect immunofluorescence technique (IIFT) as per manufacturer's protocol. Data analysis was done using statistical package for social sciences (SPSS) version 20 software and the results were presented by frequency and percentage using tables.

## Results

A total number of 529 acute febrile patients (42.7% males and 57.3% females) were enrolled in the study with a response rate of 99.4%. The overall 7.4% of acute febrile patients were seropositive for WNV-specific IgG and the rate was higher in males (9.7%) when compared to females (5.6%). While the overall 4.5% were seropositive for WNV-specific IgM and the rate was 6.6% in males and 3.0% in females.

## Conclusion

The finding of this study is an important alarm for clinicians/physicians to diagnose febrile patients in the divergent direction including with the diagnosis of flaviviruses. In addition, the finding will further contribute to understanding the epidemiology of WNV fever in Ethiopia and it will play a role in the delivery of public health measures to decrease the risk of WNV exposure in the areas.

**Keywords:** West Nile virus, acute febrile patients, Arba Minch Zuria district, Southern Ethiopia

**Teshome, T., Kassa, D. H., & Hirigo, A. T. (2020). Prevalence and Associated Factors of Metabolic Syndrome Among Patients with Severe Mental Illness at Hawassa, Southern-Ethiopia. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, 13, 569.**

## Abstract

### Background

Patients with severe mental disorders have a high risk of metabolic-related complications like metabolic syndrome (MetS), diabetes mellitus (DM), hypertension and lipid derangements, and these factors may predispose them to a high mortality rate. Data is very scarce regarding MetS

among patients with severe mental illness in Ethiopia. Therefore, this study aimed to assess the prevalence of MetS and its associated factors among patients with severe mental illness.

## Methods

A cross-sectional study was conducted in Hawassa University Comprehensive Specialized Hospital from January to June 2019 among adult patients attending a psychiatric outpatient department, Southern Ethiopia. A systematic random sampling technique was used to select 245 study subjects. Socio-demographic and other data were collected using a structured questionnaire. Both the National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III) and International Diabetes Federation (IDF) guidelines were used to define MetS.

## Results

The prevalence of MetS was 24.5% and 26.9% by NCEP-ATP and IDF criteria respectively. In both definitions, females had significantly higher MetS when compared to males (31.4% vs 19.6%;  $p=0.03$  by NCEP), and (34.3% vs 21.7%;  $p=0.03$  by IDF), respectively. Duration  $>5$  years with mental illness indicated higher MetS when compared to duration  $\leq 5$  years (42.9% vs 19.9%,  $p=0.001$ ; and 46.9% vs 21.9%,  $p<0.0001$ ) in NCEP and IDF, respectively. In addition, marital status [AOR (95% CI): 2.4 (1.1–5.3)], and BMI [AOR (95% CI): 8.4(4.0–17.6)], duration  $> 5$  years with mental illness [AOR (95% CI): 2.8(1.2–6.5)], and age  $>40$  years [AOR (95% CI): 2.7(1.2–6.1)] were significantly associated factors of MetS by NCEP. While BMI, age  $>40$  years and duration  $> 5$  years with mental illness were associated with MetS by IDF.

## Conclusion

Long-time experience with severe mental illness and antipsychotic therapy might predispose patients to metabolic complications with significant risks of cardiovascular events. Therefore, intensive screening of patients for MetS/components is required during follow-up based on national non-communicable diseases guideline. Besides, the proper intervention of patients concerning lifestyle changes and averting risk full behaviors is mandatory.

**Keywords:** Severe mental illness, Antipsychotic agents, Metabolic syndrome, Hawassa, Southern-Ethiopia

**Agaje, B. G., Delelegne, D., Abera, E., Desta, K., Girum, M., Mossie, M., Eshetu, D., & Hirigo, A. T. (2020). Strabismus prevalence and associated factors among pediatric patients in southern Ethiopia: A cross-sectional study. *Journal of International Medical Research*, 48(10), 0300060520964339.**

## **Abstract**

### **Objective**

To assess the strabismus prevalence and associated factors among children aged  $\leq 15$  years.

### **Methods**

This hospital-based cross-sectional study was conducted from March 2017 to October 2017 in the Department of Ophthalmology & Optometry, Hawassa University Comprehensive Specialized Hospital. Interviewer-administered questionnaires were used to collect relevant data and clinical examinations were performed for patient diagnosis.

### **Results**

Overall, 582 children participated in the study (response rate, 97%). The prevalence of childhood strabismus was 17.9% [95% confidence interval: 14.6–21.1]. Additionally, 9.6%, 16.7%, and 9.6% of the children had anisometropia, amblyopia, and dense cataract, respectively. Among the 16.7% of children with amblyopia, 56.7% had strabismus; among the 22.5% of children with clinically significant refractive error, 52.7% had strabismus. Moreover, among the 9.6% of children with anisometropia, 58.9% had strabismus. The presence of amblyopia (adjusted odds ratio [95% confidence interval]: 3.9, 1.7–8.6), age <5 years (13.5 [5.0–36.1]), age 5 to 10 years (6.1 [2.3–16.3]), and clinically significant refractive error (13.3 [5.8–30.6]) were significantly associated with childhood strabismus.

### **Conclusions**

The prevalence of strabismus was relatively high among patients in this study. Early screening for childhood strabismus is essential. A well-controlled community-based study is needed to confirm strabismus prevalence and predictors.

**Keywords** Children, strabismus, Hawassa, southern, Ethiopia, Amblyopia, Anisometropia, Refractive error, Cataract

**Degefa, G., Wubshet, K., Tesfaye, S., & Hirigo, A. T. (2020). Predictors of Adherence Toward Specific Domains of Diabetic Self-Care Among Type-2 Diabetes Patients. *Clinical Medicine Insights: Endocrinology and Diabetes*, 13, 1179551420981909.**

## **Abstract**

### **Background:**

Adequate knowledge, awareness, and adherence to diabetic self-care practices are vital tools to protect patients from risks of disease complications, developing comorbidity and mortality. Therefore, this study aimed to assess specific domains of diabetic self-care practice and associated factors among patients with type-2 diabetes in Hawassa University Comprehensive Specialized Hospital, Sidama regional state.

### **Materials and methods:**

A hospital-based cross-sectional study design was conducted on 217 patients with type 2 diabetes from January 01 to April 30, 2020. A structured questionnaire and the Summary of Diabetes Self-Care Activities (SDSCA) tool were used to collect relevant data through interviewer administration. Statistical analysis was done using SPSS version 23.

### **Results:**

A total of 207 patients with type-2 diabetes were participated in the study with a 95% response rate. Overall 47.8% (95%CI: 41.2-55) of patients adhered to diabetic self-care practice. Concerning the specific domain of self-care practice, 54.6%, 39.1%, 28%, and 65.2% of patients adhered to a healthy diet, physical exercise, self-monitoring blood glucose (SMBG), and diabetic foot care practices, respectively. Besides, all patients received at least 80% of the prescribed doses and frequency of anti-diabetic agents and 60.4% had good glycemic control. Receipt of advice from treating physicians and having no familial history of diabetes were significantly associated with adherence toward eating a healthy diet, diabetic foot care, and SMBG. While male sex was associated with adherence toward healthy diet management. Moreover, having glucometer, age, male sex, diabetes duration  $\geq 5$  years, and anti-diabetic treatment modality were associated with adherence toward SMBG.

**Conclusion:**

This study indicates 52.2%, 72%, and 60.1% of diabetes patients did not adhere to diabetic self-care, SMBG, and physical exercise, respectively. Improving awareness and regular diabetic education is imperative to scale up patients' adherence toward diabetic self-care practice.

**Keywords:** Type 2 diabetes, adherence, self-care, Hawassa, Southern-Ethiopia

**Yimer, N. B., Gedefaw, A., Tenaw, Z., Liben, M. L., Meikena, H. K., Amano, A., & Abajobir, A. A. (2020). Adverse Obstetric Outcomes In Public Hospitals Of Southern Ethiopia: The Role Of Parity. *The Journal of Maternal-Fetal & Neonatal Medicine*, 1–8.**

**Abstract**

**Purpose:** Direct obstetric causes have a significant contribution for severe maternal morbidities and mortalities, although the effect of grand multiparity on adverse obstetric outcomes remains controversial across studies. This study aimed to compare obstetric outcomes in grand multiparous and low multiparous women in two hospitals of southern Ethiopia.

**Materials and methods:** A comparative cross-sectional study was conducted in one general and one comprehensive specialized hospitals in 2018. Four hundred and sixty-one mothers were included in the study. Data were collected by structured questionnaire and extraction sheets from clinical documents, and were analyzed using STATA version 14 (StataCorp, College Station, TX, USA).

**Results:** About 39% of the included mothers had at least one adverse obstetric outcome. Hypertensive disorders of pregnancy, antepartum hemorrhage, and premature rupture of membrane and were higher in the grand multiparous mothers. However, obstructed labor and risk of cesarean delivery were higher in low multiparous women. History of medical illnesses, previous cesarean delivery, and high birth weight were independent predictors of adverse maternal outcomes regardless of parity. However, parity did not show statistically significant difference in obstetric outcomes.

**Conclusion:** Parity did not show statistically significant difference in experiencing adverse obstetric outcomes in women. Early identification and treatment of high-risk mothers is recommended regardless of parity.

**Keywords:** Obstetric outcomes, Parity, Ethiopia, Grand multiparous, Low multiparous

**Siyoum, M., Astatkie, A., Tenaw, Z., Abeje, A., & Melese, T. (2020). Respectful family Planning Service Provision In Sidama Zone, Southern Ethiopia. *PloS One*, 15(9), e0238653.**

## **Abstract**

### Introduction

Disrespect and abusive care is a violation of women's basic human rights and it is serious global problem that needs urgent intervention. Poor quality client-provider interaction is commonly reported from family planning programmes. In Ethiopia, disrespect and abusive care is very common (21–78%) across health facilities.

### Objective

To assess the status of respectful family planning service (client-provider interaction) in Sidama zone, south Ethiopia.

### Methodology

Health facility-based cross-sectional study was conducted from June to August 2018. Data were collected from 920 family planning clients recruited from 40 randomly selected health facilities. The Mother on Respect index (MORi) questionnaire was used to collect the data through client exit interview. Partial proportional odds ordinal regression was employed to identify determinants of respectful family planning service.

### Result

Among family planning clients, the level of respectful family planning service was found to be zero (0%) in the very low respect category, 75(18.5%) in the low respect category, 382(41.52%) in moderate respect category and 463(50.33%) in high respect category. Being a short acting method client (AOR = 0.30, 95%CI [0.12, 0.72]), being an uneducated client (AOR = 0.39, 95%CI [0.25, 0.61]) or a client with elementary education (AOR = 0.41, 95%CI [0.23, 0.73]), client's poverty (AOR = 0.75, 95%CI [0.56, 0.99]), and long waiting time (AOR = 0.46, 95%CI [0.30, 0.69]) significantly reduced the odds of moderate and high respect compared to low respect. Conversely, preference of male service providers, service providers' work satisfaction and health



workers' prior training on respectful care significantly increased the odds of moderate and high respect.

## Conclusion

Considering the current strategy of zero tolerance for disrespect and abuse in Ethiopia, the level of respectful care in this study is sub-optimal. Short term training for service providers on respectful care seems valuable to enhance the level of respectful care for family planning clients irrespective of their socioeconomic background.

**Bitew, Z. W., Alemu, A., Ayele, E. G., Tenaw, Z., Alebel, A., & Worku, T. (2020). Metabolic Syndrome Among Children and Adolescents In Low And Middle Income Countries: A Systematic Review And Meta-Analysis. *Diabetology & Metabolic Syndrome*, 12(1), 1–23.**

## Abstract

### Background

Metabolic syndrome (MetS) is a clustering of cardiovascular risk factors, which is rising in the low and middle income countries (LMICs). There are various studies with inconsistent findings that are inconclusive for policy makers and program planners. Thus, this systematic review and meta-analysis aimed at estimating the pooled prevalence of MetS and its components in LMICs.

### Methods

Electronic searches were conducted in international databases including PubMed, Web of Science, EMBASE (Elsevier), Scopus, CINAHL (EBSCOhost), Science direct (Elsevier), Food Science and Technology Abstracts (FSTA), Global Health and Medline, and other sources (World Cat, Google Scholar, and Google). The pooled estimates were computed in the random effect model. The pooled prevalence was computed using the three diagnostic methods (IDF, ATP III and de Ferranti). Publication bias was verified using funnel plot and Egger's regression test. Subgroup and sensitivity analysis were performed to identify the possible sources of heterogeneity among the included studies.

### Result

In this study, 142,142 children and adolescents from 76 eligible articles were included to compute the pooled prevalence of MetS and its components in LMICs. MeTs among overweight and obese

population was computed from 20 articles with the pooled prevalence of 24.09%, 36.5%, and 56.32% in IDF, ATP III and de Ferranti criteria, respectively. Similarly, a total of 56 articles were eligible to compute the pooled prevalence of MetS in the general population of children and adolescents. Hence, MetS was found in 3.98% (IDF), 6.71% (ATP III) and 8.91% (de Ferranti) of study subjects. Regarding the components of MetS, abdominal obesity was the major component in overweight and obese population and low HDL-C was the most common component in the general population. This study also revealed that males were highly affected by MetS than females.

## **Conclusion**

This study illustrates that MetS among children and adolescents is an emerging public health challenge in LMICs, where the prevalence of obesity is on the move. Preventive strategies such as community and school based intervention need to be designed. Promoting physical activities and healthy eating behaviors could avert this problem.

**Abebe, B. A., & Terefe, M. R. (2020). Discontinuation of Implants Use and Associated Factors Among Women Attending Health Facility Clinics in Hawassa City, Southern Ethiopia, 2019; cross sectional study. Contraception and Reproductive Medicine, 5(1), 1–11.**

## **Abstract**

### **Background**

Despite improving the availability and use of Implants, discontinuation is becoming a public health concern. A significant proportion of women discontinuing the service before its due date, which is of concern in the health system and its consequence may lead to a program failure. This might have also social and economic consequences for users. Only 8% of married women in Ethiopia use implants. Apart from its low utilization, premature removal is common for unknown reasons. However, there is paucity of information on discontinuation of implants use and associated factors in the study area.

### **Objective**

The study was aimed to assess discontinuation of implants use and associated factors among women attending health facility clinics in Hawassa city, southern Ethiopia, from March, 01-April, 01/2019.

## Methods

Facility based cross sectional study design was used. Out of 16 health facilities, 9 of them were selected for this study using simple random sampling. Total sample size of this study was determined to be 351. Data were collected from study subjects using pretested, structured questionnaire through a face-to-face interview. Data was analyzed using descriptive statistics and logistic regression. The result is presented using the Crude Odds ratio as well as Adjusted Odds Ratio with the corresponding 95% confidence level.

## Result

Out of 351 study participants, the overall proportion of implants discontinuation was 49.3%(95% CI: 44.2–55.0). Lack of counseling about side effects (AOR = 2.394; 95% CI: 1.422–4.030), developing side effects (AOR = 6.325; 95% CI: 3.719–10.757) and lack of post insertion follow-up (AOR = 2.241; 95% CI: 1.186–4.234) the major factors associated with discontinuation of Implants.

## Conclusion and recommendation

In this study, the overall proportion of discontinuation of Implants among women who were using Implants was high. Health professionals could give pre-insertion counseling about side effects and post insertion dates for follow-up to improve of utilization of implants.

**Fikre, R., Amare, B., Tamiso, A., & Alemayehu, A. (2020). Determinant of Emergency Contraceptive Practice Among Female University Students in Ethiopia: Systematic review and meta-analysis. *Contraception and Reproductive Medicine*, 5(1), 1–9.**

## Abstract

### Introduction

Despite Ethiopia's government's commitment to alleviating unwanted pregnancy and unsafe abortion by increasing holistic reproductive health service accessibility, the rate of unwanted pregnancy among female students in the universities is distressing and becoming a multisectoral concern. Therefore, this systematic review aimed to assess the prevalence and determinant of emergency contraceptive practice among female university students in Ethiopia.

## Result

The overall pooled prevalence of emergency contraceptive practice among female university students in Ethiopia was 34.5% [95% CI [20.8, 48.2%]. The pooled odds ratio showed that positive association between practice of emergency contraceptives with age of the students [OR, 0.19; 95% CI: 0.04, 0.98,  $P = 0.05$ ] Previous contraceptive methods use [OR, 0.22; 95% CI: 0.12, 0.40,  $P = 0.0001$ ], Marital status [OR, 0.09; 95% CI: 0.02, 0.40,  $P < 0.002$ ] and knowledge [OR, 0.12; 95% CI: 0.04, 0.37,  $P < 0.0003$ ].

## Conclusion

The practice of emergency contraceptives among university female students was 34.5% and explained by knowledge, age, previous use of contraceptive methods and marital status.

**Abebe, B. A., Assefa, N., & Mengistie, B. (2020). Discontinuation of Reversible Long-Acting Contraceptive and Associated Factors among Female Users in Health Facilities of Hawassa City, Southern Ethiopia: Cross-Sectional Study. *Open Access Journal of Contraception*, 11, 113.**

## Abstract

### Background

Despite improvement in the availability and use of reversible long-acting contraception, discontinuation is becoming a public health concern. A significant proportion of women discontinuing the service before its due date, which is of concern in the health system with regard to its consequences, may lead to a program failure. In addition, there is a paucity of information on discontinuation of reversible long-acting contraceptives and associated factors in the study area. Therefore, this study aimed to assess discontinuation of reversible long-acting contraceptives and associated factors among female users in health facilities of Hawassa city, southern Ethiopia, 2019.

### Methods

Institution-based cross-sectional design was used. Systematic sampling was used to select study participants. Women who were users of long-acting contraceptives and had come to selected health facilities for method-related reasons were included in the study. Data collectors approached and recruited participants before they contacted their care providers. Data were collected from study

subjects using a pretested, structured questionnaire through face-to-face interviews after participants had contacted care providers. Results are presented using the crude and adjusted ORs with corresponding 95% CIs.

## Results

The overall proportion of reversible long-acting contraceptive discontinuation was 56.6% (95% CI 52.30%, 61.10%). Maternal education at primary level (AOR 2.33, 95% CI 1.15–4.74), lack of counseling (AOR 2.50, 95% CI 1.01–6.18), side effects (AOR 2.10, 95% CI 1.31–3.34), and desire to be pregnant (AOR 2.22; 95CI 1.50–3.30) were the major factors in discontinuation.

## Conclusion

In this study, the overall proportion of discontinuation of reversible long-acting contraceptives was high. Maternal education at primary level, lack of counseling, side effects, and desire to be pregnant were the key factors associated with discontinuation of the contraceptives. Health professionals should provide counseling on the side effects before insertion.

**Keywords:** Factors, Discontinuation, Reversible long-acting contraceptives

**Alenko, A., Dejene, S., & Girma, S. (2020). Sociodemographic and Obstetric Determinants of Antenatal Depression in Jimma Medical Center, Southwest Ethiopia: Facility Based Case–Control Study. *International Journal of Women’s Health*, 12, 557.**

## Abstract

### Background

Worldwide, 10–20% of women experience depression during pregnancy. In sub-Saharan countries, depression during pregnancy is estimated to be 15–57%. Even though there is a high burden of depression during pregnancy, little attention has been given to identify sociodemographic and obstetric determinants in diverse populations like Ethiopia.

### Objective

To identify sociodemographic and obstetric determinants of antenatal depression among women attending an antenatal clinic at Jimma Medical Center, southwest Ethiopia.

## Patients and Methods

A case–control study was conducted among 246 pregnant mothers (82 cases and 164 controls) attending an antenatal clinic in Jimma Medical Center from June 1 to August 30, 2019. Antenatal depression was assessed using the Beck Depression Inventory-II. Epidata 3.1 and SPSS v24 were used for data entry and analysis, respectively. Adjusted odds ratios (AOR) and 95% CIs were estimated using logistic regression models. Statistical significance was set at  $P < 0.05$ .

## Results

Married mothers were 67% (AOR=0.33, 95%CI: 0.15–0.75), housewives were 97% (AOR=0.03, 95%CI: 0.01–0.14), private workers were 87% (AOR=0.13, 95%CI: 0.04–0.44), and government employees were 84% (AOR=0.16, 95%CI: 0.05–0.46), less likely to develop antenatal depression. Multigravida were 88% (AOR=0.12, 95%CI: 0.04–0.37) less likely to develop antenatal depression. Third trimester pregnancy was four times (AOR=4.04, 95%CI: 1.51–10.81) more likely to have depression. Mothers who having wanted pregnancy were 83% (AOR=0.17, 95%CI: 0.04–0.81) less likely to develop antenatal depression compared with mothers having unwanted pregnancy.

## Conclusion and Recommendation

Being married, multigravida, having wanted pregnancy and occupation status (housewives, private workers and government employees) can protect mothers from developing antenatal depression. Mothers with third trimester pregnancy were four times more likely to have depression. Designing a screening and intervention strategy for antenatal depression must consider the aforementioned protective and risk factors.

**Keywords:** Antenatal depression, Determinants, Ethiopia

**Duko, B., Bedaso, A., & Ayano, G. (2020). The prevalence of Depression Among Patients With Tuberculosis: A Systematic Review And Meta-Analysis. *Annals of General Psychiatry*, 19, 1–11.**

## **Abstract**

Background: Evidence has shown that the prevalence of depression is much higher among patients with tuberculosis (TB) and this, in turn, may adversely impact compliance with anti-TB medications. Therefore, this systematic review and meta-analysis aimed to quantitatively summarize epidemiologic evidence on the prevalence of depression among patients with TB and formulate a recommendation for future clinical practice as well as research. Methods: We followed the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines to conduct this review. We searched PubMed, EMBASE, SCOPUS and Psych INFO to identify relevant studies that investigated the prevalence of depression among TB patients. We also supplemented our electronic search with manual searching to include all pertinent studies in the analysis. We used a Comprehensive Meta-Analysis software version 3.0 (CMA 3.0) to conduct a meta-analysis. We conducted a subgroup and sensitivity analysis and Cochran's Q- and the I<sup>2</sup> - statistics were used to assess heterogeneity. The evidence for the presence of publication bias was checked by using Egger's test and visual inspection of the symmetry in funnel plots. Results: We identified a total of 25 studies that included 4903 participants across seven countries. In our analysis, the pooled estimated prevalence of depression among TB patients was found to be 45.19% (95% CI 38.04–52.55). The prevalence was higher in MDR-TB 52.34% (95% CI 38.09–66.22) than non-MDR-TB 43.47% (95% CI 35.88–51.37) patients. We also found that the pooled prevalence of depression was higher among females 51.54% (95% CI 40.34– 62.60) when compared to males 45.25% (95% CI 35.19–55.71). The pooled prevalence of depression was 45.45% as measured by HRDS, and it was 55.62%, 45.52%, and 38.36% as measured by BDI, HADS and PHQ-9, respectively. Conclusion: Our finding suggested that the pooled estimated prevalence of depression among tuberculosis patients was relatively high. Screening and management of depression among TB patients were warranted to alleviate suffering. Moreover, the integration of tuberculosis program with regular psychiatry services may substantially reduce the burden.

**Keywords:** Prevalence, Depression, TB, Systematic review, Meta-analysis.

**Duko, B., Toma, A., Abraham, Y., & Kebble, P. (2020). Post-Traumatic Stress Disorder and its Correlates Among People Living with HIV in Southern Ethiopia, an Institutionally Based Cross-Sectional Study. *Psychiatric Quarterly*, 91(3), 783–791.**

## **Abstract**

Post-traumatic stress disorder is a common psychiatric problem more highly prevalent among HIV infected individuals than the general population. This study aims to assess the probable prevalence of post-traumatic stress disorder and associated factors among individuals living with HIV in Hawassa, Ethiopia, 2018. An institution based cross-sectional study was employed. A total of 205 HIV positive individuals who attend follow-up sessions at HIV clinics were recruited for the study through systematic sampling techniques. The presence of probable post-traumatic stress disorder was assessed by using the post-traumatic stress disorder checklist –5. The potential traumatic life events and any stressful events that occurred in participants' lives were assessed by the life event checklist for DSM-5 (LEC-5). The mean age of the respondents was 32.33 years (SD  $\pm$ 8.67). Prevalence of post-traumatic stress disorder (PTSD) was 46.3%. Being female [AOR = 1.27, (95% CI: 1.01, 3.98)], poor social support [AOR = 1.71, (95% CI: 1.08, 4.45)], poor medication adherence [AOR = 3.87, (95% CI: 1.75, 6.79)], current alcohol use [AOR = 2.34, (95% CI: 1.32, 5.16)], HIV/TB coinfection [AOR = 1.23, (95% CI: 1.09, 6.84)] and having negative life events [AOR = 1.76, (95% CI: 1.41, 6.98)] had statistically significant association with probable post-traumatic stress disorder. The prevalence of post-traumatic stress disorder among HIV positive individuals was high. The researchers highly recommend the integration of psychiatric services to HIV clinics and develop guidelines to screen and treat PTSD among HIV patients. Further research on risk factors of PTSD and longitudinal studies should be conducted to strengthen and broaden the current findings.



**Duko, B., Pereira, G., Betts, K., Tait, R. J., Newnham, J., & Alati, R. (2020). Associations of Prenatal Alcohol Exposure and Offspring Harmful Alcohol Use: Findings from the Raine Study. *Drug and Alcohol Dependence*, 217, 108305.**

## **Abstract**

### **Background**

Epidemiological evidence suggests offspring exposed to prenatal alcohol are at increased risk of alcohol use disorders in adulthood. The evidence on the risk of developing harmful alcohol use in adolescence is less clear.

### **Methods**

We used data from the Raine Study, a multi-generational birth cohort study, to examine the association between prenatal alcohol exposure and the risk of harmful alcohol use in offspring at the age of 17 years. Log binomial regression was used to estimate the relative risks (RRs) of harmful alcohol use in offspring exposed to maternal alcohol use in the first (early) and third (late) trimesters of pregnancy. Maternal pre-pregnancy alcohol use was used as a negative control for intrauterine exposure for comparison.

### **Results**

Complete data were available for 1200 mother-offspring pairs. After adjustment for potential confounders, we found increased RRs of harmful alcohol use in offspring born to mothers who consumed four or more standard drinks of alcohol per week during the first trimester [RR 1.45(95% CI: 1.08–1.93)], third trimester [RR 1.34 (95% CI: 1.04–1.72)] and during both trimesters of pregnancy [RR 1.86 (95% CI: 1.16–2.96)]. Maternal pre-pregnancy alcohol use was not associated with an increased risk of harmful alcohol use in offspring [RR 1.15 (95% CI: 0.89–1.48)].

### **Conclusion**

Observed associations for maternal prenatal alcohol exposure but not maternal pre-pregnancy alcohol use suggests a biological mechanism for intrauterine alcohol exposure on the risk of harmful alcohol use in the offspring.

**Keywords:** Alcohol, Adolescents, Offspring, Harmful use, The raine study

**Duko, B., Pereira, G., Betts, K., Tait, R. J., Newnham, J., & Alati, R. (2021). Prenatal alcohol and tobacco use and the risk of depression in offspring at age of 17 years: Findings from the Raine Study. *Journal of Affective Disorders*, 279, 426–433.**

## **Abstract**

### **Background**

Prenatal alcohol and tobacco exposures have been associated with adverse mental health consequences in offspring. The objective of this study was to test the associations between maternal prenatal alcohol and tobacco exposures and depressive symptoms in the offspring, adjusting for a wide range of potential confounders.

### **Methods**

We used data from 1168 mother-offspring pairs from the Raine Study based in Perth, Western Australia. Depressive symptoms at age 17 years were measured using the Beck Depression Inventory for Youth (BDI-Y). Associations between prenatal alcohol and tobacco use and the risk of depressive symptoms in offspring were estimated by risk ratios (RR) derived with multivariable log-binomial regression.

### **Results**

Among offspring who were assessed for depressive symptoms, 5% were born to mothers who consumed six or more standard drinks of alcohol per week during pregnancy and 20% were exposed to prenatal tobacco. After adjustment for confounders, depressive symptoms at the age of 17 years remained associated with maternal alcohol use of six or more standard drinks per week [RR 1.59 (95% CI: 1.11-2.26)] and any tobacco use [RR 1.36 (95% CI: 1.05-1.79)] during the first trimester of pregnancy.

### **Conclusion**

Offspring exposed to prenatal alcohol and tobacco use had greater risks of depressive symptoms compared with unexposed offspring, suggesting early screening and prevention of these exposures could possibly reduce depressive symptoms in offspring.

**Keywords:** Depression, Alcohol, Tobacco, Adolescent, Pregnancy, The raine study

**Duko, B., Ayano, G., Pereira, G., Betts, K., & Alati, R. (2020). Prenatal Tobacco Use and The Risk Of Mood Disorders In Offspring: A systematic review and meta-analysis. *Social Psychiatry and Psychiatric Epidemiology*, 1–14.**

## **Abstract**

### **Purpose**

It is plausible that offspring born to mothers using tobacco during pregnancy may have increased risk of mood disorders (depression and bipolar disorders); however, mixed results have been reported. We conducted a systematic review and meta-analysis to investigate the magnitude and consistency of associations reported between prenatal tobacco use and mood disorders in offspring.

### **Methods**

We systematically searched EMBASE, SCOPUS, PubMed and Psych-INFO for studies on mood disorders and prenatal tobacco use. Methodological quality of studies was assessed with the revised Newcastle–Ottawa Scale. We estimated pooled relative risk (RR) with inverse variance weighted random-effects meta-analysis. We performed leave-one-out analyses, and stratified analyses by a subgroup (depression and bipolar disorder). Potential publication bias was assessed by inspection of the funnel plot and Egger’s test for regression asymmetry. This study protocol was prospectively registered in PROSPERO (CRD42017060037).

### **Results**

Eight cohort and two case–control studies were included in the final meta-analysis. We found an increased pooled relative risk of mood disorders in offspring exposed to maternal prenatal tobacco use RRs 1.43 (95% CI 1.27–1.60) compared to no prenatal tobacco use. Similarly, the pooled relative risks of bipolar and depressive disorders in offspring were 1.44, (95% CI 1.15–1.80) and 1.44, (95% CI 1.21–1.71), respectively. Moreover, the pooled estimated risk of mood disorders was not significantly attenuated in the studies that reported sibling comparison results [RR = 1.21 (95% CI 1.04–1.41)].

## Conclusion

Taken together, there was strong evidence for a small ( $RR < 2$ ) association between prenatal tobacco use and mood disorders in offspring.

**Duko, B., Wolka, S., Seyoum, M., & Tantu, T. (2020). Prevalence of Depression Among Women With Obstetric Fistula in Low-Income African Countries: A systematic review and meta-analysis. *Archives of Women's Mental Health*, 1–9.**

## Abstract

Depression is one of mental health consequences that present in women with obstetric fistula. It is estimated that over 264 million people of all ages suffer from depression globally. The objective of this systematic review and meta-analysis was to synthesize the epidemiologic evidence from previous studies on the prevalence of depression among women with obstetric fistula in low-income African countries. We followed the preferred reporting items for systematic review and meta-analysis (PRISMA) guidelines to conduct this meta-analysis. The common databases (PubMed, SCOPUS, EMBASE, Psych INFO, Google Scholar, African Index Medicus, and African Journals Online (AJOL)) were searched for the relevant literature. We used a random-effect meta-analysis model to estimate the overall prevalence of depression and the  $Q$ - and  $I^2$ -statistics were used to assess the heterogeneity between the studies included in the meta-analysis. Egger's test and visual inspection of the symmetry in funnel plots were used to check for the presence of publication bias. The pooled estimated prevalence of depression among women with obstetric fistula in low-income African countries was 56.2% (95% CI 43.1–68.4). The prevalence of depression among women with obstetric fistula was 74.4% in Ethiopia, 72.9% in Kenya, 46.0% in Malawi, 41.0% in Sudan, 34.8% in Nigeria, and 27.7% in Tanzania. Furthermore, the prevalence of depression was higher (97.0%) when it was measured by using Beck's Depression Inventory (BDI) when compared with Patient Health Questionnaire (PHQ9) (62.7%), General Health Questionnaire (GHQ-28) (36.7%), Hamilton Depression Rating Scale (HDRS) (41.0%), and Center for Epidemiologic Studies Depression Scale (CES-D) (27.7%). Moreover, the pooled estimated prevalence of depression among women with obstetric fistula was ranged from 48.1 to 57.7% in a leave-one-out sensitivity analysis. The prevalence of depression among women with obstetric fistula in low-income African countries was high. Screening and appropriate management of depression among women with obstetric fistula are warranted.

**Duko, B., Ayalew, M., & Toma, A. (2020). The Epidemiology of Headaches Among Patients With Epilepsy: A Systematic Review And Meta-analysis. *The Journal of Headache and Pain*, 21(1), 1–10.**

## **Abstract**

### **Background**

Headache is the symptom of pain in the face, head or neck that causes disability in most people with medical and neurological disorders. It frequently co-occurs with most chronic diseases such as epilepsy and significantly impacts the quality of life. However, epidemiologic data from different studies showed different rates of prevalence. Therefore, we conducted this review to summarize the available epidemiologic evidence on the topic and formulate recommendations for future research and clinical practice.

### **Methods**

We followed the preferred reporting items for systematic review and meta-analysis (PRISMA) guidelines. We systematically searched the literature using popular databases such as PubMed, EMBASE, Psych-INFO, and SCOPUS. We further scanned the reference lists of the eligible studies to supplement our electronic search. The Comprehensive Meta-Analysis software version 3.0 (CMA 3.0) was used to conduct a meta-analysis. Subgroup and sensitivity analysis were performed and Cochran's Q- and the  $I^2$ - test were used to assess the source of heterogeneity. The funnel plot and Egger's regression tests were used to assess potential publication bias.

### **Results**

A total of 17 studies conducted both in developed and developing countries including 5564 study participants were combined in this meta-analysis. The pooled estimated prevalence of headache among patients with epilepsy was 48.4%. The pooled estimated prevalence of Inter-Ictal headache (IIH) (42.2%) and Postictal headache (PIH) (43.1%) were higher when compared to tension-type headache (TTH) (26.2%), migraine with aura (26.0%) and migraine without aura (10.4%). The pooled prevalence of headache was 50.6% and 49.5% for developed and developing countries respectively. The pooled prevalence of headache among patients with epilepsy was considerably higher among females (63.0%) when compared to males (33.3%). Moreover, the pooled estimated

prevalence of headache among patients with epilepsy was ranging from 46.0% to 52.2% in a leave-one-out sensitivity analysis.

## Conclusion

The pooled estimated prevalence of headache among patients with epilepsy was considerably high (48.4%). Screening and appropriate management of headaches among patients with epilepsy are warranted.

**Wolka, S., Assegid, S., Temesgen Tantu, M. G., & Duko, B. (2020). Determinants of Maternal Satisfaction with Existing Delivery Care at Wolaita Sodo University Teaching and Referral Hospital, Ethiopia. *BioMed Research International*, 2020.**

## Abstract

### Background

Assessing maternal satisfaction on delivery service has significant public health importance to measure the quality of maternal and child care services in a country. Therefore, the objective of this study was to further investigate the determinants of maternal satisfaction on delivery service provided at the Woliata Sodo University Teaching and Referral Hospital, Ethiopia.

### Methods

An institutionally based cross-sectional study was employed at the Wolaita Sodo University Hospital, Ethiopia. All mothers who gave birth between March and May 2018 were included in the study. Data were collected through using a pretested and structured interviewer-administered questionnaire. Both bivariate and multivariable logistic regression analyses were performed. A *P* value of <0.05 was used to declare statistical significance.

### Result

A total of 398 delivered mothers were included in the study. The rate of maternal satisfaction on existing delivery care was found to be 67.3%. Being less educated (AOR = 5.06, [2.22-11.53]), primigravida (AOR = 3.59, [1.17-11.04]), planned and wanted pregnancy (AOR = 2.74, [1.21-6.18]), having antenatal care follow-up for current pregnancy (AOR = 4.48, [2.04-9.83]), ever used family planning service (AOR = 3.83, [1.95-67.52]), labor duration of less than 6 hours (AOR =

5.96, [2.61-13.57]), and spontaneous vaginal delivery (AOR = 2.82, [1.07-7.42]) were factors significantly associated with maternal satisfaction.

## Conclusion

In this study setting, maternal satisfaction was lower compared to other studies. Unreserved effort should be considered for future interventions.

**Duko, B., Mekuriaw, B., Molla, A., & Ayano, G. (2020). The Prevalence Of Premenstrual Dysphoric Disorder Among Adolescents in Ethiopia: A Systematic Review And Meta-Analysis. *Irish Journal of Medical Science (1971-), 1–9.***

## Abstract

The rates of prevalence of premenstrual dysphoric disorder (PMDD) in Ethiopia were high and inconsistent across studies. However, there was no previous systematic reviews and meta-analysis conducted on this topic. Therefore, this review aimed to systematically review previous studies on the topic and summarize the prevalence of PMDD among students in Ethiopia and formulate recommendations for future clinical services. The preferred reporting items for systematic review and meta-analysis (PRISMA) guidelines were used to conduct this systematic review and meta-analysis. Popular databases such as PubMed, EMBASE, Psych-INFO, SCOPUS, Google Scholar, African Index Medicus, and African Journals Online (AJOL) were searched for relevant studies. We used a Comprehensive Meta-Analysis software version 3.0 (CMA-3.0) to conduct a meta-analysis. The random-effects model was used to estimate the pooled prevalence. The magnitude of statistical heterogeneity between the eligible articles was checked by Cochran Q and the I<sup>2</sup> statistics. The funnel plot and Egger's regression tests were used to assess potential publication bias. A total of 12 studies that were published between 2003 and 2019 was included in our systematic review and meta-analysis. The pooled estimated prevalence of premenstrual dysphoric disorder among female students in Ethiopia was 54.5% (95% CI 40.8–67.6). The pooled estimated prevalence of premenstrual dysphoric disorder was approximately similar for both studies that recruited study participants from either high school or higher education. Further, the pooled estimated prevalence of premenstrual dysphoric disorder was ranging from 51.2 to 57.2% in leave-one-out sensitivity analysis, suggesting that the removal of one study did not affect the overall prevalence estimate. The pooled estimated prevalence of premenstrual dysphoric disorder among

female students in Ethiopia was high. Early screening and appropriate interventions at primary healthcare settings are warranted.

**Keywords:** Ethiopia . Premenstrual dysphoric disorder . Premenstrual syndrome . Students . Systematic review and meta-analysis

**Ayano, G., Solomon, M., Hibdiye, G., & Duko, B. (2020). The epidemiology of tobacco use in Ethiopia: A systematic review and meta-analysis. *Journal of Public Health*, 1–11.**

## **Abstract**

### **Background**

Worldwide, tobacco smoking causes approximately 7.1 million deaths per year, and most of these deaths occur in low- and middle-income countries (LMICs) such as Ethiopia. The results of previously published studies in Ethiopia are inconsistent. However, there is no previous systematic review and meta-analysis reporting on the prevalence of tobacco smoking in Ethiopia. This systematic review and meta-analysis aimed to systematically summarize the available evidence on the epidemiology of tobacco smoking in Ethiopia and put forward suggestions for future clinical practice and research.

### **Methods**

EMBASE, SCOPUS, and PubMed were searched for relevant studies on tobacco smoking in Ethiopia. We screened articles according to predetermined inclusion criteria. A meta-analysis of the studies was conducted using a random-effects model. We used the Newcastle–Ottawa scale with modifications to evaluate the quality of studies included in the meta-analysis. We also conducted a subgroup and sensitivity analysis to explore the source of heterogeneity. The heterogeneity of the studies was assessed by Cochran’s Q test and the I-square test. Egger’s test and visual inspection of the symmetry in funnel plots were used to check for the presence of publication bias.

### **Results**

Of the total of 35 full-text articles, 19 studies with 28,716 participants were included in our review and meta-analysis. The pooled prevalence of current tobacco smoking was 6.67%, and lifetime smoking was 11.98%. Males had higher rates of current smoking (10.69% vs.1.1%), lifetime



smoking (17.28% vs.4.73%), and tobacco dependence (7.7% vs. 0.2%) than females. The pooled prevalence of current and lifetime tobacco smoking among students was 5.93% and 8.97%, respectively. The prevalence of tobacco use among students was considerably lower than the prevalence in other populations of the country. The prevalence of current tobacco smoking was significantly higher in the years between 2014 and 2017 (8.24%) than in the year before 2014 (5.56%).

## **Conclusion**

The prevalence of current and lifetime tobacco smoking was higher in males when compared to females. Measures to create awareness and to integrate the management of tobacco smoking and dependence at the primary health care level are warranted.

**Bedaso, A., Duko, B., & Yeneabat, T. (2020). Predictors of Mental Distress Among Undergraduate Health Science Students of Hawassa University, College of Medicine and Health Sciences, Hawassa, SNNPR, Ethiopia: A cross-sectional study. *Annals of General Psychiatry*, 19(1), 6.**

## **Abstract**

### **Introduction**

Mental distress is a mental health problem which includes anxiety, depression and somatic symptoms. Mental health problems affect society as a whole and no group is immune to mental disorders; however, students have significantly high level of mental distress than their community peers.

### **Objective**

The aim of the study is to assess magnitude of mental distress and its predictors among undergraduate health science students of Hawassa University, College of Medicine and Health Sciences, SNNPR, Ethiopia.

### **Methods**

Institution-based cross-sectional study was conducted among 311 students. Simple random sampling technique was used to select the study participants. Data were collected using pre-tested and structured self-administered questionnaire. Mental distress among students was assessed using

SRQ-20, which is validated in Ethiopia. Bivariate and multivariate logistic regression model was fitted to identify predictors of mental distress among students. An adjusted odds ratio with 95% confidence interval was computed to determine the level of significance with *P*-value less than 0.05.

## **Result**

A total of 309 study participants were interviewed with a response rate of 99.34%. Among the total respondents 105 (34%) of them were found to have mental distress. In multiple logistic regression analysis, poor social support (AOR = 5.28; 95% CI (2.176–12.84) and current substances use (AOR = 12.83, 95% CI (7.13–23.13), were significant predictors of mental distress among respondents.

## **Conclusion and recommendations**

The overall magnitude of mental distress among students was found to be high. Therefore, it is recommended that mental distress needs due attention and remedial action from policy-makers, college officials, non-governmental organizations, parents, students and other concerned bodies.

**Tantu, T., Wolka, S., Gunta, M., Teshome, M., Mohammed, H., & Duko, B. (2020). Prevalence and determinants of gender-based violence among high school female students in Wolaita Sodo, Ethiopia: An institutionally based cross-sectional study. *BMC Public Health*, 20, 1–9.**

## **Abstract**

Background: Gender-based violence (GBV) often occurs in resource-limited settings such as Ethiopia. It could result in psychological and physical adverse outcomes such as stress, anxiety, depression, unsafe abortion, unwanted pregnancy, and sexually transmitted infections. This study aimed to assess the prevalence and factors associated with gender-based violence among female high school students in Wolaita Sodo, Ethiopia. Methods: An institutionally based-cross-sectional study was conducted in Wolaita Sodo, Ethiopia. A total of 604 female high school students were recruited through multi-stage stratified sampling techniques. The gender-based violence assessment tool, validated by the World Health Organization, was used to assess gender-based violence and other determinants. The strength of statistical association was measured by adjusted odds ratios and 95% confidence intervals. Statistical significance was declared at *p*-value < 0.05.

Results: The lifetime prevalence of GBV, sexual violence, and physical violence were found to be 63.2, 37.2, and 56.3%, respectively. The prevalence of sexual violence before and after joining the current school as well as in the current academic year were 30.5, 37.2, and 22% respectively. Having regular boy-friends (AOR = 2.02; 95% CI:1.07–3.79), being sexually active (AOR = 6.10; 95% CI: 2.49–14.92), having female or male friends who drink alcohol (AOR = 2.18; 95% CI: 1.26–3.77), students witnessed their mothers being beaten by their partners or husband (AOR = 1.92; 95% CI:1.19–3.11) and joining public school (AOR = 1.74; 95% CI:1.11–2.76) were significantly associated with gender-based violence. Conclusion: The prevalence of gender-based-violence was high. This needs a due concern from governmental, nongovernmental and civic organizations as well as other responsible bodies to tackle factors associated with GBV in this study. Further large scale studies incorporating male students are warranted to elucidate the factors associated with GBV in Ethiopia.

**Keywords:** Gender-based violence, Female, High school, Students, Wolaita Sodo, Ethiopia

**Bedaso, A., Ayalew, M., Mekonnen, N., & Duko, B. (2020). Global estimates of the Prevalence of Depression Among Prisoners: A Systematic Review And Meta-Analysis. *Depression Research and Treatment*, 2020.**

## **Abstract**

*Background.* Prison populations tend to be marginalized and disadvantaged of the rights and freedoms that other people in the community benefit from. Their separation from families, a narrow room and lack of privacy in the prison, violence between prisoners, and the uncertainty about the future result in psychological distress, for example, depression. The review has synthesized previous studies conducted on the topic and summarized to formulate recommendations for future prison health care services. *Methods.* We systematically searched the databases: PubMed, Psych Info, and SCOPUS, as well as manual Google Scholar searches, were conducted to retrieve published literature globally. We have included observational studies, written in English language. Estimates were pooled using a random-effects model. The study protocol was registered in PROSPERO with protocol number CRD42020156108. Subgroup and sensitivity analysis was conducted, and heterogeneity across the studies was evaluated using Q and the -test. Publication bias was assessed by inspection of the funnel plot and Egger's regression test. *Result.* A total of 1313 studies were initially identified through the electronic database; among these, a

total of 73 full-text articles were retrieved for further appraisal. Further, 32 full-text articles were included in the final systematic review and meta-analysis. In this meta-analysis, the pooled prevalence of depression among prisoners was 36.9% (95% CI; 27.3-47.6). The pooled prevalence of depression among prisoners in the developing and developed countries was 39.2% and 33.1%, respectively. Moreover, the prevalence of depression was 19.1% and 54% for the studies that used diagnostic and screen tools to diagnose or screen depression, respectively. A leave-one-out analysis revealed that the pooled prevalence of depression among prisoners was not dependent on a single study removal or addition. Thus, the pooled prevalence of depression ranges between 35.3 and 38.0%. *Conclusion.* The prevalence of depression among prisoners was high. Therefore, regular and continuous screening of depressive symptoms for prisoners along with its appropriate management is highly recommended.

**Duko, B., Wolde, D., & Alemayehu, Y. (2020). The Epidemiology of Postnatal Depression in Ethiopia: A Systematic Review and Meta-Analysis. *Reproductive Health*, 17(1), 1–9.**

## **Abstract**

### **Background**

Postnatal depression is among the common mental health problems that occur during the postnatal period. However, it is left undiagnosed in low- and middle-income countries including Ethiopia. Therefore, this systematic review and meta-analysis aimed to systematically summarize the available evidence on the epidemiology of postnatal depression in Ethiopia and suggest recommendations for future clinical practice.

### **Methods**

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline was followed to conduct this systematic review and meta-analysis. We searched PubMed, SCOPUS, EMBASE and Google Scholar databases for the relevant articles that assessed the prevalence of postnatal depression in Ethiopia. We used a random-effect model to conduct a meta-analysis. We conducted a subgroup and sensitivity analysis to explore the source of heterogeneity. Cochrane Q- and the  $I^2$ -test were used to check the heterogeneity of the included studies. The presence of publication bias was also checked by visual inspection of symmetry and Egger's test.

## Results

The pooled estimated prevalence of postnatal depression in Ethiopia was 20.1% (95% CI 12.7–30.2). The pooled prevalence of postnatal depression in the studies that were conducted in community settings and used the Patient Health Questionnaire to assess postnatal depression [16.6% (95% CI 8.90–28.99)] was lower than the prevalence in studies based in institutions and that used the Edinburgh Postnatal Depression Scale [23.2% (95% CI 14.50–28.5)]. Further, in a leave-one-out sensitivity analysis the prevalence of postnatal depression ranges between 15.4% and 25.4%. Unplanned pregnancy [AOR = 3.46, 95% CI (2.37–5.04)], age between 15–24 years [AOR = 1.72, 95% CI (1.11–2.68)], marital problems [AOR = 3.07, 95% CI (2.36–3.99)], experiencing the death of infant [AOR = 3.41, 95% CI (1.91–6.09)] and history of substance use [AOR = 3.47, 95% CI (2.17–5.56)] were associated with the increased odds of postnatal depression in Ethiopia.

## Conclusion

The prevalence of postnatal depression in Ethiopia was high. Therefore, the concerned body should give due attention to improve reproductive health services through early detection of risk factors of postnatal depression.

**Ali, M. M., Woldeamanuel, Y., Asrat, D., Fenta, D. A., Beall, B., Schrag, S., & McGee, L. (2020). Features of *Streptococcus Agalactiae* Strains Recovered From Pregnant Women and Newborns Attending Different Hospitals in Ethiopia. *BMC Infectious Diseases*, 20(1), 1–9.**

## Abstract

### Background

*Streptococcus agalactiae* (Group B *Streptococcus*, GBS) serotypes, sequence types, and antimicrobial resistance profile vary across different geographic locations affecting disease patterns in newborns. These differences are important considerations for vaccine development efforts and data from large countries in Africa is limited. The aim of this study was to determine serotypes and genotypes of GBS isolates from pregnant women and their newborns in Ethiopia.

## Methods

A hospital based cross-sectional study was conducted at three hospitals in Ethiopia from June 2014 to September 2015. Out of 225 GBS isolates, 121 GBS were recovered, confirmed and characterized at CDC's Streptococcus Laboratory using conventional microbiology methods and whole genome sequencing.

## Results

Of the 121 isolates, 87 were from rectovaginal samples of pregnant women, 32 from different body parts of their newborns and 2 from blood of newborns with suspected sepsis. There were 25 mother-infant pairs and 24 pairs had concordant strains. The most prevalent serotypes among mothers and/or their babies were II, Ia and V (41.5, 20.6, 19.5 and 40.6%, 25 and 15.6%, respectively). Multilocus sequence typing (MLST) on 83 isolates showed ST10 (24; 28.9%) and ST2 (12; 14.5%) as most predominant sequence types. All GBS strains were susceptible to penicillin, cefotaxime and vancomycin, which correlated to the presence of wildtype PBP2x types and the lack of known vancomycin-resistance genes. Tetracycline resistance was high (73; 88%, associated primarily with *tetM*, but also *tetO* and *tetL*). Five isolates (6%) were resistant to erythromycin and clindamycin and 3 isolates were fluoroquinolone-resistant, containing associated mutations in *gyrA* and *parC* genes. All isolates were positive for one of four homologous Alpha/Rib family determinants and 1–2 of the three main pilus types.

## Conclusions

Predominant serotypes were II, Ia, and V. A limited number of clonal types were identified with two STs accounting for about half of the isolates. All strains collected in this study were susceptible to beta-lactam antibiotics and vancomycin. Typical of most GBS, these isolates were positive for single alpha-like family protein, serine-rich repeat gene, as well as 1–2 pilus determinants.

**Assegu Fenta, D., Lemma, K., Tadele, H., Tadesse, B. T., & Derese, B. (2020). Antimicrobial Sensitivity Profile And Bacterial Isolates Among Suspected Pyogenic Meningitis Patients Attending at Hawassa University Hospital: Cross-sectional study. *BMC Microbiology*, 20, 1–10.**

## **Abstract**

**Background:** Bacterial meningitis is a serious inflammation of the meninges. Antimicrobial therapy on early cerebrospinal fluid (CSF) examination has an important role in diagnosis. The disease is still challenging in developing countries because of poor (diagnostic set-up, socioeconomic conditions, management), and misuse of antimicrobial therapy results in emerging antimicrobial-resistant strains. Therefore, this hospital based cross sectional study was aimed to assess the antimicrobial sensitivity profile and bacterial isolates among patients suspected of pyogenic meningitis at Hawassa University Hospital from February 2017 to 2018. **Results:** A total of 394 patients suspected as meningitis were included. Of these 210 (53.3%) were males and 184 (46.7%) were females. The carriage rate of bacterial pathogens was 27(6.9%). The common clinical presentations were fever 330 (83.8%), headache 205 (52.0%) and neck stiffness 179(45.4%) followed by altered mental status 125(31.7%). Neck stiffness  $P = 0.001$  (AOR = 1.18, 95% CI 1.06–6.53), Hx of seizure  $P = 0.043$ , (AOR = 1.39, 95% CI 1.15– 5.99), Nuchal rigidity  $P = 0.001^*$  (AOR = 1.26, 95% CI 1.06–4.48) were significantly associated with culture positivity. The pathogens isolated in this study were *N. meningitidis* the most frequent isolate 12(44.4%) followed by *S. pneumoniae* 5 (18.5%), *E. coli* 4(14.8%), *H. influenza* 3(13.6%), *S. aureus* 2(11.1%) and *K. pneumoniae* 1(3.7%). *S. pneumoniae* was (100%) resistance to penicillin, (80%) amoxicillin, and (20%) Cefotaxime. *S. aureus* was (100%) resistant to penicillin, amoxicillin, and ciprofloxacin. *N. meningitidis* was (100%) resistant to penicillin, (66.7%) Ceftriaxone and (41.7%) chloramphenicol. In this study a single isolate was also resistant to a different antibiotic.

**Conclusion:** The prevention of bacterial meningitis needs serious attention since the isolated bacteria showed single and multiple antimicrobial susceptibility patterns and the variable nature of isolated etiological agents makes it reasonable to provide continuous future updates on local resistance of common antibiotics and optimize the most frequent bacteria associated with meningitis in the hospital. Therefore; further, survey study with a better design of antimicrobial susceptibility at large scale to control the spread of antibiotic-resistant bacteria and the change in the causative organism of bacterial meningitis in the study area and at a national level is required.

**Keywords:** Pyogenic meningitis, Bacterial isolates, Culture, Antimicrobial sensitivity, Hawassa, Ethiopia

**Fenta, D. A., Nuru, M. M., Yemane, T., Asres, Y., & Wube, T. B. (2020). Anemia and Related Factors Among Highly Active Antiretroviral Therapy Experienced Children in Hawassa Comprehensive Specialized Hospital, Southern Ethiopia: Emphasis on Patient Management. *Drug, Healthcare and Patient Safety*, 12, 49.**

## **Abstract**

### **Background**

Human Immunodeficiency Virus (HIV) and its therapy cause a variety of hematological abnormalities that have been known to be one of the most common causes of morbidity and mortality in HIV-positive children. One of the commonly observed hematologic manifestations in HIV-positive children is anemia and it has a multifactorial source. We intended to assess the prevalence, as well as its related factors of anemia among Highly Active Antiretroviral Therapy (HAART), experienced children.

### **Methods**

A hospital-based cross-sectional study was employed at Hawassa comprehensive specialized hospital from February 15-June 15, 2018. Overall, 273 HAART-practiced children were included in the study. Socio-demographic variables and clinical data were collected using a standard and pretested questionnaire. Medical records were reviewed for each study participant using a standard checklist. Blood specimens were collected and examined for complete blood count, CD4 cell count and blood film for hemoparasites and morphological classification of anemia, whereas stool specimens were collected and examined for intestinal parasites. Data were entered into Epidata and transferred to SPSS (Statistical Package for Social Science) version 20 software. Descriptive analysis was done for prevalence and binary and multivariate logistic regression was used to determine factors associated with anemia. Statistical significance was stated at  $P\text{-value} < 0.05$ .

### **Results**

The overall prevalence of anemia in this study was 11.4%. Morphologically the predominant anemia was Normocytic Normochromic anemia which accounted for 64.5%. In the current study, children within the age group of <7years (AOR: 3, CI: 1.2–7.5,  $P=0.02$ ), those who were rural



residents (AOR: 2.6, CI: 1.0–6.6, P=0.042) and those with viral load >150 copies/mL (AOR: 3.4, CI: 1.36–8.3, P=0.009) were found to be significantly associated with anemia.

## Conclusion

The prevalence of anemia in this study was 11.4%. It was significantly associated with different factors such as age, residence and viral load. Therefore, regular follow-up management should be emphasized for HAART-experienced children. Hence, there is a need for a longitudinal study to be conducted further to explore the causes of anemia due to HIV and the pattern of hemoglobin changes with HAART- experienced children will be very important.

**Keywords:** Anemia, Children, HIV, Rural residents, Viral load, HAART, Hawassa, Ethiopia

**Fenta, D. A., & Ali, M. M. (2020). Factors Affecting Quality of Laboratory Result During Ordering, Handling, and Testing of the Patient's Specimen at Hawassa University College of Medicine and Health Science Comprehensive Specialized Hospital. *Journal of Multidisciplinary Healthcare*, 13, 809.**

## Abstract

### Background

The increase of medical laboratory test errors represents the increase of all defects within the process. An error can be any defect during the entire process, from ordering to reporting. It may have negative effects on patient care, by contributing to inappropriate treatment, an increase in lengths of hospital stay, and dissatisfaction with healthcare services. Therefore, this study aimed to determine factors affecting the quality of laboratory results through the entire process.

### Methods

A cross-sectional study was conducted at Hawassa University hospital from October 2018 to May 2019. Data were collected by using structured questionnaires and checklist and entered and analyzed using SPSS version 21. P-values less than 0.05 were considered statistically significant.

### Results

A total of 455 individuals participated in this study. During the actual observational assessment, 72.5% of laboratory professionals identify their patients correctly and 62.5% of them label the sample before collection. In multivariate logistic regression, labeling of sample before collection

(AOR=1.357, 95% CI=1.09, 1.58, P= 0.017), use of unmixed (AOR=4.364, 95% CI=1.950, 20.036, P= 0.049) and hemolyzed blood for testing (AOR=1.403, 95% CI=1.096, 1.692 P= 0.021) were associated with laboratory test errors. The clinical service providers who requested the test believed, lack of efficient laboratory service (P=0.005), unable to use manuals (P=0.025), and incorrect interpretation of reference booklets were associated with laboratory errors. Patient residence and frequency of first and second visits of the hospital were statistically associated with laboratory errors.

## Conclusion

The occurrence of laboratory errors in our study was demonstrated by the distribution pattern, the preanalytical, analytical, and post-analytical steps. But changes have occurred in the types and frequencies of errors in these phases of testing by laboratory professionals, clinicians, and patients in the current study. Therefore, the hospital administrations, laboratory professionals and clinicians should work harder and closer to solve the identified problems.

**Keywords:** Quality, Laboratory result, Clinical services providers, Patients Hawassa, Ethiopia

**Ali, M. M., Asrat, D., Fenta, D. A., Chaka, T. E., & Woldeamanuel, Y. (2020). Group B Streptococcus Colonization Rate And Serotype Distribution Among Pregnant Women And Their Newborns at Adama Hospital Medical College, Ethiopia. *Scientific Reports*, 10(1), 1–7.**

## Abstract

Rectovaginal area of pregnant women can be colonized transiently with group B Streptococcus (GBS) without causing disease. The bacteria can be transmitted to the newborn before and during birth and cause early-onset neonatal disease. In this study, we aimed to determine the GBS colonization rate among pregnant women before delivery and their newborns and serotypes distribution of GBS. Two hundred-eighty pregnant women along with their newborns were screened for GBS colonization from June 2014 to October 2014 at Adama Hospital Medical College. Rectovaginal swabs from pregnant women before delivery and specimen from nasal area, external ear, umbilical cord and throat of newborns were collected and cultured. The serotyping of GBS was performed by using serotype-specific antisera. To collect sociodemographic and clinical data we employed a structured questionnaire. GBS colonization among pregnant women and their newborns were 13.2% 95% CI (8.9–17.5) and 7.4% 95% CI (4.6–10.6). Out of 37 GBS strains

recovered from pregnant women, the prevalent serotypes were Ia 6(16.2%), Ib 8(21.6%), II 10(27%), III 3(8.1%), and V 8(21.6%). Out of 21 GBS strains recovered from newborns, prevalent serotypes were Ia 3(14.3%), Ib 6(28.6%), II 6(28.6%), III 4(19%), and V 1(4.8%). This study indicated the existence of primary risk factors for neonatal disease in Adama area. Serotype II was the common serotype detected in this study which is followed by serotype Ib, Ia, and V. As colonizing GBS serotypes could cause invasive disease among newborns, vaccine formulation which includes serotype II, Ia, V, Ib, and III can prevent of invasive disease caused by GBS in the study area.

**Ali, M. M., Mulate, Y. W., Woldetsadik, D. A., Fenta, D. A., Chaka, T. E., Denberu, M. T., Kebede, E. K., Ismael, S. J., & Tadesse, B. T. (2020). Group B Streptococci Carriage Rate And Serotype Distribution Among Mother Newborn Dyads Attending Tikur Anbesa Specialized Hospital, Ethiopia. *Ethiopian Medical Journal*, 58(02).**

## **Abstract**

**Background:** Group B streptococcus (GBS) was identified as the leading cause of neonatal disease in developed countries. The surrogate for early onset neonatal disease caused by GBS is rectovaginal colonization of pregnant women before delivery. In this study we sought to determine colonization rate of GBS among pregnant women and their new born, vertical transmission rate and serotype distribution at Tikur Anbessa Specialized Hospital (TASH).

**Methods:** A cross-sectional study was conducted at TASH from March 2015 to August 2015. 280 pregnant women and their newborn were screened for GBS. Isolated GBS were serotyped by using serotype specific antisera. Structured questionnaire was used to collect socio-demographic and obstetric data. Logistic regression was used to compare colonization rate obtained from pregnant women and their newborn with different risk factors. P value less than 0.05 was considered statistically significant.

**Result:** Maternal, newborn GBS colonization rate and vertical transmission rate were 65(23.2%), 95% CI [18.6-28.9], 32(11.3%), 95% CI [7.8-14.8] and 32/65(49.2%) respectively. GBS serotype distributions were: Ia 22(22.7%), Ib 16(16.5%), II 29(29.9%), III 7(7.2%), V 18(18.6%), and non typeable 5 (5.2%).

**Conclusion:** GBS colonization rate in this study was high. Serotype II was the predominant serotype followed by serotype Ia. In the future concerned bodies should consider implementation of prevention strategy to minimize the burden of disease. Vaccine formulation which include serotype II, Ia, V, Ib, and II may prevent majority of neonatal disease the study area.

**Kassa, Z. Y., Hussen, S., & Asnake, S. (2020). Sero-prevalence of Rubella Among Pregnant Women in Sub-Saharan Africa: A meta-analysis. *Human Vaccines & Immunotherapeutics*, 16(10), 2472–2478.**

## **Abstract**

**Background:** Rubella continues to be a leading cause of vaccine-preventable congenital birth defects and permanent organ damage, especially in developing countries. For women who are infected with the rubella virus (RV) before conception or during the first trimester of pregnancy, the unborn child has up to a 90% probability of developing congenital rubella syndrome. There are limited data on the seroprevalence of the rubella virus among pregnant women in Sub-Saharan Africa. Therefore, the aim of this study was done to determine the pooled seroprevalence of rubella among pregnant women in Sub-Saharan Africa.

**Methods:** The PRISMA guidelines protocol was followed to write the systematic review and meta-analysis. Published studies were searched in Medline, PubMed, Google scholar, advance google and Cochrane Library. The search terms on the databases are: “rubella”OR “rubeo\*”, “rubella”AND“seroepidemiology”, “seroprevalen \*” OR “prevalen\*”, “seroprevalen \*” OR “seroimmun\*”, “rubella antibod\*”AND “pregnan\*”, “seroprevalen \*” AND “sub-Saharan Africa”.The heterogeneity of studies was weighed using Cochran’s Q test and I<sup>2</sup> test statistics. Publication bias was assessed by using Egger’s and Begg’s test.

**Results:** Twenty-eight studies were included in this meta-analysis. The pooled seroprevalence of anti-RV IgG among pregnant women in Sub-Saharan African was 89.0% (95%CI: 84.6–92.3), and the pooled prevalence of anti-RV IgM among pregnant women in Sub-Saharan Africa was 5.1% (95%CI: 2.6–9.9).

**Conclusion:** This meta-analysis showed that seronegativity and acute infection with RV among pregnant women in sub-Saharan Africa is high compared to other studies and the WHO threshold among women of child-bearing age. This finding calls for primary health care providers to make

the community aware of this rubella-susceptible group and its healthcare burden, with the desired outcome that sub-Saharan Africa countries would introduce an implementation strategy for rubella vaccination of pregnant women and women of child-bearing age.

**Keywords:** Meta-analysis, Rubella virus, Pregnant women, Sub-saharan Africa

**Hussen, S., Asnake, S., Wachamo, D., & Tadesse, B. T. (2020). Pneumococcal Nasopharyngeal Carriage And Antimicrobial Susceptibility Profile In Children Under Five In Southern Ethiopia. *F1000Research*, 9(1466), 1466.**

## **Abstract**

**Background:** *Streptococcus pneumonia* causes high morbidity and mortality, particularly in children under five. Nasopharyngeal (NP) carriage predisposes individuals to pneumococcal infection and horizontal spread within the community. Overuse of antibiotics has been linked to increased risk of antimicrobial resistance to *S. pneumonia*. We investigated NP carriage rate and resistance to commonly prescribed antibiotics in under-five children visiting a public referral center in southern Ethiopia.

**Methods:** In total, 413 under 5 children who visited the outpatient department for a health check-up, immunization or acute mild illnesses underwent NP sampling. Parent/caregiver surveys were administered at the clinic. Sterile plastic applicator rayon tipped swabs were used for NP sampling. Antimicrobial susceptibility testing was performed using modified the disk diffusion method.

**Results:** *S. pneumonia* NP carriage was observed in 39% [95% confidence interval (CI): 34.4–43.8]. Living with one or more sibling (AOR (adjusted odds ratio) 1.95: 95% CI: 1.01, 3.76), age group of 3-23 months (AOR 2.31: 95% CI: 1.07, 4.98), co-sleeping with family (AOR 2.09, 95% CI: 1.16, 3.79), attendance at kindergarten/day-care (AOR 1.84: 95% CI: 1.09, 3.11) and malnutrition independently increased *S. pneumonia* carriage at the individual level. *S. pneumonia* was highly resistant to Oxacillin (38.5%), Tetracycline (37.3%), and Trimethoprim-sulfamethoxazole (34.2%). Multi-drug resistance was observed in 42.2% of isolates.

**Conclusions:** A high streptococcal NP carriage rate was observed in under-five children. The high level of resistance to commonly used antibiotics calls for enhancing national surveillance of resistance patterns and enforce antibiotic stewardship efforts.

**Keywords:** Nasopharyngeal carriage, *Streptococcus pneumonia*, antimicrobial susceptibility, under-five children, Ethiopia

**Wondimu, M. S., & Woldesemayat, E. M. (2020). Determinants of Home Delivery Among Women in Rural Pastoralist Community of Hamar District, Southern Ethiopia: A Case–Control Study. *Risk Management and Healthcare Policy*, 13, 2159.**

## **Abstract**

### **Purpose**

Studies addressing determinants of home delivery in pastoralist areas are scarce in Ethiopia. In this study, we aimed to assess determinants of home delivery in rural pastoralist communities of Hamar District, Southern Ethiopia.

### **Patients and Methods**

In April 2018, we conducted a community-based case–control study. Of 35 rural kebeles (lowest level of administration) in the district, 8 were randomly selected. Ninety-nine randomly selected cases (mothers who gave birth at home) and 193 controls (mothers who gave birth at health facility) were included in the study. We used structured questionnaires to collect data. Through face-to-face interview, data on place of delivery, socio-demographic characteristics, obstetric history knowledge and attitude of mothers were collected. We used logistic regression model to measure association between variables.

### **Results**

Late initiation of antenatal care (AOR = 4.6, 95% CI = 1.2, 17.1), husbands only decision-making (adjusted odds ratio [AOR] = 7.2, 95% CI = 2.1, 24.5), women's preference for traditional birth attendants (TBAs) (AOR = 3.9, 95% CI = 1.2, 12.5), and not involving in women's development army (WDA), (AOR = 3.3, 95% CI = 1.0, 10.5) increased the risk of home delivery. Moreover, low maternal knowledge on danger signs of pregnancy (AOR = 6.5, 95% CI = 1.5, 29.0) and negative maternal attitudes towards institutional delivery (AOR = 4.4, 95% CI = 1.4, 14.1) were other factors that increased the risk of home delivery.

### **Conclusion**

Among our study participants, a number of factors increased the risk of home delivery. Improving women's awareness on the importance of institutional delivery, establishing systems for

integration between TBAs and health facilities, empowering women and promoting them to participation in WDA were recommended.

**Keywords:** Determinants, Home delivery, Pastoralist community, Hamar District, Southern Ethiopia

**Biru, D., & Woldesemayat, E. M. (2020). Determinants of Drug-Resistant Tuberculosis in Southern Ethiopia: A Case–Control Study. *Infection and Drug Resistance*, 13, 1823.**

## **Abstract**

### **Background**

In most developing countries, including in Ethiopia, the magnitude and risk factors of drug-resistant tuberculosis (DR-TB) are expected to be high. However, this is not well reported because of lack of laboratory facilities, poor surveillance system and limited reporting. The aim of this study was to determine the risk factors of DR-TB among TB patients in southern Ethiopia.

### **Patients and Methods**

Facility-based case–control study was conducted from November 2016 to January 2017 in Sidama Zone and Gurage Zone of the southern Ethiopia region. DR-TB cases were confirmed by drug-susceptibility testing who were on treatment for DR-TB at Yirgalem and Butajira Hospitals. Controls were smear-positive pulmonary tuberculosis (TB) patients who were taking first-line anti-TB medications and sputum smear-negative at the 5<sup>th</sup> month of commencing TB treatment. Data were entered and cleaned using EPI-Info version 7 software and analyzed using SPSS version 22 statistical software.

### **Results**

A total of 84 cases and 243 controls participated in the study. About 59% (49 cases) and 55% (132 controls) were male. The median (interquartile range) age was 28 (21–37) years for cases and 27 (25–33) years for controls. Living in a one-roomed house (adjusted odds ratio [AOR]: 6.8, 95% CI: 1.8–25.8), history of contact with DR-TB cases (AOR: 6.8, 95% CI: 1.8–25.3), treatment failure TB cases (AOR: 4.2, 95% CI: 1.1–15.5) and relapsed TB cases (AOR: 4.8, 95% CI: 1.3–18.1) were independent factors associated with DR-TB.

## Conclusion

Providing standardized first-line regimen for new case and retreatment TB cases and practicing basic TB-infection control measures could help to minimize the spread of DR-TB.

**Keywords:** Drug resistance, Tuberculosis, Southern Ethiopia

**Woldesemayat, E. M. (2020). Chronic Diseases Multimorbidity among Adult People Living with HIV at Hawassa University Comprehensive Specialized Hospital, Southern Ethiopia. *International Journal of Chronic Diseases*, 2020.**

## Abstract

*Background.* Due to the wide implementation of antiretroviral therapy (ART), people living with HIV (PLWHIV) are now living longer. This increased the risk of developing noncommunicable chronic diseases (NCCDs) among them. *Objective.* We aimed to describe prevalence of NCCDs multimorbidity among PLWHIV at Hawassa University Comprehensive Specialized Hospital (HUCSH). *Method.* In April 2016, institution-based cross-sectional study was conducted among PLWHIV, years at the ART unit of HUCSH. A nurse working in the ART unit interviewed patients and reviewed medical records. Data on the NCCDs and its risk factors were obtained. List of diseases considered in this study were arthritis, diabetes mellitus, hypertension, congestive heart failure (CHF), rheumatic heart diseases (RHD), chronic bronchitis, asthma, and cancer. *Results.* More than half of the respondents (196) had at least one of the NCCDs and 34 (8.9%) had multimorbidity. The main system of the body affected were the musculoskeletal system, 146 (38.2%) and respiratory system, 46 (12.0%). There was no significant difference in the prevalence of individual NCCDs by gender. Patients aged above 44 years, patients with ART duration of at least 6 years, and patients with higher CD4 counts had increased odds of having any one of the NCCDs. Multimorbidity patients with a longer ART duration had an increased risk. *Conclusion.* The prevalence of NCCD multimorbidity among PLWHIV was high. Monitoring the occurrence of NCCDs among PLWHIV and noncommunicable disease care is recommended.



**Kassa, Z. Y., Tsegaye, B., & Abeje, A. (2020). Disrespect and Abuse Of Women During The Process Of Childbirth At Health Facilities in sub-Saharan Africa: A systematic review and meta-analysis. *BMC International Health and Human Rights*, 20(1), 1–9.**

## **Abstract**

### **Background**

Disrespectful and abusive treatment of women by health care providers during the process of childbirth at health facility is an international problem. There is a lack of data on disrespect and abuse of women during the process of childbirth at health facilities in Sub-Saharan Africa. The purpose of this study was to determine the prevalence of disrespect and abuse of women during the process of childbirth at health facilities in sub-Saharan Africa.

### **Methods**

The PRISMA guideline protocol was followed to write the systematic review and meta-analysis. Published studies were searched from Medline, PubMed, CINAHL, EMBASE, Maternal and infant care, science direct, and PsycINFO. Articles were accessed by three reviewers (ZY, BT and AA) using the following key terms, “attitude of health personnel” AND “delivery obstetrics\*/nursing” OR “maternity care” AND “disrespect” OR “abuse” OR “professional misconduct” AND “parturition” AND “prevalence” AND “professional-patient relations” AND “Sub-Saharan Africa”. Additional articles were retrieved by cross referencing of reference. The heterogeneity of studies were weighed using Cochran’s Q test and  $I^2$  test statistics. Publication bias was assessed by Egger’s test.

### **Results**

Thirty three studies met the inclusion and included in this systematic review and meta-analysis of disrespect and abuse of women during the process of childbirth at health facilities. The pooled prevalence of disrespect and abuse women during the process of childbirth at health facilities in Sub-Saharan Africa was 44.09% (95% CI: 29.94–58.24). Particularly physical abuse was 15.77% (95% CI: 13.38–18.15), non-confidential care was 16.87% (95% CI: 14.49–19.24), abandonment was 16.86% (95% CI: 13.88–19.84) and detention was 4.81% (95% CI: 3.96–5.67).

## Conclusion

In this study disrespect and abuse of women during the process of childbirth at health facilities are high compared with other studies, particularly non-confidential care and abandonment his high compared with other studies. This study points out that the ministry of health, health care providers, maternal health experts shall due attention to women's right during the process of childbirth at health facilities.

**Deyno, S., Eneyew, K., Seyfe, S., & Wondim, E. (2021). Efficacy, Safety and Phytochemistry of Medicinal Plants Used For The Management Of Diabetes Mellitus in Ethiopia: A systematic review. *Clinical Phytoscience*, 7(1), 1–13.**

## Abstract

### Background

Despite tremendous developments in synthetic medicine, medicinal plants are still commonly used for the management of diabetes mellitus. This study synthesized scientific evidence on commonly used medicinal plants for the management of diabetes mellitus (DM) in Ethiopia.

### Methods

Databases (PubMed, Cochrane, CINAHL and Google Scholar) have been thoroughly sought and evidence was synthesized.

### Results

Thirty studies conducted anti-diabetic activities studies on 19 medicinal plants in Ethiopia. Most of the studies were in vivo studies (25). Others include; clinical study (1), in vitro studies (2), and both in vivo and in vitro study (2). *Trigonella foenum-graecum L.*, clinical study, showed an improved lipid profile in type II diabetic patients. Comparable blood sugar level (BSL) lowering effect to glibenclimide was observed with *Persea Americana* and *Moringa stenopetala*. Noteworthy in vitro half maximal inhibitory concentration (IC 50) of *Aloe megalacantha B* and *Aloe monticola R* were observed. Animal model studies demonstrated the relative safety of the plants extract and phytochemistry studies showed various components.

## Conclusion

Medicinal plants used for management of diabetes mellitus in Ethiopia are worthy for further study for pharmacologically active ingredients and clinical evaluation.

**Geda, Y., Siyoum, M., & Tirfie, W. (2020). Pregnancy History and Associated Factors among Hawassa University Regular Undergraduate Female Students, Southern Ethiopia, 2020. *J Womens Health, Issues Care* 9, 3, 2.**

## Abstract

**Introduction:** Global incidence of pregnancies among University students is increasing, and challenging in Universities of Ethiopia. There are a few studies on pregnancy experiences among university students in Ethiopia the finding will be used by policymakers, additive of the existing knowledge, and as a reference for future researchers.

**Objective:** To assess the magnitude of pregnancy experiences and associated factors among Hawassa University regular female students from May 1, 2019, to May 15, 2019.

**Methods:** Institution based cross-sectional study was conducted from May 1, 2019, to May 15, 2019, and 741 participants were selected using a multistage sampling method from Hawassa University regular undergraduate female students. EPidata for entry and SPSS for analysis were used. variables with  $p < 0.25$  were considered significant.

**Result:** Magnitude of pregnancies experience among Hawassa University regular undergraduate female students was 98(13.2%) (95% CI: 10.8, 15.7). College of Agriculture 3.76 (AOR=3.76, 95% CI: 1.66, 8.50), Social Science and Humanity 2.63 (AOR=2.63, 95% CI: 1.02, 6.81), and Natural and Computational Science 3.41 (AOR=3.41, 95% CI: 1.54, 7.54) times more likely to have pregnancy compared to the college of Medicine and Health sciences. Married respondents were 2.39 (AOR=2.39, 95%CI: 1.54, 7.54) times more likely to have pregnancy compared to respondents who were not married. Respondents' source of income for a parent was 47% (AOR=0.53, 95%CI: 0.29, 0.96) less likely to have pregnancy compared to respondents whose source of income was a partner. Respondents who have a history of using contraceptives were 75% (AOR=0.25, 95%CI: 0.14, 0.44) less likely to have a pregnancy. **Conclusion:** The magnitude of pregnancy experience was high among regular undergraduate female students of Hawassa University compared to other studies. Being non-health colleges, married status, partner as a

source of income, and not having contraceptive usage history were statistically significant factors to have a pregnancy. Non-health colleges' needs to be evaluated about their SRH information flow by the university

**Gebre, B. B., Anand, S., & Assefa, Z. M. (2020). Depression and Its Predictors among Diabetes Mellitus Patients Attending Treatment in Hawassa University Comprehensive Specialized Hospital, Southern Ethiopia. *Journal of Diabetes Research*, 2020.**

## **Abstract**

*Background.* Patients with diabetes mellitus are at twice the risk of developing depression than the general population. The coexistence of diabetes and depression largely contributes to increased morbidity and mortality and results in high healthcare cost. *Objective.* The aim is to assess severity of depression and its determinants in diabetes outpatients at Hawassa University Comprehensive Specialized Referral Hospital, southern Ethiopia. *Methods.* An institutional-based cross-sectional study was done using a systematic sampling method. To assess the magnitude of depression, the patient health questionnaire-9 scale was used. Then, the data were entered into EpiData version 3.1 and exported to SPSS version 20 software. Binary logistic regression was used to assess the association between dependent variable and independent variables. *Results.* The magnitudes of depression were found to be 41.5%. The potential predictors were adhering to alcohol intake (adjusted odds ratio, , 95% CI: 1.52, 9.06), loss of someone very close or spouse (, 95% CI 3.07, 15.19), having no social support (, 95% CI: 1.63, 8.29), not adhering to the recommended dietary regimen (, 95% CI 3.07, 15.19), not adhering to physical activity (, 95% CI: 1.86,9.014), not adhering to medication (, 95% CI: 1.7, 10.31), and not having raised blood pressure of 140/90 mmHg and above (, 95% CI: 3.40, 16.17). *Conclusion.* Depression was a common comorbidity associated with diabetes occurring in more than four in ten of the participants.

**Gebre, B. B., Deribe, B., & Abeto, M. (2020). Magnitude and Associated Factors of Depression Among Hypertensive Patients Attending Treatment Follow Up in Chronic OPD at Hawassa University Comprehensive Specialized Hospital, Hawassa, Southern Ethiopia. *Integrated Blood Pressure Control*, 13, 31.**

## **Abstract**

### **Background**

Hypertension and depression are among the most common public health issues affecting the population around the world. Like patients with other chronic medical conditions, hypertensive patients experience many intense emotions which increase their risk for the development of depression. Globally, depression is the leading cause of disability and 382 million people suffer worldwide.

### **Objective**

The aim of this study was to assess the magnitude and factors associated with depression among hypertensive patients attending treatment follow up in the chronic OPD at Hawassa University Comprehensive Specialized Hospital (HUCSH) from March to May, 2019.

### **Methods**

An institutional-based cross-sectional study was conducted with 310 hypertensive patients attending treatment follow up at the chronic Out-Patient Department of HUCSH at Hawassa from March to May, 2019. A validated patient health questionnaire (PHQ-9) was used to assess depression. The data were entered using EPI-data version 3.1 and analyzed in SPSS version 22. Binary logistic regression was used to determine the association of independent variables with dependent variables.

### **Results**

The magnitude of depression among hypertension (HPN) patients was found to be 73 (24.7%). The independent predictors were sex 2.6 (1.16, 5.83), age 11.2 (2.98, 42), educational status, social support 2.55 (1.09, 5.94), family history of depression 7.12 (1.48, 34.26), hypertension 7.57 (2.67, 21.44), and medication adherence 11.6 (4.23, 31.78).

## Conclusion

The magnitude of depression among HPN patients was high. So, continuous health information dissemination at a different level regarding factors affecting them should be given. Strengthening a referral linkage with a psychiatric unit for psycho-behavioral therapy will bring good clinical outcome. Besides, controlling hypertension was crucial to bring good clinical outcome.

**Keywords:** Depression, Magnitude, Associate factor, Patient health questionnaire, PHQ-9

**Ayalew, M., Melese Gebrie, E. G., & Beyene, B. (2020). Determinants of Male Partner Involvement Towards Prevention of Mother to Child Transmission Service Utilization Among Pregnant Women Who Attended Focused Antenatal Care in Southern Ethiopia. *HIV/AIDS (Auckland, NZ)*, 12, 87.**

## Abstract

### Background

Male partner involvement is an important and crucial determinant of prevention of mother to child transmission (PMTCT) of HIV. It creates an opportunity to reverse the transmission of HIV during pregnancy, labor, and breastfeeding. Thus, involving male partners during HIV screening of pregnant mothers at ANC is the key to fight against MTCT of HIV.

### Objective

This study was designed to assess the magnitude and factors associated with male partner's involvement on PMTCT service utilization among pregnant women who attended focused antenatal care (FANC) in Southern Ethiopia.

### Methods

An institutional-based cross-sectional study was conducted among 420 randomly selected pregnant women who enrolled in PMTCT service at ANC clinics. Pre-tested and structured self-administered questionnaires were used to collect the data. Multiple logistic regression analysis was used to determine the presence of statistically significant associations between the outcome variable and the independent variables with a p-value less than 0.05.

## Results

A total of 409 pregnant women who had ANC follow-up have participated in this study. The majority 160 (39.1%) of the participants were in the age group of 25–29 years. The magnitude of male involvement in PMTCT service was 129 (29.8%). Number of ANC visits (3rd visit (AOR=2.36, CI=1.09, 5.10), 4th visit (AOR=3.49, CI=1.65, 7.38), birthplace interest (AOR=3.01, CI=1.16, 7.84), awareness about partner monthly income (AOR=2.17, CI=1.15, 4.11), source of family saving scheme (partner (AOR=2.99, CI=1.39, 6.43), self (AOR=8.59, CI=3.92, 18.82), both (AOR=5.13, CI=2.21, 11.92), maternal perception about the importance of consulting partner before HIV testing (AOR=9.30, CI=2.65, 32.64), and kinds of partner support (psychological (AOR=0.08, CI=0.02, 0.29), financial (AOR=0.33, CI=0.17, 0.68) were found to be significantly associated with male involvement in PMTCT.

## Conclusion

This study found out that male partner involvement in PMTCT is low. Therefore, improving male partner involvement in PMTCT is recommended for improving maternal FANC service utilization and adherence with notification of their partner and provision of psychological and financial support.

**Keywords:** Male partner, PMTCT, ANC service utilization, Ethiopia

**Deyno, S., Mtewa, A. G., Hope, D., Bazira, J., Makonnen, E., & Alele, P. E. (2020). Antibacterial Activities of *Echinops kebericho* Mesfin Tuber Extracts and Isolation of the Most Active Compound, Dehydrocostus Lactone. *Frontiers in Pharmacology*, 11.**

## Abstract

*Echinops kebericho* Mesfin is traditionally used for the treatment of various infectious diseases. This study investigated antibacterial activity of the essential oil (EO) and the different fractions of ethanol extract. The most active component was isolated and identified. Isolation and purification was accomplished using chromatographic techniques while identification was done by spectroscopic method. Minimum inhibitory concentration (MIC) was determined using the broth micro-dilution method. In bioactive-guided isolation, percent inhibition was determined using optical density (OD) measurement. The MICs of the essential oil ranged from 78.125 µg/ml to 625 µg/ml, and its activity was observed against methicillin-resistant *Staphylococcus*

*aureus* (MRSA, NCTC 12493). Ethyl acetate fraction showed high activity against MRSA (NCTC 12493), MIC = 39.075 µg/ml followed by *Enterococcus faecalis* (ATCC 49532), MIC = 78.125 µg/ml and was least active against *Klebsiella pneumoniae* (ATCC 700603), MIC = 1,250 µg/ml. MIC of hexane fraction ranged from 156.2 µg/ml to *Escherichia coli* (ATCC 49532) to 1,250 µg/ml to *E. coli* (NCTC 11954). The MICs of chloroform fraction ranged from 312.5 to 2500 µg/ml; while butanol fraction could be considered pharmacologically inactive as its MIC value was 2,500 µg/ml for all and no activity against *E. coli* (NCTC 11954). Dehydrocostus lactone was successfully isolated and identified whose MIC was 19.53 µg/ml against MRSA. Dehydrocostus lactone isolated from *E. kebericho* M. showed noteworthy antibacterial activity which lends support to ethnopharmacological use of the plant. Further optimization should be done to improve its antibacterial activities and pharmacokinetic profile.

**Keywords:** Dehydrocostus lactone, Essential oil, Minimum inhibitory concentration, Resazurin assay, Optical density, Fractions

**Deyno, S., Tola, M. A., Bazira, J., Makonnen, E., & Alele, P. E. (2021). Acute and repeated-dose toxicity of *Echinops kebericho* Mesfin essential oil. *Toxicology Reports*, 8, 131–138.**

## **Abstract**

*Echinops kebericho* Mesfin is used for the management of various diseases and fumigation during child birth. This study investigated acute and repeated-dose toxicity of *E. kebericho* M. essential oils (EOs). The study was conducted in Swiss albino mice. Organ weight, histopathology and clinical chemistry were analyzed. The dose and duration of treatment were defined in accordance with Organization for Economic Co-operation and Development (OECD) guideline.

No mortality was observed in acute oral dose toxicity study up to 2000 mg/kg per body weight. Compared to control group, treated groups did not show significant abnormalities in body weight and most parameters of clinical chemistry parameters and relative organ weight in repeated-dose toxicity study. However, urea, albumin, aspartate aminotransferase, and relative organ weight of right kidney showed variations in treated groups compared to control group. All treated groups and control group showed normal histology except lymphocytic infiltrates observed on the kidney with 200 mg/kg treated female group. The current study revealed that EO of *E. kebericho* M. could



be considered well tolerated in acute and repeated-dose exposure. Further, teratogenic, mutagenic, carcinogenic, and sub-chronic and chronic toxicity studies are warranted.

**Keywords;** Safety, Herbal medicine, Clinical chemistry, Histopathology

**Deyno, S., Abebe, A., Tola, M. A., Hymete, A., Bazira, J., Makonnen, E., & Alele, P. E. (2020). Acute and sub-acute toxicity of *Echinops kebericho* decoction in rats. *BMC Complementary Medicine and Therapies*, 20(1), 1–11.**

## **Abstract**

### **Background**

*Echinops kebericho* is widely used for treatment of a variety of diseases including infectious, non-infectious disease and fumigation during child birth. Antibacterial, antimalarial, anti-leishmania, anti-diarrheal and insect repellent activities have been elucidated. Its toxicity profile is not yet investigated and thus this study was to investigate acute and sub-acute toxicity of *E. kebericho* decoctions.

### **Methods**

Acute toxicity study was performed in female Wistar albino rats with single oral dose and followed up to 14 days. The sub-acute oral dose toxicity studies were conducted in rats of both sexes in accordance with the repeated dose 28-day oral toxicity study in rodent OECD guidelines. Physical observations were made regularly during the study period while body weight was measured weekly. Organ weight, histopathology, clinical chemistry and hematology data were collected on the 29th day. Results were presented as mean  $\pm$  standard deviation. One-way analysis of variance (ANOVA) was performed if assumptions were met; otherwise Kruskal-Wallis analysis was performed.

### **Result**

Oral administration of *E. kebericho* decoction showed no treatment-related mortality in female rats up to the dose of 5000 mg/kg. In sub-acute toxicity studies, no significant treatment-related abnormalities were observed compared to negative controls. Food consumption, body weight, organ weight, hematology, clinical chemistry, and histopathology did not show significant variation between controls and treatment groups. However, creatinine, relative lung weight,

triglycerides, and monocytes were lower in treated compared to control groups. Significant variations between male and female groups in food consumption, relative organ weight, hematology, clinical chemistry were observed. Histolo-pathology of high-dose treated groups showed fatty liver.

## Conclusion

*Echinops kebericho* showed LD<sub>50</sub> of greater than 5000 mg/kg in acute toxicity study and is well tolerated up to the dose of 600 mg/kg body weight in sub-acute toxicity study.

**Tuyiringire, N., Deyno, S., Weisheit, A., Tolo, C. U., Tusubira, D., Munyampundu, J.-P., Ogwang, P. E., Muvunyi, C. M., & Vander Heyden, Y. (2020). Three Promising Antimycobacterial Medicinal Plants Reviewed As Potential Sources Of Drug Hit Candidates Against Multidrug-Resistant Tuberculosis. *Tuberculosis*, 101987.**

## Abstract

Regimens of current drugs for tuberculosis are lengthy and are associated with many adverse effects. Currently, the emergence of different resistant strains has been observed. This urges a need for the discovery and development of novel drugs. The main sources of drug lead candidates are based on natural products. *Zanthoxylum leprieurii*, *Lantana camara*, and *Cryptolepis Sanguinolenta* are among the plants that have antimycobacterial activity. Recent technological methods, such as metabolomics, can rapidly detect and identify active compounds from medicinal plants. In this review, we aim to provide an overview and discussion of the antimycobacterial activity, phytochemical analysis and toxicity profile of these plants and their products as well as the potential of metabolomic fingerprinting of medicinal plants with a given activity on microbes, in the search for the potential drug hit molecules.

The information for this review was extracted from databases such as Excerpta Medica Database, Google Scholar, Springer, and PubMed Central. Primary studies, using a combination of the keywords antimycobacterial medicinal plant, multidrug-resistant tuberculosis, phytochemistry, toxicity, *Zanthoxylum leprieurii*, *Lantana camara*, *Cryptolepis sanguinolenta*, and plant metabolomics/metabolic fingerprinting of plant extracts, have been considered.

The above-mentioned plant species showed antimycobacterial activity against drug-resistant strains of *M. tuberculosis*. They may provide potential candidates for novel drugs against

multidrug-resistant tuberculosis. However, extensive work is still needed. To our knowledge, there is no or limited literature that reports the metabolic fingerprints of these plants. The analysis of the metabolite fingerprints of medicinal plants with similar antimicrobial activity could be important to determine whether the activity results from common metabolites within different plant species. This review shows that these plants are potential candidates to provide drug hits against multidrug-resistant tuberculosis strains. Future studies of compound optimization, *in vivo* safety and efficacy, as well as of the specific mechanisms of action are however required.

**Keywords:** Multidrug-resistant tuberculosis, *Zanthoxylum leprieurii*, *Lantana camara*, *Cryptolepis sanguinolenta*, Metabolic fingerprinting, Antimycobacterial activity

**Beressa, T. B., Deyno, S., & Alele, P. E. (2020). Antifungal Activity of the Essential Oil of *Echinops kebericho* Mesfin: An In Vitro Study. *Evidence-Based Complementary and Alternative Medicine*, 2020.**

## **Abstract**

**Background.** *Echinops kebericho* is an endemic medicinal plant in Ethiopia widely used in the treatment of infectious and noninfectious diseases. Essential oils are known for their antibacterial, antifungal, antiviral, insecticidal, and antioxidant properties. This study evaluated the antifungal activity of essential oil from *E. kebericho* against four common pathogenic fungi and two standard strains. **Methods.** The essential oil was obtained by hydrodistillation. The antifungal screening was done by agar well diffusion method. Minimal inhibitory concentrations (MICs) were determined by broth microdilution. Minimal fungicidal concentrations (MFCs) were determined by subculturing fungal strains with no visible growth onto a Sabouraud dextrose agar (SDA) plate. **Results.** *Candida albicans* and *Cryptococcus neoformans* were highly sensitive while *Aspergillus flavus* did not show sensitivity up to 1 mg/ml of essential oil; MICs ranged from 0.083 mg/ml to 0.208 mg/ml. Concentration and fungal species showed significant dose-dependent associations () with antifungal activity. The MICs of essential oil were comparable to those of the standard drug (fluconazole) against *C. glabrata* and *C. krusei*. The lowest MFC of the essential oil was observed against *Candida parapsilosis* (0.145 mg/ml) while the highest MFC was against *Candida krusei* (0.667 mg/ml). **Conclusion.** *Echinops kebericho* essential oil showed noteworthy antifungal activity against *Cryptococcus neoformans*, *Candida albicans*, and *Candida glabrata* and could be a potential candidate for further antifungal drug development.

**Mtewa, A. G., Sesaazi, D., & Deyno, S. (2020). Essential Drug Properties and Stages in Anti-Cancer Drug Development. In *Drug Development for Cancer and Diabetes* (pp. 29–41). Apple Academic Press.**

### **Abstract**

Cancer is a disease in which cells uncontrollably divide, destroying body tissue. Sometimes, it is regarded as a group of diseases that involves abnormal cell growth with the potential to spread to other body parts. Drug development involves the optimization of a new or existing pharmaceutical agent identified from drug discovery. This process begins from studying disease weaknesses and strengths with the aim of finding a way to reverse or stop its mechanistic strengths on body cells. Critical to an effective drug development process are drug properties which include lipophilicity, solubility, PKa, and permeability. These properties inform the developers of how they should manipulate the drug molecules through structural-activity-relationships (SARs) studies to make them as least toxic and most effective 30as possible. Before getting to the market, the properties guide formulation and their effects are monitored through different stages of clinical trials.

**Reta, Y., Ayalew, M., Yeneabat, T., & Bedaso, A. (2020). Social Anxiety Disorder Among Undergraduate Students of Hawassa University, College of Medicine and Health Sciences, Ethiopia. *Neuropsychiatric Disease and Treatment*, 16, 571.**

### **Abstract**

#### **Introduction**

Social anxiety disorder (SAD), also called social phobia, is an uncontrollable fear of social situations, which involve fear of observation or making contact with strangers. So, helping individuals with social anxiety, which is among the factors affecting mental health, can significantly influence a students' mental health and prevent other problems.

#### **Objective**

The study aimed at assessing the magnitude of SAD and its determinants among undergraduate students of Hawassa University, College of Medicine and Health Sciences.

## Methods

An institution based cross-sectional study was conducted from April 1 to May 30, 2018, in Hawassa University, College of Medicine and Health Sciences. We selected participants by a stratified random sampling method, and we collected data independently from each stratum (department) using a 17 item self-rating Social Phobia Inventory (SPIN) scale to assess SAD. We performed multiple logistic regression analysis to find factors associated with SAD.

## Results

Out of 304 students, 293 completed the questionnaire, with a response rate of 96.3%. The mean age of the participants was 22.13 years with a standard deviation of  $\pm 2.176$ , and 172 (58.7%) were males. The prevalence of SAD was 32.8%. Family history of mental illness (AOR=4.72, 95% CI (1.25, 17.74)), being a 3rd-year student (AOR=0.178, 95% CI (0.055, 0.57)) and being a 4th year student (AOR=0.15, 95% CI (0.049, 0.49)) were significantly associated with SAD.

## Conclusion

This study showed a high prevalence of SAD among medicine and health science students of Hawassa University. Therefore, the Ethiopian Ministry of Higher Education and university officials need to draw up a plan to reduce social phobia.

**Keywords:** Social anxiety disorder, Undergraduate students, Ethiopia

**Tsegaye, B., & Ayalew, M. (2020). Prevalence and Factors Associated With Antenatal Care Utilization In Ethiopia: An Evidence From Demographic Health Survey 2016. *BMC Pregnancy and Childbirth*, 20(1), 1–9.**

## Abstract

### Background

Ethiopia is one of the sub-Saharan African country with high maternal mortality ratio (MMR). According to Ethiopian demographic health survey (EDHS) 2016 report, MMR is 420 among 100,000 live births. Antenatal care utilization is a key intervention to reduce these deaths through problem detection and treatment, promotion of health seeking behavior, and preparing pregnant women for birth. Therefore, this study aimed to assess prevalence and factors associated with antenatal care service utilization in Ethiopia in 2016.

## Methods

Secondary data analysis was done on EDHS 2016. It was a stratified, two-stage, and cluster sampling design. Analysis has been restricted to antenatal care utilization among women who delivered at least one time in the past five years. Data were weighted to correct sampling bias. Moreover, complex data analysis was done. Bi-variate and multivariable logistic regression analyses were carried out. Adjusted odds ratio with 95% confidence interval was computed and P-value less than 0.05 considered as a statistically significance level for identification of association.

## Results

Prevalence of antenatal care utilization was 62.8% [95%CI: 60.9, 64.6] in this study. Maternal educational status of primary school (AOR = 1.8,95%CI:1.2, 2.6), maternal educational status of secondary school (AOR = 4.4,95%CI: 1.1, 17.3), women who listen radio less than 1 per week (AOR = 1.9,95%CI:1.12,3.34), women who listen radio at least 1 per week (AOR = 2.6,95%CI:1.4,4.8), women in rich wealth quintile (AOR = 1.9,95%CI: 1.1, 3.2) were factors positively associated with antenatal care utilization. However, women who had traditional belief (AOR = 0.1,95%CI:0.02,0.49), and women who had five children and above (AOR = 0.6,95%CI: 0.3, 0.9) were factors associated negatively with antenatal care utilization.

## Conclusions

Prevalence of antenatal care utilization is still low in Ethiopia in 2016. Maternal higher maternal educational status, frequent radio listening, higher wealth quintile, traditional belief, and greater number of children were found to be associated significantly with antenatal care utilization. Consequently, socio-economic status should be enhanced, information should be accessed by women about antenatal care utilization and family planning service through mass media. Furthermore, intensive community education program should be designed for traditional believers to increase uptake of antenatal care by stakeholders.

**Gebereselassie, Y., BirhanSelassie, M., Menjetta, T., Alemu, J., & Tsegaye, A. (2020). Magnitude, Severity, and Associated Factors of Anemia among Under-Five Children Attending Hawassa University Teaching and Referral Hospital, Hawassa, Southern Ethiopia, 2016. *Anemia*, 2020.**

## **Abstract**

*Background.* Anemia is a widespread public health problem associated with increased risk of morbidity and mortality. Infants, under-5-year-old children, and pregnant women have greater susceptibility to anemia. The magnitude and associated risk factors for anemia vary in different settings. The study aimed to assess the magnitude, severity, and associated factors of anemia at Hawassa University Teaching and Referral hospital, Hawassa, southern Ethiopia. *Methods.* In a hospital-based cross-sectional study, a total of 422 under-five children were included. Sociodemographic data and other predisposing factors were collected by structured questionnaire. Venous blood samples were collected and analyzed for hemoglobin determination using a Cell-Dyn 1800 automated analyzer. Stool samples were collected and processed using direct wet mount and formol-ether concentration method to detect intestinal parasites. Data were entered and analyzed using SPSS version 20 statistical packages. Binary and multiple logistic regressions were computed to assess factors associated with anemia. value less than 0.05 was taken as statistically significant. *Result.* The overall prevalence of anemia was found to be 41.7%. The mean hemoglobin level was 10.59 g/dl. Anemia was of mild, moderate, and severe type in 6.6%, 19%, and 16.1% of the children, respectively. Children in the age group 6–23 months (AOR = 2.04 (95% CI: 1.13, 3.69)), and mothers having no formal education (AOR = 1.73 (95% CI: 0.99, 3.02)) were identified as associated factors for anemia. *Conclusion.* The prevalence of anemia among the study subjects was 41.7% indicative of the fact that anemia is an important public health problem. It was associated with the child's age, residence, mother's education level, and intestinal parasite (*Ascaris lumbricoides*). It clearly indicates that there should be well integrated public health interventions to improve the health status that needs to be prioritized to prevent anemia among children under five years of age.

**Bedaso, A., Abraham, Y., Temesgen, A., & Mekonnen, N. (2020). Quality of sleep and associated factors among people living with HIV/AIDS attending ART clinic at Hawassa University comprehensive specialized Hospital, Hawassa, SNNPR, Ethiopia. *PloS One*, 15(6), e0233849.**

## **Abstract**

### **Background**

Sleep is a natural, restorative, physiological process that is characterized by perceptual disengagement from and unresponsiveness to whatever going around, which is reversible. Sleep quality refers to a sense of being rested and refreshed after waking up from sleep. People living with HIV/AIDS (PLWHA) are vulnerable to poor sleep quality as they suffer from social stigma and Anti-Retroviral drug side effects. The study aimed to examine the quality of sleep and its associated factors among people living with HIV/AIDS attending Anti-Retroviral Therapy (ART) clinic at Hawassa University comprehensive specialized hospital.

### **Method**

Institutional based cross-sectional study was conducted among PLWHA attending ART clinic at Hawassa University comprehensive specialized hospital from May 1–30, 2019. A systematic random sampling technique was used to select an estimated 422 study participants and data was collected using interviewer-administered technique. Sleep Quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). Data were entered and analyzed using SPSS 22 software. Bivariable and multivariable logistic regression model was fitted to identify factors associated with quality of sleep. An adjusted odds ratio with a 95% confidence interval was computed to determine the level of significance with P-value less than 0.05.

### **Result**

Out of 422 respondents, 389 participated in the study giving a response rate of 92.1%. The prevalence of poor quality of sleep among study participants was found to be 57.6% (95% CI: 54.72, 60.48). 31.9% (124) and 30.6% (119) of study participants had anxiety and depression respectively. Being between the age of 55–64 years (AOR = 5.7, 95% CI (1.9, 17.8), Age  $\geq$  65 (AOR:6.6, 95% CI (1.2, 36.9), Monthly income <1656 Ethiopian Birr (ETB) (AOR = 2.17, 95% CI (1.06, 4.4), having anxiety (AOR = 4.4, 95% CI (2.12, 9.2), having depression (AOR = 4.97,



95% CI (2.28, 10) and poor social support (AOR = 2.9, 95% CI (1.16, 7.3) were factors associated with poor quality of sleep.

## Conclusion

The prevalence of poor quality of sleep among PLWHA was significantly high. Average monthly income, age, anxiety, depression, and social support were found to be significantly associated with poor sleep quality. Health care professionals working at the ART clinic need to assess the sleep pattern of ART clients, give psychoeducation on the prevention and management of sleep pattern problems.

**Gebremedhin, S., Astatkie, A., Amin, H. M., Teshome, A., & Gebremariam, A. (2020). Changes in Care-seeking for Common Childhood Illnesses in the Context of Integrated Community Case Management (iCCM) program implementation in Benishangul Gumuz region of Ethiopia. *PloS One*, 15(11), e0242451.**

## Abstract

### Background

Integrated Community Case Management (iCCM) is a strategy for promoting access of underserved populations to lifesaving treatments through extending case management of common childhood illnesses to trained frontline health workers. In Ethiopia iCCM is provided by health extension workers (HEWs) deployed at health posts. We evaluated the association between the implementation of iCCM program in Assosa Zuria zone, Benishangul Gumuz region and changes in care-seeking for common childhood illnesses.

### Methods

We conducted a pre-post study without control arm to evaluate the association of interest. The iCCM program that incorporated training, mentoring and supportive supervision of HEWs with community-based demand creation activities was implemented for two years (2017–18). Baseline, midline and endline surveys were completed approximately one year apart. Across the surveys, children aged 2–59 months ( $n = 1,848$ ) who recently had cough, fever or diarrhea were included. Data were analysed using mixed-effects logistic regression model.

## Results

Over the two-year period, care-seeking from any health facility and from health posts significantly increased by 10.7 and 17.4 percentage points (PP) from baseline levels of 64.5 and 34.1%, respectively ( $p < 0.001$ ). Care sought from health centres ( $p = 0.420$ ) and public hospitals ( $p = 0.129$ ) did not meaningfully change while proportion of caregivers who approached private ( $p = 0.003$ ) and informal providers ( $p < 0.001$ ) declined. Caregivers who visited health posts for the treatment of diarrhea (19.2 PP,  $p < 0.001$ ), fever (15.5 PP,  $p < 0.001$ ), cough (17.8 PP,  $p < 0.001$ ) and cough with respiratory difficulty (17.3 PP,  $p = 0.038$ ) significantly increased. After accounting for extraneous variables, we observed that care-seeking from iCCM providers was almost doubled (adjusted odds ratio = 2.32: 95% confidence interval; 1.88–2.86) over the period.

## Conclusion

iCCM implementation was associated with a meaningful shift in care-seeking to health posts.

**Alemayehu, M., Alemu, T., & Astatkie, A. (2020). Prevalence and Determinants of Diarrhea among Under-Five Children in Benna Tsema District, South Omo Zone, Southern Ethiopia: A Community-Based Cross-Sectional Study in Pastoralist and Agropastoralist Context. *Advances in Public Health*, 2020.**

## Abstract

*Background.* Diarrhea is the second leading cause of death among children under-five years globally and accounts for about 1.5 million deaths each year. In low-income countries, children under three years of age experience three episodes of diarrhea on average every year. In Ethiopia, diarrheal disease is one of the common causes of mortality in under-five children. In Benna Tsema district, pastoralist community lives with lack of clean water, sanitation, and hygiene problems, which increase the risk of childhood diarrhea. *Objective.* To assess the prevalence and determinant of diarrheal disease among under five children in Benna Tsema District, South Omo Zone, Southern Ethiopia. *Methods.* A community-based cross-sectional study was conducted on a sample of 722 under five children selected randomly from eight pastoralists and two agropastoralist kebele. Data were collected using an interviewer-administered questionnaire. Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 20. Logistic regression was performed to identify the association between diarrheal disease and independent variables. Adjusted odds ratio with 95% confidence intervals (CIs) was used to judge the presence

of association. *Results.* The two-week period prevalence of childhood diarrheal disease in the study was 23.5% (95% CI: 20.4%–26.6%). Diarrheal illness was associated with nonavailability of latrine (AOR: 2.77, 95% CI: 1.66–4.63), *faeces* seen around the pit hole or floor of latrine (AOR: 2.92, 95% CI: 1.38–6.19), improper kitchen waste disposal (AOR: 2.31, 95% CI: 1.26–4.24), unprotected drinking water source (AOR: 1.81, 95% CI: 1.14–2.88), mother’s or caretaker’s diarrhea history in the last two weeks (AOR: 6.74, 95% CI: 2.51–18.07), materials used for feeding the child (cup and spoon) (AOR: 0.60, 95% CI: 0.36–0.97), and being unvaccinated for “rotavirus” (AOR: 2.87, 95% CI: 1.86–4.44). *Conclusion.* Nearly one-fourth of children had diarrheal illness in the preceding two weeks. Water, sanitation and hygiene-related factors, child feeding practice, and children’s vaccination status for rotavirus were the determinants of the occurrence of diarrhea among under-five children. The health office should conduct sustainable health education programs that emphasize on risk of open defecation, waste disposal mechanisms, and child feeding practices and also should strengthen rotavirus vaccination activities. The district administration and partners’ needed to improve water sources.

**Astatkie, A. (2020). Dynamics of Stunting From Childhood To Youthhood In Ethiopia: Evidence From The Young Lives Panel Data. *PloS One*, 15(2), e0229011.**

## **Abstract**

### **Introduction**

Stunting continues to be a public health challenge with grave health, cognitive and economic consequences. Yet, its dynamics along the life course remain not well investigated in Ethiopia and beyond.

### **Methods**

Longitudinal data generated by following two (younger and older) cohorts of about 3000 children for nearly 15 years were analyzed to investigate the longitudinal dynamics of stunting in Ethiopia. The cross-sectional prevalence of stunting in each round, longitudinal prevalence, and transition probabilities were determined. Multilevel mixed effects ordinal regression was applied to identify the determinants of stunting accounting for child-level and cluster-level variations.

## Results

The cross-sectional prevalence of severe stunting for the younger cohort fluctuated between 21% and 6%, while for the older cohort it fluctuated between 12% and 3%. Moderate stunting fluctuated between 23% and 16% for the younger cohort and between 22% and 8% for the older cohort. The longitudinal prevalence of severe stunting was 10% in both the younger and older cohorts, whereas that of moderate stunting was 20% for the younger cohort and 18% for the older cohort. Children not stunted at baseline had very high probabilities of remaining not stunted through youthhood (87% for the younger and 90% for the older cohorts). Conversely, children with moderate stunting at baseline had high probabilities either remaining moderately stunted or progressing to severe stunting. Furthermore, children who had severe stunting at baseline had high probabilities of either remaining severely stunted or transitioning to moderate stunting. In both cohorts, older age of the child, female sex, having an educated mother, and being from a household with educated head significantly reduced the risk of stunting. Children from households in the top wealth tertile had a significantly lower risk of stunting in the younger cohort, but not in the older cohort. Similarly, Productive Safety Net Programme reduced the risk of stunting in the younger cohort, but not in the older cohort.

## Conclusion

Children not stunted early in life are highly likely to grow into non-stunted adults while children stunted early in life are highly likely to grow into stunted adults. Several child-level, maternal, household and programmatic factors affect the risk of stunting. Efforts to prevent stunting shall commence early in life.

**Bekele, T., Ashenaf, T., Ermias, A., & Arega Sadore, A. (2020). Compliance with Standard Safety Precautions and Associated Factors Among Health Care Workers in Hawassa University comprehensive, specialized hospital, Southern Ethiopia. *Plos One*, 15(10), e0239744.**

## **Abstract**

### **Background**

Globally, health care-associated infections had become serious public health importance. Compliance with standard safety precaution is effective and inexpensive measure to improve quality of healthcare in reducing occurrence of healthcare associated infections. In developing countries, like Ethiopia adherence to recommended standard safety precaution is scanty.

### **Objective**

To assess level of compliance with standard safety precaution and associated factors among healthcare workers in Hawassa comprehensive specialized hospital Southern Ethiopia.

### **Methods**

An institutional based cross-sectional study was conducted at Hawassa comprehensive specialized hospital. Data were collected by using self-administered questionnaire. Study participants were allocated proportionally based on their profession by using stratified random sampling method. Data were entered and analyzed by using SPSS version 20.0. Bi-variable analysis and multi variable logistic regression model were used to check which variables were associated with dependent variable. P-values  $\leq 0.05$  were considered statistically significant. In this study the overall compliance with standard safety precaution among healthcare workers were only 56.5%. Being female healthcare worker AOR: 2.76(1.34, 5.54), married healthcare workers AOR: 4.2(2, 9.03), accessibility of safety box AOR: 3.4(1.6, 7.17), HCWs had perceived IP training AOR: 3.99(1.46, 10.9), availability of tape water AOR: 2.68(1.15, 6.2) and healthcare workers had internal infection prevention and control supportive supervision AOR: 5.8(2.54, 13.48) associated with compliance with standard safety precaution.

### **Conclusion**

According to findings of the current study, overall level of compliance with standard SP among HCWs considered to be very low. Factors such as healthcare workers being female, accessibility

of safety box, availability of running tape water, training and supportive supervision were independent predictors of compliance with standard safety precaution. Thus ensuring availability and accessibility of safety precaution materials and regular observing and supervising healthcare workers' practices are highly recommended.

**Belayneh, M., Loha, E., & Lindtjørn, B. (2021). Seasonal Variation of Household Food Insecurity and Household Dietary Diversity on Wasting And Stunting Among Young Children In A Drought Prone Area in South Ethiopia: A cohort study. *Ecology of Food and Nutrition*, 60(1), 44–69.**

### **Abstract**

This study was conducted to evaluate seasonal patterns of household food insecurity, dietary diversity, and household characteristics on wasting and stunting among children in households followed for 1 year in the drought-prone areas of Sidama, Ethiopia. A cohort study design was employed. Data were collected on the pre-harvest season (March and June) and post-harvest season (September and December) of 2017. We studied 935 children aged 6 to 47 months. At four seasons over a year, we had 3,449 observations from 897 households and 82% (2,816) (95% CI: 80.3–82.9) were food in-secured households. Severe food insecurity was higher in the pre-harvest (March; food scarcity season) which was 69% as compared to 50% of September ( $P < .001$ ). From 3,488 observations, 44% (1,533) (95% CI: 42.3–45.6) of children were stunted. Stunting showed seasonal variations with 38% (95% CI: 34.7–41.0) in March and 49% (95% CI: 45.8–52.5) in December. Six percent (95% CI: 5.0–6.6) of children were wasted, with higher prevalence in March (8%) as compared to 3% of September ( $P < .001$ ). Moreover, household characteristics such as poverty level, education, occupation and the household food insecurity and dietary diversity were associated with subsequent wasting and stunting.

**Keywords:** Seasonal variation, food insecurity, dietary diversity, wasting, stunting, Ethiopia

**Mebratu, L., Mengesha, S., Tegene, Y., Alano, A., & Toma, A. (2020). Exclusive Breast-Feeding Practice and Associated Factors Among HIV-Positive Mothers In Governmental Health Facilities, Southern Ethiopia. *Journal Of Nutrition And Metabolism*, 2020.**

## **Abstract**

*Introduction.* Globally, over 90% of HIV infections among children are due to mother-to-child transmission and breastfeeding accounts for 5–20% of the burden. Avoidance of inappropriate feeding practices and practicing exclusive breastfeeding is recommended to reduce mother-to-child HIV transmission, but it is hardly practiced. The aim of this study was to determine the prevalence of exclusive breastfeeding practice and associated factors among HIV-positive mothers attending governmental PMTCT clinics in Southern Ethiopia. *Methods.* An institution-based cross-sectional study was conducted from April to May 2019. The participants of the study were 209 HIV-positive mothers at the selected PMTCT sites. The study subjects were drawn from 10 health institutions located at 6 towns in Southern Ethiopia which constituted six hospitals and four health centers. Quantitative data were collected using the pretested structured questionnaire. Logistic regression analysis was used to determine the association between the predictors and outcome variable. *Results.* Among the 209 participants, 81.6% (95% CI: 75.8–86.5) practiced exclusive breastfeeding and 18.4% (95% CI: 13.5–23.7) practiced mixed feeding. Mothers who had attended the recommended four antenatal visits [AOR: 3.01, 95% CI (1.1–8.28)], who had disclosed their serostatus [AOR: 3.17, 95% CI (1.12–8.99)], who had sufficient knowledge about infant feeding practice [AOR: 3.32, 95% CI (1.15–9.55)], and favorable attitude towards infant feeding practice [AOR: 5.39, 95% CI (1.65–17.6)] were more likely to practice exclusive breastfeeding. *Conclusion.* Exclusive breastfeeding was predominantly practiced. But mixed feeding was also being practice considerably. Improving maternal knowledge and attitude towards appropriate infant feeding practice through appropriate counseling on ANC visits could significantly improve EBF practice. It was also evident that promoting disclose of serostatus could empower the mothers to make an informed decision on how to appropriately feed their newborn.

**Gelba, S. B., Fikadu, S., Legesse, A. K., Wubet, H., Yesuf, M. A., Abera, W., & Wube, T. B. (2020). Assessment of Pattern of CD4+ T-Cell Recovery Among Human Immunodeficiency Virus Patients After Initiation of Highly Active Antiretroviral Therapy at Arsi Negelle Health Center, Ethiopia: A Retrospective Cross-Sectional Study. *HIV/AIDS (Auckland, NZ)*, 12, 69.**

## **Abstract**

### **Background**

Antiretroviral therapy has resulted in significant reductions in HIV-associated complications by recovering the CD4+ T cell count. Some patients may not be successful in attaining this result, and some may achieve it only after many years of treatment.

### **Objective**

This study aimed to assess CD4+ T cell recovery and non-response patterns among HAART experienced HIV-positive patients at the Arsi Negelle health center.

### **Methods**

This was a retrospective cross-sectional study conducted among HAART experienced HIV/AIDS patients at Arsi Negelle Health Center from January 01, 2014 to January 06, 2019. Data were documented to a data retrieval form and analyzed with SPSS version 20. Linear regression analysis was used to identify predictors of CD4 count change. A P-value of <0.05 was considered significant.

### **Results**

The total median of CD4+ T cells increased from 257 cells/uL at the baseline to 382 cells/uL after 6 months, then to 591 cells/uL after 60 months of treatment. The non-response rate was 22.1% and 23.8% among the total study participants and children of less than 15 years, respectively. Only baseline CD4+ T cell was associated with a change in CD4+ T cell count.

### **Conclusion**

From our study, we can conclude that CD4+ T cell count has recovered in most of the study participants after HAART initiation. The immunological non-response rate of study participants was 22.1% after 12 months on HAART and 7.2% at the end of the study.

**Keywords:** CD4+ T-cell recovery, immunological non-response rate, Arsi Negelle, Ethiopia



**Wube, T. B., Begashaw, T. A., & Hirigo, A. T. (2020). Prevalence of Dyslipidemia And Its Correlation With Anthropometric and Blood Pressure Variables Among Type-2 diabetic patients. *Journal of Diabetes and Endocrinology*, 11(1), 10–17.**

## **Abstract**

Co-morbidity of hypertension and dyslipidemia are found to be high in type-2 diabetes mellitus (DM) patients particularly with poor glycemic control. This study was aimed to assess the prevalence of dyslipidemia and its correlations with anthropometric and blood pressure variables among type-2 DM patients. The study was conducted on 314 type-2 DM patients at Hawassa University Comprehensive Specialized Hospital from February 28 to May 30, 2017. Socio-demographic and other data was collected using interview-directed structured questionnaire. In addition, serum biochemical parameters determined after overnight fasting and dyslipidemia was defined based on United State National Cholesterol Education program-III criteria. Statistical analysis such as Chi-square, student's t-test/ Mann-Whitney U test, and Pearson correlation coefficient were conducted using Statistical Package for Social Sciences (SPSS) Version 20. The result showed that two hundred eight six (91.1%) participants had a minimum of one lipid parameter abnormal, which is well suited for the diagnosis of dyslipidemia. The prevalence of low HDL-cholesterol, high LDL-cholesterol, triglycerides and TC (total cholesterol) were 60.8, 14.3, 70.4 and 32.8%, respectively. The mean values of TC, LDL-cholesterol and uric acid (UA) were significantly higher among patients with body mass index (BMI)  $\geq 25$  kg/m<sup>2</sup> when compared to those with BMI  $< 25$  kg/m<sup>2</sup> ( $p < 0.01$  for all). In addition, TC and TG were significantly higher among patients with BP  $\geq 130/85$  mmHg when compared to those patients with BP  $< 130/85$  mmHg ( $p < 0.001$  for both parameters). Triglycerides was significantly correlated with BMI, UA and hypertension ( $r = 0.326, 0.553$  and  $0.22$ ), respectively. TC showed significant correlation with BMI, UA and fasting blood sugar (FBS) ( $r = 0.326, 0.298$  and  $0.132$ ), respectively. Moreover, LDL-cholesterol was significantly correlated with waist circumference, BMI and FBS ( $r = 0.16, 0.189$  and  $0.173$ ), respectively. In conclusion, dyslipidemia is significantly higher in diabetes patients and it correlated with BMI, WC, blood pressure and UA. Therefore, lipid profiles should be performed periodically through treatment follow-up and proper management of correlated factors is vital in order to limit risks of cardiovascular diseases.

**Key words:** Anthropometric parameters, dyslipidemia, uric acid, hypertension, type-2 diabetes.

**Tesfaye, A., Josef, H., Wube, T. B., Girma, Z., Negasa, B., Muche, T., & Zewude, B. (2020). Magnitude of, and Factors Associated with Cardiovascular Disease Among Type Two Diabetes Mellitus Patients. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, 13, 4123.**

## **Abstract**

### **Background**

Diabetes mellitus is becoming one of the major health problems in developing countries. The number of adults living with type 2 diabetes mellitus (T2DM) worldwide is increasing over time. Cardiovascular disease (CVD) is the major cause of death in T2DM. The objective of this study was to determine the prevalence of cardiovascular disease and its associated factors among diabetic patients at the MRC clinic of Dilla University Referral Hospital (DURH).

### **Methods**

A hospital-based cross-sectional study was conducted from April to May 2019 . A total of 216 diabetic individuals were selected with a convenient sampling technique from patients on follow-up at DURH MRC. Data were collected using a structured format. The diagnosis of CVD was made with the necessary diagnostic tests and examination. The data analysis was done in SPSS software version 20. Bivariate and multivariable logistic regression analysis was carried out to identify factors associated with cardiovascular disease.

### **Results**

A total of 216 patients participated in the study and the mean age of the study participants was 30 years; 83.3% of the study participants were male. The overall prevalence of cardiovascular disease was 25% of which 57% were ischemic heart disease, 32% were hypertensive and 10% were stroke. Duration of DM for more than 10 years and diabetic drug discontinuation were factors associated with cardiovascular disease. Odds of CVD was nearly four times more in those whose duration of DM is more than 10 years (AOR=4.00, 95% CI: 2.386–6.705) and odds of CVD among those who discontinued medication were almost three times more, (AOR=2.98, 95% CI: 1.287–6.080).

## Conclusion

A quarter of the diabetic population studied developed CVD. Duration of DM for more than 10 years and drug discontinuation are independent associated factors of CVD. Hence appropriate intervention at early stages should be implemented at primary healthcare level.

**Keywords:** T2DM, Cardiovascular disease, Ethiopia

**Kassa, Z. Y., Hussen, S., Hadra, N., Moges, Y., & Bonja, F. (2020). Prevalence of Neisseria Gonorrhoeae Infection Among Women Of Reproductive Age in Sub-Saharan Africa: A Systematic Review And Meta-Analysis. *The European Journal Of Contraception & Reproductive Health Care*, 25(5), 365–371.**

## Abstract

### Objective

*Neisseria gonorrhoeae* infection is a global, major public health problem. It is the second leading bacterial sexually transmitted infection (STI) in sub-Saharan Africa and worldwide. As study findings on the topic are inconsistent, we conducted a systematic review and meta-analysis to determine the pooled prevalence of *N. gonorrhoeae* infection in sub-Saharan Africa among reproductive-aged women.

### Methods

Published studies were systematically retrieved from PubMed, Embase, CINAHL and Science Direct. Their quality was measured using the Joanna Briggs Institute critical appraisal checklist for studies reporting prevalence data, and the score of each included study had to meet at least 4.5 out of 9 indicators of quality.

### Results

The meta-analysis of 35 studies showed that the pooled prevalence of *N. gonorrhoeae* infection among reproductive-aged women in sub-Saharan Africa was 3.28% (95% confidence interval 2.61%, 3.94%).

## Conclusion

The prevalence of *N. gonorrhoeae* infection was higher than that found in other studies carried out in the region. The results suggest that greater attention should be paid to the primary prevention of *N. gonorrhoeae*. We recommend the implementation of STI education for reproductive-aged women and the use of specific and rapid diagnostic testing for *N. gonorrhoeae* infection in STI clinics. *N. gonorrhoeae* screening and treatment should be integrated into in- and outpatient clinics to reduce infection among reproductive-aged women.

**Limaso, A. A., Dangisso, M. H., & Hibstu, D. T. (2020). Neonatal survival and determinants of mortality in Aroresa district, Southern Ethiopia: A prospective cohort study. *BMC Pediatrics*, 20(1), 33.**

## Abstract

### Background

The first 28 days of aliveness are the biggest challenge mentioned for the continuity of life for children. In Ethiopia, despite a significant reduction in under-five mortality during the last 15 years, neonatal mortality remains a public health problem accounting for 47% of under-five mortality. Understanding neonatal survival and risk factors for neonatal mortality could help devising tailored interventions. The aim of this study was to determine the neonatal survival and risk factors for neonatal mortality in Aroresa district, Southern Ethiopia.

### Methods

A community based prospective follow up study was conducted among a cohort of term pregnant mothers and neonates delivered from January 1/2018 to March 30/2018. A total of 586 term pregnant mothers were selected with a multistage sampling technique and 584 neonates were followed-up for a total of 28 days, with 12 twin pairs. Data were coded, entered cleaned and analyzed using SPSS version 22. Kaplan–Meier survival curve was used to show pattern of neonatal death in 28 days. Independent and adjusted relationships of different predictors with neonates' survival were assessed with Cox regression model. The risk of mortality was explored and presented with hazard ratio and 95% confidence interval and *P*-value less than 0.05 were considered as significant.

## Result

The overall neonatal mortality was 41 per 1000 live births. Hazards of neonatal mortality was high for neonates with complications (AHR = 3.643; 95% CI, 1.36–9.77), male neonates (AHR = 2.71; 95% CI, 1.03–7.09), neonates that mothers perceived to be small (AHR = 3.46; 95% CI, 1.119–10.704), neonates who had initiated exclusive breast feeding (EBF) after 1 h (AHR = 3.572; 95% CI, 1.255–10.165) and mothers who had no postnatal care (AHR = 3.07; 95% CI, 1.16–8.12).

## Conclusion

Neonatal mortality in the study area was 4.1% which was high and immediate action should be taken towards achieving the Sustainable Development Goals. To improve neonatal survival, high impact interventions such as promotion of maternal service utilization, essential newborn care and early initiation of exclusive breast feeding were recommended.

**Hibstu, D. T., & Alemayehu, A. (2020). Long Acting Reversible Contraceptives Utilization and Associated Factors Among Women of Reproductive Age in Arsi Negele town, Southeastern Ethiopia. *Contraception and Reproductive Medicine*, 5, 1–7.**

## Abstract

Background: Ethiopia is the second populous country in Africa with a total fertility rate of 4.6 and contraceptive prevalence of 35%, where implant and intrauterine contraceptive devices account for 8 and 2% respectively. The aim of this study was to determine the magnitude of long acting reversible contraceptives utilization and its associated factors among women of reproductive age in Arsi Negele town, Southeastern Ethiopia. Methods: Facility-based cross-sectional study was conducted from April 01–May 30, 2017. A total of 361 women using modern contraceptives were selected by a systematic random sampling technique. Pre-tested and interviewer administered structured questionnaire was used to collect quantitative data. Bivariate and multivariate logistic regressions were performed using SPSS version 20.0 software. Result: The magnitude of long acting reversible contraceptives (LARCs) utilization was 33.5% [95% CI, 28.5–38.8]. Husband with no formal education [AOR = 0.41, CI: 0.16, 0.78] and unemployed women [AOR = 0.35, CI: 0.42, 0.65] were negative predictors while having media exposure [AOR = 7.14, CI: 3.85, 13.25], women who desired only one child [AOR = 3.28, CI: 1.28, 8.39] and husband support [AOR = 7.33, CI: 3.48, 15.43] were positive predictors of LARCs utilization. Conclusion: The overall

utilization of LARCs is 33.5%. Creating employment opportunities, male involvement, advertisement and advocacy activities through mass media need to be considered to improve utilization of LARCs.

**Keywords:** Arsi Negele town, Long acting and reversible contraceptive, Magnitude, Factors

**Yohannes Seifu, D. T., Haji, Y., & Ejeso, A. (2020). Prevalence and Associated Factors Of Diabetes Mellitus Among Adult Population in Hawassa Zuria Woreda, Sidama Region, Ethiopia. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, 13, 4571.**

## **Abstract**

### Background

Diabetes mellitus (DM) is one of the main health problems in unindustrialized countries. According to the International Diabetes Federation report, adults living with diabetes were growing from time to time globally. Worldwide, diabetes mellitus accounts for 8.8% (424.9 million) morbidity and 4 million deaths. Ethiopia is one of the countries frequently affected by the disease with about 2.567 million (5.2%) of its population affected with diabetes mellitus.

### Objective

This study was aimed at determining the prevalence and associated factors of diabetes mellitus among adult population in Hawassa Zuria Woreda, Sidama Region, Ethiopia.

### Methods

Community-based cross-sectional study was conducted from January 1 to February 15, 2019 among 519 adult population. A study participant was selected using a multistage sampling technique. We had employed the World Health Organization (WHO) stepwise method for non-communicable disease surveillance to collect the data. Fasting glucose meter was used from venous blood to test for blood glucose level. EPI info was used to enter and clean the data and the data were transported to SPSS for analysis. To assess associated factors with diabetes mellitus adjusted odds ratio (aORs) with 95% confidence intervals (CIs) was employed and p.value <0.05 was considered significant.

## Results

A total of 516 participants were included in the study. The diabetes mellitus prevalence was found to be 12.4% (95% CI: 9.5–15.2). Factors associated with diabetes mellitus were being obese [AOR=9.2, 95% CI:4.3, 19.8], hypertensive (AOR=3.8, 95% CI:1.75, 8.4), cigarette smoking (AOR=7.8, 95% CI: 3.45, 18.1) and high waist circumference (AOR=25, 95% CI:8.5, 79).

## Conclusion

This study revealed that the prevalence of diabetes mellitus was found to be high, which was greater than the estimated national prevalence of diabetes mellitus. Obesity, hypertension, cigarette smoking and high waist circumference were determinant factors for diabetes mellitus. Appropriate actions such as creating community awareness on regular blood sugar testing and preventive measures are recommended.

**Keywords:** Prevalence, Associated factors, Diabetes mellitus, Hawassa Zuria Woreda

**Ayele, Y., Mekuria, A. N., Tola, A., Mishore, K. M., & Geleto, F. B. (2020). Prescription Drugs Use During pregnancy in Ethiopia: A systematic review and meta-analysis. *SAGE Open Medicine*, 8, 2050312120935471.**

## Abstract

### **Background:**

The selection of safe drugs for pregnant women in developing countries, such as Ethiopia, where there are limited options of drugs would be challenging. Hence, the aim of this review was to determine the extent of prescribed drugs use and their potential to cause fetal harm among pregnant women in Ethiopia based on the United States Food and Drug Administration risk category.

### **Methods:**

Relevant studies were identified through systematic searches conducted in PubMed, HINARI, Google Scholar and Researchgate. Data on study characteristics and outcomes were extracted using the format developed in Microsoft Excel. The primary measure was pooled prevalence of prescription drugs use during pregnancy. The  $I^2$  index was used to assess heterogeneity among studies. The presence of publication bias across studies was evaluated using funnel plot. A random effects model was used to estimate the pooled prevalence.

## **Results:**

A total of nine studies published between 2013 and 2019 were included. The pooled prevalence of prescription drugs during pregnancy, excluding minerals and vitamins, was 45.9 (95%CI: 29.3, 62.5)%. The pooled prevalence of prescription drug use, including minerals and vitamins, was 86.9 (95%CI: 81.2, 92.6)%. The pooled proportion of medications used based on the United States Food and Drug Administration risk category was 56.1 (95%CI: 43.0, 68.4)%, 29.0 (95%CI: 27.9, 30.1)%, 12.1 (95%CI: 7.9, 18.1)%, 4.1 (95%CI: 3.6, 4.6)%, and 2.5 (95%CI: 1.8, 3.6)% for the United States Food and Drug Administration fetal risk category “A,” “B,” “C,” “D,” and “X,” respectively.

## **Conclusion:**

The use of prescription drugs during pregnancy, excluding supplements, in Ethiopia was high. Drugs with evidence of fetal harm were widely used. Hence, health care providers should select relatively safe drugs. Stakeholders should ensure safe prescribing practice for pregnant women through developing guidelines and updating professionals on the fetal risk status of commonly prescribed drugs.

**Keywords:** Ethiopia, Prescription drugs, Pregnancy, Review

**Mishore, K. M., Girma, Y., Tola, A., Mekuria, A. N., & Ayele, Y. (2020). Evaluation of Medication Use Pattern Among Patients Presenting to the Emergency Department of Hiwot Fana Specialized University Hospital, Using WHO Prescribing Indicators. *Frontiers in Pharmacology*, 11.**

## **Abstract**

### **Background**

Ensuring rational drug use requires ongoing evaluation of drug prescribing, dispensing, and use by patients. Health care providers working in an emergency department face unique challenges, including making urgent decisions, patient overload, and limited resources, which contribute to inappropriate drug use. Rational medication use should be an important aspect of emergency care to improve patient outcomes. Thus, this study was conducted to assess medication utilization patterns using World Health Organization (WHO) prescribing indicators in the emergency department.



## Methods

A cross-sectional study design was implemented among patients presenting at the emergency department of Hiwot Fana Specialized University Hospital (HFSUH) from January to March 2018. The data were collected from the medical charts of a total of 342 patients using a pre-prepared structured format according to WHO recommendations. The data were analyzed using SPSS version 21 software and presented in tables and figures.

## Results

The most commonly reported clinical diagnosis was found to be soft tissue laceration or abrasion, in 75 patients (21.9%), followed by dyspepsia, in 50 (14.6%), and severe pneumonia, in 44 (12.9%). A total of 810 drugs were prescribed for the 342 patients. The main category of drugs prescribed were analgesics, constituting 125 (29.2%), followed by antibiotics, 120 (28.0%). Regarding WHO prescribing indicators, the average number of drugs prescribed per encounter was 2.36, the number of encounters at which antibiotics were prescribed was 127 (37.13%), and injections were prescribed at 300 (87.7%) encounters. All of the drugs prescribed were from the National Essential Medicine List (NEML) of Ethiopia, and 780 (98.1%) of the drugs were prescribed by international nonproprietary name.

## Conclusion

Overall, there were inflated use of antibiotics and injection drugs, whereas prescribing by international nonproprietary name and prescribing from NEML were according to the recommendations. Hence, the hospital should work to ensure the judicious use of antibiotics and injection drugs.

**Keywords:** Drug utilization, Emergency department, WHO core indicator, Ethiopia, Evaluation

**Teshome, A., Alemayehu, T., Deriba, W., & Ayele, Y. (2020). Antibiotic Resistance Profile of Bacteria Isolated from Wastewater Systems in Eastern Ethiopia. *Journal of Environmental and Public Health*, 2020.**

## Abstract

World Health Organizations launched a global action plan on antimicrobial resistance since 2015. Along with other objectives, the plan was aimed to strengthen knowledge of the spread of

antimicrobial resistance through surveillance and research. Given their high bacterial densities and that they receive antibiotics, metals, and other selective agents, wastewater systems are a logical hotspot for antibiotic resistance surveillance. The current study reports on the result of antibiotic resistance surveillance conducted in selected wastewater systems of Eastern Ethiopia from Feb. 2018 to Oct. 2019. We monitored three wastewater systems in Eastern Ethiopia, such as the activated sludge system of Dire Dawa University, waste stabilization pond of Haramaya University, and a septic tank of Hiwot Fana Specialized University Hospital for 18 months period. We collected 66 wastewater samples from 11 sampling locations and isolated 722 bacteria using selective culture media and biochemical tests. We tested their antibiotic susceptibility using the standard Kirby-Bauer disk diffusion method on the surface of the Mueller-Hinton agar and interpreted the result according to EUCAST guidelines. The result shows the highest percentage of resistance for ampicillin among isolates of hospital wastewater effluent which is 36 (94.7%), 33 (91.7%), and 32 (88.9%) for *E. coli*, *E. faecalis*, and *E. faecium*, respectively. A lower rate of resistance was seen for gentamicin among isolates of activated sludge wastewater treatment system which is 10 (16.4%), 8 (13.3%), 11 (18.9%), and 12 (20.3%) for *E. coli*, *E. faecalis*, *E. faecium*, and *P. aeruginosa*, respectively. Hospital wastewater exhibited higher resistance than the other two wastewater systems. The Multiple Antibiotic Resistance Index (MARI) has significantly increased in the wastewater's course treatment process, showing the proliferation of resistance in the wastewater treatment system.

**Asefa, A., McPake, B., Langer, A., Bohren, M. A., & Morgan, A. (2020). Imagining Maternity Care As A Complex Adaptive System: Understanding Health System Constraints to The Promotion Of Respectful Maternity Care. *Sexual and Reproductive Health Matters*, 28(1), e1854153.**

## **Abstract**

Evidence of the health system challenges to promoting respectful maternity care (RMC) is limited in Ethiopia and globally. This study investigated the health system constraints to RMC in three Southern Ethiopian hospitals. We conducted a qualitative study (7 focus group discussions (FGDs) with providers of RMC and 12 in-depth interviews with focal persons and managers) before and after the implementation of an RMC intervention. We positioned childbirth services within the health system and applied complex adaptive system theory to analyse the opportunities and constraints to the promotion of RMC. Both system “hardware” and “software” factors influencing

the promotion of RMC were identified, and their interaction was complex. The “hardware” factors included bed availability, infrastructure and supplies, financing, and health workforce. “Software” factors encompassed service providers’ mindset, staff motivation, and awareness of RMC. Interactions between these factors included privacy breaches for women when birth companions were admitted in labour rooms. Delayed reimbursement following the introduction of fee-exemption for maternity services resulted in depleted revenues, supply shortages, and ultimately disrespectful behaviour among providers. Other financial constraints, including the insufficient and delayed release of funds, also led to complex interactions with the motivation of staff and the availability of workforce and supplies, resulting in poor adherence to RMC guidance. Interventions aimed at improving only behavioural components fall short of mitigating the mistreatment of women. System-wide interventions are required to address the complex interactions that constraint RMC.

**Misgan, E., Gedefaw, A., Negash, S., & Asefa, A. (2020). Validation of a Vaginal Birth after Cesarean Delivery Prediction Model in Teaching Hospitals of Addis Ababa University: A Cross-Sectional Study. *BioMed Research International*, 2020.**

## **Abstract**

*Background.* External validation of a vaginal birth after cesarean delivery (VBAC) prediction model is important before implementation in other settings. The primary aim of this study is to validate the Grobman prenatal VBAC calculator in the Ethiopian setting. Secondly, the study was aimed at developing and comparing a new VBAC model that includes both the prenatal and intrapartum variables. *Methods.* A cross-sectional survey was conducted, complemented by a medical chart review of 268 women admitted at three teaching hospitals of Addis Ababa University and who underwent a trial of labor after one prior cesarean birth. Maternal age, prepregnancy BMI, prior vaginal delivery, prior VBAC, and prior cesarean delivery indication type were included in the Grobman model. Observed delivery outcomes were recorded and then compared with the outcomes predicted by the calculator. We assessed the predictive abilities of the Grobman model and the new model using a receiver operating characteristic (ROC) curve. Multivariate logistic regression analysis was conducted to identify variables associated with successful VBAC. *Results.* Out of the 268 participants, 186 (69.4%) (95% CI 57.5-81.3) had successful VBAC. The area under the ROC curve (AUC) of the Grobman model was 0.75 (95%

CI 0.69-0.81). Notably, the novel model including both the prenatal and intrapartum variables had a better predictive value than the original model, with an AUC of 0.87 (95% CI 0.81-0.93). Prior VBAC, prepregnancy BMI, fetal membrane status, and fetal station at admission were predictors of VBAC in the newly developed logistic regression model. *Conclusions.* The success rate of VBAC was similar to other sub-Saharan African countries. The Grobman model performed adequately in the study setting; however, the model including both the prenatal and intrapartum variables was more predictive. Thus, intrapartum predictors used in the new model should be considered during intrapartum counseling.

**Asefa, A., Morgan, A., Gebremedhin, S., Tekle, E., Abebe, S., Magge, H., & Kermode, M. (2020). Mitigating the mistreatment of childbearing women: Evaluation of respectful maternity care intervention in Ethiopian hospitals. *BMJ Open*, 10(9), e038871.**

## **Abstract**

**Objectives** There is a lack of evidence on approaches to mitigating mistreatment during facility-based childbirth. This study compares the experiences of mistreatment reported by childbearing women before and after implementation of a respectful maternity care intervention.

**Design** A pre–post study design was undertaken to quantify changes in women’s experiences of mistreatment during facility-based childbirth before and after the respectful maternity care intervention.

**Intervention** A respectful maternity care intervention was implemented in three hospitals in southern Ethiopia between December 2017 and September 2018 and it included training of service providers, placement of wall posters in labour rooms and post-training supportive visits for quality improvement.

**Outcome measures** A 25-item questionnaire asking women about mistreatment experiences was administered to 388 women (198 in the pre-intervention, 190 in the post-intervention). The outcome variable was the number of mistreatment components experienced by women, expressed as a score out of 25. Multilevel mixed-effects Poisson modelling was used to assess the change in mistreatment score from pre-intervention to post-intervention periods.

**Results** The number of mistreatment components experienced by women was reduced by 18% when the post-intervention group was compared with the pre-intervention group (adjusted

regression coefficient ( $A\beta$ )=0.82, 95% CI 0.74 to 0.91). Women who had a complication during pregnancy ( $A\beta$ =1.17, 95% CI 1.01 to 1.34) and childbirth ( $A\beta$ =1.16, 95% CI 1.03 to 1.32) experienced a greater number of mistreatment components. On the other hand, women who gave birth by caesarean birth after trial of vaginal birth ( $A\beta$ =0.76, 95% CI 0.63 to 0.92) and caesarean birth without trial of vaginal birth ( $A\beta$ =0.68, 95% CI 0.47 to 0.98) experienced a lesser number of mistreatment components compared with those who had vaginal birth.

**Conclusions** Women reported significantly fewer mistreatment experiences during childbirth following implementation of the intervention. Given the variety of factors that lead to mistreatment in health facilities, interventions designed to mitigate mistreatment need to involve structural changes.

**Asefa, A., Morgan, A., Bohren, M. A., & Kermode, M. (2020). Lessons Learned Through Respectful Maternity Care Training and Its Implementation in Ethiopia: An interventional mixed methods study. *Reproductive Health*, 17(1), 1–12.**

## **Abstract**

### **Background**

Improving respectful maternity care (RMC) is a recommended practice during childbirth as a strategy to eliminate the mistreatment of women and improve maternal health. There is limited evidence on the effectiveness of RMC interventions and implementation challenges, especially in low-resource settings. This study describes lessons learned in RMC training and its implementation from the perspectives of service providers' perceptions and experiences.

### **Methods**

Our mixed methods study employed a pre- and post-intervention quantitative survey of training participants to assess their perceptions of RMC and focus group discussions, two months following the intervention, investigated the experiences of implementing RMC within birthing facilities. The intervention was a three-day RMC training offered to 64 service providers from three hospitals in southern Ethiopia. We performed McNemar's test to analyse differences in participants' perceptions of RMC before and after the training. The qualitative data were analysed using hybrid thematic analysis. Integration of the quantitative and qualitative methods was done throughout the design, analysis and reporting of the study.

## Results

Mistreatment of women during childbirth was widely reported by participants, including witnessing examinations without privacy (39.1%), and use of physical force (21.9%) within the previous 30 days. Additionally, 29.7% of participants reported they had mistreated a woman. The training improved the participants' awareness of the rights of women during childbirth and their perceptions and attitudes about RMC were positively influenced. However, participants believed that the RMC training did not address providers' rights. Structural and systemic issues were the main challenges providers reported when trying to implement RMC in their contexts.

## Conclusion

Training alone is insufficient to improve the provision of RMC unless RMC is addressed through a lens of health systems strengthening that addresses the bottlenecks, including the rights of providers of childbirth care.

**Asefa, A., Morgan, A., Hailemariam, T., Shiferaw, M., Mekonnen, E., & Birhan, Y. (2020). Task Shifting of Emergency Caesarean Section in South Ethiopia: Are we repeating the brain drain. *The Pan African Medical Journal*, 36.**

## Abstract

### Introduction

preventable mortality from complications which arise during pregnancy and childbirth continue to claim more than a quarter of million women's lives every year, almost all in low- and middle-income countries. However, lifesaving emergency obstetric services, including caesarean section (CS), significantly contribute to prevention of maternal and newborn mortality and morbidity. Between 2009 and 2013, a task shifting intervention to train caesarean section (CS) teams involving 41 CS surgeons, 35 anesthetic nurses and 36 scrub nurses was implemented in 13 hospitals in southern Ethiopia. We report on the attrition rate of those upskilled to provide CS with a focus on the medium-term outcomes and the challenges encountered.

### Methods

a cross-sectional study involving surveys of focal persons and a facility staff audit supplemented with a review of secondary data was conducted in thirteen hospitals. Mean differences were

computed to appreciate the difference between numbers of CSs conducted for the six months before and after task shifting commenced.

## Results

from the trained 112 professionals, only 52 (46.4%) were available for carrying out CS in the hospitals. CS surgeons (65.9%) and nurse anesthetists (71.4%) are more likely to have left as compared to scrub nurses (22.2%). Despite the loss of trained staff, there was an increase in the number of CSs performed after the task shifting (mean difference=43.8; 95% CI: 18.3-69.4;  $p=0.003$ ).

## Conclusion

our study, one of the first to assess the medium-term effects of task shifting highlights the risk of ongoing attrition of well-trained staff and the need to reassess strategies for staff retention.

**Keywords:** Attrition, Caesarean section, Delivery, Ethiopia, Primary hospital, Task shifting

**Wakwoya, E. B., Gemechu, K. S., & Dasa, T. T. (2020). Knowledge of Cervical Cancer and Associated Factors Among Women Attending Public Health Facilities in Eastern Ethiopia. *Cancer Management and Research*, 12, 10103.**

## Abstract

### Purpose

This study was done to assess women's knowledge of cervical cancer and associated factors.

### Materials and Methods

We conducted a facility-based cross-sectional study in eastern Ethiopia from January 1 to May 30, 2019. A convenient sampling technique was used to include 1181 women in this study. Information on socio-demographic characteristics, sexual history, knowledge and awareness of women was collected using face-to-face interview. The data were cleaned, coded and entered into EPI-info version 3.5.4 and then exported to Statistical Package for Social Science version 23.0 software for analysis. The associations between independent variables and outcome variables were assessed using bivariate and multivariable logistic regressions. The results of these analyses were

reported as odds ratios with 95% confidence intervals. We declared statistically significant variables at a  $p$ -value less than 0.05.

## Results

Nearly half (574, 48.6%) of the participants have ever heard about cervical cancer. One hundred and thirty-nine (24.2%) of them did not know any of the risk factors. The majority of them mentioned bleeding after intercourse (329, 57.4%) as a symptom of the disease. Overall knowledge assessment revealed that 288 (55.7%) participants had adequate knowledge about cervical cancer. Participants' age in the range of 40–49 years (AOR: 2.58, 95% CI 1.99–5.57), having educational level above 12th grade (AOR: 12.11, 95% CI 4.57–32.09) and receiving information about the disease from healthcare professionals (AOR: 2.72, 95% CI 1.69–4.37) were independently associated with adequate knowledge of cervical cancer.

## Conclusion

The knowledge of women towards cervical cancer in our study area was inadequate. The respondents' age, educational status and source of information were independently associated with study participants' knowledge of cervical cancer. Young women with no formal education should get special focus in prevention strategies and we also recommend regular and effective counselling, and education about cervical cancer at health institutions.

**Keywords:** Cervical cancer, Knowledge, Associated factors, Ethiopia

**Geta, T. G., Woldeamanuel, G. G., & Dassa, T. T. (2020). Prevalence and Associated Factors Of Premenstrual Syndrome Among Women of The Reproductive Age Group in Ethiopia: Systematic review and meta-analysis. *PloS One*, 15(11), e0241702.**

## Abstract

### Introduction

Premenstrual syndrome is a clinical condition characterised by the cyclic occurrence of physical and emotional symptoms, which can interfere with normal activity. It significantly affects the health-related quality of life and can result in decreased work productivity. The prevalence of premenstrual syndrome varies widely in different countries and different regions of the same



country. Thus, this study was aimed to estimate the pooled prevalence of premenstrual syndrome and its associated factors among women in Ethiopia.

### Materials and methods

Published studies searched from electronic databases such as PubMed/Medline, google scholars, HINARI, Science Direct, Cochrane Library, and EMBASE were used. All studies done among women of the reproductive age group in Ethiopia and reported in the English language were included. The current study was reported using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Two authors extracted the data independently by using Microsoft excel extraction format and transported to STATA 14 software for analysis.  $I^2$  test was used to assess heterogeneity between the studies. A random-effect model was computed to estimate the pooled prevalence and associated factors of premenstrual syndrome. The prevalence and odds ratio with 95% confidence interval (CI) were presented using a forest plot.

### Results

After careful screening of 33 studies, nine studies were included in our systematic review and meta-analysis. The pooled prevalence of premenstrual syndrome in Ethiopia was found to be 53% (95% CI: 40.64, 65.36). Subgroup analysis by university versus high school showed a pooled prevalence of 53.87% (95% CI: 40.97, 67.60) and 56.19% (95% CI: 6.80, 105.58), respectively. The pooled odds ratio shows that age at menarche, menstrual pattern and hormonal contraceptive use had no statistically significant association with premenstrual syndrome.

### Conclusion

More than half of the women under reproductive age group were experiencing premenstrual syndrome in Ethiopia.

**Beyene, H., Hailu, D., Tadele, H., Persson, L. Å., & Berhanu, D. (2020). Insufficient Referral Practices of Sick Children In Ethiopia Shown In A Cross-Sectional Survey. *Acta Paediatrica*, 109(9), 1867–1874.**

### **Abstract**

This study aimed at assessing the referral of sick young infants and children from the community, health posts and health centres to higher levels.

### **Methods**

A cross-sectional survey was conducted in four of the largest Ethiopian regions from December 2016 to February 2017. Referral practices were assessed at each level in 46 districts of these regions. Interviews were supplemented by reviews of registers at health posts and health centres.

### **Results**

The women's development group leaders, who do not provide health services, referred half of the sick children they visited in the community to the health posts. The health extension workers referred 16% of the sick young infants and 6% of older infants and children to higher levels. From health centres, the health workers referred 6% of sick young infants and 1% of older infants and children to hospital. Many cases of possible severe bacterial infection were not referred to higher levels. A functional ambulance was available for a bit more than a third of the health centres.

### **Conclusion**

Referral practices of sick young infants and children at all levels were weak that may threaten the continued reduction of child mortality in Ethiopia. Referral logistics were insufficient, which partly could explain the missing referrals of severely ill infants and children.

**Tesfaye, S., Shifeta, M., & Hirigo, A. T. (2020). Pattern of Cardiac Diseases and Co-Existing Morbidities Among Newly Registered Cardiac Patients in an Adult Cardiac Referral Clinic of Hawassa University Comprehensive Specialized Hospital, Southern-Ethiopia. *Vascular Health and Risk Management*, 16, 379.**

## **Abstract**

### **Background**

Currently, cardiovascular diseases (CVDs) are rising in the world and require great concern because the consequences are not only morbidity and mortality, but also a high economic burden. However, the pattern of CVDs in Ethiopia is not well known. Therefore, this study aimed to describe CVD and co-existing morbidities among newly registered cardiac patients in Hawassa University Comprehensive Specialized Hospital.

### **Methods**

A retrospective cross-sectional study was conducted from January 1 to December 31, 2016 among newly registered cardiac patients in an adult cardiac referral clinic. Records and cardiac referral clinic logbooks were used to collect relevant information using structured checklists.

### **Results**

Of the total 310 records of cardiac patients, 236 were explored and included in the study, while the records of 74 patients were absent in the cards room when tracing and/or incomplete to assess cardiac pattern. Rheumatic heart disease (RHD) was the leading cardiac problem and diagnosed in 70 (29.7%) cases followed by non-ischemic cardiomyopathy (55, 23.3%), ischemic heart disease (41, 17.4%), hypertensive heart disease (29, 12.3%), and cor pulmonale (14, 5.9%). The mean age of RHD patients was 28.7 ( $\pm$ 13.1) years. Eighty-two (35%) females and 23 (19.8%) males had RHD, while 69 (29.2%) females and 23 (19.8%) males had non-ischemic cardiomyopathy. The overall rate of mitral stenosis, mitral regurgitation, and aortic regurgitation among patients with RHD were 39 (55.7%), 48 (68.6%), and 26 (37.1%), respectively. Moreover, the overall coexisted morbidity was 81 (34.3%), with a high rate of hypertension alone at 44 (18.6%) followed by hypertension with diabetes at 11 (4.7%).

## Conclusion

This study indicated that more than one-third of cardiac patients had at least one of the co-existing morbidities like hypertension, diabetes mellitus, asthma and other diseases. Therefore, careful diagnosis and management of cardiac patients plays an important role to minimize comorbidity-linked complications. Moreover, population-based studies are recommended for better representing and generalization.

**Keywords:** Cardiac diseases, Comorbidity, Pattern, Referral clinic, Hawassa

**Wakgari, N., Woyo, T., Kebede, E., Gemed, H., & Gebremedhin, S. (2020). Sexually Transmitted Disease Among Street Dwellers In Southern Ethiopia: A mixed methods study design. *BMC Public Health*, 20, 1–10.**

## Abstract

**Background:** Lack of knowledge about sexual violence, its consequences, substance use and homelessness are major problems that make street dwellers susceptible to sexually transmitted diseases. Hence, this study assessed knowledge, attitudes and treatment-seeking behaviors related to sexually transmitted diseases among street dwellers in southern Ethiopia. **Methods:** An explanatory sequential mixed-methods study design was conducted among 842 respondents. A simple random sampling technique was used to select seven cities among fourteen major cities of the region. The sample was allocated proportionally to each selected city. In order to identify and fill in the required sample size, a snowball sampling technique was used. A pre-tested and structured interviewer-administered questionnaire was used to collect quantitative data. The collected data were entered using Epidata and exported to SPSS version 23.0 for further analysis. Unstructured questionnaires were also used to collect 21 in-depth interviews and 10 key informants' interviews. Respondents for in-depth interviews were selected purposively during quantitative data collection. **Results:** Most street dwellers were aware of (86.7%) and had a favourable attitude towards (84.4%) prevention and management of sexually transmitted diseases. A portion of respondents experienced bad-smelling genital discharge (13.8%), genital ulcers (11.2%) and a burning sensation (14.5%) during urination, in the previous year. Among those who experienced symptoms of sexually transmitted disease, only 15.3% of them received treatment from a health care provider. Fear of questions raised by providers was one of the reasons for not seeking care according to our qualitative findings. **Conclusions:** In this study, a significant number

of street dwellers reported experiencing symptoms of a sexually transmitted disease. Despite having awareness about sexually transmitted diseases, seeking treatment from a health center was found to be low based on both quantitative and qualitative findings. We recommend that health care providers should undergo special training to address the sexual and reproductive health problems of street dwellers.

**Keywords:** Sexually transmitted diseases, Street dwellers, Health seeking behavior, Southern Ethiopia

**Wabe, Y. A., Reda, D. Y., Abreham, E. T., Gobene, D. B., & Ali, M. M. (2020). Prevalence of Asymptomatic Bacteriuria, Associated Factors and Antimicrobial Susceptibility Profile of Bacteria Among Pregnant Women Attending Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia. *Therapeutics and Clinical Risk Management*, 16, 923.**

## **Abstract**

### Introduction

Asymptomatic bacteriuria (ASB) is the presence of bacteria in significant quantity in the absence of signs and symptoms of urinary tract infection (UTI). ASB, if it occurs during pregnancy, can cause serious complications both among fetus and pregnant women.

### Objective

The aim of this study was to determine the prevalence of ASB, its associated factors, and antimicrobial susceptibility profile of bacterial isolates among pregnant women.

### Methods

A cross-sectional study was conducted from July to September 2019 among 290 pregnant women at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia. Clean-catch midstream urine specimens were collected using sterile containers and cultured on MacConkey agar and sheep blood agar to isolate bacteria. Socio-demographic and obstetric data were collected using a structured questionnaire. Data were analyzed by SPSS version 22. The association between ASB and risk factors was assessed using logistic regressions. A  $p$ -value  $\leq 0.05$  was considered as a cut point to determine the significant association.

## Results

From 290 study participants, 16.9% with 95 CI [13.1, 21.5] were positive for ASB. The predominant bacteria were *Escherichia coli* (43%) and *Staphylococcus aureus* (20%). Majority of *E. coli* (91.0%) were susceptible to nitrofurantoin and gentamycin; most of them were resistant to amoxicillin (86.4%) and cotrimoxazole (77.7%). The proportion of multi-drug resistance (MDR) isolates was 57.1%. Previous infection with UTI, previous history of catheterization, and natural abortion were significantly associated with ASB.

## Conclusion

In the study area, ASB is prevalent in the study area indicating the importance of screening of ASB and possible treatment to prevent its consequences.

**Keywords:** Asymptomatic bacteriuria, Antibiotic susceptibility, Pregnant woman, Addis Ababa, Ethiopia

**Tamene, A., Mulugeta, H., Ashenafi, T., & Thygerson, S. M. (2020). Musculoskeletal Disorders and Associated Factors among Vehicle Repair Workers in Hawassa City, Southern Ethiopia. *Journal of Environmental and Public Health*, 2020.**

## Abstract

*Background.* Vehicle repair work is one of the highest risk professions for work-related musculoskeletal disorders. Globally, only a few published studies have examined the prevalence and determinants of work-related musculoskeletal disorders among vehicle repair workers. Related studies in Ethiopia are even fewer. This study aimed to determine the prevalence of self-reported work-related musculoskeletal disorders and associated factors among vehicle repair workers in Hawassa city, South Ethiopia, 2019. *Methods.* An institution-based cross-sectional study was conducted among 344 vehicle repair workers in the Hawassa city. The Nordic Musculoskeletal Questionnaire-Extended (NMQ-E) was used to assess work-related musculoskeletal disorders on nine body regions. Descriptive statistics and multivariable analyses were used to characterize the data and identify factors associated with work-related musculoskeletal disorders. *Result.* The twelve-month prevalence of work-related musculoskeletal disorders among this working group

was 47.7% with 95% CI (42.7–53.2). Jobs continuously requiring repetitive motions (AOR: 4.29, 95% CI (1.78–10.2)), not having professional training (AOR: 2.04, 95% CI (1.09–3.81)), force exertion when using tools (AOR: 2.40, 95% CI (1.24–4.62)), job stress (AOR: 4.54, 95% CI (2.44–8.46)), and regularly lifting, pushing, and pulling loads greater than 20 kg (AOR: 4.85, 95% CI (2.65–8.87)) were identified as associated factors. *Conclusion.* This study showed a 47.7% prevalence of work-related musculoskeletal disorders. Force exertion, repetitive tasks, manual handling of heavy loads, stress, and lack of training were the identified factors. Ergonomic awareness among workers should be increased through training. In addition, owners should investigate methods to reduce or eliminate risk factors leading to musculoskeletal disorders found among these workers. Automation of high-risk tasks should also be investigated.

**Mengesha, S., & Dangisso, M. H. (2020). Burden of Stillbirths and Associated Factors in Yirgalem Hospital, Southern Ethiopia: A facility based cross-sectional study. *BMC Pregnancy and Childbirth*, 20(1), 1–8.**

## **Abstract**

### **Background**

Stillbirth is an adverse pregnancy outcome of public health importance causing considerable psychosocial burden on parents and their family. Studies on stillbirth are scarce in southern Ethiopia. An assessment of stillbirths and associated factors in health care settings helps in devising strategies for tailored interventions. Therefore, we assessed the burden of stillbirths and associated factors in Yirgalem Hospital, southern Ethiopia.

### **Methods**

A facility based cross-sectional study was conducted between 1 August 2015 and 30 July 2016. We randomly selected medical records of pregnant women from a hospital delivery registry. Bivariate analysis was employed to assess the association between independent and dependent variables using chi-square with significant p-value. Multivariate logistic regression was used to identify independent risk factors for stillbirths and to control for confounding variables.

## Results

Of 374 reviewed records of pregnant women, 370 were included for the study. The magnitude of stillbirths was 92 per 1000 births. Fifteen (44.1%) of fetal deaths occurred after admission to the hospital. In multivariate logistic regression, stillbirths were higher among low birth-weight babies (<2500grams) (adjusted odds ratio (AOR): 10.70, 95% CI 3.18–35.97) than normal birth-weight babies (2500–<4000). Pregnant women who experienced a prolonged labour for more than 48 hours were 12 times (AOR: 12.15, 95% CI 1.76–84.12) more likely to have stillbirths than pregnant women without a prolonged labour. Pregnant women with obstetric complications were 18.9 times more likely to have stillbirths than pregnant women without obstetric complications. Similarly, pregnant women with at least two pregnancies were more likely to have stillbirths than pregnant women with less than two pregnancies (AOR: 4.39, 95% CI 1.21–15.85).

## Conclusions

We found a high burden of stillbirths in the study setting. Modifiable risk factors contributed to a higher risk of stillbirths; therefore, tailored interventions such as early identification and management of prolonged labour and obstetric complication at each level of health system could avert preventable stillbirths.

**Dangisso, M. H., Datiko, D. G., & Lindtjørn, B. (2020). Identifying Geographical Heterogeneity of Pulmonary Tuberculosis in Southern Ethiopia: A method to identify clustering for targeted interventions. *Global Health Action*, 13(1), 1785737.**

## ABSTRACT

### Background

Previous studies from Ethiopia detected disease clustering using broader geographic settings, but limited information exists on the spatial distribution of the disease using residential locations. An assessment of predictors of spatial variations of TB at community level could fill the knowledge gaps, and helps in devising tailored interventions to improve TB control.

### Objective

To assess the pattern of spatial distribution of pulmonary tuberculosis (PTB) based on geographic locations of individual cases in the Dale district and Yirga Alem town in southern Ethiopia.



## Methods

The socio-demographic characteristics of PTB cases were collected using a structured questionnaire, and spatial information was collected using geographic position systems. We carried out Getis and Ord (Gi\*) statistics and scan statistics to explore the pattern of spatial clusters of PTB cases, and geographically weighted regression (GWR) was used to assess the spatial heterogeneities in relationship between predictor variables and PTB case notification rates (CNRs).

## Results

The distribution of PTB varied by enumeration areas within the kebeles, and we identified areas with significant hotspots in various areas in each year. In GWR analysis, the disease distribution showed a geographic heterogeneity (non-stationarity) in relation to physical access (distance to TB control facilities) and population density ( $AICc = 5591$ ,  $R^2 = 0.3359$ , adjusted  $R^2 = 0.2671$ ). The model explained 27% of the variability in PTB CNRs (local  $R^2$  ranged from 0.0002–0.4248 between enumeration areas). The GWR analysis showed that areas with high PTB CNRs had better physical accessibility to TB control facilities and high population density. The effect of physical access on PTB CNRs changed after the coverage of TB control facilities was improved.

## Conclusion

We report a varying distribution of PTB in small and different areas over 10 years. Spatial and temporal analysis of disease distribution can be used to identify areas with a high burden of disease and predictors of clustering, which helps in making policy decisions and devising targeted interventions.

**Tadesse, T., Dangisso, M. H., & Abebo, T. A. (2020). Sexual and Reproductive Health Rights Knowledge and Reproductive Health Services Utilization Among Rural Reproductive Age Women In Aleta Wondo District, Sidama Zone, Ethiopia: Community based cross-sectional study. *BMC International Health and Human Rights*, 20(1), 1–9.**

## **Abstract**

### **Background**

Various countries in the world have achieved promising progress in promoting, protecting and guaranteeing sexual and reproductive health rights (SRHRs) since the 1994 International Conference on Population and Development (ICPD) in Cairo. However, SRHRs have not been recognized to their maximum potential in Ethiopia, despite the domestication of the international instruments related to their successful implementation. This study was intended to determine the magnitude of SRHRs knowledge, reproductive health services utilization and their independent predictors among rural reproductive-age women in the Aleta Wondo District, Ethiopia.

### **Methods**

A community-based cross-sectional study was conducted among 833 rural reproductive-age women from April to May 2019. A systematic random sampling technique was employed to select households, and a structured questionnaire was used to gather the data. EPI INFO version 7 was used to enter the data, and SPSS version 23 was used for data analysis. Logistic regression analysis was employed to assess the association between outcomes and explanatory variables. Odds ratios at 95% CI were also computed and reported.

### **Results**

Of 833 respondents, 43.9% had good knowledge of SRHR, and 37% had used at least one sexual and reproductive health (SRH) service. Variables that had a statistically significant association with SRHR knowledge in multivariable analysis were: had formal education, household with the highest income, having information sources for SRH services, and knowing about SRH services and providing institutions. SRH services utilization was associated with: having information sources for SRH services, had formal education, household with the highest income, and knowing about SRH services and providing institutions.

## Conclusion

In this study demographic and economic factors, such as education and household monthly income were positively identified as independent predictors for knowledge of SRHR and SRH services utilization. Therefore, responsible government sectors and NGOs should design and implement programs to promote women's educational status and household economic status to enhance women's SRHR knowledge and SRH services utilization.

**Areru, H. A., Dangisso, M. H., & Lindtjørn, B. (2020). Births and Deaths in Sidama in southern Ethiopia: Findings from the 2018 Dale-Wonsho Health and Demographic Surveillance System (HDSS). *Global Health Action*, 13(1), 1833511.**

## Abstract

### Background

Sidama is one of the most densely populated areas in Ethiopia. Information about the demographic characteristics is scarce, and most studies were census based on interviews. Earlier population studies from Ethiopia did not sufficiently address the validity of measuring births, deaths, and age-composition.

### Objective

To investigate the population characteristics in Sidama with an emphasis on fertility estimates, age, and death reporting.

### Methods

This is a mixed-method cross-sectional study, conducted in Sidama in southern Ethiopia, using baseline data of newly established Dale-Wonsho Health and Demographic Surveillance System site in 2018. We used quantitative data of 5179 randomly selected households having 25,144 individuals. We collected information on deaths in the same study period and population from the traditional burial associations (*Iddir*). Qualitative data were collected using focus group discussions, and in-depth interviews. Life tables, age reliability indices and logistic regression were used to analyse the data.

## Results

The total fertility rate was 2.9 children/woman, the crude birth rate was 22.8/1000 population and the crude death rate was 5.2/1000 population. The dependency ratio was 66/100 working-age population. Urban residents had higher birth rates (OR = 1.4 (95% CL: 1.05–1.78), and women with basic education had lower birth rates (OR = 0.6 (95% CL: 0.46–0.78) compared to those with no education. The age accuracy indices showed unreliable age reporting. The number of deaths increased from 29 to 132 when death reports from the *Iddirs* were included. There was under-reporting of neonatal and deaths of young children. Substituting national and regional mortality estimates, the life expectancy declined to an average of 53 years (range 48–58 years).

## Conclusion

The fertility rate in Sidama is lower than previously reported and is affected by age, residence and education. As we have identified important measurement and reporting errors, future demographic surveillance sites should consider these limitations.

**Keywords:** Demographic transition, Fertility, Age reliability index, Qualitative, Southern Ethiopia

**Mesha, M., Alemayehu, A., & Daka, D. (2020). Prevalence and Factors Associated With Early Discontinuation Rate Of Implanon Utilization Among Women Who Ever Used Implanon in Kucha District Gamo Gofa Zone, Southern Ethiopia. *BMC Women's Health*, 20(1), 1–7.**

## Abstract

### Background

The promotion of contraception in countries with high birth rates has the potential to reduce poverty, hunger, maternal, and childhood deaths. Every year in sub-Saharan Africa approximately 14 million unintended pregnancies occurred and a sizeable proportion was due to poor use of short-term hormonal methods. Contraceptive hormonal implants are highly effective and suitable for almost all women at any stage of their reproductive lives. On the other hand, early discontinuation of the Implanon contraceptive method utilization is one of the foremost problems amid the family planning program. Early discontinuation of the Implanon contraceptive method and reasons for such discontinuation lingers the most significant anxiety for family planning programs. In unindustrialized countries, contraceptive discontinuation due to health concerns is generally

higher; these complaints are often related to service quality. Hence, this study aimed to assess the prevalence and factors associated with early discontinuation of Implanon among women who ever used Implanon in Kucha district, Gamo Gofa Zone, Southern Ethiopia.

## **Methods**

Implanon contraceptive device users were selected from the Kucha district using a cross-sectional community-based survey from January to March 2018. A total of 430 women were selected and data were collected through face-to-face interviews by using a pre-tested structured questionnaire. Data were cleaned, coded, and entered into Epi-Info version 7 statistical software. Factors that showed association in a bivariate analysis that has a *p* value of less than 0.25 were entered into multiple logistic regression models for controlling confounding factors. The strength of statistical association was measured by adjusted odds ratio, at 95% confidence intervals, and *p* value < 0.05 were considered as statistically significant variables.

## **Result**

The result of this study revealed that the overall discontinuation rate of Implanon in the study was 34%. Variables having statistically significant association with Implanon discontinuation were women who never use a contraceptive method other than Implanon (AOR = 2.96, 95% CI 1.53–5.74), women who didn't make discussion with a partner (AOR = 3.32, 95% CI 1.57–7.04), poor counseling and follow up (AOR = 9.23, 95% CI 4.7–18.13), fear of side effects (AOR = 0.12, 95% CI 0.058–0.24) and poor satisfaction of service (AOR = 5.2, 95% CI 2.77–9.76)

## **Conclusion**

The overall early discontinuation rate of Implanon in the study area was high. The main factors associated with early discontinuation of Implanon were contraceptive ever use, discussion with partner, poor follow-up of counseling, fear of side effects, and un-satisfaction by the services given during the insertion rate of Implanon.

**Teklesilasie, W., & Deressa, W. (2020). Barriers to husbands' Involvement in Maternal Health care in Sidama zone, Southern Ethiopia: A qualitative study. *BMC Pregnancy and Childbirth*, 20(1), 1–8.**

## **Abstract**

### **Background**

Husbands' involvement in maternal care is considered as a crucial step in scaling up women's utilization of the services. However, the factors related with how husband's involvement in maternal health care have hardly been studied to date in the study areas. Therefore, this study aimed to explore barriers to husbands' involvement in maternal health care, in Sidama zone, Southern Ethiopia.

### **Methods**

The study employed a qualitative method. A pre-tested interview guide questions that prepared in English and translated in to Amharic language were used for data collection. The data were collected using focus group discussions, in-depth interviews and key-informants' interview in April and May 2015. The data were analyzed thematically.

### **Results**

The study identified a range of factors that-deterred husbands to involve in their female partners' maternal health care. These are childbirth is a natural process, pregnancy and childbirth are women's business, preference for TBAs' care and husband's involvement in pregnancy and birth care is a new idea were identified as barriers for husbands' involvement in maternal health care, in this study.

### **Conclusions**

A range of factors related with clients' and service delivery factors' were identified as barriers to husbands' involvement in maternal health care. Based on the study findings we recommend a contextual based awareness creation programs about husbands' involvement in maternal health care need to be established.

**Chernet, A. Z., Dasta, K., Belachew, F., Zewdu, B., Melese, M., & Ali, M. M. (2020). Burden of Healthcare-Associated Infections and Associated Risk Factors at Adama Hospital Medical College, Adama, Oromia, Ethiopia. *Drug, Healthcare and Patient Safety*, 12, 177.**

## **Abstract**

### **Introduction**

Healthcare-associated infection (HCAI) is a type of infection that is acquired while receiving healthcare services in a hospital or other healthcare settings. The objective of this study was to determine the incidence of HCAI and associated factors at Adama Hospital Medical College (AHMC), Adama city, Ethiopia.

### **Method**

A hospital-based longitudinal study was conducted among 300 participants at AHMC from February to May 2017. The study participants' clinical characteristics were collected using a structured interview and clinical evaluations. Data were analyzed by descriptive statistics using SPSS software version 20. Various clinical samples collected from participants were processed and bacteria were isolated by using standard microbiological methods recommended by the World Health Organization.

### **Result**

The total incidence rate of HCAI was 9.7 [95% CI: 7.1–12.9] cases per 1000 persons-days. Specific incidence rates were as follows: 8 cases per 1000 person-days [95% CI: 08.74, 20.66] for surgical site infections; 60.2 cases per 1000 device-days [95% CI: 33.47, 100.3] for catheter-associated urinary tract infections; 1.4 cases per 1000 device-days [95% CI: 0.06752, 6.656] for catheter-associated bloodstream infections; 14.1 cases per 1000 device-days [95% CI: 0.7047, 69.46] for ventilator-associated pneumonia; 73.5 cases per 1000 person-days [95% CI: 26.94, 163] for non-surgical skin break infections and 0.6 cases per 1000 person-days [95% CI: 0.02906, 2.864] for antibiotic-associated diarrhea. Most of the infections were caused by Gram-negative bacteria. Renal disease and type 2 diabetes mellitus were significantly associated with HCAI ( $P < 0.05$ ).

## Conclusion

HCAI was predominant in this study. The major contributing factors for HCAI at AHMC were renal disease and type 2 diabetes mellitus.

**Keywords:** Healthcare-associated infection, Risk factors, Adama Hospital Medical College, Ethiopia

**Tessema, N. N., Ali, M. M., & Zenebe, M. H. (2020). Bacterial Associated Urinary Tract Infection, Risk Factors, And Drug Susceptibility Profile Among Adult People Living with HIV at Haswassa University Comprehensive Specialized Hospital, Hawassa, Southern Ethiopia. *Scientific Reports*, 10(1), 1–9.**

## Abstract

People living with human immunodeficiency virus (HIV) are more likely to develop urinary tract infections (UTI) due to the suppression of their immunity. The aim of this study was to determine the prevalence, risk factors of UTI, and drug susceptibility pattern of bacteria isolated among peoples infected with HIV. A hospital-based cross-sectional study was conducted among 224 HIV positive individuals attending Hawassa University Comprehensive Specialized Hospital (HUCSH) from September 17 to November 16, 2018. Midstream urine was collected from all study participants and inoculated on to Blood and MacConkey agar. Bacterial isolates were characterized by Gram stain and standard biochemical tests. Kirby-Bauer method was used for antimicrobial susceptibility testing. Sociodemographic and clinical data were collected by a semi-structured questionnaire. Data were analyzed using SPSS version 20. A bivariate and a multivariable regression model were employed to determine the association between dependent and independent variables. From the total 224 study participants, 23 (10.3%) (95% CI 6.7–14.7) had culture-confirmed UTIs. The distributions of the bacteria were as follows: *Escherichia coli* 16 (69.6%), *Staphylococcus aureus* 2 (8.7%), *Klebsiella pneumoniae* 2 (8.7%), *Enterobacter aerogenes* 2 (8.7%) and *Pseudomonas species* 1 (4.3%). UTI prevalence was also high among study participants with a previous history of UTI and CD4<sup>+</sup> count < 200/mm<sup>3</sup>. Female study participants were about five times more likely to have UTI (AOR 5.3, 95% CI 1.5–19.2). Ninety-three percent of bacteria isolated were susceptible to nitrofurantoin, ceftriaxone, and gentamycin; 87.5% were susceptible to meropenem and norfloxacin; whereas 93.8%, 68.8%, and 62.5% of



isolates were resistant to ampicillin, tetracycline, and cotrimoxazole respectively. Multidrug resistance (MDR) was seen in 18 (78.3%) of bacterial isolates.

**Mohammed, A. A., Ali, M. M., & Zenebe, M. H. (2020). Bacterial Etiology Of Ocular And Periocular Infections, Antimicrobial Susceptibility Profile And Associated Factors Among Patients Attending Eye Unit Of Shashemene Comprehensive Specialized Hospital, Shashemene, Ethiopia. *BMC Ophthalmology*, 20, 1–8.**

### **Abstract**

**Background:** Eye infection is a public health problem in developing countries including Ethiopia. Bacteria are major causative agents of eye infections that can lead to loss of vision. The objective of this study was to determine bacterial etiology of ocular and periocular infections, antimicrobial susceptibility profile and associated factors among patients who visited the eye unit of Shashamane Comprehensive Specialized Hospital (SCSH). **Method:** A hospital-based cross-sectional study was conducted at SCSH from September 1, 2018, to March 30, 2019. Specimens from the ocular and periocular areas were collected from a total of 332 patients who visited the eye unit. Specimens were inoculated on blood agar, chocolate agar, MacConkey agar, and mannitol salt agar. Isolated bacteria were identified by a series of biochemical tests using the standard bacteriological method. Antimicrobial susceptibility test was performed according to the Clinical and Laboratory Standard Institute by disk diffusion method. Factors that could be associated with ocular and periocular infection were collected by using structured questionnaire. Data analysis was done using SPSS version 22.0 software package. A P value less than 0.05 was considered statistically significant. **Result:** Out of the total 332 study participants with ocular and periocular infections, 198(60%) were culture positive. The proportion of Gram-positive and Gram-negative bacteria were 135(68.2%) and 63(31.8%) respectively. Among Gram-positive bacteria, *Staphylococcus aureus* were predominant. Among Gram-negative bacteria, *Escherichia coli* were predominant. Most *S. aureus* were resistant to penicillin. **Conclusion:** Majority of ocular and periocular infections in this study were caused by bacteria; Gram-positive bacteria were responsible for most cases.

**Keywords:** External eye, Infection, Bacteria, Risk factors, Antimicrobial susceptibility pattern

**Mohammed, A., Beyene, G., & Teshager, L. (2020). Urinary Pathogenic Bacterial Profile, Antibigram of Isolates and Associated Risk Factors Among Diabetic Patients in Hawassa town, southern Ethiopia: A cross-sectional study. *Urol Nephrol Open Access J*, 8(4), 84–91.**

## **Abstract**

Urinary tract infection (UTI) is the commonest bacterial infectious disease in community practice with a high rate of morbidity and financial cost. It has been estimated that 150 million people were infected with UTI per annum worldwide which costing global economy more than 6 billion US dollar. In humans, urinary tract is the second commonest site after the respiratory tract, for bacterial infection. Two hundreds forty seven diabetic patients were investigated for UTI using 5 to 10ml midstream urine sample. A loop full urine sample was inoculated on cysteine lactose electrolyte deficient (CLED) agar, MacConkey agar and Blood agar plates. Antimicrobial susceptibility test was done using Clinical and Laboratory Standards Institute (CLSI) for all patients. Age, sex, resident, marital status and other factors were used as exposure factor of the cross sectional study. The aim of this study was to assess etiology, risk factors and drug sensitivity pattern of uropathogenic bacteria isolated from diabetic patients. The overall prevalence of significant bacteriuria was 26(10.5%). Significant bacteriuria was significantly associated with age and body mass index. The predominant bacteria isolate was *E. coli* 12(46.2%) followed by Coagulase negative staphylococcus 7(26.9%). Gram negative bacteria showed high rate of sensitivity (94.1%) to Nitrofurantoin and Norfloxacin. Gram positive bacteria showed 100% sensitive for Amoxicillin-Clavulanic acid. Multidrug resistance to two or more drug was observed in 19(73.1%) of bacteria isolates. The overall prevalence of significant UTI in diabetic patients was 10.5%. The most frequently observed organisms were *E. coli*, *CONS*, *K. pneumoniae*, *K. oxytoca* and *S. aureus*. Sex, age, BMI, occupational status such as house wife was statistically significant. Gram negative bacteria isolates were the most common antibiotic resistant bacteria isolates from UTI patients.

**Keywords:** Diabetes, UTI, Uropathogens, Antimicrobial susceptibility

**Wachamo, D., & Bonja, F. (2020). Magnitude of Opportunistic Infections and Associated Factors Among HIV-Positive Adults on ART at Selected Public Hospitals in Sidama National Regional State, Southern Ethiopia. *HIV/AIDS (Auckland, NZ)*, 12, 479.**

## **Abstract**

### **Background**

Opportunistic infections are late complications of HIV infection due to the depletion of the immune system. It is a major public health problem and high morbidity AIDS patients die of AIDS-related infections in developing countries like Ethiopia. Identification of opportunistic infections (OIs) is important to develop a specific intervention. Therefore, the aim of this study was to assess the burden and associated factors of opportunistic infections.

### **Methods**

A facility-based cross-sectional study was conducted on 420 randomly selected HIV/AIDS patients taking anti-retroviral therapy. Data were collected from selected hospitals in Sidama Regional State based on population proportion to size. Data were collected by a pre-tested questionnaire and a pre-tested checklist from the medical records of patients. Data were entered and analyzed for descriptive and logistic regression models by SPSS v.23. The result declared as statistically significant at  $p < 0.05$ .

### **Results**

The magnitude of opportunistic infections was 39.6%. Major identified OIs were oral candidiasis 23.2%, recurrent bacterial pneumonia 21.5%, herpes zoster 6.3%, and pulmonary tuberculosis 6.0%. The magnitude of opportunistic associated with older age [AOR=3.50, 95% CI:1.85, 6.61], no formal education [AOR=4.54, 95% CI:1.81, 11.37], initial CD4 count less than 200 cells/mm<sup>3</sup> [AOR=3.10, 95% CI:1.61, 5.96], who interrupt ART medicines [AOR=3.21, 95% CI:1.86, 5.56] and khat chewing [AOR=4.24, 95% CI:2.07, 8.68] when compared to their counterparts.

### **Conclusion**

The overall magnitude of opportunistic infections was high when compared with other studies. Health officials and clinicians need to give attention to the strengthening of the provision if ART

with prophylaxis on early stage and adherence, implementation of the TB/HIV collaboration activity, and early initiation of ART to reduce opportunistic infections.

**Keywords:** Opportunistic infection, HIV/AIDS, WHO clinical stage, Sidama, Ethiopia

**Lee, H., Hwangbo, H., Ji, S. Y., Kim, M. Y., Kim, S. Y., Kim, D. H., Hong, S. H., Lee, S. J., Assefa, F., & Kim, G.-Y. (2020). Gamma Aminobutyric Acid-Enriched Fermented Oyster (*Crassostrea gigas*) Increases the Length of the Growth Plate on the Proximal Tibia Bone in Sprague-Dawley Rats. *Molecules*, 25(19), 4375.**

### **Abstract**

Bone growth during childhood and puberty determines an adult's final stature. Although several prior studies have reported that fermented oyster (FO) consisting of a high amount of gamma aminobutyric acid can be attributed to bone health, there is no research on the efficacy of FO on growth regulation and the proximal tibial growth plate. Therefore, in this study, we investigated the effect of FO oral administration on hepatic and serum growth regulator levels and the development of the proximal tibial growth plate in young Sprague-Dawley rats. Both oral administration of FO (FO 100, 100 mg/kg FO and FO 200, 200 mg/kg FO) and subcutaneous injection of recombinant human growth hormone (rhGH, 200 µg/kg of rhGH) for two weeks showed no toxicity. Circulating levels of growth hormone (GH) significantly increased in the FO 200 group. The expression and secretion of insulin-like growth factor-1 (IGF-1) and insulin-like growth factor binding protein-3 (IGFBP-3) were enhanced by FO administration. FO administration promoted the expression of bone morphogenic proteins IGF-1 and IGFBP-3 in the proximal tibial growth plate. This positive effect of FO resulted in incremental growth of the entire plate length by expanding the proliferating and hypertrophic zones in the proximal tibial growth plate. Collectively, our results suggested that oral administration of FO is beneficial for bone health, which may ultimately result in increased height.

**Keywords:** Fermented oyster; Gamma aminobutyric acid; Insulin like growth factor-1; Recombinant human growth hormone; Tibial growth plate

Assefa, F., Lim, J., Kim, J.-A., Ihn, H. J., Lim, S., Nam, S.-H., Bae, Y. C., & Park, E. K. (2021). Secretoneurin, a Neuropeptide, Enhances Bone Regeneration in a Mouse Calvarial Bone Defect Model. *Tissue Engineering and Regenerative Medicine*, 18(2), 315–324.

## **Abstract**

### **Background:**

This study investigates the effects of a neuropeptide, secretoneurin (SN), on bone regeneration in an experimental mouse model.

### **Methods:**

The effects of SN on cell proliferation, osteoblast marker genes expression, and mineralization were evaluated using the CCK-8 assay, quantitative reverse transcriptase polymerase chain reaction (RT-PCR), and alizarin red S staining, respectively. To examine the effects of SN on bone regeneration *in vivo*, bone defects were created in the calvaria of ICR mice, and 0.5 or 1 µg/ml SN was applied. New bone formation was analyzed by micro-computed tomography (micro-CT) and histology. New blood vessel formation was assessed by CD34 immunohistochemistry.

### **Results:**

SN had no significant effect on proliferation and mineralization of MC3T3-E1 cells. However, SN partially induced the gene expression of osteoblast differentiation markers such as runt-related transcription factor 2, alkaline phosphatase, collagen type I alpha 1, and osteopontin. A significant increase of bone regeneration was observed in SN treated calvarial defects. The bone volume (BV), BV/tissue volume, trabecular thickness and trabecular number values were significantly increased in the collagen sponge plus 0.5 or 1 µg/ml SN group ( $p < 0.01$ ) compared with the control group. Histologic analysis also revealed increased new bone formation in the SN-treated groups. Immunohistochemical staining of CD34 showed that the SN-treated groups contained more blood vessels compared with control in the calvarial defect area.

### **Conclusion:**

SN increases new bone and blood vessel formation in a calvarial defect site. This study suggests that SN may enhance new bone formation through its potent angiogenic activity.

**Shiferaw, H., & Gebremedhin, S. (2020). Undernutrition Among HIV-Positive Adolescents on Antiretroviral Therapy in Southern Ethiopia. *Adolescent Health, Medicine and Therapeutics*, 11, 101.**

## **Abstract**

### **Purpose**

Adolescents living with HIV are vulnerable to undernutrition secondary to elevated nutritional needs imposed by growth spurt and HIV-infection. Yet, in low-income countries, evidence on the epidemiology of undernutrition among adolescents living with HIV is scarce. We assessed the prevalence and predictors of stunting and thinness among adolescents receiving anti-retroviral therapy (ART) in Hawassa city, Southern Ethiopia.

### **Methods**

In this facility-based cross-sectional study, we enrolled 260 adolescents (10–19 years of age) living with HIV on ART in two public hospitals and three health centers. Anthropometric measurements, household food insecurity and dietary diversity were measured following standard approaches. Predictors of stunting and thinness were identified using multivariable logistic regression analyses and interpreted using adjusted odds ratio (AOR) with 95% confidence interval (CI).

### **Results**

One-third of the adolescents were stunted, and 20% were thin. The prevalence of severe stunting (7.7%) and severe thinness (7.3%) was also high. Significant proportions of the adolescents (38.5%) were from food insecure households, and 28.1% had low or medium dietary diversity. Significant predictors of stunting were lack of food or financial support (AOR=2.71; 95% CI: 1.36–5.39); meal skipping (AOR=2.13; 95% CI: 1.16–3.91); recent history of opportunistic infections (AOR=2.25; 95% CI: 1.11–4.55) and disclosure of HIV status to the adolescent (AOR=1.88; 95% CI: 1.12–4.34). History of opportunistic infection was the only significant predictor of thinness (AOR=3.21; 95% CI: 1.54–6.73).

## Conclusion

The burden of undernutrition among adolescents living with HIV is disturbingly high. Prevention of opportunistic infections promoting social support and discouraging practice of meal skipping may help to reduce the problem.

**Keywords:** Adolescents, HIV, Undernutrition, Stunting, Thinness, Opportunistic infections

**Reta, Y., Getachew, R., Bahiru, M., Kale, B., Workie, K., & Gebreegziabhere, Y. (2020). Depressive Symptoms and Its Associated Factors Among Prisoners in Debre Berhan prison, Ethiopia. *PloS One*, 15(3), e0220267.**

## Abstract

### Background

Depression is a common mental disorder among prisoners characterized by a mood change involving a feeling of sadness, lack of interest, or hopelessness that lasts for weeks, months, or even longer. Besides imprisonment, depression is the primary factor leading to suicidal attempts. However, little is known about the depressive status of prisoners in Ethiopia. Therefore, this study aimed at assessing the magnitude and associated factors of depressive symptoms among prisoners of Debre Berhan prison.

### Methods

We conducted an institution-based cross-sectional study. We collected data from 336 randomly selected prisoners using interviewer-administered Patient Health Questionnaire-9 (PHQ-9). We collected the data from May 3 to 28, 2015, and performed binary logistic regression to identify independent predictors of depressive disorder.

### Result

Out of the total of 336 prisoners, 98% (n = 330) were males. Using PHQ-9 at the cut-off point of  $\geq 5$ , we found the prevalence of depression to be 44% (n = 148). Being widowed (AOR = 6.30; CI: 1.09–36.67), having a college or university level educational status (AOR = 5.34; CI: 1.59–17.94), having a history of suicide attempt (AOR = 2.76 CI: 1.04–7.31), having faced severe stressful life events (AOR = 2.57; CI: 1.41–4.67), being sentenced for 5 to 10 years (AOR = 2.51; CI: 1.32–

4.79), and having a history of chronic medical illness (AOR = 3.32 CI: 1.26–8.75) were found to be independently associated with depressive symptoms.

## Conclusion

There is a high prevalence of depression among prisoners of Debre Berhan prison. Hence, designing strategies for early screening and treatment of depression at prisons is crucial.

**Reta, Y., Samuel, T., & Mekonnen, M. (2020). Mental distress and associated factors among undergraduate engineering students of Hawassa University, Ethiopia. *Journal of Multidisciplinary Healthcare*, 13, 99.**

## Abstract

### Background

Mental distress is a range of symptoms and experiences of a person's internal life that are commonly held to be troubling, confusing or out of the ordinary. Mental distress often interferes with studying, social interaction, and academic outcomes. Therefore, this study aimed at assessing the prevalence of mental distress and factors associated with it among undergraduate engineering students at Hawassa University.

### Methods

We conducted an institution-based cross-sectional descriptive study on undergraduate engineering students at Hawassa University. We collected the data from January to April 30, 2018, using interviewer-administered Self-Report Questionnaire 20 (SRQ-20) from 341 participants selected by stratified sampling and we performed multiple logistic regression analysis to find factors associated with mental distress.

### Results

Out of the total study population, 222 (65.1%) were males, and 172 (50.4%) were age  $\geq 21$ . We found the prevalence of mental distress using SRQ-20 with a cut-off point  $\geq 8$  to be 28.7%. Female students were 2.9 times more likely to have mental distress as compared to male students (AOR= 2.90, 95% CI: 1.52–5.50). Facing financial problem (AOR= 2.20; CI = 1.25–3.85), poor social support (AOR= 2.58, 95% CI: 1.51–4.42), lack of interest in their field of study (AOR=2.57; CI:



1.23–5.38) and unresolved conflict with roommate (AOR= 2.29, 95% CI: 1.08–4.00) were significant predictors of mental distress.

## Conclusion

This study showed a high prevalence of mental distress among engineering students. So, policymakers, university officials, and parents need to give due attention to engineering undergraduate students for proactive measures.

**Keywords:** Mental distress, Engineering students, Hawassa, Ethiopia

**Agegnehu, A., Worku, M., Nigussie, D., Lulu, B., & Tadesse, B. T. (2020). Pediatric Febrile Urinary Tract Infection Caused by ESBL Producing Enterobacteriaceae Species. *BioMed Research International*, 2020.**

## Abstract

*Background.* Over the past decade, drug resistance pattern has worsened for many of the uropathogens due to overuse of antibiotics for empiric treatment. The burden of extended spectrum beta-lactamase (ESBL) producing *Enterobacteriaceae* associated urinary tract infections (UTI) has become increasingly more common, limiting treatment options among children presenting with febrile UTI. We investigated the burden and correlates of ESBL producing *Enterobacteriaceae* associated UTI among children and antibacterial resistance pattern. *Methods.* 284 midstream urine specimens were collected using standard aseptic techniques from 284 children who were diagnosed with suspected UTI. Urine culture and bacteria isolation were performed following standard bacteriological techniques. The Kirby-Bauer disk diffusion technique and the double-disc synergy test were used to investigate antibiotic susceptibility and presence of ESBL production. *Results.* UTI was confirmed using a positive urine culture for a relevant pathogen in 96/284 (33.8%) of the cases. *Enterobacteriaceae* accounted for 75% (72/96) of etiologies of UTI in children. The most frequent *Enterobacteriaceae* spp. were *E. coli*, 44.4% (32/72) and *K. pneumonia*, 27.8% (20/72). The overall multidrug resistance rate was 86.1% (62/72). ESBL-producers accounted for 41.7% (30/72) of the isolated *Enterobacteriaceae*. ESBL producing *K. pneumonia* and *E. coli* isolates accounted for 70% (14/20) and 37.5% (12/32), respectively. History of UTI in the past 1 year ( ) and medium family wealth index ( ) protected from infection with ESBL-producing *Enterobacteriaceae*. *Conclusion.* ESBL production was

more common in *K. pneumonia* and appeared to be a major factor contributing drug resistance UTI in children. The findings call for the need to incorporate ESBL testing in the routine clinical practice. The resistance level to commonly prescribed first-line antibiotics observed within *Enterobacteriaceae* was alarming calling for strengthened antimicrobial stewardship.

**Zenebe, A., Eshetu, B., & Gebremedhin, S. (2020). Association between maternal HIV infection and birthweight in a tertiary hospital in southern Ethiopia: Retrospective cohort study. *Italian Journal of Pediatrics*, 46, 1–9.**

### **Abstract**

**Background:** Human Immunodeficiency Virus (HIV) infection and low birth weight (LBW) continue to be significant public health concerns in many low-income countries including Ethiopia. Yet the effect of maternal HIV infection on birth weight has not been thoroughly explored and the existing studies reported opposing findings. We examined the association between maternal HIV infection and LBW in a tertiary hospital in Southern Ethiopia. **Methods:** A retrospective cohort study was conducted based on the medical records of 277 HIV-negative and 252 HIV-positive mothers who gave singleton live birth between September 2014 to August 2017 in Hawassa University Comprehensive Specialized Hospital, Southern Ethiopia. The recodes were identified using systematic sampling approach and relevant information were extracted by using pretested extraction form. Multivariable binary logit model was fitted to examine the relationship between the exposure and outcome while adjusting for potential confounders. Adjusted odds ratio (AOR) and 95% confidence intervals (CI) is used for summarizing the findings of the analysis. **Results:** The mean ( $\pm$  standard deviation) birth weight of infants born to HIV-negative women ( $3.1 \pm 0.7$  kg) was significantly higher than those born to HIV-positive counterparts ( $3.0 \pm 0.6$  kg) ( $p = 0.020$ ). The prevalence of LBW was also significantly higher in the HIV-exposed group (22.2%) than the non-exposed group (13.7%) ( $p = 0.011$ ). In the logit model adjusted for multiple covariates, HIV-positive women had four times increased odds than HIVnegative women to give birth to LBW infant(AOR = 4.03, 95% CI: 2.01–8.06). Other significant predictors of LBW were rural place of residence (AOR = 2.04, 95% CI: 1.16–3.60), prenatal anemia (AOR = 3.17, 95% CI: 1.71–5.90), chronic hypertension (AOR = 3.68, 95% CI: 1.10–12.46) and preeclampsia (AOR = 6.80, 95% CI: 3.00–15.38). **Conclusion:** Maternal HIV infection is associated with increased

odds of LBW. HIV prevention activities are also likely to contribute for the reduction of LBW.

**Keywords:** Low birth weight, Maternal HIV infection, Ethiopia

**Tesfaye, B., Seifu, Y., Tekleselassie, B., & Ejeso, A. (2020). The Magnitude and Associated Factors of Consistent Condom Utilization Among ART Users in Hawassa City, Sidama, Ethiopia. *HIV/AIDS***

## **Abstract**

### **Background**

Antiretroviral therapy (ART) introduction has sharply decreased mortality and morbidity rates among HIV-infected patients and resulted in longer and healthier lives among people living with HIV. Hence, the aim of this study is to determine the level of consistent condom use and associated factors among ART users in Hawassa City.

### **Methods**

Cross-sectional study design triangulated with qualitative phenomenology was used. One hospital and one health center were selected by simple random sampling and proportional to size allocation was used to assign participants to each health facility. Accordingly, 358 study subjects were selected. Adjusted odds ratio (AOR) with 95% confidence interval was used to implicate significant factors. Thematic content analysis was used and narrative report writing with a quote was used to present qualitative data.

### **Results**

The prevalence of consistent condom utilization in this study was 51.4%. Sex (AOR= 4.20, 95% CI: 2.386, 7.41), residence (AOR=3.55, 95% CI: 1.81, 6.99) educational status (AOR=0.4, 95% CI: 0.196, 0.946), perception on ART's does not reduction of HIV transmission (AOR=1.96, 95% CI: 1.12, 3.43), rate of counseling (AOR=0.37, 95% CI: 0.17, 0.84) and use condom to prevent pregnancy (AOR=4.53, 95% CI: 2.11, 9.73) were found to be independent predictors of consistent condom utilization among ART users. Refusal by husbands, decrement in satisfaction, gender difference with more women than men willing to use consistently and religious reasons were factors associated with inconsistent condom utilization in the qualitative study.

## Conclusion and Recommendation

Consistent condom utilization among ART users was low. Sex, residence, educational status, perception towards ART were significantly associated with consistent condom utilization. Moreover, husband refusal, religious reason, decrement in satisfaction on the qualitative study were associated with non-consistent use of a condom. The importance of consistent condom use should be well addressed in HIV/AIDS patients, to prevent transmission and multiple infections of HIV.

**Keywords:** Condom utilization, HIV/AIDS, Hawassa City

**Muhammed, E. M., Biftu, B. B., Temachu, Y. Z., & Walle, T. A. (2020). Nurses' Knowledge Of Pressure Ulcer and Its Associated Factors At Hawassa University Comprehensive Specialized hospital Hawassa, Ethiopia, 2018. *BMC Nursing*, 19(1), 1–8.**

## Abstract

### Background

Pressure ulcer is largely avoidable, but its prevalence rate increased more than 80% in a 13 years study. Nurses have a great position to advance best practices towards the prevention of pressure ulcers. Therefore they should be knowledgeable of the signs and symptoms of pressure ulcers, and preventive strategies to reduce its incidence, but there is limited evidence on nurses' knowledge and its associated factors to prevent pressure ulcers in Ethiopia.

### Methods

A hospital-based cross-sectional study was conducted from March 25 – April 23/ 2018. A total of 356 nurses were selected by stratification with a simple random sampling technique. Pretested structured questionnaire with closed and open-ended questions was used to collect data. Frequency distribution and percentage were computed to describe each variable. Bivariate and multivariable logistic regression with a 95% confidence interval was also carried out to see the effect of each independent variable on the dependent variable and declared statistically significant association with  $P < 0.05$ .

## Result

The mean knowledge score of nurses was 25.22 out of 41 item questions. Fifty-two point 5 % of nurses score above the mean. Males [AOR = 0.44, 95% CI (0.26–0.73)], working a maximum of eight hours [AOR = 3.57, 95% CI (1.48–8.61), not having training [(AOR = 2.31, 95% CI (1.14–4.61)], Low salary [AOR = 3.47, 95% CI (1.03–11.67)] were significantly associated with inadequate knowledge.

## Conclusion

Generally a nurse's knowledge of pressure ulcers was inadequate. Being female, working less than or equal to eight hours, not having the training and low working salary are contributors to a low level of knowledge for pressure ulcers.

**Asfaw, A., Belachew, T., & Gari, T. (2020). Effect of Nutrition Education on Iodine Deficiency Disorders and Iodized Salt Intake In South West Ethiopian women: A cluster randomized controlled trial. *BMC Women's Health*, 20(1), 1–11.**

## Abstract

### Background

Although iodine nutrition status is improving globally, the progress is not uniform throughout the world due to several factors. Among these, poor knowledge, negative attitude and improper practice of iodized salt are the main risk factors for poor iodine nutrition in Ethiopia. This study was aimed to assess the effect of nutrition education intervention on knowledge, attitude and practice (KAP) of iodine deficiency and iodized salt utilization.

### Methods

A cluster randomized controlled trial was carried out among 652 women of reproductive age group in southwest Ethiopia. A total of 24 clusters were selected and randomized in to an intervention and control villages. Women in the intervention village received iodine nutrition related education for 6 months; while those in the control village did not receive any education. Baseline and endline data were collected from both groups. Generalized Estimating Equations (GEE) was used to determine the effect of intervention.

## Results

A total of 647 (99.2%) participants were successfully involved in the study. In the intervention group the median attendance was 10 out of 12 sessions. Women in the intervention group had shown statistically significant change in knowledge, attitude and practice scores as compared to control one. In multivariable GEE linear model, after adjusting for other background characteristics, the mean difference (95% CI) scores were 8.81 (8.46, 9.16) for knowledge, 3.35 (3.17, 3.54) for attitude and 2.90 (2.74, 3.05) for practice in the intervention arm.

## Conclusions

Well designed and community-based iodine nutrition education is an effective strategy to improve the KAP of iodine deficiency disorders and iodized salt utilization.

**Budge, S., Barnett, M., Hutchings, P., Parker, A., Tyrrel, S., Hassard, F., Garbutt, C., Moges, M., Woldemedhin, F., & Jemal, M. (2020). Risk Factors And Transmission Pathways Associated With Infant *Campylobacter* Spp. Prevalence and malnutrition: A formative study in rural Ethiopia. *PloS One*, 15(5), e0232541.**

## Abstract

Early infection from enteropathogens is recognised as both a cause and effect of infant malnutrition. Specifically, evidence demonstrates associations between growth shortfalls and *Campylobacter* infection, endemic across low-income settings, with poultry a major source. Whilst improvements in water, sanitation and hygiene (WASH) should reduce pathogen transmission, interventions show inconsistent effects on infant health. This cross-sectional, formative study aimed to understand relationships between infant *Campylobacter* prevalence, malnutrition and associated risk factors, including domestic animal husbandry practices, in rural Ethiopia. Thirty-five households were visited in Sidama zone, Southern Nations, Nationalities and Peoples' region. Infant and poultry faeces and domestic floor surfaces (total = 102) were analysed for presumptive *Campylobacter* spp. using selective culture. Infant anthropometry and diarrhoeal prevalence, WASH facilities and animal husbandry data were collected. Of the infants, 14.3% were wasted, 31.4% stunted and 31.4% had recent diarrhoea. Presumptive *Campylobacter* spp. was isolated from 48.6% of infant, 68.6% of poultry and 65.6% of floor surface samples. Compared to non-wasted infants, wasted infants had an increased odds ratio (OR) of 1.41 for a *Campylobacter*-positive stool and 1.81 for diarrhoea. Positive infant stools showed a significant

relationship with wasting ( $p = 0.026$ ) but not stunting. Significant risk factors for a positive stool included keeping animals inside ( $p = 0.027$ , OR 3.5), owning cattle ( $p = 0.018$ , OR 6.5) and positive poultry faeces ( $p < 0.001$ , OR 1.34). Positive floor samples showed a significant correlation with positive infant ( $p = 0.023$ ), and positive poultry ( $p = 0.013$ , OR 2.68) stools. Ownership of improved WASH facilities was not correlated with lower odds of positive stools. This formative study shows a high prevalence of infants positive for *Campylobacter* in households with free-range animals. Findings reaffirm contaminated floors as an important pathway to infant pathogen ingestion and suggest that simply upgrading household WASH facilities will not reduce infection without addressing the burden of contamination from animals, alongside adequate separation in the home.

**Kassie, A. A., Gudayu, T. W., & Araya, B. M. (2020). Knowledge, Attitude, and Preventive Practices towards Sexually Transmitted Infections among Preparatory School Students in West Gojjam Zone, Ethiopia. *Advances in Public Health*, 2020.**

## **Abstract**

*Background.* Sexually transmitted infections are major public health concerns that mostly affect adolescents and young people. Hence, the aim of this study was to assess students' knowledge, attitude, and preventive practice towards sexually transmitted infections and the associated factors. *Methods.* A school-based cross-sectional study was conducted from October 24 to November 4, 2018. A sample size of 845 was calculated and a 1-stage sampling technique was employed. Data were collected through a self-administered questionnaire. The data were entered into Epi-Info 7.2 and analyzed using IBM SPSS version 25 software. The descriptive result was presented in text, figure, and tables. Also, bivariate and multivariable logistic regression analyses were done to identify associated factors. Then the adjusted odds ratio and its 95% confidence interval were computed. And a value of  $< 0.05$  was considered to assert statistical significance. *Results.* Half of the respondents (50.5%) had good knowledge on sexually transmitted infections. Also, 46.4% of students had a good preventive practice. However, only 38.4% of students had an appropriate attitude towards sexually transmitted infections. Being a male (AOR: 1.58 (95% CI: (1.19, 2.09))) and having employed father (AOR: 1.97 (95% CI: (1.18, 3.30))) predicted good knowledge. Similarly, secondary and above level of paternal education (AOR: 2.16 (95% CI: (1.28, 3.64))) and having a farmer father (AOR: 1.77 (95% CI: (1.04, 3.02)))

predicted appropriate attitude. Predictors of preventive practices included elder age (AOR: 2.33 (95% CI: (1.27, 4.28)), never had sexual intercourse (AOR: 1.44 (95% CI: (1.07, 1.94)), and having good knowledge on STIs (AOR: 1.53 (95% CI: (1.16, 2.02))). *Conclusion.* The proportion of students that had good knowledge, appropriate attitude, and good preventive practice towards STIs were low. Personal and parental factors predicted students' knowledge, attitude, and preventive practices. Hence, creating awareness need to be strengthened.

**Ayano, G., Duko, B., & Bedaso, A. (2020). The Prevalence of Post-Traumatic Stress Disorder among People Living with HIV/AIDS: a Systematic Review and Meta-Analysis. *Psychiatric Quarterly*, 1–16.**

### **Abstract**

Numerous studies have reported that the prevalence estimates of post-traumatic stress disorder (PTSD) might be substantially high among people with HIV/AIDS (PLWHA) when compared to the general population. However, there are no previous systematic reviews and meta-analysis studies that reported the pooled prevalence of PTSD among PLWHA. To fill this gap in research, this study aims to analyze data from observational studies concerning the prevalence of PTSD among PLWHA and formulate a recommendation for future research and clinical practice. Three electronic databases (PubMed, EMBASE, and SCOPUS) were searched to identify relevant studies that reported the prevalence of PTSD among PLWHA. A comprehensive meta-analysis software was used to conduct the meta-analysis. Subgroup and sensitivity analysis was conducted the  $I^2$  test was utilized to evaluate heterogeneity. Publication bias was assessed by using Egger's test and visual inspection of the symmetry in funnel plots. Nineteen-studies with 9094 participants were included in this systematic review and meta-analysis. The pooled prevalence estimate of PTSD among PLWHA was found to be 32.67% (95% CI; 25.29–41.01). The prevalence of PTSD was 25.17% (95% CI; 19.72–31.55) for studies that used diagnostic instrument to assess PTSD and it was 34.68% (95% CI; 25.42–45.26) for studies that used screening instruments. Furthermore, the prevalence of PTSD among PLWHA was comparable between high-income (31.19%) and low, and middle-income countries (34.87%). We also found that the pooled prevalence of PTSD was remarkably higher for moderate and low-quality studies (42.64%) than for high-quality studies (24.84%). The prevalence of PTSD among PLWHA in the current study showed a significant variation by the location of the studies, the instruments used to measure PTSD as well as the quality



of the included studies. The present review demonstrated that the prevalence estimates of PTSD among PLWHA (32.67%) was notably high and requires clinical attention. The estimated prevalence of PTSD was found to be comparable between high income and low, and middle-income countries. In addition, we found that the prevalence of PTSD was notably lower when measured by the diagnostic instrument than the screening instrument, although the variation was not statistically significant. Early screening and treatment of PTSD among PLWHA is needed to alleviate suffering.

**Nageso, D., Tefera, K., & Gutema, K. (2020). Enrollment in Community Based Health Insurance Program and The Associated Factors Among Households in Boricha district, Sidama Zone, Southern Ethiopia; a cross-sectional study. *Plos One*, 15(6), e0234028.**

## **Abstract**

### **Background**

In absence of any form of health insurance, out-of-pocket payments for health care lead to decreased use of health services and catastrophic health expenditures. Community-based health insurances has been promised financial model for informal sectors to reduce these problems in many countries. When this comes down to Ethiopia, in the South Nation Nationality People's Region of the country established 52 schemes including Boricha district, the study area However, there has been little evidence about the enrollment status and the associated factors in the study area in particular elsewhere in general.

### **Objective**

The study aims to assess the current enrollment status of households in community based health insurance and the associated factors in Boricha district of Sidama Zone, Southern Ethiopia.

### **Methods and materials**

A community based cross-sectional study design was employed from February 01, 2019 to March 31, 2019, using a sample of 632 households. Data were collected using interviewer-administered pre-tested questionnaire and entered into EPI-Info 7 and transported to SPSS version 20 for analysis. Multi-variable logistic regression analysis along with odds ratio and the corresponding 95% CI was conducted and significance was declared at P-value <0.05.

## Results

Current enrollment status of households in community based health insurance was found to be 81 (12.8%). According to this study, educational status; secondary school & above [AOR = 2.749, 95%CI(1.142, 6.618)], timing of collecting premium [AOR = 0.433; 95% CI (0.196, 0.958)], family size  $\geq 5$ , [AOR = 4.16; 95%CI (1.337, 12.944)], no trust on scheme management [AOR = 0.272; 95%CI (0.140, 0.528)], lack of information [AOR = 0.086; 95%CI (0.026, 0.288)], dissatisfaction with health care service received [AOR = 0.303; 95%CI (0.171, 0.537)], no chronic illness in the family [AOR = 0.259; 95% C.I.(0.137, 0.488)] were factors significantly associated with current enrollment status in CBHI.

## Conclusions

Households head's education status, timing of premium collection, family size, no trust on scheme management, lack of information, services dissatisfaction and chronic illness in the family member were the identified factors associated with enrollment in CBHI in the study area. Therefore, to enhance the enrollment and sustainability of CBHI in the study area awareness creation, improving timing of premium collection, strengthening scheme management, improving quality of service are the areas that decision makers needs to intervene.

**Dessalegn, F. N., Astawesegn, F. H., & Hankalo, N. C. (2020). Factors Associated with Maternal Near Miss among Women Admitted in West Arsi Zone Public Hospitals, Ethiopia: Unmatched Case-Control Study. *Journal of Pregnancy*, 2020.**

## Abstract

*Background.* Maternal near miss refers to a very ill pregnant or delivered woman who nearly died but survived a complication during pregnancy, childbirth, or within 42 days of termination of pregnancy. Maternal death; the most catastrophic end is frequently described as just “tip of the iceberg,” whereas maternal near-miss as the “base.” Therefore, this study aimed at assessing the factors associated with maternal near-miss among women admitted in public hospitals of West Arsi zone, Ethiopia. *Methods.* A facility-based unmatched case-control study was conducted from Mar 1 to Apr 30, 2019. Three hundred twenty-one (80 cases and 241 controls) study participants were involved in the study. Cases were recruited consecutively as they present, whereas controls were selected by systematic sampling method. Cases were women admitted to hospitals during

pregnancy, delivery, or within 42 days of termination of pregnancy and fulfilled at least one of the maternal near-miss disease-specific criteria, while controls were women admitted and gave birth by normal vaginal delivery. The interviewer-administered structured questionnaire and data abstraction tool was used to collect data. Data were entered Epi data 3.1 and then transferred into SPSS 20 for analysis. Multivariable logistic regression was used, and the significance level was declared at value  $\leq 0.05$ . *Results.* The major maternal near-miss morbidities were severe obstetric hemorrhage (32.5%), pregnancy-induced hypertensive disorders (31.3%), and obstructed labor (26.3%), followed by 6.3% and 3.8% of severe anemia and pregnancy-induced sepsis, respectively. The odds of maternal near miss were statistically significantly associated with women's lack of formal education [, 95% CI: (1.17, 4.31)]. Not attending antenatal care [, 95% CI: (1.10, 12.76)], having prior history of cesarean section [, 95% CI: (1.49, 8.36)], any preexisting chronic medical disorder [, 95% CI: (1.11, 3.78)], and having experienced first delay [, 95% CI: (2.93, 11.2)]. *Conclusions.* Maternal education, antenatal care, chronic medical disorders, previous cesarean section, and first delay of obstetric care-seeking were identified as factors associated with maternal near-miss morbidity. Therefore, this finding implies the need to get better with those factors, to preclude severe maternal complications and subsequent maternal mortality.

**Argaw, B., Mihret, A., Aseffa, A., Tarekegne, A., Hussen, S., Wachamo, D., Shimelis, T., & Howe, R. (2020). Sero-prevalence of Hepatitis B Virus Markers and Associated Factors Among Children in Hawassa City, southern Ethiopia. *BMC Infectious Diseases*, 20(1), 1–7.**

## **Abstract**

### **Background**

Hepatitis B virus (HBV) infection is one of the major public health problems worldwide. Limited information exists about the epidemiology of HBV infection in Ethiopia. This study aimed to assess sero-prevalence of HBV markers and associated factors in children living in Hawassa City, southern Ethiopia.

### **Methods**

A community-based cross-sectional study was conducted among 471 children in Hawassa City, southern Ethiopia from May to September, 2018. A total of 471 children were included in the study using a multistage sampling technique. Data on demographic and risk factors were gathered using

structured questionnaires. Blood samples were collected and sera were screened for hepatitis B surface antigen (HBsAg), antibody to core antigen (anti-HBc), and antibody against surface antigen (anti-HBs) using enzyme-linked immunosorbent assay.

## Results

The sero-prevalence of HBsAg, anti-HBc, and anti-HBs markers among children were 4.4, 19.5 and 20.0%, respectively. Children at higher risk of having HBsAg marker were those who had a history of injectable medications (AOR 5.02, 95% CI: 1.14, 22.07), a family history of liver disease (AOR 6.37, 95% CI: 1.32, 30.74), a HBsAg seropositive mothers, (AOR 11.19, (95% CI: 3.15, 39.67), and had no vaccination history for HBV (AOR, 6.37, 95% CI: 1.32, 30.74). Children from families with low monthly income, who were home delivered, unvaccinated for HBV or with HBsAg seropositive mother had increased risk of having anti-HBc.

## Conclusions

The study findings showed an intermediate endemicity of HBV infection in the study setting. The observed rate of residual HBV infection with low rate of immunized children after HBV vaccination was high. Hence, introducing birth dose vaccine, safe injection practice and improving immunization coverage during pregnancy as part of the antenatal care package should be considered. Furthermore, governmental and non-governmental organizations should give attention on timely measures for the prevention of ongoing vertical transmission from mother to child as well as early horizontal transmission of HBV in Hawassa City, Ethiopia.

**Hussen, S., Assegu, D., Tadesse, B. T., & Shimelis, T. (2021). Prevalence of *Schistosoma mansoni* infection in Ethiopia: A systematic review and meta-analysis. *Tropical Diseases, Travel Medicine and Vaccines*, 7(1), 1–12.**

## Abstract

### Background

Schistosomiasis is a common helminthic infection in the tropics and subtropics, particularly in sub-Saharan African countries including Ethiopia. In these counties, *Schistosoma mansoni* infection is a significant public health problem due to the risk of reinfection and recurrent disease despite implementing several rounds preventive chemotherapy. This systematic

review and meta-analysis aimed at assessing the pooled prevalence of schistosomiasis in Ethiopia.

## **Methods**

The PRISMA guidelines were followed to perform the systematic review and meta-analysis.

Published studies from January 1999 to June 2020 were searched in Medline, PubMed, Google Scholar, EMBASE, HINARI, and Cochrane Library using key words including: “prevalence”, “incidence”, “schistosomiasis” “Bilharziasis”, “Bilharzia”, “*S. mansoni* “, “Ethiopia”.

Heterogeneity of included studies was assessed using Cochran’s Q test and  $I^2$  test statistics while publication bias was assessed using Egger’s test.

## **Results**

Ninety-four studies were included in the systematic review and meta-analysis. The pooled prevalence of *S. mansoni* in Ethiopia was 18.0% (95%CI: 14.0–23.0). The southern region of Ethiopia had a higher *S. mansoni* prevalence of 25.9% (995% CI, 14.9–41.1) than the national prevalence. The burden of *S. mansoni* infection was also higher than the national average in rural areas and among men with pooled prevalence of 20.2% (95% CI, 13.2–28.5) and 28.5% (95%CI, 22.7,35.1), respectively. The trend analysis showed that the prevalence of *S. mansoni* infection in Ethiopia decreased over the past 15 years, potentially because of the repeated preventive chemotherapy.

## **Conclusion**

The review unveiled a moderate prevalence of *S. mansoni* infection in Ethiopia. Targeted treatment of at-risk population groups ad high burden areas coupled with implementation of integrated vector control strategies are critical to address the burden of Schistosomiasis.

Napier, G., Campino, S., Merid, Y., Abebe, M., Woldeamanuel, Y., Aseffa, A., Hibberd, M. L., Phelan, J., & Clark, T. G. (2020). Robust barcoding and identification of *Mycobacterium tuberculosis* lineages for epidemiological and clinical studies. *Genome Medicine*, 12(1), 1–10.

## Abstract

### Background

Tuberculosis, caused by bacteria in the *Mycobacterium tuberculosis* complex (MTBC), is a major global public health burden. Strain-specific genomic diversity in the known lineages of MTBC is an important factor in pathogenesis that may affect virulence, transmissibility, host response and emergence of drug resistance. Fast and accurate tracking of MTBC strains is therefore crucial for infection control, and our previous work developed a 62-single nucleotide polymorphism (SNP) barcode to inform on the phylogenetic identity of 7 human lineages and 64 sub-lineages.

### Methods

To update this barcode, we analysed whole genome sequencing data from 35,298 MTBC isolates (~1 million SNPs) covering 9 main lineages and 3 similar animal-related species (*M. tuberculosis* var. *bovis*, *M. tuberculosis* var. *caprae* and *M. tuberculosis* var. *oryzidis*). The data was partitioned into training ( $N = 17,903$ , 50.7%) and test ( $N = 17,395$ , 49.3%) sets and were analysed using an integrated phylogenetic tree and population differentiation ( $F_{ST}$ ) statistical approach.

### Results

By constructing a phylogenetic tree on the training MTBC isolates, we characterised 90 lineages or sub-lineages or species, of which 30 are new, and identified 421 robust barcoding mutations, of which a minimal set of 90 was selected that included 20 markers from the 62-SNP barcode. The barcoding SNPs (90 and 421) discriminated perfectly the 86 MTBC isolate (sub-)lineages in the test set and could accurately reconstruct the clades across the combined 35k samples.

### Conclusions

The validated 90 SNPs can be used for the rapid diagnosis and tracking of MTBC strains to assist public health surveillance and control. To facilitate this, the SNP markers have now been incorporated into the *TB-Profiler* informatics platform

## College of Agriculture

**Kibr, G., Mulugeta, A., & Bosha, T. (2020). Socio-economic Variables Associated with Motivational Barriers of Food Choice among Lactating Women from Central Ethiopia: A Cross-sectional Study. *Ecology of Food and Nutrition*, 1–28.**

### Abstract

Understanding the drivers of food choice is essential to guide the nutrition interventions and tailor nutrition counseling messages. There is strong evidence from a published study, which demonstrate attention for the need to consider the wide range of drivers during food choice. Due to the large variety of food products on the market, consumers make a multitude of food choice daily. The study aimed to assess major motivational drivers of food choice among randomly selected lactating women aged 15–49 years (423) from Debrebirhan Town using face to face interview. Logistic regression analysis was used to find association b/socio-economic variables and motivational drivers of food choice using SPSS version 20. Candidate variables were selected and transferred using the *P*- a value of less than 0.25, and AOR was reported. Variables with a *P*-value less than 0.05 on multiple variable logistic regressions were taken as significant variables. Influences of religion, price, preparation convenience, health value and taste during food choice were responded by above half of women. From logistic regression, 15–25 years' age and self-employed were linked to religious influence in food choice with AOR (95%CI) of 0.09(0.01–0.48) and 4.13(1.4–12.24). Age (15–25 and 26–35 years), education (no, primary and secondary) and being housewife were associated to choosing of foods for their health value with AOR (95%CI) of 0.26(0.12–0.6), 0.37(0.18–0.76), 0.14(0.04–0.42), 0.25(0.13–0.54), 0.33(0.17–0.66) and 2.5(1.23–5). Only family size (2–4 vs.>4 persons) was associated with price concern in food choice with AOR (95%CI) of 0.39(0.21–0.71). Being divorced, husband headed, 7–12 and 13–18 month lactation period, 15–25 and 26–35 years' age were related to preparation convenience of foods with AOR (95%CI) of 5.94(1.13–31.33), 0.42(0.18–0.96), 3.26(1.34–7.93), 4.4(1.81–10.72), 0.16(0.05–0.47) and 0.25(0.11–0.59). Self-management approaches by nutrition education and promotion to change eating behaviors of women, increasing supply and price regulation toward healthy foods are recommended.

**Keywords:** Drivers, Motivational barriers, Food choice, Lacting women

**Besufkad, S., Betsha, S., Demis, C., Zewude, T., Rouatbi, M., Getachew, T., Haile, A., Rischkowsky, B., & Rekik, M. (2020). Field synchronization of Ethiopian Highland sheep for fixed time artificial insemination: Improvement of conception rate with a double injection of prostaglandin at 11 days. *Journal of Applied Animal Research*, 48(1), 413–418.**

### **Abstract**

The study investigated, for fixed time artificially inseminated (AI) Menz ewes in field trials, the reproductive performance of prostaglandin-based treatments simultaneously to the standard ‘P<sub>4</sub>+eCG’ protocol. A total of 483 Menz ewes were assigned to either the ‘P<sub>4</sub>+eCG’ protocol, using progesterone impregnated intravaginal sponges in combination with equine chorionic gonadotropin (eCG) injection at sponge withdrawal, or the ‘PGF<sub>s</sub>’ treatment where sheep received a single injection of prostaglandin or ‘PGF<sub>7</sub>’ and ‘PGF<sub>11</sub>’ where ewes were synchronized with 2 injections of prostaglandin 7 or 11 days apart, respectively. AI was implemented with fresh semen at  $55 \pm 1$  h after the end of the hormonal treatment. Conception rate (CR;  $60.87 \pm 4.2$ ) was highest for PGF<sub>11</sub> ewes ( $P < 0.05$ ); PGF<sub>s</sub> ewes had the lowest CR ( $34.07 \pm 4.1$ ). Other factors did not affect variation in CR ( $P > 0.05$ ). A higher proportion of ewes in the P<sub>4</sub>+eCG group yielded twins and triplets compared to the 3 prostaglandin-based protocols ( $P < 0.01$ ). Nevertheless, a higher ( $P = 0.02$ ) proportion ( $17.11 \pm 4.3$ ) of PGF<sub>11</sub> ewes yielded twins by comparison to their PGF<sub>7</sub> counterparts ( $2.50 \pm 2.5$ ). PGF-based protocol with 2 injections 11 days apart, preceded by a careful selection of non-pregnant ewes for cervical fixed-time AI, is a feasible reproductive management for sheep breeding programmes in Ethiopia.

**Keywords:** Menz sheep, Artificial insemination, Synchronization, Prostaglandins, Conception rate

**Tesfaye, D., Hailay, T., Salilew-Wondim, D., Hoelker, M., Bitscha, S., & Gebremedhn, S. (2020). Extracellular vesicle Mediated Molecular Signaling in Ovarian Follicle: Implication for oocyte developmental competence. *Theriogenology*, 150, 70–74.**

### **Abstract**

The bidirectional communication between the oocyte and the companion somatic cells in the follicular environment is known to be mediated by either a direct communication via gap junction or transzonal projections or indirectly through endocrine, paracrine and autocrine signaling factors.



Extracellular vesicles (EVs), which are found in various biological fluids, including follicular fluid (FF) are known to play important roles in mediating the communication between the oocyte and the surrounding somatic cells through shuttling bioactive molecules to facilitate follicular growth and oocyte maturation. As vesicles in the extracellular space are known to reflect the physiological status of the donor or the releasing cells, molecules carried by the EVs in the follicular environment could be markers of the internal and external stressors. EVs exhibit greater degree of heterogeneity in their size, biogenesis and the bioactive molecule they carry. The process of biogenesis of EVs is known to be regulated by several proteins associated with the endosomal sorting complex required for transport (ESCRT) proteins. The type of EVs and surface proteins markers vary according to the type of protein involved in their biogenesis. EVs are recently reported to play indispensable role in promoting cell-to-cell communication during follicular growth. Recent advancements in EV research opened the possibilities to load EVs with specific molecules like miRNA, siRNA, CRISPR-cas9 complex and protein, which showed a new horizon for their application in therapeutics. The present review explores the biogenesis, the role and the future prospects of EVs with a special emphasis given to follicular growth and oocyte maturation.

**Keywords:** Extracellular vesicles, Folliculogenesis, Oocyte maturation, Environmental stress, Metabolic stress

**Muluye, S. D., Lemma, T. B., & Diddana, T. Z. (2020). Effects of Nutrition Education on Improving Knowledge And Practice Of Complementary Feeding Of Mothers With 6-To 23-Month-Old Children In Daycare Centers in Hawassa Town, Southern Ethiopia: An institution-based randomized control trial. *Journal of Nutrition and Metabolism*, 2020.**

### **Abstract**

Undernutrition and hidden hunger threaten the survival, growth, and development of children, young people, economies, and nations. Inappropriate complementary feeding practice due to poor maternal knowledge and awareness in combination with low income and infectious disease is the contributing factor for child undernutrition. Hence, this study was aimed at determining the effect of nutrition education on improving the knowledge and practice of complementary feeding of the mothers with 6- to 23-month old children in daycare centers of Hawassa Town, Southern Ethiopia. An institution-based randomized control trial design was employed. Daycare centers were randomly allocated for the intervention group and the control group. Among the total daycare

centers in the town, five were assigned to receive nutrition education and the rest five for the control group (CG). The simple random sampling technique used to select individual participants from each daycare center. Two hundred (200) mother-child pairs (100 for each group) were recruited. Sociodemographic and economic variables were collected by the structured questionnaire. Knowledge of appropriate complementary feeding was assessed by seven knowledge questions. Appropriate complementary feeding practice was assessed by adapting Alive and Thrive Infant and Young Child Feeding (IYCF) practice guidelines. Nutrition education was given for four consecutive months by using Alive and Thrive IYCF guidelines. Data were analyzed by the SPSS software program version 20. The chi-squared test was used to test the significant differences in the proportion of good knowledge and good practice of complementary feeding and good dietary diversity between two groups. The independent *t* test was used to test the significant differences in mean dietary diversity between two groups. At 95% confidence interval, was considered statistically significant. The results revealed that the proportion of mothers with good knowledge of appropriate complementary feeding was increased from 59% at pretest to 96% at posttest and the appropriate complementary feeding practice was improved from 54% at pretest to 86% at posttest in IG. There was no change in the knowledge and practice of complementary feeding practice in CG after four months. The proportion of mothers with good complementary knowledge was 54% both at pretest and at posttest and good complementary feeding practice was 51% and 52% at pre- and posttest in CG, respectively. There was no significant difference ( ) on complementary feeding knowledge and practice between two groups at pretest, while the difference was highly significant ( ) at the posttest. In conclusion, providing nutrition education improved the appropriate complementary feeding knowledge and practice of mothers. In recommendation, government and other partners working on sustainable child nutrition reduction should focus on the nutrition education to improve the knowledge and appropriate complementary feeding practice including daycare centers.

**Zula, A. T., Ayele, D. A., & Egigayhu, W. A. (2020). Proximate, Antinutritional, Microbial, and Sensory Acceptability of Bread Formulated from Wheat (*Triticum aestivum*) and Amaranth (*Amaranthus caudatus*). *International Journal of Food Science*, 2020.**

### **Abstract**

*Background.* Breads are made throughout the world. Bread can be prepared from cereal like wheat, maize, and rice. Nowadays, gluten intolerance, requirement of healthy, and nutritious products have increased and interests towards underutilized crops have also been increasing with the aim of improving global food security and to ease an adverse effect of climate changes. Amaranth is one of nutritionally balanced and naturally grown underutilized crops, but it is mainly considered weed in Africa including Ethiopia. *Method.* The aim of the study is to develop bread from wheat and Amaranthus and to evaluate proximate composition, antinutritional, microbial, and sensory acceptability of bread. The experiment contained 100% wheat as control and four blending proportions (90% wheat and 10% amaranth, 80% wheat and 20% amaranth, 70% wheat and 30% amaranth, and 60% wheat and 40% amaranth). A complete randomized design is used for proximate composition, antinutritional, and microbial data analysis whereas a randomized complete block design with three replications was applied for sensory acceptability. SAS for windows version 9 was used for data analysis. *Result.* The study revealed that moisture, protein, fat, fiber, and antinutritional content were increased as Amaranthus concentration is increased from 10% to 40%. However, carbohydrate, microbial load, and sensory acceptability were decreased. But the gross energy is constant. *Conclusion.* From the study, it can be concluded that beside the good nutritional profile of Amaranthus, it has antinutritional content which needs to limit the concentration of Amaranthus in blending with other grains during product development.

**Tadesse, A., Gebre, A., Nigusse, G., & Tamiru, D. (2020). Proximate Composition, Minerals and Sensory Acceptability of Deep Fried Nile Tilapia Fish (*Oreochromis niloticus*) as Influenced by Repeated Use of Palm Oil.**

### **Abstract**

*Background:* Fish fryer adapted reusing of frying oil to minimize cost and health problems are reported on reusing of frying oil. This study was aimed to determine Chemical and sensory properties of deep fried Nile tilapia fish (*oreochromis niloticus*) as influenced by repeated use of palm oil. *Method:* Preliminary survey was conducted as baseline for the experiment. Data were

collected for cooperative unions who work in fish market or informally known as (Gudumale Park, Fikir hayik and Tikur wuha). The experiment was designed and conducted using data collected from unions and proximate composition, Minerals (Ca, P, Fe and Zn) and sensory acceptability were analyzed. SPSS for windows version 20 and SAS for windows version 9 were used for analysis. Result: Preliminary survey showed fried fish consumption and repeatedly using of palm oil for frying is accustomed practice around the lake. Proximate composition indicates as frying cycle increases ash and crude fat were increased while protein and moisture were decreased. However, total carbohydrate was not significantly different. As frying cycle increases Ca, P, Fe and Zn were decreased. In case of sensory properties color and appearance of fried fish from cycle 1 to cycle 3 had better preference. However, the rest cycle had lower color and appearance acceptability. Similarly, odor of fried fish from cycle 1 to cycle 4 had better preference as compared to cycle 5 and cycle 6. Conclusion: Thus it can be concluded that repeatedly using of palm oil has effect on proximate composition, Minerals (Ca, P, Fe and Zn) and sensory acceptability deep frying of Nile tilapia fish due to deteriorated frying palm oil has drawn in to frying fish as the moisture is evaporated and this could be harmful to human health. Therefore frequent replacing of oil could be better.

**Keywords:** Chemical, Sensory properties, Palm oil, Lake side Hawassa

**Eshete, M., Gebremedhin, S., Alemayehu, F. R., Taye, M., Boshe, B., & Stoecker, B. J. (2021). Aflatoxin Contamination of Human Breast Milk And Complementary Foods In Southern Ethiopia. *Maternal & Child Nutrition*, 17(1), e13081.**

### **Abstract**

Exposure to unsafe level of aflatoxin in early life may lead to growth faltering. However, the extent of contamination of breast milk and complementary foods is poorly examined. We determined aflatoxin M<sub>1</sub> (AFM<sub>1</sub>) and B<sub>1</sub> (AFB<sub>1</sub>) contamination of human breast milk and cereal-based cooked complementary foods, respectively, among households having children 6–23 months of age in Sidama zone, southern Ethiopia. Data were collected through two cross-sectional surveys implemented in the wet ( $n = 180$ ) and dry ( $n = 180$ ) seasons. Eligible households ( $n = 360$ ) were recruited from three agroecological zones (lowland, midland and highland, each with sample size of 120) using a multistage sampling technique. AFB<sub>1</sub> and AFM<sub>1</sub> levels were determined using enzyme-linked immunosorbent assay. Mann–Whitney  $U$  and Kruskal–Wallis tests were

performed to compare aflatoxin levels between seasons and across the agroecological zones. Among 360 breast milk samples tested, 64.4% had detectable AFM<sub>1</sub> and 5.3% exceeded the 0.025 parts per billion (ppb) limit set by the European Union for infant milk. The median AFM<sub>1</sub> in the lowlands was significantly higher than in the other agroecological settings ( $P < 0.001$ ). By season, AFM<sub>1</sub> was higher in breast milk samples collected in the dry season ( $P = 0.041$ ). AFB<sub>1</sub> was detected in 96.4% of the food samples tested, and 95.0% had concentration exceeding the permissible European Union limit of 0.1 ppb. The median AFB<sub>1</sub> was significantly higher in the lowland ( $P = 0.002$ ), but there was no difference between the seasons ( $P = 0.386$ ). The study indicated that, in southern Ethiopia, foods intended for infants are heavily contaminated with AFB<sub>1</sub>. Contamination of breast milk is also a significant health concern.

**Boshe, B., Gebremedhin, S., Alemayehu, F., Eshete, M., Taye, M., & Stoecker, B. J. (2020). Aflatoxin Exposure Among Lactating Women In Southern Ethiopia. *Food Science & Nutrition*, 8(12), 6738–6745.**

### **Abstract**

In Ethiopia and many other low-income countries, little is known about the exposure of lactating women to aflatoxin, which is a major health concern to the mother and her nursing infant. We determined the aflatoxin B<sub>1</sub> contamination of family foods (AFB<sub>1</sub>) and urinary aflatoxin M<sub>1</sub> (AFM<sub>1</sub>) of lactating women in Sidama, southern Ethiopia, and compared the levels across agroecological settings (lowland, midland, highland) and two seasons. We conducted two surveys ( $n = 360$ ) that represented the dry and wet seasons of the locality. AFM<sub>1</sub> and AFB<sub>1</sub> were determined using enzyme-linked immunosorbent assay (ELISA). Statistical analysis was made using Mann–Whitney  $U$  test and Kruskal–Wallis test. The median (interquartile range) AFB<sub>1</sub> was 0.94 (0.63–1.58) ppb. AFB<sub>1</sub> was detected in 95.6% of the food samples, and 13.6% exceeded the 2.0 ppb threshold. We observed an increasing trend for aflatoxin exposure from highland to lowland ( $p < .001$ ), but there was no difference between seasons ( $p = .743$ ). The median (interquartile range) urinary AFM<sub>1</sub> was 214 (undetectable to 2,582) ppt, and AFM<sub>1</sub> was detectable in 53.3% of the samples. Urinary AFM<sub>1</sub> showed significant difference among agroecological zones ( $p < .001$ ) but not between seasons ( $p = .275$ ). A significant but weak correlation was observed between AFB<sub>1</sub> and urinary AFM<sub>1</sub> ( $r_s = 0.177, p = .001$ ). We concluded that lactating women in Sidama, especially those in the lowland area, have unsafe exposure to aflatoxin.

**Haile, B., Fininsa, C., Terefe, H., Hussen, S., & Chala, A. (2020). Spatial Distribution of Enset Bacterial Wilt (*Xanthomonas campestris* P.v. *Musacearum*) and its Association with Biophysical Factors in Southwestern Ethiopia. *Ethiopian Journal of Agricultural Sciences*, 30(3), 33–55.**

#### **Abstract**

Enset (*Ensete ventricosum*) bacterial wilt (EBW), caused by *Xanthomonas campestris* p.v. *musacearum*, is one of the highly destructive diseases of enset in Ethiopia. Field survey was conducted to determine the distribution of EBW and its association with biophysical variables in Southwestern Ethiopia. In the survey, 120 enset fields in 10 major enset growing districts were assessed. The mean disease incidence across districts ranged from 23.67 to 31.92%, and significantly different levels of disease severity were recorded among districts. Thus, among districts, the highest mean disease severity of 62.50% was recorded from Semen-bench, whereas Andiracha district showed the lowest (49.58%) mean severity. Logistic regression analysis indicated that EBW incidence of >25% had high probability of association with enset grown on soils with pH of 5.5-7, sole cropped, susceptible clones, using planting materials obtained from other farmers and enset fields with no weeding and EBW management practices. EBW severity of >55% had high probability of association with growing enset in Semen-bench and Yeki districts, weed management through machete slashing, growing local susceptible enset clones, vegetative to maturity growth stages, and low to medium levels of farmer's awareness about EBW. Findings of this survey indicate that EBW is widely distributed and could be minimized through growing enset preferably on soils out of pH 5.5-7 ranges, intercropping system, proper weeding, access to disease-free planting material, disinfecting farm tools before using, rouging out and burning of infected plants, accessing of advisory services, and limiting free exchange of planting material among enset growers.

**Yilma, S., Busse, H., Desta, D. T., & Alemayehu, F. R. (2020). *Fish Consumption, Dietary Diversity and Nutritional Status of Reproductive Age Women of Fishing and Non-Fishing Households in Hawassa, Ethiopia: Comparative Cross Sectional Study.***

#### **Abstract**

Malnutrition is one of the public health problems in Ethiopia. Households relying on fishing for their livelihoods are assumed to consume more fish than none fish producing households. Thus, fish producing households are expected to have better nutritional status compared to none fish

producing households. However, this assumption is not well studied and there is limited evidence about the consumption and the nutritional outcomes of fishing in and around Hawassa city. Therefore, the aim of this study was to determine and compare fish consumption, dietary diversity and nutritional status of reproductive aged women from fishing and non-fishing households in Hawassa. A comparative cross-sectional study was conducted among 804 reproductive age women both from fishing and non-fishing households. Women from fishing households were selected by purposive sampling technique and from non-fishing households' simple random sampling were used. Data were collected by personal interview using structured and pre-tested questionnaire. Levels of fish consumption were determined from reported frequency by the participants. Household food security status was assessed using the Food Insecurity Experience Scale (FIES). Minimum dietary diversity and Body Mass Index (BMI) were determined to assess nutritional status. Data were entered, cleaned and analyzed by using SPSS version 22. Statistical significance was declared at  $p=0.05$ . The result shows that women in fishing households were consuming fish more frequently than from none fishing households ( $p<0.001$ ). In addition, women in the fishing households had better household food security status compared with non fishing households ( $p<0.001$ ). There was no statistical significant difference in terms of Body Mass Index ( $p=0.571$ ) among reproductive age women of fishing and non-fishing households. However, the reproductive age women in the fishing households had greater minimum dietary diversity score than non fishing households ( $p<0.001$ ). The finding indicated that reproductive age women from fishing households had better fish consumption; household food security and minimum dietary diversity. This shows that fishing contributed to food and nutrition security. Thus, it is important to promote fish production and consumption in the study area.

**Keywords** Fish consumption, Household food security, Livelihood, Nutritional status, Reproductive age women

**Mekonnen, M. F., Desta, D. T., Alemayehu, F. R., Kelikay, G. N., & Daba, A. K. (2020). Evaluation of Fatty Acid-Related Nutritional Quality Indices In Fried And Raw Nile Tilapia,(*Oreochromis Niloticus*), Fish Muscles. *Food Science & Nutrition*, 8(9), 4814–4821.**

## **Abstract**

During frying, fat degrade and many reactions occur resulting in numerous altered fatty acid products. This would lead to the formation of *Tran's* fatty acids and changes in nutritional

qualities. Hence, this study was aimed to determine the changes during frying on fatty acid composition of Nile tilapia (*Oreochromis Niloticus*) fish muscle from local fish market of Hawassa, Ethiopia. Fish fryers reported that they usually use palm oil for frying. They also indicated that the oil is kept for days and reused for frying at different cycle. In fried fish, 35 types of fatty acids were identified and 27 in raw fish muscle. Palmitic, stearic, heptadecanoic, and tetradecenoic acids were the abundant saturated fatty acids in both fried and raw fish muscle. Oleic, Docosahexaenoic, Eicosapentaenoic, and Linoleic acid were the major unsaturated fatty acids. The percentages of total saturated fatty acids (SFA) of raw fish muscle (47.4%) were found to be lower compared with fried fish muscle (51.8%). The *n*-6/*n*-3 ratio (7.83), index of atherogenicity (0.85), and thrombogenicity (1.71) in the fried fish muscle were in the undesirable values. The hypocholesterolemic/hypercholesterolemic ratio was relatively similar in the fried (1.09) and raw (1.02) fish muscles. The total unsaturated fatty acids (UFA) level of raw fish muscle (52.2%) was higher than the fried fish muscle (47.2%). Higher percentage of *Tran's* fatty acid was identified in the fried fish muscle compared with raw. Frying considerably altered fatty acid composition of fish muscle. It increased saturated fatty acid concentration and decreased unsaturated. Hence, frying noticeably decreases the nutritional quality of fish muscle. Therefore, it is suggested that further analysis on fatty acid composition of oil usually used for frying and the nutritional quality index across frying cycles.

**Hailu, A., Henry, C., Kebebu, A., & Whiting, S. (2020). Effectiveness Of The Women's Development Team Leaders In Delivering Nutrition Education On Pulse Sprouting In Southern Ethiopia. *African Journal of Food, Agriculture, Nutrition and Development*, 20(1), 15331–15343.**

#### **ABSTRACT**

Effectively implemented nutrition education can provide participants with the knowledge and skills to make healthy food choices in the context of their lifestyles and economic resources. In Ethiopia, the government equips health extension workers (HEWs) to provide nutrition education to communities by enabling HEWs to transfer knowledge to women's development team leaders (WDTLs) who in turn share the knowledge with the one-to-five network leaders (1-5NWL) and members. The objective of this study was to examine the effectiveness of WDTLs in delivering nutrition education to women as the intervention group (IG). This was compared to having trained HEWs educate women directly (the positive control group, PCG), and having women receive no



specific education (negative control group, NCG). A cluster randomized trial design was used. Three kebeles (villages of 5000 people) were purposively selected from which the WDTLs were randomly selected and their respective 1-5NWL and members were participants. Nutrition education to teach pulse sprouting was provided every other week for 6 months to intervention and positive control groups. Focus group discussions and demonstrations were held to reinforce knowledge and skills. Knowledge, attitude and practice (KAP) of the women were evaluated pre and post-intervention. At baseline all three groups had similar low scores in KAP. After the education intervention, knowledge improved in IG compared to PCG ( $p=0.009$ ), and both were greater than NCG ( $p=0.001$ ). Attitude in IG improved more in PCG ( $p=0.008$ ) and both increased compared to NCG ( $p=0.001$ ). Practices improved, similarly, in IG and PCG ( $p=0.084$ ) after intervention, and both were better than NCG ( $p=0.001$ ). From this study, we conclude that nutrition education delivered through WDTLs, as is intended in communities in Ethiopia having HEWs, was more effective than delivery by HEWs alone. Nutrition education on pulse sprouting has the potential to bring positive changes on KAP of rural women who depend on this processing skill to provide nutritious foods for their families.

**KEYWORDS:** Ethiopia; Health Extension Workers; Pulse Sprouting; Nutrition Education

**FEKADE, M., & NURFETA, M. B. P. P. A. (2020). *Available Feed Resources and Nutritive Value of Major Browse Species in East Dembia District, Central Gondar, Ethiopia.***

### **Abstract**

This study was conducted to assess the available feed resources, identify the most commonly used browse species as livestock feed and to determine their nutritive value from East Dembia district. Four kebeles (Sufankara, Gargie, Salj Gebeba and Atkilit Teleft) were selected purposively. Stratified random sampling was used for the selection of respondents. A total of 12 plots of 20m \*20m (400m<sup>2</sup>) were established at an interval of 200m along the transect line to identify and record the available browse species. The leaves and petioles of *A. abyssinica*, *C. africana*, *F. thonigii*, *F. sycomorus*, *V. amygdolina*, *M. arbutifolia*, and *A. seyal* were collected for chemical analysis. General linear model procedure of SAS was used for statistical analysis. The mean CP content of the browse species ranged from 12.13% (*F. sycomorus*) to 29.74% (*V. amygdolina*). The IVDMD varied from 38.5% for *M. arbutifolia* to 71.67% for *F. sycomorus*. High gas production from immediately soluble component (a) was recorded for *C. africana*. The gas

production from insoluble but potential degradable fraction (b) and production potential (a+b), organic matter digestibility, where high for *F. thounigii* but low for *V. amygdolina*. The browse species in the current study could be used as protein supplements to livestock fed on low quality feeds due to their high levels of crude protein, low fiber contents and high digestibility potentials. However, it is recommended that further studies need be undertaken in determining the nutritive value of the other browse components such as pods.

**Keywords:** Browse species, Nutritive value, Crude protein, In vitro dry matter digestibility

**Tamasgen, N., Urge, M., Girma, M., & Nurfeta, A. (2020). Effect of Replacing Soybean Meal With Linseed Meal On Production And Quality Of Eggs From White Leghorn hens. *Experimental Animals*, 6(6.5), 6–5.**

#### **Abstract**

Feed intake, egg production and quality were studied with 180 White Leghorn hens fed diets in which soybean meal was replaced by linseed meal at levels of 0, 6.5, 13, 19.5 and 26% in the diet. Feed intake, body weight change, egg production and quality and egg fertility, did not differ among treatments. It is concluded that linseed meal can be used up to 26% in diets of laying hens without detrimental effect on egg production, or on quality and fertility of the eggs.

**Key words:** *albumen, egg mass, embryo mortality, feed conversion, yolk*

**Yassin, M., Nurfeta, A., & Banerjee, S. (2020). The effect of Supplementing Fenugreek (*Trigonella foenum-graecum* L.) Seed Powder on Growth Performance, Carcass Characteristics and Meat Quality of Cobb 500 Broilers Reared on Conventional Ration. *Ethiopian Journal of Agricultural Sciences*, 30(3), 1291–42.**

#### **Abstract**

A study was conducted to evaluate the effect of fenugreek (*Trigonella foenum-graecum* L.) seed powder on growth performance, carcass characteristics, and meat quality of broilers. A total of 156 day-old unsexed broiler chicks (Cobb 500) were randomly assigned to four treatment groups in a completely randomized design with three replicates of 13 chicks each which lasted for 42 days. The experimental diets were: Control (T1, commercial broiler diet), T1 + 1% fenugreek seed powder (T2), T1 + 2% fenugreek seed powder (T3), T1 + 3% fenugreek seed powder. The dry matter intake increased with increasing the levels of fenugreek seed powder in the ration. The

crude protein and metabolizable energy intake for T3 and T4 were higher ( $P<0.05$ ) than those fed T1 and T2 diets. The average daily gain (ADG) for T4 and T3 was higher ( $P<0.05$ ) than those fed T1 diets while T2 had an intermediate value during the growing phase. During the finisher and the entire period the highest ( $P<0.05$ ) ADG was for T4 while the lowest ( $P<0.05$ ) was for T1. During the finisher phase and the entire period, T4 had higher ( $P<0.05$ ) feed conversion efficiency compared with T1 and T3 diets. The slaughter weight, uneviscerated carcass, eviscerated carcass, and thigh weight increased ( $P<0.05$ ) with increasing levels of fenugreek seed powder. Thorax, back, and drumstick for T1 were lower ( $P<0.05$ ) than that of T3 and T4. Neck and breast muscle for T4 was greater ( $P<0.05$ ) than that of T1 and T2. The highest ( $P<0.05$ ) total carcass weight was for T4. The fenugreek supplemented group had the highest ( $P<0.05$ ) dressing percentage. The control diet (T1) had the highest abdominal fat. The dry matter, ash and protein content of the meat were higher ( $P<0.05$ ) in the broilers receiving fenugreek supplemented diet, with no significant differences among the supplemented group. The control diet (T1) had the highest ( $P<0.05$ ) cooking loss, pH, and water holding capacity. It can be concluded that better performance was observed when fenugreek seed powder is added up to 3% in commercial broiler diet under conditions of the current experiment.

**Zafu, A., Tolera, A., Kochero, Y., & Nurfeta, A. (2020). Chemical composition, In Vitro Gas Production and Tannin Biological Activity Of Prosopis Juliflora Pods Varying With Harvesting Season. *Ethiopian Journal of Applied Science and Technology*, 11(1), 36–42.**

### **Abstract**

This study was conducted to evaluate the effect of harvesting season on chemical composition, in vitro gas production and tannin biological activity of *Prosopis juliflora* pod. *P. juliflora* pods were collected during dry (May/June) and wet (September/October) seasons from three districts (Asayta, Dubti and Amibara) of Afar region, Ethiopia. Dry matter, ash, neutral detergent fiber, acid detergent fiber, acid detergent lignin, total phenols, total tannin and condensed tannin content were higher ( $P<0.05$ ) for pods collected during dry season while crude protein content was lower ( $P<0.05$ ) for dry season pods. Gas production at 24h incubation, gas production from immediately fermentable fraction (a), gas production from water insoluble but potentially fermentable fraction (b), potential gas production (a+b), the rate constant of gas production (c) were higher ( $P<0.05$ ) for pods collected during wet season whereas, lag time

(L) of *P. juliflora* pod were higher ( $P<0.05$ ) during the dry season. Lower ( $P<0.05$ ) organic matter digestibility, metabolizable energy and short chain fatty acids contents were recorded at 24h of incubation of pods collected during dry season than those of wet season. The tannin activity was higher ( $P<0.05$ ) for pods collected in the dry season (7.76%) than in the wet season (4.16 %). The overall results of this study revealed a decline in crude protein, organic matter digestibility, short chain fatty acid and metabolizable energy of *P. juliflora* pods during the dry season. Therefore, it is recommended to use different strategies such as supplementation of pod by mixing with better quality feeds or application of physical and chemical treatments to reduce the impacts of dry season on nutritional quality of *P. juliflora* pod.

**Hassan, H., Beyero, N., & Bayssa, M. (2020). Estimation of Major Livestock Feed Resources And Feed Balance In Moyale District Of Boran Zone, Southern Ethiopia. *International Journal of Livestock Production*, 11(1), 43–51.**

#### **Abstract**

The study was conducted to assess the major livestock feed resources and estimating annual feed production and feed balance in Moyale district of Boran Zone, Southern Ethiopia. A simple random sampling technique was employed to select the household's (HHs) and 96 representative households were selected. Data were collected using group discussions, structured questionnaire, secondary data and personal observations. As it was identified in the study district, natural pasture, crop residues and agro-industrial by-product were major feed resources for the livestock. An average of 129,461.0156 tons of feed dry matter (DM) per year was produced in the district from the major available feed resources, and the demand for maintenance requirement of the livestock population in the district was 190,054.416 (tons DM/year) and this showed that a deficit off 60,593.4004 (31.88%) tons of DM per year in the district. Drought, feed shortage, water scarcity, disease and parasite, market and theft and predator were assessed to be the major livestock production constraints. Generally, the results from this study confirmed that the total dry matter produced from different feed resources in to the study area was not enough to satisfy the dry matter requirement of livestock to support the livestock production in to the study area, which suggest that the main focus needs to be refining the existing feed resources through restoration of tainted grazing areas, introduction compliant feedstuff production, improving feed utilization practices and introduce and promote the crop residue feed improvement.

**Key words:** Feed availability, feed balance, feed requirement, feed resources.

**Yemane, G., Melesse, A., & Taye, M. (2020). Evaluation of Production Systems and Husbandry Practices of Ethiopian indigenous goats. *Online J. Anim. Feed Res.***

### **Abstract**

The study was conducted in Limu Seka, Nono Benja and Omo Nada districts of Jimma zone with the objectives to assess production system and husbandry practices of indigenous goat. Data were collected through questionnaire, focal group discussion and secondary data. A total of 210 households were selected for an interview and case study. Data were analyzed by descriptive statistics and ranking index. The results showed that the overall family size and mean goats flock size per household are 7.10 and 7.78 respectively. The farming activities were mixed crop and livestock systems. Natural pasture (herbs and shrubs), fallow land, crop residues and non-conventional feeds were the feed resources of the study area. Free grazing/browsing, riverside grazing/browsing, aftermath grazing, and herding were the major grazing management types for goats in the dry season. In wet season, grazing management were herding and tethering alone and both herding and tethering together. In the study area, rivers were the main source of water in both dry and rainy season. All households in all the study districts provide nighttime shelter (house) for goat throughout the year. On average about 63.8% and 61.9% of respondents have been practicing fattening and castrating goat. Castration was primarily practiced to improve fattening and get a better price. Disease, feed shortage and lack of superior genotypes were major constraints of goat production in the study area. In general, goat production system and husbandry practices in the study area was traditional with mixed livestock system that challenged by serious disease problem and feed shortage, so interference is needed to solve identified problems.

**Keywords:** Indigenous breeds, Husbandry practices, Jimma zone, Rural farming system

**Melesse, A., Chalew, N., & Nurfeta, A. (2020). Effect of Sweet Potato Leaf Supplementation on Growth and Nutrient Digestibility in Sheep. *Scientia Agriculturae Bohemica*, 51(2), 51–57.**

### **Abstract**

The effects of feeding dried sweet potato (*Ipomoea batatas*) leaf (SPL) on growth performance, digestibility, and nitrogen (N) utilization were studied in sheep. Twenty-four rams with initial body weight of  $18.5 \pm 1.49$  kg were

randomly allocated to four treatments containing ad libitum natural grass hay alone (T1), hay + 150 g SPL (T2), hay + 300 g SPL (T3) and hay + 450 g SPL (T4) on as fed basis. Results indicated that dry matter (DM), organic matter (OM) and crude protein (CP) in-takes increased ( $P < 0.001$ ) with increasing levels of SPL. Sheep fed with T2, T3 and T4 diets gained 55.1, 52.6 and 66.5 g per head per day, respectively, while the gain of non-supplemented sheep (9.19 g per head per day) differed ( $P < 0.05$ ). Digestibility of DM, OM, and CP was higher ( $P < 0.01$ ) for all supplemented sheep compared with the control. The CP digestibility and N retention were negative in non-supplemented sheep. Urinary N excretion decreased ( $P < 0.001$ ) with the increasing levels of SPL supplementation. The N retention improved with the increasing levels of SPL and was the highest ( $P < 0.001$ ) in sheep fed with T4 diet and the lowest in non-supplemented sheep. In conclusion, supplementing a basal diet of natural grass hay with SPL considerably improved the average daily gain, OM and CP digestibility and N retention.

**Keywords:** Apparent digestibility, Ipomoea batatas leaf, Nutrient intake, Nutrient utilization, Weight gain, Natural grass hay

**Bekele, B., Melesse, A., Banerjee, S., Esatu, W., & Dessie, T. (2020). Farmers Preferences Towards Breeding Objective For Indigenous Chickens In Different Agro-Ecologies of Ethiopia. *African Journal of Agricultural Research*, 16(12), 1681–1690.**

## **Abstract**

A study was conducted in different agro-ecologies of Ethiopia with the objective of understanding the farmers' preferences towards breeding objectives in indigenous chickens. For the interview, 245 households (60 from lowland, 100 from midland and 85 from highland) were randomly selected. Farmers in lowland had significantly ( $p < 0.05$ ) lower chicken populations while comparing with the remaining agro-ecologies. The average age of village pullets at first egg was  $6.54 \pm 0.063$  months. There was significantly ( $p < 0.05$ ) higher egg production in midland. There was significant difference ( $p < 0.05$ ) in clutch number among the three agro-ecologies. Among the three agro-ecologies; midland showed significantly ( $p < 0.05$ ) higher number of eggs set/hen. Effective population size of village chickens per household was calculated as 4.43, 7.8 and 7.18 in lowland, midland and highland respectively. Most of the farmers (91%) were practicing culling their chickens for getting old, sickness, brooding frequency and low production for hens and getting old, sickness and fighting each other for cocks. Comparing the preferences of traits, female farmers preferred egg production, unlike the male farmers who gave equal emphasis both for egg and meat.

Egg production for sale was prioritized by the farmers, especially for women, followed by live chicken sale. Body weight is the most considered trait to select male chickens for breeding, followed by plumage color, across three agro-ecologies. For female chickens, brooding frequency is most considered in lowland (48.3%) and midland (37%) unlike in highland where age at first egg (47.1%) is prioritized. This study can be the base to design the breeding strategy of the chicken population in the study sites and beyond.

**Key words:** Agro-ecology, breeding objectives, effective population, farmer preference, inbreeding coefficient, local chickens.

**Tera Dolebo, A., Melesse, A., Porcu, C., Getachew, T., Haile, A., Rouatbi, M., Abate, Z., Zeleke, M., Rischkowsky, B., & Mwacharo, J. M. (2020). Increased Number Of Large Non-Atretic Follicles And Co-Dominance Effects Account For High Litter Sizes in Bonga sheep. *Animal Science Journal*, 91(1), e13384.**

## **Abstract**

To understand the ovarian basis for prolificacy of Bonga sheep, a total of 31 ewes were selected based on litter size (LS) records and divided into two groups: High Prolificacy (HP) ( $n = 20$ ) with  $LS \geq 2$  and Low Prolificacy (LP) ( $n = 11$ ) with  $LS = 1$ . At a synchronized estrus, follicular dynamics were determined using transrectal ultrasonography. Plasma estradiol concentrations were also monitored. In total 27 ewes were observed in estrus being 9/11 LP (82%) and 18/20 HP (90%). On the day of estrus (day 0), the mean number of large follicles was higher ( $p < .05$ ) in HP ( $1.78 \pm 0.19$ ) than in LP ( $1.0 \pm 0.28$ ) ewes. Prior to estrus, more ( $p < .05$ ) medium follicles were visible for HP compared to LP ewes. Plasma estradiol concentrations were higher in HP compared to LP ewes ( $18.91 \pm 0.41$  vs.  $14.51 \pm 0.65$  pg/ml;  $p < .05$ ) and similarly was ovulation number ( $2.3 \pm 0.15$  vs.  $1.28 \pm 0.14$ ;  $p < .05$ ). Higher ovulation rates and litter size in Bonga sheep are evidenced by the previous presence of more large follicles and the existence of co-dominance effects as most likely medium follicles are selected to ovulate.

**Chala, A., Degefu, T., & Brurberg, M. B. (2019). Phylogenetically Diverse *Fusarium* Species Associated With Sorghum (*Sorghum Bicolor* L. Moench) And Finger Millet (*Eleusine coracana* L. Garten) grains from Ethiopia. *Diversity*, 11(6), 93**

### **Abstract**

*Fusarium* is one of the most diverse fungal genera affecting several crops around the world. This study describes the phylogeny of *Fusarium* species associated with grains of sorghum and finger millet from different parts of Ethiopia. Forty-two sorghum and 34 finger millet grain samples were mycologically analysed. All of the sorghum and more than 40% of the finger millet grain samples were contaminated by the *Fusarium* species. The *Fusarium* load was higher in sorghum grains than that in finger millet grains. In addition, 67 test isolates were phylogenetically analysed using *EF-1 $\alpha$*  and  $\beta$ -tubulin gene primers. Results revealed the presence of eight phylogenetic placements within the genus *Fusarium*, where 22 of the isolates showed a close phylogenetic relation to the *F. incarnatum*–*equiseti* species complex. Nevertheless, they possess a distinct shape of apical cells of macroconidia, justifying the presence of new species within the *Fusarium* genus. The new species was the most dominant, represented by 33% of the test isolates. The current work can be seen as an important addition to the knowledge of the biodiversity of fungal species that exists within the *Fusarium* genus. It also reports a previously unknown *Fusarium* species that needs to be investigated further for toxin production potential.

**Keywords:** Beta-tubulin gene; DNA sequence; Elongation factor gene (*EF1- $\alpha$* ); Species diversity

**Melesse, A. (2020). Substitution Effect of Maize (*Zea Mays*) with Grain Milling By-Products on Egg Production and Hatchability of Eggs in White Leghorn Layer Hens.**

### **Abstract**

The substitution effect of maize grain with grain milling by-products (GMP) was investigated on egg production and fertility parameters in White Leghorn layer hens. To this effect, four treatment (T) diets were formulated to contain GMP (g/kg) at zero (T1), 100 (T2), 150 (T3) and 200 (T4) by partially replacing the maize grain. Onehundred forty four White Leghorn layer hens were allocated randomly to the treatment diets, replicated thrice consisting of 12 hens each. The experiment was conducted for 20 weeks. The results indicated that the hen-housed egg production and daily egg mass output was higher ( $p < 0.001$ ) in hens fed with T1 and T2 diets than those of T3 and T4. Birds fed with T1 diet produced heavier ( $p < 0.001$ ) ) eggs than those reared in T2, T3 and



T4 diets, the former being significantly different with the latter two. The daily feed intake differed significantly among treatment diets being higher ( $p<0.001$ ) in birds fed with T1 and T2 than that of T3 and T4 diets, which had similar values. No significant difference was observed in hen-housed egg production, daily egg mass output, and daily feed intake among hens fed with T1 and T2 diets. Similarly, no significant difference was observed in egg weight, total and daily feed intake between hens fed with T3 and T4 diets. The feed conversion ratio (FCR, kg feed/kg egg mass) were different among treatment diets in which the lowest value being observed in those chickens reared in T1 followed by T2 diets. Birds fed with T4 diet had the highest FCR as compared with the rest of the treatment groups. Fertility and hatchability of eggs set were similar among chickens reared in T1 and T2 diets; but were higher ( $p<0.05$ ) than those of T3 and T4 which had similar values. However, hens fed with T4 diet had lower ( $p<0.05$ ) value in hatchability of fertile eggs than the rest of other treatments. In conclusion, the substitution of maize grain with 10% GMP showed similar effect with that of the control group in all studied performance parameters. Thus, GMP could be safely incorporated in replacement of maize for layer hen diets up to 10%.

**Keywords:** Egg fertility; Egg production; Grain milling by-products; Maize grain; White Leghorn chicken

**Dea, D., Melesse, A., & Mekasha, Y. (2019). Application of Morphometric Traits and Body Indices in Assessing the Type and Function of Local Goats Reared in Two Districts of Gamo-Gofa Zone, South Ethiopia. *Anim. Prod*, 19(1), 73–90.**

## **Abstract**

The present study was conducted with the objectives of applying the morphometric traits and their indices in assessing the type and function of indigenous goats reared in Arbaminch-Zuria (AMZ) and Mirab-Abaya (MA) districts of Gamo-Gofa zone. For this study, 151 bucks and 464 does were scored for morphometric measurements from which fourteen body indices were calculated. The results indicated that the AMZ bucks had higher ( $p<0.05$ ) wither height (WH), chest girth (CG), rump width (RW) and head width (HW) values than those of MA. Conversely, chest depth (CD), rump length (RL), head length (HL) and ear length (EL) of MA bucks were higher ( $p<0.05$ ) than those of AMZ. The body weight (BW), body length (BL), CG, RW and HW values were higher ( $p<0.05$ ) in does of AMZ than those of MA. However, does in MA had higher ( $p<0.05$ ) wither height (WH), CD, RL and EL values than those of AMZ. Except at OPPI, goats in MA had higher

( $p < 0.05$ ) CD, RL and EL values than those of AMZ at all age ranges. Goats in AMZ at 2PPI and above had higher ( $p < 0.05$ ) than those of MA at 1PPI and 3PPI. Irrespective of 1PPI, goats in AMZ had higher ( $p < 0.05$ ) CG than those of MA and their RW was higher ( $P < 0.05$ ) than those of MA at all age ranges. The BW of bucks was strongly ( $p < 0.001$ ) and positively correlated with BL, WH, CG and HL. In does, a positive and moderate ( $p < 0.01$ ) correlation of BW was observed with BL, CG, RW and HL. Rump width was identified as suitable predictor of BW in does at 3PPI ( $R^2 = 93.9$ ). Withers height and CG were the best predictor of BW in bucks at 2PPI ( $R^2 = 99.6$ ). At 3PPI, CG was a single predictor of bucks' BW ( $R^2 = 94.8$ ). Goats in AMZ had higher values than those of MA for cephalic index, thoracic development, pelvic index, transversal pelvic, length index, area index compact index, conformation index, foreleg index and weight. Conversely, goats in MA had higher values in relative depth of thorax, longitudinal pelvic and proportionality than those of AMZ. In conclusion, morphometric traits and their indices suggested that goats reared in AMZ can be classified as a medium-sized and long-shaped body frame, with a marked orientation for meat production, while goats in MA were characterized as medium-sized animal whose morphology corresponds to dairy type

**Keywords:** Arbaminch-Zuria; indigenous goat; Mirab-Abaya; Morphometric traits; Zoometric indices

**Alemayehu, S., Abay, F., Ayimut, K. M., Assefa, D., Chala, A., Mahroof, R., Harvey, J., & Subramanyam, B. (2020). Evaluating Different Hermetic Storage Technologies to Arrest Mold Growth, Prevent Mycotoxin Accumulation and Preserve Germination Quality Of Stored Chickpea in Ethiopia. *Journal of Stored Products Research*, 85, 101526.**

## **Abstract**

Chickpea is an economically important pulse produced by millions of smallholder farmers as a source of food, income and nutrition in Ethiopia. Mold infection and mycotoxin production can potentially lead to significant losses of chickpea during storage. Under laboratory conditions we tested comparative effects of hermetic and traditional storage structures on mold infection, germination and mycotoxin levels of chickpea. Purdue Improved Crop Storage (PICS) bags, Super GrainPro (SGP) bags, and small metal bins were compared to the traditional and popularly used chickpea storage structures such as polypropylene (PP) bags and jute bags over a six-month storage period. Oxygen and carbon dioxide levels, chickpea temperature and moisture, seed infection with

molds and percentage germination and mycotoxins levels were determined every two months for six months. In PICS bags, SGP bags and metal bins chickpea temperature and moisture changed very little during storage, whereas in jute and PP bags significant temperature and moisture increases were observed. Oxygen levels in PICS and SGP bags decreased from 20% to 8–10% in six months and carbon dioxide levels increased from 0.4% to 10% in PICS bags and from 0.1% to 17% in SGP bags. In jute and PP bags, oxygen levels were around 20% but carbon dioxide levels increased from 0.05% to 0.1–0.2%, perhaps due to mold activity. Mold infection decreased over time in chickpea stored in PICS bags, SGP bags, and metal bins, and seed germination was high (82–92%). Mold infection increased and seed germination decreased in chickpea stored in jute and PP bags. Increases in levels of aflatoxin, fumonisin, deoxynivalenol, and ochratoxin were observed only for chickpea stored in metal bins, and in jute and PP bags. Our study showed that PICS and SGP bags can effectively arrest mold growth, mycotoxin accumulation and preserve germination of chickpea during six months of storage.

**Keywords:** Chickpea, Hermetic storage, Gas concentrations, Seed infection, Seed germination, mycotoxins

**Haile, B., Fininsa, C., Terefe, H., Chala, A., & Hussen, S. (2020). Evaluation of Enset (*Ensete ventricosum*) Clones for Resistance Reaction Against Pathogenic *Xanthomonas campestris* pv. *Musacearum* isolates from Southwestern Ethiopia. *Cogent Food & Agriculture*, 6(1), 1773094.**

## **Abstract**

Enset (*Ensete ventricosum*) bacterial wilt (EBW) incited by *Xanthomonas campestris* pv. *musacearum* (Xcm) is threatening *enset* production in southwestern Ethiopia. The objectives of this study were to determine the pathogenicity of Xcm isolates and select *enset* clones resistant to pathogenic Xcm isolates in the study areas. A total of 30 Xcm isolates were subjected to pathogenicity tests on a susceptible *enset* clone *Yeko* and all were found pathogenic. Out of 30 pathogenic isolates, three isolates representing three altitude groups [lowland (1470 m.a.s.l), midland (1938 m.a.s.l) and highland (2360 m.a.s.l)] were used for *enset* clonal evaluation trials. In the clone evaluation trial, 15 *enset* clones (13 local and a tolerant and susceptible check) were evaluated for 2 years (2017 and 2018) under screen house conditions at Tepi National Spice Research Center, southwestern Ethiopia. The experiments were factorially arranged in a

completely randomized design with three replications. An aliquot of 10 ml of the bacterial cell suspension with a concentration of  $1 \times 10^8$  cfu/ml was inoculated into the second innermost leaf petiole of *enset* using a sterile hypodermic syringe. Starting from 15 days after inoculation (DAI), data were collected on incubation period (IP), disease incidence (DI), percentage severity index (PSI), days to complete wilting/death (DD), area under disease progress curve (AUDPC) and disease progress rate. Analysis of variance for IP, DI, DD and AUDPC revealed significant differences ( $P < 0.05$ ) among tested *enset* clones, while for PSI significant differences ( $P < 0.05$ ) existed among the interaction effect of *enset* clones x bacterial isolates. Disease incidence recorded ranges from 0% to 90% and IP ranges from 0 to 23 days. Similarly, the days to complete wilting of susceptible clone reaches up to 63 days, while the calculated AUDPC values ranged from 0 (*Gudiro, Maziya and Nobo*) to 3190%-days (*Arkia, Ataro, Yeko, Chikaro and Ogisso*). Disease progress rates also ranged from  $-0.00165$  to  $0.04398$  units  $\text{day}^{-1}$ . Clones *Gudiro, Maziya and Nobo* showed a resistant/tolerant reaction to EBW, while clones *Arkia, Ataro, Yeko, Chikaro* and *Ogisso* were the most susceptible *enset* clones. Based on the results, it is recommended that more clones be evaluated across different agro-ecological areas to select *enset* clones with stable resistance against the disease. In addition, clone selection should also be given due attention to adaptability as well as quantitative and qualitative yield traits to improve adoption.

**keywords:** Clone, ensete ventricosum, EBW, Incidence, Resistant reactio, Severity, Xcm isolates

**Aragaw, G., Chala, A., & Terefe, H. (2021). Spatial Distribution and Association of Factors Influencing Sorghum Anthracnose (*Colletotrichum Sublineolum*) Epidemics in Eastern Ethiopia. *International Journal of Pest Management*, 67(1), 20–31.**

## **Abstract**

Sorghum is an important staple food crop in Ethiopia. However, production of the crop is adversely affected by biotic and abiotic constraints among which sorghum anthracnose (*Colletotrichum sublineolum*) is the major one. A field survey was conducted to determine the distribution and association of sorghum anthracnose with biophysical factors in eastern Ethiopia. A total of 125 fields were assessed in five districts and results revealed that all the surveyed fields were infected with anthracnose. However, significant variations observed in anthracnose intensity across the surveyed districts. Logistic regression was used to analyse the association of sorghum anthracnose

with independent variables. High ( $\geq 60\%$ ) disease severity was highly associated with districts Girawa, Tullo and Haramaya, sole cropping system, early sowing date and continuous growing of sorghum. Lower anthracnose severity had a high probability of association with Babile district, residue removal, flowering growth stage, weed control, and rotation of different crops in the field. High distribution of sorghum anthracnose in the study areas requires effective and feasible management options to be developed.

**Wolde, G., Asmamaw, M., Sido, M., Yigrem, S., Wolde-meskel, E., Chala, A., Storteboom, H., & Davis, J. (2020). Optimizing a Cyanobacterial Biofertilizer Manufacturing System for Village-Level Production in Ethiopia. *Journal of Applied Phycology*, 32(6), 3983–3994.**

### **Abstract**

A series of experiments in laboratory and hoop house environments was conducted to develop a cyanobacteria-based biological N fertilizer source that can be produced in Ethiopian villages, thus providing an alternative to expensive, imported urea. In the laboratory, factorial combinations of four *Anabaena* species strains (E-2, E-3, E-5, and E-9) isolated from Ethiopian soils and three water sources (river, lake, and ground water) were laid out in a complete randomized design in a light box constructed for this purpose with three replications. Factorial combinations of two pond-lining materials (transparent and black plastic sheets) and two aeration intervals (1-hour and 30-min intervals) were laid out in a complete randomized design with three replications in a hoop house using small ponds (1 m  $\times$  2 m  $\times$  0.25 m). Cyanobacteria strain E-3 performed best in the river water and was selected based on significantly higher values of optical density, growth rate, heterocyst frequency, and total Kjeldahl nitrogen than the other strains. DNA sequencing showed that clones of E-3 shared 99% similarity with *Anabaena oscillarioides*. Moreover, transparent plastic-lined ponds with a 1-hour aeration interval provided the best growing conditions for the E-3 strain based on its significantly higher dry biomass, optical density, and growth rate under these conditions as compared with ponds lined with black plastic or aerated in 30-min intervals. Therefore, transparent plastic-lined ponds with 1-hour aeration intervals are recommended for the mass production of *A. osciiloides* strain E-3 for use as a biofertilizer.

**Abera, G., & Gerkabo, H. (2021). Effects of green manure legumes and their termination time on yield of maize and soil chemical properties. *Archives of Agronomy and Soil Science*, 67(3), 397–409.**

### **Abstract**

A two-year field experiment was conducted to examine the effects of interseeded green manure (GM) legumes in maize (*Zea mays* L.) cropping systems and their termination time on yield of maize and soil chemical properties in southern Ethiopia. Maize variety, BH540 was planted as the main crop while three GM legumes cowpea (*Vigna unguiculata* L. Walp), lablab (*Lablab purpureus* (L.) Sweet) and hairy vetch (*Vicia villosa* Roth) were interseeded between maize rows. The GM legumes were terminated and incorporated into soils at 30, 45 and 60 days after planting. The amounts of dry biomass produced varied significantly ( $p < 0.05$ ) among GM legumes and their termination time. The results indicated that GM legumes accumulated over 39.3–65.5 kg N ha<sup>-1</sup> yr<sup>-1</sup> during 2014 cropping season and 53.3–156.6 kg N ha<sup>-1</sup> yr<sup>-1</sup> during 2016 cropping season. However, maize stover and grain N yields were not significantly influenced by GM. The results suggest GM legumes, lablab and cowpea improved soil chemical properties (N, P and K). Therefore, interseeding and incorporation of GM legumes can be considered as an alternative mechanism of soil fertility management for sustainable crop production in southern Ethiopia, where rotational and successional GM legumes cultivation is practically impossible.

**keywords:** Green manure legumes, Maize agronomic performance, Sustainable crop production, n recovery, Ermination time

**Abebe, A., Abera, G., & Beyene, S. (2020). Sorption Characteristics, Growth and Yield Response of Wheat (*Triticum Aestivum* L.) To Application Of Essential Nutrients on Nitisol And Vertisol of Central Highland of Ethiopia. *African Journal of Plant Science*, 14(3), 108–120.**

### **Abstract**

Wheat growth and yield response were evaluated in a greenhouse experiment using two major soils, Nitosols and Vertisols. Sorption capacities of the soils and crop response were employed to determine the availability of nutrients in the two soils. Eight fertilizer treatments (Optimum (Opt.), Optimum-N, Optimum-P, Optimum-K, Optimum-S, Optimum-B, Optimum-Zn and control) in Nitosols and six fertilizer treatments (Optimum, Optimum-N, Optimum-P, Optimum-S,

Optimum-B and control) in Vertisols were arranged in completely randomized design (CRD) with five replications using wheat variety (Digalu) as a test crop. Deficiency in total N, available P, S and B was observed in the two soils. Besides, K and Z in Nitisols were less than three times the critical values. The result indicated that applications of optimum fertilizer significantly ( $P < 0.05$ ) increased plant height, spike length, number of seeds per spike, straw yield, grain yield and total biomass yield. Similarly, it resulted in an increase in grain yield of 75 and 68% over the controls in Nitosols and vertisols respectively. Omission of N, P, S, and B were resulted in grain yield reduction by 65.6, 23.4, 4.7, and 3.1% in Nitosols and by 69.4, 22.4, 14.1, and 15.3% in vertisols. Omission of K and Zn in Nitisols also causes up to 9.4 and 4.7% grain yield reduction. Thus, external supplies of these nutrients could be recommended for optimum production of wheat.

**Keywords:** Grain yield, Nitisols, nutrient concentrations in plants, soil nutrient contents, Vertisols.

**Tadesse, T., Tesfaye, B., & Abera, G. (2020). Coffee Production Constraints and Opportunities at Major Growing Districts Of Southern Ethiopia. *Cogent Food & Agriculture*, 6(1), 1741982.**

## **Abstract**

The study was conducted in four zones (Sidama, Gedeo, Gamo Goffa and Wolayta) of South Nation Nationalities and Peoples Region (SNNPR) with the objective to assess coffee production constraints and opportunities at major coffee growing districts (Wereda) of the region. Two districts from each zone and two peasant associations from each district were selected for the study using multistage sampling technique. Total sample sizes of 161 households were interviewed to generate both qualitative and quantitative data. Data were analyzed by using SPSS software and descriptive statistics were implemented. The study indicated that about 98.1% of the respondents produce coffee as a major crop followed by maize (75.2%) and "enset" (68.3%). Coffee was identified as a primary source of cash in all assessed areas except Gamo Goffa where banana ranked first among cash crops. The most important constraints identified in coffee production system were clustered in to two major categories as biotic and abiotic factors that can be considered as agronomic and environmental. Among the biotic factors diseases, insect pests, weed species and vertebrate animals were identified as the most important ones. Recurrent drought, frost, fluctuating rainfall pattern, high humidity, high temperature, low moisture, hail, storm, wind and reduced soil fertility were among abiotic factors affecting coffee production that could cause as

much as 70% yield loss. Immense opportunities for the production, marketing and processing of coffee in the studied areas were also identified. The existence of all weather road, convenient topography, fertile land, relatively good climatic condition, water bodies for irrigation, convenient government policy and support from agricultural offices were some of the opportunities discovered. Thus, based on the information obtained, it is possible for farmers (producers) to improve coffee production and productivity by solving the constraints and using possible opportunities in the study areas and locations with similar agroecologies.

**Keywords:** Abiotic, Biotic, Policy, Production, Productivity, SNNPRS empirical

**Tefera, T. T., Tesfaye, B., & Abera, G. (2020). Evaluation of the Performance of Coffee Varieties Under Low Moisture Stressed Areas of Southern Ethiopia. *African Journal of Agricultural Research*, 15(2), 212–221.**

### **Abstract**

The experiment was conducted by using seven released coffee varieties at three locations in southern Ethiopia, Halaba, Loka Abaya and Dilla, to select coffee varieties with higher yield and tolerant to low soil moisture stress. It was arranged in RCBD having three replications. The result indicated that the varieties showed significant difference on main stem diameter, plant height at harvesting, plant height up to the first branch, number of primary branches, number of secondary branches, number of tertiary branches, number of main stems, fruiting nodes per branch (FNPB), number of beans per cherry (NBPC), canopy diameter, leaf area, number of leaves per branch, number of leaves per tree (NLPT), hundred bean weight (HBW), weight of fresh husk (WHF), weight of dried husk (WHD), weight of fresh husked bean (WHBF), and weight of dried husked bean (WHBD). Stand count at harvest (STCNT), leaf length (LL), leaf width (LW), bean thickness (BTH), bean length (BL), bean yield per tree (YPT), bean yield per plot (YPP), bean yield per hectare (YPHA) and weight of husked clean coffee (WHCC) were not statistically significant. Location specific significant variations were observed on some of the variables such as stand count, leaf length, and leaf width at Halaba; yield per tree, yield per plot, yield per hectare and weight of husked clean coffee were significant at all the three locations despite their non-significant value while combined. The coffee variety Catimor J-19 performed best at all location with respect to fresh bean yield and dried clean coffee followed by Angafa. Thus they can be



promoted for larger commercial production at tested locations and locations with similar agro-ecological conditions.

**Key words:** *Coffea arabica*, husked coffee, clean coffee, agroecology.

**Bekele, D., Abera, G., & Gobena, A. (2020). Effects of Chemical Fertilizer Types and Rates on Tuber Yield And Quality of Potato (*Solanum Tuberosum* L.) At Assosa, Western Ethiopia. *African Journal of Plant Science*, 14(4), 155–164.**

### **Abstract**

Potato tuber yield and quality is constrained by a number of biotic and abiotic factors, among which low soil fertility is the prime one. Thus, the objective of the study was to evaluate the effects of chemical fertilizer types and rates on tuber yield and quality of potato at Assosa, Western Ethiopia. The treatments consisted of control, three rates of NP combinations (55 kg N and 45 kg P<sub>2</sub>O<sub>5</sub>, 110 kg N and 90 kg P<sub>2</sub>O<sub>5</sub>, 165 kg N and 135 kg P<sub>2</sub>O<sub>5</sub> kg ha<sup>-1</sup>), one NPK combination (110 kg N, 90 kg P<sub>2</sub>O<sub>5</sub> and 69 kg K<sub>2</sub>O ha<sup>-1</sup>), formula 2 (100 % NPSB + 91.9 N kg ha<sup>-1</sup> and 200% NPSB + 128.8 N kg ha<sup>-1</sup>) and formula 4 (100 % NPSZnB + 93.1 N kg ha<sup>-1</sup> and 200% NPSZnB + 131.2 N kg ha<sup>-1</sup>). It was observed that higher marketable tuber yield (30.03 t ha<sup>-1</sup>) and total tuber yield (34.58 t ha<sup>-1</sup>) were obtained with the application of NPK (110 kg N + 90 kg P<sub>2</sub>O<sub>5</sub> + 69 kg K<sub>2</sub>O ha<sup>-1</sup>) implying that K is an important limiting nutrient besides N and P in the study area. Therefore, NPK fertilizer application is recommended for high yield and quality tuber production in Assosa area, western Ethiopia.

**Key words:** Chemical fertilizer, potato, tuber, yield.

**Limeneh, D. F., Beshir, H. M., & Mengistu, F. G. (2020). Nutrient Uptake and Use Efficiency of Onion Seed Yield As Influenced By Nitrogen And Phosphorus Fertilization. *Journal of Plant Nutrition*, 43(9), 1229–1247.**

### **Abstract**

The experiment was conducted at Kulumsa, South East Ethiopia, using four levels of nitrogen (N) (0, 50, 100 and 150 kg N ha<sup>-1</sup>) and four levels of phosphorus (P) (0, 35, 70 and 105 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup>) fertilizers arranged in 4 × 4 factorial arrangements in randomized complete block design with three replications. The available P was increased after harvest due to the application of N and P fertilizer at the rates of 100 or 150 kg N ha<sup>-1</sup> and 70 or 105 kg P<sub>2</sub>O<sub>5</sub> ha<sup>-1</sup>. More specifically, nutrients

concentration and nutrient uptake were significantly ( $p < .01$ ) varied among treatment combinations and nutrient use efficiency was declined by increasing N and P after optimum rates. The higher physiological efficiency of N ( $53.47 \text{ kg kg}^{-1}$ ) and P ( $580.41 \text{ kg kg}^{-1}$ ) and the highest apparent recovery of N (19.62%) and P (2.47%) was recorded from application of  $50 \text{ kg N ha}^{-1}$  and P at  $70 \text{ kg P}_2\text{O}_5 \text{ ha}^{-1}$  and the highest agronomic efficiency of N ( $10.78 \text{ kg kg}^{-1}$ ) and P ( $15.25 \text{ kg kg}^{-1}$ ) was recorded from N at the rate of  $50 \text{ kg N ha}^{-1}$  and P at  $35 \text{ kg P}_2\text{O}_5 \text{ ha}^{-1}$ , respectively. The combination of N at  $100 \text{ kg N ha}^{-1}$  and P at  $70 \text{ kg P}_2\text{O}_5 \text{ ha}^{-1}$  was promising combination that generated highest net benefit 488,878.5 ETB (Ethiopian birr)  $\text{ha}^{-1}$  with the highest marginal rate of return (36638%) and gave the highest seed yield ( $1858.82 \text{ kg ha}^{-1}$ ) with yield increment of about 57.72% over the control.

**Keywords:** Apparent recovery, Physiological efficiency, Soil fertility, Use efficiency

**Abrham, T., Beshir, H. M., & Haile, A. (2021). Sweetpotato Production Practices, Constraints, and Variety Evaluation Under Different Storage Types. *Food and Energy Security*, 10(1), e263.**

## **Abstract**

Sweetpotato plays an important role in ensuring food security and household income sources for local communities in Ethiopia. It is dominantly grown in southern parts of Ethiopia. However, its production and productivity over the last few years has declined due to the limited access of quality planting materials at the onset of the rainy season, disease, and severe pest infestation. Therefore, it was imperative to carry out this study to identify the main constraints related to the recent decline of the crop in Misrak Badawacho District. The survey result revealed that many varieties of sweetpotato were grown in the district; mainly, Awassa-83, Ogan-Sagan, and Wolaita-local were the most preferred variety by producers. The main sweetpotato production and storage constraints in the study district are as follows: rodents, disease and insect pests, heat and drought, shortage of quality planting materials, and absence of best methods for long-term storage. Awassa-83, Ogan-Sagan and Wolaita-local were evaluated under different storage types (straw, soil, ash, sawdust, and sand storage). The combination of Awassa-83 variety and sand storage was performed better in percentage of decay, weight loss, and weevil damage, whereas length and number of vine per storage roots were performed better in the separate treatment. Thus, Awassa-83 variety and sand storage can be recommended for maintaining the storage roots during dry periods and access of

quality vines at the onset of the rainy season. More importantly, sand storage provides an opportunity to maintain the quality of sweetpotato storage roots for a long period of time and producers can easily and timely access quality vines at the onset of rainy season.

**Musse, Z. A., Yoseph Samago, T., & Beshir, H. M. (2020). Effect of Liquid Bio-Slurry and Nitrogen Rates on Soil Physico-Chemical Properties and Quality Of Green Bean (*Phaseolus vulgaris* L.) at Hawassa Southern Ethiopia. *Journal of Plant Interactions*, 15(1), 207–212.**

### **Abstract**

Green bean is one of the widely cultivated crops in developing countries. However, its cultivation is constrained by low soil fertility. A field experiment was conducted to evaluate the effect of LBS and N rates on soil physico-chemical properties and yield of green bean at Hawassa, Ethiopia. Four levels of LBS (0, 20.6, 41.2 and 61.8 m<sup>3</sup>/ha) and four N levels (0, 20.5, 41 and 61.5 kg/ha) were used in factorial RCBD with three replications. Results revealed that the application of LBS and N rates significantly affected most parameters. The application of LBS (20.6 m<sup>3</sup>/ha) and N (41 kg/ha) increased CEC by 120% as compared to control. Similarly the application of LBS (41.2 m<sup>3</sup>ha<sup>-1</sup>) and N (20.5 kg/ha) gives the highest OC as compared to control. The addition of 41 N and 20.6 m<sup>3</sup>/ha LBS also scored the highest (14.3 t/ha) total pod yield as compared to control. Therefore 41 N with 20.6 m<sup>3</sup>/ha recommended both soil and green bean improvement.

**Serbessa, A., Mohammed, H., & Kiflu, A. (2019). Growth and Yield Response of Fenugreek (*Trigonella foenum-graecum* L.) Genotypes to Phosphorus Application at Adea District, Ethiopia. *Ethiopian Journal of Applied Science and Technology*, 10(2), 29–39.**

### **Abstract**

Fenugreek (*Trigonella foenum-graecum* L.) is an important legume crop which has huge potential for human nutrition and animal feeds. However, its productivity is considerably lower due to production constraints such as poor agronomic practices and low yielding varieties. A field experiment was conducted during August to December 2018 to evaluate the response of fenugreek genotypes to phosphorus (P) application in terms of growth, yield attributes and seed yield at Adea district, central highland of Ethiopia. The experiment consisted of six genotypes (Bishoftu, Chala, Ebbisa, Hunda, 28605 and 28606) combined with four P levels (0, 9, 17 and 26 kg P ha<sup>-1</sup>) of P. The treatments were arranged in factorial fashion and laid out in completely randomized block design with three replications. The results revealed that most growth and yield attributes, biological

yield and harvest index were significantly influenced by genotype. Among the tested genotypes Chala variety was highest in biological yield, harvest index and apparent recovery. Phosphorus application also significantly affected growth, yield components and biological yield. Nodule number and dry weight, P agronomic use efficiency and seed yield were those parameters influenced by interaction effect of genotype and P application. The combination of Chala variety with 17 kg P ha<sup>-1</sup> was promising combination that generated highest seed yield followed by same variety with 9 kg P ha<sup>-1</sup>. Therefore, Chala variety combined with 17 kg P ha<sup>-1</sup> rate can be recommended for farmers in the study area. However, in order to give comprehensive recommendation in the study area and areas of similar agro-ecology the study should be reconfirmed over the year and location.

**Berhane, A., Hadgu, G., Worku, W., & Abrha, B. (2020). Trends in Extreme Temperature And Rainfall Indices in The Semi-Arid Areas of Western Tigray, Ethiopia. *Environmental Systems Research*, 9(1), 1–20.**

## **Abstract**

### **Background**

Africa is the most vulnerable continent in the world; which recurrent droughts, extreme temperature and rainfall affects agriculture and food security. The aim of this study was to analyze the trends in extreme temperature and rainfall in major sesame producing areas in western Tigray using RCLimDex software. We selected eight temperature and nine rainfall indices from 27 extreme temperature and rainfall indices, which are recommended by joint CCL/CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices (ETCCDI). A non-parametric Mann–Kendall test and Sen’s slope estimates were used to test the statistical significance and trend of each of the extreme temperature and rainfall indices, respectively.

### **Results**

Number of heavy rainy days, number of very heavy rainy days, very wet days, extremely wet days, and maximum 5 days precipitation showed a negative trend, with significant ( $p < 0.05$ ) decrease throughout the study area. Monthly maximum value of maximum and minimum value of maximum temperature, monthly maximum and minimum value of minimum temperature, hot days and hot nights revealed positive trend throughout the study areas. Total rainfall was decreasing

significantly ( $p < 0.05$ ) by 13.34 mm, 13.8 mm, 14.65 mm, 10.9 mm and 8.4 mm/year at Humera and Dansha, Adiremets, Maygaba, Maytsebri and Sheraro, and Adigoshu, respectively. Spatial analysis on extreme temperature also indicated there was relatively lower variability on minimum temperature in Humera, Dansha, Adiremets, and Adigoshu. On average, the western part of Tigray experienced a reduction in total rainfall ranging 8.45 to 14.7 mm/year; and increase in average maximum temperature of 0.04 to 0.051 °C/year since 1983 to 2016. The results also revealed an increase in warm nights and warm days ranging from 0.31 to 0.62 days, and 0.38 to 0.71 days/year, respectively.

## Conclusions

Increase in temperature and decrease in amount of rainfall may have a negative impact on crop transpiration, photosynthetic rate and soil water balance; exacerbating distribution and infestation of malaria and leishmaniasis. The results in this study could have an important role in identifying possible present and future production strategies on sesame, cotton, and sorghum crops, which are essential cash crops produced by farmers and investors.

**Wondimu, Z., Bantte, K., Paterson, A. H., & Worku, W. (2020). Agro-morphological Diversity of Ethiopian Sorghum [*Sorghum bicolor* (L.) Moench] Landraces Under water Limited Environments. *Genetic Resources and Crop Evolution*, 67(8), 2149–2160.**

## Abstract

Drought stress is one of the major constraints affecting sorghum [*Sorghum bicolor* (L.) Moench] production in rain-fed regions of the Semi-Arid Tropics. Ethiopia is the suspected center of origin for sorghum and as such has tremendous variability for a wide range of traits. Ironically, there has been little systematic characterization of Ethiopian sorghum for traits of agronomic interest including drought tolerance. Hence, the objectives of this study were to evaluate the phenotypic diversity of 315 sorghum accessions (314 landraces plus 1 standard check) collected from farmers' fields of diverse geographic regions in Ethiopia, and to identify potential sources of drought tolerance for future breeding programs. We phenotyped these accessions for ten agro-morphological traits at two water limited environments (Kobo and Mieso). Significant ( $p < 0.05$ ) differences among genotypes and genotype by environment interaction effects were found for all traits studied, as well as significant correlations between agro-morphological traits of primary interest in sorghum improvement programs. While a lack of geographic differentiation suggested

extensive gene flow among the regions, agro-morphological traits reveal clear differentiation among eight clusters that are phenotypically distinct. An intriguing hypothesis is that the richness of diversity in Ethiopia may facilitate selection for different allele combinations that result in particular suites of traits (ideotypes). This would provide great opportunity to identify diverse sources of tolerance and/or highly contrasting lines that could be used for sorghum improvement programs, crossing to potentially obtain even more extreme, transgressive, phenotypes. High yielding and drought tolerant lines were more abundant among accessions from lowland areas, implying that targeted collection from these areas would be important for improving drought adaptation of sorghum. Overall, high phenotypic trait-based variability for sorghum improvement remains available in Ethiopia, with further collection and/or detailed characterization using molecular markers needed to promote the conservation and effective use of these resources

**Hidoto, L., Worku, W., Tar'an, B., & Mohammed, H. (2020). Effect of Zinc Fertilizer Rates on Grain and Straw Zn Content, and Grain Yield of Chickpea Varieties in Southern Ethiopia. Ethiopian Journal of Agricultural Sciences, 30(4), 183–196.**

#### **Abstract**

Application of Zn had a significantly positive effect on grain Zn concentrations and also on grain yield especially under Zn deficient conditions. The amount of Zn required to alleviate Zn deficiency varied with severity of deficiency, soil types, nature of crops and cultivars. The response of chickpea varieties to Zn nutrition was studied in pots and on fields using zinc deficient soils during 2012 and 2013 cropping seasons to determine zinc fertilizer rate which improve zinc content and productivity of the crop. A factorial combination of three chickpea varieties and seven zinc fertilizer rates were laid in Randomized Complete Block design with three replications for both pot and field experiments. The result of pot experiment revealed that, variety Mastewal produced the highest grain yield ( $5.9 \text{ g pot}^{-1}$ ) and Habru produced highest ( $35.99 \text{ mg kg}^{-1}$ ) straw zinc content. Conversely, local chickpea provided the highest ( $36.1 \text{ mg kg}^{-1}$ ) grain Zn. Chickpea varieties and zinc fertilizer rates interaction on grain yield was significant where  $25 \text{ kg ha}^{-1}$  produced highest regardless of the varieties. Similarly, location had significant ( $p < 0.01$ ) effect of grain zinc content where Choroko produced 46.6 % more grain zinc content than both Taba and Jolle. Highest straw zinc ( $24.96 \text{ mg kg}^{-1}$ ) obtained from variety Habru, while highest grain zinc obtained from the application of  $25 \text{ kg ZnSO}_4 \cdot 7\text{H}_2\text{O ha}^{-1}$  with either of the varieties which was at

par with the highest Zinc rate (30kg ha<sup>-1</sup>). Significant interaction effect of variety by location on grain yield and straw zinc content was observed. The variety Mastewal was superior in grain yield at Jolle and Choroko, while landrace performed better at Taba. The landrace and Habru were higher in straw zinc content across locations. Moreover, 25 kg ZnSO<sub>4</sub> .7H<sub>2</sub>O ha<sup>-1</sup> resulted in 7 and 8% more grain and straw zinc content over the control, in that order. Thus, the current research inveterate a possibility of agronomic intervention for zinc fortification of chickpea through zinc fertilizer management.

**Worku, W., Temeche, D., Gossa, R., & Abate, B. (2021). Agronomic Management Options To Enhance Adoption of Maize–Common Bean–Common Bean Sequential Intercropping In Southern Ethiopia. *Journal of Crop Science and Biotechnology*, 24(3), 307–318.**

### **Abstract**

Achieving food security is a prime strategic goal for many developing countries where subsistence smallholder farming is dominant. It is crucial to study and improve existing cropping systems and develop novel ones for enhanced production and efficient resource use. Experiment was conducted to identify compatible density and spatial arrangement for first associated common bean (*Phaseolus vulgaris* L.) under maize (*Zea mays* L.)–common bean–common bean sequential intercropping. Factorial combination of four bean densities and three bean arrangements was tested in randomized complete block design. Greater maize yields were obtained from 25 and 50% bean densities and from single-row and within-row arrangements. Single-row arrangement at any bean density and low to moderate densities at any arrangement maintained maize performance. Density by arrangement interaction indicated that increasing bean density enhanced competitive ability and productivity of bean under double-row and within-row arrangements. Greater maize partial land equivalent ratio (LER) of 0.90 and 0.92 were obtained at lower densities of 25 and 50%, respectively, and at single-row arrangement (0.93). Interaction of density with arrangement on total LER showed that moderate densities either in single- or double-row arrangement gave higher intercrop advantages up to a maximum of 59%. Mean net benefit from intercropping exceeded those from sole maize by 30% and from bean–bean double sole crop by 16%. Net benefit among intercrops did not vary significantly and this would allow farmers to make choice depending on their crop priority and their resources such as farm size, labor and crop management techniques.

**Worku, W. (2020). Performance, Radiation Capture And Use By Maize–Mungbean–Common Bean Sequential Intercropping Under Different Leaf Removal And Row Orientation Schemes. *Experimental Agriculture*, 56(5), 752–766.**

## **Abstract**

Food security under smallholder farming can be improved through innovative intensification of cropping systems. Maize (*Zea mays* L.) – mungbean (*Vigna radiata* (L.) Wilczek) – common bean (*Phaseolus vulgaris* L.) sequential intercropping was studied to evaluate the patterns of radiation capture and radiation use efficiency and to determine the effects of leaf removal and row orientation on performance and intercropping efficiency. Sequential intercropping captured 1039 MJ m<sup>-2</sup> photosynthetically active radiation (PAR) accounting for 70% of incident seasonal PAR. The corresponding sole stands for maize captured 41%, mungbean 29%, common bean 34% and mungbean–common bean 63%. Intercropped components had interception ratios of 0.98, 0.31 and 0.61 for maize, mungbean and common bean, respectively. Associated maize used intercepted light with similar efficiency, mungbean with greater efficiency and common bean with lesser efficiency compared to sole crops. Maize leaf removal and row orientation had no significant effect on performance and partial land equivalent ratio (LER) of maize. Leaf removal under East–West (EW) orientation increased grain yield by 96%, total biomass by 63%, partial LER by 92%, in common bean and total LER by 7%. Leaf removal also improved grain yield, biomass yield, partial LER, in common bean and total LER during the wetter year of 2013. Similarly, EW orientation was advantageous in 2013 raising total LER by 8%. Maize leaf removal and EW row orientation had synergistic effects on intercropping efficiency and economic benefit and both have exerted positive influence under favourable weather. Total LER values of 1.47 in 2013 and 1.29 in 2015 had revealed greater biological efficiency for intercropping during both years though it was more profitable in 2013. Thus, the cropping system can be adopted under timely onset of the rainy season using EW row orientation while leaf removal can also be practiced depending on weather conditions and convenience.

**Keywords:** Intercropping, Leaf removal, Radiation interception, Radiation use efficiency, Row orientation



**Mengistu, S. B., Mulder, H. A., Benzie, J. A., Khaw, H. L., Megens, H.-J., Trinh, T. Q., & Komen, H. (2020). Genotype by Environment Interaction Between Aerated and Non-Aerated Ponds and The Impact Of Aeration On Genetic Parameters in Nile tilapia (*Oreochromis niloticus*). *Aquaculture*, 529, 735704.**

## **Abstract**

A major problem in smallholder Nile tilapia (*Oreochromis niloticus*) farms is that the achieved production is much lower than under optimal management. One of the main environmental factors contributing to lower production is dissolved oxygen (DO), because the majority of Nile tilapia production takes place under smallholder farms with no aeration of ponds which leads to large DO fluctuations. On the contrary, breeding programs select fish in aerated ponds. Aerating ponds is currently not an option for smallholder farmers because either it is too expensive or they lack access to cheap electricity supply. Therefore, it is crucial to know the genetic correlation between aerated and non-aerated ponds to optimize breeding programs to select fish that perform well in ponds with fluctuating DO levels. The objectives of this study were 1) to investigate the presence of genotype by environment (GxE) interaction between aerated and non-aerated earthen ponds using a design that minimized common environmental effects and 2) the impact of (non-)aeration on genetic parameters. The experimental fish were mass-produced using natural group spawning and nursed in four 30m<sup>2</sup> hapas. A random sample of fingerlings from each hapa was tagged and randomly distributed to aerated and non-aerated ponds for a grow-out period of 217 and 218 days. Body weight and photographs were taken on five consecutive time points during grow-out. Of the stocked fish, 2063 were genotyped-by-sequencing. A genomic relationship matrix was built using 11,929 SNPs to estimate genetic parameters with ASReml. No-aeration significantly reduced mean harvest weight (HW), survival and thermal growth coefficient (TGC) compared to aeration. Substantial heritabilities (0.14–0.45) were found for HW, TGC, surface area (SA) and body shape, expressed as ellipticity, and low heritabilities (0.03–0.04) for survival in aerated and non-aerated ponds. In both ponds, the environmental effect common to full sibs was not significant. Genetic coefficients of variation were 20–23% lower and heritabilities were 19–25% lower in the non-aerated pond compared to the aerated pond, for HW, TGC and survival. Genetic correlations between ponds for HW, standard length, height, SA and TGC were 0.81, 0.80, 0.74, 0.78 and 0.78, respectively. In summary, some GxE interaction between aerated and non-aerated ponds was found and no-aeration decreased genetic coefficients of variation and heritabilities compared to

aerated ponds. Breeding programs are recommended to use half sib information from non-aerated farms or to set up a reference population for genomic selection in a non-aerated environment either on-station or in farms.

**Keywords:** Nile tilapia, genotype by environment interaction, Harvest weigh, Thermal growth, coefficient, Survival, Dissolved oxygen

**Mengistu, S. B., Mulder, H. A., Benzie, J. A., & Komen, H. (2020). A systematic Literature Review Of The Major Factors Causing Yield Gap By Affecting Growth, Feed Conversion Ratio and Survival In Nile Tilapia (*Oreochromis Niloticus*). *Reviews in Aquaculture*, 12(2), 524–541.**

### **Abstract**

Productivity among small- and medium-scale tilapia farms varies considerably. The difference between the best performers and lower ones (yield gap), is affected by differences in growth rate and feed conversion ratio (FCR). FCR at the farm level is strongly influenced by survival of fish. In this study a systematic literature review of two databases (ASFA and CAB-Abstracts) identified 1973 potentially relevant articles. Data from 32 articles that met the inclusion criteria were analysed using linear mixed models for the most important factors with significant contributions to growth [investigated through analysis of the thermal growth coefficient (TGC)], survival and FCR of Nile tilapia. Increasing crude protein (CP), dissolved oxygen (DO) and pH significantly decreased FCR and increased TGC. Increasing stocking weight (SW) significantly improved both FCR and survival. Temperature had the largest effect on FCR followed by DO, pH and CP. DO had the largest effect on TGC followed by CP and pH. This study confirms that the optimal rearing temperature for Nile tilapia is between 27 and 32°C. Improving management to optimize DO (> 5 mg/L), stocking density (3–5 fish/m<sup>2</sup>), SW (> 10 g) and CP (25 – 30%) will improve performance and survival in small- and medium-scale tilapia farming. However, it is hard to influence temperature in ponds and cages while DO is largely influenced by aeration. Since many small- and medium-sized farms do not have aeration, these major tilapia farming systems could benefit from genetically improved strains selected for resilience to highly fluctuating diurnal temperature and DO levels.

**Mekonnen, A., Tessema, A., Ganewo, Z., & Haile, A. (2020). Climate Change Impacts On Household Food Security And Adaptation Strategies In Southern Ethiopia. *Food and Energy Security*, e266.**

## **Abstract**

Climate change is predicted to adversely affect agricultural yields, particularly in African countries such as Ethiopia, where crop production relies heavily on environmental factors such as rainfall and temperature. However, there have only been a limited number of studies on the effects of climate change dynamics on food security in Africa, particularly at the household level. We therefore analyzed local climatic changes, the status of household food security, climate-related causes of food insecurity, food security determinants, and the adaptation strategies of local farmers. Three decades meteorological data were analyzed. A total of 185 farmers were selected using simple random sampling and interviewed, together with focus groups. Data were analyzed using the descriptive and inferential statistics together with the logit regression model. Climate change over the last three decades was found to have a negative impact on the food security status of households. Crop production was constrained by poor rainfall, severe erosion, and increases in temperature. The unpredictability of rainfall, pests, and diseases were also contributing factors. Using the calorie intake approach, 60.5% of sampled respondents were found to be food insecure. Analysis using the logistic regression model showed that age and family size, as well as the amount of cultivated land and rainfall, were the significant ( $p < .05$ ) factors influencing household food security status. A large proportion (69.8%) of farmers were incorporating adapting strategies into farm management including improved use of crop varieties and livestock production, in addition to income diversification. Taken together, these findings show that improving climate change awareness, facilitating the participation of female-led households in income generation, and strengthening existing adaptation measures have positive impacts on food security.

**Ewunie, G. A., Morken, J., & Yigezu, Z. D. (2020). Alkaline and Co-Digestion Pretreatments: Process Optimization for Enhancing the Methane Yield of Jatropha press cake. *Biomass Conversion and Biorefinery*, 1–18.**

## **Abstract**

Oil extraction and biodiesel production process produce a massive amount of by-products like Jatropha press cake (JPC) and crude glycerol (CG), which could be used as a potential substrate for methane production. However, the higher lignocellulosic and nitrogen content in the JPC act as a recalcitrant and inhibitor, respectively, for microbes that are involved in the anaerobic digestion (AD) process. Therefore, the present study aimed to enhance the methane yield of JPC by optimizing the alkaline pretreatment and co-digestion process conditions. The effects of NaOH concentration, incubation temperature, and retention time on methane and soluble chemical oxygen demand (sCOD) yields were evaluated and modeled by employing a response surface methodology coupled with central composite design (RSM-CCD). Moreover, a series of batch experiments with various feedstock concentrations (FCs) were tested to investigate the methane yield of JPC when co-digested with CG at different levels. The methane yields of all pretreated samples were significantly higher when compared with these of the untreated JPC. Pretreating the JPC using 7.32% NaOH at 35.86 °C for 54.05 h was the optimum conditions for maximum methane increment of 40.23% (353.90 mL g<sup>-1</sup> VS), while co-digesting 2% CG with JPC at 2 g VS L<sup>-1</sup> FC enhanced the methane yield by 28.9% (325.47 mL g<sup>-1</sup> VS). Thus, the methane yield of JPC was effectively increased by alkaline pretreatment and co-digesting with CG. However, the alkaline pretreatment was relatively more effective compared with the co-digestion process.

**Keywords** Co-digestion . Crude glycerol .Jatropha press cake . Methane yield . Optimization . Pretreatment

**Ewunie, G. A., Yigezu, Z. D., & Morken, J. (2020). Biochemical Methane Potential Of Jatropha Press Cake: Effect Of Steam Explosion Pretreatment And Co-Digestion With Crude Glycerol. *Journal of Renewable and Sustainable Energy*, 12(6), 063102.**

## **Abstract**

Biodiesel production from *Jatropha curcas* generates a considerable amount of Jatropha press cake (JPC) and crude-glycerol (CG) biowastes with intense biogas production potential. However, JPC contains a larger amount of lignocellulosic materials that potentially affect the hydrolysis stage of the anaerobic digestion process, while CG significantly lacks nitrogen needed for microbial biomass growth. Therefore, the present study sought to explore the optimal steam explosion (SE) pretreatment and co-digestion conditions that can improve the methane yields of JPC with inhibitor formation reduction. The effects of different temperature-time combinations during SE on soluble chemical oxygen demand (sCOD) and methane yield of JPC were evaluated using response surface methodology coupled with central composite design (RSM-CCD). JPC was also co-digested with CG, and the methane yield of the mixture was investigated by varying the total organic loading (TOL) and CG levels. The RSM-CCD model predicated that the maximum methane yield (330.14 ml g<sup>-1</sup> VS) could be achieved after exploding the JPC at 202 °C for 9.39 min, while relatively high temperature (209 °C) and retention time (13.68 min) were needed to obtain a higher predicted sCOD yield (94.48 g L<sup>-1</sup>). During the co-digestion processes, the methane yields of the mixture were significantly varied, and co-digesting 2% CG with JPC at 2 g VS L<sup>-1</sup> TOL was the optimum condition to obtain a maximum methane yield of 325.25 ml g<sup>-1</sup> VS. Thus, considering the environmental and economic advantage of biowaste utilization, co-digesting JPC with CG was the best option for improving the methane yield of the mixture compared to SE pretreatment.

**Ewunie, G. A., Morken, J., Lekang, O. I., & Yigezu, Z. D. (2020). Factors Affecting The Potential of *Jatropha Curcas* for Sustainable Biodiesel Production: A critical review. *Renewable and Sustainable Energy Reviews*, 110500.**

## **Abstract**

Scarcity, insecurity, and severe environmental impact of fossil fuel-based energy consumption have enthused the production and utilization of alternative energy resources. Biodiesel is identified as promising renewable energy that can substitute the petrol diesel consumption with numerous advantages. However, more than 95% of biodiesel is produced from edible oil crops, which jeopardizes the food supplies. As a result, exploring inexpensive and non-edible oil-bearing energy crops such as *Jatropha curcas* (*Jatropha*) has been the target of governments, researchers, industries, and policymakers. However, sustainable biodiesel production from this plant is not achieved yet due to various ecological, socioeconomic, legislative, and technological factors. Previous reports showed that the individual impact of those factors; however, all factors are strongly correlated, and the impact of one factor is significantly affected by the situation of other factors. Therefore, the present review is devoted to critically examine and discuss the sole and interactive effect of various factors affecting the cultivation of *Jatropha* for sustainable biodiesel production by reviewing more than 185 published articles. Various oil extraction and biodiesel production technologies and factors affecting the physicochemical properties of *Jatropha* oil and biodiesel were profoundly investigated. Moreover, the performance, combustion, and emission characteristic of diesel engines fuelled with *Jatropha* biodiesel were carefully reviewed and compared with petrol diesel. In conclusion, factors affecting the sustainable biodiesel production potential of *Jatropha* vary across growing regions due to variation in determinants, and the performance and emission characteristic of diesel engines fuelled with *Jatropha* biodiesel slightly differed from petrol diesel.

**Keywords:** Biodiesel, Factors, *Jatropha curcas*, Oil yield, Physicochemical properties, Technologies

**Yigezu, Z. D., & Jawo, T. O. (2020). Empirical analysis of Fuelwood Consumptions and Its Environmental Implications in Rural Sub-city, Southern Ethiopia. *International Journal of Sustainable Energy*, 1–12.**

### **Abstract**

Consumption of fuelwood contributes to forest degradation and greenhouse gas emissions in developing countries. The aim of the present study was to assess the household energy sources and their contribution to climate change. Multi-stage sampling procedure was employed to select sample households. A total of 152 households with different wealth status were included in the present investigation. Firewood consumption and GHG emission at household level were estimated. Average annual firewood consumption per household was 2781.30 kg (2.78 t). The amount of firewood consumed per household could emit 337.62 kg CO<sub>2</sub>e/yr. Use of improved stove could help to save 1.05 t of firewood and protect  $4 \times 10^{-3}$  ha of forest degradation per year per household. To reduce the use of biomass as household energy source and its environmental impacts, all stakeholders need to work on awareness creation and provision of alternative household energy sources and improved fuel-saving stoves.

**Keywords:** Energy source, Environmental Impacts, Fuelwood, Household, Save

**Teshome, Z., Terfa, M. T., Tesfaye, B., Shiferaw, E., & Olango, T. M. (2020). Genetic Diversity in Anchote (*Coccinia Abyssinica* (Lam.) Cogn) Using Microsatellite Markers. *Current Plant Biology*, 24, 100167.**

### **Abstract**

Anchote (*Coccinia abyssinica* (Lam.) Cogn) is an endemic crop species of Ethiopian origin mainly cultivated for its nutritious tuberous roots and tender leaves. The crop plays an important role in the local diet of rural and peri-urban communities mainly in Western and South Western Ethiopia. Limited molecular marker resources hinder breeding and genetic studies for improvement, conservation and management of anchote genetic resources. In this study we aimed to (i) measure the genetic diversity of *C. abyssinica* and of its populations; and (ii) describe the genetic structure of populations across the cultivation range in Ethiopia. A total of 45 germplasm accessions collected from Western parts of Ethiopia were studied along with three cultivars of related species in Cucurbitaceae family using 24 microsatellite markers. Results showed high level of genetic diversity in the anchote accessions. All the analyzed loci were highly polymorphic and detected a

total of 354 alleles among all population, with an average of 15 alleles per locus. The average genetic diversity, as quantified by the expected heterozygosity, was  $0.88 \pm 0.06$  per locus. Nei's gene diversity index was the highest ( $I = 1.93$ ) for populations from East Wellega maintained *in situ* in the farmers' field and *ex situ* in Debre Zeit Agricultural Research Center (DZARC). Using discriminant analysis of principal components (DAPC), four clusters including outlier groups were detected. The DAPC analysis indicated that the most closely related populations geographically occurred in close proximity to each other. AMOVA attributed 95% of the genetic variation to within population and only 4% to between populations. The results provide important genetic information in *C. abyssinica* to drive improvement, management and conservation decisions efforts.

**Keywords:** Anchote germplasm, *Coccinia Abyssinica*, Genetic diversity, Genetic structure, Microsatellites, Ethiopia

**Vandebroek, I., Pieroni, A., Stepp, J. R., Hanazaki, N., Ladio, A., Alves, R. R. N., Picking, D., Delgoda, R., Maroyi, A., & van Andel, T. (2020). Reshaping the Future of Ethnobiology Research After The COVID-19 Pandemic. *Nature Plants*, 6(7), 723–730.**

### **Abstract**

A geographically diverse group of 29 ethnobiologists addresses three common themes in response to the COVID-19 global health crisis: impact on local communities, future interactions between researchers and communities, and new (or renewed) conceptual and/or applied research priorities for ethnobiology.

**Terfa, M. T., Olsen, J. E., & Torre, S. (2020). Blue Light Improves Stomatal Function and Dark-Induced Closure of Rose Leaves (*Rosa x hybrida*) Developed at High Air Humidity. *Frontiers in Plant Science*, 11, 1036.**

### **Abstract**

Plants developed under constant high (>85%) relative air humidity (RH) have larger stomata that are unable to close completely in response to closing stimuli. Roses (*Rosa x hybrida*) developed in high RH have previously been shown to have high water loss during leaf dehydration and reduced dark-induced closure resulting in a shorter postharvest life. In this study, the effect of B-light on stomatal function under high RH conditions was investigated. The ability of rose leaves



developed under continuous high (90%) or moderate (60%) RH to close their stomata in response to darkness and leaf dehydration assay was studied. Moreover, the level and regulation of ABA in light and darkness in relation to B-light was measured. Our results show that increased B-light proportion improved stomatal function and dark-induced stomatal closure under high RH conditions and that was associated with increased [ABA] in general and a dynamic ABA peak during darkness. Furthermore, increased B-light during the day was associated with the presence of high  $\beta$ -glucosidase activity during night. This indicates that B-light is important as a signal to activate the  $\beta$ -glucosidase enzyme and release ABA during night. Altogether, the improved stomatal function and reduced transpiration in combination with increased [ABA] indicate that preharvest B-light plays an important role in governing stomatal functionality and ABA homeostasis under high RH and can be a useful method to improve postharvest water balance of roses.

**Olango, T. M. (2020). Research Article Interactive Effect of Solar UV-B Radiation and Planting Density on Sucker Development and Physiology of Enset (*Ensete ventricosum*) Variety-Entada.**

### **Abstract**

**Background and Objective:** Entada, which is one of the enset landraces cultivated in Ari zone southern part of Ethiopia. It produces natural suckers like banana, however, sucker development is not preferred in enset production . The purpose of the study was to evaluate the effect of UV-B radiation and planting density on sucker development and physiology of Entada plants. **Materials and Methods:** The experiment was carried out at field condition using a randomized complete block design with 3 replications. For this study three level of planting density (40,000 plants/ha), (17,777plants/ha) and (10,000 plants/ha) and two level of UV-B radiation (with and without Solar UV-B radiation) were used. Data were collected on light quality, morphological and physiological parameters. **Results:** It was observed that, total number of sucker and suckering ratio were significantly ( $p<0.05$ ) affected by UV-B radiation, planting density and their interaction. An increase in planting density significantly reduced R:FR ratio and leading to significant increase in plant height by 18%. Plant grown under higher planting density significantly reduced sucker number by 45% compared to the effect of lower planting density. Maximum number of suckers were recorded (47.3) from treatment combination of lower planting density and exposed to solar

UV-B radiation. Removing UV-B radiation using plastic film significantly increased photo system II efficiency (Fv/Fm) of leaves by 3.8% than leaves treated with solar UV-B radiation under lower planting density. Moreover, Entada plant exposed to solar UV-B radiation significantly reduced stomata aperture than the effect of planting density. Conclusion: Generally, change in the composition of light quality using planting density and screening material resulted in significant modification on sucker development and physiology of Entada variety.

**Keywords:** Entada, sucker, red light, far red light, UV-B, planting density, physiological growth, morphology

**Kacharo, D. K. (2020). ICT and Challenges Of Agricultural Extension Education. *Journal of Agricultural Extension and Rural Development*, 12(3), 57–61.**

### **Abstract**

After the novel coronavirus outbreak, many countries closed universities. This situation urges to implement online delivery as an alternative method. This study aimed assessing the access to and use of ICT by students, the ICT competencies possessed by the students, and assesses the current level of students' readiness for online education methods in the developing country like Ethiopia. Sample of 106 undergraduate students were selected. Semi-structured survey questionnaire was used for data collection. The findings revealed that most of the students have very limited access to and use of different types of ICTs. Mobile phones are the most popular ICT tool used by students. Poor ICT using competencies is another problem observed. ICT experts in the field of online education need to plan smartphone-based technologies, and it is recommended to offer zero-rated access to specific educational websites, and offer free or discounted mobile internet packages to all students who need it to switch to online classes.

**Key words:** Online education, coronavirus, students, university, mobile phones, ICT.

**Kacharo, D. K. (2020). Information Needs and Seeking Behavior of Farmers in Southern Ethiopia. *Library Philosophy and Practice*, 1–18.**

### **Abstract**

Information is an important factor in agricultural development. The study investigated farmers' agricultural information needs and seeking behavior in the Southern Regional State of Ethiopia. A cross-sectional research design was employed and the study population included all household heads of the eight sampled villages in four administrative zones. A multi-stage sampling procedure was employed to obtain a sample of 320 farmers. Quantitative data were collected and research adopted descriptive statistics. The results revealed information on crop production technologies; information about diseases, pests and weather forecasts, and market information were identified as the top three most important types of agricultural information. Similarly, crop production technologies; animal husbandry technologies, and information about agricultural inputs were the information farmers seek frequently. Farmers use development agents as the first source of agricultural information. All of the respondents communicate with development agents face-to-face.

**Keywords:** Agriculture, Farmers, Information need, Information-seeking behavior, Ethiopia

**Bekele, M., Kebede, F., & Haile, W. (2020). Phosphorus Adsorption-Desorption Isotherm of Lime Treated and Untreated Acid Soils of Assosa and Bambasi Districts, West Ethiopia. *Communications in Soil Science and Plant Analysis*, 51(15), 1979–1990.**

### **Abstract**

The objective of the study was to evaluate effects of liming on phosphorus (P) adsorption and desorption capacity of acid soils in Assosa and Bambasi Districts. The soil samples were collected from six rural Kebeles; three from each Kebele and totally 18 samples were collected. The study was conducted in accordance with batch equilibrium method and adsorption values were fitted to Langmuir, Freundlich, and Temkin models to evaluate the goodness of curve fit. Differences between the models' indices and soil property parameters were analyzed by analysis of variance (ANOVA). The study revealed that unlimed soils of Amba-7, Sonka, and Amba-1 sites had higher range of *P*-sorption maxima (416.7–500.0 mg/kg) than the limed ones. In addition, the limed soils had shown lower adsorption maxima than the unlimed soils based on the Langmuir model. According to Freundlich model, limed soils had a lower  $K_f$  value than the unlimed soils. Similarly,

Temkin model also verified that unlimed soils had higher  $b$  value (sorption energy) than limed soils. Total P desorbed (TPD) value of limed soils had shown a significant difference ( $p = .022$ ) between the soils of different sites; then soils of Amba-16, Amba-7 and Sonka had relatively higher TPD value than the soils of the left sites. On lime treated soils the total P desorbed had shown increment relative to the untreated soils. The  $P$ -sorption isotherm was fitted best to Temkin model than the Langmuir and Freundlich models. Soils of the study area require liming to improve the  $P$ -adsorption problem; especially soils of Amba-7, Sonka, and Amba-1.

**Keywords:** Assosa district, Bambasi district, limed soils, phosphorus, unlimed soils

**Buko, D. H., Gedebo, A., Spetz, C., & Hvoslef-Eide, A. K. (2020). *An update of sweet potato viral disease incidence and spread in Ethiopia*.**

### **Abstract**

Sweet potato (*Ipomoea batatas* (L.) Lam.) is an important root crop for poor farmers in developing countries. Since the late 1980s, viral diseases have increasingly become a threat to sweet potato production in Ethiopia. This review paper presents the role of sweet potato production for ensuring food security, the level of sweet potato virus research, including the types of viral species identified and their current level of incidences in Ethiopia. Sweet potato feathery mottle virus (SPFMV), Sweet potato chlorotic stunt virus (SPCSV), Sweet potato virus 2 (SPV2), Sweet potato virus G (SPVG), and Cucumber mosaic virus (CMV) were reported in Ethiopia, where the first two are the most common and exist at high incidences. In addition, this paper discusses the virus vectors, virus transmission methods to new farms, factors exacerbating the rate of viral incidence and the methods used to reduce the incidences. Moreover, it highlights methods of sweet potato viruses' detection and cleaning of infected materials in use and the challenges encountered towards the efficient utilization of the methods. Finally, we suggest major intervention techniques that will integrate all key players in managing the impact of the virus on sweet potato production to improve productivity and ensuring food security in Ethiopia. The findings obtained from this review could be an input for the current research on sweet potato improvement (both planting materials and routines) in Ethiopia.

**Buko, D. H., Spetz, C., & Hvoslef-Eide, A. K. (2020). Next generation Sequencing as A Method To Verify Virus Elimination Using Heat Treatment and Meristem Tip Culture In The Five Most Widely Used Sweet Potato Varieties In Ethiopia. *African Journal of Biotechnology*, 19(7), 458–463.**

### **Abstract**

Sweet potato (*Ipomoea batatas* L. Lam) has become one of the staple crops in Africa in the last 20 years. In Ethiopia, sweet potato is the second most widely grown root crop and is the first regarding the production per hectare. Thus, there is a great demand of planting material throughout the country. Currently, planting material is usually obtained from own previous season harvest, local markets or from the neighboring fields since no certified clean planting material production scheme has been established in Ethiopia yet. Unfortunately, this practice has contributed to the spread of viral diseases throughout the country. Elimination of viruses from infected plants is a tedious job, which requires efficient methods to eliminate the virus and also to verify that the plants are indeed virus-free. In the case of sweet potato, it was observed that heat treatment, combined with meristem tip culture is an efficient method for virus elimination. Previous findings indicate that reverse transcription (RT) PCR is more efficient than ELISA to verify the efficiency of virus elimination. In this study, the use of next generation sequencing (NGS) was explored as a verification method and compared with RT-PCR. The results show that NGS seems to be more efficient than RT-PCR, although also prone to inconclusive results.

**Key words:** Viruses, next generation sequencing (NGS), sweet potato, reverse transcription (RT) PCR, badnavirus.

**Buko, D. H., & Hvoslef-Eide, T. A. (2020). Optimization of Plant Growth Regulators for Meristem Initiation and Subsequent Multiplication of Five Virus Tested Elite Sweet Potato Varieties from Ethiopia. *African Journal of Biotechnology*, 19(6), 332–343.**

### **Abstract**

Vegetatively propagated crops are exposed to pests every growing season, providing them with the opportunity to feed on the plants and transmit diseases. Meristem culture is an important method to clean for viruses to restore high yields. Media optimizations with different concentrations and combinations of 6-benzylamino purine (BAP) and Naphthalene Acetic Acid (NAA) were tested for their effects on shoot initiation from meristems. This was followed by

regeneration and shoot multiplication from nodal cuttings in five elite varieties of sweet potato. There was a highly significant genotype (variety) x environment (media) interaction for all experiments. Concentrations and combinations of BAP and NAA significantly affected the percentage of meristem survival/regeneration and subsequent shoot multiplication. The best combination of the plant growth regulators was NAA (0.1 mg/L) and BAP (1.0 mg/L). For further propagation, shoot numbers per single nodal cuttings were significantly affected by BAP concentrations ( $p < 0.05$ ) and genotypes. The medium which gave maximum numbers of shoots was  $\frac{1}{2}$  MS media supplemented with BAP (2.5 mg/L) and GA<sub>3</sub> (0.5 mg/L). The tallest shoots, with the highest number of internodes, suitable for transfer to soil, was obtained from  $\frac{1}{2}$  MS media without any growth regulators for all of the cultivars.

**Key words:** Media, Meristem, Multiplication, Regeneration, Shoot, Sweet Potato.

**Gebisa, G., Beriso, K., Bogale, B., Gizaw, O., & Chala, D. (2020). Bovine Trypanosomosis and Its Vectors in Three Selected Districts of Buno Bedele Zone of Oromia Region, Ethiopia. *Veterinary Medicine International*, 2020.**

### **Abstract**

Trypanosomosis is one of the most economically challenging diseases affecting mammals, and it is a serious haemoprotozoan disease caused by different species of unicellular eukaryotic parasite of the genus trypanosome. The study was conducted to access the prevalence of bovine trypanosomosis, its associated risk factors, and vector density on cattle reared in three selected districts, namely, Chewaka, Dabo Hana, and Meko districts. Blood was collected from a total of 1046 cattle of age groups extending from 1 to 6 years. The buffy coat technique was used to check the presence of parasites from sampled blood, and the trypanosome species were identified using Giemsa-stained thin blood films. The packed cell volume of sampled blood was determined using the haematocrit. A total of 160 traps were deployed to study the entomological survey. Generally, 3.44% of the studied animal was infected with trypanosomosis, and *T. vivax* was the dominant species of trypanosomosis in the study areas. Significant differences ( $< 0.05$ ) were observed due to associated factor viz. body condition and anaemic status of the animal; however, insignificant differences were also recorded between different districts, age group, and sex. The mean PCV value of parasitaemic and aparasitaemic animals was  $22.22 \pm 0.92$  and  $26.18 \pm 0.16$ , respectively, and significant difference was  $< 0.05$ . An overall of 1.82 flies per trap per day was recorded from

the study areas, and among the total caught vectors, 81.4% of it was *G. tachinoides* and the rest was *G. morsitans*. Therefore, the veterinarians have to continue providing the appropriate medication/treatment for the infected animals per appropriate recommendation, and Bedele NTTICC has to take more measures to control the density and distribution of tsetse flies in Dabo Hana district than the others due to high flies per trap per day observed in Dabo Hana district.

**Raji, S. G., & Dörsch, P. (2020). Effect of Legume Intercropping on N<sub>2</sub>O Emissions and CH<sub>4</sub> Uptake During Maize Production in the Great Rift Valley, Ethiopia. *Biogeosciences*, 17(2), 345–359.**

### **Abstract**

Intercropping with legumes is an important component of climate-smart agriculture (CSA) in sub-Saharan Africa, but little is known about its effect on soil greenhouse gas (GHG) exchange. A field experiment was established at Hawassa in the Ethiopian rift valley, comparing nitrous oxide (N<sub>2</sub>O) and methane (CH<sub>4</sub>) fluxes in minerally fertilized maize (64 kg N ha<sup>-1</sup>) with and without *Crotalaria* (*C. juncea*) or lablab (*L. purpureus*) as intercrops over two growing seasons. To study the effect of intercropping time, intercrops were sown either 3 or 6 weeks after maize. The legumes were harvested at flowering, and half of the aboveground biomass was mulched. In the first season, cumulative N<sub>2</sub>O emissions were largest in 3-week lablab, with all other treatments being equal to or lower than the fertilized maize mono-crop. After reducing mineral N input to intercropped systems by 50 % in the second season, N<sub>2</sub>O emissions were comparable with the fully fertilized control. Maize-yield-scaled N<sub>2</sub>O emissions in the first season increased linearly with aboveground legume N yield ( $p=0.01$ ), but not in the second season when early rains resulted in less legume biomass because of shading by maize. Growing-season N<sub>2</sub>O-N emission factors varied from 0.02 % to 0.25 % in 2015 and 0.11 % to 0.20 % in 2016 of the estimated total N input. Growing-season CH<sub>4</sub> uptake ranged from 1.0 to 1.5 kg CH<sub>4</sub>-C ha<sup>-1</sup>, with no significant differences between treatments or years but setting off the N<sub>2</sub>O-associated emissions by up to 69 %. Our results suggest that leguminous intercrops may increase N<sub>2</sub>O emissions when developing large biomass in dry years but, when mulched, can replace part of the fertilizer N in normal years, thus supporting CSA goals while intensifying crop production in the region.

**Tsige, M., Synnevåg, G., & Aune, J. B. (2020). Gendered Constraints for Adopting Climate-Smart Agriculture Amongst Smallholder Ethiopian Women Farmers. *Scientific African*, 7, e00250.**

## **Abstract**

Although Climate-smart agriculture (CSA) can offer economic and food security opportunities for women farmers, success in the uptake of these technologies is contested by gendered constraints. Previous studies that use the household head as a unit of analysis to explain adoption patterns do not adequately demonstrate the extent to which women smallholders are restricted by gendered constraints. This study uses 344 women and men survey respondents involved in conservation agriculture (CA) and small-scale irrigation schemes (SSIS) as data sources for examining the effect of gendered constraints for adopting climate-smart agriculture amongst women in three areas in Ethiopia. Qualitative and quantitative data collections were applied using survey, in-depth interviews and focus group discussions. Quantitative data were analyzed using descriptive statistics, Pearson's chi-square test and binary logistic regression using statistical software for the social sciences (SPSS) version 24. Thematic and narrative analysis methods were used to analyze qualitative data. The findings show that women smallholders uptake is affected by limited access to credit, extension, restricted membership in cooperatives and water user associations, lack of access or user rights to land, skill training, information, and restricted mobility. Agricultural development interventions should be implemented by accepting and considering individual farmer's entitlement to development. Expanding off-farm diversification and rural employment opportunities through changing the land tenure system, which is currently state-owned, are essential to enhance women smallholders' access to land and other agricultural inputs.

**Keywords:** Climate-smart agriculture, Climate change, Ethiopia, Gendered Constraints, women, smallholders



**Hailu, F., Cherie, A., Gebreyohannis, T., & Hailu, R. (2020). Determinants of traditional medicine utilization for children: A parental level study in Tole District, Oromia, Ethiopia. *BMC Complementary Medicine and Therapies*, 20, 1–11.**

## **Abstract**

**Background:** In Ethiopia, about 80% of the population use traditional medicine (TM) due to the cultural acceptability of healers and local pharmacopeias, the relatively low cost of traditional medicine, and the difficulty of accessing modern health facilities. This study was aimed at assessing traditional medicine utilization and its determinants among parents of the children employing a case study of the Tole District of South West of Oromia, Ethiopia. **Methods:** A community-based cross-sectional data were collected from 267 parents who have children less than 18 years old. The respondents were selected through a systematic random sampling technique. Both descriptive and exploratory techniques were used to analyze the data. The exploratory logistic regression analysis was carried out to identify factors determining the use of traditional medicine (TM). **Results:** We found out that 85.9% of parents used TM for their children. Herbal medicine 73 (34.4%), massage 55 (25.9%), and religious/prayer therapy 25 (11.8%) were the major therapies used by parents for their children. In the study area, the rate of parental TM utilization for their children was determined by monthly income [OR: 0.25(0.08, 0.78)], cultural belief [OR: 3.01(1.16, 7.83)], religious belief [OR = 3.17(1.26, 7.93)], and duration of illness [OR = 3.11(1.07, 9.02)]. **Conclusion:** Traditional medicine use is highly prevalent that its contribution to the public health is significant as some could not access to and afford modern health services in the area. Therefore, health professionals should advise parents side-by-side procuring modern health services. In light of this, further research will be needed on the safety and efficacy of TM for wider application.

**Keywords:** Traditional medicine, Children, Parents, Tole District, Ethiopia

**Hailu, R., Tolossa, D., & Alemu, G. (2020). Household Water Security Index: Development and Application in the Awash Basin of Ethiopia. *International Journal of River Basin Management*, 1–17.**

## **Abstract**

Despite water security becomes a complex global challenge; its assessments are spatially and temporally inconsistent. This affected water security monitoring at the local level. Some studies attempted to downscale national, regional or global level indicators to local scale, which have several shortcomings. Therefore, this study came up with a new Household Water Security Index to estimate the state of water security at a local level. The study constructed Household Water Security Index (HWSI) based on water resources availability (R), access (A), utilization (U), capacity (C), and environment (E), and water institution (I) indicators. It also tested the index using a sample district in the Awash Basin of Ethiopia. A cross-sectional firsthand data were collected from randomly selected 400 households. A multivariate technique called Principal Component Analysis (PCA) and bivariate correlation were employed. The result revealed that every household is either chronically or transitionally water unsecured. This was mainly due to poorly organized institutions, as well as lack of both the system and knowledge of water management systems under scarcity and surfeit. In some areas, there are moderate resource constraints. In other areas, the capacity to use water is very low. Yet the institutional performance was consistently weak. We concluded that first; macro-level indicators often obscure the local realities. Thus, the policy-makers and development planners need to prioritize the household's situations accordingly. Second, water resources availability with proper use and capacity plays a pivotal role to achieve household water security. Third, it is important to integrate institutional elements in water security as a mediating process and stewardship of the local needs. Fourth, the HWSI can be replicable at various scales and contexts, which could be considered for further research. Finally, recognizing the local arrangements and building the capacity of water actors are of paramount importance.

**Keywords:** Water security, institution, Awash basin, Household Water Security index, Ethiopia

**Hailu, R., & Tolossa, D. (2020). Multi-stakeholder platforms: Institutional options to achieve water security in the awash basin of Ethiopia. *World Development Perspectives*, 19, 100213.**

### **Abstract**

Securing water resources under common pool resources regime is becoming a challenge without proper collective actions. This paper explores Multi-stakeholder Platforms (MSPs) as a 'soft path' to realize water security using a case study of Awash River Basin. The data for this study were collected from various sources at multi-scale using a survey of key experts, in-depth interviews, focussed group discussions, participant observations, and document reviews. The data were systematically analysed using actors network analysis employing Ventism PLE for Windows Version 7.2, UCINET 6 for Windows, and Visualzyer 2.2 software. Moreover, descriptive statistics and content analyses were used. The result revealed that water resources involve Multi-stakeholder with various interests, priorities, sectors, and actors in the basin. Albeit, the vertical and horizontal linkages and interaction of the key actors are either loose or completely missed that affected the coordination mechanism. We argued that it is possible to negotiate the needs of all actors without endangering the water security of the others. MSPs- as an instrument to actualize collective actions- potentially realize this goal. To this end, we proposed three levels of MSPs based on the functions, mandates, and homogeneity of actors: (i) macro level, (ii) Meso level, and (iii) micro level. We believe that MSPs can be used as an institutional framework and pragmatically drive Integrated Water Resources Management in the basin. Thus, a successful platform requires reconciling various actors, sectors and uses, encouraging the water stewardship, as well as promoting Public-Private-Partnership in water resources management and development.

**Keywords:** Multistakeholders, Water security, Awash basin, Institutions, Coordination

**Tefera, T., Elias, E., & van Beek, C. (2020). Determinants of Smallholder Farmers' Decisions On Fertilizer Use for Cereal Crops in the Ethiopian highlands. *Experimental Agriculture*, 1, 11.**

### **Abstract**

This study identified decision variables influencing fertilizer adoption and optimal fertilizer rates among smallholder farmers in the Ethiopian highlands. The fertilizer adoption and fertilizer use were examined in four regional states using a questionnaire survey, which was administered to 2880 farm households. A double hurdle model was used to analyze factors influencing the two independent decisions of adoption of fertilizers and use of fertilizers. The model estimates of the first hurdle revealed that the probability of fertilizer adoption increased by 1.2% as household education status improved, by 1.4% for an increased number of active family members, by 5.6% with improved access to credit, by 3.4% with cooperative membership, by 3.3% with an increase in farm size, by 4.6% when soil and water conservation practices are employed, and by 3.4% when agroecology of the farm is located in the medium to highland zone. Conversely, the probability of fertilizer adoption reduced by 0.9% for an increase in family size, 0.6% with 1 km distance from all-weather road, 1.6% for a kilometer further to farm plots, and 0.9% for an increase in number of parcels. The intensity of use of fertilizers was influenced by education status of the household head, family size, access to credit, membership to cooperatives, use of crop rotation, annual income, number of farm plots owned, use of soil and water conservation, and agroecology. Therefore, a concerted effort is needed to encourage fertilizer adoption and optimum fertilizer use intensity by improving households' resource endowment, institutional capacity to deliver services, and infrastructure development.

**Elias, E., Teklu, B., & Tefera, T. (2020). Effect of Blended Fertiliser Application on Bread Wheat Yield, Agronomic Efficiency And Profitability on Nitisols of Southern Ethiopia. *South African Journal of Plant and Soil*, 37(4), 292–299.**

### **Abstract**

Continuous use of only N and P fertilisers that depletes secondary and micronutrients has been presented as a major cause for low wheat yields (2.2 t/ha) in the Ethiopian highlands. In this study, on-farm trials were conducted to compare the effects of multi-nutrient blended fertilisers on the wheat yield on Nitisols in southern Ethiopia. Five quantities of fertiliser blend (50, 100, 150, 200,

300 kg NPS + ZnB kg/ha) were compared against a newly introduced compound fertiliser (150 kg/ha NPS) and the conventionally used NP (Di-Ammonium Phosphate DAP) fertiliser at 150 kg/ha. Treatments were arranged in a randomized complete block design (RCBD) and replicated five times using farm fields as replicates. Results revealed that application of 200 and 300 kg/ha of NPS + ZnB blend fertiliser produced significantly ( $p < 0.01$ ) higher biomass (16.9 t/ha) and grain yield (3.7 t/ha) than the lower amounts. However, the marginal rate of return was highest for 100 kg NPS + ZnB/ha, but compared with DAP, the blend fertiliser did not produce significantly higher yield. Conversely, the agronomic nutrient use efficiency was significantly higher for NPS + ZnB blend suggesting the importance of balanced fertilization.

**keywords:** Agronomic efficiency, Blended fertiliser, Bread wheat feasibility, Yield components

**Tafere, T., Elias, E., & Koomen, I. (2020). *Drivers of Farm-level Adoption of Crop Extension Packages in Ethiopia*. Wageningen Centre for Development Innovation.**

### **Abstract**

Smallholder farmers' adoption of agricultural technologies varies to a great degree with respect to spatial diversity, household related characteristics, access to infrastructure and institutional design. This cross-sectional study was conducted in order to understand the factors affecting the uptake agricultural technologies in the highlands of Ethiopia. Analysis was conducted on data collected in 2014 from a survey of 2,880 households in four major regions of the country covering 30 districts. Econometric method (two-limit Tobit model) was used to analyse determinants of farm-level adoption of crop technology packages promoted by the national agricultural extension service. Findings reveal that 71%, 66%, 60%, 52%, 46% and 29% of the sample households adopted recommended technology packages for potato, wheat, maize, tef, barley, and sorghum respectively. Results demonstrate that agro-ecology and spatial variability, distance from homestead to farm plots, slope index of the farm, access to extension services, access to credit, lagged gross annual income and membership to a cooperatives were all significant factors influencing technology adoption. The study shows there is significant variation in technology adoption between model farmers and non-model farmers. However, the productivity difference is limited to few crops. The findings suggest that investment in infrastructure, promoting access to

institutional services and access to credit are instrumental to technology adoption by smallholders. The extension strategy should therefore promote inclusive strategy in which both model and non-model farmers have equal access to technology supply and extension services.

**Ahmed, J., Tefera, T., & Kassie, G. T. (2020). Consumers' Preference and Willingness To Pay for Enriched Snack Product Traits In Shashamane And Hawassa Cities, Ethiopia. *Agricultural And Food Economics*, 8, 1–20.**

### **Abstract**

This study investigated the consumers' preference and willingness to pay for enriched snack product traits. Using a choice experiment framework, we generated 8400 observations from a random sample of 700 respondents in Shashamane and Hawassa city administrations. Taste parameters and heterogeneities were estimated using the generalized multinomial logit (G-MNL) model. The results reveal nutrition and/or health claim labeling is the most influential trait on the consumers' decision to buy enriched snack products followed by mango flavor, sorghum chickpea main ingredient, price, and mixed shape. The WTP estimates show that consumers are willing to pay a premium for nutrition and/or health claim labeling equal to 1.43, 1.6, and 8.03 times higher than for a change in the flavor of the products from tomato to mango, the improvement of main ingredients to sorghum chickpea, and change of the product shape from spherical to mixed shape, respectively. The heterogeneities (variations) around the mean taste parameters were partially explained by sex, family size, and educational levels of the respondents. Generally, the consumers in the study areas prefer buying sorghum chickpea main ingredients, a combination of different shapes (mixed shape), mango flavored, and nutrition and/ or health claim-labeled enriched snack products. Therefore, we suggest designing and implementing innovative ways of promoting snack products to urban communities with a deliberate focus on these traits to create a snack with the best combination. Given the high literacy of urban consumers and influential role of nutrition and/or health claim labeling trait on consumers' decision, the trait-based promotion and marketing of the products constitute the right strategy.

**Keywords:** Choice experiment, Generalized multinomial logit, Preference heterogeneity, Snack products, Willingness to pay

**Tenaye, A. (2020). Sources of Productivity Growth in Ethiopian agriculture. *African Journal of Agricultural Research*, 15(1), 19–32.**

### **Abstract**

In Ethiopia, agricultural production and productivity are very low, and hence increase in production and productivity are vital to meet increasing food demand. This study identifies and quantifies the main sources of productivity growth in Ethiopian agriculture using the translog (TL) stochastic input distance function and the Ethiopian Rural Household Survey (ERHS) panel dataset. The true fixed effects (TFE) panel data estimator is used to separate inefficiency effects from observed and unobserved heterogeneity. The parametric Malmquist productivity index (MPI) is used to decompose total agricultural growth into three major sources. The average technical efficiency score was 0.875; this finding indicates that on average a farmer produces 87.5% of the value of the output that is produced by the most efficient farmer using the same technology and inputs. This implies that they can reduce the inputs required to produce the average output by 12.5% if their farming operation becomes technically efficient. MPI shows that the average annual productivity growth was 17.9% between 1994 and 2009. Further decomposition of the index shows that scale efficiency change is the most important source of this growth, and accounts for about 14.5%. Technological improvement accounts for approximately 4.8% while the contribution of technical efficiency change is negative, leading to an annual productivity decline of 1.3%. This finding suggests that increasing productivity is possible via improving these components by improving training to the farmers, extension services, research and development, and agronomic practices.

**Keywords:** Productivity growth, Translog stochastic input distance function, Malmquist productivity index, Ethiopia.

**Tenaye, A. (2020). Technical Efficiency Of Smallholder Agriculture in Developing Countries: The case of Ethiopia. *Economies*, 8(2), 34.**

### **Abstract**

The efficient use of inputs is indispensable in many developing countries, such as Ethiopia. This study assesses the level and determinants of technical efficiency of smallholder farmers using the true fixed effects (TFE) model. The TFE model separates inefficiency from unobserved

heterogeneity. Empirical data come from four rounds of panel data (1994–2009) from the Ethiopian rural household survey (ERHS). A one-step maximum likelihood estimator was employed to estimate the Cobb-Douglas stochastic frontier production function and factors influencing technical efficiency. The results indicated that the major variables affecting technical efficiency are policy responsive, albeit to varying degrees: education of the household head, family size, farm size, land fragmentation, land quality, credit use, extension service, off-farm employment, and crop share. The analyses also identify variables amenable to policy changes in the production function: labor, traction power, farm size, seeds, and fertilizer. The mean household-level efficiency for the surveyed farmers is 0.59, indicating that farmers could improve technical efficiency. This implies that smallholder farms in Ethiopia can reduce the input requirement of producing the average output by 41% if their operations become technically efficient. This study recommends that the above policy variables be considered to make Ethiopian smallholder farmers more efficient.

**Keywords:** Technical efficiency; Stochastic frontier; Cobb-Douglas production function; True fixed effects model; Ethiopia

**Tenaye, A. (2020). New Evidence Using a Dynamic Panel Data Approach: Cereal Supply Response in Smallholder Agriculture in Ethiopia. *Economies*, 8(3), 61.**

## **Abstract**

Increasing agricultural production is essential to improving food availability and farm household incomes in developing economies. This study investigated the dynamic supply responses of major cereal crops to price and nonprice factors in Ethiopia using the Ethiopian Rural Household Survey (ERHS) panel dataset from 1994 to 2009. According to the Nerlovian expectation and adjustment approach in conjunction with the system GMM (generalized method of moments) estimator, both the planted areas and produced yields of major crops (*teff*, wheat, and barley) are influenced by price and nonprice factors in Ethiopia. The supply of major cereal crops is affected positively by their own prices and negatively by the prices of substitute crops. Nonprice factors such as education, farm size, fertilizer, land quality, and precipitation also affect supply of major cereals. Both the short-term and long-term acreage and yield response elasticities of *teff* and barley are positive. Moreover, the adjustment coefficients are positive for *teff*, barley, and wheat. The results suggest that Ethiopian farmers are capable of analyzing market signals and responding positively



to price increases of staple crops. The findings also imply that the Ethiopian agricultural sector has been responsive to the cereal price increases observed since 2006. The remarkable growth of Ethiopian agriculture over recent decades is partly explained by the increase in agricultural prices. This study recommends that a fine-tuned balance between government interventions and market solutions is important, in addition to improving farmers' agronomic practices, for increasing agricultural production.

**Keywords:** System GMM; Acreage response; Yield response; Supply elasticity; Dynamic panel data approach; Major cereals; Ethiopia

## College of Natural and Computational Sciences

**Keneni, Y. G., Hvoslef-Eide, A. K. T., & Marchetti, J. M. (2020). Optimization of the Production of Biofuel From Jatropha Oil Using A Recyclable Anion-Exchange Resin. *Fuel*, 278, 118253.**

### Abstract

The study of an anion-exchange resin (Amberlyst A26 (OH)) catalyzed transesterification of Jatropha (*Jatropha curcas* L.) oil was conducted to determine the effects of three variables: reaction temperature, ethanol: oil molar ratio and catalyst amount, on Jatropha oil conversion ( $X_{JO}$ ) and fatty acid ethyl esters yield's ( $Y_{FAEEs}$ ). The modified central composite design that involved three independent factors (temperature, ethanol: oil molar ratio and the catalyst present) with two levels, but not included the non-linear stage, was employed to optimize the process. From the main factors and their interactions, the ethanol: oil molar ratio was found to highly affect the  $X_{JO}$  and  $Y_{FAEEs}$ . In this study, the statistical analysis showed that curvature is not significant ( $p \leq 0.05$ ), and thus, from the model regression equations, linear model was found to be more suitable to optimize the responses. By using the regression analysis and the response surface plots, the optimum  $X_{JO}$  and  $Y_{FAEEs}$  of 37.63% and 36.31%, respectively were predicted to be obtained at the optimum temperature of 55 °C, ethanol: oil molar ratio of 35:1 and catalyst amount of 15%. Employing higher amount of catalyst reduced the  $X_{JO}$  and  $Y_{FAEEs}$ , particularly, when the variable interacted with the reaction temperature.

**Keywords:** Amberlyst A26 (OH), Biodiesel, Heterogenous catalyst, *Jatropha curcas* L.oil, optimization, Transesterification.

**Keneni, Y. G., Bahiru, L. A., & Marchetti, J. M. (2020). Effects of Different Extraction Solvents on Oil Extracted from *Jatropha* Seeds and the Potential of Seed Residues as a Heat Provider. *BioEnergy Research*, 1–16.**

### **Abstract**

The present study focuses on the determination of oil contents of thirteen different *jatropha* seed collections from Ethiopia. The oil was extracted with a Soxhlet extractor using n-hexane which was selected out of four different solvents: diethyl ether, ethanol, n-heptane, and n-hexane. Cotton and thimble were used as filter for the extractions. Some properties of the oil of Chali seed collection and a sample of mixed oils (a mixture of equal volume of oils from thirteen different seed collections) were determined. The energy contents of selected de-oiled *jatropha* seed residues were also estimated. In the extraction with cotton and thimble, the largest percentage of oil yield was obtained from Dana seed (48.29%) and Chali seed (45.79) collections, respectively. The acid value (1.32 mg KOH/g) and percentage of free fatty acids (%FFA) (0.66%) of Chali seed oil were lower than the acid value (2.12 mg KOH/g) and %FFA (1.06%) of the mixed oil, and thus, the former oil is more suitable for alkaline-catalyzed biodiesel production. The iodine values of both Chali seed oil (116.02 g/100 g) and mixed oil (109.24 g/100 g) did not exceed the maximum standard for biodiesel according to the European EN 14214 specification, and the oils could be used for biodiesel production. The gross calorific values of de-oiled *jatropha* seed residues after oil extraction were found to range from 18.57 to 24.03 MJ/kg, and with the average value of 19.64 MJ/kg. Thus, the de-oiled seed residues can be used as the source of heat.

**Habte, A. G., Hone, F. G., & Dejene, F. B. (2020). Influence of Annealing Temperature on The Structural, Morphological and Optical Properties of SnO<sub>2</sub> Nanoparticles. *Physica B: Condensed Matter*, 580, 411760.**

### **Abstract**

Nano crystalline tin dioxide (SnO<sub>2</sub>) were synthesized using co-precipitation method by varying the annealing temperature from 400 °C to 800 °C in step of 100 °C. The X-ray diffraction patterns showed a rutile tetragonal crystallized structure of all the prepared samples. It further displayed that the crystallinity was improved with annealing temperature. The scanning electron microscope study verified that the morphological features changed from tiny to nearly large spherical shape particles as the annealing temperature was increased. The energy dispersive X-ray spectroscopy

studies revealed that the prepared nanomaterials were composed of tin and oxygen elements. The optical properties of the nanostructure were studied in the wavelength range of 250–800 nm by means of UV–Vis spectroscopy technique. It indicated that with increase in annealing temperature the absorption edge was red shifted. The photoluminescence measurement at an excitation wavelength of 340 nm displayed weak and strong emissions in the UV region.

**Keywords:** Tin oxide, co-precipitation, Heat treatment, Photoluminescence

**Habte, A. G., Hone, F. G., & Dejene, F. B. (2020). Effect of Solution Ph On Structural, Optical and Morphological Properties Of SnO<sub>2</sub> Nanoparticles. *Physica B: Condensed Matter*, 580, 411832.**

### **Abstract**

Nano crystalline tin dioxide (SnO<sub>2</sub>) nanostructure was synthesized by co-precipitation technique by varying the pH value of the solution from 7 to 11. The structural, optical properties and surface morphology of the prepared SnO<sub>2</sub> nanostructure were studied by X-ray diffraction (XRD), UV–Vis spectroscopy, scanning electron microscope (SEM) and energy dispersive X-ray spectroscopy (EDX). The XRD study revealed the formation of tetragonal structure. The average crystallite size was found in the range of 15–21 nm. The SEM images showed that samples consist of agglomerated spherical grains. The EDX analysis confirmed the existence of the expected elements, tin and oxygen in the prepared samples. The optical band gap was found to increase with increasing of pH. This blue shift might be due to quantum confinement effect. The PL measurement displayed two emission peaks due to the near band edge emission and surface defects present in the systems.

**Keywords:** Tin dioxide, Co-precipitation, pH, Optical properties

**Belay, A., Mekuria, M., & Adam, G. (2020). Incorporation of Zinc Oxide Nanoparticles In Cotton Textiles for Ultraviolet Light Protection and Antibacterial Activities. *Nanomaterials and Nanotechnology*, 10, 1847980420970052.**

## **Abstract**

The textile materials functionalized with nanostructures have proven to be useful for many applications, such as antimicrobial, ultraviolet (UV) light protection, and self-cleaning substrates. The objective of this research is to synthesize and characterize zinc oxide (ZnO) nanoparticles (NPs) for the applications of UV absorbers and antibacterial activities. ZnO NPs were synthesized at different temperatures and reaction media of water (S-1) and 1,2-ethanediol (S-2) using precipitation and in situ methods on the surface of cotton fabric. The average crystalline size of the ZnO NPs estimated from the Debye Scherrer formula was found to be 32 and 26 nm for S-1 and S-2, respectively. The morphology of ZnO NPs characterized by scanning electron microscope revealed that agglomerated nanostructures were homogeneously formed on the fabric surface for S-1 and S-2; on the other hand, bundle-/flower-like particles having different sizes were observed for synthesis using an in situ method. The UV protection ability of ZnO NPs coated on textiles was investigated using UV-Vis spectroscopy by measuring the UV protection factor (UPF) in the range of 280–400 nm. Higher values of UPF were obtained for ZnO NPs prepared using an in situ method. The UPF value obtained by this method was found to be 320, which demonstrates its excellent ability to block UV radiation. The antibacterial activities of ZnO NPs synthesized by the two methods possess very good bacteriostatic activity against *Staphylococcus aureus* and *Escherichia coli* bacteria demonstrated by the zone of inhibition.

**Keywords:** UPF, ZnO NPs, In situ method, Cotton fabrics

**Tula, A., Mikru, A., Alemayehu, T., & Dobo, B. (2020). Bacterial Profile and Antibiotic Susceptibility Pattern of Urinary Tract Infection among Pregnant Women Attending Antenatal Care at a Tertiary Care Hospital in Southern Ethiopia. *Canadian Journal of Infectious Diseases and Medical Microbiology*, 2020.**

## **Abstract**

### **Background**

Urinary tract infection (UTI) is a common and important clinical problem in pediatrics. Recurrent UTIs may lead to renal scarring, hypertension, and end-stage renal dysfunction later in life. The objective of the study was to determine bacterial profile and antimicrobial susceptibility pattern of urinary tract infections (UTIs) among children attending Felege Hiwot Referral Hospital (FHRH).

### **Methods**

A cross-sectional study was conducted from February 2013 to May 2013 among children 5–15 years of age with symptoms of UTI. Samples were processed for culture and identification. Antimicrobial susceptibility was done for positive urine cultures by the Kirby-Bauer's disk diffusion method based on standards of the Clinical Laboratory Standard Institute (CLSI). Data were entered into Epi-data version 3.2.1 and exported to the Statistical Package for the Social Science (SPSS) version 20 statistical software. Fisher's exact test and binary logistic regression test results were used.

### **Results**

A total of 259 urine samples were collected from children with UTI. The result revealed 41 (15.8%) samples had significant bacteriuria, among which the most prevalent pathogen was *E. coli* 14 (34.1%) followed by *Pseudomonas* species. Gram-negative bacteria showed high level of sensitivity to ciprofloxacin (70), norfloxacin (63.4%) and ceftriaxone (60%), whereas the level of resistance was high to ampicillin (80%) and nitrofurantoin (70%). Gram-positive isolates showed high sensitivity to ciprofloxacin (77.8%), penicillin (72.8%) and erythromycin (72.7%). Multiple drug resistance (MDR) for Gram-positive and Gram-negative bacteria was 100% and 83.1%, respectively.

## Conclusion

*E. coli* is the predominant bacteria isolated in the present study. The results showed that the prevalence of resistance to at least one antibiotic to commonly prescribed antimicrobials was high. Hence, the guidelines for empiric treatment of UTI should be re-evaluated periodically based on local studies.

**Keywords:** Urinary tract infection, Significant bacteriuria, Antimicrobial susceptibility, Children

**Lulu, M., Lemma, B., & Melese, A. (2020). Soil organic Carbon and Nutrients in Smallholding Land Uses In Southern Ethiopia. *Journal of Plant Nutrition and Soil Science*, 183(1), 69–79.**

## Abstract

This study assessed the soil organic C (SOC) and soil nutrients in smallholding home garden, woodlot, grazing land, and cropland at two soil depths and two sites in Wolaita Zone, southern Ethiopia. The results showed that soil properties were significantly influenced by land use. The home garden had significantly higher ( $p < 0.05$ ) SOC and soil nutrients when compared to the cropland. When the home garden was compared to the woodlot and grazing land uses, it had significantly higher ( $p < 0.05$ ) values except in SOC, total N (TN), cation exchange capacity (CEC), and exchangeable Ca. Cropland, in comparison with grazing land and woodlot, had a non-significant difference except TN. The SOC stock (0–40 cm) in the home garden, woodlot, grazing land and cropland was 79.5, 68.0, 65.0, and 58.1 Mg ha<sup>-1</sup>, respectively. Home garden significantly differed ( $p \leq 0.05$ ) in SOC only from cropland, and this was attributed not only to the relatively higher organic input in the home garden but also to the little organic matter input and frequently tillage of the cropland. The similar SOC among the home garden, woodlot and grazing lands may imply that the balance between inputs and outputs could be nearly similar for the land uses. Soil TN and CEC had a nearly similar pattern of difference as in SOC among the land uses because of their close relationship with SOC. In general, the land use influence on soil nutrients can be in the order: home garden > wood land  $\approx$  grazing land  $\approx$  cropland, with home garden showing the least difference from the woodlot and the greatest from the cropland. In the agroecosystem, in general,

the influence of smallholding home garden on SOC and soil nutrient was marginally different from *Eucalyptus* woodlot and grazing lands but evidently different from cropland.

**Hido, A., Tolera, M., Lemma, B., & Evangelista, P. H. (2020). Population Status and Resin Quality of Frankincense *Boswellia neglecta* (Burseraceae) Growing in South Omo, Southwestern Ethiopia. *Journal of Sustainable Forestry*, 39(6), 620–634.**

### **Abstract**

A study was conducted in South Omo Zone, Ethiopia with the aim of assessing the population status of the frankincense tree *Boswellia neglecta* and investigating its resin essential oil chemical composition. The status of populations of *B. neglecta* was assessed by examining the density, abundance, frequency, dominance, importance value index, and population structure. Resin sample was analyzed for the physicochemical properties. The composition of the essential oil was analyzed with Gas Chromatography-Mass Spectrometry. The high values of density, abundance, frequency, dominance, and importance value index for *B. neglecta* showed the potential of the tree for bulk resin collection. *Boswellia neglecta* had a bell-shaped diameter distribution indicating a hampered regeneration. The *B. neglecta* resin had a moisture content of 2.68%, ash content of 0.99%, pH of 5.7, and oil yield of 5.92%. The resin possessed good quality as compared to resins in other reports. The essential oil was optically active ( $-31.6^\circ$  at  $23.2^\circ\text{C}$ ). The essential oil contained several compounds, but 71.1% of the composition were formed mainly from methyl oleate, methyl linoleate, methyl palmitate, which have not been reported from *B. neglecta*. Sustainable management must be enacted since the agro-pastoralist mode of life hinders regeneration of the species and its resin resources.

**Keywords:** Abundance, Essential oil, Frankincense tree, Importance value index, Resin quality

**Kitabo, C. A., & Damtie, E. T. (2020). Bayesian Multilevel Analysis of Utilization of Antenatal Care Services in Ethiopia. *Computational and Mathematical Methods in Medicine*, 2020.**

### **Abstract**

In sub-Saharan Africa, 72% of pregnant women received an antenatal care visit at least once in their pregnancy period. Ethiopia has one of the highest rates of maternal mortality in sub-Saharan African countries. So, this high maternal mortality levels remain a major public health problem.



According to EDHS, 2016, the antenatal care (ANC), delivery care (DC), and postnatal care (PNC) were 62%, 73%, and 13%, respectively, indicating that ANC is in a low level. The main objective of this study was to examine the factors that affect the utilization of antenatal care services in Ethiopia using Bayesian multilevel logistic regression models. The data used for this study comes from the 2016 Ethiopian Demographic and Health Survey which was conducted by the Central Statistical Agency (CSA). The statistical method of data analysis used for this study is the Bayesian multilevel binary logistic regression model in general and the Bayesian multilevel logistic regression for the random coefficient model in particular. The convergences of parameters are estimated by using Markov chain Monte-Carlo (MCMC) using SPSS and MLwiN software. The descriptive result revealed that out of the 7171 women who are supposed to use ANC services, 2479 (34.6%) women were not receiving ANC services, while 4692 (65.4%) women were receiving ANC services. Moreover, women in the Somali and Afar regions are the least users of ANC. Using the Bayesian multilevel binary logistic regression of random coefficient model factors, place of residence, religion, educational attainment of women, husband educational level, employment status of husband, beat, household wealth index, and birth order were found to be the significant factors for usage of ANC. Regional variation in the usage of ANC was significant.

**Kitabo, C. A. (2020). Bayesian Spatial and Trend Analysis on Ozone Extreme Data in South Korea: 1991–2015. *Advances in Meteorology*, 2020.**

## **Abstract**

*Background.* Extreme events like flooding, extreme temperature, and ozone depletion are happening in every corner of the world. Thus, the need to model such rare events having enormous damage has been getting priorities in most countries of the world. *Methods.* The dataset contains the ozone data from 29 representative air monitoring sites in South Korea collected from 1991 to 2015. Spatial generalized extreme value (GEV) using maximum likelihood estimation (MLE) and two max-stable and Bayesian kriging models are the statistical models used for analysis. Moreover, predictive performances of these statistical models are compared using measures like root-mean-squared error (RMSE), mean absolute error (MAE), relative bias (rBIAS), and relative mean separation (rMSEP) have been utilized. *Results.* From the time plot of ozone data, extreme ozone concentration is increasing linearly within the specified period. The return level of ozone concentration after 10, 25, 50, and 100 years have been forecasted and showed that there was an

increasing trend in ozone extremes. High spatial variability of ozone extreme was observed, and those areas around the territories were having extreme ozone concentration than the centers. Moreover, Bayesian Kriging brought about relatively the minimum RMSE compared to the other models. *Conclusion.* The extreme ozone concentration has clearly showed a positive trend and spatial variation. Moreover, among the models considered in the paper, the Bayesian Kriging has been chosen as the better model.

**Tole, T. T., Jordaan, J. H., & Vosloo, H. (2020).  $\alpha$ -Pyridinyl alcohols,  $\alpha, \alpha'$ -pyridine diols,  $\alpha$ -bipyridinyl alcohols, and  $\alpha, \alpha'$ -bipyridine diols as Structure Motifs Towards Important Organic Molecules and Transition Metal Complexes. *Current Organic Synthesis*, 17(5), 344–366.**

### **Abstract**

**Background:** The preparation and use of pyridinyl alcohols as ligands showed incredible increment in the past three decades. Important property of pyridinyl alcoholato ligands is their strong basicity, which is mainly due to the lack of resonance stabilization of the corresponding anion. This strongly basic anionic nature gives them high ability to make bridges between metal centers rather than to bind to only one metal center in a terminal fashion. They are needed as ligands due to their ability to interact with transition metals both covalently (with oxygen) and hemilabile coordination (through nitrogen).

**Objective:** The review focuses on the wide application of  $\alpha$ -pyridinyl alcohols,  $\alpha, \alpha'$ -pyridine diols,  $\alpha$ -bipyridinyl alcohols, and  $\alpha, \alpha'$ -bipyridine diols as structure motifs in the preparation of important organic molecules which is due to their strongly basic anionic nature.

**Conclusion:** It is clear from the review that in addition to their synthetic utility in the homogeneous and asymmetric catalytic reactions, the preparation of the crown ethers, cyclic and acyclic ethers, coordinated borates (boronic esters), pyridinyl-phosphine ligands, pyridinyl-phosphite ligands, and pyridinyl-phosphinite ligands is the other broad area of application of pyridinyl alcohols. In addition to the aforementioned applications they are used for modeling mode of action of enzymes and some therapeutic agents. Their strongly basic anionic nature gives them high ability to make bridges between metal centers rather than to bind to only one metal center in a terminal fashion in

the synthesis of transition metal cluster complexes. Not least numbers of single molecule magnets that can be used as storage of high density information were the result of transition metal complexes of pyridinyl alcoholato ligands.

**Keywords:** Complex; Crown Ether; Polyether; Preparation; Pyridinyl-Phosphine Ligand; Pyridinyl-Phosphinite Ligand; Pyridinyl-Phosphite Ligand

**Jasrotia, R., Kour, S., Puri, P., Jara, A. D., Singh, B., Bhardwaj, C., Singh, V. P., & Kumar, R. (2020). Structural and magnetic investigation of  $Al^{3+}$  and  $Cr^{3+}$  substituted Ni–Co–Cu nanoferrites for Potential Applications. *Solid State Sciences*, 110, 106445.**

### Abstract

Nanocrystalline  $Al^{3+}$  and  $Cr^{3+}$  doped Ni–Co–Cu ferrites with the chemical composition  $Ni_{0.7}Co_{0.2}Cu_{0.1}Al_{0.5x}Cr_{0.5x}Fe_{2-x}O_4$  ( $x = 0.0, 0.1, 0.2$ ) were prepared for demonstrating their structural, surface morphological and magnetic characteristics. The technique used for synthesizing the doped and undoped Ni–Co–Cu nanoferrites was sol-gel auto-combustion technique. The existence of single phase was confirmed with the help of X-ray diffractometry (XRD) which indicates the presence of spinel cubic structure for the synthesized specimens. The crystallite size (D) was determined from the highest intense (311) peak of the observed x-ray diffraction patterns by Debye-Scherrer formula and it was found in the dimensions of 44–55 nm. FESEM micrographs shows the existence of agglomerated and spherical magnetic nanoparticles with an average grain size of 63–78 nm. The prepared samples were examined with energy dispersive x-ray spectroscopy for the analysis of purity of synthesized samples and thus, from the EDX spectrum, only peaks of nickel, cobalt, copper, aluminium, chromium, iron and oxygen were observed which confirms the high purity of our results to a next level. The magnetic study was taken into consideration by vibrating sample magnetometer (VSM) and therefore, from the M – H curves data, various magnetic parameters were calculated. From the M – H loops measurements, the maximum of saturation magnetization ( $M_s$ ) observed was 52.49 emu/g along with few hundreds of coercivity ( $H_c$ ) indicating the ferromagnetic and soft behaviour of synthesized specimens. Therefore, in the present investigation, excellent values of saturation magnetization (28.11–52.49 emu/g) and coercivity (536.6–591.02 Oe) were obtained making these nanoferrites suitable for the high-density recording media and electromagnets application.

**Keywords:** Ni-Co-Cu nanoparticles, Sol-gel auto-combustion preparation, XRD analysis, M-H loops.

**Jara, A. D., Woldetinsae, G., Betemariam, A., & Kim, J. Y. (2020). Mineralogical and Petrographic Analysis on the Flake Graphite ore From Saba Boru area in Ethiopia. *International Journal of Mining Science and Technology*, 30(5), 715–721.**

### **Abstract**

The mineralogy and petrography of natural graphite in Saba Boru of Ethiopia indicate that there exists flake graphite with a slightly oval structured fine size according to our study on thin and polished sections. Herein, for estimating the carbon content in graphite, the ASTM-C561, the test method for ash in a graphite sample, was used. For characterizing graphite, x-ray diffraction, x-ray fluorescence, inductively coupled plasma mass spectroscopy, and scanning electron microscopy were also used. Chemical analysis of ore samples determined that the average compositions are 63.35% SiO<sub>2</sub>, 15.45% Al<sub>2</sub>O<sub>3</sub>, 2.36% Fe<sub>2</sub>O<sub>3</sub>, 2.07% K<sub>2</sub>O, less than 1% others, and loss-on-ignition (LOI) in the range of ~4.74%–37.42%. The total carbon content of graphitic ore ranged from 4.11% to 33.14%. Importantly, when graphite is concentrated through floatation, its average purity and recovery are 92.97% and 90.82%, respectively. Furthermore, once the graphite concentrates are treated with hydrofluoric acid, the average value attains a high grade of 96.48% C. Moreover, the average ash content is 81.93% (pre-flotation) and 3.1% (post-flotation), respectively. Finally, after beneficiation, a silica is identified as a major gangue (85.88%), usable as a raw material for other purposes such as cement. Hence, these graphite-bearing rocks seem to be worth exploring for commercialization opportunities.

**Keywords:** Mineralogy, Petrography, Flake Graphite, Flotation, Saba Boru, Ethiopia

**Andualem, W. W., Sabir, F. K., Mohammed, E. T., Belay, H. H., & Gonfa, B. A. (2020). Synthesis of Copper Oxide Nanoparticles Using Plant Leaf Extract of *Catha edulis* and Its Antibacterial Activity. *Journal of Nanotechnology*, 2020.**

### **Abstract**

Development of green technology is generating interest of researchers towards ecofriendly and low-cost methods for biosynthesis of nanoparticles (NPs). In this study, copper oxide (CuO) NPs were synthesized using a copper nitrate trihydrate precursor and *Catha edulis* leaves extract as a

reducing and capping agent during the synthesis. The biosynthesized CuO NPs were characterized using an X-ray diffractometer (XRD), scanning electron microscopy-energy-dispersive X-ray spectroscopy (SEM-EDS), transmission electron microscope (TEM), Ultraviolet visible spectroscopy (UV-Vis), and Fourier transform infrared (FTIR) spectroscopy. XRD characterization confirmed that the biosynthesized CuO NPs possessed a good crystalline nature which perfectly matched the monoclinic structure of bulk CuO. Furthermore, the results obtained from SEM and TEM showed that the biosynthesized CuO NPs were spherical in shape. EDS characterization of the biosynthesized NPs also indicated that the reaction product was composed of highly pure CuO NPs. Moreover, the antimicrobial activities of different concentrations of CuO NPs synthesized using *Catha edulis* extract were also tested. Accordingly, the result showed that the highest zone of inhibitions measured were for CuO NPs synthesized using 1 : 2 ratios at 40 mg/ml solution concentration and observed to be  $22 \pm 0.01$  mm,  $24 \pm 0.02$  mm,  $32 \pm 0.02$  mm, and  $29 \pm 0.03$  mm for *S. aureus*, *S. pyogenes*, *E. coli*, and *K. pneumonia*, respectively.

**Sime, G., Tilahun, G., & Kebede, M. (2020). Assessment of Biomass Energy Use Pattern and Biogas Technology Domestication Programme in Ethiopia. *African Journal of Science, Technology, Innovation and Development*, 12(6), 747–757.**

### **Abstract**

Biogas is an energy-efficient and environmentally beneficial technology used as an alternative to biomass energy sources. The objective of this study was to evaluate the traditional biomass energy system in Ethiopia and the National Biogas Program of Ethiopia (NBPE) as an alternative energy system. The study involved key informants, government legislation documents and strategy papers, bio-digester operating households and extensive literature reviews. The article provides a review of relevant literature in terms of both biogas technology and policy documents and related strategies in the Ethiopian context that support the NBPE. The literature review touches on both the technology itself and the policy aspects from within the country, sub-Saharan Africa and Asian countries. Furthermore, the article provides effective use and assessment of the findings for theory and policy of traditional biomass energy systems and biogas technology programmes. We argue that biogas technology is crucial as alternative sources of energy in Ethiopia, specifically for rural areas as it negates the disproportionate use of available traditional energy sources of firewood, cow dung, agricultural residues and charcoal

**Keywords:** Bio-Digester, Biogas Energy, Biomass Energy, Biogas Programme, Energy Policy, Rural Household, Ethiopia

**Sime, G. (2020). Technical and Socioeconomic Constraints to The Domestication and Functionality of Biogas Technology In Rural Areas Of Southern Ethiopia. *Cogent Engineering*, 7(1), 1765686.**

### **Abstract**

Although biogas technology has been introduced as a national program to respond to the ever-increasing energy demand in Ethiopia, empirical studies on the technical, institutional and socioeconomic constraints to the domestication and functionality of the technology are scant. Thus, this study provides an overview of these constraints. The study is based on, key-informant interviews, legislation and strategy documents, extensive literature reviews and observation of bio-digesters. Limitations in technical, economic, sociocultural and institutional perspectives are the major factors constraining the domestication and functionality of the technology. The constraints pertain to the adequacy of institutional follow-up; management of bio-slurry; availability and cost of maintenance service; price, availability and accessibility of appliances at local markets; availability of credit associations; adequacy of masons skill; skill and level of awareness of users; and sociocultural acceptance to connecting toilets to bio-digesters. Primarily, these constraints emanate from the weak organizational and institutional alignment among key stakeholders. Thus, for the realization of sustainable domestication of the technology and renewable energy policy, there is a need to emphasize on dissemination, monitoring and ownership strategies as well as on operationalizing institutional commitments.

**Keywords:** Biogas Technology, Rural Energy Security, Rural Household, Constraints, Ethiopia

**Desta, G. A., Melka, Y., Sime, G., Yirga, F., Marie, M., & Haile, M. (2020). Biogas Technology in Fuelwood Saving and Carbon Emission Reduction in Southern Ethiopia. *Heliyon*, 6(10), e04791.**

## **Abstract**

Most rural communities in developing countries, rely heavily on traditional biomass for cooking and lighting. Furthermore, a large area of forest land has been changed to other land-use types like agricultural land is becoming a serious problem in Wondo Genet district. This situation largely contributed to deforestation and forest degradation. Hence, assessing the efficiency of adopting an alternative source of energy was found to be very important. This study was carried out to examine the role of biogas technology in fuelwood saving and carbon emission reduction in Wondo Genet district, southern Ethiopia. The multi-stage sampling procedure was followed to select sample households. A total of 152 households (54 adopters and 98 non-adopters) were involved in the household survey. Moreover, 25 test subjects were taken randomly from both adoption categories to conduct Kitchen Performance Test. Descriptive statistics and independent-sample t-test were used to analyze the data. Results showed that the major fuel sources for domestic use were plantation forest, natural forest, crop residue, and animal dung, accounting 46.71 %, 30.92 %, 15.13 %, and 7.24 %, respectively. Among the 54 sampled biogas plants, 32 (59.26 %) were a digester size of 6 m<sup>3</sup> whereas the remaining 22 (40.74 %) were of 8 m<sup>3</sup>. The annual fuelwood saving potential of the technology was found to be 1423.06 kg with an emission reduction potential of 2.1 tons of CO<sub>2</sub> e per biogas plant annually. Accordingly, all functional biogas plants were estimated to reduce about 91.63 tons of carbon emission annually. Generally, the biogas was found to be a promising technology in combating the pressure on forest resources and mitigating climate change. Therefore, the energy sector of the country should encourage households to adopt biogas plants that have more than 8 m<sup>3</sup> digester size to improve the fuelwood and carbon emission reduction potential.

**Keywords:** Adopter, Biogas Energy, Deforestation, Fuelwood, Greenhouse gas emission

**Shallo, L., Ayele, M., & Sime, G. (2020). Determinants of Biogas Technology Adoption in Southern Ethiopia. *Energy, Sustainability and Society*, 10(1), 1–13.**

## **Abstract**

### **Background**

Renewable energies such as biogas are considered as clean sources of energy that minimize environmental impacts and are sustainable with regard to current and future economic and social needs. Biogas offers an attractive option for replacing the unsustainable usage of traditional energy sources such as firewood, cow dung, and charcoal in developing countries. In Ethiopia, these energy sources have been in decline. To address these challenges, mainly in rural areas, biogas technology has been domesticated since 2009, as seen in the National Program. The purpose of this study is thus to examine factors that influence households' decisions of adopting biogas technology in rural areas in southern Ethiopia.

### **Methods**

A sample of 268 households with 134 biogas adopters and 134 non-adopters were surveyed using simple random and purposive sampling techniques, respectively. The data were collected through individual interviews of households using a semistructured questionnaire. Descriptive statistics and a binary logistic regression model were used for the data analysis. The binary logistic regression model was applied to identify determinant factors affecting the adoption of biogas technology.

### **Results**

The results of the study indicated that biogas adopter and non-adopter households had significant mean differences in education level, cattle size, household income, farmland size, number of planted trees as well as the distance to water sources, market places, and firewood sources. Level of education, level of income, access to credit, distance to firewood sources, and access to electronic media had a significantly positive influence on the adoption of biogas technology. Conversely, distance to water sources and access to electricity had a significantly negative influence on the adoption of biogas technology.



## Conclusions

Biogas technology mostly appears in privileged households having a better socioeconomic status and other resource endowments. The beneficiaries are thus households that can afford the higher initial investment costs for bio-digester installation, maintenance services and purchasing bio-digester spare parts; as well as households that have access to credit facilities, water sources for adequate water supply, markets for purchasing spare parts and electronic media for information, and also households residing far away from firewood sources.

**Getnet, H., Kifle, D., & Fetahi, T. (2020). Water Hyacinth (*Eichhornia crassipes*) Affects the Composition and Abundance of Zooplankton in the Littoral Region of Koka Reservoir, Ethiopia. *African Journal of Aquatic Science*, 45(4), 486–492.**

## Abstract

Water hyacinth, *Eichhornia crassipes* (Martius) Solms 1883, is a rampant invasive aquatic plant that is recognised as one of the ten worst weeds in the world. Its appearance in Koka Reservoir was reported in 1965 and since then it has become a major threat to the aquatic ecosystem. Despite numerous limnological studies on Koka Reservoir, the effects of water hyacinth on zooplankton has not been addressed previously. To assess this, samples were collected from three weed-infested and three non-infested sites from March to July 2018. The zooplankton community living, which was constituted of 38 species, was dominated by Rotifers, followed by copepods and cladocerans at both sites. The variations in the abundance of zooplankton and species richness ( $d$ ) between the two sites were significant with higher mean values in the non-infested sites ( $p < 0.05$ ). The existing infestation level of water hyacinth poses a significant effect on the composition and abundance of zooplankton. Therefore, continuous follow-up, such as physical removal of the weed and constructing buffer zone and designing sustainable management strategies, have to be addressed.

**Keywords:** Biomas, Community Structure, Ecosystem, Foodweb

**Shallo, L., Ayele, M., & Sime, G. (2020). Determinants of Biogas Technology Adoption in Southern Ethiopia. *Energy, Sustainability and Society*, 10(1), 1–13.**

## **Abstract**

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Renewable energies such as biogas are considered as clean sources of energy that minimize environmental impacts and are sustainable with regard to current and future economic and social needs. Biogas offers an attractive option for replacing the unsustainable usage of traditional energy sources such as firewood, cow dung, and charcoal in developing countries. In Ethiopia, these energy sources have been in decline. To address these challenges, mainly in rural areas, biogas technology has been domesticated since 2009, as seen in the National Program. The purpose of this study is thus to examine factors that influence households' decisions of adopting biogas technology in rural areas in southern Ethiopia.

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**Haile, H., & Dejene, F. (2020). The Influence of Deposition Gases on the Material Properties of  $\text{Y}_2\text{SiO}_5$ :  $\text{Ce}^{3+}$  thin films Deposited by Pulsed Laser Deposition (PLD) method. *Materials Research Express*, 7(7), 076406.**

## Abstract

The material properties of  $\text{Y}_2\text{SiO}_5$ :  $\text{Ce}^{3+}$  thin films have been investigated. The X-ray powder diffraction (XRD) analysis shows that the films are structurally monoclinic with the most prominent diffraction peak of  $15.7^\circ$ . The maximum crystallize size was obtained for samples deposited under oxygen deposition. The PL emission peaks are observed at 423 nm when probed at 370 nm, which can be ascribed to the transition of the electrons from the excited state of 5d to the ground state of 4f. Due to the spin–orbit interactions, the 4f ground state splits into  $^2\text{f}_{5/2}$  and  $^2\text{f}_{7/2}$  energy sub-levels. The scanning electron microscopy (SEM) measurement shows a rough and uniform distribution of grains with small agglomerated topographic areas. The energy dispersive spectroscopy (EDS) measurements shows the presence of all elements (Y, Si, O, and Ce). The maximum and minimum absorbance of the visible ultraviolet (UV–vis) spectrum was observed for the thin films deposited under the Argon and vacuum atmospheres with small shifts from Argon to the other depositions. The energy bandgap varies between 3.14 and 4.33 eV. The CIE measurement gives the blue emission band at an emission wavelength of 423 nm. The activation energy was obtained in the range of 0.1733 and 0.1938 eV. The maximum activation energy was obtained under the argon gas deposition.

**Asmare, K., Sibhat, B., Demissie, K., Mamo, G., Skjerve, E., & Amini, G. (2020). Tuberculosis in Small Ruminants and Dromedary Camels In Ethiopia: A Systematic Review And Meta-Analysis. *Preventive Veterinary Medicine*, 105181.**

## **Abstract**

Tuberculosis (TB) is a chronic infectious disease of livestock with serious economic and public health impact in Ethiopia. The disease is reported from cattle, small ruminants and dromedary camels in the country. However, there is no organized summary report on the magnitude and distribution pattern of TB in small ruminants and dromedary camels, unlike that of bovine TB. Consequent to this gap, this review was organized to provide pooled prevalence estimates, and examine level of heterogeneity among studies at national level. In addition, it attempts to illustrate the spatial distribution patterns along the three livestock species based on available reports. Tuberculosis articles on the aforesaid livestock species were searched online using PubMed, CAB direct, Web of Science and AJOL databases. Eighteen articles published from January 2000 to May 15, 2020, written in the English language that fulfill the selection quality criteria were considered for the review. Altogether, 50 district based observational studies conducted on 10,371 goats, 6262 dromedary camels, and 1457 sheep were used for analysis. Accordingly, the pooled prevalence estimates of TB, in a random effect model were 2.3 % (95 % CI: 1.7, 3.1) for goats, 0.8 % (95 % CI: 0.5, 1.4) for sheep and 8.2 % (95 % CI: 6.6, 10.2) for dromedary camels. The subgroup analysis revealed presence of statistically significant differences ( $p < 0.001$ ) in pooled prevalence estimates among the three species. In multivariable meta-regression model, diagnostic methods used for screening (single intra-dermal comparative cervical tuberculin test (SICCTT) > 2mm, SICCTT > 4mm and detailed postmortem inspection) were the only predictors identified to show statistically significant difference ( $p < 0.001$ ) and explained 68.6 % of the explainable heterogeneity ( $R^2 = 0.686$ ) in goat TB studies. In general, study reports on small ruminant and dromedary camel TB are limited throughout the country. The most significant data gaps were in *Gambella*, and *Benshangul-Gumuz* regional states, where no single report could be retrieved on small ruminant TB. Limitation of study reports and lack of comparable categories constrained further investigation on other predictors in sheep and camel studies. Thus, the authors would like to emphasize the need for more representative studies in the species of concern in all regions of the country. Meanwhile, the relatively higher proportion of TB in dromedary camels demands special attention in arid and semiarid parts of the country, as it is the leading livestock species on which agropastoralist and pastoralists livelihoods depend.

Keywords: Dromedary Camel, Diagnostic test, Small ruminants tuberculosis, Ethiopia

**Hailu, M., Asmare, K., Gebremedhin, E. Z., Sheferaw, D., Gizaw, D., Di Marco, V., & Vitale, M. (2020). Cryptosporidium and Giardia Infections in Dairy Calves in Southern Ethiopia. Parasite Epidemiology and Control, 10, e00155.**

## **Abstract**

*Giardia* and *Cryptosporidium* are the most common enteric protozoan parasites causing diarrhea in humans and animals worldwide. This study was conducted with the objectives of estimating prevalence and identifying risk factors for *Cryptosporidium* and *Giardia* infections in dairy calves in selected districts of southern Ethiopia. Fecal samples ( $n = 330$ ) were collected from calves in 92 farms. The monoclonal antibody-based commercial direct immunofluorescent kit was used to test the samples for *Cryptosporidium* oocysts and *Giardia* cysts. A questionnaire survey was also administered to collect data on potential risk factors of infections. The results showed a farm-level prevalence of 69.6% (95% confidence interval [CI]: 59.1–78.7%) for *Cryptosporidium* and 38.04% (95% CI: 28.1–48.8%) for *Giardia*. Likewise, an overall animal level prevalence of 13.0% (95% CI: 9.6–17.2%) for *Cryptosporidium* and 9.7% (95% CI: 6.7–13.4%) for *Giardia* was found. At the farm level, multivariate logistic regression model showed that calves in smallholder farms were 5.3 times more likely to shed *Cryptosporidium* oocysts than calves in commercial farms ( $p=0.019$ ). However, in case of *Giardia*, calves in commercial farms were 5.5 times more likely to shed cysts than calves in smallholder farms ( $p=0.037$ ). Calves with diarrhea were nearly three times more likely to be positive for *Cryptosporidium* oocysts than those with normal feces ( $p=0.027$ ). At the animal level, larger farms and younger calves were associated with *Giardia* cysts shedding, while larger herd size and loose fecal consistency were associated with *Cryptosporidium* oocysts shedding. *Giardia* and *Cryptosporidium* infection are endemic in the studied dairy farms. Therefore, detailed molecular epidemiological studies are essential to identify the role of domestic animals in the transmission of infections to humans and vice versa, and to determine the best options for prevention and control of cryptosporidiosis and giardiasis.

**Keywords:** Calves, cryptosporidium, Giardia, Prevalence, Risk factors, Southern Ethiopia

**Workagegn, K. B., Natarajan, P., & Gedebo, A. (2020). Genetic Parameters and Genotype By Environment Interaction of The Nile Tilapia (*Oreochromis Niloticus*) Reared in Two Test Environments. *Aquaculture International*, 28(6), 2263–2273.**

## **Abstract**

The Nile tilapia (*Oreochromis niloticus*) is a globally important aquaculture fish species, particularly in tropical and subtropical areas. However, aquaculture in many African countries including Ethiopia is not well developed. One of the main challenges for the development of aquaculture in Ethiopia is the lack of better performing Nile tilapia strain that can grow well in a wide range of production environments, and thus, it is crucial to develop fast growing Nile tilapia strain that can grow in a wide range of environments. Therefore, the main objectives of this study were to evaluate growth performance and genetic parameters such as heritability, additive genetic and genetic correlation of different strain combinations, and level of genotype by environment interaction (GxE) for harvest body weight (HBW) of 2409 fish from 81 full-sib families reared in high- (Hi-P) and low-input (Lo-P) pond-based production systems. The full-sib families were produced in a complete diallel cross of three Ethiopia Nile tilapia strains collected from Lake Chamo, Lake Koka, and Lake Ziway. After 5 months of rearing, HBW were measured and then phenotypic and genetic parameters were analyzed using univariate and bivariate animal models using SAS and ASReml softwares. The results of the study showed that the Chamo and the Koka strains and their crossbreds performed significantly better than that of the Ziway strain and its crossbreds with the other two strains. The HBW of the fish obtained from the two production systems (111.4 g for Hi-P and 100.5 for Lo-P) was not significantly different ( $P > 0.05$ ). The heritability estimates from bivariate model were 0.23 and 0.20 for Hi-P and Lo-P, respectively. The heritability estimates of common full-sib for HBW of the fish reared in the Hi-P were higher (0.03) than found in the Lo-P (0.002). Re-ranking of the different strain combinations in the two production systems was observed. However, the high genetic correlation (0.95) and the non-significant ( $P > 0.05$ ) GxE resulted in a weak re-ranking of strain combinations. In conclusion, the higher genetic correlation with low genotype by environment interaction between the harvest body weight of the fish reared in the two production systems indicated that environment-specific breeding program is not essential. However, the use of Hi-P is preferable.

**Tesfaye, Z., Ferede, B., Pavanassam, N., & Workagegn, K. B. (2020). Prevalence of nematode parasite, *Contracaecum*, in Nile tilapia, African catfish and *Barbus* species in Lake Hawassa, Ethiopia. *Aquaculture Research*, 51(10), 3993–3998.**

## **Abstract**

A cross-sectional study was conducted from November 2017 to March 2018 at Lake Hawassa to determine the prevalence of larval *Contracaecum* infestation in Nile tilapia, (*Oreochromis niloticus*), African Catfish (*Clarias gariepinus*) and *Barbus* species (*Barbus intermedius*). Fifty-two point six per cent (52.6%) previous prevalence and 5% precision were used to estimate the sample size. Accordingly, a total of 383 randomly sampled fish species comprising of 163 (42.6%) *C. gariepinus*, 159 (41.5%) *O. niloticus* and 61(15.9%) *B. intermedius* were examined. The length and weight of each sampled fish were recorded. All the sampled fish were examined for the evidence of *Contracaecum* parasites in Hawassa University Veterinary Parasitology and Pathology Laboratory. Chi-square values and comparison of proportions were used to analyse the data. The overall prevalence of *Contracaecum* parasites of fish population was 31.6%. The distribution of parasite was significantly affected by fish species ( $p = .000$ ), sexes ( $p = .018$ ), length ( $p = .003$ ) and weight classes of fish ( $p = .026$ ). As a hygienic problem and gutting activity conducted at the sides of the Lake Hawassa and distribution of discarded fish wastes for surrounding piscivorous birds by butchers and other people, the life cycle of *Contracaecum* parasite was perpetuated. Thus, the parasite is of zoonotic significance. Therefore, awareness creation activities for societies and control of fish parasites should be conducted in the study area.

**Mania, D., Woliy, K., Degefu, T., & Frostegård, Å. (2020). A common Mechanism for Efficient N<sub>2</sub>O Reduction in Diverse Isolates of Nodule-Forming Bradyrhizobia. *Environmental Microbiology*, 22(1), 17–31.**

### **Summary**

Bradyrhizobia are abundant soil bacteria, which can form nitrogen-fixing symbioses with leguminous plants, including important crops such as soybean, cowpea and peanut. Many bradyrhizobia can denitrify, but studies have hitherto focused on a few model organisms. We screened 39 diverse *Bradyrhizobium* strains, isolated from legume nodules. Half of them were unable to reduce N<sub>2</sub>O, making them sources of this greenhouse gas. Most others could denitrify NO<sub>3</sub><sup>−</sup> to N<sub>2</sub>. Time-resolved gas kinetics and transcription analyses during transition to anaerobic respiration revealed a common regulation of *nirK*, *norCB* and *nosZ* (encoding NO<sub>2</sub><sup>−</sup>, NO and N<sub>2</sub>O reductases), and differing regulation of *napAB* (encoding periplasmic NO<sub>3</sub><sup>−</sup> reductase). A prominent feature in all N<sub>2</sub>-producing strains was a virtually complete hampering of NO<sub>3</sub><sup>−</sup> reduction in the presence of N<sub>2</sub>O. In-depth analyses suggest that this was due to a competition between electron transport pathways, strongly favouring N<sub>2</sub>O over NO<sub>3</sub><sup>−</sup> reduction. In a natural context, bacteria with this feature would preferentially reduce available N<sub>2</sub>O, produced by themselves or other soil bacteria, making them powerful sinks for this greenhouse gas. One way to augment such populations in agricultural soils is to develop inoculants for legume crops with dual capabilities of efficient N<sub>2</sub>-fixation and efficient N<sub>2</sub>O reduction.

**Kasahun, M., Yadate, A., Belay, A., Belay, Z., & Ramalingam, M. (2020). Antimicrobial Activity of Chemical, Thermal and Green Route-Derived Zinc Oxide Nanoparticles: A Comparative Analysis. *Nano Biomed Eng*, 12(1), 47–56.**

### **Abstract**

In this study, antimicrobial activity of zinc oxide (ZnO) nanoparticles (NPs) synthesized by different chemical, thermal and green routes were systematically investigated with an aim to determine which method yields the most efficient antimicrobial property. The methodologies employed in this study were sol-gel, thermal decomposition, precipitation and green synthesis routes. The physical and optical properties of synthesized ZnO NPs were characterized by X-ray



diffraction (XRD), scanning electron microscope (SEM), ultraviolet–visible spectroscopy (UV-Vis) and fluorescence spectroscopy. The results of the XRD and SEM analysis indicated the size and shape of the particles, depending on synthesis methodology and calcination temperature. The optical properties of the ZnO NPs investigated using UV-Vis absorption and photoluminescence spectra were also depending on the synthesized route. The antimicrobial activity of the ZnO NPs was tested against gram-negative bacteria (*E. coli*, *P. aeruginosa* and *S. typhi*), gram-positive bacteria (*S. aureus* and *B. subtilis*) and fungus (*C. albicans*) using agar-well diffusion method. Effects of size, shape of the crystal and concentration on the antimicrobial activity were investigated. The experimental results showed that the antimicrobial activity of ZnO NPs increased with decreasing size of the crystal. It was also found that the gram-positive bacteria were more sensitive to ZnO NPs than gram-negative bacteria and fungus. Interestingly, ZnO NPs synthesized using the green route showed more effective antimicrobial activity than those using the chemical or the thermal route.

Keywords: Zinc oxide nanoparticles; Sol-gel; Thermal decomposition; Precipitation; Green synthesis; Antimicrobials

**Dawed, M. Y., Tchepmo Djomegni, P. M., & Krogstad, H. E. (2020). Complex Dynamics in A Tritrophic Food Chain Model With General Functional Response. *Natural Resource Modeling*, 33(2), e12260.**

## **Abstract**

This paper investigates the rich dynamics in a tritrophic food chain mathematical model, consisting of three species: prey, intermediate predators, and top predators. It is assumed that alternative food are supplied to intermediate predators in addition to feeding on prey. We consider a general Holling type response function and analyze the model. The existence and stability of six possible equilibrium points are established. These equilibrium points describe the various dynamics that could take place in the food chain. Hopf bifurcation, limit cycle, doubling periods, chaotic attractors, boundary crisis are observed in the numerical computations. Our results reveal the rich and complex dynamics of the interactions in the food chain.

**Djomegni, P. T., Tekle, A., & Dawed, M. Y. (2020). Pre-exposure Prophylaxis HIV/AIDS Mathematical Model with non Classical Isolation. Japan Journal of Industrial and Applied Mathematics, 37, 781–801.**

#### **Abstract**

We propose a mathematical model to understand the transmission dynamics of HIV/AIDS in an environment. In addition to previous approaches, we incorporate two classes of isolated. By isolated we do not mean physical separation, but commitment to keep its status. We establish the well-posedness of our model and fully analyze the asymptotic behavior of the solutions which depends on the basic reproduction number  $R_0$ . We then perform sensitive analysis to investigate the best strategy to keep the average number of secondary infection  $R_0$  low. Our investigation reveals that when there is both high awareness and high efficacy of PrEP (pre-exposure prophylaxis) use, increasing the efficacy of PrEP use decreases  $R_0$  the most. Otherwise, the best strategy is to isolated more susceptible to the class  $H_1$ . Our model can be applied to any organizations/companies relying on physical labor forces (with some workers being infected by HIV/AIDS).

**Nagano, S., Guan, K., Shenkutie, S. M., Feiler, C., Weiss, M., Kraskov, A., Buhrke, D., Hildebrandt, P., & Hughes, J. (2020). Structural Insights into Photoactivation and Signalling in Plant Phytochromes. *Nature Plants*, 6(5), 581–588.**

#### **Abstract**

Plant phytochromes are red/far-red photochromic photoreceptors that act as master regulators of development, controlling the expression of thousands of genes. Here, we describe the crystal structures of four plant phytochrome sensory modules, three at about 2 Å resolution or better, including the first of an A-type phytochrome. Together with extensive spectral data, these structures provide detailed insight into the structure and function of plant phytochromes. In the Pr state, the substitution of phycocyanobilin and phytochromobilin cofactors has no structural effect, nor does the amino-terminal extension play a significant functional role. Our data suggest that the chromophore propionates and especially the phytochrome-specific domain tongue act differently in plant and prokaryotic phytochromes. We find that the photoproduct in period–ARNT–single-minded (PAS)–cGMP-specific phosphodiesterase–adenylyl cyclase–FhlA (GAF) bidomains

might represent a novel intermediate between MetaRc and Pfr. We also discuss the possible role of a likely nuclear localization signal specific to and conserved in the phytochrome A lineage.

**Dessie, Y., Tadesse, S., & Eswaramoorthy, R. (2020). Physicochemical Parameter Influences and Their Optimization on The Biosynthesis of MnO<sub>2</sub> Nanoparticles Using Vernonia Amygdalina Leaf Extract. *Arabian Journal of Chemistry*, 13(8), 6472–6492.**

## **Abstract**

The manganese dioxide nanoparticles (MnO<sub>2</sub> NPs) were synthesized using *Vernonia amygdalina* leaf extract which was used as a reducing, capping, and stabilizing agents due to the presence of bioactive phytochemical compounds. Twenty five runs were designed to investigate the effect of *V. amygdalina* leaf extract ratio (A), initial potassium permanganate (KMnO<sub>4</sub>) concentration (B), pH (C), and reaction time (D) on the biosynthesized MnO<sub>2</sub> NPs using 4-factor, 4-level D-Optimal Response Surface Quadratic Design Model approach. The relationship between physicochemical variables and absorption responses were established using transform second degree polynomial quadratic model. The effects of each absorption responses were analyzed by ANOVA principle using quadratic equations. A very low p-values (<0.0001), non-significant Lack of Fit F-values, and reasonable regression coefficient values (coefficient  $R^2 = 0.9790$ , adjusted  $R^2 = 0.9496$ , and predicted  $R^2 = 0.8452$ ) suggested that there is an effective correlation between experimental results and predicted values. Numerical and graphical optimized results demonstrated that the optimized conditions for the predicted absorbance at 320 nm (1.095) were suggested at 43.72%, 1.81 mM, 6.02, and 103.42 min for *V. amygdalina* leaf extract ratio, initial KMnO<sub>4</sub> concentration, pH, and reaction time, respectively. Under these optimal conditions, the average absorbance from four experimental run was recorded to be 0.9678. This result was very closest to the predicted values. The average size elucidated by X-ray diffraction (XRD) analysis was found in the range between 20 nm and 22 nm. The stretching/or and vibrational, surface topography, thermal, and surface roughness as well as its porosity distributions were investigated by UV–Vis spectroscopy, Fourier transforms infrared (FTIR), scanning electron microscopy (SEM), differential scanning calorimeter (DSC), and Gwyddion software analysis.

**Keywords:** Manganese Dioxide nanoparticles, Vernonia amygdalina, Optimization process, D-Optimal Design, Physicochemical parameters, Surface roughness.

**Kara, H. T., Anshebo, S. T., & Sabir, F. K. (2020). A Novel Modified Cellulose Nanomaterials (Cnms) for Remediation of Chromium (VI) Ions From Wastewater. *Materials Research Express*, 7(11), 115008.**

## **Abstract**

Wastewater (WW) remediation technologies were the most crucial issues all over the world at present time. Thus, the remediation of Cr (VI) ions from real WW was conducted using green biocompatible and biodegradable pristine (CNM) and succinic anhydride functionalized cellulose nanomaterial (S-CNM) adsorbents. Both CNM and S-CNM adsorbents were prepared by using sulfuric acid hydrolysis method and characterized for particle sizes, functional groups, and surface morphologies by using XRD, FT-IR, and SEM instruments, respectively. The physicochemical properties of the collected WW were investigated. Next, both the prepared adsorbents were applied for the remediation of Cr (VI) ions from WW. The remediation processes is spontaneous and have higher remediation efficiencies of Cr (VI) ions from WW. The Cr (VI) ions remediation mechanism was evaluated from both the Cr (VI) ions adsorption isotherms and kinetic concepts. Both Langmuir and Freundlich Cr (VI) ions adsorption isotherm models were certainly fixed to a maximum Cr (VI) ions uptake capability ( $q_{\max}$ ) of 60.24 and 156.25 mg g<sup>-1</sup> by CNM and S-CNM sorbents, respectively, and it follows pseudo-second-order (PSO) kinetics model through chemisorption processes. The Cr (VI) ions uptake capabilities were hindered by the presence of organic matter and any other competing pollutants in the WW. The S-CNM sorbent was selected for the regeneration study due to its higher efficiencies of remediation relative to CNM sorbent and the study was conducted through desorption of Cr (VI) ions by using HCl. Findings have shown that the sorbent was easily recyclable and applicable for the remediation of pollutants from real WW after consecutive 13th cycles.

**Neja, S. A. (2020). Site-Specific DNA Demethylation as a Potential Target for Cancer Epigenetic Therapy. *Epigenetics Insights*, 13, 2516865720964808.**

## **Abstract**

Aberrant promoter DNA hypermethylation is a typical characteristic of cancer and it is often seen in malignancies. Recent studies showed that regulatory cis-elements found up-stream of many tumor suppressor gene promoter CpG island (CGI) attract DNA methyltransferases (DNMT) that hypermethylates and silence the genes. As epigenetic alterations are potentially reversible, they make attractive targets for therapeutic intervention. The currently used decitabine (DAC) and azacitidine (AZA) are DNMT inhibitors that follow the passive demethylation pathway. However, they lead to genome-wide demethylation of CpGs in cells, which makes difficult to use it for causal effect analysis and treatment of specific epimutations. Demethylation through specific demethylase enzymes is thus critical for epigenetic resetting of silenced genes and modified chromatin. Yet DNA-binding factors likely play a major role to guide the candidate demethylase enzymes upon its fusion. Before the advent of clustered regulatory interspaced short palindromic repeats (CRISPR), both zinc finger proteins (ZNFs) and transcription activator-like effector protein (TALEs) were used as binding platforms for ten-eleven translocation (TET) enzymes and both systems were able to induce transcription at targeted loci in an *in vitro* as well as *in vivo* model. Consequently, the development of site-specific and active demethylation molecular trackers becomes more than hypothetical to makes a big difference in the treatment of cancer in the future. This review is thus to recap the novel albeit distinct studies on the potential use of site-specific demethylation for the development of epigenetic based cancer therapy.

**Keywords** Cancer, DNA, Demethylase, Epigenetics, Promoter, Methylase, Tumor suppressor

**Shin, E. M., Huynh, V. T., Neja, S. A., Liu, C. Y., Raju, A., Tan, K., Tan, N. S., Gunaratne, J., Bi, X., & Iyer, L. M. (2021). GREB1: An Evolutionarily Conserved Protein With A Glycosyltransferase Domain Links ER $\alpha$  Glycosylation and Stability To Cancer. *Science Advances*, 7(12), eabe2470.**

### **Abstract**

What covalent modifications control the temporal ubiquitination of ER $\alpha$  and hence the duration of its transcriptional activity remain poorly understood. We show that GREB1, an ER $\alpha$ -inducible enzyme, catalyzes O-GlcNAcylation of ER $\alpha$  at residues T553/S554, which stabilizes ER $\alpha$  protein by inhibiting association with the ubiquitin ligase ZNF598. Loss of GREB1-mediated glycosylation of ER $\alpha$  results in reduced cellular ER $\alpha$  levels and insensitivity to estrogen. Higher *GREB1* expression in ER $\alpha$ <sup>+ve</sup> breast cancer is associated with greater survival in response to tamoxifen, an ER $\alpha$  agonist. Mice lacking *Greb1* exhibit growth and fertility defects reminiscent of phenotypes in ER $\alpha$ -null mice. In summary, this study identifies GREB1, a protein with an evolutionarily conserved domain related to DNA-modifying glycosyltransferases of bacteriophages and kinetoplastids, as the first inducible and the only other (apart from OGT) O-GlcNAc glycosyltransferase in mammalian cytoplasm and ER $\alpha$  as its first substrate.

**Ali, J. M., & Lelisho, T. A. (2020). Chemical fixation of CO<sub>2</sub> with propylene oxide catalyzed by Trimethylsulfonium bromide in the presence of HBr: A computational study. *Theoretical Chemistry Accounts*, 139(10), 1–10.**

### **Abstract**

The chemical fixation of CO<sub>2</sub> into value-added chemicals has recently received much attention with regard to the utilization of CO<sub>2</sub>, a gas responsible for global warming. One of the most well-known methods is the fixation of CO<sub>2</sub> with epoxides to form cyclic carbonates. In this work, the conversion of CO<sub>2</sub> and PO into five-membered cyclic carbonate catalyzed by (CH<sub>3</sub>)<sub>3</sub>SBr alone and (CH<sub>3</sub>)<sub>3</sub>SBr in the presence of HBr have been studied by using DFT method at B3LYP/6-311 ++ G (d, p)//B3LYP/6-31G (d) level of theory to understand the reaction mechanism and efficiency of the catalyst. Two possible reaction mechanisms ( $\alpha$  and  $\beta$ ) were considered and it was found that the  $\beta$  pathway is more favorable over  $\alpha$  pathway for the catalyzed route in gas phase. The ring-

opening step was the rate-determining step that results from the nucleophilic attack of the bromide to the carbon atom of the epoxide. The synergetic effect of HBr is tested as HBD for the  $(\text{CH}_3)_3\text{SBr}/\text{HBr}$  catalyzed reaction and it gave better result and minimized the activation energy for the reaction and the rate-determining step was the ring closure with free energy of activation 5.2 kcal/mol in gas phase.

**Gezhagn, T. M., Temam, A. G., & Lelisho, T. A. (2021). Theoretical Study On Chemical Fixation of Carbon Dioxide With Aziridine Into Cyclic Carbamate Catalysed By Purine/HI System. *Molecular Physics*, 119(5), e1831637.**

### **Abstract**

The cycloaddition of carbon dioxide with aziridine into cyclic carbamate catalysed by purine/HI has been investigated using exchange–correlation functional B3LYP of DFT and the 6-31+G(d,p) basis set for non-iodine atoms and the LANL2DZ for iodine in order to understand the catalytic efficiency of purine/HI system. Two hypothetical reaction mechanisms were proposed for the studied reaction in each catalyst systems. Thermodynamic and kinetic parameters were computed for each step to determine the more favourable route. The calculations reveal that the reaction prefers to proceed through a three-step mechanism in both purine and purine/HI catalyst system. HI plays a co-catalytic role to promote the initial ring-opening of aziridine. The obtained results emphasise purine/HI system had better catalytic efficiency than purine and mechanism II of purine/HI catalysed reaction is more favourable than mechanism I. The more favourable pathway comprises three steps such as ring-opening of aziridine by iodine anion,  $\text{CO}_2$  insertion and ring-closure. The  $\text{CO}_2$  insertion step was determined as barrierless. The ring-opening of aziridine was rate-determining step which requires 16.79, 16.33, and 15.94 kcal/mol in the gas phase, water and diethyl ether (better), respectively. Finally, this work endorsed that purine/HI is an effective catalyst for  $\text{CO}_2$  fixation with aziridine.

**Abza, T., Dadi, D. G., Hone, F. G., Meharu, T. C., Tekle, G., Abebe, E. B., & Ahmed, K. S. (2020). Characterization of Cobalt Sulfide Thin Films Synthesized from Acidic Chemical Baths. *Advances in Materials Science and Engineering*, 2020.**

### **Abstract**

Cobalt sulfide thin films were synthesized from acidic chemical baths by varying the deposition time. The powder X-ray diffraction studies indicated that there are hexagonal CoS, face-centered cubic Co<sub>3</sub>S<sub>4</sub>, and cubic Co<sub>9</sub>S<sub>8</sub> phases of cobalt sulfide. The crystallite size of the hexagonal CoS phase decreased from 52.8 nm to 22.5 nm and that of the cubic Co<sub>9</sub>S<sub>8</sub> phase increased from 11 nm to 60 nm as the deposition time increased from 2 hrs to 3.5 hrs. The scanning electron microscopic images revealed crack and pinhole free thin films with uniform and smooth background and few large polygonal grains on the surface. The band gap of the cobalt sulfide thin films decreased from 1.75 eV to 1.3 eV as the deposition time increased from 2 hrs to 3.5 hrs. The photoluminescence (PL) spectra of the films confirmed the emission of ultraviolet, violet, and blue lights. The intense PL emission of violet light at 384 nm had red shifted with increasing deposition time that could be resulted from the increase in the average crystallite size. The FTIR spectra of the films indicated the presence of OH, C-O-H, C-O, double sulfide, and Co-S groups. As the deposition time increased, the electrical resistivity of the cobalt sulfide thin films decreased due to the increase in both the crystallite size and the films' thickness.

**Geremew, T., & Abza, T. (2020). Microstructural and Optical Characterization of Heterostructures of ZnS/CdS and CdS/ZnS Synthesized by Chemical Bath Deposition Method. *Advances in Materials Science and Engineering*, 2020.**

### **Abstract**

ZnS/glass and CdS/glass single layers and ZnS/CdS and CdS/ZnS heterojunction thin films were deposited by the chemical bath deposition method using zinc acetate and cadmium acetate as the metal ion sources and thioacetamide as a nonmetallic ion source in acidic medium. Na<sub>2</sub>EDTA was used as a complexing agent to control the free cation concentration. The single layer and heterojunction thin films were characterized with X-ray diffraction (XRD), a scanning electron microscope (SEM), energy dispersive X-ray (EDX), and a UV-VIS spectrometer. The XRD patterns of the CdS/glass thin film deposited on the soda lime glass substrate crystalized in the cubic structure with a single peak along the (111) plane. The ZnS/CdS heterojunction and



ZnS/glass single layer thin films were crystalized in the hexagonal ZnS structure. The CdS/ZnS heterojunction thin film is nearly amorphous. The optical analysis results confirmed single band gap values of 2.75 eV and 2.5 eV for ZnS/CdS and CdS/ZnS heterojunction thin films, respectively. The CdS/glass and CdS/ZnS thin films have more imaginary dielectric components than the real part. The optical conductivity of the single layer and heterojunction films is in the order of 1/s. The optical study also confirmed refractive index values between 2 and 2.7 for ZnS/glass, ZnS/CdS, and CdS/ZnS thin films for incident photon energies between 1.2 eV and 3.8 eV. The surface morphology studies revealed compacted spherical grains covering the substrate surfaces with few cracks on ZnS/glass, ZnS/CdS, and CdS/glass and voids on CdS/ZnS thin films. The EDX result confirmed nearly 1 : 1 metallic to nonmetallic ion ratio in the single-layered thin films and the dominance of Zn ion over Cd ion in both ZnS/CdS and CdS/ZnS heterojunction thin films.

**Mitiku, R. G., Tolera, B. S., & Tolesa, Z. G. (2020). Prevalence and Allele Frequency of Congenital Colour Vision Deficiency (CCVD) among Students at Hawassa University, Ethiopia. *Journal of the Egyptian Public Health Association*, 95(1), 1–6.**

## **Abstract**

### **Background**

The prevalence of congenital colour vision deficiency (CCVD) varies from race to race and differs in different geographic regions. Colour vision deficiency or colour blindness, is the inability or decreased ability of discriminating certain colour combinations and colour differences under normal lighting conditions. This study aimed to determine the prevalence of congenital colour vision deficiency among students at Hawassa University.

### **Methods**

A cross-sectional survey was employed involving 4004 students (females = 1171 and males = 2833) from four campuses, namely, Institutes of Technology, College of Health Science and Medicine, College of Agriculture and Main Campus. The Ishihara pseudo-isochromatic 24 plate edition was used to test the colour vision of students under natural day light condition.

### **Results**

The prevalence of CCVD in the present study was 2.85%. A hundred and six (3.75%) males and eight (0.68%) females were affected with congenital colour vision deficiency. The frequencies of achromacy, deutan and protan in male subjects were 4 (0.14%), 82 (2.89%), and 24 (0.85%),

respectively. Deutan was highest among students of Amhara ethnic origin (38, 2.51%), but the frequency of protan was highest amongst Oromo students (10, 0.8%).

### **Conclusion and recommendations**

The overall prevalence of CCVD found in the present study was lower compared to the previous studies done in Ethiopia. There was clear variation in the prevalence of colour vision deficiency among students of various ethnic groups. Proper screening, education and counseling are needed to minimize impacts of CCVD in the country, and can also be beneficial for the affected subject in tackling difficulties in everyday work and for proper choice of future profession.

**Hailu, M., Asmare, K., Gebremedhin, E. Z., Sheferaw, D., Gizaw, D., Di Marco, V., & Vitale, M. (2020). *Cryptosporidium* and *Giardia* infections in Dairy Calves in Southern Ethiopia. *Parasite Epidemiology and Control*, 10, e00155.**

### **Abstract**

*Giardia* and *Cryptosporidium* are the most common enteric protozoan parasites causing diarrhea in humans and animals worldwide. This study was conducted with the objectives of estimating prevalence and identifying risk factors for *Cryptosporidium* and *Giardia* infections in dairy calves in selected districts of southern Ethiopia. Fecal samples ( $n = 330$ ) were collected from calves in 92 farms. The monoclonal antibody-based commercial direct immunofluorescent kit was used to test the samples for *Cryptosporidium* oocysts and *Giardia* cysts. A questionnaire survey was also administered to collect data on potential risk factors of infections. The results showed a farm-level prevalence of 69.6% (95% confidence interval [CI]: 59.1–78.7%) for *Cryptosporidium* and 38.04% (95% CI: 28.1–48.8%) for *Giardia*. Likewise, an overall animal level prevalence of 13.0% (95% CI: 9.6–17.2%) for *Cryptosporidium* and 9.7% (95% CI: 6.7–13.4%) for *Giardia* was found. At the farm level, multivariate logistic regression model showed that calves in smallholder farms were 5.3 times more likely to shed *Cryptosporidium* oocysts than calves in commercial farms ( $p=0.019$ ). However, in case of *Giardia*, calves in commercial farms were 5.5 times more likely to shed cysts than calves in smallholder farms ( $p=0.037$ ). Calves with diarrhea were nearly three times more likely to be positive for *Cryptosporidium* oocysts than those with normal feces ( $p=0.027$ ). At the animal level, larger farms and younger calves were associated with *Giardia* cysts shedding, while larger herd size and loose fecal consistency were associated with *Cryptosporidium* oocysts shedding. *Giardia* and *Cryptosporidium* infection are endemic in

the studied dairy farms. Therefore, detailed molecular epidemiological studies are essential to identify the role of domestic animals in the transmission of infections to humans and vice versa, and to determine the best options for prevention and control of cryptosporidiosis and giardiasis.

**Keywords:** Calves, Cryptosporidium, Giardia, Prevalence, Risk factors, Southern Ethiopia

**Filkale, A. E., & Gangwar, M. K. (2020). Synthesis, Crystal Structure and Magnetic Properties of New Trinuclear Copper (II) Complexes With Biphenol– Based Dinucleating Ligands. *Journal of Molecular Structure*, 1218, 128450.**

### Abstract

Treatment of (3,3'-bis-((2,6-dimethylphenyl)-imino)methyl)-(1,1')-biphenyl-2,2'-diol)

(**H<sub>2</sub>L<sup>2</sup>**) and (3,3'-bis-((2-methoxyphenyl))imino)methyl)-(1,1')-biphenyl-2,2'-diol) (**H<sub>2</sub>L<sup>3</sup>**) with excess [Cu<sub>2</sub>(OAc)<sub>4</sub>(H<sub>2</sub>O)<sub>2</sub>] in the presence of triethylamine afforded new trinuclear complexes [Cu(3,3'-bis-((R)-iminomethyl)-(1,1')-biphenyl-2,2'-dioxo)]<sub>3</sub> [R = 2,6-Me<sub>2</sub>C<sub>6</sub>H<sub>3</sub> (**3e**) and R = 2-OMeC<sub>6</sub>H<sub>3</sub>(**4e**)] respectively. The resulting complexes were characterized by elemental analysis, magnetic susceptibility, EPR, UV–Vis, IR, CV and Single crystal X-ray diffraction analysis. The magnetic susceptibility study of **3e** and **4e** was performed in the 5–300 K and revealed the existence of antiferromagnetic interaction in both complexes. The experimental data could be satisfactorily reproduced using an isotropic exchange model,  $H = -J (S_1S_2 + S_2S_3 + S_1S_3)$ , yielding as best fit parameters:  $J = -15 \text{ cm}^{-1}$ ,  $g = 1.99$  for **3e** and  $J = -18 \text{ cm}^{-1}$ ,  $g = 1.99$  for **4e**. Both complexes have an angular C<sub>2</sub>/c-symmetric trinuclear core and each Cu(II) ion is in similar environments coordinated to two (O, N) donor sets as revealed from single-crystal X-ray diffraction studies. The coordination geometry can best be described as distorted square planar which could be judged using the  $\tau_4$  index,  $\tau_4 = 360 - (\alpha + \beta)/141^\circ$ , where  $\alpha$  and  $\beta$  are the two largest angles subtended by the ligand donor atoms in the four-coordinate complex. The average indexes for **3e** and **4e** were found to be 0.42 and 0.43 respectively, signifying a considerable distortion from an idealized square planar, D<sub>4h</sub> geometry ( $\tau_4 = 0.0$ ) or idealized tetrahedral, T<sub>d</sub> geometry ( $\tau_4 = 1.0$ ). The average Cu...Cu distance between closest copper(II) ions in the complex **3e** is 4.48 Å. On the other hand, the single crystal X-ray analysis showed that each of the three Cu(II) centers in complex **4e** is strongly tetracoordinated to two N and two O atoms & weakly to two O atoms of the methoxy groups of the ligand, N,N',O,O'-3, 3'-bis ((2-methoxyphenyl)-iminomethyl)-

[1, 1'-biphenyl]-2, 2'-diol (**H<sub>2</sub>L<sup>3</sup>**). Generally, Cu–N & Cu–O bond lengths are (1.983–1.994) & (1.882–1.893) respectively, comparable to similar systems.

**Keywords:** Biphenol, 2,6-dimethoxyaniline, 2,6-dimethylaniline, Dinucleating ligands, trinuclear copper(II) complexes, Magnetic susceptibility

**Filkale, A. E., & Pathak, C. (2020). Dinuclear Cobalt Complexes Supported By Biphenol and Binaphthol-Derived Bis (Salicylaldimine) Ligands: Synthesis, Characterization and Catalytic Application In  $\beta$ -Enaminone Synthesis From 1, 3-Dicarbonyl Compounds and Aliphatic Amines. *New Journal of Chemistry*, 44(35), 15109–15121.**

### Abstract

Two new tetradentate ligands, namely, 3,3'-bis[[(2,4,6-trimethyl-phenyl)imino)methyl]-[1,1']-biphenyl-2,2'-diol, **H<sub>2</sub>L<sup>1</sup>** (**1**), and 3,3'-bis[[(2,4,6-trimethylphenyl)imino)methyl]-[1,1']-binaphthalenyl-2,2'-diol, **H<sub>2</sub>L<sup>2</sup>** (**3**), based on 2,2'-biphenol and 2,2'-binaphthol frameworks have been synthesized and characterized. Correspondingly, dinuclear cobalt complexes {Co[3,3'-bis-((R)-iminomethyl)-(1,1')-biphenyl-2,2'-dioxo]}<sub>2</sub> (**2**) and {Co[3,3'-bis-((R)-iminomethyl)-(1,1')-binaphthalenyl-2,2'-dioxo]}<sub>2</sub> (**4**) (where R = 2,4,6-Me<sub>3</sub>C<sub>6</sub>H<sub>2</sub>) were synthesized *via* reactions of the respective ligands with tetrahydrate cobalt acetate. The complexes were then characterized by elemental analysis, mass spectrometry, IR, UV-vis, magnetic susceptibility and single-crystal X-ray diffraction analysis. The single-crystal X-ray crystallographic study indicates a distorted tetrahedral geometry for each of the metal ions in **2** and **4**. The magnetic susceptibility measurements at varying temperatures (5–300 K) showed that the complexes exhibit weak antiferromagnetic (AF) interactions. Both metal complexes **2** and **4** successfully catalysed the synthesis of  $\beta$ -enaminones from 1,3-dicarbonyl compounds and aliphatic amines under ambient conditions.

## Wondogenet College of Forestry and Natural Resources

**Eyasu, G., Tolera, M., & Negash, M. (2020). Woody Species Composition, Structure, and Diversity of Homegarden Agroforestry Systems In Southern Tigray, Northern Ethiopia. *Heliyon*, 6(12), e05500.**

### **Abstract**

Nowadays, the conservation of biodiversity is a major environmental challenge globally. Homegarden agroforestry systems (HGAFs) have a large potential for biodiversity conservation. However, little attention has been given to the relative importance of HGAFs in terms of biodiversity conservation. The present study, therefore, aimed to estimate and compare the woody species diversity and structure of HGAFs and adjacent natural forest (NF) in Northern Ethiopia. Three sites were purposively selected based on the presence of HGAFs and NF adjacent to each other. A stratified sampling system was used to select representative homegardens from different wealth categories. In NF, a systematic transect sampling technique was employed. A total of 90 sample plots (10 m × 20 m) were used to collect vegetation data. A total of 32 species representing 26 genera and 20 families were identified from the studied HGAFs and NF. Thirty woody species belonging to 24 genera and 20 families were recorded in the HGAFs whereas, 11 species, belonging to 9 genera and 8 families were recorded in the NF. Native woody species accounted for 66% of all woody species recorded in both HGAFs and NF. Stem density, richness, and diversities of woody species were significantly higher in HGAFs than in NF ( $p \leq 0.05$ ). Trees and shrubs in the HGAFs had significantly lower stem diameters, height, and basal area than the adjacent NF ( $p \leq 0.05$ ). The results show that HGAFs complements the NF for biodiversity conservation and supports in counteracting the loss of woody species from the natural ecosystem. Hence, promoting HGAFs habitats in human-dominated landscapes should be part of the biodiversity conservation strategy.

**Keywords:** Agroforestry, Biodiversity, Forest, Indigenous species, Low land, Horticulture, ecological restoration, Flora, Ecology, Environmental science

**Jemal, Z., Girma, Z., & Mengesha, G. (2020). Bird Diversity in Nensebo Moist Afromontane Forest Fragment, South Eastern Ethiopia. *The Open Ornithology Journal*, 13(1).**

## **Abstract**

### **Background:**

Birds are one component of biodiversity. Ethiopia is rich in biodiversity resources. The avian diversity record is far from complete. There is no scientifically documented information on bird species composition and abundance at Nensebo forest. The objective of the study was to assess species composition, relative abundance and distribution of birds at Nensebo forest in southern Ethiopia.

### **Methods:**

We employed a stratified random sampling technique with our study area stratified into two dominant habitat types: moist Afromontane forest and modified habitat. Within strata, we established 20 transect lines of 1km length and 0.25km width to sample 27.75% of the study area. We used line transect count methods aided by binoculars to estimate avian species diversity and distribution. We employed quantitative biodiversity indices, such as Shannon wiener diversity indexes to compare species diversity among habitat types and two way ANOVA to analyze the effect of season and habitat on bird species richness and abundance.

### **Results:**

A total of 105 bird species consisting of 1 endemic, 8 near endemic, 1 globally threatened and 9 Palearctic migrants were recorded in Nensebo forest. Species richness and abundance varied between habitat types in Nensebo forest with mean species richness greater in modified habitat (mean=  $4.70 \pm 1.65$ ) as compared to moist Afromontane forest habitat (mean=  $3.95 \pm 4.12$ ,  $F=94.66$   $P<0.001$ ). Additionally, modified habitat (Shannon diversity index= 4.131) harbored higher diversity of birds as opposed to Afromontane forest habitat (Shannon diversity index=3.79).

### **Conclusion:**

The Nensebo forest has high avian species diversity including several endemic and endangered species revealing the importance of this site for bird conservation. Although we found that habitat heterogeneity favored bird species diversity, moist Afromontane habitat is critical for forest

obligate species. Hence, sustainable bird conservation strategies including land use planning should be initiated for this area.

**Keywords:** Avian species, Habitat heterogeneity, Species abundance, Species richness, Afromontane habitat, Biodiversity.

**Girma, Z., & Worku, Z. (2020). Large Mammal Diversity in Nensebo Forest, Southern Ethiopia. *International Journal of Zoology*, 2020.**

### **Abstract**

There is a lack of information on mammalian faunal resources of remote forests in Ethiopia; as a result, the findings of the research on large wild mammals at Nensebo forest is one of the steps in a continuing effort to document and describe the diversity and distribution of Ethiopian mammals in remote and less accessible forests. The survey was conducted to assess the species composition and relative abundance of large mammals. Two standardized survey techniques, direct (sighting/hearing) and indirect (scat/footprint), were employed using systematically established transect lines and field plots in two dominant habitat types (modified moist Afromontane forest and intact moist Afromontane natural forest) of the study area. A total of 16 species were recorded including two endemic mammals, namely, *Tragelaphus buxtoni* and *Tragelaphus scriptus meneliki*. Abundance of species among different habitat types was not significantly different ( $\chi^2 = 0.125$ ,  $df = 1$ , ), and *Colobus guereza* was the most abundant species. In contrast, *Felis serval*, *Panthera leo*, and *Tragelaphus buxtoni* were the least abundant species. The highest diversity index was recorded in the natural forest habitat ( $H' = 2.188$ ), and the modified forest had the lowest diversity index ( $H' = 1.373$ ). There is an urgent need to minimize threats and mitigate impacts.

**Derebe, Y., & Girma, Z. (2020). Diet Composition and Preferences of Bohor Reedbuck (Redunca Redunca) In The Compound of Alage College, Central Rift Valley of Ethiopia. *Ecology and Evolution*, 10(23), 13370–13381.**

### **Abstract**

Numerous indices have been developed to compare use and availability of foods in field diets of wild ungulates. However, little attention has been given to laboratory analysis for comparing food preferences. To this end, a study aimed at investigating the diet composition and preference of Bohor reedbuck was conducted in the compound of Alage Agricultural College, Central Rift Valley of Ethiopia from 2017 to 2018 encompassing both dry and wet seasons. Bohor reedbuck is a medium sized horned antelope species endemic to Africa. Continuous focal animal observation was used to collect the data on plant species included in the diet of Bohor reedbuck. Focal individuals' observation was carried out for 30 min in 10 min sampling interval during their active feeding period (early morning and late afternoon) over four different habitat types. The nutrient composition of plants consumed was determined using wet chemistry laboratory analysis. Bohor reedbucks consumed 15 species of plants; herbs comprised 94.3% of the foods they consumed. *Digitaria abyssinica* was the most preferred plant species with highest crude protein (23.75%) and less fiber (61.8% nitrogen detergent fiber and 27.8% acid detergent fiber). These findings suggest that food preference of Bohor reedbuck is determined by the nutritional content of the plant it consumed, since the area is more or less natural habitat in terms of plant species composition. For sustainable conservation of the species, there is a need to actively promote management of the plant species most preferred by the reedbuck to feed on.

**Worku, Z., & Girma, Z. (2020). Large Mammal Diversity and Endemism at Geremba Mountain Fragment, Southern Ethiopia. *International Journal of Ecology*, 2020.**

### **Abstract**

Outside protected areas in Ethiopia, there is a lack of information concerning mammalian diversity and ecology. Consequently, the findings of the research on large mammals at Geremba Mountain constitute one of the steps towards a continuing effort to document the diversity and distribution of Ethiopian mammals. The survey was conducted to investigate the species composition, relative abundance, and population structure of large mammals at Geremba Mountain fragment from



August 2017 to February 2018, covering both dry and wet seasons. Direct (sighting) and indirect (scat) survey techniques were employed using systematically established transect lines and sampling plots, respectively. Transects and plots were established across three dominant habitat types (modified dry ever green Afromontane forest, alpine bamboo forest, and Erica scrubland). A total of 10 large mammal species were recorded including two endemic mammals, namely, *Chlorocebus djamdjamensis* and *Tragelaphus scriptus meneliki*. There was a statistically significant difference in the abundance of species among habitat types at Geremba Mountain. The highest diversity index was recorded in the alpine bamboo forest habitat ( $D = 7.142$ ,  $H' = 2.052$ ), and the Erica scrubland had the lowest. *Papio anubis* was the most abundant species while *Felis serval* was the least abundant species. The populations of most of the species were characterized by more adult and more female individuals. However, promising young individuals of the endemic mammals (*C. djamdjamensis* and *T. s. meneliki*) and *Papio anubis* were recorded. The mountain fragment is an isolated island that is totally disconnected with other fragments in the region, so attempts should be made to connect the fragment with other fragments using wildlife corridors.

**Diriba, G., Tamene, S., Mengesha, G., & Asefa, A. (2020). Diversity of Medium and Large Mammals In The Loka Abaya National Park, Southern Ethiopia. *Ecology and Evolution*, 10(18), 9896–9905.**

### **Abstract**

We evaluated the richness, diversity, and composition of the medium and large mammal community in the Loka Abaya National Park (LANP), southern Ethiopia, and how these parameters differ among four habitat types: wooded grassland, riverine forest, hilly scrubland and wetland, and between seasons. We recorded a total of 2,573 individual animals of 28 medium and large mammal species in the park. This included three globally threatened species: the endangered African wild dog (*Lycaon pictus*), the vulnerable Leopard (*Panthera pardus*), and Hippopotamus (*Hippopotamus amphibius*). Season had little effect on species richness, diversity, and composition both across and within habitat types. However, species richness across seasons was significantly different among the four habitat types, in the declining order of the following: wooded grassland > riverine forest > hilly scrubland > wetland. The strongest similarity in species composition, both across and within seasons, was found between wooded grassland and riverine forest. In terms of relative abundance, mammal assemblage of the wooded grassland and wetland

habitats had more evenly distributed number of species with different relative abundance categories. Overall, Anubis Baboon (*Papio anubis*), Grivet Monkey (*Chlorocebus aethiops*), and Greater Kudu (*Tragelephus strepsiceros*) were the three most abundant species across habitat types. In conclusion, findings of our study reveal that LANP plays an important role in Ethiopia's mammal conservation. Our findings will serve as baseline information for managers of the park to make effective conservation decisions and as a baseline for researchers wishing to conduct related ecological studies.

**Haj-Amor, Z., Dhaouadi, L., Kim, D.-G., Anlauf, R., Mokadem, N., & Bouri, S. (2020). Effects of Climate Change on Key Soil Characteristics And Strategy to Enhance Climate Resilience of Smallholder Farming: An Analysis Of A Pomegranate-Field In A Coastal Tunisian Oasis. *Environmental Earth Sciences*, 79(19), 1–16.**

### **Abstract**

Climate change may affect soil fertility because it can alter various soil physicochemical characteristics through different mechanisms. Currently, a better understanding of its effect on soil physicochemical characteristics is required for sustainable soil management. Therefore, the main purposes of this study were to assess the effect of climate change on key soil physicochemical characteristics (i.e., soil moisture, organic carbon content, and macro-nutrients) and to develop a suitable soil management strategy to enhance climate resilience of smallholder farming in a Tunisian oasis, called Gabes Oasis. An investigation methodology was developed based on future climate projection and simulation of climate change effects on key soil physicochemical characteristics from 2019 to 2050 using the HP1 model. The HP1 model was calibrated and validated based on intensive field measurements over four years (from January 2015 to December 2018) in a pomegranate-field in Gabes Oasis. The results showed that the HP1 model could simulate soil physicochemical characteristics under the baseline scenario. Compared to the no climate change scenario, significant effects of climate change (i.e., RCP8.5, RCP6.0, and RCP4.5 scenarios) on the investigated key soil characteristics were predicted by 2050. Among the investigated soil characteristics, it was predicted that soil organic carbon content was most critically affected. By 2050, it is expected that this content will decrease by 14% for RCP4.5 scenario, 16% for RCP6.0 scenario, and 23% for RCP8.5 scenario. Finally, it is recommended to apply the following cow manure amount to enhance soil characteristics resistance to future climate

change: 3748 kg ha<sup>-1</sup> year<sup>-1</sup>. However, more experiments on fields are necessary to investigate the sustainability of the proposed level of cow manure.

**Beyene, S. S., Ling, T., Ristevski, B., & Chen, M. (2020). A Novel Riboswitch Classification Based on Imbalanced Sequences Achieved By Machine Learning. *PLoS Computational Biology*, 16(7), e1007760.**

### **Abstract**

Riboswitch, a part of regulatory mRNA (50–250nt in length), has two main classes: aptamer and expression platform. One of the main challenges raised during the classification of riboswitch is imbalanced data. That is a circumstance in which the records of a sequences of one group are very small compared to the others. Such circumstances lead classifier to ignore minority group and emphasize on majority ones, which results in a skewed classification. We considered sixteen riboswitch families, to be in accord with recent riboswitch classification work, that contain imbalanced sequences. The sequences were split into training and test set using a newly developed pipeline. From 5460 *k*-mers (*k* value 1 to 6) produced, 156 features were calculated based on *CfsSubsetEval* and *BestFirst* function found in WEKA 3.8. Statistically tested result was significantly difference between balanced and imbalanced sequences ( $p < 0.05$ ). Besides, each algorithm also showed a significant difference in sensitivity, specificity, accuracy, and macro F-score when used in both groups ( $p < 0.05$ ). Several *k*-mers clustered from heat map were discovered to have biological functions and motifs at the different positions like interior loops, terminal loops and helices. They were validated to have a biological function and some are riboswitch motifs. The analysis has discovered the importance of solving the challenges of majority bias analysis and overfitting. Presented results were generalized evaluation of both balanced and imbalanced models, which implies their ability of classifying, to classify novel riboswitches.