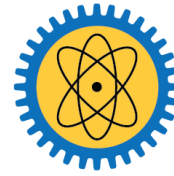


2021



**BUSITEMA
UNIVERSITY**
Pursuing excellence

The 1st BUSITEMA UNIVERSITY SCIENCE, TECHNOLOGY & INNOVATION SYMPOSIUM

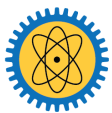


THEME:

**Innovative Approaches for
Health and Climate Change
towards Community
Empowerment.**

DATES:

24-25th
JUNE 2021



**BUSITEMA
UNIVERSITY**
Pursuing excellence

TABLE OF CONTENTS

Foreword	2
Message from the Vice Chancellor	4
Message from the Chairman - Organising Committee	5
University Administration	6
Deans & Directors	9
2. Our Campuses	10
Vision & Mission of University	13
3. Abstracts	14



”

Foreword

In the era of Sustainable Development Goals (SDGs); there is an increasing call for the role of science, technology, and innovation (STI) to trigger and contribute to global development. Busitema University is founded on the principles that advance science, technology, and innovation (STI) and is a key player in developing relevant human resources, research, and innovations for development. Against this background, there is a need for an annual platform for accountability on STI and therefore, Busitema University Science, Technology and Innovation Symposium (BUSTIS) is organized cognizant of new measurement challenges that come from changes due to training, globalization, demography, and the environment, including the demand and supply for development solutions.

This book presents the abstracts of the First Busitema University Annual Science, Technology and Innovation Symposium under the theme “Innovative Approaches for Health and Climate Change towards Community Empowerment”. The event had initially been planned to be blended virtual and face-to-face but due to the Covid19 pandemic and closure of universities in the country, the symposium will be only virtual held at Busitema University from 24th to 25th June 2021.

More than 40 abstracts in four broad thematic areas have been processed herein. The symposium has attracted speakers and presenters, both in academia and industry in diverse fields, from various countries.

The organizers of this conference are indebted to the University Council, the University Management Board, the Directorate of Graduate Studies, Research and innovations, the Maritime Institute and the organizing Committee for their invaluable contribution towards the success of symposium

Conference Organizing Committee

Program Committee

Dr. Charles Muweesi
Dr. Saphina Biira
Dr. Daniel Otim

Organising Committee

Assoc. Prof. Samson Rwahwire
Dr. Saphina Biira
Dr. Godliver Owomugisha
Dr. Charles Muweesi
Dr. Yahaya Gavamukulya
Dr. Rebecca Nekaka
Mr. Ronald Emojong
Ms. Diana Asero
Mr. Ambrose Ashabahebwa





Slogan Here



**PAUL
WAAKO**
Vice-Chancellor

MESSAGE
VICE-CHANCELLOR

It is my pleasure to invite you to the First Busitema University Annual Science, Technology and Innovation Symposium that is going to be held virtually. The symposium comes after several years of planning and interruption by the Covid19 pandemic. Initially the symposium had been slated to take place last year but was cancelled due to the lockdown, even this year the closure of universities affected the plans since it was supposed to be a blended mode symposium, nevertheless, we thank God that we can meet virtually.

In line with our vision: a centre of academic and professional excellence in science, technology and innovation, we have created a forum for researchers, policy makers and industrialists where they can meet and share common practices in STI.

I am fully convinced that the output of the symposium will change the country whereby researchers will further disseminate their knowledge through publications and registration of patents, utilities or startup companies addressing the problems faced by the country.

We acknowledge the immense support given to us by the government of Uganda and also research support through the Ministry of Science, Technology and Innovation and the Ministry of Education and Sports.

I wish you fruitful deliberations during the symposium.



MESSAGE

CHAIRMAN – ORGANIZING COMMITTEE

It a pleasure to invite you all to the First Busitema University Annual Science, Technology and Innovation Symposium. I thank all members of the organizing committee for tirelessly making sure that this event is held albeit with challenges from the Covid19 pandemic.

Busitema University's mission is yo provide inclusive high standard Training, quality research and outreach for industrialization and sustainable development. Driven by that mission, we believe that the university is better placed to address the challenges faced by the local community as well as the region in light of the Sustainable Development Goals, Africa Vision 2063 and Uganda's Vision 2040.

The Busitema University Annual Science, Technology and Innovation Symposium is a multi-disciplinary platform where researchers share and network. A total of 43 abstracts from three countries were received, reviewed and accepted for presentation.

I extended my gratitude to all presenter for allowing to share their knowledge and research with us. In the same vein, I thank the university council, management, faculties and institutes for the immense support.

I wish you all fruitful deliberations during the symposium.

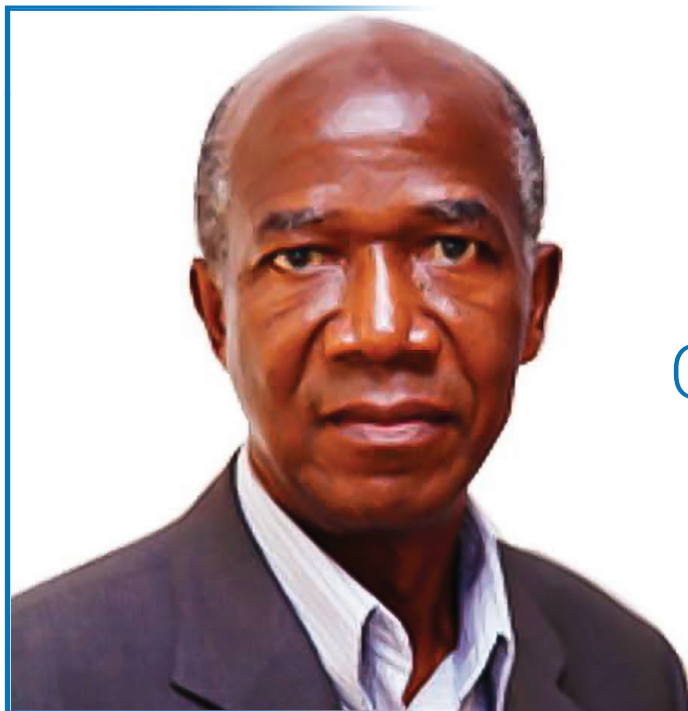


ASSOC. PROF

**SAMSON
RWAHIRE**

Ph.D., NEFF, FUNAS

Director Graduate Studies
Research and Innovations



Chancellor

PROFESSOR

**VINAND MUTAKABALA
NANTULYA**

MD, PHD (IMMUNOLOGY), FRCPATH



MS. ROSEMARY MUTYABULE

BA(SS)-ECONOMICS & SOCIAL ADMINISTRATION
MBA(COOPERATE STRATEGY & ECONOMIC POLICY),
CERT. IN AGRO-INDUSTRIAL PROJECT PLANNING & APPRAISAL

Chaiperson of Council



**HON. DR.
WABUDEYA MUKAYE BEATRICE**

BACHELOR OF VETERINARY MEDICINE (BVM),
MASTERS OF SCIENCE IN AGRICULTURE (MSC AGRIC.) (MAK)

Vice-Chaiperson of Council



PROFESSOR ELLY N. SABIITI

BSC AGRIC & MSC AGRIC (MAK), PHD (UNIV. OF NEWBRUNSWICK, CANADA), FTWAS, F.UNAS, F.AAS, FULBRIGHT SCHOLAR; TWAS RESEARCH PROFESSOR.

Chairperson of Appointments Board



PROFESSOR PAUL WAAKO

MBCHB & MSC. (MAK), PHD (CLINICAL PHARMACOLOGY) (UCT, CAPE TOWN). DIP MGT (UMI), FUNAS

Vice-Chancellor



SAMUEL BAKER KUCEL (PHD)

BSCENG (MUK), MENGSC (UNIVERSITY OF NEW SOUTH WALES), PHD (UNIVERSITY OF TRENTO/UDINE)

First Deputy Chancellor
(ACADEMIC AFFAIRS AND RESEARCH)

Associate Professor of Energetics



MR. MATSIKO MUTUNGWIRE ABERT

BA(SS) HON & MHRM (MAK), PGDHRM (UMI), CERT. ADMIN. LAW (LDC)

University Secretary



DR. LILLIAN N. GIMUGUNI

PHD (ED.MGT)-KISII UNIVERSITY, MED & BAED (MAK)

Academic Registrar



MRS. SOPHIA ACON

BA (ARTS) & MA (EDUC. MGT) (MAK)

Dean of Students



DR. FREDRICK KIWUWA LUGYA

BLIS (MAK), MSCLIS & PHD (ILLINOIS)

University Librarian



MR. WILBERFORCE OJIAMBO

CPA(U), MBA(FINANCE & ACCOUNTING),
BCOM(ACCOUNTING) MAK, PDCIT, PODITRA

University Bursar



ASSOC. PROF. SAMSON RWAHWIRE

PHD MAT.ENG (TU LIBEREC), NEFF, FUNAS.
MSC MECH & AERO. ENG (CTU, PRAGUE)

Director, Directorate of Graduate Studies, Research & Innovation



ASSOC. PROF. DR. DAVID KANI OLEMA

BED (SCI ED) MUST, MED (PSYCHOLOGY) MAK,
PHD (PSYCHOLOGY) MUST

Dean, Faculty of Science and Education



PROFESSOR JULIUS N. WANDABWA

MBCHB, MMED (OBS AND GYN) (MUK),
PHD (LONDON)

Dean, Faculty of Health Sciences



DR. JUSTINE EKOU

BVM, MSC, PHDCAND, CERT. PUBLIC ADMIN
& MGT, CERT. ADMIN LAW

Dean, Faculty of Agriculture & Animal Sciences



DR. ALICE NAKIYEMBA

DIP.(EDUC), BA(SOCIALSCIENCES)
MA(SOCIOLOGY), PHD

Dean, Faculty of Natural Resources & Environmental Sciences



DR. DANIEL OTIM

PHD (UNIV. OF KWAZULU-NATAL,
SOUTH AFRICA);
MSC IRRIGATION ENG
(UNIVERSITÀ DEGLI STUDI DI
FIRENZE, ITALY);
BSC CIVIL ENG. (HONS) (MAK)

Dean, Faculty of Engineering



DR. MUSENZE IBRAHIM

PHD(BUSINESS ADMINISTRATION),
MASTERS(PUBLIC ADMINISTRATION),
PGD(PUBLIC ADMINISTRATION) - MAK,
BACHELORS IN PUBLIC ADMINISTRATION
(UIU),
CERT. ADMINISTRATIVE LAW (LDC)

Dean, Faculty of Business & Management Sciences



KEYNOTE

SPEAKER

Dr. Maxwell Otim Onapa

Dr. Maxwell Otim Onapa is a Biomedical Scientist who is currently the Director of Science, Research and Innovation at the Ministry of Science, Technology and Innovation.

Prior to joining the ministry, Dr. Otim was the Deputy Executive Secretary for Uganda National Council for Science and Technology (UNCST) from 2006 to 2019. He also worked as a Research Officer at the National Agricultural Research Organization (NARO) between 1993 and 2006. During his career with NARO, Dr. Otim conducted research on infectious zoonotic diseases including bird flu, and published several research articles in high impact peer-reviewed international journals. Dr. Otim, therefore, has an accumulated experience of over 12 years as a scientific researcher.

Dr. Otim originally obtained a Bachelor of Veterinary Medicine Degree from Makerere University, Kampala in 1992; a Master of Science Degree from the Free University of Berlin, Germany in 1999, and a Ph.D. from the Royal Veterinary and Agricultural University, Denmark in 2005. He also holds a Master of Business Administration (MBA) Degree from the Eastern and Southern Africa Management Institute (ESAMI) where he won a leadership award in 2009. In 2015, Dr. Otim graduated with a Diploma in African Leadership in ICT Management and Knowledge Society, and a Professional Development Certificate in African Leadership in ICT from Dublin City University and the Global e-Schools and Communities Initiative respectively. Dr. Otim has a deep knowledge of approaches and tools such as change management and planning tools such as futures thinking and fore sighting that use horizon scanning, signals and trends, futures wheel and scenario building to facilitate planning and policy development.

Among other roles, Dr. Otim served as the Vice-Chair of the United Nations Commission on Science and Technology for Development (CSTD) of the United Nations Conference on Trade and Development (UNCTAD), a position to which he was elected in Geneva in May 2015. He is also a member of the Governing Council of the Atomic Energy Council (AEC), a Uganda government Agency mandated to regulate the use of ionizing radiation in Uganda. Dr. Otim is also the lead negotiator on Climate Technology for Uganda at the UNFCCC Conference of Party.

Dr. Otim is a member of the doctoral committees and an examiner in Colleges of Makerere University where he also supervises students and serves as a member of the Governing Board of Makerere University Press. He is also the Coordinator of the European Commission and African Union supported Information Society in Africa (IST-Africa) Initiative.

Dr. Otim is passionate about translating result into policy and product, as well as promoting the use of ICT as a tool for facilitating the development of STI.

Our

Campuses

02



Busitema University is a public University established by Statutory Instrument No.22, 2007 enacted by Parliament on 10th May, 2007. The University is a multi campus model with six operational campuses namely;



BUSITEMA CAMPUS

01

The main campus is located at Busitema, formerly the National College of Agricultural Mechanization, which is along Jinja-Tororo highway, 25km South West of Tororo or 185km East of Kampala. This is the Faculty of Engineering.

JINJA STUDY CENTRE

Located in Jinja District

02



MBALE CAMPUS

03

is based at Mbale Regional Referral Hospital, in Mbale Town. It is the Faculty of Health Sciences



NAGONGERA CAMPUS

04

The Campus is located along Tororo-Busolwe access road and about 15km West of Tororo.
It is the Faculty of Science & Education.

ARAPAI CAMPUS

05

It is based at the former Arapai National ARAPAI CAMPUS Faculty of Agriculture & Animal Sciences.
This is the Faculty of Agriculture & Animal Sciences.



PALIISA CAMPUS

06

It is based at Kalaki in Pallisa Town Council.
It is the Faculty of Management Sciences.

NAMASAGALI CAMPUS

07

It is based in Kamuli District at the former Namasagali University.
It is the Faculty of Natural Economics & Environmental Sciences



Our Mission & Values



OUR VISION

“A center of academic and professional excellence in science, technology and innovation”.



OUR MISSION

“To provide high standard training, engage in quality research and outreach for socio-economic transformation and sustainable development”.

03 Abstracts

DAY 1 (20 Papers)

THURSDAY 24TH, JUNE 2021

0830 - 0900: **Arrival**

0900 - 0915: **Opening Remarks from the Organizing Committee**

0915 - 0930: **Speech from the First Deputy Vice-Chancellor,
Academics and Research**

0900 - 1000: **Speech from the Vice-Chancellor**

1000 - 1030: **Keynote Address - Dr. Maxwell Otim Onapa**

1030 - 1230: **Sustainable Development (6)**

1230 - 1330: **Lunch**

1330 - 1500: **One Health (4)**

1500 - 1530: **Posters(4)**

1530 - 1700: **Water Resources & Climate Change (6)**

1700 - 17:10: **Closing**

RESPONSE SURFACE MODELING OF AIR PERMEABILITY OF SINGLE JERSEY KNITTED FABRICS USING CENTRAL COMPOSITE DESIGN.

01

AUTHOR(S) Dan Tigalana (Busitema University), Ildephonse Nibikora (Busitema University) & Josphat Mwasiagi (Moi University).

Knitted fabrics are the preferred structures in sports and active leisure activities in which a key requirement is comfort. The fundamental influencing property of such a behaviour is air permeability. Liquid sweat and heat generated during exercise activities in form of water vapour must be transported out and dissipated to the atmosphere to derive comfort of the wearer. The yarn and fabric physical factors play a vital role in determining its air permeability. The objective of this study was to establish and model the effect of yarn and fabric factors on the air permeability of cotton single jersey knitted fabrics. Fabric samples of varying areal densities (100, 120, 150, 180 and 200 g/m²) were knitted using yarns of five different counts (20, 24, 30, 36 and 40 Ne) by systematically varying knitting stitch lengths (2.7, 2.8, 3.0, 3.2 and 3.34 mm) and air permeability was measured for each fabric. A total of 25 different fabric samples were tested among which 20 were allocated for development of the prediction model while the remaining were utilized for its validation. Response surface methodology-central composite design option was applied on the collected data set in order to develop the prediction model of the selected input variables. Air permeability increased with increase in knitting stitch length and yarn count owing to the decrease in fabric areal density. ANOVA was performed to statistically analyze the results. The model showed satisfactory predictability when applied on unobserved dataset and yielded mean absolute percentage error of 9.75 % with high R-sq. of 98.9% and adjusted R-sq. of 98.6%. Sensitivity analysis was also performed to determine the relative importance of the model factors on the air permeability of single jersey knitted fabrics. The developed model can be effectively used for prediction of air permeability of the single jersey fabrics before manufacturing which saves on the time and wastage aspects.

KEYWORDS: *Response surface methodology, air permeability, modeling, single jersey knitted*

SEISMICITY AND ACTIVE STRESS FIELD DERIVED FROM THE INVERSION OF FOCAL MECHANISM DATA, SOUTH ATLAS OF TUNISIA.

02

AUTHOR(S) Makrem Harzali (ENIS)

Seismicity is not uniformly distributed throughout in the southern Tunisian Atlas and is mainly clustered around active strike-slip faults, thrust-related anticlines and shear zones. In the present study, focal mechanisms of 14 events taken from 1987 to 2019 were studied on the basis of stress inversion of focal mechanism parameters in order to investigate the spatial variations of the stress regime and understand the detailed tectonics. Study of earthquake focal mechanisms reveals prevailing strike-slip faulting using the Win-Tensor program that changes into thrust faulting locally in relation to the complexity of the regional tectonic domain. Pressure/Tension axes are mostly horizontal and maximum horizontal stress directions (SH max) are directed mainly in NW-SE direction which corresponds to the slip character of the E-W strike-slip motion of Chotts faults and its splays. Furthermore, maximum (δ_1) and minimum (δ_3) principal stresses shows a subhorizontal trend and the intermediate principle stress (δ_2) is vertically orientated, in fit with the prevailing strike-slip regime. Indeed, these orientations seem to shift, locally, from N to S where NW-SE directed δ_1 turns towards N-S in some zones. Our observations are in strong alignment with the NW-SE Africa-Eurasia convergence, which is accommodated by an array of strike-slip movement along the major fault systems in this segment of Tunisian Atlas.

KEYWORDS: *Southern Tunisian Atlas, focal mechanism data, stress inversion, strike-slip, tectonics*

DEVELOPMENT OF ANTIMICROBIAL COTTON FABRIC THROUGH APPLICATION OF DYE EXTRACTS FROM GALINSOGA PARVIFLORA PLANT LEAVES.

03

AUTHOR(S) Musinguzi Alex (Busitema University), Tigalana Dan (Busitema University), Tumusiime Godias (Busitema University) and Nibikora Ildephonse (Busitema University)

Cotton being one of the organic natural fibers, is susceptible to microorganism's attack thus leading to loss of physical aesthetic and mechanical properties. The present study involves the aqueous extraction of dyes, optimization of dyeing conditions (Extract concentration and dyeing temperature), application of extracted dyes onto cotton fabrics using optimized conditions, SEM analysis of treated fabric surface morphology, assessment of their antibacterial activity, and wash durability. Using Central Composite Design (CCD), the optimized dyeing conditions were selected as 39.14 percent and 700C based on the lowest bacterial count demonstrated by the dyed cotton fabric samples. Results of Analysis of Variance (ANOVA) confirmed that extract concentration has more significant statistical influence compared to dyeing temperature. Treated cotton fabric at optimized conditions together with alum as a cross-linking agent exhibited a 98.54 and 97.96 percent reduction in the bacterial count against Staphylococcus Aureus and Pseudomonas Aeruginosa bacterial strains respectively. The retention of the antimicrobial activity of treated fabric was found to be more significant even after 5 washes thus confirming that Galinsoga Parviflora extract is a potential source of finishes capable of improving antibacterial resistance of cotton fabrics for a longer period.

KEYWORDS: *Antimicrobial activity, Central Composite Design, Cotton fabric, Galinsoga Parviflora, Optimization*

REMOTE SENSING AND GIS APPLICATION IN DETERMINING WATER REQUIREMENT FOR PADDY AT KIBIMBA IRRIGATION SCHEME IN BUGIRI DISTRICT, EASTERN UGANDA.

04

AUTHOR(S) Michael Onyango (Busitema University), Mugisha Moses (Busitema University) and Kimbowa George (Busitema University).

Water in the modern world is a highly valuable resource, so it is very necessary to use this very precious resource wisely. One of the major users of water is agriculture either in form of direct use or through irrigation. It becomes very important to note the various requirements and their amount of supply, in this case an important tool can be useful to the calculation. I.e. IRRIGATION EFFICIENCY and with this crop water requirement can also be an effective tool. Irrigation efficiency is highly useful data in calculation the actual water requirement at the field and the amount of water that is supplied to the farm lands. There are many techniques usually applied for calculation of such process but ArcGIS was taken into consideration with high resolution satellite images because a large area can be covered with ease a thematic map can be usually designed, land use and land cover map can be used too. The study area is Kibimba rice irrigation scheme, in Bugiri district of eastern Uganda. This study is focusing on estimating the water demand for paddy crop during specific cropping season within the study area. High quality satellite images were taken into consideration to identify the irrigated areas and the fallow land.

KEYWORDS: *GIS, Remote sensing, CROP WAT*

SMART WATER DISTRIBUTION SYSTEM DECISION SUPPORT TOOLS FOR OPTIMAL PRESSURE MANAGEMENT

05

AUTHOR(S) **Benedicto Maseruka (Busitema University)**

Despite water utility companies' efforts to provide proactive pressure management strategies, low and high system pressures still prevail. This has led to a wide state of Intermittent Water Supply (IWS), with areas close to the source disrupted by bursts and leakages and those far from it succumbed to no water supply.

This study aims at enabling operators to make sound and informed decisions for effective pressure management in large WDS through the development of computationally efficient and intelligent tools that apply machine learning and metaheuristic paradigms to automatically detect and demarcate constituent pressure zones in the network, and provide optimal pressure boosting and reduction installation strategies.

The tools when applied to Zhi Jiang and Bulenga Water distribution networks delineated statistically different pressure zones and offered pressure management strategies that not only reduce Non-Revenue Water through pressure regulation but also subsequently improve reliability and equitability of water supply within and between the demarcated zones. This is beneficial in the attainment of SDGs 6 (clean water), 11 (sustainability), and 12 (reasonable consumption).

KEYWORDS: *pressure management strategies, Intermittent Water Supply, pressure zones, Non-Revenue Water, machine learning, metaheuristic, Reliability*

DESIGN AND CONSTRUCTION OF A HUMAN FECES INCINERATION TOILET.

06

AUTHOR(S) **Egeu Pascal (Water and Environment) and Maseruka Benedicto (Water and environment)**

In an attempt to increase access to emergency sanitation and reduce the risk of transmission of many infectious diseases including cholera, there is a need to develop sustainable toilets. In 2020, a prototype of a mobile hybrid human feces incineration toilet that uses heat from clean renewable energy to sanitize waste was developed in response to sanitation needs in Buwali Internally Displaced People's Camp of Bududa District in Eastern Uganda. The criteria of the treatment process were developed from several questions that addressed the task including how many active users per day, how much energy is required to sanitise the waste, could the waste be sanitized?

The prototype was tested at Busitema University Engineering Workshop and National Water and Sewerage Corporation, Tororo Laboratory. Results showed that when waste reaches flame temperature, pathogens in the fuel can be killed. The heat eliminated pathogens concentration with a high efficacy and reduced the mass of waste by 90%, leaving only char matter, that can be used in briquette making.

The projects economic viability and capabilities present a potential of quick life-saving interventions and sustainable water and sanitation needs in emergencies and urban poor settlements where lack of resources, infrastructure and disaster preparedness systems limits planning. The project can contribute to attainment of Sustainable Development Goals (SDGs) 3 and 6 which are; promoting health and well-being for all and access to clean water and sanitation for all respectively.

KEYWORDS: *Fecal, Pathogens, Incineration, Efficacy, Efficiency*

THE RISKS CAUSED BY RISING L.VICTORIA LEVELS & COVID 19 TO DAM SAFETY. CASE STUDY: RIVER NILE CASCADE UGANDA



AUTHOR(S) Kadapawo Gerald Opolot (EAST AFRICAN POWER),
Okello Geatano (AWE) and Nsubuga Andrew (PAC spa)

East Africa has recently experienced extreme weather conditions characterized by over eighteen months of continuous precipitation which has led to the rising ponding levels of water resources like Lake Victoria. These unusual hydrological events have resulted into a gauged mark of above 13.4 m of the lake level that was last experienced more than fifty years ago in 1964.

In the same period, a global crisis of the COVID 19 pandemic has also led to the alteration of the operational dynamics of the power plants/ dams.

These two unrelated conditions pause a hidden risk for the safety of dams on the Nile River in Uganda which is the major outflow of the lake. Circumstances resulting from the existence of the two happening simultaneously increases the chances of dam failure, each dam case analyzed independently according to the surrounding hydrologic, hydraulic conditions and mode of failure trigger exposed to it.

In this paper, careful studies about the threat to the Nile cascade dams ascribed to resultant failure triggers from both rising levels and COVID-19 are discerned. In a special way, moving islands and limited outflow due to low power demand as genesis for triggers from rising levels and the pandemic respectively are a major focus.

The first risk from these islands is structural destabilization as a dam failure trigger. Lake Victoria shores are prone to lake waves that cause vigorous agitation of the shoreline thereby suspending the whole masses of the clayey soil together with the floating weeds and plants. The floating soil mass and the native vegetation (grass, weeds and in some cases tuberous paddy crops such as yams and even sugar canes, cassava, matooke) and in more serious cases even makeshift human shelters may be such suspended (due to increasing rising lake water level) as to break off from the rest of the shoreline and begin to move all over the lake surface driven by the wind and wave strengths.

This is the start of the hydrologic/hydraulic disequilibrium in the lake system. When these floating islands are eventually caused to spill from the lake basin through the outlet such as the outflow at Jinja (Owen falls) where the channel is narrower than the original open lake, the velocity of movement increases tremendously and becomes very catastrophic because the water in front of the moving land mass develops waves that strengthen as it advances barrier structures like the dam walls at Nalubaale and Kiira. These hydraulic structures are therefore subjected to serious impulsive loads of the floating landmass and the vegetation.

This has serious effect on the structural stability of the dam walls in two ways: first the impulse of the landmass sets the rigid dam walls into dynamic movement and depending on the frequency of the oscillation of the dam wall as a rigid structure the degree of deformation of the crests may be beyond admissible/acceptable and the dam walls break leading to dam collapse. Secondly the accumulation of soil and other silty materials can exert active soil pressure and water pressure on the dam walls and push causing them to slide beyond allowable/acceptable limits resulting in dam wall failures through sliding. In either cases, the factor of safety of the dam walls used during their designs are overshoot so the structures cannot stand. (cont'd)

THE RISKS CAUSED BY RISING L.VICTORIA LEVELS & COVID 19 TO DAM SAFETY. CASE STUDY: RIVER NILE CASCADE UGANDA

AUTHOR(S) Kadapawo Gerald Opolot (EAST AFRICAN POWER),
Okello Geatano (AWE) and Nsubuga Andrew (PAC spa)

The other hidden risk from the islands is of sedimentation accumulation in the dam reservoirs and a possible constriction to the outflow capacity through the bottom outlets for the case of Nalubaale. The latter is another risk of a possible scenario of also constriction of outflow through the turbined capacity of the facility which still brings limitation to the relieving actions in the dam. This is the unattractive showdown between MOTHER NATURE and also the Ugandans/ East Africans who have continued to violate her rules.

In addition, the COVID-19 pandemic that has resulted into a changed pattern of the nation's grid supply from the power stations at the Nile cascade Uganda. This also causes an indirect risk to dam failures. Low energy consumption/ demand due to lockdowns, curfew and generally reduced industrial activity limit the turbined outflow of these dams compared to the normal patterns they were designed for.

The heavy and prolonged down pour as a possibility predicted by the climatic models arrive at "THE EAST AFRICAN PARADOX" phenomenon. This is a shift in weather patterns which could be associated with the extreme variance in lake levels and is a situation expected to continue for the next fifteen or so years in the region.

Dam failures are usually triggered by a combination of unusual circumstances simultaneously occurring.

Implementation of ideas generated from this study can improve dam safety of the cascade in the following ways:

- I. Brings about the awareness of the exact risk at hand due to the two prevailing conditions of rising levels and COVID-19 analysed singly and combined.
- II. Propose better ways of dealing with triggers resulting from these conditions such as floating islands factoring in dam safety measures.
- III. Reduce chances of over flooding of any one reservoir.
- IV. Improves Emergency Preparedness and Response actions for Cascade dams operation and maintenance (O&M).
- V. Introduce serious dam safety considerations downstream and awaken dam designs, construction, O&M to define/gazette high flood level lines below which there should be no human settlement and activities.
- VI. Provide motivation to the concerned authorities as to why lake shores should be more strictly protected.

KEYWORDS: *Rising lake victoria levels, Spilling capabilities, reduced demand /turbined outflow, climate change--The eastafrican paradoxx, floating islands, cascade dams in Uganda, dam safety, Nalubaale dam*

VIRTUAL COUNSELLOR - ONLINE THERAPY AMPLIFIED



AUTHOR(S) Gerald Kisangala (Busitema University), Denis Zami Atibuni (Busitema University) and Andrew Lukyamuzi (Busitema University).

With the rapid in surge of technology in every field, there arises a need to evaluate the proceedings of psychological working on the cyber-sphere. The popular thoughts is that online therapy is a duplication of what happens in the expanse of face-to-face traditional psychotherapy. However, the said therapy is an amalgamation of the benefits of traditional setting with the added benefits taken from various therapeutic practices. Communication, being one major contributor; based on which the efficacy of online counseling is underlined. This paper attempts at elucidating the benefit online counseling.

Counseling has primarily been contained as a face-to-face (f2f), 'in the therapy room' practice. However, the development of internet has over the ages facilitated an 'indirect' form of therapy. The online channel is not a mere mirroring of the traditional f2f; rather a whole new paradigm of counseling with some built in advantages to facilitate therapy. Traditional therapy has many benefits to its credit. The client and counselor know of each other as being 'real' owing to the physical presence. The counselor has access to the client's abstract senses, body-language, phase shift, tonal shifts, etc. which helps them assess the situation and move the session in the apt direction. However, many individuals have reported to being elusive of going to a psychologist at the first place; owing to the stigma attached to it. Even if they take the step and see a shrink, it may take many sessions to break out of the overt personality and reach catharsis. Hence, in turn it may take many more sessions to reach to the real problem.

Forms of indirect therapy have been practiced since the time of Freud; as early as 1899 when he elaborated the disorder oedipus complex after having corresponded with the father of the child diagnosed with the syndrome (through letters). The modern version of indirect therapy involves e-mails, chats, telephonic conversations, etc. For the scope of this article, e-mails and text-based chat system will be the modus operandi.

The very nature of online counseling is 'written'; in the sense that the client has to put their thoughts in writing which they send to their counselor. Writing, by itself is a therapeutic process. Even in traditional f2f counseling, writing about thoughts, journaling and maintaining thought diaries is prescribed as exercises.

Pennebraker (1997) has elucidated empirical evidences of how writing can be therapeutic to physical health. This type of therapy is especially beneficial for people trapped in abusive situations, traumatic past and shy individuals. The virtual nature of online therapy helps the client dissolve the 'shame' and 'judgment' attached by creating a disinhibiting effect

(Joinson, 1998). This directly puts the counselor in access of the covert personality of the client, enabling a speedy catharsis.

Since the client is no more required to process the thoughts of stigma, shame and fear of judgment; the psyche is free for self-reflection. The client has to write their thoughts down for the counselor to understand. This forces them to sit and frame the thoughts which in turns pushes them to introspect on their memory of the traumatic events, their thoughts and feelings of the memory and reach the core issue. As they write their thoughts out, they are able to 'see' what they have written, giving rise to an automatic review of their own psyche, bringing to conscious what was not very apparent before. This is majorly cathartic to the client. This need to channel their thoughts also inclines the client to vent out. By re-reading and re-analysing their own thought; the client can reach composure even before the counselor adds to the exchange.

VIRTUAL COUNSELLOR - ONLINE THERAPY AMPLIFIED

One of the most notable aspect of online therapy is dissolving of the 'power differential' (Owen, 1995). In a traditional set-up, the psychologist is the 'authority figure'. On the virtual front, however, the client and psychologist becomes co-author to the process and the client assumes an automatic control of the therapy in terms of level of disclosure, time, duration and interaction level. This in turn puts the client in a 'responsible' position and take charge of their change; rather than relying on the counselor. The text-based chats also help in re-wiring the associations one creates in their life to trauma. The exchange enables the client to create new memories, review the old ones and come to a new level of insight; all by their own writing. The client and counselor enter a zone of reflection (Suler, 2000) where both the parties can pay close attention to their thoughts while in dialogue.

The platform of Virtual Counsellor will provide an anonymous chat-space where clients can be availed with the benefits of online therapy while revealing their identity only to the level they are comfortable with. The platform will be available in both mobile and web applications, hence accessible anytime from anywhere. The interactions the client has with their counselor is contained in the platform to protect the anonymity. The chat history enables the client to access their sessions anytime, giving them an opportunity to re-read and rehearse their sessions; sometimes mid-way of a stimulating situation. The benefit for the psychologists is that they can avail expert consultation in the middle of the chat. If at any time they feel stuck, they can ask their peer to take over, or at least gain perspective. This gives the client an advantage of maximum input.

With the increasing curve of stress in general, every area of our life can get affected. Online therapy, with its ease of accessibility and availability can have a positive impact in helping people stabilize their stress, learn better coping mechanisms; and if nothing more, gain a safe venting space to reach better productivity in workplace, relationship, and/or physical health. The client connect anonymously to a psychologist on the platform, where they are hand-held through a process to reach catharsis and delivered Evidence Based Practices that enables the client to gain ownership of the process and their life. This gets reflected in their efficiency of work, productivity, personality dynamics and regularity.

Given that there is not enough empirical research on therapeutic techniques directly modelled in online practices, I suggest further research on the practices used online in accordance to progress of the client with measurable modifications.

References

- Suler, J. (2000). Psychotherapy in cyberspace: A 5-dimensional model of online and computer-mediated psychotherapy. *Cyber Psychology and Behavior*, 3, 151-160.
- Joinson, A. (1998). Causes and implications of disinhibited behavior on the internet. In J. Gackenbach (Ed.) *Psychology and the Internet: Intrapersonal, Interpersonal, and Transpersonal Implications*, pp. 43-60. San Diego: Academic Press.
- Owen, I. (1995). Power, boundaries, inter subjectivity. *British Journal of Medical Psychology*, 68(2), 97-107.
- Penne baker, J. W. (1997). Writing about emotional experiences as a therapeutic process. *Psychological Science*, 8(3), 162-166

KEYWORDS: *Virtual Counsellor, Virtual Conselling, Online therapy, Virtual therapy, Internet counselling, Mobile Counsellor, Chat with therapist*

DEVELOPING FUNCTIONAL GARMENTS FOR CHILDREN WITH LOCOMOTOR DISABILITIES.



AUTHOR(S) Edwin Kamalha (Busitema University), Allan Kasedde (Busitema University), Ildephonse Nibikora (Busitema University) and Ivoynne Tusiimire (Busitema University).

Clothing is one of the most personal components of daily life and provides aesthetic enjoyment, a means of self-expression and a way to suggest prestige and wealth as well as an outlet for creative energies.

Keeping up with clothing for growing children is a challenging task to all parents and caregivers but it is more challenging if a child has clothing need different from normal child due to any disability or health problem. The aim of this study was to develop functional garments for children with locomotor disabilities that make them more independent while donning and doffing. The study was carried out on 60 respondents (children with locomotor disability), between the age group of 4-15 years, in Katalamwa Cheshire Home, selected through purposive sampling. A questionnaire was developed for personal interview to elicit the data regarding the locomotor disabilities, needs of these disabled children and their clothing preferences. The garments were designed by keeping the comfort parameters and special needs foremost. A total of 4 garment sketches, 2 for girls and 2 for boys were prepared by incorporating the functional features and constructed into garments. Further, the prepared garments were subjected to evaluation by a respondents through wear trial using acceptability performance. Results of the wear study revealed that trousers with front opening, utilizing zippers, skirt with side full front zipper opening, trouser with inside leg velcro opening and finally gored skirt with godets were preferred the most. The prepared functional garments were highly appreciated by both the respondents and caretakers. Children perceived comfort and felt confident in the functional garments.

KEYWORDS: *Functional clothing, Children clothing, Locomotor disability, Wear perception*

DEVELOPING THE UGANDAN 3D STRUCTURAL NATURAL PRODUCTS DATABASE FOR DRUG DESIGN AND DEVELOPMENT.

10

AUTHOR(S)

Moses Andima (Department of Chemistry, Busitema University),
Jennifer Muhindo (Department of Chemistry, Busitema University)
& Tabitha Kalenda (Department of Chemistry, Busitema University)

Background: Computer-aided drug design (CADD) has become a very important component of the drug discovery process. CADD incorporates virtual screening (VS) of large compound databases against validated drug targets followed by the careful selection of virtual hit compounds to be screened by biological assays. This strategy considerably narrows down the number of compounds that undergo biological screening and thus considerably cuts down the cost and time of drug discovery (Klebe 2006). The adoption of this drug discovery strategy has necessitated the development of databases of virtual compounds.

Aim: The aim of this project was to develop a downloadable 3D database of natural products (NPs) isolated from medicinal plants in Uganda to inspire drug discovery and development.

Description: Our current collection named DAWA consists of > 300 compounds isolated from 30 distinct medicinal plant species belonging to 24 plant genera from the Ugandan flora. About 80 % of these have been previously published and/or referenced in internationally recognized journals. For each compound, the optimized 3D structure, drug-like properties, plant source, collection site, and currently known biological activities are given, as well as literature references. We have evaluated the "drug-likeness" of this database using Lipinski's "Rule of Five".

In silico screening of the current database against key SARS-CoV-2 viral targets or the host target ACE2 led to the identification of lead compounds. Further studies are underway to evaluate extracts containing the lead compounds in vitro and in vivo.

Conclusion: DAWA could be highly useful to identify lead molecules for drug development against current and emerging diseases.

KEYWORDS: *3D structures, Database collection, Natural products, Medicinal plants, Virtual screening*

ADHERENCE TO THE STANDARD OPERATING PROCEDURES IN THE PREVENTION OF TRANSMISSION OF COVID 19 IN MUYEMBE SUBCOUNTY.**11**

AUTHOR(S) Emmanuel Bwayo (Busitema University Faculty of Health Sciences), Miria Apio (Busitema University Faculty of health sciences) & Rebecca Nekaka (Busitema University faculty of health sciences).

KEYWORDS: *SOP, COVID-19, Community*

COMMUNITY KNOWLEDGE, ATTITUDE AND ADHERENCE TO SOPS IN THE PREVENTION OF TRANSMISSION OF COVID-19 IN BUGOBERO TOWN BOARD.**12**

AUTHOR(S) Roberta Ampurira (Busitema University Faculty of Health Sciences), Rebecca Nekaka (Busitema University Faculty of health sciences) & Joseph Mpagi (Busitema University faculty of health sciences).

KEYWORDS: *KNOWLEDGE, ATTITUDES, PRACTICES, COVID-19, BUGOBERO*

IMPACT OF DIFFERENTIATED SERVICE DELIVERY MODELS ON RETENTION AND VIRAL LOAD SUPPRESSION AMONG ART CLIENTS IN KATAKWI DISTRICT.**13**

AUTHOR(S) Brian Jemba (Busitema University Faculty of Health Sciences), Rosaria Lomuria (Busitema University Faculty of health sciences) and Rebecca Nekaka (Busitema University faculty of health sciences).

KEYWORDS: *DSD, MODELS, HIV, VIRAL LOAD*

FACTORS ASSOCIATED WITH UNDER NUTRITION AMONG CHILDREN UNDER 5 BORN TO MOTHERS LIVING WITH HIV AND COMMUNITY PERCEPTION ON HUMAN DONATED MILK IN BUKEDEA DISTRICT.**14**

AUTHOR(S) Ivan Orombi (Busitema University Faculty of Health Sciences), Rebecca Nekaka (Busitema University Faculty of health sciences) & Jacob Stanley Iramiot (Busitema University faculty of health sciences).

KEYWORDS: *COMMUNITY, DONATED MILK, BUKEDEA, DISTRICT*

EFFECT OF TIME DELAY ON THE CONTROL OF BANANA XANTHOMONAS WILT ON BANANA PRODUCTION AND YIELD.

15

AUTHOR(S)

Fulgensia Mbabazi (Busitema University), Richard Awichi (Busitema University), Jackson Okiring (Busitema University), Stephen Kandedesya (Busitema University), Topista Nabirye (Busitema University), Mark Kimathi (Machakos University) and Livingstone S. Luboobi (Institute of Mathematical Sciences, Strathmore University, Nairobi, Kenya).

Banana is a main crop in the livelihoods of numerous people in the Great Lakes region of East and Central Africa. Banana has been threatened by Banana Xanthomonas Wilt (BXW) which spreads at different rates for more than a decade now. The disease attacks all banana cultivars and may result into 100% yield losses at farm level. We propose a mathematical model to study the effect of time delay on the control of BXW in the production and yield of banana. Delay differential equations are formulated, analyzed for disease free and endemic equilibria with no time delay and with time delay in the infected population. The method of the next generation matrix is used to compute the reproductive threshold responsible for the BXW control. Numerical experiments show that with reduced time delay in removing infected banana plants would lead to a stable state of reduced infected plants population. However, increased time delay in removing infected plants shows manifestation of more infected plants that would reduce banana production and Yield if intervention/control measures are not adhered to.

KEYWORDS: *Banana Xanthomonas Wilt, Time delay, Stability analysis, Delay Differential Equations, Banana Production*

LAND SUITABILITY ANALYSIS FOR MAIZE AND SORGHUM PRODUCTION IN KARAMOJA REGION USING SPATIAL MULTI-CRITERIA EVALUATION.

16

AUTHOR(S)

Moses Mugisha (BUSITEMA UNIVERSITY), Yashon Ouma (MOI UNIVERSITY) and Job Rotich Kosgei (MOI UNIVERSITY)

Karamoja is a region in north-eastern Uganda. Over 80% of its population has suffered from food insecurity. This situation has often prompted relief agencies to engage in humanitarian relief especially food aids for the last three decades. Historically, the region has been a pastoral area. More Karamojong are turning to crop cultivation, and settlement even in unsuitable areas. The expansion and increasing population is clear indicator that human activities and agriculture would insert pressure on available land. It's therefore important to analyze and identify the suitable land for agriculture crop production (maize and sorghum), livestock and protected areas while causing minimum impact to the environment. In this research an attempt was made to identify the suitable land for maize and sorghum production by using a Spatial Multi-Criteria Evaluation (SMCE) in Integrated Land and Water Information System (ILWIS) software. Through the SMCE, the development of geospatial datasets for the study area comprising of the boundary map, slope map, attribute soil maps, and the protected areas map was made. The results showed that 85.3% and 45.4% areas in the region were found at least moderately suitable for Maize and Sorghum production respectively. Therefore, these results on land suitability analysis using spatial multi-criteria evaluation can be used by the stakeholders, smallholder farmers and climate policy makers in planning and making decision in allocation of land for effective and sustainable Maize and Sorghum production in Karamoja region of Uganda.

KEYWORDS: *Geospatial datasets, Land suitability analysis, Spatial multi-criteria evaluation (SMCE), ILWIS, Stakeholders, Sustainable food production*

A PROPOSED ONLINE AGRICULTURAL PRODUCTS MARKETING MANAGEMENT SYSTEM FOR FARMERS IN JINJA DISTRICT, EASTERN UGANDA.

17

AUTHOR(S) Shariff Mugoya (Busitema University).

Agriculture today has advanced from being an activity for food production to a business in countries across the globe, Uganda inclusive. The data shows that 98% of the farmers in Jinja district majorly depend on traditional physical markets for sale of their agricultural products. These markets of two types; those held on particular days of the week (locally known as “action markets”) and daily markets with permanent structures. The remaining 2% of the farmers sell off their agriculture products through barter trade. However these markets have limited sales of products due to a large number of farmers scrambling for the limited available market. Therefore exploring the internet for the sale of agriculture products can solve the problem of limited market for agricultural products.

This study had two specific objectives:

- (i) to explore the challenges of depending on physical markets for sale of agriculture products in Jinja district and
- (ii) to propose an Online Agriculture Products Marketing Management System for farmers in Jinja district.

The study found out that there is limited market and access to some of these markets is difficult due to poorly developed road networks. Therefore the system aims at reducing the dependence on physical markets and also enable them track their customers, and other sales records. The system will store clients’ records online and advertise the agricultural products online.

In this study, a closed-ended interview using questionnaires was used for data collection. Apache web server, html, CSS, php, MySQL database, and Microsoft visio were used in developing the system.

Terms: Agribusiness is a term which describes economic activities related to agriculture.

GDP stands for Gross Domestic Production and it is a term used to measure a country’s development.

The higher the GDP the higher the development.

OAPMMS stands for Online Agricultural Products Marketing Management System.

KEYWORDS: *Agricultural products (Agri-products), Agribusiness, Online Agricultural Products Marketing Management System*

AGRICULTURE 4.0: THE PROMISES FOR SUSTAINABLE AGRICULTURAL AND FOOD SYSTEMS.

18

AUTHOR(S) Ocident Bongomin (Moi University), Collins Okello (Gulu university), Gilbert Gilibrays Ocen (Busitema university) and Dan Tigalana (Busitema university).

The transformative power of industry 4.0 in agricultural and food systems (Agri-food) can be attested from the explosive disruption of agricultural production infrastructures such as connected farms, new farm equipment, and connected tractors and machines which is well-known today as Agriculture 4.0 or Agri-food 4.0. The driving force behind the emergence of Agriculture 4.0 is the dire need to increase efficiency, productivity and quality in agri-food, and environmental protection.

This has gained attention of many researchers in the recent past and thus, making Agriculture 4.0 a buzzword among the academic literature today. Despite the fact that a number of studies have covered the applications of several disruptive technologies in agri-food, the key technologies that are transforming the agri-food have been ill-defined. Therefore, the present paper aimed at identifying the key disruptive technologies and highlighting their application areas in agri-food.

Massive exploratory literature search was conducted on the published papers obtained from the electronic databases including Scopus, ScienceDirect, Wiley, Emerald insight, Taylor & Francis, and Springer. The applications of 12 disruptive technologies in agri-food were analyzed based on 119 published papers. The results showed that 5 key disruptive technologies including Internet of things, Drones, Blockchain, Bigdata, and Robotics are emblematic of Agriculture 4.0 epoch. The application areas of these technologies in agri-food are clearly highlighted. The present study revealed the need for extensive research to expand the application areas of the disruptive technologies in agri-food.

KEYWORDS: *Internet of things, Drones, Bigdata, Blockchain, Robotics, industry 4.0, agriculture 4.0, disruptive technologies, Agri-food 4.0*

KNOWLEDGE, ATTITUDES AND PRACTICES TOWARDS CYSTIC ECHINOCOCCOSIS IN LIVESTOCK AMONG SELECTED PASTORAL AND AGRO-PASTORAL COMMUNITIES IN UGANDA AGRICULTURAL AND FOOD SYSTEMS.

19

AUTHOR(S) Leonard Omadang (Busitema university)

A cross-sectional study was done from March 2013 to May 2014 to assess knowledge, attitudes, and practices towards cystic echinococcosis (CE) or hydatidosis among selected pastoral and agro-pastoral communities in Uganda. A structured questionnaire was administered to 381 respondents. Multivariate logistic regression analysis was done to find the relationship between knowledge about CE and factors such as age, sex, and level of education across all regions. The odds ratios and confidence intervals were used to determine the difference in responses across regions. It was shown that age above 36 years was significantly ($p < 0.001$) associated with awareness about CE in livestock. Likewise, uneducated ($p < 0.0001$) and agro-pastoralists ($p = 0.01$) were significantly less knowledgeable than the educated and pastoralists across all regions. The overall knowledge towards CE in livestock was low 17.8% (95% CI = 14.0–21.6). Dog ownership was high and they never dewormed their freely roaming dogs. Dogs shared water with livestock. In conclusion, knowledge about CE in livestock was low across all regions. Therefore, public health education and formulation of policies towards its control by the relevant stakeholders should be done. Also, the true prevalence of CE in livestock needs to be done so that the magnitude and its public health significance are elucidated.

KEYWORDS: *echinococcus granulosus, knowledge, pastoralists*

FLUORIDE CONTAMINATION AND ITS OPTIMUM UPPER LIMIT IN GROUNDWATER FROM SUKULU HILLS, TORORO DISTRICT, UGANDA

20

AUTHOR(S) Moses Egor (Busitema University)

This study was carried out to assess fluoride (F⁻) concentration and to determine its upper permissible limit in groundwater from Sukulu Hills, a phosphate mining area in Tororo District, Uganda, where groundwater is the main source of drinking water. This area is known to have a high prevalence of dental fluorosis, a condition manifested as permanently brown-stained teeth caused by excess fluoride in drinking water. To establish the extent of fluoride contamination, water samples were collected from boreholes and protected springs within a three-kilometer radius from the foot of the Sukulu Hills. The physicochemical parameters (pH, electrical conductivity & total dissolved solids) and F⁻ concentration were analyzed using potentiometric methods. The water samples collected had a pH range of 6.0–7.2, the electrical conductivity of 148–750 $\mu\text{S}/\text{cm}$, and TDS values of 75–378 mg/L; and these parameters were within the WHO normal range for drinking water. F⁻ concentration in groundwater from boreholes ranged from 0.4 to 3 mg/L, whereas in springs the range was from 0.2–2.4 mg/L. High F⁻ levels corresponded with higher TDS values at near-neutral pH. The WHO and UNBS guideline value of 1.5 mg/L F⁻ was exceeded by groundwater from spring S3 and boreholes B3 and B7 (14% of samples). From the five-year average weather conditions of Tororo, a modified Galagan equation was applied to calculate the recommended F⁻ level in drinking water for the area and was found to be 0.4 mg/L. All water sources studied contained average F⁻ levels higher than 0.4 mg/L. These findings imply the local population is exposed to the risk of the dangers of the high F⁻ intake. This presents the need to develop effective and affordable F removal technologies.

KEYWORDS: *fluoride, groundwater, optimum upper limit*

DAY 2 (23 Papers)

FRIDAY 25TH, JUNE 2021

0900 - 1000: ICT and Computing (3)
1000 -1100: Water Resources & Climate Change (4)
1100 - 1110: Break (10 minutes)
1110 - 1210: Sustainable Development (4)
1230 - 1330: Lunch
1330 - 1530: One Health (6)
1600 - 1700: Sustainable Development (6)
1700 - 17:10: Closing

AUTOMATED HEALTH CARE WASTE SEPARATION AND MONITORING SYSTEM.

21

AUTHOR(S) Mike Ayiko (Busitema University) and Felix Bwire (Busitema University)

Health care waste or wastes described as unwanted materials generated by health facilities like medical research centers, laboratories, hospitals, clinics, physician's offices, dental practices, blood banks, and veterinary hospitals/clinics has become a major global challenge due to the increasing volumes produced from health facilities. The nature of these wastes render them as potential harbor, danger and extension for pathogens, injuries and spread of diseases. This category of wastes also contaminate land, water and air rendering them unsuitable for living organism.

Despite isolation of health care waste management from the general waste, policies and Acts and publication for best practices for their management, diseases and injuries to humans and environment as a result of health care wastes has been on the rise. In this study aimed at development and implementation of an automated health care waste separation system, an innovative approaches for proper segregation - processes involving separation of healthcare waste into its various constituent categories ensures accurate waste identification and infectious wastes can be distinguished from general waste before final disposal thus reducing hazards caused to humans and environment.

Analysis of data from interviews and literatures helped in determining requirements for the design and development of the sensor based health care waste separation and monitoring system. The functional requirements included the system's ability to detect and categorize wastes, turn the appropriate receptacles and communicate the level of wastes in the receptacles. Microsoft office Visio 2019 was used for designing the block and dataflow diagrams, Solid Edge Version 16 for the physical parts, Fritzing for the electronic circuit diagram and coding was done using Arduino language.

Results showed that the system was capable of detecting wastes, detecting metallic wastes, detecting wet wastes, separating the wastes, detecting the levels of wastes, transmitting the results through a Wi-Fi module and monitoring the levels of wastes in the bins over a web platform.

KEYWORDS: *health care, hospital, waste, separation, segregation, sensor, monitoring, biomedical, medical, engineering, safety, developing countries*

MOBILE PHONE ADOPTION IN AGRI-FOOD SECTOR: ARE FARMERS IN SUB-SAHARAN AFRICA CONNECTED?

22

AUTHOR(S) Ronald Kabbiri (Busitema University), Manoj Dora (Brunel Business School, Brunel University), Vikas Kumar (Bristol Business School, University of the West of England), Gabriel Elepu (Makerere University) and Xavier Gellynck (Ghent University).

In recent years user acceptance of new technology has become of much interest. One of the most outstanding global problems facing Africa is the digital divide. However, the use and adoption of mobile phones are reducing the digital divide in Africa. Given the mobile phone's role in bridging the digital divide in Africa, this study extends the applicability of the technology acceptance model (TAM), without altering its parsimony and information technology focus, in mobile phone adoption. This paper extends the TAM model by adding two new constructs, perceived advantage, and socio-economic characteristics. Consequently, the extended TAM was applied to the adoption of mobile phones in farming communities in Sub-Saharan Africa.

The study relies on a sample from 300 dairy farmers in Uganda which were analyzed using structural equation modelling. Theoretically, it contributes to the limited literature on mobile phone adoption in the agri-food sector in Sub-Saharan Africa and provides empirical evidence from Ugandan farmers. The research contributes to promoting mobile phone usage in farming communities beyond just normal communication. The research also has a strong practical implication for farmers as well as other stakeholders from the agri-food sector.

KEYWORDS: *Dairy value chain, The extended technology adoption model, Smartphone use, Structural equation modeling, Uganda*

AUTOMATED TEACHERS' CLASSROOM ATTENDANCE MONITORING SYSTEM.

23

AUTHOR(S) Joan Nabadda (Busitema) and Felix Bwire (Busitema University).

Teachers set the tone of their classrooms, build warm environments, mentor and nurture learners, become role models, and listen and look for signs of trouble in students to inform their teaching and mentorship of learners. This greatly helps learners to grow mentally, intellectually, financially in the world of knowledge and also to broaden on their horizon towards life. However, teachers in Uganda often tend to be absent from classrooms, thus disrupting students learning and mentorship process. There is need for a closer and full monitoring of the entire teachers' classroom delivery and interaction with learners. However, existing teacher classroom attendance monitoring systems in Uganda lack components of full monitoring of teachers' classroom attendance except in rare instances where inspector/administrators sit the full length of the lesson to invigilate the teachers' classroom delivery. Study identified challenges to proper teachers' classroom attendance monitoring system, including, wastage of parent's finances, disorganization of the timetable and wastage of the school facilities. To solve the challenges, the study developed an Automated Teachers' Classroom Attendance Monitoring System with an aim to monitor and provide full proof of teachers' classroom attendances. The developed system provides three major functionalities. One, the system records teachers' attendance through a fingerprint scanner that detects registered users and records their attendance in the system database. Two, a login interface for the system administrator and the management team to access summary information of teachers' attendance. Three, automated random recording of video clips of the teaching session. Results of the testing and validation show that the system performs the above mention functionalities. Therefore, it is anticipated that the system will reduce cases of teachers' absenteeism in schools that may adopt it.

KEYWORDS: *Absenteeism, Attendance, Classroom, Teacher.*

MODELING OF TIRE-ROAD SURFACE INTERACTION UNDER WET CONDITIONS.

24

AUTHOR(S) Moses Nagulama (Busitema university), Samson Rwahwire (Busitema University), Fulgensia Kamugisha Mbabazi (Busitema University) and John Tuirinya (Busitema university).

The occurrence of wet-weather accidents, from the perspective of the road surface characters caused by poor fluid friction obtained from the tire hydroplaning, has for many years been a challenge for various road authorities. Any traction failure throughout high rushing causes fatal accidents and loss of most human lives. Many researchers, since the 1920s focused on aspects of measurement and prediction of fluid friction and the development of strategies to reduce wet-weather condition accidents. Despite the improvements in measurement techniques, the understanding of hydroplaning mechanisms has not improved much over the past decades due to a lack of development in the theoretical and numerical models that can explain and simulate the mechanisms. This study presents the modeling of hydroplaning of a deformed tire using Computational Fluid Dynamics (CFD) technology, particularly Ansys Fluent. The results show that the hydroplaning speed decreases with increasing water film thickness and tire inflation pressure i.e. a water thickness range of 1mm to 10mm generated a speed of 48.1m/s to 46.3m/s while as tire pressure range of 100kPa to 250kPa generated a speed of 42269.8m/s to 42261m/s. It was also observed that fluid friction force decreases with increasing tire sliding speed and water film thickness.

KEYWORDS: *CFD, Ansys Fluent, tire-road surface interaction, wet conditions*

IDENTIFICATION OF POTENTIAL SURFACE WATER RESOURCES FOR INLAND AQUACULTURE FROM SENTINEL-2 IMAGES OF THE RWENZORI REGION OF UGANDA UNDER WET CONDITIONS.

25

AUTHOR(S) Athanasius Ssekyanzi (Ghent University), Nancy Nevjan (Ghent University) and Gilbert Van Stappen (Ghent University)

Aquaculture has huge potential to sustainably meet the growing demand of animal protein. The availability of water is essential for aquaculture development, but there is limited knowledge about the potential inland water resources of the Rwenzori region of Uganda. Though remote sensing is popularly utilized during studies involving various aspects of surface water, it had never been employed in mapping inland water bodies of Uganda. In this study, we assessed the efficiency of seven water index methods to map the available water resources in the Rwenzori region. From the four target scenes, only AWEIsh and AWEInsh best identified the inland water bodies in the region. Both consistently had the highest overall accuracies and kappa coefficient, as well as the lowest omission errors in all scenes (15.79% for both indices in scene 1; 21.93% for AWEIsh in scene 2; 18.59% for AWEInsh in scene 2; 24.49% for AWEIsh in scene 3; 27.80% for AWEInsh in scene 3; 45.40% for AWEIsh in scene 4; 32.76% for AWEInsh in scene 4). Thereby, AWEI ably suppressed classification noise from shadows and other non-water dark surfaces. However, none of the seven water indices involved during this study was able to efficiently extract very narrow water bodies such as streams. These could ideally be extracted from images with a higher resolution than that of sentinel-2A or by delineating narrow streams from digital elevation model images. Nonetheless, AWEI can efficiently identify previously invisible surface water resources that are potentially suitable for aquaculture.

KEYWORDS: *water, water index, optimum threshold, omission error, NDWI, MNDWI1, MNDWI2, AWEIsh, AWEInsh, MuWI_C, MuWI_R, Sentinel-2, Rwenzori region*

VARIABILITY AND ACCURACY OF ZENITH TOTAL DELAY OVER THE EAST AFRICAN TROPICAL REGION

26

AUTHOR(S) Richard Cliffe Ssenyunzi (busitema university).

The Global Navigation Satellite System (GNSS) can be used to derive accurately the Zenith Tropospheric Delay (ZTD) under all-weather conditions. The derived ZTDs play a vital role in climate studies, weather forecasting and are operationally assimilated into numerical weather prediction models. In this study, variations and statistical analysis of GNSS-derived ZTD over the East African tropical region are analysed. The data is collected from 13 geodetic permanent stations for the period of 4 years from 2013 to 2016. The 13 stations consist of 5 International GNSS Service (IGS) stations plus 8 stations as follows: 4 Africa Array stations and 4 Malawi Rifting stations from Uganda, Kenya, Tanzania and Rwanda. The ZTD time series were processed using goGPS software version 1.0 beta1, a MATLAB based GNSS processing software, originally developed for kinematic applications but recently re-engineered for quasi static applications. The annual variation of the ZTD time series was investigated using Lomb Scargle periodograms. The semi-annual frequency has the dominant power in sub region 1 (latitudes 4oS and 4oN) and the annual frequency has the dominant power in sub region 2 (latitudes 12oS to 4oS). The highest ZTD estimates occur during the rainy seasons, at all stations, and the lowest estimates occur during the dry seasons. The results also show that the ZTD estimates are largest at stations located at low elevation (regions close to the Indian Ocean). The derived ZTDs are compared to the values derived from the GIPSY-OASIS via Jet Propulsion Laboratory (JPL) online Automatic Precise Positioning Service (APPS) and the Unified Environmental Modelling System (UEMS) numerical weather prediction (NWP) model. The comparison of goGPS and APPS ZTD at the 13 stations shows an overall average bias, Root Mean Square (RMS) and standard deviation (stdev) of -0.9 mm, 3.2 mm and 3.0 mm respectively, with correlation coefficients ranging from 0.974 to 0.999. The comparison of goGPS ZTD against UEMS NWP ZTD at 8 selected stations shows average bias, RMS and stdev of -12.4 mm, 22.0 mm and 17.6 mm respectively, with correlation coefficients ranging from 0.802 to 0.974. The agreement between the GPS ZTD and the NWP ZTD indicates that goGPS ZTD can be assimilated into NWP models in the East African region.

KEYWORDS: *Precise Point Positioning, Zenith Tropospheric Delay, GNSS, goGPS, UEMS-NWP*

HOUSEHOLD PREPAREDNESS FOR CLIMATE RISKS: A CASE STUDY OF LANDSLIDES IN BUDUDA DISTRICT, EASTERN UGANDA.

27

AUTHOR(S) Sowedi Masaba (Busitema University).

Preparedness is critical to managing climate risks, including landslides. Well prepared households can significantly minimize losses when landslides occur. The aim of the study was to assess household preparedness for climate risks, particularly landslides. The study adopted a survey research design. Primary data were collected from 300 households drawn from the landslide disaster prone district of Bududa in Eastern Uganda. Stratified random sampling was used to select the sample sub-counties. Simple random sampling was used to select sample parishes while systematic random sampling was used to select the sample households. Quantitative data were analyzed using descriptive statistics and spearman's correlations. Content analysis was used to analyze the qualitative data.

The study findings indicate that most of the households (80%) were prepared for future landslides. The most common measures put in place by households to prepare for landslides include; tree planting (55%) and terracing (49%). There is a moderate positive correlation between preparedness for landslides and involvement in landslide disaster risk reduction activities ($r=0.535$). The study concludes, most of the households in Bududa district are prepared for future climate risks, particularly landslides.

KEYWORDS: *preparedness, climate risks, landslides, Uganda*

DESIGN AND CONSTRUCTION OF CENTRIFUGAL EGG BREAKING MACHINE.

28

AUTHOR(S) Stephen Okwang (Madraam engineers ltd)

Eggs are one of the world's major poultry produces whose market is rising almost annually in East Africa and Africa at large due to the increased demand by both direct consumers and processing firms. An egg is composed of three main parts: eggshell, egg white (albumen) and yolk, representing 9.5%, 63%, and 27.5%, respectively, of the whole egg. The major unit operations done on eggs during egg processing are mainly sorting, cleaning, breaking and separation of the required egg components. The main objective in egg processing is usually to separate the components for the manufacture of various products such as bread and cakes in which the albumen and yolk are used, and also the calcium-rich eggshell powder which can be made from eggshells. In Uganda today, egg breaking and separation by both large scale, medium scale and small-scale egg processors is mainly accomplished manually by the use of hand held knives method or by hitting on container edges. These manual methods waste a lot of time, leading to delays in production thus making the process unreliable due to the low capacity. It also occupies a large production space in case a good number of eggs is to be worked on within a stipulated time since it will require a good number of individuals to work in that period thus becoming labor intensive associated with high risks of product contamination by human contact. Therefore, this project was carried-out to design and construct an automated centrifugal egg breaking machine to resolve these problems faced by egg processors. The machine breaks the eggs, separates off the eggshells and finally allowing the egg liquid to flow into the collecting container by gravity without mixing the components. The NPV value obtained was positive hence the project is highly viable. The centrifugal egg breaking machine was constructed running at a capacity of 50 L/hr, with extraction efficiency of 77.6% compared to the knife method of 31.7L/Hr capacity, 74.9% extraction efficiency. I recommend the final machine to be fabricated using stainless steel food grade in order to minimize tear and wear.

KEYWORDS: *Centrifugal, Extraction, Contamination*

DESIGN AND FABRICATION OF A TWO ROW ANIMAL DRAWN IRISH POTATOE PLANTER.

29

AUTHOR(S) Malinga Eliud (Busitema University).

Irish potatoes is one of the important food crop grown in the slopes of mount elgon and western parts of Uganda. They are rich sources of carbohydrates, and are grown on fertile soils for greater yield. According to FAO (2017), it was approximated that 450,000 mt are produced on approximately 65,000 ha with an average yield of 7 mt / ha. The small-scale farmers are capable of growing 1 to 4 acres, under natural Ugandan climatic conditions, and yields of between 80-100 bags per acre.

One of the major challenges for Irish potatoes production in Uganda is, small holder farmers lack an implement which ensures precisions in row planting, saves time and reduces drudgery in planting. The planting of Irish potatoes is labour intensive and time-consuming operation; estimated to take approximately 10 people to plant an acre of land in one day. Small scale farmers have very positively responded to planting Irish potatoes in rows from traditional methods through opening ridges manually and planting using hand

The main objective is to develop a two row animal drawn planter for Irish potatoes crops that meets farmers' planting requirements and the specific objectives are; to design, fabricate and evaluate the working efficiency, and performance of the proto-type.

Using basic engineering principles and some physical properties of Irish potatoes such as, size, density and weight of the tubers, the various components of groundnut planter will be designed that is, the seed hopper, Main frame, furrow opener, Seed metering mechanism and furrow covering assembly. The drive will be got from transport wheels to metering roller shaft by help of a chain and sprockets.

The proto-type was subjected to both on station and field testing;

The machine designed and constructed can improve crop and labour productivity and boost farmers' income while releasing valuable time for other activities. The proto-type can be adapted for use in Ugandan soil conditions. The technology should be utilized by a group of small-scale farmers to boost Irish potatoes production and rural development.

The project proposal embraces the project schedule and budget for the design, fabrication, and evaluating the row planter for Irish potatoes. The project cost 633,000 Uganda shillings.

KEYWORDS: *two row animal drawn, animal driven planter, chain sprocket mechanism*

DESIGN AND CONSTRUCTION OF A SOLAR POWERED WINNOWING MACHINE FOR SORGHUM.

30

AUTHOR(S) Emmily Auma (none) and Ronald Gyezaho (Busitema University).

Sorghum is a very important food crop around the world because of its nutritional values, it also serves as a dietary staple food for humans, and is rich in vitamin B-complex. About 217000 Metric tons of sorghum are produced in Uganda annually. A solar powered winnowing machine for sorghum was designed, constructed with locally available materials and tested for sorghum winnowing. Winnowing is a technology for particle size separation which separates on the principle of gravity and air movement. It is applied to most cereals and legumes which are already dry. Sorghum is a light grain with an average weight of 202.88g and requires minimal air forces because of its lightness. Traditionally, sorghum is winnowed using baskets and circular trays by lifting and tossing the threshed material so that the lighter chaff and straw get blown to one side while the grains fall down vertically.

This method is not reliable because people carrying out the work have to wait for the wind current. Existing machines that do winnowing like power operated and engine driven machines require electricity and fuel for their operation thus making them expensive, environmentally unconscious and unreliable in areas with unstable power supply. The constructed machine generates electricity from the sunlight for the winnowing work and consists of the following parts; the frame, hopper, solar charge controller, centrifugal blower, motor and battery. It was powered by 36W direct current motor, 2800rpm blower speed, 100W solar panel, 75Ah battery, 30Ah solar charge controller that were suitable to operate the machine. The newly developed solar powered sorghum winnower is techno economically suitable for winnowing of sorghum at feed rate of 110.2 kg/h and gives a thorough put capacity of 85.8kg/hr. The machine comes with a production cost of 1.35 million UGX. The sorghum winnower is recommended to be used by the rural farmers who grow sorghum.

KEYWORDS: : *centrifugal blower, solar charge controller, winnowing*

DESIGN AND CONSTRUCTION OF MOTORIZED PASSION FRUIT PULP EXTRACTOR.

AUTHOR(S) Anthony Kibwika (none) and Ronald Gyezaho (Busitema University).

31

The fruit production potential is on an uptrend in Uganda with Passion fruits estimated at over 1200 ha, giving a total annual yield of 10,000 tones. This is due to increased demand for fresh fruit extracts and juices for nutritional and further manufacturing purposes on both local and the international market. New small and medium scale ventures for fruit pulp extraction of major fruits; passion fruits, pineapples and mangoes have emerged in the fruit value addition chain but these are characterized by rudimentary processing techniques that are tedious, time consuming and unhygienic. This project involved designing, construction and testing of a motorized passion fruit pulp extractor which simultaneously separates the pulp, peels and seeds in a single process so as to curb the aforementioned challenges. Conceptualization of the machine involved two inter-related units; the crushing unit and the rubbing unit. Different components of the machine were designed basing on the physical, mechanical and chemical properties of the fruit, the components include; the feed hopper, crushing rollers, perforated frame screw conveyor, main shaft and roll shafts, pulp collection chamber, main frame, driving mechanism and analyzing forces acting on the components to prevent failure. From the designs, crushing unit operates at a speed of 500rpm and the rubbing unit at a speed of 600rpm with a total maximum transmitted power requirement of 3HP, though 2HP can run the system with the same results. After fabrication, the performance and economic analysis of the machine were performed in terms of extraction efficiency and extraction loss, resulted into 76% extraction efficiency and 3% losses in peels and other areas. The machine's total cost is Ugx 1.6M. Owing to the performance, it achieves all its design purposes hence it is recommended for commercialization and adoption by the target groups.

KEYWORDS: *Passion fruits, pulp collection chamber, pulp extraction*

COMMUNITY- BASED ACTIVE TUBERCULOSIS CASE FINDING IN PASTORALIST COMMUNITIES OF NORTH-EASTERN UGANDA

AUTHOR(S)

Isaac Guma (Busitema University Faculty of Health Sciences),
Jacob Stanley Iramiot (Busitema University Faculty of health sciences)
and Rebecca Nekaka (Busitema University faculty of health sciences).

Background: Given the global urgency to improve tuberculosis (TB) case detection, a renewed interest in active case finding (ACF) has risen. Missed TB cases pose a serious threat as they continue to fuel TB transmission in the community. We aimed to assess the feasibility of community based ACF for TB among people living in a pastoralist community in Uganda and determine its impact on case detection and treatment uptake.

Methods: Between April and May 2019, four third year medical and nursing students placed at Moroto Regional Referral for community orientation worked together with community health workers to conduct a door-to-door survey for TB in pastoralist communities of Nadunget Sub County, Moroto district. The community health workers and the Medical/Nursing students performed symptom screening, collected sputum and facilitated specimen transport to the laboratory. Gene Xpert MTB/RIF assay was performed at the regional referral Hospital for all sputum samples. The community health workers were tasked to follow up on all those clients whose samples turned out to be positive so that they could start treatment as soon as possible. All presumptive cases with negative sputum results were referred to the TB clinic for further evaluation.

Results: In one month, we screened 385 individuals and identified 143 aged above 15 years with symptoms suggestive of TB. Among the presumptive cases, 132 (92%) reported a cough of more than two weeks and we were able to obtain sputum samples from 84(58.7%) participants. We diagnosed 11, including 8 bacteriologically confirmed TB cases using Gene Xpert and there was no multi-drug resistant case identified. The median time from sputum collection to notification of the positive result was 3 days. All the positive cases were followed up and initiated on treatment.

Conclusion: The findings from our study suggest that in a pastoralist community, ACF for TB using a sensitive symptom screen followed by Gene Xpert contributed to improved case detection of TB, shortening the turnaround time hence timely initiation of patients on TB treatment.

KEYWORDS: *Tuberculosis, gene-xpert, case-finding, multi-drug, resistance*



SOCIO-DEMOGRAPHIC DETERMINANTS OF VACCINE COVERAGE FOR PNEUMOCOCCUS AND ROTAVIRUS AMONG UNDER FIVE CHILDREN IN BUSOLWE TOWN COUNCIL, BUTALEJA DISTRICT, EASTERN UGANDA: A CROSS SECTIONAL STUDY.

AUTHOR(S)

Brenda Wafana (Busitema University Faculty of Health Sciences),
Ivan Wambi (Busolwe District Hospital) and Rebecca Nekaka
(Busitema University faculty of health sciences).

Background and Aims: There is a high burden of vaccine-preventable diseases in the children under five years of age, particularly pneumonia diarrhea and which is greatly affected by low immunization coverage despite the existing efforts and policies. This study was carried out in Butaleja district and was aimed at establishing the socio-demographic determinants of vaccine coverage for pneumococcus and rotavirus among under five children (U5C) in the district.

Study Design: This was a mixed methods cross-sectional study.

Place and Duration of Study: Busolwe Town Council, Butaleja District, Eastern Uganda.

Methodology: Structured researcher administered questionnaires were administered to 434 caregivers of U5C in different parts of Butaleja district. In-depth interviews with key informants and focused group discussions with Village Health Teams and community members were conducted.

Review of Health Management Information Systems records was done. STATA 15 was used to analyze the data.

Results: The study found that there is a declining trend in completion of the doses of Pneumococcal vaccine (PCV) and Rotavirus vaccine. For example, in quarter 1 of 2019, out of the 312 children who started immunization, only 2 completed Rota virus immunization and only 117 completed PCV vaccinations a trend that has been observed since 2016. The factors that showed a significant association with the the fact that they gave their child at least one dose of the vaccine were having been sensitized on the current immunization schedule (P-value = <0.001), misunderstanding that vaccine is harmful for child (P-value = 0.007), willingness to take children to vaccination (P-value = <0.001), and social factors such as family (P-value = <0.030). Gender also played a key determinant role where the children's fathers lacked knowledge on significance of immunization and thus discouraged the mothers from taking the children for immunization. Inadequate funding was also highlighted from the Focus Group Discussions.

Conclusion: Vaccine coverage for pneumococcus and rotavirus is still low in Butaleja district mainly due to the attitudes and perceptions of caregivers as well as the knowledge gap. There is need for extensive sensitization of all community members to enable them understand the significance of immunization. It would further be important to increase the funding of the immunization programme to intensify and ensure effectual outreaches as well as the establishment and enforcement of a policy for immunization compliance.

KEYWORDS: *Vaccine, coverage, Pneumococcus, rotavirus, under-five, children, Butaleja, Eastern, Uganda, COBERS, knowledge*

TRANSITION GONE BAD? TEENAGE PREGNANCY AND SUGGESTED REMEDIES IN A RURAL COMMUNITY IN EASTERN UGANDA.

34

AUTHOR(S)

Erone Nandyose (Busitema University Faculty of Health Sciences)
 Rebecca Nekaka (Busitema University Faculty of health sciences)
 and Julius Nteziyaremye (Busitema University faculty of health sciences)

The transition from childhood to teenage stage is a critical moment in one's life cycle and presents with complex psychological challenges, opportunities and risks such as teenage pregnancy (TP). It predisposes to increased risk of adverse maternal and perinatal outcomes. Uganda has a high teenage pregnancy rate averaging 25%. Quite often solutions directed against it fail to deliver desired results. This study reports effects of, risk factors, and remedies from the teenagers' perspective in Bududa district.

Methods: A community-based cross-sectional study was employed. Using interviewer administered questionnaires; quantitative data amongst 150 randomly sampled teenagers was collected. Data were entered into Microsoft Excel and imported to SPSS version 16 for analysis. Simple proportions were used to describe categorical and numerical data.

Results: Mean age of participants was 16.9yrs (IQR16- 18yrs).The majority, 59.3 % were below 18 years with 4.7% being 13yr olds. The majority, 69.4% were lowly educated, none was formally employed while 64% were married. Knowledge of sexual and reproductive health (SRH) was low. Possible risk factors to teenage pregnancy included cultural events, poverty and fertility testing. The majority associated TP with various negative social and health outcomes. Suggested remedies against TP included early age and school based SRH programs and provision of long term contraception.

Conclusion: Teenage pregnancy is a public health problem in Bududa and victims suffer various adverse effects. Provision of SRH services, incorporating comprehensive sex education in the school curriculum and improved supervision during social-cultural gatherings is critical in fighting TP.

KEYWORDS: *Teenage, pregnancy, Kadodi, Comprehensive, sexual, education, Eastern, Uganda*

SERO PREVALENCE AND FACTORS ASSOCIATED WITH HELICOBACTER PYLORI INFECTION IN A RURAL POPULATION IN EASTERN UGANDA A COMMUNITY CROSS SECTIONAL STUDY.

35

AUTHOR(S)

Rebecca Nekaka (Busitema University Faculty of Health Sciences),
 Julius Nteziyaremye (Busitema University Faculty of health sciences)
 and Jacob Stanley Iramiot (Busitema University faculty of health sciences)

Background: Globally, 50% or more of the world's population is infected with Helicobacter pylori making it the most widely spread bacteria across the world. The low developed countries are more overburdened by Helicobacter pylori infection than the developed countries. H. pylori infection is associated with duodenal ulcer, chronic atrophic gastritis (CAG), lymphomas, and adenocarcinoma. This study reports the prevalence of H. pylori and its associated factors in Eastern Uganda.

Materials and methods: A cross-sectional study involving 275 participants was carried out in eastern Uganda. *H. pylori* serology was done and face to face interviewer-administered questionnaire were used for data collection. Data were entered in Microsoft Excel and imported to Stata version 14 for analysis and a P value of <0.05 was considered statistically significant.

Results: The seroprevalence of *H. pylori* was 27.3% (75/275) with 28.4% (50/176) of the females being positive compared to 25.3% (25/99) of the males. Consumption of animal products (meat, milk, and eggs) was the only statistically significant factor associated with *H. pylori* seropositivity (P = 0.001, 95% CI = 1.934-4.209, AOR=2.85).

Conclusion: The *H. pylori* seroprevalence is high in eastern Uganda. Consumption of animal products was a positive predictor of infectivity.

KEYWORDS: *Helicobacter, pylori, Animal, products, Seroprevalence, Kibuku, Eastern, Uganda*

CONTRACEPTIVE UPTAKE IN EASTERN UGANDA WAS THE 2020 TARGET OF 50% MODERN CONTRACEPTIVE RATE ACHIEVED?



AUTHOR(S) Julius Nteziyaremye (Busitema University Faculty of Health Sciences), Daisy Julian Birungi (Busitema University Faculty of health sciences) and Rebecca Nekaka (Busitema University faculty of health sciences)

Background: Contraception is a worthwhile and cost effective investment that has potential to spur national development. It is important in averting significant maternal and childhood morbidity and mortality. No wonder countries with low contraceptive prevalence rates (CPR) have poor maternal and childhood health indicators. Consequently, during the 2012 London conference Uganda set a target of improving modern CPR (mCPR) to 50% by 2020. We report how eastern Uganda is faring on this commitment and identify the factors associated with contraceptive uptake.

Methods: Using a cross-sectional study design, we recruited 418 sexually active women aged 15-49 years who had come to nurse their sick ones in a tertiary hospital. We used systematic sampling to recruit participants. Data was collected using an interviewer administered pretested questionnaire, analyzed using STAT version 19.

Results: Of the 418 women respondents, 15.6% were teens while 50% were aged 20-29 years. Significantly, 64.59% were married. The majority, 78.7% were informally employed, and more than 62% were Christians. Moreover, 97.8% were formal educated and 52.2% had 1-4 living children. The overall contraceptive prevalence was 33.7% while mCPR was 30.86%. Significantly whereas 36.6% had ever used contraception, 29.7% had never. The top contraceptives choices were injectables (56.7%), implants (27%), calendar method (6.4%) and abstinence (2.8%). Significantly, 99.8% were aware of contraception and, radio (91%) and health workers (82%) being major sources of information. Significant factors affecting uptake include age and marital status, youngest child's age, decision when to have next child, history of sexually transmitted disease, partner's age and support. Conclusion: The contraceptive prevalence rates are below the national average and the London target despite significant awareness among women. Efforts to increase uptake should include male involvement, continued dissemination of information and reinforcing sexual and reproductive health education in schools. This will help to demystify misconceptions, misapprehensions and myths about contraceptives

KEYWORDS: *Contraception, London 2012 summit, Male support, Uganda*

BASEMENT ASSESEMENT OF RISK FACTORS OF PRESUMPTIVE TUBERCULOSIS AMONG UNDER FIVE CHILDREN LIVING WITH AN INDEX CLIENT UNDER TREATMENT IN MBALE DISTRICT, EASTERN UGANDA.

37

AUTHOR(S)

Rosemary Tumusiime (Busitema University Faculty of Health Sciences), Jerome Odyeny (Busitema University Faculty of health sciences) and Rebecca Nekaka (Busitema University faculty of health sciences)

Background and aims: Children in contact with adults having pulmonary tuberculosis (TB) are vulnerable to TB and hence contact tracing and screening is important for early detection of infection. However, there are few contacts traced and the prevalence and risk factors for transmission are not well studied. The objective of this study was to determine the prevalence of infection and risk factors associated with TB transmission among under five children in household contact with adult pulmonary TB patients.

Materials and Methods: Across sectional study was carried out in three health facilities with high TB burden in Mbale District, Eastern Uganda involving all under five household contacts of adults with pulmonary tuberculosis recorded in the TB register from October 2018 to March 2019 and still on treatment. Structured questionnaires were administered to the index clients to obtain their demographic and clinical data about TB, HIV as well as information on the children. Children were screened using the intensive case finding forms to identify presumptive cases.

Results: The total number of index TB clients line listed were 70. Number of clients traced were 38, 21% of whom had children under five years and a total of 33 children were identified. The number of presumptive cases was 9/33 (27,27%). 77.8% of the presumptive cases ere living in poorly ventilated houses.

Conclusion: The study identified children with presumptive TB and various risk factors for TB transmission. Intensive contact tracing can therefore help reduce TB transmission within the communities. It is recommended to undertake studies aiming at improving contact tracing and strategies to eliminate the risk factors to TB transmission

KEYWORDS: *Presumptive, TB, under-five, children, Index-clients, contact, tracing, Mbale, district.*

APPLICATION OF RESPONSE SURFACE METHODOLOGY FOR OPTIMIZATION OF PLASTIC WASTE AND LIGNIN CONTENT IN BITUMEN BLENDS.

38

AUTHOR(S)

Vicent Muwulya (Busitema University), Peter Wilberforce Olupot (Makerere University), Umaru Bagampadde (Makerere University) and Samson Rwahwire (Busitema University).

The disposal of plastic waste is a great problem in many low developed countries, including Uganda. That said, Uganda needs a large network of paved roads for its smooth economic and social development, therefore high importation of bitumen for asphalt is inevitable for road paving. Furthermore, Bitumen undergoes oxidation at high temperatures which affects its performance in roads construction hence calling for bitumen properties modification. Separate effects of plastic waste and Kraft lignin has been unveiled to enhance the relevant performance of bitumen, however, their interactions with their right proportions have not been explored.

This study therefore, seeks to optimize the effect of blending plastic waste and Kraft lignin in bitumen using response surface methodology (RSM) to support solid waste management as well as modify bitumen properties for road construction. Polyethylene Terephthalate (PET) plastic waste was shredded and blended with bitumen 80/100 grade and Kraft lignin in a speed mixer at a temperature range of 1700C–1800C at varying compositions of 1-6% PET plastic and 1-6% Kraft lignin. Basic rheological parameters; penetration, softening point and viscosity tests were employed to determine the resulting changes from base bitumen. FTIR spectroscopy was also employed to study the chemical functionalities present in the bitumen blend. The properties of the unmodified bitumen were found to be modified with the changes recorded in the rheological properties. Using ANOVA and R2, RSM models were successfully fitted to the experimental results. The most enhanced homogenous blend is achieved at 4.8% PET plastic waste and 2.5% lignin loading. The reduction in the use of bitumen in asphalt mixtures by adding PET plastic waste and lignin contributes to the goals of sustainable development and cleaner production of asphalt mixtures.

KEYWORDS: *Response Surface Methodology, Lignin, Bitumen, Plastic waste*

AGROBIODIVERSITY OF HOMEGARDENS IN A COMMERCIAL SUGARCANE CULTIVATION LAND MATRIX IN UGANDA.



AUTHOR(S) *Esther Ariango (Busitema University) and Edward Nestor Mwavu (Makerere University, Kampala, Uganda)*

Understanding biodiversity in homegardens embedded in landscapes dominated by commercial monoculture agriculture is critical for sustainable management of agrobiodiversity and meeting rural households' needs in the face of global changes. We assessed agrobiodiversity in the 120 homegardens and its contribution to rural household livelihood strategies within a commercial monoculture sugarcane cultivation land matrix in eastern Uganda. We recorded a total of 68 plant species from 46 genera representing 27 families. Species richness spanned 6 to 19 species, and α -diversity (H') ranged from 0.6 to 2.3; with 86.67% of the homegardens having $H' > 1$. Species composition differed significantly (global RANOSIM = 0.153, $p < 0.001$) among the villages. The most important and commonly maintained plants were those that provided food, fuelwood and money income and included *Zea mays* L., *Manihot esculenta*, *Phaenololus* spp., *Coffea* sp., *Musa* spp., *Ipomea batatas* and *Artocarpus heterophyllus*. Most of the crops cited as useful by households were also frequent and visible in many of the homegardens. Although homegardens still hold some valuable plants, there is also loss of important plants from the agricultural system including cowpeas, soya beans, bambara groundnuts, finger millet, cotton, aerial yams and oysternut essential for sustaining household livelihoods. This loss, precipitated by increased land-use/cover change to commercial sugarcane plantations threatens agrobiodiversity conservation and the benefits households derive from homegardens. Our findings underline the importance of homegardens in the conservation of indigenous agrobiodiversity, and indicate that with the continued expansion of commercial sugarcane cultivation this opportunity may be lost.

KEYWORDS: *climate change, commercial agriculture, food security, homegardens, rural livelihoods*

EFFECTS OF SOIL PLASTICS TO THE GROWTH AND YIELD OF SOYBEANS.

40

AUTHOR(S) Simon Peter Otukey (BUSITEMA UNIVERSITY)

In 2017, an estimated 34.8 million metric tons of waste plastics were land-filled globally. Studies show that the accumulation is undesirable and can affect quality of soil and crop production. Attempts to recycle the plastic residues are always hampered by practical difficulties and high costs and yet every year new plastic residue is added to the agricultural soils. Most studies have concentrated on aquatic ecosystems and little has been done on the terrestrial ecosystem which is as well affected by the plastic materials. Waste plastic contamination on land is estimated to be between 4 to 32 times higher than in the oceans. This research will inform policy decision makers on potential impact of waste plastics on agricultural output in Sub-Saharan African (SSA) context. More relevant to Uganda to check plastic consumption and production relating to other countries like Rwanda

KEYWORDS: *waste plastics, non biodegradable, landfills, plastic mulches*

EIGENVALUE ESTIMATES FOR MAGNETIC SCHRÖDINGER OPERATORS IN A WAVEGUIDE.

41

AUTHOR(S) Ben Sorowen (Kyambogo University) and Martin Karuhanga (Mbarara University of Science and Technology).

The study of quantum waveguides has attracted much interest in the recent years largely because of their physical importance. They represent many important applications in nanophysical devices as well as flat electromagnetic waveguides. Several interesting results on the spectral properties of these quantities have been obtained, including results on the existence of eigenvalues below the essential spectrum. Some of these results largely depend on the geometry of the waveguide and the conditions imposed on the boundary.

In the present paper, we present an upper estimate for the number of negative eigenvalues below the essential spectrum for the magnetic Schrödinger operator with Aharonov Bohm magnetic field in a strip.

The estimate is obtained by reducing the operator to a family of selfadjoint Sturm Liouville operators whose estimates for the number of negative eigenvalues below the essential spectrum are given by the well known Bergman type estimates.

KEYWORDS: *Negative eigenvalues, Magnetic Schrödinger operator, Waveguide, Strip*

DEVELOPMENT OF ENGINE POWERED GROUND NUT STRIPPING MACHINE.

42

AUTHOR(S) Lawrence Grism Obeti (Busitema University).

Groundnut (*Arachis hypogaea*) is one of the world's important crops ranking fifth in oil production. Groundnuts is the principal source of quality vegetable oil (44–56%), digestible protein (25–34%), dietary fiber, minerals and vitamins. Despite this great significance, groundnuts sub-sector still faces several challenges, especially the stripping operation which is manually done mostly by women and youth. This method is labor intensive, time consuming thus making stripping process slow. Delays during stripping stage in the garden exposes groundnuts to rain which delays drying. Due to high moisture content in the groundnuts at this stage, the crop becomes vulnerable to mold and bacterial attack. Such attacks result into release of poisonous substance (aflatoxin) in the product, thus becoming health hazard when consumed. Therefore the purpose of this study was to develop a gender responsive engine powered groundnut stripper with view of reducing drudgery, relieve women and youth and also to increase stripping output. The prototype groundnut stripper was designed using generic force and stress analysis. Local anthropometric data with special consideration for women and youth was used. There after the prototype was fabricated. On station preliminary performance evaluation was done. The prototype does effective stripping with minimum pod damage, stripping capacity is 105kg per hour. The team therefore intends to carry out intensive on-farm performance evaluation to obtain credible information on the prototype.

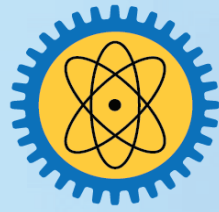
KEYWORDS: *Groundnuts stripping, Engine powered, Stripping output***DESIGN AND CONSTRUCTION OF AN IMPROVED PEDDLED MAIZE SHELLER.**

43

AUTHOR(S) Jimmy Kajjimu (Busitema University) and Thomas Makumbi (Busitema University).

A cross-sectional study was done from March 2013 to May 2014 to assess knowledge, attitudes, and practices towards cystic echinococcosis (CE) or hydatidosis among selected pastoral and agro-pastoral communities in Uganda. A structured questionnaire was administered to 381 respondents. Multivariate logistic regression analysis was done to find the relationship between knowledge about CE and factors such as age, sex, and level of education across all regions. The odds ratios and confidence intervals were used to determine the difference in responses across regions. It was shown that age above 36 years was significantly ($p < 0.001$) associated with awareness about CE in livestock. Likewise, uneducated ($p < 0.0001$) and agro-pastoralists ($p = 0.01$) were significantly less knowledgeable than the educated and pastoralists across all regions. The overall knowledge towards CE in livestock was low 17.8% (95% CI = 14.0–21.6). Dog ownership was high and they never dewormed their freely roaming dogs. Dogs shared water with livestock. In conclusion, knowledge about CE in livestock was low across all regions. Therefore, public health education and formulation of policies towards its control by the relevant stakeholders should be done. Also, the true prevalence of CE in livestock needs to be done so that the magnitude and its public health significance are elucidated.

KEYWORDS: *Jimmy Kajjimu (Busitema University) and Thomas Makumbi (Busitema University)*



**BUSITEMA
UNIVERSITY**
Pursuing excellence



CONTACT US

ADDRESS

Busitema University
P. O. Box 236, Tororo
Jinja-Malaba High Way

PHONE: +256 454 448838
+256 454 448813
+256 454 448864
+256 454 448838

WEB: www.busitema.ac.ug

EMAIL US

Vice Chancellor: vc@adm.busitema.ac.ug
University Secretary: us@adm.busitema.ac.ug
Academic Registrar: ar@acadreg.busitema.ac.ug
Public Relations: pro@adm.busitema.ac.ug