

# **Kabarak University International Conference on Trends and Opportunities in Addressing Global Health Challenges 2020**

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## **Book of Abstracts**



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## Screening Strategies to Detect Prevalence of Gestational Diabetes Mellitus and Related Risk Factors in AIC Kijabe Hospital, Kenya

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**Background** Gestational DM is associated with increased risk of perinatal morbidity and mortality, yet clear screening strategies have not been described in Kenya. The aim of this study is to describe and compare the prevalence of GDM based on selective and universal screening strategies. **Methods** A cross-sectional study. Study participants between 24- and 32-weeks' gestation were screened and tested for GDM. **Results** 38 women were universally screened, while 343 women were selectively screened for GDM. The prevalence of GDM was 13.2% and 2.6% in the universal and selective screening strategies, respectively ( $p=0.016$ ). Forty-three percent of women with GDM did not have any risk factors for GDM. **Conclusion** Universal screening detects a significantly higher prevalence rate of GDM than the selective screening strategy. A significant proportion of women with no risk factors develop GDM, meaning many women would be missed when selective screening strategy is implemented. **Recommendations** Kenyan health facilities should adopt the universal screening strategy for diagnosis of GDM in order to prevent maternal and neonatal complications during pregnancy.

**Keywords:** Gestational Diabetes Mellitus, Oral glucose tolerance test

## THE QUALITY OF POST ABORTION CARE PACKAGE OFFERED TO WOMEN PRESENTING TO TWO REFERRAL HOSPITALS IN BOMET COUNTY

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In 2011, WHO reported 56 million abortions worldwide majority in the developing world. Maternal mortality in Kenya is high at 488/100,000 live births, with abortion related deaths contributing to the top five causes of maternal mortality. The Comprehensive post abortion care package (CPAC), which offers holistic care, has been shown to decrease the rate of maternal mortality and morbidity. This study aims to determine if all the elements of CPAC are offered to women presenting to hospitals in Bomet County. A quantitative Cross-sectional study was undertaken at two referral hospitals in Bomet County. 100 respondents who presented with abortion complications were surveyed in three months with a mean age of 26.6 years. Results indicate poor access to care with 70% accessing care after 24 hours despite life threatening complications. Gaps were noted in contraceptive uptake with only 36% getting a contraceptive at discharge and of these, most were short-term methods. Young people less than 25 years were less likely to be given a contraceptive unlike their counterparts in the faith-based facility OR 0.22(0.06,0.83) P value <0.02. On spiritual care and emotional counseling, 100% of respondents reported having been emotionally affected by the abortion but only 66% reported care in that area. Only 46% of the patients were tested and counselled for HIV and STIs. Linkage to care was poor indicated by late access to care, there was an improper referral system and inadequacies in follow-up after discharge were also noted. Only 30% of the respondents received the whole CPAC package as required. Results indicate gaps in how frequently the elements of CPAC are provided which affects quality. Efforts need to be put in place to advocate for adherence to CPAC as stipulated in the guidelines with the aim of reducing maternal mortality.

Key words; Comprehensive Post Abortion Care

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## **DETERMINANTS OF FIRST ANTENATAL CARE VISIT AMONG PREGNANT WOMEN ATTENDING TENWEK HOSPITAL, BOMET COUNTY, KENYA**

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Every pregnant woman is at risk of complications and hence Antenatal Clinic (ANC) is recommended to identify these complications early and adequately managed through timely ANC visits. Late attendance of first antenatal visit is a common problem throughout sub-Saharan Africa posing difficulty in accomplishing the targeted maternal mortality ratio of less than 70 maternal deaths per 100,000 live births and newborn death to 12 per 1000 live birth by 2030. This study aims to investigate the determinants of the first ANC visit among pregnant mothers attending antenatal clinics in Tenwek Hospital. The objectives of this study are to explore maternal individual reasons, to explore hospital factors, and to investigate maternal cultural beliefs and practices that affect when to make the first antenatal visit. This is a qualitative study that has utilized a phenomenological study design to understand the experiences of pregnant women in seeking ANC service. Homogeneous purposive sampling was used to sample mothers coming to the clinic for the first time during the index pregnancy. In-depth interviews were used to gather data from the participants. Analysis of the data was completed using the Braun and Clarke framework for thematic analysis to reach thematic saturation. NVivo coding was done. From this study, it is notable that the findings were in agreement with the study objectives and that the impacts of various demographic data were explored. The following themes came out of this data: economic reasons, fear, knowledge deficit, and service provision. This knowledge can be translated to the pregnant and non-pregnant women in the community, health-care providers as well as policymakers. The need for further research was also appreciated in this study.

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## **DETERMINANTS OF FIRST ANTENATAL CARE VISIT AMONG PREGNANT WOMEN ATTENDING TENWEK HOSPITAL, BOMET COUNTY, KENYA**

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Every pregnant woman is at risk of complications and hence Antenatal Clinic (ANC) is recommended to identify these complications early and adequately managed through timely ANC visits. Late attendance of first antenatal visit is a common problem throughout sub-Saharan Africa posing difficulty in accomplishing the targeted maternal mortality ratio of less than 70 maternal deaths per 100,000 live births and newborn death to 12 per 1000 live birth by 2030. This study aims to investigate the determinants of the first ANC visit among pregnant mothers attending antenatal clinics in Tenwek Hospital. The objectives of this study are to explore maternal individual reasons, to explore hospital factors, and to investigate maternal cultural beliefs and practices that affect when to make the first antenatal visit. This is a qualitative study that has utilized a phenomenological study design to understand the experiences of pregnant women in seeking ANC service. Homogeneous purposive sampling was used to sample mothers coming to the clinic for the first time during the index pregnancy. In-depth interviews were used to gather data from the participants. Analysis of the data was

completed using the Braun and Clarke framework for thematic analysis to reach thematic saturation. NVivo coding was done. From this study, it is notable that the findings were in agreement with the study objectives and that the impacts of various demographic data were explored. The following themes came out of this data: economic reasons, fear, knowledge deficit, and service provision. This knowledge can be translated to the pregnant and none pregnant women in the community, health-care providers as well as policymakers. The need for further research was also appreciated in this study.

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## **Knowledge and attitude of married men and women towards vasectomy: A cross sectional survey of a mission health center in Burundi**

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### **Background**

Vasectomy is a safe, cheap, easy to perform method of contraception. However, its uptake in Burundi is low. Moreover, matters of family planning are packaged as a female responsibility than male and it is not clear what attitude and knowledge married men and women have towards vasectomy.

### **Objective**

To assess knowledge and attitude of married men and women towards vasectomy as well as factors that influence vasectomy uptake.

### **Methods**

A cross sectional survey design was carried out utilizing a questionnaire. Stratified and simple random sampling were used. The sample size consisted of 234 respondents with 142 male respondents and 92 female respondents. Descriptive statistics and independent T test using SPSS version 17 were used for data analysis.

### **Results**

51.2% of respondents had good knowledge about vasectomy. Sociodemographic characteristics affecting vasectomy included: level of education ( $p<0.001$ ), Religion ( $p<0.001$ ), Desired number of children ( $p<0.001$ ) and age ( $p<0.001$ ). The overall attitude towards vasectomy was poor with a mean attitudinal score of 47.1%. The majority of respondents did not accept vasectomy (91.6% of male respondents and 95.7% of female respondents). 95.6% of respondents agreed that vasectomy was not acceptable in the Burundian culture and 80% agreed that there was not enough information about vasectomy.

### **Conclusion**

Overall knowledge of married men and women about vasectomy was good (52.1%), attitude towards vasectomy was poor and acceptance was low. Myths and misconception about vasectomy were noted. There is need for greater awareness of vasectomy knowledge as a potential vehicle to affect attitude change towards vasectomy.

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## **TOWARDS WHOLE PERSON HEALTHCARE FOR FEMALE SEX WORKERS IN BOMET COUNTY, KENYA: IDENTIFY THE UNMET HEALTH NEEDS**

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Female Sex Workers (FSWs) have complex health needs that predispose them to a higher morbidity and mortality risk than the general population. The healthcare system in Kenya has responded to their physical health needs however there is marginal understanding on how their psychological, social and spiritual needs are met. To meet FSWs needs, a paradigm shift from the disease model to a whole person care (WPC) model is paramount. This study gives us an understanding of female sex workers' health needs and if they are met by the healthcare system.

This is a qualitative research design that included female sex workers living in Bomet County, Kenya. It also comprised of healthcare workers who provide health services to this population. Non-probability, purposive, respondent-driven snowball sampling procedure was used until thematic saturation. In-depth individual interviews, key-informant interviews and one focus group discussion were conducted. The interviews were recorded and analyzed factoring in specific ethical considerations that relates to FSWs were observed.

FSWs in Bomet experience financial constraints, community and health worker stigma, a lack of drugs for them and their children and a lack of awareness of health services available to them which all affected their access to healthcare services. The health workers provide sexual and reproductive health services, create health awareness and sensitize the community against stigma with an aim of improving utilization of healthcare services. Apart from the psychological and social support they offered to the women and their children. They were uncertain in integrating spirituality during health provision.

Female sex workers living in Bomet, still have unmet health needs that goes beyond the physical. This research is a call to healthcare providers to focus on the person rather than the disease through whole person care during service delivery.

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## Prostate Cancer Incidence and Diagnosis in Urban Kenya: A Systematic Review and Meta-Analysis

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**Background:** Prostate cancer (PCA) is rated the second most common cancer and sixth leading cause of cancer deaths among men globally. Prostate cancer is disproportionately high among African men compared to males from other races (Iarc., 2012) In Kenya it is ranked as number one killer cancer (KDHS 2014). We therefore systematically reviewed the available literature on prostate cancer in Urban Kenya and provided a Kenya perspective on rates of PCA based on available data in the region.

**Methods:** The study applied an in-depth systematic review of Kenya's cancer policies, Kenya cancer registry's, with additional search of Google Scholar and WHO African region websites, for studies that estimated incidence rate of PCA in any African location and guidelines, a qualitative analysis of results from a section of a semi-structured key informant survey focused on the opinions of clinicians delivering cancer services.

**Results:** To investigate the incidence and diagnosis of PCA, the study surveyed cancer registry that spans 14 of the 47 counties in Kenya during 2013 to 2018. It sampled 1048 cancer records and 12 health-care facilities. We estimated a pooled PCA incidence rate of 22 per 10000 populations, and also reported a median incidence rate of 19.5 per 10000 populations. We observed an increasing trend in PCA incidence with advancing age and very low screening almost zero for Kenyans living in the rural areas.

**Discussion and conclusion:** Although the Nairobi Cancer Registry has attempted to collect data with respect to the prevalence of types of cancer based on participating facilities in Nairobi, there is still a large gap for such coordinated data at national level. We hope our findings may further assist at identifying relevant gaps, and contribute to improving knowledge, research, and interventions targeted at prostate cancer in Africa.

**Keywords:** Prostate cancer, Risk factors, Diagnosis, PSA

## **Factors Affecting Uptake of Cervical Cancer Screening Among Women of Reproductive Age (15-49 Years). A Case of Samburu County Referral Hospital**

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Cervical cancer is the 4th most common cancer in women with an estimated 570,000 new cases in 2018 representing 6.6% of all female cancers. Around 90% of deaths from cervical cancer occur in low- and middle-income countries. The aim of this research was to assess factors affecting uptake of cervical cancer screening among women of reproductive age (15-49years). A cross-sectional study was conducted to assess the factors affecting uptake of cervical cancer screening among women attending Samburu County Referral Hospital MCH department, Samburu County, Kenya. Two hundred and twenty-two women were targeted. The sampling method was a simple random sampling. Respondents were reassured of the confidentiality of the data. The instrument used was a semi-structured interview schedule, data was analyzed using descriptive statistics. The proportion of women who had cervical cancer screening among women attending the health facility was low 45 (20%). Married women and women above 26 years mostly sought cervical cancer screening. 79.7% never had screening. 58.1% didn't go for screening due to fear of a positive results. The Study recommended that the County department of health to train all health care workers on cervical cancer screening and to ensure screening was easily available and accessible by having more facilities offering the services. The department of health should conduct awareness drives on cervical cancer and its screening methods and make cervical cancer screening part and parcel of universal health coverage.

**Keywords:** Cervical Cancer Screening

## **Folate Receptor-Mediated Delivery of mRNA using Chitosan Functionalized Selenium Nanoparticles: Potential for Cancer Immunotherapy**

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### **Introduction**

Systemic mRNA delivery, although still at its infancy, holds immense potential for application in cancer vaccination and immunotherapy. Its many advantages over DNA transfection makes it attractive in applications where transient expression is desired. Selenium nanoparticles have found a new role in biomedical science as drug delivery vehicles, owing to their biocompatibility, low toxicity, and biodegradability. Furthermore, selenium plays an important role in immune function and modulation.

### **Objective**

Selenium nanoparticle use in the delivery of mRNA has proved challenging due to RNA's instability and susceptibility to degradation. Herein, we developed chitosan functionalized selenium nanoparticles for potential use in the delivery of therapeutic mRNA.

### **Methodology**

In this study, we have synthesized chitosan-coated selenium nanoparticles with a folic acid targeting moiety for mRNA delivery to tumor cells.

### **Results and Discussion**

Synthesised selenium nanoparticles were stable, well dispersed and ranged from 59-102 nm in size.

Nanoparticles bound and protected mRNA from RNase degradation while exhibiting low cytotoxicity in HEK293, MCF-7 and KB cells in vitro. Moderate cytotoxicity in colon cancer cell lines Caco-2 and HT-29 were attributed to apoptosis induction by selenium, as confirmed by acridine orange/ethidium bromide staining. Cellular uptake of selenium was monitored by coupled plasma - atomic emission spectrometry (ICP- AES). The Fluc-mRNA expression investigated in folate receptor positive and negative cell lines indicated highest transfection in KB cells.

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## **PERSONALITY DETERMINANTS OF BURNOUT AMONG NURSES AT NAKURU COUNTY REFERRAL HOSPITAL**

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Workplace burn-out is characterized as feelings of energy depletion or exhaustion; increased mental distance from one's job, or feelings of negativism or cynicism related to one's job; and reduced professional efficacy (Maslach, 1982; WHO, 2019). Relationship between personality traits and development of burnout has been studied in other parts of the world but literature in Africa, particularly Kenya, is scant. The purpose of this study was to establish the relationship between personality traits and burnout among nurses at Nakuru County Hospital. A cross sectional study design was adopted. A structured questionnaire assessing the big five personality traits and Maslach's burnout inventory were used to collect quantitative data. A convenient sample of 76 nurses working in Nakuru County Referral Hospital constituted the study participants, while the nurse managers of the units were key informants. Quantitative data was analyzed using SPSS version 22.0. The SMHS's nursing department's ethical review committee and NACOSTI approved the proposal, and informed consent sought from participants before the data collection. The majority of the respondents were fully employed (84%), aged 21-50+, gender 80.3% female, 47.4% single, 44.7% married. Most of the respondents (68.4%) attained ≤ Diploma while 31.5% had BSc.N and above. Work experience ranged from 1-≥15. The scores on levels of burnout were: LOW emotional exhaustion occurred in traits of agreeableness (32.8%) and conscientiousness (17.7%), MODERATE emotional exhaustion among 23.6% with conscientiousness trait. At depersonalization level, agreeableness trait experienced LOW (19.7%) and MODERATE (23.6%), and conscientiousness (21%), while LOW level of Decreased Personal Competence in those with agreeableness (32.2%) and conscientiousness (43.4%). Traits of extraversion, neuroticism and openness to experience scored significantly less on burnout. The traits of agreeableness and conscientiousness seem to predispose nurses to burnout. Baseline personality tests and periodic burnout surveillance should be carried out to ensure early detection and intervention.

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## **EFFECT OF BURNOUT AMONG SENIOR NURSING STUDENTS IN KABARAK UNIVERSITY**

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Burnout as a progressive process of emotional exhaustion and loss of professional interest due to prolonged period of exposure to high levels of stress emerged in the 1970s. The stress arises from work situations, emerging among professionals who exercise care for others (Jamila Geri, et al., 2014). Maslach, et al. (1996), defined burnout syndrome as comprising of emotional exhaustion, disbelief,

and low professional efficacy. Although most nursing students cope effectively with physical and emotional demands of nursing, but some situations nursing students become overwhelmed and develop burnout. The purpose was to assess the effect of burnout among senior nursing students at Kabarak University. A cross sectional study design was adopted. A structured questionnaire assessing characteristics of the students, Maslach's burnout inventory and perceived effects of the workload was used to collect the data. A random sample of 60 third and fourth year nursing students of Kabarak University was selected. Quantitative data was analyzed using SPSS version 22.0. The SMHS's nursing department's ethical review committee approved the proposal, and informed consent sought from participants before the data collection. Most respondents were female (65.6%) and 34.4%, aged 20-24 (90.2%). Most of the students resided off- campus (61.7%), with academic workload of 6-10 CF and not on a work study programme (91.8%). The results showed 5.0%, 33.3% and 61.7% of moderate, severe and very severe burnout, respectively. The three dimensions of burnout found to be important significantly affected were emotional exhaustion and personal accomplishments (scores between moderate and high), and low scores on depersonalization. The sentiments of the senior students about their workload were largely negative expressing that "balancing class, placement schedules, exams and balancing personal life were stressors in a nursing student's life". The key recommendation was that the semesters should be scheduled in terms of blocks of theory and clinical rotation.

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## **ORAL CONTRACEPTIVES AND INTRAUTERINE DEVICES AS RISK FACTORS FOR BREAST AND CERVICAL CANCERS: A SYSTEMATIC REVIEW**

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### **ABSTRACT**

Breast and cervical cancers have commandingly become major public health threats across the world. While studies have reported on the nexus between the use of oral contraceptives (OCs) and intrauterine devices (IUDs) as risk factors for breast and cervical cancers, there exists a paucity of explicit data on the nature of the association. Authors report the effect of oral contraceptives and the use of IUDs on the development of breast and cervical cancers. Several databases (Cochrane Library, Google Scholar and PubMed) were searched using well-specified criteria and a total of 15 papers selected. Meta-analyses, systematic reviews and studies that used cross-sectional designs were excluded from the review. Three and twelve cohort and case-control studies were reviewed respectively. Four of these studies reported an increased association between oral contraceptives and the risk of cervical cancer while nine showed positive correlation between oral contraceptives and risk of breast cancer. One study showed association between levonorgestrel IUDs and risk of breast cancer while the other study did not show association between both levonorgestrel and copper IUDs with risk of breast cancer. Use of copper IUDs was associated with diminishing risk of cervical cancer. Overall, use of oral contraceptives upsurges risk of breast and cervical cancers especially when used for longer periods of time. Further studies should therefore be done to understand the mechanisms of action of oral contraceptives and IUDs on the development of both cancers.

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## **Strengthening foundational microbiology for Infection Prevention & Control Competence in Health Care: Perspectives from COVID-19**

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#### ABSTRACT

Coronavirus disease 2019 (COVID-19) pandemic is caused by a newly emergent Coronavirus strain named Severe Acute Respiratory Syndrome (SARS-CoV-2). The disease began in December 2019 in Wuhan City China where it is believed to have been transmitted to humans from an unknown animal reservoir. The public health, social and economic impact of the pandemic the world over has been detrimental. Health care providers at the frontline in the fight against COVID-19 are at the greatest risk of infection and so far many have been infected and some have succumbed to the disease. A range of factors responsible for healthcare provider infections have been cited including the complex nature of COVID-19 transmission, insufficient infection prevention & control (IPC) practices as well as inadequate compliance. Thus, it is imperative that healthcare providers have adequate knowledge of infectious diseases and microbial pathogens to comprehend the scale of risk for better recognition and response. Microbiological based concepts of IPC such as hand hygiene and aseptic techniques are essential in slowing down the spread of the virus. COVID-19 has proven that infectious agents can emerge from any region globally and can spread rapidly with ominous consequences to all humanity. This review discusses the role of college-learnt (foundational) microbiology in health care provider preparedness for emerging infectious diseases with a focus on IPC competence.

Key words: Healthcare, COVID-19, Infection Prevention & Control, Microbiology, Preparedness

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## Developing potential drugs for COVID-19 using ligand based virtual screening

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**Background and purpose:** Coronavirus disease 2019 (COVID-19) caused by Severe Acute Respiratory Syndrome- Coronavirus 2 (SARS-CoV2) is a highly contagious disease that has infected more than 13 million patients and led to more than 580, 000 deaths in less than seven months. Chloroquine is very effective in management of COVID-19. Compounds similar to chloroquine may have the same biological activity and thus inhibit SARS-CoV2.

**Methods:** SwissSimilarity tool was used to identify similar compounds to chloroquine in the ZINC database. Compounds which were more similar than hydroxychloroquine were selected and used to test molecular docking with quinone reductase 2 (a target for chloroquine). Pharmacokinetic and toxicity profiles of selected compounds were assessed using SwissADME and Protox Server respectively.

**Results:** There were 49 drug-like compounds in the ZINC database having a higher similarity index to chloroquine compared to hydroxychloroquine. 17 of these had a better binding potential to quinone reductase 2 compared to chloroquine while two had similar binding potential to chloroquine and three had similar binding potential to hydroxychloroquine. Out of these 22 compounds, 18 had a higher predicted LD50 compared to chloroquine but lower when compared to hydroxychloroquine.

**Conclusion:** Eighteen drug-like compounds in the ZINC database bind with high affinity to quinone reductase 2, are less toxic but similar to chloroquine. Therefore, they may have activity against SARS-CoV2. However, in vivo or in vitro study should be done since this is an in silico study.

**Keywords:** COVID-19, SARS-CoV2, chloroquine, quinone reductase, ZINC database, ligand-based virtual screening

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## A Review of Documented Immune Responses to SARS CoV-2 as a Basis for Therapy and Vaccine Development

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The high level of transmissibility, associated morbidity and mortality rates, and the tremendous effects on the global economy makes SARS CoV-2 a public health emergence of international repute. Owing to its incredible pathologic and epidemiologic dynamics, a quick and effective intervention is urgently required. Understanding the precise behaviour of the immune system during infection with COVID-19 is fundamental in the development of an effective and safe vaccine. Recently published articles on SARS CoV-2 and COVID-19 were reviewed using PRISMA guidelines with an aim to piece together views from different scholars on how the immune system responds to infection with SARS CoV-2. Only papers reporting on immune responses during COVID-19 infection and published in the year 2020 were included. Humoral immune responses including production of immunoglobulin M (IgM), immunoglobulin G (IgG) and cytokines like interferons (IFN- $\alpha$ , IFN- $\beta$  and IFN- $\gamma$ ) as well as cellular responses like production of CD8+, CD4+ and natural killer cells (NK-cells), all play a fundamental role during SARS CoV-2 infection. A recombinant subunit vaccine targeting production of adequate neutralizing antibodies against the viral spike protein or a regimen featuring both whole killed and genome based vaccines may be adequately immunogenic.

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## IN VITRO ANTIBACTERIAL, IN VIVO IMMUNOMODULATORY AND SAFETY PROPERTIES OF ETHYL ACETATE LEAF EXTRACT OF *Ocimum basilicum*

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*Staphylococcus aureus*, MRSA, *P. aeruginosa* and *E. coli* are common bacterial pathogens. Multi-drug resistant strains of these pathogens have led to a demand for new treatment options. *O. basilicum* is an important medicinal plant and has been shown to have therapeutic values. However, there was need to validate its safety and immune modulation potential. The aim of this study was to determine the in vivo immunomodulatory, safety and in vitro antibacterial effects of *O. basilicum*. This was a laboratory-based experimental study. Different concentrations of the ethyl acetate leaf extract were used for testing antibacterial activity by the disc diffusion method followed by determination of MIC and MBC by broth dilution. Phytochemical and elemental properties of the extract were assayed by GC-MS and atomic absorbance spectrophotometry. For immune modulation concentrations, 300mg/kgbw, 200mg/kgbw and 100mg/kgbw were used while RRBC's were used as the antigen. Administration of mice with 300mg/kgbw, 548mg/kgbw and 1000 mg/kgbw for 28 days was done to determine their body weight, organ weight, biochemical and hematological profiles for safety evaluation. The highest activity was on *P. aeruginosa* ( $27.00 \pm 2.00$ mm) while the lowest activity was on the isolate of *S. aureus* ( $17.33 \pm 0.58$ mm). There was a dose dependent effect on the humoral antibody responses. The extract exhibited an effect on neutrophil adhesion and a dose dependent effect on phagocytic index which wasn't significantly different among the extract concentrations. In vivo safety tests revealed that the 1000mg/kgbw concentration significantly lowered PLT counts

( $556.00 \pm 76.00 \text{ } 10^3/\mu\text{l}$ ) while having no effect on other blood indices. The extract was also proven safe on the liver and kidney. The ethyl acetate leaf extract of *O. basilicum* had antibacterial, immune modulation effects and was safe for in vivo use, therefore, this plant could be harnessed in efforts to come up with alternative and complementary therapies.

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## ANTIMICROBIAL RESISTANCE (AMR) AS A THREAT TO GLOBAL HEALTH

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Alexander Flemming's penicillin discovery was the most important advances of modern science because it reduced mortality and alleviated suffering but Antimicrobial Resistance (AMR) is threatening such advances. AMR is where infectious microorganisms do not respond to any drug given in equal doses or higher than those required. AMR has become a global concern due to its negative effect on the economy through high cost of treatment, research and emergence of untreatable diseases. World health organization (WHO) setting first World Antibiotic Awareness Week (WAAW) in November 2015, was a commendable move. Fiji is the first country to develop and roll out a national plan for AMR and marking it annually therefore setting pace globally. Kenya has subsequently launched its National Action Plan on 13th November 2017 during the WAAW. Despite efforts made, there are challenges including inadequate reliable surveillance data which monitors antimicrobial use and detect occurrence and spread of AMR bacteria, limited awareness of factors promoting the emergence, maintenance and transmission of AMR and inaccessibility of quality health care in developing countries. Interventions like public health education together with new antimicrobial strategies, legislative measures, and vaccine development to prevent health care associated pathogens can be used to mitigate this menace. To explore this research current articles, journals, entries and previous published works related to AMR from 2001-2018 were reviewed, focusing on; emergence, reasons for resistance, factors contributing to AMR, tests available to diagnose and identify resistance, global health effects, and measures to mitigate AMR. It was found that, unnecessary antimicrobial prescription imposed microorganisms to selective pressures, antimicrobials use in agriculture to promote animal growth and genetic factors intrinsic to microorganism promoting AMR. Guidelines on over-the-counter accessibility of antibiotics, regular hand washing and improving infection prevention and control are recommended approaches.

Key Words: Antimicrobial Resistance,Mortality, Prevention and Control

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## Influence of community health workers on uptake of hormonal implants and the intrauterine device in Kenya: An ecological quantification using zero inflated models.

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## ABSTRACT

### Background

Pooled evidence suggests that community health workers may improve uptake of implants and the intrauterine device in resource poor settings. However, differential among counties may adversely affect their motivation. Understanding regional how this affects uptake of contraception is important for policy makers.

### Objectives

To compare uptake of implants and copper IUD between regions with active vs inactive community health workers between 2018-2019 in Kenya.

### Methods

This was an analysis of District Health Information Software (DHIS) data. We extracted data on the uptake of hormonal implants and the intrauterine device from 2800 health centers across Kenya. Data on the status of community health workers in all regions was extracted from a ministry of health up-to date database of all community health units in Kenya. To test the effect of community unit functional status on uptake of the two methods, we used zero inflated negative binomial regression (ZINB) and zero inflated Poisson (ZIP) regression models. All models were on the additive scale.

### Results

A total of 1185 health centers were included for analysis. The mean number monthly insertions in health centers was 5.05 for IUDs and 11.65 for hormonal implants. In regions where community health workers were active (functional), women were 61% more likely to take up hormonal implants compared to other regions, even after adjusting for density of health facilities and health workers (RR=1.61, 95% CI=1.52 – 1.69). However, we did not find a similar effect for the copper intrauterine device (RR=0.98, 95% CI=0.88 - 1.52).

### Conclusion

Uptake of the hormonal implant was higher in regions with active community health workers compared to regions with non-functional community health workers. However, there was no effect on the intrauterine device. Additional research is needed to understand the role of community health workers in promoting LARCs and especially the intrauterine device.

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## **Effect of Umbilical Cord Clamping Time on Nutrition Status of Infants, Randomized Control Trial in County Referral Hospital in South Rift Valley, Kenya**

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**Background:** Although the benefits of delayed umbilical cord clamping are globally including by the World Health Organization (WHO) Kenya among many Sub-Saharan African Countries continue to record variation in the clamping time in its private and public health facilities.

**Objective:** This study sought to establish the effects of umbilical cord clamping time on infant nutritional status at 6 months at Longisa County Referral Hospital

**Methods:** The study was a randomized controlled trial design. Mother-infant pairs were randomized into the experimental and control groups A sample size of n=204 of mother-infant pair was enrolled in both study arms. Recruitment of the study participants took place at onset of labour pains for all eligible mothers admitted to labour and delivery ward. The experimental group involved clamping the umbilical cord between 3-5 minutes after delivery while the control group involved clamping of

umbilical cord as per the standard routine practice soon after delivery in the health facility. Infant weight, length and haemoglobin was assessed at baseline, 6 weeks and at 6 months. Comparison of effect of umbilical cord clamping time on length, height and haemoglobin at 6 weeks and at 6 months was done using unpaired student t-test at 95% CI, significance set at  $P < 0.05$ . Two-sample t-test, the results for weight, length and haemoglobin was determined. Results: The mean weight at six (6) months of life for the control group of the study was  $7.41 \pm 0.65$  kgs while for the experiment group the mean weight is  $8.51 \pm 0.60$  kgs ( $p < 0.05$ ). The mean length at 6 months for the control group was  $56.91 \pm 14.36$  cm and the experiment group were  $58.18 \pm 16.72$  cm ( $p < 0.05$ ).

**Conclusion:** Delayed clamping is beneficial for the infant's nutrition status.

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## **SYNTHESIS, PHARMACOLOGICAL AND SOLUBILITY EVALUATION OF ANTIPLASMODIAL PYRIDO [1, 2A] BENZIMIDAZOLES WITH CYCLIC AND FUNCTIONALIZED AMINE SIDE CHAIN SUBSTITUENTS**

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Malaria continues to be a leading cause of morbidity and mortality, especially in sub-Saharan Africa. The burden of malaria is worsened by antimicrobial resistance (AMR), a phenomenon that could render currently useful antimalarial medicines obsolete. Chloroquine, once the gold standard in malaria treatment, now offers minimal to zero clinical benefit due to widespread resistance. Use of Sulfadoxine/Pyrimethamine and Atovaquone is currently limited to a few geographical zones as a consequence of resistance by *P. falciparum* to these agents. A serious concern is emergence of resistance to ACTs, the WHO-recommended first-line therapy for *P. falciparum* malaria. Consequently, research targeting antimalarial drug discovery and development is a vital intervention to reverse the effects of AMR in malaria therapy. This study focused on synthesis of pyrido [1, 2a] benzimidazoles analogs and their evaluation for in vitro antimalarial activity as well as physicochemical. These were characterized using spectroscopic and chromatographic methods. They were then assessed for in vitro antiplasmodial activity against *P. falciparum* isolates and physicochemical properties determined. Aminopiperidine-based compounds were found to be the most potent, while those bearing pyrrolidine and piperazine substituents displayed only moderate activity. Azetidine and cyclohexylamine substitution produced compounds with moderate to poor in vitro activity and solubility. Cyclic amine groups were detrimental to both activity and solubility, and a number of active compounds also displayed significant cytotoxicity. Cyloalkylamine-functionalized benzimidazoles analogs possess potent antimalarial activity and are promising leads for development of preclinical candidates for treatment of malaria. Further work is required to investigate antimalarial activity of benzimidazoles and optimize these compounds to achieve an acceptable balance between activity and physicochemical properties.

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## **PREVALENCE AND FACTORS ASSOCIATED WITH DYSLIPIDAEMIAS IN ADULT RENAL TRANSPLANT RECIPIENTS ATTENDING A NEPHROLOGY CLINIC AT A TERTIARY HOSPITAL IN KENYA**

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**Introduction:** Dyslipidemia is a common modifiable risk factor for cardiovascular disease in renal transplant recipients and is usually multifactorial. This study aimed to assess the prevalence and factors associated with dyslipidemia in renal transplant recipients attending a nephrology clinic at a tertiary hospital in Kenya

**Methods:** This cross-sectional study was carried out on 110 adult renal transplant recipients on follow up at the nephrology clinic in Kenyatta National Hospital who were consecutively selected and interviewed after granting a written informed consent. A structured questionnaire was used to obtain data on sociodemographic characteristics, diet and exercise. Data on lipid profile, medication and comorbidities was abstracted from their medical files. Sample size was calculated using a modified Cochran formula as described by Naing et al. Ethical approval was obtained from Kenyatta National Hospital/University of Nairobi- Ethics and Research Committee (KNH/UON -ERC).

**Results:** The mean age of the participants was  $43.4 \pm 13.4$  with a male gender predominance. The overall prevalence of dyslipidemia was 72% and the most prevalent types were elevated LDL-C and elevated non-HDL-C each at 44%. In the bivariable model, factors that were significantly associated with dyslipidemia included weight gain ( $COR=22.67$ ,  $CI=2.79-184.11$ ;  $P=0.003$ ), physical activity ( $COR=0.19$ ,  $CI=0.04-0.93$ ;  $P=0.040$ ) and dietary modification ( $COR=0.06$ ,  $CI=0.02-0.22$ ;  $P<0.001$ ). In the multivariable model only dietary modification ( $AOR=0.03$ ,  $CI=0.003-0.32$ ;  $P=0.004$ ) was significantly associated with dyslipidemia.

**Conclusion:** The prevalence of dyslipidemia was high and the most prevalent types were elevated LDL-C and elevated non-HDL-C. Whereas dietary modification, engaging in physical activity and weight gain were significantly associated with dyslipidemia in the bivariable model, only dietary modification was significantly associated with dyslipidemia in the multivariable model

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## **CHARACTERIZATION OF DIARRHEAGENIC *Escherichia coli* PATHO-TYPE ISOLATED FROM STOOL SAMPLES OF CHILDREN UNDER FIVE YEARS IN NAKURU COUNTY**

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Diarrheal diseases are among the major causes of escalated morbidity and mortality rates among children under 5 years of age in developing countries with approximately 2.5 million annual fatalities globally (Shetty et al., 2012). Diarrheagenic *E. coli* (DEC) has been implicated in rising epidemic patterns of infant diarrhea worldwide. DEC strains exist in 6 distinct pathotypes (pathogenic types). In Kenya, cases of DEC have been recently implicated with high prevalence in children under 5 years of age in a cosmopolitan setting (Iijima et al., 2017). Despite several studies having been done to characterize the different DEC pathotypes in Kenya, there has not been information on the occurrence of the most frequently isolated DEC pathotypes from stool samples of children under 5 years of age attending Nakuru Provincial General Hospital (NPGH) in Nakuru County. This study, therefore, sought to characterize the DEC pathotypes isolates from the selected rural and urban settings in Nakuru County.

A total of 2400 children (0-60 months) who reported to NPGH pediatric unit experiencing diarrhea. The selection of the cohort was based on antibiotic usage. The subjects with prior antibiotic usage (within 7 days) were excluded from the study. Diarrhea was defined by the occurrence of more than three loose stools, liquid or watery or bowel movements in any 24-hour period. All consenting parents/guardians were considered and a questionnaire was administered to provide pertinent information regarding the study. The determination of pathogen was performed using PCR assays. The data obtained were expressed as frequencies and percentages. A comparison was done using a two-tailed Chi-square test. A P-value of less than or equal to 0.05 ( $p \leq 0.05$ ) was considered statistically significant. The researcher sought ethical approval from Kenyatta National Hospital and the University of Nairobi Ethics Review Committee.

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## **GENETIC POLYMORPHISMS IN ESTROGEN METABOLISM ENZYMES IN PATIENTS DIAGNOSED WITH ESTROGEN RECEPTOR POSITIVE BREAST CANCER AT A TERTIARY HOSPITAL IN NAIROBI**

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Breast cancer is a deadly disease. It is reportedly the most prevalent type of cancer in females and is the chief contributor of cancer related mortalities in women globally. Estrogen receptor positive (ER+) breast cancer constitutes the highest percentage of breast cancer cases. Estrogen is a key risk factor associated with the ER+. Therefore, its metabolism is fundamental to understanding the aetiology of the disease. Studies carried out on populations of different ethnicities report contradicting findings on the association of genetic polymorphisms of estrogen metabolism enzymes to breast cancer. There is scanty of information on the effects of these polymorphisms and ER+ breast cancer in populations of African descent. This study will employ a hospital based case control design. Study participants will be patients visiting Aga Khan University hospital, Nairobi (AKUH,N). Case and control samples constitute formalin fixed paraffin embedded tissues of women diagnosed with ER+ and benign bloods from women diagnosed with benign blood disorders respectively. The ratio of case: controls will be 1:1. Single nucleotide polymorphisms will be genotyped using PCR-RFLP and sequencing. Association of Genotypes to key risk factors and to clinicopathological characteristics in relation to ER+ breast cancer will be evaluated using the logistic regression analysis. The odds ratio at 95% confidence intervals will be determined. This study seeks to inform on the polymorphisms associated with ER+ breast cancer as well as their relationship to risk factors and clinicopathological parameters and susceptibility to the disease in the patients diagnosed with the disease at AKUH, N. The findings will inform on development of policies as well as public health and medical practices and strategies that will aid in prevention of ER+ in the local population.

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## **DETERMINANTS OF NUTRITION STATUS AMONG PATIENTS WITH PULMONARY TUBERCULOSIS AT KERICHO COUNTY REFERRAL HOSPITAL, KENYA**

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Tuberculosis (TB) is one of the top 10 causes of mortality worldwide. Africa hosts the highest prevalence with Kenya being among 30 countries with the leading burden of TB. Considering that it is a major cause of death in Kenya, it remains a major public health concern. Nutrition status is one of the determinants for the development of TB. Poor nutrition status affects cell-mediated immunity, which is the principal host defense against TB, increasing the risk of reactivation of latent TB and progression to active disease and also predicts outcomes of TB cases. Assessing nutrition status is essential for patients with TB to identify those at risk, improve their nutritional status, and

prevent any complications associated with malnutrition while promoting good dietary practice influencing recovery from TB. Sustainable development goal number 3 of ensuring healthy lives and promoting well-being for all at all ages aims at ending epidemics of tuberculosis and other infectious diseases by 2030. There are limited studies on the determinants of nutrition status among pulmonary tuberculosis (PTB) patients. The main aim of the study is to investigate the determinants of nutrition status among PTB patients attending Kericho County Referral Hospital. The study will adopt a Cross-sectional descriptive study design. Kericho County Referral hospital and TB clinic will be selected using purposive sampling; PTB patients will be selected using systematic random sampling. Structured questionnaire will be used to collect data from 185 PTB patients. Demographic and socioeconomic characteristics, dietary practices, Morbidity status, and Nutrition status will be analyzed using descriptive statistics; mean, median, standard deviation, and percentages, 24-hour recall data will be analyzed using Nutri-survey 2007 computer package. The association between demographic and socioeconomic characteristics, dietary practices, morbidity status and nutrition status will be determined using chi-square and Pearson correlation coefficient ( $r$ ).

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## Malaria vaccines targeting the pre-erythrocytic stage: a scoping review

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Malaria is a deadly infectious parasitic disease that causes devastating morbidity and mortality globally. Despite being a public health concern, an effective vaccine for prevention of the disease remains elusive. Global efforts are exploring possible ways of developing and improving vaccines to counteract the complex nature in which Plasmodium falciparum evades the immune system. A number of vaccines have been developed in the past targeting the various parasitic life cycle stages. Transmission blocker vaccines, such as PpPf S25, target the parasite stages in the mosquito vector. However, these herd vaccines only protect the immunized population. Vaccines targeting blood-stage forms, such as the AMA-1 and MSP-1 vaccines, are challenged by the complex metabolic pathways of erythrocytes and merozoites. Vaccines targeting the pre-erythrocytic sporozoite stage remain the most promising approach thus far. Here, we systematically review the literature on pre-erythrocytic stage vaccines and on-going work in the field. Furthermore, we highlight gaps in current knowledge and point to potential areas of future work. Articles on pre-erythrocytic malaria vaccines were obtained from Google scholar, PubMed and Cochrane starting from the year 2010. Ten papers were reviewed. A number of vaccines were reviewed highlighting; the vaccine type, clinical phase of trial, population demographics, vaccine immunogenicity, efficacy and safety. The RTS,S vaccine is reportedly the most advanced, having been rolled out for phase III clinical trials in a number of malaria-endemic African countries. The pre-erythrocytic vaccines discussed have made milestones in clinical trials. Some of the challenges elicited may be addressed via screening for novel antigens, exploring suitable vaccine administration vehicles, as well as using a combined multi-stage vaccine approach.

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## Pattern of Antibiotic Prescription for Upper Respiratory Tract Infections Among Under-Fives in Outpatient Clinics in Tharaka-Nithi County

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The World Health Organization (WHO) qualified antimicrobial resistance (AMR) as one of the principal threats to public health globally and inappropriate antibiotic prescription is its modifiable contributor. Therefore assessing antibiotic prescriptions for URTI is an acceptable way to analyze the appropriateness of the prescriptions. However, there is a paucity of data regarding the pattern of antibiotic prescriptions in rural hospitals in Kenya. This study seeks to profile the pattern of antibiotic prescriptions among under-fives with URTI in Tharaka-Nithi County, Kenya.

This was a retrospective charts review of under-fives treated from November 2018 to December 2019 for URTI in outpatient clinics in Chogoria and Chuka hospitals. A systematic sampling of 385 charts was carried out using the table of Robert and Morgan based on the total of 5000 URTI cases recorded. Charts of children with suspected bacterial infections were excluded, and for cases of tonsillitis, only children with a modified Centor score  $\leq 3$  were included. The binary logistic regression was used to assess the association between variables with the calculation of Odd ratio with a CI of 95% using SPSS 24.

This study found that 70.4% of under-fives with URTI were prescribed antibiotics. The prescriptions were associated with the diagnosis of tonsillitis as part of the URTI, OR 21(95%CI 4.52-99.3); the level of education of the prescriber with clinical officers prescribing more than medical officers, OR 15.9(95%CI 6.98-36.2) and the patient's proximity to the hospital, OR 1.77(95%CI 1.22-2.77).

Antibiotics were prescribed to 70.4% of URTI cases. This percentage was higher than the 30% expected by WHO and was significantly associated with the diagnosis of tonsillitis, the level of education of the prescriber and hospital accessibility. There is a need to train clinicians about the indications of antibiotic prescriptions and to implement antimicrobial stewardship programs in rural facilities.