

## CONFERENCE ABSTRACTS

### THE 6TH EAST AFRICAN HEALTH AND SCIENTIFIC CONFERENCE:

*Preparedness for and Control of  
Disease Outbreaks, Epidemics, and  
Pandemics in the Context of Climate  
Change, Globalisation and Gaps in  
Health Systems*

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*The basis for better health policy and practice*

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## KEYNOTE SPEAKER ABSTRACTS

### **K1. Preparedness for and control of disease outbreaks, epidemics and pandemics, in the context of climate change, globalization, and gaps in health systems**

Professor Japhet Killewo

Muhimbili University of Health & Allied Sciences, Dar es Salaam, Tanzania

The emergence of new or the re-emergence of existing diseases of animal origin, the growing threat of trans-boundary animal diseases and the emerging pandemic threats, emphasize the critical need for national and international collaborations. The spread of these diseases has been facilitated by the surge of world travel, impact of climate change, increase in animal food production and encroachment in wildlife populations. In addition, new societal demands related to food security, food safety, public health, and animal welfare, as well as changes in global or regional climate patterns, have attributed largely to the increased levels of human-animal interactions.

Over the last decade, nations worldwide have been grappling with an increase in emerging and re-emerging disease threats at the human, animal, and environmental interface. The pathogens responsible can spread rapidly, not only nationally, but regionally and globally. Traditional methods of epidemics control using single disciplines are not effective for these threats. Recently, the unprecedented Ebola outbreak in West Africa triggered a crisis that, for a period, seemed to evade effective national and international response, with catastrophic results for human health and wellbeing, food security, and economic prosperity. In 2005-2006, facing the threat of highly pathogenic avian influenza H5N1, most African countries established multi-sectoral committees to help address the threat. When that threat was under control worldwide—and the disease-specific funding that supported these structures diminished or disappeared—these committees disbanded.

Fortunately, recent outbreak experiences, especially with avian influenza, have spurred increasing recognition of the importance of an ongoing multi-sectorial effort to proactively address pandemic threats. A One Health approach has been internationally endorsed by FAO, OIE and WHO to improve prevention, detection and response. Important questions, however, still remain about how to concretely institutionalize and operationalize this approach in different countries. In Africa, Rwanda, Kenya, Uganda, Tanzania and Cameroon have made substantial progress toward creating permanent, multi-sectoral mechanisms to pre-empt and manage disease threats with epizootic and epidemic potential. There are however, many gaps and challenges in the health systems of these countries that may hinder progress towards achieving the goal of One Health. These must be addressed soon and I hope the conference will start to address them.

### **K2. Health systems in control of outbreaks, epidemics, and pandemics**

Dr. Andrew Yona Kitua, Director, East and Central Africa Region

USAID EPT2 – Preparedness & Response Project, Kampala, Uganda

Health systems of countries with limited resources, in our experience, apply the most expensive and money wasting strategy in control of epidemics and outbreaks by investing more on responding rather than preventing such threats. The East African member states are highly vulnerable to outbreaks and epidemics and cannot afford to waste meagre resources to firefight such threats. We analyse the events surrounding an outbreak by breaking these into the before, during, and after event periods. We point out the major policy, programmatic, and research gaps in our health systems that hinder effective prevention, detection, and controlling of outbreaks, epidemics and pandemics. We propose a three-pronged approach of high impact interventions to address the identified policy, research, and program gaps.

The strategic impact interventions include: 1. Educating and convincing our government policy makers on the value of investing in prevention, and hence, strengthening regional and national capacities for infectious disease intelligence that allows effective prevention, detection, and responding to public health events at source. 2. Strengthening

cross-sectoral cooperation, collaboration, and coordination in designing and implementing disease prevention and control programmes 3. Establishing a regional One and Eco Health competitive fund to support research and innovations to strengthen targeted health systems prevention capacities. In this respect, emphasize strengthening health economics research as a tool to motivate policy decisions to invest in prevention.

We further recommend building upon existing One Health initiatives and networks, and national One Health platforms to strengthen multi-sectoral coordination of efforts.

### **K3. Social mobilization in the national response for the control of emerging outbreaks, epidemics and pandemics – the Ebola experience in Uganda 2000-2012**

Dr Samuel Okware, Director General

Uganda National Health Research Organisation, Entebbe, Uganda

**Introduction:** Social mobilisation is a critical strategy in the containment of outbreaks in low resource settings. Five separate outbreaks have occurred in Uganda between 2000 and 2012. In September 2000, the first outbreak of Ebola erupted in war torn Gulu district with the death of several nurses. In 2007, the second Ebola outbreak occurred in Bundibugyo, and in 2011 a single fatality occurred. In June 2012, another outbreak occurred in Kibaale. A fifth outbreak re-occurred in the Luwero district the same year. Community involvement for active case search, case management and isolation contained the outbreaks. The *Sudan ebolavirus* subtype caused four epidemics, while the *Bundibugyo Ebola* subtype caused one. The primary cases started from rural areas and suggested a seasonal pattern related to ecological changes. Since then twenty six outbreaks have occurred in Equatorial Africa. The West African outbreak in Guinea, Liberia and Sierra Leone was the largest with over 27,500 cases and over 11,300 deaths. The Ebola virus is contagious and enters the body through contact with broken skin and mucosal surfaces of infected persons. Visiting a health facility, participating funeral rites significantly increased the risk four-fold. Attack rates were highest among women and lowest among children.

**Planning and implementing the national response:** The national response involved all levels of government: from cabinet to the villages. A national task force was set up for coordination and community mobilization. The task force established subcommittees for *coordination and resource mobilization; surveillance and laboratory work; case isolation and management; public education, and logistics management*. One national joint plan was developed to which the various collaborators subscribed. A country-wide community-based mobilisation was conducted with contact tracing, public education, and the timely isolation of cases and contacts. Community-based teams included political and public leaders, volunteers, NGOs, schools and faith based organizations. Two ambulances operated by mobile teams supported the referral of cases. Each village had a village scout who led the mobilisation for active case search, and public education from door-to-door on foot. The scouts met daily and shared progress. Cultural leaders were mobilised. The media was fully integrated into the national response. A cascade of training for health care workers and journalists were carried out in all the districts. A burial team was hired to ensure safe and quick burials at designated places.

**Isolation and care:** The WHO syndrome case definition for Ebola was adapted. Three distinct categories based on clinical symptoms namely: “**suspected**”, “**probable**”, and “**confirmed**” were adopted as the case detection. Fever, abdominal pain, diarrhoea, and vomiting were common symptoms. There were shortages of supplies and human resources. Significant delays were reported at community level. Effective community mobilisation led to early action and limited the outbreak to a single fatality. For instance, effective community action also prevented transmission beyond the index family in Masindi district. Only a single case in the general population of 300,000 occurred. There were gaps in the effectiveness of the isolation units as 64% of the 31 health care workers were infected after the establishment of isolation units in Gulu. To support community effort isolation facilities for barrier nursing were set up. A risk allowance was paid per day and this upheld commitment and kept the workers in the wards.

Case fatality was high at the beginning of the outbreak. However, with community effort and early detection, fatality was reduced. Patient care was intensive and expensive.

**Conclusion:** Community mobilisation and leadership enhanced early detection and action that yielded the best outcome. Inadequate capacity in surveillance, human resource, and laboratory capacity was a significant challenge. Therefore, health systems strengthening is needed at all levels. Community-based surveillance of *unusual health events* should be strengthened. The positive role of the media in social mobilisation for the control of outbreaks cannot be overemphasised. Enhanced collaboration with the community and partnerships is necessary for containment of future outbreaks.

**K4. The role of frontline health workers in controlling disease outbreaks**

Dr Andrew Yona Kitua, Director, East and Central Africa Region

USAID EPT2 – Preparedness & Response Project, Kampala, Uganda

Frontline health workers are trusted, knowledgeable health personnel, who come or have a profound knowledge from the communities they serve. They bridge cultural and linguistic barriers, expand access to coverage and care, and improve health outcomes. They are the ground soldiers and backbone of effective health systems and therefore key to achieving universal health coverage. In addition, they form the core foundation of the intelligence for disease and disease outbreak prevention. However, against such important roles, they are among the most neglected cadre of health workers, poorly resourced in terms of human resource development, supervision and field support, and poorly paid and often work as unpaid volunteers. Where they have been well recognized and supported to perform their roles, they have proven to be effective, affordable and reliable in communicating to communities and listening on behalf of the rest of health workers, providing the intelligence and interventions for disease prevention to needy communities. We share success stories that show that they can be key to bringing about huge health gains and preventing disease outbreaks with limited resources and lessons that poor access to health services does not only arise from lack of resources, but rather reflects a lack of political will on the part of leaders to protect their most vulnerable populations. We therefore urge Member states to enshrine health as a fundamental human right in their national constitutions and invest in PHC by build an army of Frontline Health workers to save money by preventing diseases and outbreaks at source. The saved money can be ploughed back to stimulate economic growth, eliminating poverty and improving health of millions of needy populations.

**K5. Climate Change**

Dr Gakumba John Bosco, National Coordinator

Nile Basin Discourse Forum, Rwanda

By definition, climate change (CC) impacts on human health are numerous and varied. Some factors, such as heat waves, will have a direct impact on human health. However, CC could also have adverse effects on the work world, notably on occupational health and safety.

Important occupational health risks include heat stress effects, injuries due to extreme weather, increased chemical exposures, vector-borne diseases and under-nutrition. In Africa, and many other parts of the world experiencing a hot season each year, the effects of heat stress may be of greatest relevance to the large working populations in mining, agriculture, construction, quarries, transport and other outdoor services. Factory and workshop heat will also become an increasing problem in the numerous workplaces without effective cooling systems. The climate model trends for this century indicate that the heat exposure may increase by 2 - 4°C during the hottest months, and this would change the occupational heat situation from 'low risk' to 'moderate or high risk'. Among the direct effects of climate change on human health are fatalities and injuries as a result of extreme weather events or disasters, such as flooding or landslides following heavy rain.

Conclusively, the underlying analysis of greenhouse gas emissions focuses on increased thermal energy in the atmosphere and the temperature changes are the most valid estimates. Direct effects on health of thermal conditions are therefore of particular importance. Workplace heat exposure is a well-known occupational health hazard, and local climate change will make risks more widespread and create new risks. Workplace exposure to excessively cold conditions is also a well-known hazard, but only a small fraction of the global population lives and works in very cold locations.



## CONFERENCE ABSTRACTS

### 1. Comparative efficiency of *Biomphalaria pfeifferi* and *B. sudanica* as intermediate host snails for *Schistosoma mansoni* and its implications on transmission of schistosomiasis in Kenya.

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**Background/Introduction:** In Kenya, schistosomiasis infects 6 million people with >30 million at risk of infection. Its transmitted by *Biomphalaria pfeifferi*, an inhabitant of streams and small water bodies, and *B. sudanica*, found along lakeshores, mainly in Lake Victoria.

**Objective:** To determine compatibility between wild populations of *S. mansoni* and its local intermediate host snails (*Biomphalaria pfeifferi* and *B. sudanica*) in Kenya in relation to transmission of schistosomiasis.

**Materials and Methods:** A reciprocal cross infection of Juvenile (<6 mm shell diameter), young adult (6-9 mm) and adult snails (>9 mm) to one miracidium/snail was done. Snails were screened weekly for shedding from 4 weeks post-exposure (PE) and numbers of cercariae shed per snail counted 6, 10 and 14 weeks PE.

**Results:** *S. mansoni* developed faster and had higher infection rates in *B. pfeifferi* than in *B. sudanica* (39.6-80.7% vs. 2.4-21.5%) regardless of snail size. Cercariae production was greater in *B. pfeifferi* exposed to sympatric than allopatric *S. mansoni* (624-1686 and 392-1232, respectively), and low (50-590) amongst all *B. sudanica*. Mean survival time of shedding snails (9.3-13.7 weeks) did not differ substantially between snail species.

**Discussion:** High rates of compatibility of *S. mansoni* with *B. pfeifferi* helps explain different rates of schistosome-infected snails in *B. pfeifferi* inhabited streams vs. *B. sudanica*-inhabited lakeshore habitats. *B. pfeifferi* is strongly preferential self-fertilizer whereas *B. sudanica* is preferential out-crosser, In coevolutionary interactions, self-fertilization in host is associated with high susceptibility to parasitism

**Conclusion and Recommendation:** *B. pfeifferi* is more likely to become infected and shed more cercariae than *B. sudanica*, suggesting per snail risk of perpetuating transmission in Kenyan streams and lacustrine habitats differ considerably

### 2. Prevalence and factors associated with hepatitis B and C infection in persons living with HIV enrolled in care in Rwanda

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**Background/Introduction:** Hepatitis B (HBV) and C (HCV) are important causes of morbidity and mortality in people living with human immunodeficiency virus (PLHIV). However the burden of these co-infections in Rwanda is still unclear.

**Objective:** Primary Objective: To quantify the prevalence of HBsAg and HCVAb in HIV-positive individuals enrolled into care. Secondary Objectives: To analyse data by subgroups to inform policy and decision-making. To perform multi-variate regression to determine factors associated with infection

**Materials and Methods:** Between January 2016 and June 2016, systematic screening for HBsAg and HCVAb was performed in PLHIV enrolled in public and private HIV facilities across Rwanda; 117,258 individuals were reached, 65% of total PLHIV enrolled to care. Results were analyzed to determine marker prevalence overall and by demographic factors. Multivariate logistic regression models were performed, applying survey weighting to ensure representative estimates. Odds ratios (ORs) were used as the measure of association and were considered significant at  $p < 0.05$ .

**Results:** Overall, the prevalence of HBsAg and HCVAb was 4.3% (95% CI 4.2-4.4) and 4.6% (95% CI 4.5-4.7) respectively; 182 (0.2%) HIV+ individuals were co-infected with HBsAg and HCVAb. Prevalence was higher in males (HBsAg, 5.4% [5.1-5.6] vs. 3.7% [3.5-3.8]; HCVAb, 5.0% [4.8-5.2] vs. 4.4% [4.3-4.6]) and increased with age; HCVAb prevalence was dramatically higher in people aged  $\geq 65$  years (17.8% [16.4-19.2]). In multivariate analysis, male gender (1.47 [1.20-1.80]) was associated with HBsAg positivity; being <15 years was protective against HBsAg (0.42 [0.23-0.75], ref. age 35-44). For HCVAb, older age was associated with positivity (age 45-54, 1.25 [1.01-1.54]; age 55-64, 2.46 [1.96-3.10]; age  $\geq 65$ , 5.49 [3.85-7.83]) and younger age was protective (age <15, 0.39 [0.23-0.67]; age 15-24, 0.46 [0.26-0.81]). Compared with living in Kigali, living in the Western province was associated with lower odds of HCVAb (0.77 [0.60-1.00]).

**Discussion:** Almost 120,000 individuals with HIV screened for HBV and HCV; 2/3 of PLHIV enrolled to care. Overall prevalence: HBsAg: 4.3% (~5,000 individuals), HCVAb: 4.6% (~5,500 individuals). Result considered to be robust estimates of the prevalence of HBsAg and HCVAb among HIV-infected individuals linked to care in Rwanda. Key populations include males, individuals above 45 years, and individuals living in border districts. Findings to be used to inform policy and target screening activities.

**Conclusion and Recommendation:** HBV and HCV co-infections are common in PLHIV in Rwanda. It is important that viral hepatitis prevention and treatment activities are scaled-up to control further transmission and reduce the burden in PLHIV. Special efforts should be made to conduct targeted screening of males and the older population. Further assessment is required to determine rates of HBV and HCV chronicity among PLHIV and to outline strategies to link individuals to care.

### 3. Mapping hotspots of chikungunya and dengue transmission in Northeastern Tanzania using disease exposure and vector data

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**Background/Introduction:** Dengue and chikungunya fever are mosquito-borne viral diseases that are public health problems in Tanzania and throughout the world. Seasonal variations in transmission of these viruses have been suggested owing to the ecology of their mosquito vector species, but little is known about the epidemiology of the diseases in North-eastern Tanzania, where disease activity has been increasingly recognized in recent years.

**Objective:** To determine seasonal spatial pattern of dengue and chikungunya clusters in Hai district.

**Materials and Methods:** Epidemiological and entomological data from two cross-sectional surveys were used to examine the spatial pattern of dengue and chikungunya transmission. Serological measures of dengue and chikungunya infection were derived using enzyme-linked immunosorbent assays (ELISA), and all participants were geo-referenced to the household level using a global positioning system (GPS). All significant clusters (with  $p < 0.05$ ) of human dengue and chikungunya cases and *Aedes* mosquitoes were mapped using ArcGIS.

**Results:** Spatial analysis of dengue and chikungunya cases found two significant clusters in the wet season. A cluster of dengue cases was detected in Boma Ng'ombe with relative risk (RR)=4.42,  $p < 0.001$ . A large, widely dispersed cluster of chikungunya cases was detected spanning Rundugai village and parts of Magadini village with RR=2.58,  $p = 0.01$ , and contained 20% of all seropositive individuals.

**Discussion:** High number of participants recently infected by dengue during wet season were not distributed evenly in the 5 villages but clustered in Boma ng'ombe. Boma ng'ombe is more urban as compared to other villages and it has been reported that *Ae. aegypti* is highly adapted to urban environments, and therefore its abundance is positively correlated with increasing urbanization.

**Conclusion:** Identification of locations where diseases are clustered is useful for early evaluation of case distribution to provide an assessment of risk at a small geographical scale for targeted control.

### 4. The prevalence of *Leptospira* spp in rodents and shrews and its potential transmission to humans and animals in and around Queen Elizabeth National Park (QENP)

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**Background/Introduction:** Rodents and shrews have been known to play an important role as reservoirs and hosts of many animal pathogens of public health importance globally especially *Leptospira* spp.

**Objective:** The purpose of this study was to determine the prevalence of *Leptospira* spp among the different rodent and shrew species and evaluate the likelihood of its transmission to both humans and other animals.

**Materials and Methods:** This study was conducted in and around QENP at Kahendero, Katara and Muruti. These areas are on the fringes of the park with high human-domestic animals and wildlife interface. Sherman traps were used to trap these rodents and shrews. Rodents and shrews were collected and their kidneys screened for *Leptospira* spp using the Fluorescent Antibody Test after which Real-time Polymerase Chain Reactions (PCRs) were conducted to confirm the presence of *Leptospira* spp.

**Results:** A total of 445 rodents and shrews were collected. These comprised of 11 rodent and five shrew species. Out of the 445 rodents and shrews, 275 were screened for *Leptospira* spp of which 72% (n=199/275) were positive. *Lemniscomys striatus*

showed higher prevalence of leptospira, followed by *Mastomys natalensis* and least by *Gerbilliscus validus*. The highest prevalence was with rodents in the park land.

**Discussion:** This is the first study looking at Leptospirosis at the human-domestic animals-wild life interface in and around QENP. Species diversity was higher as was the prevalence of *Leptospira* spp in relation to other studies done elsewhere. Potential for transmission of *Leptospira* spp is high due to presence of rodents in human households and community land.

**Conclusions and Recommendations:** The high prevalence of *Leptospira* spp in Rodents and shrews in QENP is a potential risk to humans and animals in the area. Multi disciplinary control strategies need to be put in place to prevent and control these diseases in both humans and animals.

### 5. Identification and characterization of Black *Aspergillus* fungi isolated from maize in aflatoxigenic hot zones in Kenya.

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**Background:** Black *Aspergillus* is an important agricultural pathogen due to its ability to produce Mycotoxins and to cause diseases in plants, humans and animals. During the aflatoxicoses episodes in Kenya it has been observed only aflatoxins were investigated neglecting other potent *Aspergillus* species.

**Objective:** This study sought to establish the extent to which maize in Kenya are contaminated with Black *Aspergillus* and its potential to produce toxins.

**Methodology:** One hundred grain samples were collected from cereal markets in Eastern province Kenya. Sixty isolated Black *Aspergillus* fungi were identified based on the microscopic and macro morphological features. Molecular characterization was performed with Polymerase chain reaction and Sequencing of the  $\beta$ -tubulin, Calmodulin genes.

**Results and Discussion:** The most frequently isolated *Aspergillus* spp. from all samples were; *Aspergillus awamori* (50%), *A. foetidus* (30%), *A. acidus*, *A. piperis*, *A. tubingensis*, *A. neoniger*, *A. niger*. The ability of these isolates to produce Ochratoxin A and fumonisin B2 was confirmed by using Enviroligix test kit. We can conclude that 40% isolated of the species are associated for the production of Ochratoxin A, and Fumonisin B2 toxin.

**Conclusion:** Raised concerns ought to be directed on the *Aspergillus* section *nigri* as an emerging contributor to mycotoxins in maize contamination in Kenya.

### 6. Genetically determined response to Artemisinin Based Combination Therapy in Western Kenya *Plasmodium falciparum* parasites

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**Background:** In 2006, artemether-lumefantrine (AL) became the first-line treatment of uncomplicated malaria in Kenya due to widespread SP resistance. AL remains highly efficacious but there are heightened concerns because ACTs resistance is now well documented in Southeast Asia (SEA). Genetically determined artemisinin resistance in *Plasmodium falciparum* has been described in SEA in association with slow parasite clearance rates (CRs). This study attempted to elucidate whether parasite genetics can provide basis for discovering genetic markers associated with ACTs resistance in Kenya. A clinical efficacy study was conducted to evaluate whether genetic factors play a role in CRs in patients treated with ACTs from western Kenya as well as parasites collected before the introduction of AL (pre-ACTs).

**Method:** A panel of 12 microsatellites (MS) markers and 91 SNPs distributed across the *P. falciparum* genome were genotyped using MassARRAY and Sanger sequencing technique respectively. Parasite CRs were calculated using the WWARN online parasite clearance estimator tool. Genotype and phenotype comparison was done.

**Research Findings:** All subjects achieved parasite clearance within 42 hours of treatment with a median clearance half-life of 2.6 hours (range 1.2-5.1 hours). The 12 MS showed high polymorphism with post-ACTs parasites being significantly more diverse compared to pre-ACTs ( $p < 0.0001$ ). SNP analysis showed 15 of 90 post-ACTs parasites were single-clone infections. Analysis revealed 3 SNPs in chromosome 12 and 14 were significantly associated with delayed parasite CRs. Further, bayesian tree revealed parasites with similar parasite clearance were more closely related.

**Conclusion:** This describes parasites with genetically determined response to artemisinin treatment which can provide the basis for discovering genetic markers associated with ACTs resistance in Kenya.



### **7. Protecting people and animals from high-impact disease threats: FAO's component of the USAID's Emerging Pandemic Threats Phase-2 (Ept-2) Programme**

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Effective prevention and control of emerging and re-emerging infectious diseases in animals entails good understanding about the drivers that underpin the emergence, spill-over, spread and persistence of pathogens. Risk factors can include agro-ecological conditions, anthropogenic activities, socio-economic conditions and demographics. These factors influence the emergence, spill-over, spread and persistence of pathogens. High quality information and data on drivers of disease emergence support sound disease prevention and control policies.

A multi-sectoral and interdisciplinary One Health approach is crucial to enhance the understanding of disease ecology and epidemiology at animal-human-wildlife-environment interfaces where new pathogens are likely to emerge, spillover, transmit, spread and persist. Leveraging on its vast experience from the avian influenza surveillance and response in Africa, the Middle-East and Asia, FAO through the USAID's Emerging Pandemic Threats Phase-2 (EPT-2) Programme has expanded its surveillance activities to include other high risk viruses with pandemic potential. FAO's risk-based surveillance will focus on understanding the role of livestock in the epidemiology of filo-, flavi-, influenza-, corona- and paramyxovirus targeting livestock populations at human-livestock-wildlife interfaces.

To achieve the goal of this program, the One Health approach will ensure the use of harmonized surveillance and diagnostic tools and integration, management and analysis of surveillance results as well as definition and mitigation of risk factors for emergence, spillover and spread. The surveillance program will inform prevention and control measures against emerging and re-emerging infectious diseases of public health significance with an ultimate goal of safeguarding public health, animal health, livelihoods, and national economies.

### **8. Characterizing mobility among key and vulnerable populations along Kenyan borders**

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**Background:** Population mobility has been identified as a key driver of sexually transmitted infections due to risky sexual behaviors. However, different interpretations of mobility have been used in literature. This study characterizes levels of mobility among key and vulnerable populations along East African borders.

**Method:** The study uses data from a cross-sectional Cross-Border Health Integrated Partnership Project (CB-HIPP) survey in five sites along Kenyan-Uganda border (Busia, Malaba, Sio Port and Port Victoria/Majanji) and Kenyan-Tanzania border (Taveta and Muhuru Bay). Mobility was based on questions related to plans to travel outside the current district/county and the time spent away. Mobility status was summarized by target populations, respondent characteristics and survey sites.

**Results:** Forty-two percent of 1,099 female sex workers (FSW) interviewed were mobile and high proportion of mobile FSWs was observed in Muhuru Bay (68%). The mobility status among FSWs varied with the respondents' age. The odds ratio of being mobile for FSWs in Busia and Muhuru Bay were 1.9 and 4.8 respectively compared to those from Malaba. Among men who have sex with men (MSM), 24% were mobile; Busia had the highest proportion of 32%. Twenty percent of people living with HIV (PLHIV) were mobile with high mobility in Taveta (31%) and Sio/Port Victoria (27%). The odds ratio of mobility among PLHIV in Taveta and Sio/Port Victoria were 4.1 and 3.2 respectively compared to those from Malaba. The proportion mobile among people who inject drugs (PWID) was 14% which differed for the three sites; Malaba (27%), Busia (11%) and Taveta (9%). A fifth of vulnerable women and girls (VWG) were mobile with the highest proportion in Taveta (40%). The odds ratio was 6.6 for mobility among VWG in Taveta compared to Malaba.

**Conclusion and Recommendation:** Health systems need to be cognizant of mobility patterns and how this affects access to health services in cross-border areas

### **9. Surveillance for Acute Flaccid Paralysis (AFP), National Stop Transmission of Polio Mission in Kasese District, Western Uganda, September 2015**

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**Background:** In 2012, WHO declared polio a global public health emergency. Uganda is still among the countries with recurring reinfections of polio virus. Kasese was one of the selected districts in Uganda with actual non-polio AFP rate of less than 1/100,000 (the actual rate is 0.6/100,000) as of August 15, 2015.

**Objectives:** To conduct active surveillance in poor performing districts with actual non-polio AFP rate of less than 1/100,000, build capacity of district health workers, community health workers and community members in vaccines preventable diseases surveillance (VPDs) and conduct 60 days follow up of late AFP cases that had onset of paralysis.

**Methods:** A cross sectional design. 8 members were deployed in Kasese to strengthen the surveillance system for one week. All children 15 years and below were eligible. Data was collected through document review of performance weekly surveillance reports, OPD, IPD, Physiotherapy registers for the last 60 days. Health worker were sensitised on VPD surveillance with focus on AFP, measles, Neonatal Tetanus and Adverse Effects Following Immunization. Group discussions and interviews assessed community workers' and community members' knowledge on VPDs, AFP case definition and AFP surveillance steps. All missed cases of AFP were line listed.

**Results:** Community health workers together with NSTOP missioners identified 2 unreported and uninvestigated AFP cases, 2 reported and investigated AFP cases during this visit. 90/106 health facilities were visited. 135 health workers, 24 community health workers and over 1500 community members were sensitized.

**Conclusion:** Kasese district's surveillance system was still weak. Knowledge on AFP case definition was still low and steps of surveillance not well known to Health workers. There is need for continued sensitization on VPDs in all health facilities and communities. Increased involvement of community health workers in disease surveillance is vital.

#### 10. Diversity and Leishmania tropical infection rate in sand flies from an endemic focus of cutaneous leishmaniasis in Gilgil Area, Nakuru County, Kenya.

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**Background/Introduction:** Kenya is one of the countries in sub-Saharan Africa known to have transmission of cutaneous leishmaniasis (CL) caused by *Leishmania tropica*. Gilgil sub-county, located on the Eastern fault scarps of the Kenyan Rift Valley is an important focus for transmission. Presence of *L. tropica* parasites in local permissive sand flies has previously been demonstrated. However most of these studies were done in the 1990s. There is therefore need for updated data on sand fly diversity and the infection rates with *Leishmania*.

**Objective:** To analyze sand flies captured from an area surrounding a forested ancient volcanic cone from which numerous cases of CL were being reported.

**Materials and Methods:** Sand flies were captured using CDC light traps and commercial printing paper soaked in castor oil. Captured flies were transferred to normal saline and then subjected to detergent wash followed by rinse in normal saline. The gut was then examined for presence of promastigotes. For species-identification microscopy, the head and lower abdomen of each sand fly were mounted using gum chloral, and examined for characteristic features after air drying.

**Results:** A total of 685 sand flies were captured. The following species were identified: *P. aculeatus* (22, 3.21%), *P. guggisbergi* (307, 44.82%), *P. sergentisaeveus* (217, 31.68%), *S. adleri* (1, 0.15%), *S. africana* (1, 0.15%), *S. antenata* (2, 0.29%), *S. bedfordi* (63, 9.30%), *S. schwetzi* (10, 1.50%), *S. squamipleuris* (3, 0.44%), *S. thomsoni* (59, 8.61%). Out of these, 9 female *P. guggisbergi* were positive by microscopy although only one isolate was successfully cultured.

**Discussion:** Presence of *L. tropica* infected *P. guggisbergi* is in agreement with previous studies which have implicated the species in the transmission of CL due to *leishmania tropica*. PCR for *Leishmania* species-identification and characterization by analysis of rDNA sequences are ongoing.

#### 11. Cluster of meningococcal meningitis in a rural district of Western Province, Rwanda, 2015

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**Background/Introduction:** Meningococcal meningitis is a life-threatening infection associated with high death rates in communities within the African meningitis belt. Although Rwanda is considered to be within this belt and conducts health-facility based surveillance, no meningococcal meningitis outbreak has been reported since 2001. In June 2015, seven suspected cases of meningococcal meningitis were reported by Kibogora Hospital and an investigation was initiated.

**Objectives:** Verify the diagnosis, assess the magnitude; Identify potential risk factors; Guide prevention and control measures.

**Materials and Methods:** We reviewed medical records and registries to quantify all cases meeting the case definition. A suspected case was any person living in the affected district or in its neighborhood with sudden onset of fever and with one of the signs: headache, stiff neck, altered consciousness, and vomiting. A confirmed case was one with positive culture in cerebrospinal fluid. We conducted active case finding in the affected villages. We used a questionnaire to collect data on socio-demographics and potential risk factors. We computed frequencies and proportions using STATA.

**Results:** We identified 18 suspected cases including 9 confirmed positive to *Neisseria meningitidis* W135. Two patients died (Case Fatality Rate=11%). All case-patients were from different villages. Median age was 14 years (range 3-62 years). Fourteen of the 18 case-patients were aged under 15 years. Close contacts were provided with antibiotic prophylaxis and no secondary cases were reported. The attack rate was 1.5/100,000 inhabitants during the eight-week duration with the weekly incidence remaining below the thresholds needed to declare an outbreak.

**Discussion:** The weekly incidence remained below the thresholds needed to declare an outbreak during the eight-week duration.

**Conclusion and Recommendation:** The investigation showed that Rwanda remains at risk of meningococcal meningitis outbreaks. It demonstrated the value of timely epidemiological surveillance and the importance of early case detection and management to prevent secondary transmission that may have led to outbreak.

## 12. Evaluation of Shigellosis surveillance system in Rwanda, 2014

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**Background/Introduction:** Due to its epidemic potential, shigellosis is an immediately reportable disease under the Integrated Disease Surveillance and Response System (IDSR) in Rwanda. We evaluated the surveillance system to assess its performance and capacity to detect shigellosis outbreaks.

**Objective:** Assess the performance of shigellosis surveillance system.

**Materials and Methods:** We conducted a cross sectional study. We collected data from seven hospitals. We reviewed individual records of suspected cases of shigellosis for the period of January to December 2014 and collected data using an adapted questionnaire. Three key informants per hospital were interviewed using an interview guide. We evaluated surveillance system attributes using guidelines for evaluating public health surveillance system. We used STATA SE 13 to compute frequencies and proportions.

**Results:** All of the seven hospitals assessed had at least four staff trained on IDSR. The shigellosis standard case definitions were available at all entry points in four of seven hospitals. Two out of seven hospitals had laboratory capacity to confirm shigellosis. Out of 55 individual records reviewed, 43 (78%) met the standard case definition; 36 (65%) had complete information; 17 (31%) were notified including 14 (82%) reported within 24 hours. Seven out of 21 tested samples were positive for *Shigella* species. All IDSR users found the system easy to operate and flexible. The system triggered six probable outbreaks but none was confirmed.

**Discussion:** Reporting of epidemic prone disease aims to trigger an appropriate public health response so that related morbidity and mortality can be prevented. Completeness of reporting is an important attribute to achieve this objective. Laboratory diagnosis is an essential element of communicable disease surveillance.

**Conclusion and Recommendation:** The surveillance system is implemented at health facility level. However, reporting, sample collection and testing rates are low. More emphasis should be placed on strengthening laboratory capacity for confirmation including timely sample collection, transportation and reporting at all levels.

## 13. Risk of neonatal mortality and its association with HIV infection among postnatal women attending Pumwani Maternity Hospital, Kenya.

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**Background:** HIV infection during pregnancy has contributed to early neonatal deaths. In developing nations, neonatal mortality rates have relatively remained unchanged. HIV infection rates among pregnant women range from 15 to 40 percent in countries with the highest overall HIV prevalence as at 2006, with neonatal mortalities seemingly being higher among HIV infected women. Following the inception of PMTCT in Kenya, no study has been done to document the association between maternal HIV status and neonatal mortality

**Design:** Case control study.

**Setting:** Pumwani maternity hospital (health records department)

**Subjects:** 128 cases and 128 controls were abstracted from the records at 1:1 ratio using a pre-tested abstraction tool. Case files of babies who died in the neonatal period and files of or actual live neonates within the same period were used.

**Main Outcome Measures:** Maternal HIV status, Neonatal mortality and the association (Pearson's chi-square test and odds ratio with corresponding 95% confidence interval computation), and other predictors of neonatal mortality were put in to consideration. The level of statistical significance at P-value was set at <0.05. Binary logistic regression analysis was performed to adjust for confounding factors in the relationship between neonatal mortality and HIV status.

**Results:** Out of 128 cases (neonatal mortalities) 12.5% were born from HIV-positive mothers compared to 3.9% among 128 controls (live neonates).

HIV sero-positive was found to be significantly associated with neonatal mortality in bivariate analysis [OR=3.51; 95% CI: 1.25-9.91; P=0.012] but not sustained after adjusting for other factors at the multivariate analysis [AOR=2.33; 95% CI: 0.76-7.15; P=0.139]. Multiple logistic regression revealed the following factors as independent predictors of neonatal mortality: LBW [AOR=3.97; 95% CI: 2.26-6.98; P<0.001], co-morbidities [AOR=3.84; 95% CI: 1.32-11.16; P=0.013]. Mother's hemoglobin level [AOR=3.18; 95% CI: 1.19-8.46; P=0.021], unemployment [AOR=0.43; 95% CI: 0.22-0.85; P=0.016].

**Conclusions:** An increased risk of neonatal mortality with HIV infection among postnatal women though not sustained at multivariate analysis. A robust study with larger sample size is recommended. Prompt screening, treatment, management of comorbidities, hemoglobin monitoring, nourishment in pregnancy and individualized approach to Low Birth Weight newborns.

#### 14. Prevalence and intensity of *Schistosoma haematobium* pre-post treatment with praziquantel in pre-school age children of Kwale County, Kenya

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**Background:** The recommended strategy to control schistosomiasis is preventive chemotherapy. Pre-school aged children are excluded from population treatment programs. In high endemic areas, these children are also at risk, and require treatment with praziquantel (PZQ).

**Objective:** To determine the prevalence and intensity of *Schistosoma haematobium* in pre-school age children

**Materials and Methods:** 400 pre-school aged children were enrolled. Urine samples were collected between 10 a.m. and 2p.m. 10 ml aliquot of urine was filtered through 15-mm polycarbonate filters and examined microscopically within 6 hours for the presence of eggs and the mean counts of the two filters was recorded and expressed as eggs per 10ml urine. This was done before treatment and five weeks post-treatment with praziquantel tablets at a single dose of 40 mg/kg body

**Results:** Before treatment, 41 of the 80 children (48.8%) who were infected with *S. haematobium* had heavy intensity ( $\geq 50$  eggs/10 ml urine), 39 children had light intensity (1-49 eggs/10 ml urine). After treatment with praziquantel, ten children were found to have an infection of low intensity. Reduction in the intensities of infection was significant even when analysis was stratified by sex and age. Overall pretreatment and post treatment prevalence of *S. haematobium* infections was 20.0% (95% confidence interval (CI) 16.4%-24.2%) and 2.8% (95% CI 1.5%-4.9%) respectively. Prevalence was higher in boys 22.9% (95% CI 17.7%-29.2%) when compared to girls 16.9% (95% CI 12.3%-22.8%).

**Discussion:** The burden of *Schistosoma haematobium* among pre-school aged children is high. Without early treatment, this often leads to serious health consequences including nutritional deficiencies

**Conclusion and Recommendation:** Pre-school children represent a high risk group for schistosomiasis and should be included in population treatment programs.

#### 15. A false reported typhoid outbreak due to inadequacies in typhoid surveillance

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**Background/Introduction:** The Health Management Information System reported 1549 cases of typhoid fever in 2015 and 1743 in 2016 in Nakaseke District. The Uganda Ministry of Health has provided surveillance case definitions on typhoid fever to districts; however, adherence is unknown.

**Objective:** We conducted an investigation to determine whether an outbreak had occurred, and evaluated the adherence to the surveillance guidelines



**Materials and Methods:** We compared the number of typhoid cases reported during January-April 2016 in three health facilities in Nakaseke District and the same time period in 2016. We extracted patient medical records to assess adherence to surveillance guidelines, especially in regard to standard surveillance case definitions, and to identify any cases of perforations. We also examined freshly admitted typhoid in-patients and reviewed laboratory and data collection procedures. We collected blood specimens from 5 freshly diagnosed typhoid patients for culture confirmation

**Results:** Nakaseke District reported 560 typhoid cases during January to June 2016, compared to 291 reported cases during the same time-period in 2015. Of the admitted patients reviewed, 28% (5/18) met the surveillance case definition. Of the 1025 records reviewed in 2016, 81% (829/1025) of diagnoses were clinical only, and 19% (192/1025) had a positive Widal test as the supporting laboratory evidence. All 5 samples from the freshly diagnosed patients cultured negative for typhoid at the reference laboratory. No cases of perforations were identified in area hospitals during the time periods under review

**Conclusion and Recommendation:** No evidence supported that a typhoid outbreak had occurred in the district. The increase in the reported typhoid cases was likely due to inadequate use of standard surveillance case definitions and use of unreliable laboratory diagnostic tests. We recommend enforcing the use of surveillance case definitions for typhoid reporting, and developing laboratory capacity for typhoid diagnosis

#### 16. The effect of a developed insecticide in protecting maize grains against maize weevils and weight loss under semi-field condition

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**Background/Introduction:** Post-harvest losses due to storage insect pests, mainly the maize weevil; *Sitophilus zeamais* have been recognized as an increasingly important problem in Tanzania. Over 35% of stored maize grains are damaged by these storage pests. Damaged grains have reduced nutritional values and reduced weight hence low market values. This call for a need to development of a natural insecticide from *C. ambrosioides* medicinal plant extracts.

**Objective:** To assess the effect of a developed insecticide in protecting maize grains against maize weevils and weight loss on maize under semi-field environment.

**Materials and Methods:** Two semi-field trials with different durations were conducted to assess maize grain's weight loss. The first trial had duration of 120 days and the second one had 850 days (28months). For the first semi-field trial, bioassays were conducted by weighing 2Kgs of sterilized maize grains and separately packaged into 12 bags belonging to 5 treatments and one negative control group. Each treatment had two replicates. 20 adult weevils were introduced into bags including the untreated control. For the second trial, bioassays were conducted by weighing 1Kg of sterilized maize grains and separately packaged into 6 bags; of which 4 were treatments and 2 were controls replicates. No weevils were introduced in maize bags and this was set purposely to mimic the normal maize storage practices.

**Results:** When maize grains were treated with a developed insecticide, the % weight loss of maize grains for the duration of 4months was below 1% compared to untreated maize. For the semi-field trial conducted for the duration of 28months, maize weight losses (g) were higher in control replicates as compared to the maize bags treated with a developed insecticide. In each of the control replicates, over 220g out of 1000g were lost during the entire period due maize weevils' infestation.

**Discussion:** Our findings have revealed that, a developed insecticide had capacity to protect maize against maize weevils (*S. zeamais*) and associated secondary infestation by aflatoxins producing fungi

**Conclusion and Recommendation:** A developed insecticide can act against *S. zeamais* and other maize weevils. It is a promising alternative to synthetic insecticides for maize weevils' control. Further studies are needed to assess the safety of the product to the environment and human beings.

#### 17. The impact of malaria and gastrointestinal helminthiasis co-infection on anaemia and severe malaria among children in Bugesera District, Rwanda

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**Introduction:** Malaria and helminthiasis are common parasitic diseases of the tropics. Both diseases are major public health concerns in the endemic regions. In addition, different helminthes have different effects when in dual co-infection with *Plasmodium* species. Most importantly, these co-infections lead to profound immune conflict because of the different immune control mechanisms with antagonistic mediators. One of the main impacts of malaria parasites and helminthic infections is anaemia. Malaria parasites cause anaemia through haemolysis and increased splenic clearance of infected and uninfected red

blood cells. On the other hand, intestinal helminthes are significant causes of anaemia as a result of direct blood loss and nutrient depletion. Based on the distinct mechanisms by which malaria parasites and helminthes reduce haemoglobin levels, it can be speculated that their co-infections enhance the risk of anaemia.

**Aims:** Determine the impact of malaria and gastrointestinal helminthiasis co-infection on anaemia and severe malaria among children aged 1-15 years.

**Methodology:** A cross sectional study was carried out. Place and Duration of Study The study was carried out in fifteen health centres of Bugesera District–Rwanda, between the months of April and October 2014. A total of 465 children were enrolled. Finger prick blood and stool were collected and examined according to the established standard methods. Data were double entered into EPI info software (Center for Disease Control and prevention, USA) and analysed using STATA Version 12.

**Results:** The overall prevalence for malaria, helminthiasis and anaemia was 30.8%, 47.5% and 30.1% respectively. The prevalence of malaria and helminthiasis was highest in the age group of 6 -10 years. The anaemia prevalence was highest in the age group of 1-5 years. The prevalence of malaria and helminthiasis co-infection was 61.5% while the associated anaemia prevalence was 38.5%. Severe malaria was dominant in co-infected children (Chi1=31.5222, P<0.000)

**Conclusion:** Malaria and helminthiasis co-infection is a better predictor of anaemia than either malaria or helminthiasis. Malaria and helminthiasis co-infection was significantly associated with severe malaria. The impact of malaria and helminthiasis co-infection reported in this study needs further investigation.

## 18. CESSARi-A research initiative on Cystic Echinococcosis in sub-Saharan Africa

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**Introduction:** Research on cystic echinococcosis (CE) has a long history in Kenya, but has mainly concentrated on two discrete areas, Turkana and Maasailand, which are known to be foci of human CE in Africa, and little is known about it in other sub-Saharan countries. Here, we report on a survey for CE in humans, livestock and wildlife from Kenya, Uganda, Ethiopia and Sudan. The aim of the project is to 1) Determine correlations of *Echinococcus* genotypes with geographical distribution, host preference and infectivity to humans, 2) identify wildlife-based cycles and their interaction with domestic echinococcosis cycles, 3) determine clinical manifestation of the disease and 4) Assess the impact on public health and economy, and 5) Training, networking and capacity building

**Methodology:** Human ultrasound scan surveys were done and cyst materials collected to determine infection in humans. Slaughter house surveys, wildlife surveys were carried out to determine Cystic echinococcosis infection in livestock and wildlife. Genomic DNA was extracted from the cyst materials and identification of the parasite was done using an RFLP-PCR of the mitochondrial nad1 gene, which had been validated before against the various *Echinococcus* taxa currently recognized as distinct species.

**Results:** In Sudan, human CE is more frequent than previously expected, high prevalence exists in foci. Livestock CE is generally frequent, especially in camels. In Ethiopia, First survey since 30 years reveals high prevalence of human CE in southern Ethiopia. Geographical endemicity pattern shows two high-prevalence foci of human and livestock CE in Kenya (northwest and south-southwest), with low endemicity regions in-between. Composition of *Echinococcus* species/strains is non-homogeneous. Frequency of *E. granulosus* s.s. correlates with impact on public health. In Uganda, First country-wide ultrasound surveys for human CE reveal high prevalence in all parts of the country.

**Conclusion:** Frequency of human CE is stable and high, frequency of livestock CE regionally increasing. Prevailing *Echinococcus* species/strain is likely to be crucial for the moderate impact on public health.

## 19. Evaluation on regulation of antibiotics consumption in Bujumbura

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**Background/Introduction:** Antibiotic self-medication is highly prevalent in the developing countries due to easy availability and poor regulatory controls for selling these drugs.

**Objective:** We conducted a study to evaluate the regulation of antibiotics consumption in the private and public pharmacies.

**Materials and Methods:** Two validated, self-administered questionnaire were used to collect data. Data were analyzed using Epi info. 3.5.3, and the chi-square test when applicable. Four hundred and sixty clients randomly chosen in 26 private and 6 public pharmacies of Bujumbura were invited to participate in the study in a period of 8 months. In parallelism, another questionnaire was handed to 32 sellers of those pharmacies.

**Results:** Among 460 participants, 186 (40.43%) practiced self-medication to antibiotics. The average age was 34.89 years. Abdominal pain was the first motivation to self-medication (20.8%) followed by cough (17.1%) and diarrhea (9.25%). Amoxicillin was the antibiotic most commonly used (47.3%), followed by Ciprofloxacin (32.7%) and Bactrim (7.5%). Inaccessibility to health care facilities due to the lack of financial resources was the main cause of this phenomenon (62%). Antibiotics were mostly acquired from community pharmacies without prescriptions (84.4%). The survey haven't showed a significant association between self-medication to antibiotics and sex or age group ( $p>0.05$ ) but the association were significant between self-medication to antibiotics and access to health insurances but also with the level of study ( $p[N/A]0.05$ ). Among the 32 sellers, 93.75% of them sometimes ask for prescription to customers willing to buy antibiotics and less than one percent always asks for prescription to them. In addition, 82% of those sellers always accept to give antibiotics without seeing the prescription.

**Conclusion and Recommendation:** This study shows the need to set up a regulation of the sale of drugs especially antibiotics to limit the resistance.

## 20. Frequency of uropathogens and antimicrobial susceptibility in childhood urinary tract infection at Kamenge University Hospital.

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**Background:** Increasing resistance to antimicrobials is a worldwide problem. The aim of our study was to determine the pathogens and antimicrobial susceptibility of bacteria causing urinary tract infection (UTI) in children.

**Methods:** This is a prospective cohort study conducted over a 10-month period with 101 children hospitalised at Kamenge University Hospital for acute UTI. The infections were confirmed by Kass urinalysis criteria, and culture and susceptibility antibiotic tests were performed for isolated microbial agents.

**Results:** Frequency of UTI in the overall population of children hospitalised at Kamenge University Hospital was 8.4%. Of the 101 children with UTIs, 87 (86.1%) were under the age of 24 months. Diagnosis of pyelonephritis (82%) was the most common, followed by cystitis (18%). *Escherichia coli* (82%) was the most frequent pathogen causing UTI. We found *E coli* and *Klebsiella pneumoniae* to be resistant to aminopenicillins (100%), cotrimoxazole (98.2%, 100%), Augmentin (amoxicillin/clavulanic acid) (70.5%, 80%), cefotaxime (45.8%, 28.6%), cefuroxime (36.8 to 45.5%, 50%), fluoroquinolones (33.3 to 53.6%, 28.6 to 50%), gentamicin (27.5%, 20%), and nitrofurantoin (9.3%, 50%).

**Conclusion:** *E coli* is the main causal agent of UTI in childhood with a high resistance to antibiotics. Appropriate antibiotics for empiric therapy should be based on local circulating bacterial strains and resistance profiles.

## 21. Fitness cost of resistance for lumefantrine- and piperaquine-resistant *Plasmodium berghei* in a mouse model

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**Background:** The evolution of drug resistant malaria parasites is a major obstacle to the effective treatment and control of malaria. Behaviour of drug-resistant mutants in the absence of drug pressure is of clinical relevance. The study aimed to investigate how resistance against two quinoline-based anti-malarial drugs; lumefantrine (LU) and piperaquine (PQ) impacts parasite fitness. It would be essential to know the behaviour of these parasites, as the two drugs are the currently used partner drugs in artemisinin-based combination therapy (ACT).

**Methods:** The stability of *Plasmodium berghei* ANKA strain that had been previously selected for LU and PQ resistance was evaluated using the 4-day assay and established infection test in mice. Fitness cost of resistance was determined by comparing parasites proliferation rates for the drug-exposed parasites, relative to their wild-type counterpart. Statistical analysis of data to compare mean parasitaemia and growth rates of the appropriate parasite lines was carried out using student's *t*-test and one-way analysis of variance (ANOVA).

**Results:** Drug sensitivity studies confirmed that PQ resistance was stable. During serial passaging in the absence of the drug, the PQ-resistant parasite maintained low growth rates (average parasitaemia,  $5.6\% \pm 2.3$ , 7dpi) relative to the wild-type ( $28.4\% \pm 6.6$ ) translating into a fitness cost of resistance of 80.3% for the resistant line. Interestingly however, the resistance phenotype for LU was observed to be present only transiently since after several serial passages, it was noted that the LU-exposed line assumed the patterns of its wild-type counterpart. It was probable that unrelated, susceptible strains may have coincidentally replaced the former strains in this case.

**Conclusions:** The PQ-resistant parasite was less fit than the wild-type form while LU resistance was not stable. It is important to note that with some exceptions, resistance-mediating polymorphisms lead to malaria parasites that are less fit. In the absence of drug pressure, therefore, it is likely that the sensitive form of the parasite will out-compete the mutant form. This would be expected even in the field and implies the possibility of reintroducing an anti-malarial drug previously lost to resistance, after a period of suspended use. Considering the recent reports of high failure rates associated with ACT, currently the most potent anti-malarial regimen against uncomplicated malaria, this finding is of clinical relevance as PQ is one of the long-acting partner drugs used in ACT.

## 22. Antimicrobial susceptibility patterns of *Mastitis staphylococcus aureus* from bovine and caprine in peri-urban Nairobi, Kenya

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**Background:** Mastitis in farm animals is a major cause of economic losses in the dairy sector and *Staphylococcus aureus* represents the most prevalent and contagious etiologic agent. *S. aureus* is also a common cause of invasive and life threatening infections in humans. Antimicrobial agents are the main therapeutic tools for treatment and control of mastitis. A major reason for low efficacy in treatment of staphylococcal infections is antimicrobial resistance. The expansion of resistance both in human and animal bacterial pathogens has been allied with the widespread remedial use of antimicrobials.

**Objective:** The aim of this retrospective study was to evaluate the antimicrobial resistance rates and the trend in resistance of *S. aureus* strains isolated from bovine and caprine with clinical and sub-clinical mastitis from year 2004 to 2014 at the Bacteriology Laboratory, Department of Clinical Studies, Faculty of Veterinary Medicine, University of Nairobi.

**Methodology:** A retrospective study was carried to determine the antimicrobial susceptibility patterns to *S. aureus* isolates from milk samples received from peri-urban area of Nairobi between the years 2004 and 2014. The bacterial isolates were tested for sensitivity on 9 antimicrobial drugs commonly used by ambulatory clinic using Agar Disk Diffusion Technique. The effectiveness of a drug was determined by measuring the diameter of the zone of inhibition around the disc. A zone diameter of 0-8mm was considered resistant, 9-15mm mildly susceptible, 16-22mm moderately susceptible and  $\geq 23$ mm susceptible. Descriptive statistics were computed on Microsoft Office Excel 2007 to establish the frequencies and percentages of species, annual distribution and antimicrobial susceptibility.

**Results:** A total of 582 isolates were studied from bacterial cultures obtained from the both bovine (97%) and caprine (3%) milk samples received at the Bacteriology laboratory. Overall, 1% of the *S. aureus* isolates were susceptible to all of the antimicrobial agents tested while 4% of all isolates were resistant. The susceptibility of the antibiotics in decreasing order against *Staphylococcus aureus* was found to be Cefaclor (57%), Ampiclox (54%), Ampicillin (20%), Gentamicin (2%), Norfloxacin (2%), Tetracycline (2%), Kanamycin (1%), Cotrimoxazole (1%) and Streptomycin (1%). Whereas resistance pattern in decreasing trend was Cotrimoxazole (81%), Ampicillin (46%), Tetracycline (23%), Streptomycin (23%), Ampiclox (20%), Cefaclor (20%), Kanamycin (17%), Gentamycin (5%) and Norfloxacin (4%). Most of the isolates were either mildly or moderately susceptible to various antimicrobials suggestive of reducing susceptible to antimicrobials and increase in resistance.

**Conclusions:** The current study has demonstrated existence of alarming levels of resistance of *S. aureus* to commonly used antimicrobials. Given this antimicrobial drug resistance and zoonotic nature of the *S. aureus*, similar presentation may occur in humans. Frequent surveillance for antimicrobial resistance of *S. aureus* isolated from dairy animals with mastitis is strongly recommended as an important component of prudent antimicrobial use practices.

## 23. Multi-drug resistant bacteria isolates recovered from herbal medicinal products in Nairobi, Kenya

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**Background:** Medicinal herbs have been reported to be contaminated with microorganisms indigenous to the environment. These microbes become a threat when they harbour drug-resistant traits.

**Objective:** The aim of this study was to evaluate phenotypic and genotypic drug-resistant traits of bacteria isolated from herbal medicinal products in Nairobi, Kenya.

**Methods:** We employed an exploratory as well as laboratory-based experimental design. Herbal products were purchased from markets and transported to Kenya Medical Research Institute laboratories for processing and analysis. Microbial contamination and antibiotic susceptibility were determined following standard methods. Antibiotic-resistant genes were determined using polymerase chain reaction. Data were coded and analysed accordingly.



**Results:** We collected 138 samples of herbal products in the form of liquids, powders, capsules, creams/lotions, and syrups. In total, 117 samples (84.8%) were contaminated with bacteria and 61 (44.2%) were contaminated with fungi. *Bacillus*, *Klebsiella*, *Proteus*, *Staphylococcus*, *Streptomyces*, *Escherichia*, *Enterobacter*, *Serratia*, *Yersinia*, *Morganella*, *Citrobacter*, *Erwinia*, and *Shigella* were the bacterial genera identified. Most of the isolated bacteria were generally sensitive to the panel of antibiotics tested, although a few (35 [36.5%]) were resistant; more than half of these were resistant to more than 1 of the antibiotic agents we tested.

**Discussion:** We found an association between phenotypic and genotypic drug resistance among the drug-resistant bacteria. This study makes it evident that herbal medicinal products sold in Nairobi are contaminated with drug-resistant bacteria. **Conclusions:** The results show that herbal medicinal products are a potential source of dissemination of multidrug-resistant bacteria. There is an urgent need for specific education programmes, policies, and regulations that address herbal products safety to prevent the possibility of these pathogens being involved in deadly invasive infections.

#### 24. Antibiotic resistance in isolated bacteria from lesions of Tungiasis patients in Vihiga County, Western Kenya

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**Background:** Tungiasis is a parasitic disease caused by the jigger flea. Bacterial infection of the lesions caused by this flea is not uncommon in endemic communities. This study therefore sort to shed light on the bacterial pathogens causing secondary infections in tungiasis lesions and their susceptibility profiles to commonly prescribed antibiotics.

**Objective:** To determine the bacterial pathogens causing secondary infections in tungiasis lesions and their susceptibility profiles to commonly used antibiotics.

**Materials and Methods:** Participants were recruited by the help of community health workers. Swabs were taken from lesions which clinically showed signs of secondary infection like swelling, erythema and pus after disinfection of the surrounding skin with 70% alcohol for 1 minute. Identification of suspected bacteria colonies was done by colony morphology, gram staining, catalase, coagulase tests and biochemical tests. The Kirby Bauer disc diffusion test was used to determine the drug susceptibility profiles.

**Results:** Out of 37 participants, from whom swabs were collected, specimen were positive in 29 and 6 had no growth. From these, 10 different strains of bacteria were isolated. Two were gram positive and they were also the most common, [*Staphylococcus epidermidis* (38.3%) and *Staphylococcus aureus* (21.3%)]. Eight were gram negative namely *Enterobacter cloacae* (8.5%), *Proteus species* (8.5%), *Klebsiella species* (6.4%), *Aeromonas sobria* (4.3%), *Citrobacter species* (4.3%), *Proteus mirabilis* (4.3%), *Enterobacter annigenus* (2.1%) and *Klebsiella pneumoniae* (2.1%). The methicillin resistant *S. aureus* (MRSA) isolated were also resistant to Clindamycin, Kanamycin, Erythromycin, Nalidixic acid, Trimethoprim sulfamethoxazole and Tetracycline. All bacteria isolates were sensitive to Gentamicin and Norfloxacin drugs.

**Conclusion and Recommendation:** In this study, the presence of resistant bacteria in tungiasis lesions was confirmed. This implies that antimicrobial susceptibility testing should routinely be performed on bacterial isolates from tungiasis patients to guide identification of appropriate antibiotics and treatment therapy.

#### 25. Prevalence and antimicrobial resistance of non-typhoid Salmonella in locally produced and imported broilers meat in Zanzibar, Tanzania

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**Background:** Non-typhoid Salmonella are zoonotic pathogens worldwide known for causing food poisoning and gastroenteritis. Multiple antibiotic resistances exhibited by Salmonella compromise international public health concern.

**Objective:** To investigate prevalence and antimicrobial resistance of Non-Typhoid Salmonella in locally produced and imported broilers meat in Zanzibar.

**Materials and Method:** A cross sectional study was conducted, where a total of 450 broiler carcasses and cecal samples were randomly selected and examined. Primary isolation and identification was done using DS EN ISO 6579-2002 Salmonella isolation protocol and serotyped by polyvalent serum. To establish antibiotic resistance profile of the isolated serovars, antimicrobial susceptibility testing was carried out using disc diffusion method.

**Results:** The overall NTS prevalence was 18.9%. Nine serovars were identified including *S. Kentucky* (55%), *S. Zanzibar* (11.9%), *S. Heidelberg* (10.1%), *S. Amager* (8.3%), *S. Agona* (6.4%), *S. Braederup* (2.8%), *S. Livingstone* (1.8%), *S. Hadar*

(1.8%) and *S. Blockley* (0.9%). *S. Kentucky* was a leading serovars isolated in locally produced broiler meat. The multi drug resistance tests revealed a total of, 105 drug resistant isolates, of which 13 (12.4%) were single drug resistant, 39 (37.1%) were two drug resistant and 53 (50.5%) were more than three drug resistant. The highest resistance was exhibited by tetracycline (69.5%), whereas the third generation Cephalosporins; Cefotaxime (1.5%) and Ceftiofur (1.5%) showed the lowest resistance. Amongst all isolated serovars, *S. Kentucky* exhibited the highest single or multi drug resistance. The MDR was less common with the isolates from imported carcasses as compared to those from local poultry.

**Conclusion and Recommendation:** High prevalence of Non-typhoid *Salmonella* along with its accompanying multidrug resistance is high and poses a significant public health risk to Zanzibar society. There is an urgent need therefore for local public health authorities to take the right steps to ensure poultry meat safety in Zanzibar.

## 26. Spatial-temporal prevalence of enteric pathogenic bacteria associated with diarrhoea in under-five children, and their sensitivity against conventional antibiotics in Unguja Island, Zanzibar.

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**Background:** Diarrhoea is an important cause of morbidity and mortality among children in developing countries. On other hand, antimicrobial resistance is a global public health concern and Zanzibar as well.

**Objective:** The study reported on here was aimed at determining the prevalence of enteric pathogenic bacteria associated with diarrhoea in under-five years of age, and their sensitivity to conventional antibiotics in three districts of Unguja Island, during both dry and rainy seasons.

**Materials and Method:** A cross sectional study was conducted from September 2013 to February 2014. A total of 319 stool samples were collected from three districts of Unguja Island, namely Urban, North and South districts. The prevalence of pathogenic enteric bacteria were isolated and indentified using conventional methods, and Antimicrobial resistance by Kirbeur method.

**Results:** The common pathogenic enteric bacteria found were *Shigella* (38.5%), *Salmonella* (25%), *Vibrio parahaemolyticus* (19.23%) and Pathogenic *E.coli* (17%) ( $p < 0.05$ ). Prevalence of enteric bacteria was high in urban than rural areas; rainy seasons reported significantly ( $p < 0.05$ ) higher prevalence of enteric bacteria than the dry season. The pathogenic enteric bacteria were more resistance to sulfamethoxazole/trimethoprim, erythromycin, tetracycline and ciproflaxin compared to gentamycin, and chloromphenicol. Isolated enteric pathogenic bacteria were more resistant to common used antibiotics for treatment of diarrhoea in under five years children in Zanzibar.

**Discussion:** High prevalence of *shigella* is due to the fact that, it is the common food borne pathogens, Poor urbanization associated with high prevalence of enteric pathogenic bacteria. Lack of awareness to antibiotics resistance and drugs misuse in community is the common reason for increasing antibiotics resistance in Zanzibar.

**Conclusion:** Prevalence of enteric bacteria caused diarrhoea along with their antibiotic resistance is high in Zanzibar. Standard treatment guideline for diarrhoea should be reviewed.

## 27. Patterns of infections, aetiological agents, and antimicrobial resistance at a tertiary care hospital in northern Tanzania

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**Background:** Empirical treatment is common in resource-limited settings. Knowledge regarding the most common etiological agents of infections and their antimicrobial susceptibility is essential to guide optimal treatment.

**Objective:** To determine the causative agents of infections and their antimicrobial susceptibility at a tertiary care hospital in Moshi, Tanzania.

**Methods:** A total of 590 specimens (stool (56), sputum (122), blood (126) and wound swabs (286)) were collected from 575 patients admitted in the medical and surgical departments. The bacterial species were determined by conventional methods and disk diffusion was used to determine the antimicrobial susceptibility pattern of the bacteria isolates.

**Results:** A total of 249 (42.2%) specimens were culture positive yielding a total of 377 isolates. A wide range of bacteria was isolated, the most predominant being Gram-negative bacteria: *Proteus spp.* (n=48, 12.7%), *Escherichia coli* (n=44, 11.7%), *Pseudomonas spp.* (n=40, 10.6%), and *Klebsiella spp.* (n=38, 10.1%). Wound infections were characterised by multiple isolates (n=293, 77.7%), with the most frequent being *Proteus spp.* (n=44, 15%), *Pseudomonas* (n=37, 12.6%), *Staphylococcus* (n=29,

9.9%), and *Klebsiella spp.* (n=28, 9.6%). All *S. aureus* tested were resistant to penicillin (n=22, 100%) and susceptible to vancomycin. Significant resistance to cephalosporins such as cefazoline (n=62, 72.9%), ceftriaxone (n=44, 51.8%) and ceftazidime (n=40, 37.4%) was observed in Gram-negative bacteria as well as resistance to ceftazidime (n=6, 27.3%) in *Staphylococcus aureus*.

**Conclusion:** The study has revealed a wide range of causative agents, with an alarming rate of resistance to the commonly used antimicrobial agents. Furthermore, the bacterial spectrum differs from those often observed in high-income countries. This highlights the imperative of regular generation of data on aetiological agents and their antimicrobial susceptibility patterns especially in infectious disease endemic settings. The key steps would be to ensure the diagnostic capacity at a sufficient number of sites and implement structures for the routinely exchange, comparison, analysis and reporting of data. As a minimum, a number of sentinel sites (hospitals) across the country (and region) should at least on a yearly basis report on a representative subset of bacterial species and their susceptibility to drugs. A central organizing body should collate the data and report to all relevant national and international stakeholders

## 28. Meta-analysis of proportion estimates of Extended-Spectrum-Beta-Lactamase-producing *Enterobacteriaceae* in East Africa hospitals

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**Background:** The magnitude of ESBL-producing *Enterobacteriaceae* in East Africa is large but information is scarce and thus it is unclear how big the problem really is.

**Objective:** To gain insight into the magnitude of ESBL-producing *Enterobacteriaceae*, a literature review was performed.

**Materials and Methods:** A random-effects meta-analysis model was used to calculate the pooled (weighted) proportion of ESBL and the  $I^2$  statistic (measure of inconsistency) as described by Nyaga et al [1].

**Results:** 4076 bacterial isolates were included. 24 articles were reviewed: 12 (50.0%) from Tanzania and 12 (50.0%) from Ethiopia, Kenya, Uganda, and Rwanda. No articles were found for Burundi.

The overall pooled proportion of ESBL-producing *Enterobacteriaceae* was 0.42 (95% CI: 0.34-0.50). Heterogeneity ( $I^2$ ) between countries' proportions was significantly high (96.95% and  $p < 0.001$ ). The countries pooled proportions were: Ethiopia 0.30 (95% CI: 0.21-0.38),  $I^2$  was 67.98% and  $p = 0.02$ , Kenya 0.47 (95% CI: 0.23-0.71);  $I^2$  was 98.82% and  $p < 0.001$ , Tanzania 0.39 (95% CI: 0.30-0.48);  $I^2$  was 93.16% and  $p < 0.001$ , Uganda 0.62 (95% CI: 0.38-0.87);  $I^2$  was 97.83% and  $p < 0.001$ .

**Discussion:** The scarcity of studies available from the region warrants caution in drawing conclusions. This review finds high proportion (42%) of ESBL-producing *Enterobacteriaceae* across hospitals in the region but that is close to estimates for Ghana (49%), Cameroon (54%), Gabon (45%), Morocco (43%) and China (46%) [2-6]. However, the region's proportion is considerably higher than for resource-rich countries: Germany (10-15%) [7] and USA (4-12%) [8]. Only one study done in Rwanda investigated risk factors and found out that previous use of ciprofloxacin or cephalosporins were risks for ESBL [9]. Over-the-counter sale of drugs, counterfeit drugs, and non-adherence are very common in African settings; unnecessarily fueling emergence of resistant microorganisms.

**Conclusion and Recommendation:** These findings underscore an urgent need for antimicrobial resistance surveillance to help understand the actual epidemiology and aid in formulating national or regional guidelines

## 29. Antimicrobial susceptibility testing in Uganda: preliminary results and challenges

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**Background/Introduction:** Foodborne antimicrobial resistance is a worldwide concern. In Uganda, importation, distribution and sale of antibiotics for veterinary use are liberalized. There is therefore a huge potential for overuse and misuse of antibiotics in clinical and in preventive veterinary medicine practice. This promotes development and spread of antibiotic resistant bacteria. Currently, there is no surveillance program for foodborne antimicrobial resistance in Uganda. This paper presents preliminary results and challenges of antimicrobial susceptibility testing conducted in a World Health Organization funded project at Makerere University.

**Objective:** To generate preliminary data to be used for designing an integrated program for surveillance of foodborne antimicrobial resistance in Uganda.

**Materials and Methods:** A total of 50 samples of beef were collected between May and June 2015 from butcher shops in suburban areas of Kampala, the capital city of Uganda. The samples were cultured for *E. coli* and *Salmonella* using standard laboratory methods. *E. coli* isolates were tested for antibiotic susceptibility using Kirby-Bauer technique.

**Results:** E. coli was isolated in 46 out of the 50 samples tested. Salmonella was not isolated in all samples. Multiple drug resistance was recorded in 43% (20/46) of E.coli isolates. All E.coli isolates were resistant to erythromycin.

**Discussion:** This study is on-going. The study has provided evidence of occurrence of antibiotic resistance in E.coli recovered from beef in Kampala, Uganda. This signifies a potential public health problem for beef consumers. The major challenges of antimicrobial susceptibility testing encountered were: inadequate laboratory infrastructure, disconnected data reporting systems in human and animal health sectors and lack of enabling policies.

**Conclusion and Recommendation:** E. coli isolated from beef in Kampala, Uganda is resistant to some antibiotics. One Health approach should be promoted to generate inter-sectoral data required to fight antimicrobial resistance in Uganda

### 30. From antiretroviral therapy access to provision of third line regimens: evidence of HIV drug resistance mutations to first and second line regimens among Ugandan adults

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**Background/Introduction:** HIV care programs in resource-limited settings have hitherto concentrated on antiretroviral therapy (ART) access, but HIV drug resistance is emerging. In a cross-sectional study of HIV-positive adults on ART for  $\geq 6$  months enrolled into a prospective cohort in Uganda, plasma HIV RNA was measured and genotyped if  $\geq 1000$  copies/ml. Identified Drug resistance mutations (DRMs) were interpreted using the Stanford database, 2009 WHO list of DRMs and the IAS 2014 update on DRMs, and examined and tabulated by ART drug classes

**Findings:** Between July 2013 and August 2014, 953 individuals were enrolled, 119 (12.5%) had HIV-RNA  $\geq 1000$  copies/ml and 110 were successfully genotyped; 74 (67.3%) were on first-line and 36 (32.7%) on second-line ART regimens. The predominant HIV-1 subtypes were D (34.5%), A (33.6%) and Recombinant forms (21.8%). The commonest clinically significant major resistance mutations associated with the highest levels of reduced susceptibility or virological response to the relevant Nucleoside Reverse Transcriptase Inhibitor (NRTI) were; the Non-thymidine analogue mutations (Non-TAMS) M184V—20.7% and K65R—8.0%; and the TAMS M41L and K70R (both 8.0%). The major Non-NRTI (NNRTI) mutations were K103N—19.0%, G190A—7.0% and Y181C—6.0%. A relatively nonpolymorphic accessory mutation A98G—12.0% was also common. Seven of the 36 patients on second line ART had major Protease Inhibitor (PI) associated DRMS including; V82A—7.0%, I54V, M46I and L33I (all 5.0%). Also common were the accessory PI mutations L10I—27%, L10V—12.0% and L10F—5.0% that either reduce PI susceptibility or increase the replication of viruses containing PI-resistance mutations. Of the 7 patients with major PI DRMs, five had high level resistance to ritonavir boosted Lopinavir and Atazanavir, with Darunavir as the only susceptible PI tested

**Conclusion and Recommendation:** In resource-limited settings, HIV care programs that have previously concentrated on ART access, should now consider availing access to routine HIV viral load monitoring, targeted HIV drug resistance testing and availability of third-line ART regimens

### 31. Susceptibility patterns of *Salmonella enterica* serovar Typhi during the 2015 typhoid outbreak in Kampala, Uganda.

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**Introduction:** *Salmonella enterica* serovar Typhi remains a major global public health problem causing 22 million typhoid fever cases and 216,000 deaths annually worldwide. The emergence of antimicrobial resistance threatens the ability to control the infection. During the 2015 typhoid outbreak in Kampala Uganda, we investigated the drug susceptibility and resistance patterns of *Salmonella enterica* serovar Typhi isolates

**Methods:** Inoculated blood culture vials for 320 patients, were received in the laboratory between March and May 2015. These were sub-cultured and suspected colonies were identified using biochemical tests and Salmonella antisera. Antimicrobial susceptibility testing was performed using the Kirby-Bauer disc diffusion method following the British Society for Antimicrobial Chemotherapy, 2015 guidelines. Nalidixic acid and pefloxacin were used to screen for reduced susceptibility to ciprofloxacin. Culture-confirmed *S. Typhi* isolates (n=44) were subjected to a DNA-based microarray for serogenotyping which detects besides the serogenotype also genes associated with antimicrobial drug resistance and virulence factors.

**Results:** All tested *Salmonella* Typhi isolates (n=44), showed reduced susceptibility to ciprofloxacin. Susceptibility to ceftriaxone was 100%, cotrimoxazole (77.3%), chloramphenicol (77.3%) and ampicillin (72.7%). We detected genes associated with



antimicrobial resistance on the microarray in 22.7% of the samples Integrase (itnI) and Plasmid Vi(tviA) were found to be the virulence factors common to all Typhi Isolates. Confirmatory test results by CDC Atlanta were in agreement

**Conclusion and Recommendations:** Presence in Ugandan of *S. Typhi* with reduced susceptibility to ciprofloxacin, one of the front-line treatments and strains with integrons pose a major threat. Isolates have been sequenced at the Sanger laboratories UK, pending analysis. There is need to strengthen existing laboratory systems and creation of AMR surveillance systems linked to global networks

### 32. Antibiotic sensitivity patterns of amniotic fluid cultures from women with premature rupture of membranes in Mulago Hospital Kampala Uganda: a cross sectional study

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**Affiliation:**

**Background/Introduction:** A 2013 Cochrane review concluded that the choice of antibiotics for prophylaxis in PROM is not clear. In Uganda, a combination of oral erythromycin and amoxicillin is the 1<sup>st</sup> line for prophylaxis against ascending infection.

**Objective:** To establish the current rate of positive bacterial amniotic fluid cultures, the prevalent bacteria and their antibiotic sensitivity patterns

**Materials and Methods:** Amniotic fluid was collected aseptically from the pool in the posterior fornix of the vagina. Aerobic cultures were performed on blood, chocolate and MacConkey agar and incubated at 35-37°C for 24-48 hrs. Enrichment media were utilized to culture for GBS and facultative anaerobes. Isolates were identified using colonial morphology, gram staining, and biochemical analysis. Sensitivity testing was performed via Kirby-Bauer disk diffusion and dilution method. Pearson's chi-squared ( $\chi^2$ ) test and the paired t-test were applied; at a P-value of 0.05

**Results:** Thirty percent of the amniotic fluid cultures were positive and over 90% were aerobic. Resistance to erythromycin, ampicillin, cotrimoxazole and ceftriaxone was 44%, 95%, 96% and 24% respectively. Prolonged rupture of membranes and lower gestation age were associated with higher percentage of positive cultures.

**Conclusion and Recommendation:** The spectrum of bacteria associated with PROM hasn't changed, but resistance to Erythromycin and Ampicillin has increased.

### 33. A situational analysis of multi-drug resistance among clinical isolates of *Staphylococcus aureus* in Mbale Regional Referral Hospital-Uganda

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**Background/Introduction:** Antibiotic resistance has become a significant problem worldwide and is recognized as a threat to the country of Uganda (UNAS, CDDEP, GARP-Uganda, Mpairwe, Y., and Wamala, S., 2015). There is presently little information as to the extent of antibiotic resistance in Eastern Uganda. *Staphylococcus aureus* has been identified as an organism that has a high rate of resistance to antimicrobial agents. This microorganism is also responsible for a significant degree of morbidity and mortality. Given these characteristics, it has been identified as a sentinel organism in the understanding of antibiotic resistance.

**Objective:** Determining *S. aureus*' rate of resistance to antibiotics, found in Mbale Regional Referral Hospital

**Materials and Methods:** One hundred and thirty-seven samples were taken from various body fluids from various patients throughout Mbale Regional Referral Hospital and cultured on MacConkey, chocolate and Blood agar for maximum recovery of *Staphylococcus*. Biochemical identification was carried out to phenotypically characterize the organism. Methicillin Resistant *Staphylococcus aureus* (MRSA) was detected using Cefoxitin disc (30µg) and Inducible Clindamycin was detected using a D-test. Antibiotic susceptibility patterns were done on Mueller Hinton agar using the Kirby-Bauer disc diffusion test and interpreted using the CLSI guidelines.

**Results:** The highest resistance patterns were recorded in Trimethoprim/sulfamethoxazole, Ampicillin, Erythromycin and Penicillin G (75, 67, 60 and 51) % respectively. Linezolid, Imipenem and Vancomycin had resistance patterns below five percent. The prevalence of MRSA was 30% where as that of Inducible Clindamycin resistance was 14.5%.

**Conclusion and Recommendation:** The prevalence of MRSA in Mbale Regional Referral Hospital Eastern Uganda is high with a high proportion of staphylococcal isolates is multidrug resistant. Simple phenotypic methods for detection of MRSA and ICR could improve treatment outcomes.

### 34. Triazole resistance and sequence analysis of *Aspergillus Fumigatus* from experienced and naïve soils in Naivasha Sub-County and Nairobi County

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**Background:** The Emergence of azole-resistant among *A. fumigatus* isolates have been reported in some countries ascribed to either previous antifungal treatment, prophylaxis or triazoles use in agriculture. The use of azole based fungicides in the robust horticulture in Kenya is a significant risk factor for antifungal resistance.

**Objective:** The study analyzed environmental isolates of *Aspergillus fumigatus* for the presence of resistance against the triazoles antifungal.

**Methods:** Ninety two samples collected from experienced soils and the same number from naïve soils. Isolation were done by cultured method and *Aspergillus* species confirmed by MALDI TOF MS and  $\beta$ -tubulin, calmodulin and ITS gene sequence Susceptibility to Itraconazole, Voriconazole and Posaconazole by broth micro dilution method was done. The isolates with elevated MIC values greater than 4ug/ml had their *cyp51A* region amplified by PCR.

**Results:** Of the 92 isolates, 7.2% of the isolates showed resistance to either of the three azoles antifungal (Itraconazole, Voriconazole and Posaconazole) with MIC greater than 4. The resistant *Aspergillus fumigatus* isolates exhibited TR34/L98H mutation in the *cyp51A* gene.

**Conclusions:** We report the occurrence of TR34/L98H mutation in *cyp 51A* gene from experienced soils exposed to fungicides in Kenya. The finding is of public health concern and calls for more surveillance of azole resistance among environmental and clinical fungal pathogens.

### 35. Antimicrobial resistance in pathogenic aerobic bacteria causing surgical site infections in Mbarara Regional Referral Hospital, Southwestern Uganda

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**Background/Introduction:** Surgical site infections (SSIs) are infections that occur at the surgical site postoperatively. Despite use of prophylactic antibiotics and other preventive measures, SSIs remain a burden to postoperative patients contributing to prolonged hospitalization, increased cost of treatment, morbidity and mortality. The increased incidence of SSIs has been ascribed to the injudicious use of antimicrobials that favors drug resistance and lack of surveillance including documenting antimicrobial susceptibility pattern.

**Objective:** This study presents the bacterial isolates of SSIs, their antibiotic resistance pattern, and isolation rate by patients' characteristics in Mbarara Regional Referral hospital, Southwestern Uganda.

**Materials and Methods:** A descriptive cross sectional study was carried out with a total of 83 postoperative patients with clinical SSIs recruited. Data regarding patients demographic, clinical and operation procedure was collected using structured data collection form. Two swabs were collected and analyzed microbiologically by culture, Gram staining, biochemical tests including API20E test. Antibiotic susceptibility test was done by Kirby-Bauer disc diffusion method.

**Results:** Out of the 83 samples analyzed, 81.93% showed culture positivity with Gram negative predominance (65.59%) and *Klebsiella* spp (29.03%) were the dominant isolates. Isolation rate was higher in emergency, males and dirty wounds in relation to nature of surgery, gender and class of surgical wound respectively. 95.7% of the aerobic bacteria isolated were multi-drug resistant. Gram negative isolates showed high resistance to all antibiotics tested except for ciprofloxacin with moderate resistance. *E.coli* demonstrated high resistance to all antibiotics tested. Gram positives showed low resistance to ciprofloxacin (37.5%), moderate resistance to sulfamethoxazole/trimethoprim, gentamicin and erythromycin, and high resistance to other antibiotics tested. *Staphylococcus aureus* demonstrated high resistance to all antibiotics tested except ciprofloxacin with moderate resistance.

**Conclusion and Recommendation:** The high isolation rate and multidrug resistant pattern necessitates antimicrobial susceptibility testing as guidance for antimicrobial administration, and calls for surveillance of SSIs periodically as well as implementation and practice of infection control measures.

### 36. Quality of antibiotics-amoxicillin and co-trimoxazole in Nairobi County: number of brands circulating in selected Nairobi retail and hospital pharmacies.

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**Objective:** To determine the quality of varying brands of co-trimoxazole and amoxicillin sourced from selected retail and hospital pharmacies in Nairobi County; To establish brands of co-trimoxazole and amoxicillin that are in circulation in selected Nairobi retail and hospital pharmacies.

**Materials and Methods:** This was a cross-sectional study that was conducted in randomly selected Pharmacies in Nairobi County. The pharmacies were stratified into different administrative regions to represent different socio-economic settings; low, middle and high income neighbourhoods. Stratified simple random sampling procedure was used to select the pharmacies. The required sample size of pharmacies was obtained using Krejcie and Morgan, (1970) table. Two hundred and seventy eight (N=278) Pharmacies were randomly selected in eleven locations. Brands of available antibiotics that were stocked at the time of the study were documented. Details of each drug sample, such as active pharmaceutical ingredient, dosage strength, manufacturer's details, was captured into a data capture form.

**Results and Discussion:** From the 278 pharmacies/chemists that were randomly selected in Nairobi County, 2,896 samples of the antibiotic amoxicillin ( $n=2195$ , 75.8%) and co-trimoxazole ( $n=701$ , 24.2%) brands were documented, where drugs bearing the same brand name but different strengths were considered as different samples. Of these, 106 brand names of amoxicillin and 43 brand names of co-trimoxazole were documented. Eleven (11) regions in Nairobi County were purposively selected to represent different socio-economic settings. Central Business District (CBD) had the highest frequency of samples (amoxicillin,  $n=564$  samples, co-trimoxazole,  $n=128$  samples) followed by Westlands (amoxicillin,  $n=295$  samples, co-trimoxazole,  $n=87$  samples) while Umoja area had the lowest number of samples (amoxicillin,  $n=34$  samples, co-trimoxazole,  $n=9$  samples).

**Conclusion:** Data show that amoxicillin and co-trimoxazole brand names vary from one location to the other. High income neighbourhoods such as Karen tend to have fewer brands. Work to establish quality of selected brands is in progress.

### 37. Antimicrobial activity of *Moringa oleifera*, *Aloe vera* and *Warbugia ugandensis* extracts on multidrug resistant *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*

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**Background:** Infections caused by multi drug resistant micro-organisms are a major concern since they contribute to an increase in morbidity and mortality of diseases.

**Objectives:** This experimental study aimed at evaluating the antimicrobial activity of *Moringa oleifera*, *Aloe vera* and *Warbugia ugandensis* extracts on the rapidly emerging multi drug resistant *Pseudomonas aeruginosa*, *Escherichia coli* and *Staphylococcus aureus*.

**Materials and Methods:** A total of nine isolates of established multi drug resistant bacteria obtained from National Public Health Laboratory, Nairobi were used to evaluate the antimicrobial activity of extracts. The leaves of the plants were harvested and extracted using methanol and water. The extracts were subjected to multi drug resistant *P. aeruginosa*, *E. coli* and *S. aureus* to determine the zones of inhibition through Agar Diffusion Assay and Minimum Inhibitory Concentration (MIC). Tetracycline was used as a positive control while *S. aureus* ATCC 26923, *P. aeruginosa* ATCC 27853 and *E.coli* ATCC 29218 were used as the control organisms.

**Results and Discussion:** It was found that the methanolic extracts of all the three plants exhibited higher zones of inhibition as compared to aqueous extracts except in *Moringa oleifera* extracts against multi drug resistant *S.aureus* where the aqueous extract had a zone of inhibition of 7.1 mm. *W. ugandensis* methanolic extract had the highest zone of inhibition of 8mm against multi drug resistant *S. aureus*. The control drug, tetracycline, had inhibition value range of 10-30mm dependent on the nature of the micro-organism. MIC of all the bacteria isolates was determined to be 100mg/ml. The results were statistically significant with a  $p$  value of 0.05.

**Conclusion and Recommendation:** All the extracts tested showed varying degrees of antimicrobial activity on the micro-organisms tested. The results of this study therefore validate the use of these medicinal plants for the management of microbial infections. It is recommended that further studies be carried out to identify the antimicrobial compounds in the plants.

### 38. Hospital epidemiology of Methicillin-Resistant *Staphylococcus aureus* (MRSA) in a tertiary care hospital in Moshi, Tanzania as determined by whole genome sequencing

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**Background:** Methicillin-resistant *Staphylococcus aureus* (MRSA) is a worldwide leading cause of nosocomial infections and molecular typing is important to understand transmission and guide control programs.

**Objective:** To determine molecular epidemiology of *S.aureus* using whole genome sequencing.

**Methods:** Over a period of two years, 30 *S.aureus* strains were isolated from in-patients admitted in medical and surgical wards at the Kilimanjaro Christian Medical Centre (KCMC) tertiary care hospital in Northern East Tanzania. Whole genome sequencing (WGS) of all MRSA strains was completed on Miseq (Illumina) system available at KCMC. Raw sequence data were analyzed for confirmation of species, multilocus sequence typing (MLST), determination of antimicrobial resistance gene and presence of virulence genes.

**Results:** Among the 30 *S. aureus* isolates, a high diversity in sequence types (ST) was observed while the majority was ST-8 (n=7, 23.3%). Ten of the isolates (33.3%) were MRSA as determined by the presence of the *mecA* gene and out of these, six belonged to ST-8. When comparing these six ST-8 isolates to the 24 obtained from European Nucleotide Archive (ENA), a total of 1,663 SNPs were identified. The mutation rate was estimated to  $1.29 \times 10^{-6}$  SNPs/site/year. The most recent common ancestor was estimated to emerge in ~1933 (95% credible interval, 1851 to 1971).

**Discussion:** Based on multiple likely hood analysis six Tanzania ST-8 strains formed a separate epidemiological connected cluster causing nosocomial transmission over a period of one year. However, using the Bayesian phylogeny it was concluded that, there mostly likely were two separate introduction events into the hospital. Further phylogenetic analysis of these ST-8 strains from Tanzania could clearly show that they may form their own clade in global epidemiology.

**Conclusion:** Our analysis demonstrates that WGS in combination with phylogenomic analysis can facilitate the identification of outbreaks and introduction events into hospitals.

### 39. *Aeromonas caviae* mimicking *V.cholerae* infectious enteropathy in a cholera-endemic region-a case report

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**Introduction:** *Aeromonas spp.* have been documented to yield false positive results in microbiological tests for *V. cholerae*. *Aeromonas spp.* are increasingly associated with gastroenteritic infections, albeit with a great apparent variation in pathogenicity both between and within species. However, with close to no epidemiological data available on *Aeromonas* infection in cases of diarrhoea and dysentery in sub-Saharan Africa, it is impossible to establish the extent of misdiagnosis with any degree of certainty.

**Aim:** We report on two cases which presented at a Tanzanian hospital with clinically mild cholera-like symptoms, at a time when a cholera outbreak was unfolding in other regions of the country.

**Methods:** Two patients were admitted at the isolation unit designated by the hospital for emerging infectious diseases outbreak in Kilimanjaro Christian Medical Centre (KCMC) in Moshi, Tanzania, a tertiary referral hospital and academic training centre in September 2015. They provided informed consent about regular stool testing with the indication of infectious gastroenteritis, as well as their participation into further genomic studies. Stool culture was done and the isolates were subjected to whole genome sequencing.

**Results:** Microbiological testing confirmed colonies isolated from stool to be *Vibrio cholerae*, though serology for the virulent O1-related strains was negative. Whole genome sequencing (WGS) however established the presence of *Aeromonas caviae* rather than *V. cholerae*.

**Conclusion:** The two cases of suspected cholera were eventually confirmed being *Aeromonas spp.* Their co-existence with *V. cholerae* in cholera-endemic regions suggests the possibility that a proportion of suspected cholera cases may be *Aeromonas* infections.

### 40. *Plasmodium falciparum* causing febrile infections express EPCR-binding PfEMP1

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**Background:** *Plasmodium falciparum* parasites avoid the blood circulation and splenic clearance by attaching infected erythrocytes to blood vessels. The sequestration of parasites in host organs provoke malaria pathogenesis. Severe malaria symptoms are associated with parasites expressing an antigenically distinct subset of the *P. falciparum* erythrocyte membrane protein 1 (PfEMP1) adhesins, which mediate binding to endothelial receptors. Previous studies have converged to indicate that PfEMP1



with so-called CIDR $\alpha$ 1 domains capable of binding endothelial protein C receptor (EPCR) constitute the PfEMP1 subset expressed in severe malaria patients.

**Method:** Here, we quantified var transcripts in children hospitalized with severe (N=123) or uncomplicated (N=42) malaria and in 22 children found *P. falciparum* positive during a village cross sectional survey, using an extensive set of quantitative PCR primers targeting most subtypes of PfEMP1 var genes.

**Results and Discussion:** High levels of transcripts encoding EPCR-binding PfEMP1 were found in patients with symptomatic infections and the abundance of these transcripts increased with disease severity. In some of patients with severe symptoms there was a high abundance of transcripts encoding EPCR-binding PfEMP1 as well as transcripts encoding DBL $\beta$  or DBL $\zeta$  domains. Such domains could mediate binding phenomena that in conjunction with EPCR binding contribute to pathogenesis.

**Conclusion:** These observations implicate the PfEMP1-EPCR interaction as key to the development of clinical malaria symptoms, and a target for development of vaccines and adjunctive therapies to combat malaria.

#### **41. Bacterial superglue generates VLP based full-length CSP protein virus-like particle vaccine capable of inducing high and durable antibody responses**

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**Background:** Malaria, caused by *Plasmodium falciparum*, continues to have a devastating impact on global health, emphasizing the great need for a malaria vaccine. The circumsporozoite protein (CSP) is an attractive target for a malaria vaccine, and forms a major component of RTS,S, the most clinically advanced malaria vaccine. The clinical efficacy of RTS,S has been moderate, yet demonstrated the viability of a CSP-based malaria vaccine. In this study, a vaccine comprised of the full-length CSP antigen presented on a virus-like particle (VLP) is produced using a splitintein conjugation system (SpyTag/SpyCatcher) and the immunogenicity is tested in mice.

**Methods:** Full-length 3D7 CSP protein was genetically fused at the C-terminus to SpyCatcher. The CSP-SpyCatcher antigen was covalently attached (via the SpyTag/SpyCatcher interaction) to *Acinetobacter phage* AP205 VLPs which were modified to display one SpyTag per VLP subunit. To evaluate the VLP-display effect, the immunogenicity of the VLP vaccine was tested in mice and compared to a control vaccine containing AP205 VLPs plus unconjugated CSP.

**Results:** Full-length CSP was conjugated at high density to AP205 SpyTag-VLPs. Vaccination of mice with the CSP Spy-VLP vaccine resulted in significantly increased antibody titres over a course of 7 months as compared to the control group (2.6-fold higher at 7 months after immunization). Furthermore, the CSP Spy-VLP vaccine appears to stimulate production of IgG2a antibodies, which has been linked with a more efficient clearing of intracellular parasite infection.

**Conclusion:** This study demonstrates that the high-density display of CSP on SpyTag-VLPs, significantly increases the level and quality of the vaccine-induced humoral response, compared to a control vaccine consisting of soluble CSP plus AP205 VLPs. The SpyTag-VLP platform utilized in this study constitutes a versatile and rapid method to develop highly immunogenic vaccines. It might serve as a generic tool for the cost-effective development of effective VLP vaccines. Kumar,

#### **42. Synthesis of a novel trioxaquine with potential to replace Artemether-Lumefantrine (Alu) for malaria chemotherapy**

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**Background:** Reports from Southeast Asia indicate failure of artemisinin-based combination therapy (ACT), necessitating urgent search for novel and innovative compounds with respect to their chemical scaffold. A recent rational drug design approach termed "covalent bitherapy" involves linking two molecules with individual intrinsic activity into a single agent, thus packaging dual-activity into a single molecule termed as dual-drug, conjugate or hybrid.

**Methodology/Principal Findings:** We report on the synthesis and antimalarial evaluation of a hybrid drug based on quinoline and trioxane pharmacophoric scaffold of quinolines and artemisinins, respectively. The drug was active against lumefantrine (LU)-resistant and piperazine (PQ)-resistant *P. berghei* ANKA in mice with a suppressive effect of 67% (LU; 0%) and 70% (PQ; 11%), pointing to its potential as a replacement of artemether-lumefantrine (Coartem®) and dihydroartemisinin-piperazine (Artekin®), the leading WHO prequalified ACT in case of pervasive resistance by malaria parasite against them. The drug also showed good safety profile, with low inhibition of Hep2 cell proliferation (29.3%).

**Conclusions/Significance:** The findings validate the concept of “covalent bitherapy” as a feasible strategy in antimalarial drug development.

#### **43. Laboratory evaluation of antileishmanial activity of pyrethrin extracts of *Chrysanthemum cinerariaefolium* (Asterales: Asteraceae) plant**

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**Background:** The most important of natural materials is pyrethrin which is extracted from *Chrysanthemum cinerariaefolium*, that has shown to have antiplasmodial and antitrypanosomal activities but not much definite and authoritative documentation exists about its activity on *Leishmania* parasites. Therefore the present studies sought to provide additional valuable information on antileishmanial activity of pyrethrin extracts of *Chrysanthemum cinerariaefolium* against *Leishmania major* parasites.

**Objectives:** 1) To determine the minimum inhibition concentration, parasite growth and infection rates in vitro upon treatment of *L. major* promastigotes and amastigotes with *C. cinerariaefolium* extracts; 2) To assess the toxicity of pyrethrin extracts of *C. cinerariaefolium* vero cells; and 3) To determine the levels of nitric oxide production in infected macrophages treated with *C. cinerariaefolium* extracts.

**Materials and Methods:** Pyrethrin was extracted. Parasites were treated with extracts and standard drugs and MIC and IC<sub>50</sub> were determined. MTT assay was done to determine IC<sub>50</sub> and toxicity levels. Macrophage assays were carried to determine nitric oxide production, infection rates and parasite growth in the macrophages.

**Results:** The MIC levels of water and methanolic plant extracts, amphotericin B and pentostam were 250µg/ml, 125µg/ml, 125µg/ml and 250µg/ml respectively against *Leishmania major* promastigotes. This study revealed that methanolic plant extracts significantly inhibited the growth of *Leishmania* parasites ( $P \leq 0.05$ ) as compared to water extracts with respect to the parasite infection rates and multiplication index. The water and methanol plant extracts were not toxic to the cells as compared to pentostam and amphotericin B drugs. The IC<sub>50</sub> for the water and methanolic plant extracts were 89.72 µg/ml and 12.24 µg/ml respectively.

**Discussion:** The antileishmanial activity of the extracts is shown in stimulation of the macrophages to produce nitric oxide and reduction of the number of amastigotes in infected macrophages.

**Conclusion and Recommendation:** The elevated inhibitory activity observed in this study against *Leishmania major* parasites provides evidence and basis for their potential use as therapeutic agents against leishmaniasis.

#### **44. Screening and assessment of K13 propeller gene for *P. falciparum* uncomplicated malaria after introduction of Artemether-Lumefantrine and Dihydroartemisinin-piperaquine in Msambweni Coastal region, Kenya**

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**Background/Introduction:** *Plasmodium falciparum* parasite resistance to artemisinin derivatives threatens treatment for malaria. The K13 propeller gene, a molecular marker for parasite resistance to Artemisinin Combination Therapy has been established. Some mutations have been reported in a few studies done.

**Objective:** This study was aimed at determining mutations on K13 propeller gene related to reduced susceptibility of *P. falciparum* to Dihydroartemisinin-piperaquine and Artemether-lumefantrine in Msambweni coastal region, Kenya

**Materials and Methods:** A total of 150 *P. falciparum* positive dried blood spots on filter paper samples were used in DNA extraction using chelex method. Polymerase chain reaction and sequencing technique was used to detect single nucleotide polymorphism in K13 propeller gene. Codon code Aligner Version 5.1 and MEGA 6 was used to identify specific single nucleotide polymorphism combinations. The amino acid sequences were compared with the wild-type reference sequence (XM\_001350122). The presence of single nucleotide polymorphism was confirmed by reading the complimentary strands.

**Results:** 80 samples amplified for K13 propeller gene only 65 (81.5%) had conserved region of the gene. The wild type allele was found in 53/65 (81.5%) samples and the mutant allele in 12/65 (5.63%).

**Discussion:** The presence of mutations in the K13 propeller gene in isolates analyzed from Msambweni is an indication of emerging resistance of *P. falciparum* to Artemisinin Combination Therapy.

**Conclusion and Recommendation:** There is need to correlate the presence of mutations with the clinical features from patients in Msambweni and other participating sites in order to ascertain the clinical significance to inform policy.

#### 45. Impact of *kdr* gene frequencies on major malaria vectors' host blood meal preferences in Teso sub counties, western Kenya.

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**Background/Introduction:** Knockdown resistance (*kdr*) caused by a leucine-serine substitution mutation at position 1014 of the *vscg* gene is strongly associated with pyrethroid insecticide resistance in *Anopheles gambiae* in Africa; which may have vital implications to the current up-scaled pyrethroid-treated bednet programmes.

**Objective:** The study aimed at determining the impact of insecticide resistance levels on blood meal preferences in *Anopheles gambiae sensu lato* in Teso sub-counties, western Kenya.

**Materials and Methods:** Mosquito larvae sampled using a dipper were reared in the insectary and 3-5 days-old females exposed to 0.75% permethrin, 0.05% deltamethrin, and 0.1% bendiocarb using WHO tube assay method. Oviposited eggs hatched into larvae which were reared and susceptibility tests done. Adult mosquitoes caught using four collection methods had species identification and *kdr* Eastgene PCR done on them. Blood meal sources were analyzed using ELISA.

**Results:** Human blood meal remained the most preferred at 77.2%. None of the analyzed blood meals had been sourced from dog, cat, donkey and chicken. Pig's blood was a delicacy among female mosquitoes collected in a low resistance Akiriamasit cluster. *An. gambiae s.s.* had the highest affinity for human blood at 71.9%. An almost equal preference for human, cow and pig's blood was found among *An. arabiensis*. The cow's blood meal source was the most preferred among *An. funestus* at 1.3%. Susceptible LL allelic vectors had equal successful quests for blood from either human or bovine host. Heterozygous LS allelic vectors had significantly higher affinity for bovine blood while SS allelic vectors had significantly higher affinity for human rather than bovine blood ( $p < 0.05$ ).

**Discussion:** Host preference is normally affected by a myriad of extrinsic and intrinsic factors. Inherent factors are determined by genetic selection even due to insecticidal selection pressure.

**Conclusion and Recommendation:** Resistance genes may be enhancing or depressing anthropophagic behavior in malaria vectors hence influencing transmission levels. Zoo-prophylaxis may reduce plasmodium transmission rates.

#### 46. Impact of an intervention to minimize over diagnosis of malaria cases in a low risk Kenyan Sub County.

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**Background:** Over diagnosis of malaria cases hinders malaria control in developing countries. Due to lack of diagnostics, febrile cases are treated using signs and symptoms. We evaluated an intervention to minimize over diagnosis in Ijara sub-County. This intervention entailed training health workers on malaria case management and supply of rapid diagnostic tests (RDTs) to peripheral health facilities.

**Design:** A longitudinal study

Setting: Ijara Sub County, Garissa County

Subjects: The study used two data sets, namely monthly malaria outpatient morbidity pre and post intervention as well as consumption of RDTs in Ijara.

Main Outcomes: Number of malaria cases, proportion of malaria cases diagnosed clinically and those confirmed using Rapid diagnostic tests.

**Results:** Malaria cases in Ijara declined from 16,851 in 2011 to 1,895 in 2012, representing an 88.8% decline. Cases diagnosed clinically reduced from 10,957 in 2011 to 362 in 2012, representing a 96.7% decline. There was a significant difference in number of diagnosed monthly malaria cases during the pre-intervention (Mean=1,299, SD=550.4) and

Post- intervention periods (Mean=158, SD=160.9,  $t(12.9)=6.9$ ,  $p=.000$ , two tailed). Confirmed cases declined from 5,894 to 1,533, representing a 74% decline. Mean RDTs consumed per month across the nine facilities was 730. Mean RDTs testing negative per month was 692. Mean RDTs testing positive per month was 38 or 5.2% of all RDTs consumed.

**Conclusion:** Introduction of RDTs led to a significant decline in malaria cases and Ijara is on target to ensure that all fever cases presenting in health facilities received a parasitological diagnosis.

Recommendation: There is need to ensure an adequate supply of RDTs to all health facilities coupled with regular refresher training for health workers.

**47. Knowledge, attitude and practices in relation to prevention and control of schistosomiasis infection in Mwea Kirinyaga County, Kenya****Corresponding Author:** Judy Anyango Mwayi, [jmwai@kemri.org](mailto:jmwai@kemri.org), [judymwai15@gmail.com](mailto:judymwai15@gmail.com)**Co-authors:** Barasa MB, Njenga SM**Affiliation:** KEMRI, Kenya**Background/Introduction:** Schistosomiasis remains a major public health problem in Kenya. Inadequate knowledge, attitudes and practices (KAP) on causative factors are some of the critical factors for the increased prevalence.**Objective:** The study assessed KAP on the control and prevention of schistosomiasis infection in Mwea division, Kirinyaga County. Enrolled in this study were 460 house-hold heads by use of simple random sampling technique.**Materials and Methods:** The study employed an analytical descriptive cross sectional design utilizing both quantitative and qualitative methods. A pretested structured questionnaire, FGDs and KIIs guides were used for data collection. Descriptive statistics and Chi square tests and Fisher's exact tests were computed where applicable. Qualitative data was analyzed using NUIST NUIRO.6 software.**Results:** Significant associations between knowledge and demographic factors i.e age ( $p=0.011$ ), education level ( $p=0.046$ ), were reported. Handwashing after visiting the toilet ( $p=0.001$ ), having a toilet facility at home ( $p=0.014$ ); rearing animals ( $p=0.031$ ), households being affected by floods ( $p=0.005$ ) and frequency of visits to the paddies ( $p=0.037$ ) had a significant association with respondents practices and schistosomiasis infection. Further significance was reported on households being affected by floods during the rainy season ( $p<0.001$ ), sources of water ( $p<0.047$ ) and having temporary water bodies ( $p=0.024$ ) with increase in schistosomiasis infection. Respondents practices were not significantly associated with gender ( $p=0.060$ ), marital status ( $p=0.71$ ), wearing of protective gear ( $p=0.142$ ) and working on the paddies ( $p=0.144$ ).**Discussion:** Study reveals that knowledge on cause, transmission, symptoms and prevention of schistosomiasis was inadequate and this could be a challenging obstacle to the elimination of schistosomiasis in Mwea.**Conclusion and Recommendation:** Different integrated controlled strategies should be designed e.g mass drug administration need to go beyond anti-helminthic treatment and that there is a need of a more comprehensive approach including access to WASH. School- Community-based health education is also significant in reducing the transmission and morbidity from schistosomiasis.**48. Factors affecting access to health services at the Busia (Kenya/Uganda) cross-border area****Corresponding Author:** Dorothy Muroki, [dmuroki@fhi360.org](mailto:dmuroki@fhi360.org)**Co-authors:** Olenja J, Kitungulu B, Oindo M, Kamau L, Juma D**Affiliation:** FHI 360, Kenya**Background:** The impact of mobility on the health of communities living along transport corridors in Eastern Africa has been documented. However, there is a gap on the health impact of cross-border community interactions. The level of interaction between cross border communities is more regular and somewhat complex. Border communities share common social and environmental dynamics. Though there is limited data on transnational access to health services, information available indicate constant mobility of cross border populations seeking health services.**Objectives:** To document factors that influence demand for health services from health facilities across the border by mobile key and vulnerable populations.**Methods:** The Cross-Border Health Integrated Partnership Project (CB-HIPP) conducted assessments at five cross-border sites: Busia, Malaba, Sio Port/Port Victoria/Majanji (Kenya/Uganda) and Taveta/Holili and Muhuru Bay/Kirongwe (Kenya/Tanzania). The assessments used qualitative methods: 150 key informant interviews, 200 focus group discussions and 200 in-depth interviews for key and vulnerable populations. Data was coded using NVIVO software and subjected to content analysis.**Results:** Cross-border populations perceive services across the border to be better. Setup of the health services, perceived high or low quality services and level of facility are some of the identified factors determining health mobility. Others include cost, distance to services, fear of stigma and discrimination and perceived confidentiality.**Conclusion and Recommendations:** There is constant mobility by communities across the border in search of health services raising the need for intergovernmental policy to address access to health services for cross-border populations. Seamless access to health services by these communities will improve their health outcomes. A cross-border health system jointly established through existing health structures on both sides of the border is critical to address effective continuum of care for cross-border populations.



**49. The policy context and health service delivery to key and vulnerable populations at cross border sites: experience from CB-HIPP Project, Kenya****Corresponding Author:** Dorothy Muroki, dmuroki@fhi360.org**Co-authors:** Olenja J, Kitungulu B, Oindo M, Kamau L, Juma D**Affiliation:** FHI 360, Kenya**Background:** The Cross-Border Health Integrated Partnership Project (CB-HIPP) is designed to extend quality, integrated health services to mobile key and vulnerable populations in strategic border areas in East, Central and Southern Africa focusing on Burundi, Kenya, Rwanda, Tanzania and Uganda.**Objectives:** One of CB-HIPP's result areas is to support the policy environment for delivery of integrated services to cross border key and vulnerable populations specifically female sex workers (FSW); men who have sex with men (MSM); and people who inject drugs (PWID); and vulnerable populations including long-distance truck drivers (LDTDs), clearing and forwarding agents (CFA), vulnerable women and girls (VWG), fisher folk and people living with HIV (PLHIV).**Methodology:** CB-HIPP conducted assessments in three land cross-border sites (Busia, Malaba, and Taveta) and two wet cross-border sites (Muhuru Bay and Sio Port/Port Victoria). The assessments utilized qualitative methods: 30 key informants, 33 focus group discussions and 120 in-depth interviews that were subjected to content analysis.**Results:** Gaps in policy include lack of guidelines and policy on transnational access to health services including lack of uniformity in service delivery for PLHIV. The key concern was treatment regimen for HIV which is different for Kenya, Tanzania and Uganda, posing a challenge to clients who may require refills when in a foreign country. Current systems do not support defaulter tracing for individuals on treatment across borders contributing to loss-to-follow.**Conclusion and Recommendations:** There are policy gaps in the provision of services to cross-border key and vulnerable populations. There is need to review health policy, standardized treatment regimen at regional level, sensitize and train health service providers to provide quality services to key and vulnerable populations at cross border sites. A review of the health management systems to address.**50. Evaluation of disease surveillance systems in Rwanda, using rabies as case study****Corresponding Author:** Emmanuel Irimaso, irimasoemmy@gmail.com**Co-authors:** Okech SG, Nzietchueng S, Mwiine FN**Affiliation:** University of Rwanda, Rwanda

In Rwanda animal rabies surveillance system is weak and instable characterised by lack of rabies surveillance data. Human rabies surveillance system is at advanced level but still rabies information is scanty yet country has political will. This study set out to evaluate rabies surveillance systems so as to inform policy makers and improve the rabies surveillance systems in Rwanda. A cross-sectional study was conducted between March 2014 and June 2014 among 251 animal and human health workers working in Ministry of Health, Ministry of Agriculture and Animal resources and Wildlife's disease surveillance units and community consented to the study. Ten health personnel at central level, 43 district disease surveillance animal and human health personnel, 49 nurses, 85 veterinarians and 73 community members were purposively selected to participate in this study. Rabies surveillance systems were evaluated using CDC's updates public health surveillance and SERVAL attributes. Both qualitative and quantitative data was collected entered into Epiinfo and exported to SPSS for analysis.

There was a well-structured useful, stable and flexible human rabies surveillance system, in MoH. A weak and unstable rabies surveillance system characterised by lack of rabies surveillance guidelines in MINAGRI was reported. Rabies surveillance system in wildlife department was still at infant stage. Rabies surveillance systems was influenced by an association between mandatory rabies report with the employment category among veterinarians  $p=0.001$  and physicians and nurses  $p=0.047$  and  $FET=0.024$  (Odds ratio=0.67, CI=0.540 and 0.845). Majority (91.2%) of district disease surveillance personnel reported immediately rabies cases encountered. Only 14.7% (5/34) analysed their rabies data according to the person, place and time. There were weak information shares among veterinarians and physicians, (55.9%). Surprisingly there was no rabies laboratory test carried out to confirm rabies cases in both animal and health ministries. Community preferred to report rabies cases to the nearest health centre (43.8%) compared to (9.6%) reported their cases to veterinary practitioners. Policy makers should consider revealed factors and improve the rabies surveillance systems in Rwanda. One health approach could be an effective and consistent way to alleviate the found challenges

**51. Establishment of ethical oversight of human research in Tanzania: A case in Tanzania and lessons learned****Corresponding Author:** Joyce K Ikingura, jikingura@nimr.or.tz, jkemilembe@gmail.com**Co-authors:** Massaga JJ, Kafuye MY

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**Background/Introduction:** Protecting the rights and welfare of those who volunteer to participate in research is a fundamental tenet of ethical research. Human research is necessary for establishing the best approaches to health care, and should be overseen by functional research ethics committees. However, in most low-income countries, especially in Africa South of the Sahara, these committees are inadequate in providing the regulations and guidelines needed to ensure that ethics remain a prominent feature of human research

**Objective:** To establish the ethical oversight of human research in Tanzania

**Materials and Methods:** In the East African Region, the establishment of ethical oversight slowly began in 1979, when the Government of the United Republic of Tanzania, established the National Institute for Medical Research (NIMR), by the Act of Parliament No.23, of 1979, followed by the amendment of NIMR Act in 1997, by the Minister for Health.

**Results:** Since then, in 2002, NIMR under the Medical Research Coordinating Committee, formed the National Health Research Ethics Review Committee (NatHREC) to oversee all issues of health research including oversight of human research in the country on behalf of MRCC. The NatHREC system developed mechanisms for oversight including writing regulations (to accept the International guidelines for biomedical, social-economic and cultural research involving human which are developed and updated by the WHO jointly with CIOMS will be adapted for implementation), guidelines, and Standard Operating Procedures, and Tanzanian government engagement, to guide the Institutions and mandated them to host and conduct human research. NatHREC

**Discussion:** The system has gained experience for further sensitizing other institutions with capacity to host human research to establish research ethics committees. The fourteen years Tanzanian experience, could be used by other developing countries including East African Community Partner States to strengthen and the capacity for ethics in research and oversight for ongoing research. The mechanisms of the system, the research capacity building, challenges and solutions will be shared and discussed.

**Conclusion and Recommendations:** The EA partner states need to establish and develop the mechanisms of ensuring ethical oversight for health and other research involving humans as participants

## 52. Economic impact of contagious Caprine Pleuropneumonia and Peste des Petits Ruminants in small ruminants in pastoral communities: case of Ngorongoro and Coastal Districts, Tanzania

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**Background/Introduction:** Contagious Caprine Pleuropneumonia (CCPP) and Peste des petits ruminants (PPR) are considered as the serious small ruminant diseases due to high economic losses attributed to them.

**Objective:** A study was carried out in Ngorongoro, Kibaha and Bagamoyo districts to quantify the economic losses due to two diseases focusing on direct losses and its contribution to food insecurity.

**Materials and Methods:** Production and epidemiological data collected in ten selected villages through household questionnaires were analysed using spreadsheet model to estimate direct losses attributed to CCPP and PPR. Multiple linear regression model used to determine contribution of disease losses to food insecurity while independent sample t-test used to comparing disease burden between two studied sites.

**Results:** Results indicated that CCPP accounts for 2,273,281Tshs per household annually while PPR cause losses of 1,920,924Tsh and 1,162,562Tshs in goats and sheep respectively. It was also found that PPR contribute significantly to food insecurity ( $p < 0.01$ ) while CCPP influence was insignificant. Ngorongoro experienced higher losses due to PPR (sheep=1,405,330.69Tshs, goats=2,186,356.46Tshs) compared to Coastal districts (sheep=192,353.41Tshs, goats=877,293.77Tshs) and the difference was statistically significant ( $P=0.000$ ) while for CCPP the impact was almost the same for both sites.

**Discussion:** PPR accounts for significant loss in Ngorongoro than coastal districts because of high prevalence in the area. Economic losses found to be higher in goats than in sheep due to relatively higher prevalence and mortality rate in the former compared to the later flocks. CCPP losses are almost the same between two study sites because currently the disease is endemic in the country. However, the effect of these two diseases on food security varies across the production systems (pure pastoralism vs. agropastoralism)

**Conclusion and Recommendation:** In the view of the findings, it is evident that CCPP and PPR are diseases of economic importance to the pastoral communities in Tanzania as they impose high economic burden and threaten food security. Therefore, this study recommends fast tracking of availability and accessibility of CCPP vaccines accompanied by regular vaccination campaigns against PPR to minimize the impact

**53. One Health research in northern Tanzania: challenges and progress****Corresponding Author:** Ruth Zadoks, ruth.zadoks@glasgow.ac.uk**Co-authors:** Ladbury G, Cleaveland S, Davis A, de Glanville WA, Forde TL, Halliday JEB, Kibiki G, Kiwelu L, Lembo T, Maro V, Mmbaga BT, Ndyetabura T, Sharp J, Thomas K, Haydon TD**Affiliation:** University of Glasgow (UK), URT**Background:** East Africa has one of the world's fastest growing human populations—many of whom are dependent on livestock—as well as some of the world's largest wildlife populations. Humans, livestock, and wildlife often interact closely, intimately linking human, animal, and environmental health. The concept of One Health captures this interconnectedness, including the social structures and beliefs driving interactions between species and their environments. East African policy-makers and researchers are recognising and encouraging One Health research, with both groups increasingly playing a leading role in this subject area.**Objective:** One Health research requires interaction between scientists from different disciplines, such as the biological and social sciences and human and veterinary medicine. Different disciplines draw on norms, methodologies, and terminologies that have evolved within their respective institutions and that may be distinct from or in conflict with one another. These differences impact interdisciplinary research, both around theoretical and methodological approaches and during project operationalisation.**Materials and Methods:** We present experiential knowledge gained from numerous ongoing projects in northern Tanzania, including those dealing with bacterial zoonoses associated with febrile illness, foodborne disease, and anthrax. We use the examples to illustrate differences between and within social and biological sciences and between industrialised and traditional societies, for example, with regard to consenting procedures or the ethical treatment of animals. We describe challenges encountered in ethical approval processes, consenting procedures, and field and laboratory logistics and offer suggestions for improvement.**Results and Discussion:** While considerable investment of time in sensitisation, communication, and collaboration is needed to overcome interdisciplinary challenges inherent in One Health research, this can yield great rewards in paving the way for successful implementation of One Health projects.**Conclusion and Recommendation:** Continued investment in African institutions and scientists will strengthen the role of East Africa as a world leader in One Health research.**54. Patient's perspectives on use of mobile phones in HIV patient-care support: a descriptive study at Kibera and Baba Dogo health centers, Nairobi.****Corresponding Author:** Patrick Nagide Igunza, patrick.igunza@amref.org**Co-authors:** Abunah B, Gichuki R, Omondi E, Kabia E, Muhula S**Affiliation:** Amref Health Africa, Kenya**Background/Introduction:** Mobile phone interventions have been found to have beneficial effects in healthcare service delivery. Use of short text message service (SMS) in HIV care has been shown to improve adherence to ART, and consequently clinical outcomes. Factors associated with effective and consistent use of phones by patients have not however been adequately evaluated.**Objective:** This study assesses HIV patient's perspectives on mobile phone use for care support in resource limited settings.**Methods:** A longitudinal study involving HIV-positive patients presenting for care for the first time and with regular cell phone access was conducted. They were sent weekly SMSes assessing their wellbeing and were expected to respond within 48 hours to indicate whether ('Shida') or not ('Sawa') they needed help from a healthcare provider. Those responding with "shida" were triaged by phone. Non-responders were called to establish reasons for non-response. An exit questionnaire inquiring participant's perspectives on the SMS service was administered after one year. Descriptive statistics were used to analyze the responses.**Results:** Of 350 (57.7% female) participants recruited, 215 (61.4%) were interviewed after one year. 48 (22.3%) reported ever losing access to a cell phone. Most participants did not have any difficulty receiving (87%) or sending (79.1%) weekly SMS. Weekly SMSes were perceived to be helpful by 93.9% of participants while 90.7% felt they could also help patients with other disease conditions. Only 0.5% felt the SMSes were a nuisance and 2.3% felt SMSes could expose their HIV status. Main benefit of weekly SMSes reported was getting assistance when sick (33%). Main reason for non-response was SMS not being received or delivered (33%).**Discussion:** SMS service is acceptable for care support by HIV patients who perceive it as beneficial to even patients with other health conditions.**Conclusion/Recommendation:** Cell phone use should be included among healthcare service delivery strategies

**55. The use of information communication technologies to support specific disease surveillance and management: using cholera as an exemplar disease in Tanzania****Corresponding Author:** Eron Karimuribo**Co-authors:** Sindato C, Beda E, Mwabukusi M, Mboera L, Rweyemamu M**Affiliation:** Sokoine University of Agriculture, Morogoro, Tanzania**Background:** The traditional disease surveillance in the majority of developing countries employs paper-based system although some countries have started using an electronic-based integrated disease surveillance and response strategy (e-IDSR) system. With the exception of some vertical programs, specific disease epidemic surveillance rarely applies an e-based surveillance system.**Objectives:** Faced with the challenge of responding to cholera outbreak in timely and efficient manner, a new system was designed to allow prompt access to cholera case information that was needed for case management and overall response to and control of outbreaks.**Materials and Methods:** An Information and Communication Technology (ICT)-supported surveillance model was designed to link Cholera Treatment Centers (CTC) and laboratory facilities using a bar-coded system which helps to provide prompt laboratory results digitally. The model was piloted in selected areas of Morogoro and Dar es Salaam regions in Tanzania.**Results:** A cholera response model that employs ICT tools packaged in 'AfyaData' mobile application was developed. The system links key authorized health care and public health personnel at the facility, district, region and national levels. Through this system, laboratory results are received promptly at CTCs for immediate case management. In addition, authorized public health officials are updated on cholera case on daily basis.**Conclusion:** Utilization of mobile technologies has potential to significantly reduce time and costs associated with physical movements between points responsible for case management, laboratory analysis and overall coordination of outbreak management. The employment of a bar-coded sampling approach has potential of eliminating double counting and other human errors associated with manual registration and recording of cases, samples and laboratory results sent back to CTCs. Furthermore, this system could be extended and adapted for surveillance, monitoring and control of other epidemic-prone conditions particularly in resource compromised area in developing countries.**56. Management of malaria at community level in Bukedea District, Eastern Uganda****Corresponding Author:** Paul Candiga, Pcandiga@gmail.com**Co-authors:** Kairanya M, Karabyo S, Katumwa K, Kintu JO, Namirimo B, Nannono MV**Affiliation:** Busitema University Faculty of Health Sciences (BUFHS), Uganda**Background/Introduction:** BUFHS seeks to produce health professionals with a passion to serve in rural areas. This is being achieved through a 3 year COBERS programme during which, community entry skills, problems identification/intervention (s), health system, are learnt. A COBERS malaria report from 3 sub-counties of Bukedea district (Kakere, Kachabule and Kamon)**Materials and Methods:** Facility registers/reports from April 2015 to April 2016 were reviewed. Descriptive cross sectional survey in 3 sub-counties of Bukedea enrolled 59 household leaders. FGDs/home inspections were also carried out.**Results:** Malaria was endemic, with peak from June to August and contributed 77% of all admissions, 64% of which were among the paediatrics. Cases among adults were >x2 compared to paediatric, except for June, August and January.

At households, 54% experienced at least a case of malaria monthly. As many as 56% always treated malaria with ACTs at home, 29% at private clinics and only 15% sought treatment from public facility. From the FGDs, community members admitted faking symptoms of malaria for purposes of collecting/stocking ACTs for future home use from Bukedea HCIV. On knowledge, 88% of household leaders cited mosquitoes as the cause, 81% used ACTs for treatment and 95% knew prevention methods.

**Conclusion and Recommendation:** Malaria threat and politicization of health services has modified the practices/behaviour of the people in Bukedea. Though the knowledge on malaria treatment was good among the households, deceitful stocking of medicines not only pose the fear of irrational use of these medicines and development of resistance, but also feed the system with wrong data. The study recommends community sensitization on rational use of medicines at household level**57. A measles outbreak propagated by children congregating at water collection points: Mayuge District, Eastern Uganda, October 2016****Corresponding Author:** Robert Kaos Majwala, rmajwala@musph.ac.ug, rmajwala@musph.ac.ug, kaosug@gmail.com**Co-authors:** Kadobera D, Nakiire L



**Affiliation:** Public Health Fellowship Programme, Uganda

**Background/Introduction:** On 12th October, 2016, Ministry of Health was notified of a measles outbreak in Mayuge district. Of 10 specimens collected, 3 tested positive for measles IgM.

**Objectives:** These were to determine the outbreak's scope and risk factors, evaluate vaccination coverage and vaccine effectiveness, and recommend evidence-based control measures.

**Materials and Methods:** A probable case: someone presenting with fever lasting  $\geq 3$  days, generalized rash, and  $\geq 1$  of conjunctivitis, cough or runny nose. A confirmed case: a probable case with measles IgM (+). We found cases by reviewing health facility records and actively searching for community cases with the help of local community leaders. A case-control investigation with 41 cases and 161 was conducted. A case was matched with 4 controls by age and village of residence, who were randomly selected from houses without a case-patient. Vaccine effectiveness was estimated using the formula  $=100*(1-(\text{attack rate in vaccinated}/\text{attack rate in unvaccinated}))$ ; vaccination coverage was calculated by obtaining vaccination coverage among controls.

**Results:** We identified 62 case-patients, including 3 confirmed (attack rate=1.3/10,000). The outbreak affected two sub-counties with similar attack rates at 4.0/10,000. Male and female residents exhibited similar attack rates at 4.0/10,000. Infants and young children aged 0-59 months were the most affected (attack rate=14/10,000). The epidemic curve showed a propagated outbreak. 32% (13/41) of the cases and 13% (21/161) of the controls visited water collection points during the case patients' likely exposure period (ORMH=5.0; 95% CI=1.5-17). Estimated vaccine effectiveness and vaccination coverage were 75% (95% CI=24-92), and 68% (95% CI=61-76) respectively.

**Discussion:** Exposure to infectious patients at water collection sites propagated this outbreak. Low vaccine effectiveness and inadequate vaccination coverage facilitated transmission.

**Conclusion and Recommendation:** We recommended intensification of measles vaccination for children aged 0-59 months and introduction of a second dose of measles vaccine in routine vaccination to improve vaccine effectiveness. Community leaders advised residents with suspected measles to avoid going to water collection points and other gatherings during the outbreak period.

## 58. Tuberculosis infection control capacity and influencing factors among private facilities in Mbale District, Eastern Uganda

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**Background/Introduction:** Tuberculosis remains a public health threat globally and in Uganda with a prevalence of 130 million and 600,000 respectively. Annually, one in every three TB cases go undiagnosed or untreated in Uganda. With 50% of health facilities in Uganda being Private facilities, Public Private Mix was instituted to enhance TB control. However, infection control capacity and influencing factors among private facilities remain unknown

**Objective:** We assessed capacity for infection control and explored influencing factors among private facilities in Mbale district, Eastern Uganda

**Materials and Methods:** A cross sectional quantitative and qualitative study of 18 private health facilities in Mbale district was conducted from June to August 2016. Quantitative data were collected using checklists, coded, entered and analyzed using SPSS version 19. Qualitatively, 15 Semi structured key informant interviews were conducted, transcribed verbatim and analyzed using content analysis (themes were developed after multiple transcript readings)

**Results:** Two (2/18, 11.1%) facilities were HC IV level, 8/18 (44.4%) were HC III level and 8/18 (44.4%) were HC II level. Fifty six percent of the facilities were private not for profit. From the checklist, 38.9% (7/18) facilities lacked capacity for TB control. According to key informants, lower level facilities especially HC IIs and those not involved in PPM had limited TB infection control capacity with 38.5% of facilities being involved in the district PPM. Other factors identified by participants included: lack of TB training and stock outs of drugs and diagnostic supplies.

**Discussion:** PPM is designed to improve TB control capacity of private facilities. It is therefore not surprising that facilities not involved in PPM lacked capacity.

**Conclusion and Recommendation:** A number of facilities lacked capacity. Key factors which influenced capacity included: level (lower level) of facilities, non-involvement in PPM and stock out of supplies. MOH should institute a holistic approach to implementation of PPM in Mbale district

**59. Cholera outbreak caused by drinking lakeshore water contaminated by feces washed down from a hill-side residential area: Kaiso Village, Uganda, October 2015****Corresponding Author:** David Were Oguttu, [dguttu@gmail.com](mailto:dguttu@gmail.com), [doguttu@musph.ac.ug](mailto:doguttu@musph.ac.ug)**Co-authors:** Okullo EA, Ario AR, Zhu BP**Affiliation:** Uganda Public Health Fellowship Program, Uganda**Background:** On 15 October 2015, a cholera outbreak involving several cases and 2 deaths was reported in Kaiso, a fishing village in Hoima District, western Uganda. Despite initial response of the local health department, the outbreak persisted**Objective:** To identify the source, mode of transmission and recommend evidence-led interventions to control and prevent cholera outbreaks**Materials and Methods:** We defined a suspected case as onset of acute watery diarrhoea from 1 October to 2 November 2015 in a resident of Kaiso Village. A confirmed case was a suspected case with *V.cholerae* isolated from stool. We performed descriptive epidemiologic analysis for hypothesis generation. In an unmatched case-control study, we compared exposure histories of 61 cases and 126 controls. We also conducted an environmental assessment and obtained meteorological data**Results:** We identified 123 suspected cases (2 deaths). Two initial deceased cases had onset on 2 and 10 October 2015. Heavy rainfall occurred during 7-11 October; a point-source outbreak occurred during 12-15 October, followed by continuous community transmission for two weeks. Village residents usually collected drinking water from three lakeshore points, A, B and C. Compared to 9.8% (6/61) of case-persons and 31% (39/126) of control-persons who usually used point A for water collection, 21% (13/61) of case-persons and 37% (46/126) of control-persons usually used point B (OR=1.8, 95% CI: 0.64-5.3), whereas 69% (42/61) of case-persons and 33% (41/126) of control-persons usually used point C (OR=6.7; 95% CI=2.5-17). All case-persons (61/61) and 93% (117/126) of control-persons reportedly never treated/boiled drinking water (OR= $\infty$ , 95% CI<sub>Fisher</sub>=1.0- $\infty$ ). The village's piped water system had broken, and open defecation was common. A gully channel washed the faeces into the lake at point.**Discussion, Conclusion and Recommendations:** This outbreak was caused by drinking lakeshore water contaminated by faeces from a gully channel. We recommended treatment of drinking water, fixing the broken piped-water system and constructing latrines**60. NGO practical experiences on implementing One Health zoonotic research: case studies of Brucellosis and Leptospirosis sero-survey in the Albertine ecosystem, Hoima District, South Western Uganda****Corresponding Author:** Lawrence Mugisha, [mugishalaw@gmail.com](mailto:mugishalaw@gmail.com), [www.ceha.co](http://www.ceha.co)**Co-authors:** Dominic T, Pelican K**Affiliation:** Conservation and Ecosystem Health Alliance (CEHA), Uganda**Background:** The one health concept, recognized as a multi-disciplinary, multi-sectorial approach to addressing grand challenges in health, is increasingly being utilized in the outbreak disease investigation, response, control and management of infectious diseases at human-wildlife-livestock interface.

Conservation and Ecosystem Health Alliance (CEHA), a local Non-Governmental Organisation (NGO) working with universities and Local District Governments in the Albertine Ecosystem, South Western Uganda uses one health approaches to Zoonotic Disease Research and Ecohealth Capacity Building. Part of our EcoHealth Group Research Focus is the neglected tropical zoonotic diseases: Brucellosis and Leptospirosis as an outcome of the risk mapping.

**Objective:** Sero-surveys to quantify the magnitude of these problems were undertaken to provide the much needed evidence for the local government and policy makers to allocate resources for interventions.**Materials and Methods:** The survey was carried out by CEHA Ecohealth research team together with District Local Government team comprised of veterinarians, medical workers, nurses, environmentalists, laboratory technologists, community leaders and community development officers. The team underwent a series of planning meetings and trainings to understand the research protocol and research ethics on animal and human subject handling. Community entry meetings were held with top district leadership on the intended research, the roles of the different players and support required, before having similar meetings at the sub county and village levels. Data and sample collection was followed by daily reviews to not only address technical issues but also team dynamics and community issues.**Results:** We share our practical experiences of using this approach for the zoonotic disease research and preliminary results of the sero-survey studies. In one of the studies, we report a proportion of participants who reported to having suffered from fever (70%), Typhoid fever (6%), Brucellosis (3%) and Malaria (49%) in the past year, and from a Malaria relapse (14%) in the same year. 126 study participants (35.0%, 95% CI 30.2-40.3%) were sero-positive (MAT titre  $\geq 100$ ) against any serovar. The highest prevalence of 19.8% (95% CI 15.9-24.4%) was against *L. borgpeterseni*svNigeria (serogroup Pyrogenes) with 71 sero-positive cases.

**Discussion and Conclusion:** The immediate outcome of using One Health research approach is the appreciation of the community health challenges by local technical personnel that trigger intervention even before the research results are published. It is also comprehensive and cost effective approach to understanding complex issues of health in rapidly changing environments like zoonotic diseases. The role of NGO specifically CEHA linking universities to communities has proved very vital to one health research and capacity building.

#### **61. Assessing health care services delivery for sexually transmitted infections in selected health facilities in Rwanda, 2014**

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**Background/Introduction:** Sexually Transmitted Infections (STIs) remain a major public health challenge especially in developing countries. Untreated or inappropriately treated STIs can cause severe complications resulting in poor quality of life and high costs for the community and health systems.

**Objective:** 1) To determine the reliability of reported data; 2) To assess the quality of services given to clients

**Materials and Methods:** We selected all 15 health facilities which reported more than 500 cases of STIs in 2014. Patients' registers and files for the period of July to December 2014 were reviewed. Data was collected using structured questionnaires and check lists.

**Results:** Systematic screening for STIs was conducted in 14 of the 15 sites. Of 73,402 clients received, 46,298(63%) were screened for STIs (range; 675-7982). Among them, 3,918 (8%) clients had one or more STI syndromes. Of the patients with STIs, 2,432 (62%) were aged 20-35 years. About 795 (22%) STIs cases were tested for HIV and 106 (13%) were HIV positive while only 149 (4%) sex partners of all index clients were notified and treated. Of 4,281 first-visit pregnant women who were screened for syphilis, 55(1.3%) tested positive and 15 (27%) co-infected with HIV. Vaginal discharge was reported by 63% (n=2470), urethral discharge by 10% (n=403) and genital ulceration by 3.9% (n=154). Only 24% (n=957) received prescriptions with the correct drug frequency, duration and dosage.

**Discussion:** An over reporting (almost three times the real data) observed was may be due to the error in diagnosis (urinary infection reported as STIs). Lack of partner notification is an issue and there was no respect of national guidelines. A high vaginal discharge observed can be due to other courses than STIs

**Conclusion and Recommendation:** Systematic screening for STIs is well conducted in Rwanda. However, training of health care providers is needed to strengthen reporting and appropriate management of patients and their asymptomatic partners.

#### **62. Community-based one health participatory disease surveillance using digital and mobile technologies in Tanzania**

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**Background/Introduction:** Human and animal disease surveillance systems in Tanzania operates in silos and do not include information on disease events reported from and by the community thereby posing challenges on early detection of disease outbreaks occurring at the community level.

**Objective:** The objective of this study was to establish and deploy a participatory community-based disease surveillance system to enhance early disease detection and response.

**Materials and Methods:** Volunteers from the community in Morogoro Urban and Ngorongoro Districts in Tanzania were trained on the use of digital technology in disease surveillance. One Health Knowledge Repository (OHKR), which is a knowledge-based decision support tool, was developed to enhance early detection of diseases.

**Results:** Twenty-nine Community Health Reporters (CHRs) were trained and equipped with mobile phones installed with digital disease surveillance tools. OHKR was developed for key endemic and epidemic prone diseases of humans (15) and animals (14). Based on the clinical manifestations reported by CHRs from July to November 2016, the most probable diseases identified in humans by OHKR included malaria, typhoid fever, cholera, dengue fever, rabies and anthrax. The most probable infectious diseases in cattle included Malignant Catarrhal Fever, Contagious Bovine Pleural Pneumonia, brucellosis, Foot and Mouth Disease and anthrax. The most probable infectious diseases in goats were Peste des Petits Ruminants [PPR] and Contagious Caprine

Pleural Pneumonia [CCPP]. The most probable disease in chicken was Newcastle disease, and in pigs was African swine fever. Preliminary laboratory validation of performance of the system indicated that 63% (n=240) of blood samples from goats were positive for PPR and 48.1% (n=183) were positive for CCPP.

**Discussion:** Combination of participatory community-based One Health approaches with mobile technology enhanced by OHKR supports early detection, timely reporting and prompt responses to disease events at the community level.

**Conclusion and Recommendation:** Community-based participatory disease surveillance system has the potential to complement the national disease surveillance systems.

### 63. Effectiveness of expanded delivery mechanisms/channels and empowerment of caregivers in improving access of ORS and Zinc in Narok County, Kenya

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**Background:** Studies have shown that childhood diarrhoea is best managed by use of ORS with Zinc administered as an adjunct. Whereas in Kenya ORS is widely known and is available at facilities, zinc is not widely accessed and limited knowledge exists about its use in diarrhoea management in communities. This paper sought to find out if increasing the mothers' access to ORS and Zinc through innovative approaches and outlets can lead to at least 20% increase in the proportion of children with diarrhoea who receive Zinc and ORS compared to those in the routine programmes.

**Methods:** This was a cluster randomised controlled study, conducted in 22 sub locations (11 intervention and 11 controls). A community linkage to an ORS and Zinc manufacturer/large distributor was established to innovatively enable mothers in remote communities to improve access to ORS and Zinc through outlets of trained shop/kiosk owners, teachers, and churches/mosques. The community was sensitised and baseline data collected for 10,989 under 5-year old children compared to 10,623 at end-line. The surveys were conducted 12 months apart. Descriptive statistics with the chi-square at 95% CI was computed and change attributable to intervention (effect size) achieved by use of Difference-in-Differences (DiD) approach.

**Results:** Over 90% of respondents in both surveys were female, with 93.6% end-line compared to 91.7% baseline being the mother of the index child. Adequate knowledge on diarrhoea management using ORS and zinc among mothers/caregivers by study arm increased in comparison clusters by 30.8% (11.8-42.4%,  $p < 0.001$ ), compared to 43.7% (8.3-52.0%) in intervention arm, with an intervention effect size using DiD approach of 12.9%. Overall diarrhoea prevalence within 2-weeks preceding data collection dropped by 5.5% (20.4-14.9%;  $p < 0.001$ ) with intervention arm reducing by 6.4% compared to 4.6% for control and DiD of 1.8%. The overall use of ORS and Zinc among children experiencing diarrhoea in the last two weeks improved (5.1-28.6%) while similar improvement (7.2-18.7%,  $p < 0.001$ ) and (3.1-38.4%,  $p < 0.001$ ) were observed for control and intervention respectively. Change in use of ORS and Zinc attributable to intervention (DiD) was 23.8%.

**Conclusion:** a strengthened health system through empowerment of mothers/caregivers and establishment of alternative community mechanisms for delivery of ORS and Zinc in remote communities improved both knowledge and use of ORS and zinc as an adjunct in childhood diarrhoea home management.

### 64. Leveraging horizontal models to develop healthcare capacity: LifeNet International's Conversion Franchise Innovation.

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**Background:** Single-issue, "vertical" solutions to leading public health issues are the most popular methods for addressing public health priorities in low-resource settings, in spite of studies suggesting they are limited in their ability to strengthen health systems.1 In a departure from these preferred methods, LifeNet International (LN) has developed a "horizontal" health systems strengthening method that has proven successful in Burundi and other East African contexts.2 Through a comprehensive franchise package, LN leverages existing resources and responds to a range of obstacles preventing facilities from providing quality care.

**Methodology:** LN measures the impact of its horizontal conversion franchise model over time through its Quality Score Card (QSC) evaluation tool. This tool is designed to measure both medical and management quality and was developed by LN nursing, public health, and development specialists, drawing on local Ministry of Health standards, the USAID/Smiling Sun Health Services "Quality and Monitoring Supervision Clinic Preparedness Guide," the IFC SelfAssessment Guide for Health Care Organizations from the Joint Commission International, the Management Sciences for Health Financial Management



Assessment Tool, the Columbia University Access Project Health Center Assessment Tool, and other similar sources. Directly aligned with the LN training curriculum, the medical and management QSCs measure standards set by the local Ministries of Health and then measure important additional items to quantify staff adherence to LN-taught best practices in healthcare delivery and management. With an emphasis on measurements in Burundi, LN has recently extended its partner network, data collection, and evaluation to Uganda and the Democratic Republic of the Congo.

**Findings:** The LN QSC has measured consistent and significant improvements in quality of care through LN partnership. These quality of care measurements and improvements are consistent with local Ministry of Health quality evaluation tools. Over 7 years of research and testing, LN has expanded this “horizontal” model to 3 countries in East Africa. With continuing validation research in support of this horizontal model, LN is preparing to scale its interventions across the region to 1,000 facilities in 10 countries, reaching 20 million patients by 2025.

### 65. Modeling the disease burden of hepatitis C virus (HCV) infection in Burundi

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**Introduction:** Hepatitis C virus (HCV) infection is a major public health concern due its impact on liver related morbidity and mortality. In Burundi, anti-HCV prevalence has been estimated to be around 8% in adults [1], one of the highest rates across the African continent. Currently, there is little data to quantify the HCV disease burden in the country and its impact on late stage liver disease.

**Objective:** To estimate the disease burden of HCV infection in 2030

**Material and Methods:** An Excel-based disease progression model was developed to estimate HCV incidence, prevalence, morbidity, and mortality. Assumptions and transition probabilities are based on published literature and validated.

**Results:** In 2015, it was estimated that approximately 406,000 individuals were infected with HCV and 40% of the total infected population was aged 20 to 39. Under the current treatment paradigm, HCV infections are assumed to decrease slightly, while HCV-related morbidity and mortality is expected to increase. Infections will decline to 364,000 cases by 2030 due to the continued treatment of HCV-infected patients and the aging of the older patient population.

By 2030, the number of decompensated cirrhosis patients would increase by 65%, from 2,800 cases in 2015 to 4,600 cases in 2030. Hepatocellular carcinoma is forecasted to increase by 60%, rising from 1,500 cases to 2,400 by 2030. Lastly, liver related mortality will also increase by 60%, from 1,400 deaths in 2015 to 2,200 deaths in 2030.

**Conclusion:** HCV-related disease burden is forecasted to increase significantly by 2030. Disease control strategies are needed in order to reduce the health and economic impact caused by HCV in Burundi.

### 66. Needlestick and sharps injuries among final year bachelor of veterinary medicine students at the University of Nairobi, Kenya

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**Background:** Needle-stick and Sharps Injuries (NSIs) are accidental skin penetrating wounds caused by sharp instruments in a medical setting. Include, but not limited to, hypodermic needles, blood-collection needles, Intra-venous catheter stylets, suture needles, scalpel blade and broken glass. It is postulated that veterinarians are at higher risk of NSIs than other health care workers for they treat patients that are often uncooperative and difficult to communicate with. Students are at an increased risk for NSIs and its consequence because of their relative inexperience and lack of knowledge regarding instruments handling and disposal.

**Objective:** The current study was designed to estimate the NSIs incidence, perception and associated risk factors among the final year Bachelor of Veterinary Medicine students, University of Nairobi.

**Methodology:** The survey was undertaken in February 2014 at the Faculty of Veterinary Medicine, University of Nairobi. Data was collected using a self-administered questionnaire that captured demographic information, roles played during clinics, handling of needlestick and sharps, causes, frequency and management of NS injuries. Questionnaires examined the last 6 months to minimize recall bias tap on the recent clinical exposure.

**Results:** A total of 70 respondents were interviewed in the study. Amongst them, 71.43% (50) were male and 28.57% (20) female with a mean age of  $25.36 \pm 3.06$  years. The respondents had participated in clinical activities in the past 6 months by engaging in different roles that included surgeon (mean frequency =  $2.59 \pm 2.41$ ), assistant surgeon (mean frequency = 2.5

$\pm 1.73$ ), anesthetist (mean frequency =  $1.87 \pm 1.99$ ), restrainer (mean frequency =  $17.0 \pm 33.47$ ) and drug injection (mean frequency = 16.92). 72.86% (51) of the respondents had experienced NS injuries at least once in the last 6 months. Hypodermic needle caused injury in 76.47% (39) of the respondents while suture needles and scalpel blade caused injury in 56.86% (29) and 39.22% (20) of the respondents respectively. Other causes of injuries included broken drug bottles, wire saw, blood slides, and shaving razor blade. Noted side effects were pain, bleeding, numbness, swelling, abscessation and anaphylaxis depending on the cause of injury. Most of the respondents either did not do anything about the injury or managed it themselves.

**Conclusion and Recommendations:** It is concluded that the incidence of NS injuries was high among the final year veterinary students in their clinical years. Proper guidelines and strategies to reduce NS injuries in veterinary practice should be promoted. A similar study to investigate occurrence of NS injuries among practicing veterinarians needs to be undertaken.

### 67. Occupational safety and health needs in Uganda: training and policy priorities

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**Background:** Globally about 2.3 million workers die every year from work-related accidents and diseases. In low income countries, there has been emerging risks in safety, health and the general environment due to the revolution shift to industrialization and globalization with workers having little control over working conditions and risks involved. In many developing countries including Uganda, there exists several hazardous workplaces but less attention is given to occupational health. This study assessed the Occupational Safety and Health (OSH) needs and opportunities in Uganda to identify national priority areas for OSH policy and training.

**Methods:** Data was collected qualitatively by conducting key informant interviews (KIs) and review of OSH laws and policies and review of OSH policies and related documents. KIs were conducted with a range of stakeholders in OSH including line departments in government ministries, civil society, private sector, international agencies and academic institutions. Resultant data was analyzed thematically.

**Results:** Although the existing OSH laws and policies had some strengths including involvement of various stakeholders in OSH processes and the existence of established structures and mechanisms for OSH implementation, they were largely outdated and did not reflect the current work environment characterised by new technologies. In addition, the available structures are weak and mechanisms of implementation fragile. The challenges in the implementation of the OSH laws and policies included shortage of OSH professionals, fragmentation of OSH functions among stakeholders and lack of coordination of OSH institutions. Other challenges were the lack of prioritisation of OSH during planning processes, organisational impediments and workers' lack of awareness about OSH.

**Conclusion:** There is thus need to review and update existing OSH laws and policies, streamline OSH implementation mechanisms and coordination of stakeholders, and train more OSH professionals and build capacity of existing practitioners.

### 68. Fluconazole resistant opportunistic *Candida* sp isolates on the external surfaces of hospital cockroaches

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**Background/Introduction:** Hospital care associated infections (HAI) infections are a major public health concern worldwide because of their morbidity, mortality and cost. Studies have suggested that hospital cockroaches are potential carriers of infectious microorganisms including drug resistant bacteria. However there are limited studies that have looked in role of cockroaches as reservoirs of opportunistic and HAI associated with fungal pathogens.

**Objective:** To determine prevalence of medically important fungi carried on the external surfaces of hospital cockroaches

**Materials and Methods:** Cockroaches were captured from various areas and wards of Muhimbili National Hospital over period of two months between February and March 2015. Normal saline washings from the external surface of cockroaches were cultured. Standard mycological agar and methods were used to isolate and identify fungi. Susceptibility to fluconazole was done using the CLSI M27-A3 microdilution method.

**Results:** At total of 72 cockroaches were captured. All cockroaches captured were shown to carry medically importance fungi. Of 956 fungal isolates, 57.9% were *Candida* sp., 23.2% *Aspergillus* sp., 3.1% *Cladosporium* sp., 1.8% *Rhizopus* sp., 1.2% *Geotrichum* sp., 0.9% *Penicillium* sp., 0.7% *Alternaria* sp, 0.6% *Fusarium* sp, 0.3% *Mucor* sp and 10.1% others.

Over 16.3% of the *Candida* isolates not intrinsically resistant to fluconazole showed resistance. Resistance was most frequently found in *C. pseudotropicalis* (23.8%) and *C. glabrata* (20.0%)

**Discussion:** The presence of medically important fungi associated with HAI on cockroaches suggests that the outer surfaces cockroaches represent potential reservoir of fungal pathogens. The presence of drug resistant *Candida* spp suggests that these insects may be vectors for the dissemination of fluconazole resistant *Candida* strains.

**Conclusion and Recommendation:** Cockroach's outer surfaces may be reservoirs for medically important drug resistant opportunistic fungi. Hospital Infection control practices and vector control practices need to strengthen to avoid transmission of fungal HAI through cockroaches

### 69. Climatic spatial models to guide surveillance and prevention of epidemic arboviral infections in Tanzania

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**Background:** Climate projections models predict increases in average annual temperature, precipitation and extreme events in the future. Arboviral infections such as Rift Valley Fever (RVF), Dengue, Zika and Chikungunya are climate-related diseases. Incidence of these infections has dramatically increased recently, potentially due to changing climate. Climate is thought to represent a threat towards emerging risk areas for epidemics globally.

**Objective:** The objective of this study was to evaluate influence of climate on distribution of suitable breeding habitats for *Culex pipiens* complex and infected *Aedes aegypti*; potential mosquito vector responsible for transmission and distribution of arboviral diseases epidemics risk areas in Tanzania.

**Material and Methods:** We used ecological niche models (ENM) to estimate potential distribution of disease risk areas based on vectors and disease co-occurrence data approach. Climatic variables for the current and future projections were used as model inputs. Changes in mosquito vectors habitat suitability and overlap under future climatic scenarios were estimated. We used partial receiver operating characteristic (ROC) and the area under the curves (AUC) and jack-knifing approaches to evaluate model predictive performance and significance.

**Results:** Model predictions indicated high suitability for *Cx. pipiens* complex and infected *Aedes aegypti* with broad-scale potential for change and shift in the distribution of the vectors and disease for the current, 2020 and 2050 climatic scenarios. Risk areas indicated more intensification in localized areas for 2020 and 2050 climate scenarios. Models show higher probability of emerging hotspots in some parts of Tanzania while and decreasing in other areas.

**Conclusion:** Results presented here identified sites for consideration in order to guide surveillance and control interventions to reduce risk of RVF and Dengue epidemics in Tanzania. A collaborative approach is recommended to develop and adapt climate related disease control and prevention strategies.

### 70. Mobility and health seeking behavior among key and vulnerable populations along selected East African borders

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**Background:** Mobility is an important factor contributing to key and vulnerable populations (KandVPs) health seeking behavior. However, research linking this relationship is limited in EA region. This study examines the association between mobility and health seeking behavior among KandVPs along EA borders.

**Methods:** The Cross-Border Health Integrated Partnership Project (CB-HIPP) conducted a cross-sectional study of KandVPs in five cross-border sites: Busia, Malaba, Sio Port/Port Victoria/Majanji (Kenya/Uganda) and Taveta and Muhuru Bay (Kenya/Tanzania). Participants were recruited through a respondent-driven sampling. The health seeking behavior covered unmet need for health care services, seeking health services in neighboring country and awareness of HIV status (except PLHIV). The study used logistic regression models to estimate odds ratios and 95% CIs for health seeking behavior on mobility after adjusting for gender (except for MSM and FSW), age and study site.

**Results:** Mobility among FSW was associated with seeking health care in neighboring country (OR=1.65, 95% CL 1.13 to 2.39) and HIV positive status (OR=1.50, 95% CL 1.12 to 2.00). Among MSM, the results showed mobility was associated with high odds of unmet need for health care services, low odds of seeking health care in the neighboring country and low odds of HIV status awareness. However, the association was not statistically significant. High proportion of mobile PLHIV had unmet need for health care services (OR=1.52 95% CL 0.69 to 3.33) compared to non-mobile PLHIV. Mobile PWID were more

likely to have tested for HIV in less than three months compared to non-mobile (OR=3.10 95% CL 1.17 to 8.23). Among VWGs, mobility had high odds of seeking health care services in neighboring country (OR=2.07 95% CL (1.32 to 3.23)).

**Conclusion and Recommendation:** Mobile KandVPs have differing health care seeking patterns. Targeted interventions need to factor mobility in efforts to increase access and update of health services among these groups.

### **71. Explorative survey of socio-epidemiological determinants of cutaneous leishmaniasis in an endemic focus in Gilgil, Kenya**

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**Background/Introduction:** Explorative survey of socio-epidemiological determinants of cutaneous leishmaniasis in an endemic focus in Gilgil, Kenya

Despite prolonged endemicity of Cutaneous Leishmaniasis in Gilgil area, Kenya, the possible role of socio-epidemiological factors in facilitating human infections has never been investigated. This information would advise on the feasibility of community-driven control and prevention initiative in the area.

**Objective:** To determine the knowledge, attitude and socio-epidemiological determinants of cutaneous leishmaniasis.

**Materials and Methods:** A questionnaire survey was done to determine the knowledge, attitude and possible socio-epidemiologic factors contributing to the persistence of cutaneous leishmaniasis in a focus of reported high human transmission surrounding a forested volcanic cone.

**Results:** A large proportion of the respondents (87.74%) knew cutaneous leishmaniasis although they generally lacked knowledge of sand flies (90.57% of respondents). Lesions characteristic of cutaneous leishmaniasis were observed on 9.43% of respondents. Poor housing conditions and low uptake of bed nets were also observed in most households. There was significant association between proximity to Utut forest and affliction with lesions, either active or healed.

**Conclusion and Recommendation:** The study revealed a community experiencing a cutaneous leishmaniasis scourge of which they understand little. The findings highlight the need for awareness creation and appropriate intervention to curtail the epidemic and treat cases.

### **72. Engagement of community health workers in prevention of mother-to-child transmission of HIV (PMTCT): a qualitative study from fishing communities of Musoma Rural and Sengerema Districts**

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**Background:** The study aimed at exploring the engagement of CHWs in the PMTCT among the fishing communities of Sengerema and Musoma District in Lake Zone of Tanzania.

**Methods:** A cross-sectional study using qualitative approach was conducted in some selected fishing communities of Sengerema and Musoma Districts, involved health care providers and CHWs who were purposively selected.

**Results:** A total of 25 participants comprising Nurses (7), Midwives (5), Clinical Officers (4) and CHWs 9 were involved in the study. Pushing factors for CHWs to engage in health service included fulfilling unmet past ambitions, moral obligations, and economic gains. Government Health providers engaged CHW in health promotion activities as a coping strategy for shortage of trained health staff and reducing the work load. Mostly CHWs were involved in Maternal and Child Health and HIV/AIDS health care services than PMTCT service provision. Regardless of the available potentials, CHWs have not been deployed in the study area. NGOs seem to motivate the CHWs than the government. CHWs who failed to meet the economic motives from the Government quitted the responsibilities.

**Conclusions and Recommendation:** PMTCT services provision in the study areas have benefited from CHW approach. Deploying CHWs in hard to reach areas such as fishing communities can curb the gap of shortage of human resources for health and adequate provide HIV/AIDS health related services.

### **73. Effectiveness of family support group initiatives in promoting the health of HIV positive mothers participating in EMTCT programmes**

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**Background:** Family Support Groups (FSG) was established as a strategy for behavioral support among mothers who were found to be positive with HIV. Though these groups, mothers encourage and get encouraged by their peers in matters of seeking health services like antenatal care among others.

**Objective:** This study assessed the effectiveness of FSGs in improving the health of HIV-Positive mothers participating in EMTCT programmes in Kalangala district in Uganda.

**Materials and Methods:** A case study research design using mixed methods approach was employed to answer the research questions.

**Results and Discussion:** There were no initial estimates for FSG coverage, but the study reached 269 respondents (20.1% men, 79.9% women). FSGs can to a greater extent improve levels of antenatal care attendance, testing for HIV during pregnancy and seeking postnatal care. This was majorly attributed to “meaningful engagement” of mothers, which gave them the power and motivation to talk and share about their HIV status, thus improving self-concept and coping efficacy. The study findings indicated that HIV-Positive mothers who attended Family Support Groups had better help-seeking patterns and knowledge about HIV compared to those who did not attend. However, attendance for such groups is still very low.

**Conclusion and Recommendations:** Family Support Groups can be a strategic and motivating strategy for behavior change programs even for Men’s Health programs. They do not only address individual fears but also address wider community challenges like exclusion and stigma. There is however need to increase their visibility and provide logistical support so as to maintain functional Family Support Groups and to motivate more people to join.

#### **74. Evaluating adherence to testing and treatment procedures by community health volunteers in community case management of malaria, Bungoma County, Kenya**

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**Background:** For prompt diagnosis and treatment of malaria cases, World Health Organization recommended Community Case Management of Malaria (CCMM). In CCMM, community health volunteers (CHVs) are trained in management of uncomplicated malaria at household level while referring severe malaria cases or other ailments to health facility.

**Objective:** We evaluated adherence to testing and treatment procedures using rapid diagnostic test kits (RDTs) and artemether lumefantrine (AL).

**Method:** A cross sectional study was conducted among 147 CHVs in Bungoma County who were randomly selected from the CHVs trained on CCMM. An observational checklist and structured questionnaire was used to evaluate the testing and treatment procedures, where a series of steps were systematically evaluated as they carried out testing and treatment. CHVs scoring an average of 80% and more were considered to adhere to testing while an average score of 100% was considered adherence to treatment. Data was analyzed using both descriptive and bivariate analysis.

**Results:** Of the 147 CHVs, the mean age was 40 and 39% were female. Majority of CHVs (89%) had attained a post primary education. A total of 452 clients were tested for malaria at the household level and the malaria positivity rate was 24%. 65% of CHVs were considered to adhere to testing procedures while 85% of CHVs with a positive malaria test managed treatment correctly. Gloves use frequency and RDT availability were significantly associated to adherence to testing (UAOR 2.02 (95% CI 0.78-5.25)) and (UAOR 6.08 (95% CI 1.12-33.1)) respectively. 67% CHVs who had received supportive supervision (131) adhered to testing.

**Discussion:** A considerable number of CHVs tested and treated clients correctly according to the required guidelines for CCMM. Availability of commodities such as gloves and RDTs influences adherence to testing and treatment procedures.

**Conclusion and Recommendation:** Level one health service is essential in the fight against Malaria.

#### **75. Non compliance and associated factors leading to the prevalence of multi-drug resistant tuberculosis in Uganda**

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**Background/Introduction:** Multi-Drug Resistant Tuberculosis (MDR-TB) remains a global health threat to progress made in tuberculosis (TB) care and control worldwide. Uganda has unknown rates of anti-tuberculosis drug resistance. The first national survey showed a multi-drug resistant tuberculosis prevalence of 1.4% and 12.1% among new and previously treated

sputum smear-positive TB patients respectively. High incidence of development of multi-drug resistance tuberculosis has been linked with drug non-compliance.

**Objective:** The objectives of the study were to identify the factors that lead to poor anti-TB drug compliance and to draw practical, cost-effective interventions to combat MDR-TB

**Materials and Methods:** Literature review of peer reviewed journals, government publications and relevant textbooks was done. Databases for retrieving journals were EBSCOHOST and HINARI. Search engines such as Google, Google Scholar were also used. Only journal articles published from 2010-2016 were used. The key word tuberculosis in Uganda was keyed in to search engines and came up with 87 journals. To narrow down the number of journals of relevancy, the key words multi drug resistant tuberculosis and drug adherence was keyed in to EBSCOHOST and HINARI, and came up with 22 journals. The articles were narrowed down to those that provided relevant information on factors affecting compliance to anti-TB drugs leading to MDR-TB in Uganda.

**Results:** Non-compliance was due to social/economic, health system/healthcare team, patient and therapy related factors. Four approaches to combat MDR-TB were drawn: community empowerment through Village Health Teams and tuberculosis ambassadors; tax incentives to agencies that promote community awareness about MDR-TB; coexistence of tuberculosis and HIV/AIDS programmes and promotion of research to develop enhanced therapeutic regimens.

**Discussion:** All factors leading non-compliance are man-made with no hereditary factors in play. Approaches to combat MDR-TB are those geared toward increasing knowledge and change of attitudes, beliefs and practices about compliance at individual and **Institutional** levels.

**Conclusion and Recommendation:** The political and other stake holders' will is therefore urgently needed to affect the recommended approaches for MDR-TB elimination.

## 76. Prevalence and factors associated with self-reported STIs among HIV-positive individuals aged 15-49 years in Rwanda (2014-2015)

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**Background/Introduction:** Data shows a strong association between sexually transmitted infections (STIs) and human immunodeficiency virus (HIV), with co-infection accelerating the progression of HIV and increasing the risk of HIV transmission.

**Objective:** To determine the proportion of self-reported STIs among HIV+ people and analyze factors associated

**Materials and Methods:** Cross-sectional analysis of the Rwanda Demographic and Health Survey (DHS) 2014-15. We analyzed sociodemographic variables and conducted bivariate analysis to measure potential associations between covariates and STIs. STI was defined as any self-reported STI, genital discharge, or genital sores within the last 12 months. High risk sex defined as not using a condom during sex with boyfriend/casual

**Results:** A total of 380 respondents were HIV positive and 67% were female. STIs prevalence was 19.2% (95% CI 15.5-23.5). In bivariate analysis, people from Eastern Provinces were more likely to have STIs compared by those in Kigali (OR 3.42 [95% CI 1.39-8.38]. Conversely, people who attained secondary school education (OR 0.24[0.08-0.76]) and those aged 18 years and above were less likely to have STIs (OR 0.31 [0.18-0.54]). Surprisingly individuals who reported condom use were more likely to have STIs (OR 2.19[1.29-3.73]). People with one sex partner (OR 2.24 [1.14-4.42]) and more than one sex partners (OR 21.52[4.14-112.27]) were also more likely to report STIs. In multivariate analysis, Eastern province (OR 3.42 [1.39-8.38]), and high risk sex (OR 6.13 [1.79-20.98]) remained significantly associated with STIs, while secondary school attainment (OR 0.19 [0.06-0.76]) and age above 18 (OR 0.34 [0.17-0.65]) were protective.

**Discussion:** STIs prevalence in People with HIV was high (19%) comparing with 3% in general population, and female were most infected 20.2% vs 15.2% in male, this is match results from many studies where a STIs high prevalence is observed in female than in male. Having attained secondary school and initiate sex intercourse after 18 years were protective and studies show the same results. Living in Eastern Province was associated with STIs and this was found also for HIV in 2015. High risk sex were continuously associated with STIs as it has been shown by several studies

**Conclusion and Recommendation:** Infection with an STI is very common in PLHIV in Rwanda. Strengthening STI education surrounding correct condom use, reduction of extramarital partnerships and delaying sexual activity initiation is necessary. Clear definition of condom use in the DHS is also needed for a better understanding of this important component in sexual and reproductive health.

**77. Seasonal variation of *Culex quinquefasciatus* densities emerged from pit latrines in rural settings, Tanga Region, Tanzania****Corresponding Author:** Basiliana Emidi, ebasi2002@gmail.com, ebasi2002@yahoo.co.uk**Co-authors:** Kisinza WN, Mosha FW**Affiliation:** Kilimanjaro Christian Medical University College, Tanzania**Introduction:** Lymphatic filariasis (LF) is widespread and a major public health problem in many developing countries with a warm and humid climate. In Tanga, the burden of chronic LF disease is still high. *Culex quinquefasciatus* is a vector of LF in the study area and also a biting nuisance mosquito. There is limited information on the factors that contribute to higher abundance of this mosquito species in rural areas. Therefore, this study was assessed the seasonal variation of *Cx. quinquefasciatus* abundance emerged from pit latrines in rural settings of Tanga region.**Methods:** This was a cross-sectional study conducted in rural settings of Tanga for 11 months in 24 villages which were selected randomly. Collection of adult *Culex* mosquitoes emerged from pit latrines was done by using emergence traps. In each village three houses were selected basing on the presence of pit latrines.**Results:** A total of 13,511 mosquitoes consisted of *Culex quinquefasciatus* (12%) and *Culex cinereus* (88%) species were collected in 24 villages. Majority of *Cx. quinquefasciatus* were collected in August, and September, 2015 as well as April, 2016. In February, 2016 no mosquitoes were collected and this was an extremely dry month and most of the pit latrines were dry. Generally, there were monthly variations in mosquito densities with a slight fluctuation with rainfall.**Discussion:** Rainfall onsets and high water tables contributes to the wetness of the pit latrines hence make them ideal for *Culex* mosquitoes to breed.**Conclusion:** Wet pit latrines plays important role as potential breeding sites for lymphatic filariasis vector; the *Cx. quinquefasciatus* especially during the rainy season when water table is high. Proper covering of pit latrines vents may prevent the entry of *Culex* gravid mosquitoes from breeding in pit latrines.**78. Bat management: A contribution to prevention and control of emerging and re-emerging infections in Kasese District: a One Health approach****Corresponding Author:** Howard Onyuth**Co-authors:** Adam I, Tindyebwa T, Okech SG, Mutebi A, Sente C**Affiliation:** Makerere University, Uganda**Background:** Although bats play a vital role in ecosystems around the world, they are considered 'reservoirs' of a number of viruses which are a threat to health. They have been associated with the spread of some of the deadliest zoonotic diseases such as Rabies, Ebola, and Marburg. Communities living near bat caves/roosts or those with bats roosting within their households are at risk of such infections. In Uganda, many rural communities living in close proximity with bat habitats experience regular invasions of their households by bats. Kahendero village, a suburb of Kasese municipality at the wildlife-domestic-human interface had high levels of bat-human interactions. The buildings of Kahendero primary school, the Health Centres, entertainment places and many households were highly infested with bats. This posed a great community health threat. To minimize these threats a One Health approach, unifying disciplines across domains of animal, humans and environmental health have tremendous potential in reducing health threats associated with bats. A pilot study aimed at controlling bat infestations at Kahendero primary school with the intent of scaling up the intervention was carried out.**Methods:** A site-specific bat management plan consisting of education, training, prevention, and response strategies for bats was developed and implemented. This was carried out through school talks and focus group discussions with local communities, school staff, pupils and Village Health Teams. Emphasis was made on prevention of direct contact between bats and humans, and response strategies in case of a bat bite. They were trained in bat management practices such as sealing off of all entry points of bats into the school buildings. An ecosystem friendly ethno-bat repellent in form of paint was concocted from locally available materials and used to paint the inner and outer portions of the school buildings near the ceiling (areas of aboard of bats). The short term observation was taken after 4 days by the team still in attachment and the long term after 3 months by phone calls to the local area leaders and school management chairperson.**Results:** The ecosystem friendly ethno-bat repellent successfully repelled bats from the primary school. Community members adopted the same technology to repel bats from their homes, entertainment and health centres. Others used this as a spring-board to generate household income by making the concoction and offering bat-repulsion services to the members of Kahendero and neighboring communities.**Conclusion:** This method made of locally available materials was cost effective as compared to a previously employed toxic fumigation service by the health centre management where over 2,000 bats that previously inhabited the Kahendero Health Centre II building were killed. However, effective repulsion of bats in communities should be combined with bat conservation necessitating demand-driven conservation and human health intervention.

**79. Uptake of second dose of measles-containing vaccine among children in Kakamega County, Kenya****Corresponding Author:** Fredrick M. Makokha, makokhamf@gmail.com**Co-authors:** Wanjala PM, Githuku J, Kutima HJ**Affiliation:** Jomo Kenyatta University of Agriculture and Technology, Kenya**Background:** Measles is a major cause of death and complications among young children worldwide despite the availability of a safe and effective vaccine. Annually over 158,000 cases of mortality due to measles are reported globally, especially in Africa and Asia. In Kenya, 59 per a million measles incidences were reported in 2011. Approximately 80% of the children aged less than 5 years received a first dose of measles-containing vaccine in Kakamega County in 2014. In 2013 a second dose of measles-containing vaccine was introduced in the routine immunization schedule.**Method:** A cross-sectional survey was conducted to determine the coverage, the factors associated with uptake of second dose of measles-containing vaccine and reasons for not being vaccinated with second dose of measles-containing vaccine among children aged 24-35 months of age in Kakamega County. Multi-stage cluster sampling technique was used. First, 30 clusters were selected using probability proportional to size with replacement. Out of which 19 households were surveyed per cluster and data of the youngest child aged between 24-35 months in a household collected. Data was collected using a structured questionnaire administered to the child's mother or caregiver. Data was entered and cleaned using Ms Excel 2007 and analysed using EPI Info 7 computer software. Univariate and bivariate analysis was conducted on all variables. Prevalence and odds ratios was carried out at 95% confidence interval (CI), and two-tailed statistical significance was set at  $p \leq 0.05$ . Variables with a  $p$ -value  $\leq 0.10$  were subjected to multiple logistic regression model using backward elimination, dropping the least significant independent variable until all the remaining predictor variables were significant ( $p$ -value  $\leq 0.05$ ).**Results and Discussion:** Among the 571 children surveyed; the coverage of second dose of measles-containing vaccine was 102 (17.9%) (95% CI=14.9% to 21.3%). The mother's or caregiver's awareness of the second dose of measles-containing vaccine, time taken to the nearest immunizing health facility, uptake of Pentavalent 3 and uptake of at least two doses of Vitamin A were significantly associated with the uptake of the second dose of measles-containing vaccine with ( $p$ -values of 0.0000, 0.0010, 0.0281 and 0.0000 respectively). The main reasons cited by the Mothers/caregivers for the children not receiving the second dose of measles-containing vaccine were; lack of awareness of need to return for second dose of measles-containing vaccine 210 (44.8%) and lack of awareness of need for immunization 67 (14.3%). The second dose of measles-containing vaccine coverage in Kakamega County is very low.**Conclusion and Recommendations:** Department of Health in Kakamega County should put in place strategies aimed at increasing awareness on importance for second dose of measles-containing vaccine, conducting outreach services in hard-to-reach areas and ensuring that there are no missed opportunities when children present themselves for other health services. A wider study should be conducted in all the other counties and sub counties in Kenya.**80. The use of Disability Adjusted Life Years to evaluate health programs: a case study for a tuberculosis program that utilised community health workers to support treatment adherence****Corresponding Author:** Jane Rahedi Ong'ang'o, jrnabongo@gmail.com**Co-authors:** Ong'ang'o JR**Affiliation:** KEMRI, Kenya**Introduction:** Disability Adjusted Life Year (DALY) is a common measurement unit for morbidity and mortality. It facilitates comparisons of all types of health outcomes. Disability Adjusted Life Years (DALYs) may be used for quantitative analysis of the burden of disease or to analyse the cost-effectiveness of alternative interventions. A DALY is a health outcome measure with two main components; Quality of life reduced due to a disability and lifetime lost due to premature mortality. This study aimed at measuring the cost effectiveness of utilising the Community Health Workers (CHWs) in Tuberculosis treatment adherence by using DALYs and cost measurements of treatment.**Methods:** A retrospective cohort study was conducted in selected health facilities using standard clinical records for each TB patient registered for treatment between 2005 and 2011. The cohort study had 2 comparison groups, one utilizing CHWs and other not. The effectiveness of utilising the CHWs was measured in terms of cost per DALY averted using the number of tuberculosis cases that were successfully treated being considered as averted. A comparison of mortality using DALY between the cohort that utilised CHWs and that which did not utilise was also used to assess effectiveness.**Results:** The study assessed 2778 tuberculosis patients and among them 1499 (54%) utilized CHWs for their TB treatment. The cost effect analysis revealed that the average cost per DALY averted for treatment success was higher (184 US\$) in the cohort that utilised CHWs compared to the non-utilising cohort (87 US\$). Use of CHWs resulted in better treatment success rate (82.15%) compared to not using at 72.25% ( $p$ -value  $< 0.001$ ). Utilising CHWs resulted in less DALYs (5688) from death compared to not utilising CHWs (5725). Of the patients who died, a majority 29% died within the first month of their treatment in the cohort that did not utilise CHWs compared to 14% in other comparison group.



**Conclusion:** Utilisation of CHWs for TB treatment adherence was highly cost effective with an average cost per DALY averted at USD 184.

### 81. Risk factors for cholera in Kayonza District: results from a matched case control study, Rwanda, 2016

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**Background/Introduction:** Cholera remains an important global cause of morbidity and mortality causing periodic epidemic disease. In Rwanda cholera is endemic in the districts surrounding Lake Kivu in Western Province. In January 2016, a cholera outbreak was reported in Kayonza district which had not experienced cholera in the past.

**Objective:** Determine risk factors associated with a cholera outbreak that occurred in the affected community.

**Materials and Methods:** Two controls were matched with one case by age group and neighborhood. A cholera case was defined as any resident of the affected villages presenting with acute watery diarrhoea since mid-December 2015 to end January 2016. Controls were randomly selected individuals from neighboring households. Data were obtained through review of clinical records and participants' interviews. Data were analyzed using STATA 13. Logistic regression was used to identify independent risk factors.

**Results:** A total of 87 participants including 29 cases and 58 controls were enrolled for the case-control study. The proportion of respondents with knowledge on cholera prevention was low in both controls (53.7%) and cases (45.4%). The proportion of clean latrines was higher among controls (70.7%) than among cases (51.7%). Seventy-seven percent (77.6%) and fifty-eight percent (58.6%) of controls and cases respectively treat drinking water. Close contact with someone having cholera (aOR=17.30, C.I: [1.84-162.69]; p=0.013); and never washing hands before eating (aOR=10.85, C.I: [1.59-74.10]; p=0.015) were variables found to be independently associated with cholera.

**Discussion:** Close contact with someone having cholera might be linked to cholera spread especially at household level where household members or neighbors are more likely to share the contaminated food or drink.

**Conclusion and Recommendation:** This outbreak was a person to person propagated outbreak most probably exacerbated by poor hygiene and close contact at individual and community level. Improving access to soap for hand washing and adherence to infection prevention and control measures can limit transmission to close contacts.

### 82. Who participates in One Health student clubs?

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**Background/Introduction:** One Health Student Club (OHSC) is a strategy used in pre-service training to promote experiential learning and support breaking disciplinary silos among the future One Health workforce. One Health Central and Eastern Africa, a network of 21 schools of Public Health and Veterinary Medicine has been supporting the creation and nurturing of One Health Student clubs for a couple of years.

**Objective:** To understand who participates in the OHSC activities and the motivation behind the participation.

**Materials and Methods:** We conducted an online survey for OHSC members from Uganda, Rwanda and Tanzania using qualtrics ([www.qualtrics.com](http://www.qualtrics.com)). Emails with a link to the survey were sent to all OHSC members with email addresses. Reminders to complete the survey were sent through social media, OHSC leadership, and emails. Data were exported to SPSS-PC for statistical analysis. Wordle<sup>TM</sup> as a word cloud generator.

**Results:** 22 respondents participated in the survey and 72% were male. Majority (83.2%) were bachelors' degree students, 6% diploma level, while 9% were post-graduate. Composition in terms of academic discipline was as follows: 38% veterinary medicine, 17% public health, 14% wildlife, 9% nursing, 5% human medicine, 3% zoology and conservation, and 5% others. Motivation to join and participate in OHSC activities was due to networking opportunities, learning opportunities, multidisciplinary collaboration benefits, support received from faculty, community outreach opportunities, Clubs' mission and vision, and potential for One Health in addressing challenges,

**Discussion:** OHSC has been effective in bringing together multidisciplinary teams of students and to build their skills in One Health. Majority of students participating are from science-based disciplines. However recent epidemics such as Ebola have highlighted the need to involve more disciplines in order to successfully manage such epidemics.

**Conclusion and Recommendation:** OHSC should promote targeted recruitment of members from other disciplines that are relevant to One Health.

**83. Using smart phones coupled with intelligent mobile and web apps for electronic system of disease surveillance in Tanzania**

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**Background/Introduction:** The disease surveillance of the 21<sup>st</sup> century is more complex and it requires to capture information from various sources; clinical, demographical, ecological and climatological data. All these are important in epidemic responses. However, such data, other than clinical cases, are not captured by the current official surveillance system in Tanzania.

**Objective:** Design and develop a tool that may facilitate the rapid capture of data of health related events from various sources and devise a mechanism to seamlessly integrate such data into national surveillance system to support the detection and management of disease outbreaks.

**Materials and Methods:** We convened an EpiHack event comprising of human and animal health experts, Information communication technology (ICT) experts to develop system requirements. From this we developed "AfyaData", a mobile and web application pair that combines easy data gathering (media, geo-tagged and text) and management, interactive feedback, decision support and public health analytics with graphing and mapping features. We then trained key stakeholders in Morogoro Urban and Ngorongoro district in Tanzania on using these tools and deployed it within their respective districts

**Results:** Over 58 digital forms have been created within four months to assist in the collection of data on health related events, ranging from official public and animal health disease surveillance, community based syndromic surveillance, environmental data forms to disease specific surveillance forms, with over 1000 forms submitted to the system. This demonstrates how mobile technologies may be used to simplify deployment of new surveillance systems for different types of data sources. Geo-tagging of data helped in locating events and monitor spatial progression of events over time. Data collected has the potential to be fed into national surveillance systems. Animal and public health officials have commended on the suitability of the tool to support national surveillance system in Tanzania.

**Discussion:** The integration of multiple data sources into national surveillance systems will require an ideological and paradigm shift in government planning and operations. Technically this relates to developing and sharing Application Programmers Interfaces that will make it possible for organizations with health relevant data to securely and seamlessly feed it into the national surveillance systems in near to real time.

**Conclusion:** Mobile and Web applications are better equipped as data collection and transfer tool for disease surveillance as they may include location, images and videos that are key data items that may aid in management of outbreaks

**84. Investigation of the risk factors contributing to persistence of schistosomiasis in Burera District (Case of Kagogo and Rugarama Sector)**

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**Co-authors:** Mindje M

**Affiliation:** University of Rwanda-College of Medicine and Health Sciences, School of Public Health, Environmental Health Sciences, Rwanda

**Background:** The tropical parasitic disease schistosomiasis is second to malaria in contributing to the overall chronic disease burden in the developing world. Schistosomiasis is a disease that is caused by genus *Schistosoma* that enter humans by attaching to the skin, penetrating it. Schistosomiasis is endemic in 76 countries, where 779 million people are at risk of infection; it is estimated that 207 million people are infected. World Health Organization reports that there were 593608 rwandese infected with schistosomiasis in 2009 and 610209 in 2010 with an overall prevalence rate of 2.7% and 70% among children living in close proximity to lakes Burera, Ruhondo and Muhazi and surrounding swamps. Burera district where the two lakes located accommodate Schistosomiasis prevalence 11% and 8.3% consecutively in Kagogo and Rugarama sectors.

**Methods:** A cross-sectional study was used to investigate factors contributing to persistence of Schistosomiasis in area.

**Results and Discussion:** The results showed that 17.4% do not have latrines, 39.3% use water from lake, 87.7% don't aware on schistosomiasis prevention, 58.1% of children swim in the lake and 18.4% fish in the lake. The prevalence of schistosomiasis in Burera District is positively associated with inadequate sanitation practices.

**Conclusion and Recommendations:** A multidisciplinary team in one health approach should plan a health education and provide clear and strategic guidance on the implementation of preventive measures of Schistosomiasis and on ensuring their sustainability.

**85. Client satisfaction with community case management of uncomplicated malaria in Bungoma County, Kenya****Corresponding Author:** C. Okutoyi**Co-authors:** Oule J, Jerop M, Musombi E, Nduri M, Manyonge L, Kandie J, Koech T, Karanja S, Gichuki R, Mungai M, Marita E**Affiliation:** Amref Health Africa, Kenya**Background:** Owing to the burden of malaria in Kenya, community case management of Malaria (CCMM) has been adopted to overcome barriers to prompt access to Malaria treatment as recommended by World Health Organisation. This initiative is part of the contributions to achieving malaria eradication. Community members' feedback is essential in evaluating the process as implemented by Amref Health Africa.**Objectives:** This study therefore sought to evaluate the extent to which clients were satisfied with Community Case Management of Malaria.**Method:** A cross-sectional study was conducted whereby a client satisfaction tool was administered to 381 clients offered CCMM services at household level. All suspected malaria tested by Community Health Volunteers (CHVs) were asked to consent to participate in the assessment. The inclusion criteria included individual or child must have been sick or presented with a new health problem or does not require urgent referral. Parameters used to measure satisfaction were availability of CHVs, convenience of getting CCMM service and promptness to respond to a call by CHVs. Data was analysed using descriptive statistics.**Results:** Average age of the respondents was 40 years, 81% were female and majority of respondents practised farming (61%). Majority (93%, 94% and 91%) of the clients were satisfied with availability (obtainability/readiness), convenience (suitability/ease) and promptness (timeliness/punctuality) to respond to a call by CHVs. They further felt that the time taken to conduct the test, explanations given on treatment and friendliness during CCMM was good (94%, 90%, and 95% respectively). Most (98%) of the clients considered CHVs a regular source of basic healthcare on Malaria. Health education received was highly perceived to be helpful (93%).**Discussion:** The community was satisfied with CCMM due to accessibility to diagnosis and treatment of uncomplicated malaria in relation to convenience, promptness and additional health education services received.**Conclusion and Recommendation:** Community satisfaction is key successful implementation of CCMM.**86. Factors determining the utilization of impregnated mosquito net for malaria prevention in Burundi: a quantitative study****Corresponding Author:** Prosper Niyongabo, niyopro@yahoo.fr**Co-authors:** Niyongabo P**Affiliation:** National Institute of Public Health**Background:** Since the Abuja summit in 2000, where heads of state gave their commitment to roll back Malaria, efforts were made in Africa to enhance Malaria prevention. At the core of all strategies for prevention, lies the use of impregnated mosquito nets. In Burundi, although the use of mosquito nets was adopted as the key national strategy for Malaria prevention, little is known in regard with factors favoring or hindering its use. A study was conducted in eight provinces of Burundi in 2013 with the aim of identifying factors associated with utilization of mosquito nets.**Method:** A questionnaire was used in household survey using sample size of 2520 households to collect data from the community in regard with the utilization of mosquito nets. Bivariate and multivariate analysis was performed for data analysis as well as a linear regression to analyze data. SPSS software facilitated calculations and analysis.**Results:** Only 60% of the study participants use permanently the impregnated mosquito net. Factors like the old age, the single marital status; being uneducated, large size household, living in rural area; the perceived cost of the mosquito net, living in a traditional house and the unavailability of mosquito net in the community appeared as hindering the use of mosquito nets in Burundi. In addition, there is no cultural or social beliefs that stand at odds of mosquito nets utilization in Burundi.**Discussion:** Newly introduced in Burundi, mosquito nets face no particular challenge to be utilized by the Burundian community. Factors determining the use of mosquito nets in Burundi were found also elsewhere.**Recommendations:** Mosquito nets should be made available at private market in Burundi to enhance their utilization.

## SYMPOSIA ABSTRACTS

### **S1. Lessons learnt from Ebola and highly pathogenic avian influenza H5N1: way forward for preparedness for and control of outbreak.**

USAID Preparedness & Response Project  
East and Central Africa Region  
Kampala, Uganda

Over the last decade, East African Community (EAC) partner states have experienced a number re-emerging infectious diseases outbreaks of regional and international concerns. The 2014 unprecedented Ebola outbreak in West Africa put at risk the EAC partner states and the airlines companies of some countries were negatively affected financially. On the other hand, between 2005 and 2006 there was a threat of highly pathogenic avian influenza H5N1 (HPAI H5N1). Similar to the Ebola threat, countries worldwide have developed and operationalized preparedness and response to address that particular pandemic threat.

Such public health events, which occur most of the time at the Environment-Animal (Domestic, Wildlife)-Human interface, pose serious security threat and disrupt countries' economic growth and development. As such, they have spurred East African Community to develop, establish and operationalize a number of mechanisms and tools to address them.

The mechanisms and tools that have been operationalized include, among others the East Africa Health Research Commission (EAHRC), the East, Central and Southern African Health Community (ECSA), the East Africa Integrated Disease Surveillance Network (EAIDSNet), the East Africa Public Health Laboratory Network (EAPHLNP), and the East Africa One Health Contingency Plan for Epidemics due to Communicable Diseases, Conditions and other events of public health concern.

Since 2014, and simultaneously to the Ebola outbreak in West Africa, several West and Central Africa countries declared outbreaks of HPAI H5N1. Very recently on January, 2017, the Government of Uganda declared an outbreak of HPAI H5N8. Following the alert, most of EAC partner states have reactivated and reviewed their 2006 HPAI H5N1 contingency plans, while some countries have rolled out active surveillance on Wildlife. In this regard, an EAC coordination meeting took place to discuss country epidemiological status and needs.

Although these regional mechanisms and tools are operationalized, including activation and revision of contingency plans, important questions still remain regarding the level of country preparedness, to prevent, detect and respond to public health events of unknown and known etiology and how these regional mechanisms and tools are enhancing countries' capacity as first responders.

The symposium aims to foster greater understanding of the experiences and lessons to date from East, Central and West African countries in preparedness and response to Ebola, HPAI H5N1 and H5N8. The symposium will be focusing on critical factors that have enabled or posed barriers to develop, activate and operationalize countries and regional preparedness and response plans, including political, human and financial resources, organizational issues and operational dynamics.

### **S2. Managing recurrent epidemics: experiences and opportunities for strengthening preparedness and control of epidemics in EAC**

East Africa Public Health Laboratory Networking Project/East Central and Southern Africa-Health Community  
Arusha, Tanzania

The burden of communicable diseases is high in all Partner States of the East African Community. Because over 60% of the increasingly more frequent emerging and re-emerging diseases are zoonotic and over 80% of reported illnesses are associated with environmental sanitation, the need to adopt a One Health Approach to disease control in the region is underscored. The East African Integrated Diseases Surveillance and Response Network (EAIDSNet) and the East Africa Public Health Laboratory Networking Project (EAPHLNP) which is coordinated at the East, Central and Southern Africa Health Community (ECSA-HC) collaboratively work together to improve disease surveillance in the region. The two jointly organize an epidemiological symposium at every biennial East African Community Health and Scientific Conference. Participants invited include officials from Ministries responsible for health in all EAC Partner States; guest speakers; scientists involved with the Operations Research program of the EAPHLNP; EAC; ECSA-HC and funding partners. All interested conference participants may attend.



The theme of the 4<sup>th</sup> Epidemiological Symposium to be held at the 6<sup>th</sup> EAC Health and Scientific Conference in Bujumbura is “Managing recurrent epidemics: Experiences and opportunities for strengthening preparedness and control of epidemics in EAC”. It is in line with the conference theme of “Preparedness for and control of disease outbreaks, epidemics, and pandemics, in the context of climate change, globalization, and gaps in health systems”. The symposium will have five sessions i) Experiences and lessons in managing recurrent disease outbreaks in East Africa, which will discuss what is envisioned in terms of efforts to stem further occurrence of epidemics; ii) Generating evidence to inform diagnostics, treatment and control of outbreaks—will offer experiences of EAPHLN Operations Research team in providing applicable evidence for the role of the laboratory in disease surveillance; iii) Antimicrobial resistance as a public health concern: current and future actions—will provide an overview of the AMR situation in the region; iv) Role of primary health care facilities in supporting diagnostics and management of outbreaks—will discuss the important role played by the PHC health workers who first get reports of outbreaks and are usually first responders and v) Advances in promoting One Health Approach interventions in the region, which will discuss the need to involve a multidisciplinary and multi-sectoral approach in prevention and control of infectious diseases in the region.

A guest speaker will deliver a ground-breaking key note presentation at the beginning of every session. The invited speakers are high caliber scientists with experience in the field of discussion, in the EAC region. This will be followed by 3-4 abstracts to support the theme; and this will be followed by discussion in a plenary. The discussions will end up with resolutions which the rapporteur will compile and send to the conference secretariat for inclusion in the conference report.

### **S3. Antimicrobial agents use, antimicrobial resistance and policy on antimicrobial agents in the East African Community**

TWENDE Consortium, Arusha, East Africa

Multiple factors including the way antimicrobial agents are used in human medicine, agriculture and inability to implement medicines regulatory policies drive development and spread of antimicrobial resistance (AMR)<sup>1</sup>. The O’Neill Commission review warned that failure to act on AMR would result in an additional 10 million lives lost each year to drug-resistant strains of malaria, HIV, TB, and certain bacterial infections by 2050, at a cost to the world economy of 100 trillion USD<sup>1,2</sup>. On the 21<sup>st</sup> of Sept 2016, the UN general assembly acknowledged AMR as a global health threat and declared their commitment to fight it<sup>3,4</sup>. At this meeting, countries reaffirmed their commitment to develop national action plans on AMR, as stipulated in the *Global Action Plan on Antimicrobial Resistance*—the blueprint for tackling AMR<sup>5</sup>. In line with the action plan, countries are expected to investigate the magnitude of the problem, stop misuse of antimicrobial medicines, strengthen surveillance systems to monitor anti-microbial infections and the volume used in humans, animals and crops<sup>3</sup>. The symposium will attempt to put these issues into the East African Community perspective and draw points for AMR action plan for the region. The main goal of the symposium will be to highlight what the EAC member States should do to prevent emergence antimicrobial resistance or manage antimicrobial resistance infections.

The symposium theme will be, “Antimicrobial agents use, antimicrobial resistance and policy on antimicrobial agents in the East African Community (EAC)”. The theme is broken down the theme into sub-topics from which the presentations and discussions will be drawn:

- The Global action plan on AMR: what implementation lessons can be drawn by the EAC?
- Situation analysis of the use or misuse of antimicrobial agents in EAC in relation to the rest of Africa
- The magnitude, transmission dynamics, and drivers (biological, health system, socio-economic etc) of antimicrobial resistance in EAC.
- The human – animal (and agricultural) interface impact on the use of antimicrobial agents and spread of antimicrobial resistance.
- Do EAC member states have policy and regulatory framework on the use of antimicrobial agents – to what extent are these policies being practiced?
- To what extent is research evidence being used in formulating policy on use of antimicrobial agents?
- Situational analysis of the capacity (laboratory, clinical, community health etc) of health systems among EAC states to prevent or manage antimicrobial resistance
- National antimicrobial resistance task forces – challenges and opportunities in addressing the use or misuse of antimicrobial agents.

The symposium will bring together researchers, policy makers and the wider public from EAC members States and beyond. The 2.5h session will take the format of short thought provoking presentations by expert researchers in the field of antimicrobial research followed by panel discussion with policy makers and implementers.

#### **S4. Strengthening collaboration between civil society and key research stakeholders in promoting health research and innovation in Africa**

Programme for Appropriate Technology in Health (PATH)  
Nairobi, Kenya

Africa has made notable gains in improving its health outcomes with several countries having reduced child mortality, maternal deaths and turned around the HIV epidemic among others. Civil society organizations (CSOs) have been key contributors to these efforts through partnerships with governments and other health stakeholders to advance the health of Africans through community health promotion, service provision, outreaches and resource mobilization. Participation in local and global policy processes include trade agreements and health, access to drugs and pricing, international conventions and treaties on health related issues and debates around policies and public health standards. These developments within the health systems at local, national and global level signal that CSOs are an important channel for public involvement.

Despite these contributions by civil society, there is ambivalence in the African states towards CSO roles in community organization, research, monitoring and holding policy makers and duty bearers accountable. African States need to closely work with civil society to better organize the social dimensions of health actions and strengthen public accountability and responsiveness within health systems.

This forum organized by PATH will engage experts from across sectors and disciplines including researchers, policy makers, civil society and private sector to catalyse a discussion on need and ways of strengthening civil society engagement in promoting scientific research, community engagement, policy development and implementation. This dialog will contribute to shaping shared understanding and strengthening linkages that will promote recognition of the catalytic role that advocacy will play in creation of an enabling policy and investment environment to drive research and innovation in Africa. Discussions will also focus on roles CSOs play in promoting global health research and development to achieve a national and regional health, social and economic development.

#### **S5. Academic Health Centres: an important part of the health improvement agenda in low and middle-income countries.**

Aga Khan University Nairobi, Kenya

The objective of the is to define the potential impact that Academic Health Centres (AHC) can have on health outcomes in low and medium-income countries and identify strategies for improving the effectiveness of these systems.

There is increasing recognition both in high resource countries (HRC) and in low- and middle-income countries (LMIC) that improvements in quality, access and cost of health care will principally come about through a population-based health systems approach to service delivery that is continuously learning and adapting. This requires a level of collaboration between government and institutions that is often challenging to achieve with often multiple ministries within government having a portion of the mandate; often strained relations between the universities who have the primary mandate for education and research and the health care delivery organizations and most often each operating under separate governance structures. However, there is good evidence, mostly from HRCs that where there is strong collaboration between a university and a hospital or hospital health system, defined together as an Academic Health Centre (AHC), the impact in terms of education, research and clinical care can be enormous. These AHCs create an important infrastructure for a region, bringing a high quality sustained workforce and generating economic opportunity. Increasingly in these settings the institutions are moving to think in terms of populations and systems (Academic Health Systems) rather than simply a relationship between a university and a hospital. Evidence indicates that separate governance is not the barrier to success but instead the barriers relate to not having the right leaders who can share a common vision and mission and have the understanding and skills required to build the structures, incentives and accountabilities that drive collaboration. Building linkages between academic institutions across health disciplines and more effective linkage to health service delivery systems was a central recommendation coming from the Lancet Commission on Health Professionals for the 21<sup>st</sup> Century. The symposium will explore successful models and identify potential strategies and resources that can support development of academic health systems in LMIC settings.

The outcome of the Symposium will be an increase in understanding of the elements of and importance of academic health systems. The Symposium will provide evidence of systems that are working well and those that are struggling. If sufficient interest is generated from participants, then consideration will be given to establishment of an East Africa Chapter of the Association of Academic Health Centres International (<http://www.aahci.org/>) to support further development of this strategy as a contribution to health system strengthening in the East African community.

## ABSTRACT TITLES

Alphabetical list, numbers represent abstract numbers

- 15 A false reported typhoid outbreak due to inadequacies in typhoid surveillance
- 57 A measles outbreak propagated by children congregating at water collection points: Mayuge District, Eastern Uganda, October 2016
- 33 A situational analysis of multi-drug resistance among clinical isolates of *Staphylococcus aureus* in Mbale Regional Referral Hospital-Uganda
- 39 *Aeromonas caviae* mimicking *V.cholerae* infectious enteropathy in a cholera-endemic region-a case report
- 24 Antibiotic resistance in isolated bacteria from lesions of Tungiasis patients in Vihiga County, Western Kenya
- 32 Antibiotic sensitivity patterns of amniotic fluid cultures from women with premature rupture of membranes in Mulago Hospital Kampala Uganda: a cross sectional study
- 37 Antimicrobial activity of *Moringa oleifera*, *Aloe vera* and *Warbugia ugandensis* extracts on multidrug resistant *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*
- 35 Antimicrobial resistance in pathogenic aerobic bacteria causing surgical site infections in Mbarara Regional Referral Hospital, Southwestern Uganda
- 22 Antimicrobial susceptibility patterns of Mastitis staphylococcus aureus from bovine and caprine in peri-urban Nairobi, Kenya
- 29 Antimicrobial susceptibility testing in Uganda: preliminary results and challenges
- 61 Assessing health care services delivery for sexually transmitted infections in selected health facilities in Rwanda, 2014
- 41 Bacterial superglue generates VLP based full-length CSP protein virus-like particle vaccine capable of inducing high and durable antibody responses
- 78 Bat management: A contribution to prevention and control of emerging and re-emerging infections in Kasese District: a One Health approach
- 18 CESSARI-A research initiative on Cystic Echinococcosis in sub-Saharan Africa
- 8 Characterizing mobility among key and vulnerable populations along Kenyan borders
- 59 Cholera outbreak caused by drinking lakeshore water contaminated by feces washed down from a hill-side residential area: Kaiso Village, Uganda, October 2015
- 85 Client satisfaction with community case management of uncomplicated malaria in Bungoma County, Kenya
- 69 Climatic spatial models to guide surveillance and prevention of epidemic arboviral infections in Tanzania
- 11 Cluster of meningococcal meningitis in a rural district of Western Province, Rwanda, 2015
- 62 Community-based one health participatory disease surveillance using digital and mobile technologies in Tanzania
- 1 Comparative efficiency of *Biomphalaria pfeifferi* and *B. sudanica* as intermediate host snails for *Schistosoma mansoni* and its implications on transmission of schistosomiasis in Kenya.
- 10 Diversity and *Leishmania* tropical infection rate in sand flies from an endemic focus of cutaneous leishmaniasis in Gilgil Area, Nakuru County, Kenya.
- 52 Economic impact of contagious Caprine Pleuropneumonia and Peste des Petits Ruminants in small ruminants in pastoral communities: case of Ngorongoro and Coastal Districts, Tanzania
- 63 Effectiveness of expanded delivery mechanisms/channels and empowerment of caregivers in improving access of ORS and Zinc in Narok County, Kenya
- 73 Effectiveness of family support group initiatives in promoting the health of HIV positive mothers participating in EMTCT programmes
- 72 Engagement of community health workers in prevention of mother-to-child transmission of HIV (PMTCT): a qualitative study from fishing communities of Musoma Rural and Sengerema Districts
- 51 Establishment of ethical oversight of human research in Tanzania: A case in Tanzania and lessons learned
- 74 Evaluating adherence to testing and treatment procedures by community health volunteers in community case management of malaria, Bungoma County, Kenya
- 50 Evaluation of disease surveillance systems in Rwanda, using rabies as case study
- 12 Evaluation of Shigellosis surveillance system in Rwanda, 2014
- 19 Evaluation on regulation of antibiotics consumption in Bujumbura
- 71 Explorative survey of socio-epidemiological determinants of cutaneous leishmaniasis in an endemic focus in Gilgil, Kenya
- 48 Factors affecting access to health services at the Busia (Kenya/Uganda) cross-border area
- 86 Factors determining the utilization of impregnated mosquito net for malaria prevention in Burundi: a quantitative study

- 21 Fitness cost of resistance for lumefantrine- and piperazine-resistant *Plasmodium berghei* in a mouse model
- 68 Fluconazole resistant opportunistic *Candida* sp isolates on the external surfaces of hospital cockroaches
- 20 Frequency of uropathogens and antimicrobial susceptibility in childhood urinary tract infection at Kamenge University Hospital.
- 30 From antiretroviral therapy access to provision of third line regimens: evidence of HIV drug resistance mutations to first and second line regimens among Ugandan adults
- 6 Genetically determined response to Artemisinin Based Combination Therapy in Western Kenya *Plasmodium falciparum* parasites
- 38 Hospital epidemiology of Methicillin-Resistant *Staphylococcus aureus* (MRSA) in a tertiary care hospital in Moshi, Tanzania as determined by whole genome sequencing
- 5 Identification and characterization of Black *Aspergillus* fungi isolated from maize in aflatoxinogenic hot zones in Kenya.
- 46 Impact of an intervention to minimize over diagnosis of malaria cases in a low risk Kenyan Sub County.
- 45 Impact of *kdr* gene frequencies on major malaria vectors' host blood meal preferences in Teso sub counties, western Kenya.
- 84 Investigation of the risk factors contributing to persistence of schistosomiasis in Burera District (Case of Kagogo and Rugarama Sector)
- 47 Knowledge, attitude and practices in relation to prevention and control of schistosomiasis infection in Mwea Kirinyaga County, Kenya
- 43 Laboratory evaluation of antileishmanial activity of pyrethrin extracts of *Chrysanthemum cinerariaefolium* (Asterales: Asteraceae) plant
- 64 Leveraging horizontal models to develop healthcare capacity: LifeNet International's Conversion Franchise Innovation.
- 56 Management of malaria at community level in Bukedea District, Eastern Uganda
- 3 Mapping hotspots of chikungunya and dengue transmission in Northeastern Tanzania using disease exposure and vector data
- 28 Meta-analysis of proportion estimates of Extended-Spectrum-Beta-Lactamase-producing Enterobacteriaceae in East Africa hospitals
- 70 Mobility and health seeking behavior among key and vulnerable populations along selected East African borders
- 65 Modeling the disease burden of hepatitis C virus (HCV) infection in Burundi
- 23 Multi-drug resistant bacteria isolates recovered from herbal medicinal products in Nairobi, Kenya
- 66 Needlestick and sharps injuries among final year bachelor of veterinary medicine students at the University of Nairobi, Kenya
- 60 NGO practical experiences on implementing One Health zoonotic research: case studies of Brucellosis and Leptospirosis sero-survey in the Albertine ecosystem, Hoima District, South
- 75 Non compliance and associated factors leading to the prevalence of multi-drug resistant tuberculosis in Uganda
- 67 Occupational safety and health needs in Uganda: training and policy priorities
- 53 One Health research in northern Tanzania: challenges and progress
- 54 Patient's perspectives on use of mobile phones in HIV patient-care support: a descriptive study at Kibera and Baba Dogo health centers, Nairobi.
- 27 Patterns of infections, aetiological agents, and antimicrobial resistance at a tertiary care hospital in northern Tanzania
- 40 *Plasmodium falciparum* causing febrile infections express EPCR-binding PfEMP1
- 25 Prevalence and antimicrobial resistance of nontyphoid *Salmonella* in locally produced and imported broilers meat in Zanzibar, Tanzania
- 2 Prevalence and factors associated with hepatitis B and C infection in persons living with HIV enrolled in care in Rwanda
- 76 Prevalence and factors associated with self-reported STIs among HIV-positive individuals aged 15-49 years in Rwanda (2014-2015)
- 14 Prevalence and intensity of *Schistosoma haematobium* pre-post treatment with praziquantel in pre-school age children of Kwale County, Kenya
- 7 Protecting people and animals from high-impact disease threats: FAO's component of the USAID's Emerging Pandemic Threats Phase-2 (Ept-2) Programme
- 36 Quality of antibiotics-amoxicillin and cotrimoxazole in Nairobi County: number of brands circulating in selected Nairobi retail and hospital pharmacies.
- 81 Risk factors for cholera in Kayonza District: results from a matched case control study, Rwanda, 2016
- 13 Risk of neonatal mortality and its association with HIV infection among postnatal women attending Pumwani Maternity Hospital, Kenya.
- 44 Screening and assessment of K13 propeller gene for *P. falciparum* uncomplicated malaria after introduction of Artemether-Lumefantrine and Dihydroartemisinin-piperazine in Msambweni Coastal region, Kenya
- 77 Seasonal variation of *Culex quinquefasciatus* densities emerged from pit latrines in rural settings, Tanga Region, Tanzania



- 26 Spatial-temporal prevalence of enteric pathogenic bacteria associated with diarrhoea in under-five children, and their sensitivity against conventional antibiotics in Unguja Island, Zanzibar.
- 9 Surveillance for Acute Flaccid Paralysis (AFP), National Stop Transmission of Polio Mission in Kasese District, Western Uganda, September 2015
- 31 Susceptibility patterns of *Salmonella enterica* serovar Typhi during the 2015 typhoid outbreak in Kampala, Uganda.
- 42 Synthesis of a novel trioxaquine with potential to replace Artemether-Lumefantrine (Alu) for malaria chemotherapy
- 16 The effect of a developed insecticide in protecting maize grains against maize weevils and weight loss under semi-field condition
- 17 The impact of malaria and gastrointestinal helminthiasis co-infection on anaemia and severe malaria among children in Bugesera District, Rwanda
- 49 The policy context and health service delivery to key and vulnerable populations at cross border sites: experience from CB-HIPP Project, Kenya
- 4 The prevalence of *Leptospira* spp in rodents and shrews and its potential transmission to humans and animals in and around Queen Elizabeth National Park (QENP)
- 80 The use of Disability Adjusted Life Years to evaluate health programs: a case study for a tuberculosis program that utilised community health workers to support treatment adherence
- 55 The use of information communication technologies to support specific disease surveillance and management: using cholera as an exemplar disease in Tanzania
- 34 Triazole resistance and sequence analysis of *Aspergillus Fumigatus* from experienced and naïve soils in Naivasha Sub-County and Nairobi County
- 58 Tuberculosis infection control capacity and influencing factors among private facilities in Mbale District, Eastern Uganda
- 79 Uptake of second dose of measles-containing vaccine among children in Kakamega County, Kenya
- 83 Using smart phones coupled with intelligent mobile and web apps for electronic system of disease surveillance in Tanzania
- 82 Who participates in One Health student clubs?

# INDEX

Numbers represent abstract numbers

## A

Aarestrup FM, 27, 28, 38  
 Abdi M, 5  
 Abunah B, 54  
 Achacha L, 10, 71  
 Adam I, 78  
 Adolphe N, 84  
 Aga Khan University, S5  
 AIDS Healthcare Foundation, 46  
 Akala HM, 6  
 Akello B, 9  
 Alifrangis M, 27, 28, 38  
 Amto R, 45  
 Amoke D, 45  
 Ampaire L, 35  
 Amref Health Africa, 54, 63, 74, 85  
 Andagalu B, 6  
 Ario AR, 59  
 Atieli F, 45

## B

Baraka E, 68  
 Barasa, MB, 47  
 Barugahare JB, 17  
 Bazeyo W, 67, 82  
 Beda E, 55, 62, 83  
 Bidii N, 6  
 Bigala EEK, 4  
 Bii C, 5, 23, 24, 34  
 Bikaako W, 82  
 Bosco GJ, K5  
 Braun SD, 31  
 Bukuru H, 20  
 Buregyeya E, 67  
 Burundi, 19, 20, 65  
 Busitema University, 33, 56  
 Buule J31,

## C

Candiga P, 56  
 Chamba N, 39  
 Chege C, 46  
 Cleaveland S, 53  
 Conservation and Ecosystem Health Alliance (CEHA), 60

## D

Davis A, 53  
 de Glanville WA, 53  
 Dekker MCJ, 39

Dominic T, 60  
 Downing RG, 31

## E

East Africa Public Health Laboratory Networking  
 Project, S2  
 East Central and Southern Africa-Health Community, S2  
 ECTAD/FAO Kenya, 7  
 Ediau M, 58  
 Egondi T, 8, 70  
 Ejobi F, 29  
 Emidi B, 16, 77  
 Environmental Health Sciences, 84  
 Ethiopia, 7

## F

Fasina F, 7  
 FHI 360, 8, 48, 49, 70  
 Forde TL, 53

## G

Gathirwa JW, 36  
 Gatumwa EM, 5  
 George J, 52  
 Gichuki R, 54, 74, 85  
 Gimode WR, 21  
 Githinji EK, 45  
 Githuku J, 79  
 Gono T, 5

## H

Habtu M, 13  
 Haesler B, 52  
 Hakizimana JL, 11, 12, 81  
 Halage AA, 67  
 Halliday JEB, 53  
 Hamad H, 25, 26  
 Hassan N, 25  
 Havyarimana C, 19  
 Haydon TD, 53  
 Hope D, 35  
 Horie, 5  
 Hughues P, 31

## I

Ibrahim A, 25, 26  
 Igunza PN, 54  
 Ikingura JK, 51  
 Ingasia L, 6  
 Ingonga J, 10, 71

Innovations in Healthcare, 64

Iramiot JS, 33

Irimaso E, 50

Irungu BN, 36

Irungu L, 45

## J

Jaoko W, 23

Jared O, 76

Jerop M, 74, 85

Jespersen JS, 40

Jobre Y, 7

Jomo Kenyatta University of Agriculture and  
Technology, 34, 79

Juma D, 8, 48, 49, 70

## K

Kabasa D, 82

Kabia E, 54

Kadobera D, 57

Kafuye MY, 51

Kagawa MN, 75

Kairanya M, 56

Kajeguka DC, 3

Kaleebu P, 30, 31

Kamau E, 6

Kamau J, 22

Kamau L, 8, 48, 49, 70

Kandie J, 74, 85

Kang'ethe, 37

Kapaata A, 30

Karabyo S, 56

Karanja S, 74, 85

Karema C, 17

Karimuribo BD, 52

Karimuribo E, 55, 62, 83

Kasamba, 30

Katumwa K, 56

Kavishe A, 3

Kavishe R, 40

Kawana S, 5

Kayongo B, 67

Kazooba P, 30

KCM University College, 41

Keller C, 64

Kemei B, 45

Kemoi E, 34

KEMRI, 1, 5, 10, 14, 23, 24, 36, 43, 44, 45, 47, 71, 80

Kenya, 1, 5, 6, 8, 10, 13, 14, 21, 22, 23, 24, 34, 36, 42, 43, 44,  
45, 46, 47, 48, 49, 54, 63, 66, 70, 71, 74, 79, 80, 85, S4, S5

Kenya Medical Training College, 13

Kenya University, 21

Kern P, 18

Keter L, 23, 36

Kibiki G, 27, 28, 38, 53

Kiggundu C, 75

Kigundu EVM, 36

Kihara JH, 14

Kilimanjaro Christian Medical Centre, 28

Kilimanjaro Christian Medical University College, 3, 16,  
40, 72, 77

Kilimanjaro Clinical Research Institute, 27, 28, 38, 39, 40

Killewo J, K1

Kilonzo KG, 39

Kimani BW, 14, 44

Kimeli P, 22, 66

Kimera SI, 69

Kintu JO, 56

Kinyanzwii, 44

Kiondo P, 75

Kipyegon AN, 22, 66

Kirira PG, 37

Kirui G, 22, 66

Kisinja WN, 77

Kitua AY, K2, K4

Kitungulu B, 8, 48, 49, 70

Kivaria F, 7

Kiwelu L, 53

Kizito H, 73

Koech CL, 36

Koech T, 74, 85

Kombe Y, 13

Korir RK, 5, 23, 24

Kulkani M, 3

Kumburu H, 27, 28, 38, 39

Kung'u J, 63

Kusiima J, 15

Kutima HJ, 79

## L

Ladbury G, 53

Laidemitt MR, 1

Lasman JL, 33

Lavstsen T, 40

Leetcharoenphon P, 38

Lelo AE, 1

Lembo T, 53

Lifenet International, 64

Loker ES, 1

Lorna JC, 6

Lu L, 1

Lukjancenkenko O, 38

Lund O, 27, 28, 38

Lusingu J, 40

Lutaakome J, 30

Lyagoba F, 30

## M

Magambo J, 18

Majwala RK, 57

Makerere University, 4, 9, 29, 58, 67, 78  
Makokha A, 13  
Makokha FM, 79  
Makumbi I, 31  
Makuraza F, 19  
Makuza JD, 2  
Makwaga O, 24  
Malamba S, 76, 81  
Mangesho PE, 52  
Maniga J, 17  
Manirakiza M, 19  
Manirakiza S, 20  
Manyonge L, 74, 85  
Marita E, 74, 85  
Maro V, 53  
Maseke RM, 72  
Mashedi O, 5, 34  
Massaga JJ, 51  
Mathenge E, 45  
Matondo S, 41  
Matsuzawa T, 5  
Mayanja B, 30  
Mayora C, 58  
Mbae C, 18  
Mbale Regional Referral and Teaching Hospital, 75  
Mbarara University of Science and Technology, 35  
Mbiti E, 63  
Mbituyumuremyi, A, 2  
Mboera L, 55, 62, 69, 83  
Mbogo C, 45  
Mbugua A, 14  
Medical Research Council, 31  
Menge D, 46  
Mindje M, 84  
Ministry of Health, 15  
Mkoji GM, 1  
Mkumbaye S, 40  
Mlangwa JED, 52  
Mloka DAS, 68  
Mmbaga BT, 27, 38, 39, 53  
Mochache DM, 13  
Mogoa EM, 66  
Morogoro, 55  
Morzaria S, 7  
Mosha FW, 3, 77  
Mount Kenya University, 37, 42  
MRC/UVRI Uganda Research Unit on AIDS, 30  
MSF/Epicentre Mbarara Research Centre, 35  
Msuya SE, 72  
Muasya D, 22  
Mugambe RK, 67  
Mugisha L, 60  
Muhimbili University of Health and Allied Sciences, K1, 68  
Muhuha A, 37  
Muhula S, 54

Mulinge E, 18  
Munderi P, 30  
Mungai M, 74, 85  
Munyaneza T, 17  
Muregi FW, 21, 42  
Muroki D, 8, 48, 49, 70  
Musaba MW, 75  
Mushi D, 72  
Musunguzi G, 67  
Musombi E, 74, 85  
Mutebi A, 78  
Muthuka JK, 46  
Muthuka JK, 13, 46  
Mutua J, 63  
Mutuku MW, 1  
Muwanguzi E, 35  
Mwabukusi M, 55, 62, 83  
Mwangi IN, 1  
Mwangi J, 45  
Mwangi WE, 22, 66  
Mwayi JA, 47  
Mweya CN, 69  
Mwiine FN, 50  
Mwikwabe N, 36  
Mwitari P, 24

## N

Nabriye J, 58  
Naigaga I, 82  
Nakiire L, 57  
Nalweyiso C, 9  
Namakoola IBM, 30  
Namirimo B, 56  
Nampijja P, 58  
Namugamba A, 9  
Nannono MV, 56  
Nassor M, 25  
National Institute for Medical Research, 62, 69  
National Institute of Public Health, 86  
Nattimba M, 82  
Nde H, 65  
Ndegwa P, 45  
Ndejjo R, 67  
Ndirahisha E, 20  
Nduri M, 74, 85  
Nduwayo E, 20  
Ndyetabura T, 53  
Neebye R, 67  
Newman S, 7  
Ngaruko DS, 52  
Ngetich R, 24  
Ngomirakiza JB, 20  
Ngumbi P, 10, 71  
Nile Basin Discourse Forum, K5  
NIMR, 51



Nisubire D, 20  
 Niyongabo P, 86  
 Nizeyimana F, 11  
 Njenga SM, 47  
 Njomo DW, 14  
 Njuguna J, 46  
 Nsanzimana S, 2, 61  
 Nshimiyimana E, 11  
 Nsimire J, 31  
 Ntaganira J, 76, 81  
 Ntagirabiri R, 65  
 Nyagero J, 63  
 Nyamusore J, 11, 12, 81  
 Nyandwi J, 19, 20  
 Nyangacha RM, 24  
 Nyerere A, 34  
 Nyombi B, 39  
 Nzietchueng S, 50  
 Nzou J, 46

## O

Ochanda O, 1  
 Ochwoto M, 24  
 Odero P, 64  
 Odikro MA, 58  
 Odiwuor S, 10, 71  
 Odongo D, 24  
 Oguttu DW, 59  
 Oindo M, 8, 48, 49, 70  
 Okech SG, 50, 78  
 Okullo EA, 59  
 Okutoyi C, 74, 85  
 Okware S, K3  
 Olenja J, 48, 49  
 Omar M, 25, 26  
 Ombok M, 45  
 Omolo J, 11, 12, 81  
 Omondi E, 54  
 Omu A, 23  
 Ondicho J, 36  
 One Health Central and Eastern Africa, 82  
 Ong'ang'o JR, 80  
 Onyuth H, 78  
 Orwa JA, 36  
 Oule J, 74, 85  
 Oyet C, 35  
 Oyieke F, 24

## P

Pelican K, 60  
 Petersen JEV, 40  
 Programme for Appropriate Technology in Health (PATH), S4  
 Public Health Fellowship Programme, 15, 57

## R

Rabia A, 25  
 RBC, 2, 61, 76  
 Robbins S, 65  
 Romig T, 18  
 Ruttoh RK, 43  
 Rwanda, K5, 2, 11, 12, 17, 50, 61, 76, 81, 84  
 Rwanda Biomedical Center, 11, 12, 81  
 Rweyamamu M, 52, 55, 62, 83

## S

Sabah, 44  
 School of Public Health, 58, 84  
 Sebuho D, 76  
 Sekimpi DK, 67  
 Semakura M, 81  
 Sente C, 78  
 Sharp J, 53  
 Sigei E, 34  
 Simai B, 25, 26  
 Simmons B, 2, 76  
 Sindato C, 55, 62, 83  
 Sokoine University of Agriculture, 55, 83  
 Sonda T, 27, 28, 38, 39  
 Southern African Centre for Infectious Disease Surveillance, 83  
 Ssempebwa JC, 67  
 Suleiman M, 10, 71

## T

Tabora, 62  
 Tadesse Z, 7  
 Tanzania, K1, 3, 7, 16, 25, 26, 27, 28, 38, 39, 40, 41, 51, 55, 62, 68, 69, 72, 77, 83, S2, S3  
 Tegule SS, 29  
 Thaiyah A, 22, 66  
 The Open University of Tanzania, 52  
 The State University of Zanzibar, 25, 26  
 Theander TG, 40  
 Thomas K, 53  
 Tindyebwa T, 78  
 Tolo F, 24  
 Too EK, 44  
 TWENDE Consortium, S3  
 Twizerimana H, 35

## U

Uganda, K2, K3, K4, 4, 7, 9, 15, 29, 30, 31, 33, 35, 56, 57, 58, 59, 60, 67, 73, 75, 78, 82, S1  
 Uganda Martyrs University, 73  
 Uganda National Health Research Organisation, K3  
 Uganda Public Health Fellowship Program, 59  
 Umulisa N, 17  
 Umutesi J, 2, 61, 76

Umwanankundi M, 17  
United States Army Medical Research Directorate, 6  
University of Burundi, 19, 20, 65  
University of Gitwe, 17  
University of Glasgow (UK), 53  
University of Nairobi, 22, 66  
University of Rwanda, 50, 84  
Urasa SJ, 39  
URT, 53  
USAID EPT2, K2, K4, S1  
Uwimana JM, 2

## V

van Zwetselaar M, 28, 38, 39

## W

Wakabi T, 82

Wamakima HN, 42  
Wampande LN, 73  
Wandabwa JN, 75  
Wang CW, 40  
Wang J, 67  
Wanjala PM, 79  
Wanjoya A, 45

## Y

Yaguchi T, 5  
Yawe A, 82

## Z

Zadoks R, 53  
Zeyhle E, 18  
Zhu BP, 59



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