The 30th Annual Joint Scientific Conference

NATIONAL INSTITUTE FOR MEDICAL RESEARCH

Achieving the Sustainable Development Goals: Investing Innovative Research to fill the Critical Gaps

Julius Nyerere International Convention Centre, Dar es Salaam, Tanzania
October 4-6, 2016

Programme and Abstract Book
CONFERENCE ORGANIZATION

Organizing Committee

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Dr. Julius J. Massaga  Mr. Godfrey Kisiga
Mr. Obedi S. Ole Kaondo  Ms. Irene R. Mremi
Dr. Susan F. Rumisha  Ms. Goodness Mrema
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The 30\textsuperscript{th} Annual Joint Scientific Conference

\textbf{Background}

The 30\textsuperscript{th} Annual Joint Scientific Conference (AJSC) of the National Institute for Medical Research will be held at the Julius Nyerere International Convention Centre in Dar es Salaam, Tanzania from October 4-6, 2016. The goal of AJSC is to foster and facilitate communication and collaboration between scientists, trainers, policy makers, donors, students and the media. The conference will feature speakers discussing the latest research elucidating the need for innovative research to address the Sustainable Development Goals.

The conference theme is “\textit{Achieving the Sustainable Development Goals: Investing Innovative Research to fill the Critical Gaps\textsuperscript{,}}” which covers a wide range of critically important sessions from basic research to recent innovations in health systems, communicable and non-communicable diseases and social determinants of health. The Conference Opening Ceremony will be graced by Her Excellency Samia Suluhu Hassan, The Vice President of the United Republic of Tanzania. The opening Ceremony on October 4, 2016 will be marked by the presence of Minister for Health, Community Development, Gender, Elderly and Children, Hon. Ummy Mwalimu and officials and renowned researchers from different research institutions of the country and abroad. During the Opening ceremony, Organizers will briefly outline the 30 years’ history of the Conference, highlighting the success and benefits that AJSC has drawn in terms of communicating research findings to users as well establishing and cementing collaboration with local and international institutions.

The Conference theme will address the Goal 3 of the SDG, i.e. \textit{Ensure healthy lives and promote well-being for all at all ages.} The Goal 3 targets to be covered by the Conference include the following: By 2030, (i) reduce the global maternal mortality ratio to less than 70 per 100,000 live births; (ii) end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births; (iii) end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases; (iv) reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being; (v) ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes; and (vi) Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks. The Conference is therefore organized in the following sub-themes/symposia:

\textbf{Strategic approach to Reproductive, Maternal, Newborn, Child and Adolescent health}

The United Republic of Tanzania has identified many economic and social development challenges as national priorities. Consistent with the health global development goals, Tanzania’s national development priorities address public health and healthcare challenges including those related to reproductive, maternal, newborn, child and adolescent health. Maternal mortality ratio and under five mortality rates are still among the major challenges facing the health sector in Tanzania. Although Tanzania has witnessed a decline of maternal mortality ratio from 870 per 100,000 live births to 410 per 100,000 live births, the annual reduction rate of 3.2\% is lower than the UN recommended rate of at least 5\%. This session will provide better opportunity to bring together researchers, stakeholders and policy makers working on the areas to share their new research findings, experiences and deliberate on the best approach in addressing the problem.
**Chronic non-communicable diseases in Sub-Saharan Africa: current burden and challenges**

Chronic non-communicable diseases (cNCDs) are a serious public health threat to low and middle income countries (LMIC). Major cNCDs include cardiovascular diseases, diabetes, chronic obstructive pulmonary diseases and cancers. These account for two thirds of all deaths world-wide. Tobacco use, poor diet, physical inactivity and alcohol are the four most common risk factors for cNCDs. Nearly one-fifth of the burden of chronic NCD in LMIC arises in the elderly. Health systems in most LMICs are poorly prepared to deal with the burden of cNCDs. Human resource for prevention and management of NCDs is limited. If neglected, chronic non-communicable diseases are likely to eventually cripple national development and health systems. In 2011, WHO endorsed a Global action plan for the prevention and control of NCDs (2013-2020). This plan aims to reduce the number of premature deaths from cNCDs by 25% by 2025. The objective of the session is for experts from different fields to share new research findings on the prevention and control of cNCDs, promote sharing of evidence and identify priority areas to support implementation of the Global NCD Action Plan.

**Sustaining the gains in the control of HIV/AIDS, Tuberculosis and Malaria in Sub-Saharan Africa**

Sub-Saharan African countries have recorded considerable advances in HIV, tuberculosis and malaria control over the recent years. However, the big three, have remained the most important causes of morbidity and mortality in the region. The successes against HIV, TB and malaria have been significant. To sustain such gains, various efforts are needed from the country and development partners. Research is expected to continue to provide guidance on evidence-based strategies to better target interventions, and strengthen the existing health systems towards an HIV, TB and malaria-free region. This session is expected to serve as a platform to inform the researchers, policy makers, disease control managers and practitioners, on the challenges, achievements registered over the years and the new direction in research and control strategies in combating the three deadly diseases.

**Water, Sanitation and Hygiene towards achieving sustainable development goals**

Access to safe water, adequate sanitation, and practicing proper hygiene leads to improved overall health with development benefits. Goal 6 of the Sustainable Development Goals (SDG) advocates for clean water and sanitation for all by the year 2030. The path to achieving the goal of this global agenda requires new ways of thinking with supported research evidence. It is important that all water, sanitation and hygiene (WASH) stakeholders including governments, civil society and private sectors – collaborate to ensure sustained access for everyone. This session is expected to bring together scientists and other professionals from civil societies, governments, private sectors, donor communities, and academic institutions to contribute to the broader WASH dialogue and share knowledge toward improving WASH in Sub-Saharan Africa. Discussion on the current cholera outbreak in Tanzania will form the great part of the session.

**One health approach towards achieving global security agenda**

The One health concept is a global strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals and the environment. One Health and Global Security is of great interest to human and animal health care scientists and environmental scientists, especially now that the world is witnessing an increase in emerging and re-emerging epidemics that affect both human and animals. This session aims to provide a forum to: (i) share experiences and expertise of the importance of solving pressing health issues at the interface of humans, animals and the environment; (ii) facilitate interdisciplinary, collaborations embracing health, science and economics; and (iii) inform public policy development that is necessary for preserving human and animal health. The synergism achieved through the sectoral collaboration is envisaged to advance health care for the 21st
century and beyond by accelerating biomedical research discoveries, enhancing public health efficacy, expeditiously expanding the scientific knowledge base, and improving health education and clinical care. The sub-theme is timely that Tanzania is starting to operationalise its first One Health Strategic Plan. In this session, a presentation of the Tanzania National One Health Strategic Plan will be made.

**Neglected Tropical Diseases in Sub-Saharan Africa: Prospects for elimination**

Neglected tropical diseases (NTDs) are a diverse group of communicable diseases that prevail in tropical and subtropical conditions in more than 100 countries and affect more than one billion people, costing developing economies billions of dollars every year. They mainly affect populations living in poverty, without adequate sanitation and in close contact with infectious vectors and domestic animals and livestock. The global goal is to eliminate NTDs. However, the current control strategies are faced by a number of challenges. It is the objective of this symposium to provide a forum for discussion among scientists, practitioners and policy makers on the best approach to the elimination of NTDs, utilizing the available research evidences. The discussion will focus on identifying novel approaches to mitigate the diseases and improve the health and social well-being of affected populations.

**Strengthening health systems through a new global development framework**

Recent changes in the global health and development context, in particular the efforts of low-income countries to move into middle-income status coupled with declining levels of development assistance and adoption of the Sustainable Development Goals, are defining a ‘new context’ for access to medicines, vaccines and diagnostics. Additionally, the increasing demand for quality and timely delivery of healthcare services and the human rights to health emphasizes on the need for implementation of universal health coverage programme. Consequently, low income countries need to allocate more domestic resources for public health which will require innovative financing models to successfully overcome the challenge. The sustainable development goal number three underscores the need to ensure healthy lives and promote well-being for all at all ages by 2030. This can only be achieved through increased access to and delivery of quality healthcare services supported by sustainable health financing models. This goal is premised under the universal health coverage agenda which apparently is the driving force. This session aims to bring together policy makers, implementers of various health programmes, development partners, researchers, academicians, investors and healthcare workers to share current research evidence and deliberate on the appropriate strategies for achieving universal health coverage.

**Health innovations as a strategy to achieve Sustainable Development Goals**

Innovation may include tangible products, improved service delivery and approaches in the implementation of health interventions or strategies employed to promote behavioral change for better lifestyle and health. Therefore, innovative solutions to global development challenges have the potential for substantially greater impact than existing approaches, especially for poor and vulnerable groups, and are cost-effective than competing alternatives. Over the past six years, with a support from the Grand Challenges Canada, a total of 30 innovative researches were conducted by Tanzanian institutions. The awardees were from Ifakara Health Institute (13), National Institute for Medical Research (6), Registered Trustees of Ifakara Health Institute (5), Muhimbili University of Health and Allied Sciences (2), Catholic University of Health and Allied Sciences (1), A to Z Textile Mills Limited (1) and MSABI (1). The scientist will take the opportunity to share their findings with conference participants. The aim is to provide a platform for the researchers, innovators, social entrepreneurs and other stakeholders to networks and discuss the way forward as well as the potential to scale up the innovations.
It is a great pleasure to invite you to the 30th Annual Joint Scientific Conference. The organizing committee is wishing you an exciting and informative conference programme including plenary lectures, round tables, on a variety of subjects, poster demonstration and various social programmes. We wish you a fruitful conference and pleasant stay in Dar es Salaam.

KARIBUNI SANA!

Leonard E.G. Mboera, BVM, MSc., PhD, DIC
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Website: http://www.nimr.or.tz
## CONFERENCE PROGRAMME

### DAY 1, TUESDAY, OCTOBER 4, 2016: OPENING CEREMONY

**SELOUS HALL**

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<td>Dr. Leonard Mboera</td>
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<td>Minister for Health, Hon. Ummy Mwalimu</td>
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### DAY 1: TUESDAY, OCTOBER 4, 2016
#### SELOUS HALL: PLENARY SESSION

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<td>Julius Massaga</td>
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<tr>
<td>Rapporteur</td>
<td>George PrayGod, Stella Kilima, Elizabeth Shayo</td>
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<td>11.30-11.50</td>
<td>Paper1: Gender-based violence in Sub-Saharan Africa: the hidden health burden (Saidi Kapiga)</td>
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<td>Paper2: Strategic approach to Reproductive, Maternal, Newborn, Child and Adolescent Health (Rutasha Dadi)</td>
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<td>12.10-12.30</td>
<td>Paper3: One Health approach towards global security agenda: Tanzania perspective (John Kunda)</td>
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#### PARALLEL SESSIONS

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<td>Strategic approach to reproductive, maternal, newborn, child and adolescent health (MNC)</td>
<td>One Health approach towards achieving global security agenda (OH)</td>
<td>Sustaining the gains in the control of HIV/AIDS, Tuberculosis and Malaria (MAL-Wing)</td>
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<td>Paper 4: Chronic non-communicable diseases in Sub Saharan Africa: Current burden and challenges (Mary Mayige)</td>
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<td>Paper 5: Moving Innovations in Health to Scale: Opportunities and Challenges in the Innovation Cycle (Evelyn Gitau)</td>
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<td>Strategic approach to reproductive, maternal, newborn, child and adolescent health (MNC)</td>
<td>Sustaining the gains in the control of HIV/AIDS, Tuberculosis and Malaria (HIV-Wing)</td>
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## PARALLEL SESSIONS

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<th>Sustaining the gains in the control of HIV/AIDS, Tuberculosis and Malaria (HIV-Wing)</th>
<th>Sustaining the gains in the control of HIV/AIDS, Tuberculosis and Malaria (MAL/TB)</th>
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**15.00-15.15** | **NUTRITIONAL BREAK** | **Convener:** Elizabeth Shayo

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**END OF DAY 2**
DAY 3, THURSDAY, OCTOBER 6, 2016
MIKUMI HALL: PLENARY SESSION

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<tr>
<td>07.30-08.30</td>
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<td>08.30-08.50</td>
<td>Paper 6: The new face of HIV Co-infection: risk of acquiring HIV in individuals with NTDs (Inge Krodl)</td>
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<td>08.50-09.10</td>
<td>Paper 7: Urban Health and the Urban Poor: Addressing Inequalities (Tausi Kida)</td>
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09.10-09.25: Discussion

09.30-10:30: MIKUMI HALL: POSTER DEMONSTRATION SESSION / NUTRITIONAL BREAK
(MNC26-28; HIV36-37; MAL40, 43, 46-51; TB10; NCD13; WASH17-20; HS3, HS13; SDH4)

Chair: Nyagosya Range
Rapporteur: Sokoine Kivuyo

PARALLEL SESSIONS

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<tr>
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<td>Neglected Tropical Diseases in Sub-Saharan Africa (NTD)</td>
<td>Strengthening Health Systems (HS)</td>
<td>Round Table</td>
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<td>Soori Nnko</td>
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14:00-14:10  | NTD17                     | NTD18                     | NTD19                                | NTD18                                                     |
| 14:10-14:20 | NTD19                     | NTD20                     | NTD21                                | NTD20                                                     |
| 14:20-14:30 | NTD20                     | NTD21                     | Discussion                           | NTD21                                                     |
| 14:30-14:40 | NTD21                     | NTD22                     | Discussion                           | NTD22                                                     |
| 14:40-14:50 | Discussion                | NTD23                     | Discussion                           | NTD23                                                     |
| 14:50-15:00 |                           |                           |                                     | NTD24                                                     |
| 15:00-15:10 |                           |                           |                                     | NTD25                                                     |

15:10-15:25  | NUTRITIONAL BREAK        | NTD26                     | NTD27                                | NTD26                                                     |
### DAY 3: THURSDAY, October 6, 2016: CLOSING CEREMONY: RUAHA HALL

**Chairman:**  
**Rapporteur:**

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<td>Conference Participants to be seated</td>
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<tr>
<td>15:45-16:00</td>
<td>Presentation, discussion and consensus on the Conference Recommendations</td>
<td>Dr. Leonard Mboera</td>
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<tr>
<td>16:00-16:05</td>
<td>Remarks from NIMR Director General</td>
<td>Dr. Mwelecele Malecela</td>
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<td>16:05-16:10</td>
<td>Background and presentation of Scientific awards</td>
<td>Dr. Mwelecele Malecela</td>
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<tr>
<td>16:10-16:20</td>
<td>Presentation of the Award</td>
<td>Guest of Honour</td>
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<tr>
<td>16:20-16:25</td>
<td>Invite Guest of Honour to deliver Closing Speech</td>
<td>Dr. Mwelecele Malecela</td>
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<tr>
<td>16:25-16:55</td>
<td>Closing Speech</td>
<td>Guest of Honour</td>
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<td>16:55-17:00</td>
<td>Vote of thanks</td>
<td>Dr. Joseph Swila</td>
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<tr>
<td>17:00</td>
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STRATEGIC APPROACH TO REPRODUCTIVE, MATERNAL, NEWBORN, CHILD AND ADOLESCENT HEALTH

MNC1: Needs assessment for maternal, child and neonatal health services in Pwani Region, Tanzania
Julius J. Massaga, Judith Msovel, Kijakazi O. Mashoto, Ndekya Orio & Elizabeth H. Shayo
National Institute for Medical Research, Headquarters, P. O. Box 9653, Dar es Salaam Tanzania
Correspondence E-mail: jmassaga@nimr.or.tz
Maternal and newborn deaths remain public health problems in Tanzania. While there has been considerable improvement in maternal and newborn health globally, it is increasingly evident that important gaps and disparities remain. The objective was to determine factors influencing access and utilization of maternal, neonatal and child health services in Pwani region in Tanzania. The study was conducted in Kibaha and Kisarawe Districts, employing exploratory sequential mixed method design. Both quantitative and qualitative methods were used. Focus group discussions and in-depth interviews, and household survey, hospital records reviews and exit interviews were conducted in the qualitative and quantitative phase respectively. Most of the required Maternal, Neonatal and Child Health (MNCH) services were provided at health facilities. Lack of nearby health facility (76%) was reported as barrier for use of MNCH services. More frequently Kisarawe (75%) respondents complained of distance to the health facility, which offers MNCH services. Quality of the services was reported to be poor and most of the respondents were dissatisfied with the services. On average a person spent Tanzanian Shillings 6,580/= as transport fare and the cost was higher in Kisarawe. Other barriers to the utilization of the maternal and child care services included inadequate supply of medicines, supplies and equipment, cost for the services, poor provider-client relationship and lack of accountability. The coverage of at least one antenatal clinic attendance was 92.1% while health facility delivery was 93%. Respondents’ knowledge on danger signs during pregnancy, delivery and after delivery and child illness symptoms which requires medical attention was limited. In conclusion, there is a need to strengthen the health system through use of combination interventions to improve delivery of maternal and child health care services.

MNC2: Prevalence, indications and short-term maternal-neonatal outcomes of caesarean-section among women who delivered at Mkomaindo Hospital in Mtwara, Tanzania
Oresta P. Mnali1, Benjamin G. Brown1, Sia E. Msuya1, Elizabeth E. Senkoro1, Francisca Seraphin1, Festo Mazuguni1,2 & Michael J. Mahande1,2
1Institute of Public Health, Kilimanjaro Christian Medical Centre, Moshi, Tanzania; 2Kilimanjaro Christian Medical University College, Moshi, Tanzania; 3Department of Global Health, Weill Cornell Medical College, United States of America
Correspondence E-mail: jmmahande@gmail.com
Caesarean section (CS) is the commonest lifesaving procedure to both mother and child worldwide. World Health Organization- recommends CS rate of 10% to 15% per hospital. Few studies have examined on prevalence, indications and maternal-neonatal outcomes of CS in district hospitals of Tanzania. This study aimed to determine the prevalence, indications and adverse outcomes of CS among women who delivered at Mkomaindo district hospital in Mtwara region, Tanzania. This cross-sectional analytical study was conducted at Mkomaindo hospital from June to July 2016. Files of 3,033 women who delivered at Mkomaindo hospital in 2015 were obtained. A standard data extraction sheet was used to collect relevant information from all participants. Women with incomplete records on CS (No CS status) and those who had below 28 weeks of gestation age were excluded. Data analysis was performed using SPSS version 23.0. Odds ratio with 95% confidence intervals for short-term maternal outcomes associated with CS were estimated in a multiple logistic regression models. The prevalence of CS was 18.6%. Cephalo-
pelvic disproportion (43.1%) and previous scar (97.9%) were the commonest indications for primary and repeat CS, respectively. The most common adverse maternal outcomes were hospitalization for more than 3 days (64.5%), wound sepsis (61.8%) and haemorrhage (blood loss of >1000ml) (10.7%). About 10.5% of neonates born by CS were premature. These findings indicate that the use of CS at Mkomanindo District Hospital is above the WHO recommendations. A number of risk factors and indications for CS as well as poor maternal outcomes were identified. Knowledge of these factors may reduce unnecessary CS use and promote early intervention in at-risk individuals.

**MNC3: Maternal and foetal risk factors for stillbirth in northern Tanzania: a registry based retrospective cohort study**
Francisca S. Chuwa1,2, Benjamin G. Brown3, Sia E. Msuya1,2, Amasha Mwanamsangu1,2, Elizabeth E. Senkoro1,2, Oresta P. Mnali2, Festo Mazuguni1,2 & Michael J. Mahande1,2

1Institute of Public Health, Kilimanjaro Christian Medical College, Moshi, Tanzania; 2Kilimanjaro Christian Medical University College, Moshi, Tanzania; 3Weill Cornell Medical College, New York, USA

Correspondence E-mail: franciscaseraphin@gmail.com

Stillbirth is a major cause of perinatal mortality and occurs disproportionately in developing countries including Tanzania. However, there is scant information regarding the predictors of this condition in Tanzania. This study aimed to determine maternal and foetal risk factors for stillbirth in northern Tanzania. This retrospective cohort study was performed using maternally-linked data from the Kilimanjaro Christian Medical Centre (KCMC) Birth Registry. A total of 47,681 women who had singleton delivery at KCMC between 2000 and 2014 were analyzed. Women with multiple gestations were excluded. Chi-square test was used to determine risk factors for stillbirth in bivariate analysis. A multivariable regression model was used to estimate adjusted odds ratios (AOR) with 95% confidence intervals for maternal and fetal factors associated with stillbirth. The frequency of stillbirth was 3.5%. Pre-eclampsia (AOR 3.99; 95% CI: 3.31-4.81) and placental abruption (AOR 22.62; 95% CI: 15.41-33.19) were the strongest maternal risk factors. Non-cephalic presentation (AOR 6.05; 95% CI: 4.77-7.66) and low birth weight (AOR 9.66; 95% CI: 8.66-10.77) were the foetal factors with the greatest impact on stillbirth. In conclusion, the rate of stillbirth in our study was consistent with past studies of developing countries. Numerous maternal and fetal risk factors were identified. Early identification of at-risk pregnancies and appropriate intervention may help to reduce the occurrence of stillbirth.

**MNC4: Frequency, risk factors, and adverse foeto-maternal outcomes of placenta previa in northern Tanzania**
Elizabeth E. Senkoro1, Amasha Mwanamsangu1, Fransisca S. Chuwa1, Sia E. Msuya1, Oresta P. Mnali2, Benjamin G. Brown3 & Michael J. Mahande1

1Institute of Public Health, Kilimanjaro Christian Medical University College, Moshi, Tanzania; 2Kilimanjaro Christian Medical University College, Moshi, Tanzania; 3Weill Cornell Medical College, New York, United States of America

Correspondence E-mail: senkoroelizabeth@yahoo.com

Placenta previa is a potent risk factor for obstetric haemorrhage, a cause of foeto-maternal morbidity and mortality in developing countries. Little is known about placenta previa and its associated adverse outcomes in Tanzania. This study aimed to determine frequency, risk factors and adverse foeto-maternal outcomes of placenta previa in northern Tanzania. We conducted a retrospective cohort study using maternally-linked data from the Kilimanjaro Christian Medical Centre (KCMC) Birth Registry covering six years (2000 to 2015). Adjusted odds ratios (ORs) with 95% confidence intervals for risk factors and adverse foeto-maternal outcomes associated with placenta previa were estimated in multivariable regression models. A total of 47,686 singleton deliveries were analyzed. The frequency of placenta previa was 0.6%. Notable risk factors included gynaecological disease during pregnancy [OR 48.7; 95% CI: 4.78-497] and gravidity ≥5.
Adverse maternal outcomes were postpartum haemorrhage [OR 9.21; 95% CI: 5.3-16.2], antepartum hemorrhage [OR 17.6; 95% CI: 8.6-6.2] and caesarean mode of delivery [OR 9.68; 95% CI: 6.66-14.1]. Placenta previa increased odds of foetal malpresentation [OR 4.98; 95% CI: 1.5-16.2], and early neonatal death [OR 3.75; 95% CI: 1.15-12.3]. The findings suggest that the prevalence of placenta previa was comparable to that found in previous researches. Multiple independent risk factors were identified. Placenta previa was found to have associations with several adverse feto-maternal outcomes. Early identification of women at risk of placenta previa may help clinicians manage and prevent such complications.

MNC5: Factors contributing to high uptake of injectable contraceptives and factors affecting uptake of intrauterine contraceptive devices among women in Shinyanga District, Tanzania

Deriomercy Chingoma1, Namanya Basinda1 & Emmanuel Kadelya2
1Catholic University of Health and Allied Sciences, Mwanza, Tanzania; 2Shinyanga Regional Hospital, Shinyanga Tanzania

Correspondence E-mail: deriomercychingoma@gmail.com

Injectable contraceptives are fast becoming the method of choice among married women in Sub-Saharan Africa. The intrauterine contraceptive device (IUCD) represents only 2% of modern method of contraceptive use in Sub-Saharan Africa, revealing the under-utilization of this method in the region despite being an important choice for women elsewhere in the world. This study aimed to determine: (i) factors that contribute to choice of contraceptives among women; (ii) socio-demographic pattern of women using contraceptives; (iii) the proportion of women using injectable contraceptives and proportion of women using IUCD; (iv) the decision of the number of children to have. This study was conducted in Shinyanga District, Tanzania. A survey of 201 women of reproductive age using a questionnaire was done and information obtained was processed and analysed using SPSS statistic 20 software. The study found out that the most common (34.4%) contraceptive method was injectables, followed by condoms (30.5%), implants (16.4%) while the least reported contraceptive was the IUCD (1.6%). The majority of women (82.6%) reported to have heard about contraceptives at the health facility. 70.5% of users of injectables reported that they prefer injectables due to its relative safety. Some 43% of participants who ever heard of IUCD reported that they did not choose IUCD because they lack knowledge about it, 27.7% had fear of side effects, 15.4% reported to have fear of how to insert it, while others 13.8% reported myths about the IUCDs. Lack of awareness and knowledge about the IUCD is the major factor affecting its uptake. Large number of non-users of contraceptives attributed it to husband refusal. Family planning campaigns should equally be emphasized to men.

MNC6: Self-fulfilling prophecy: stigma, contraception myths, and non-acceptability

Daniel J. Nyato1, Joyce Wamoyi1, Melissa Stockton2 & Laura Nyblade1
1National Institute for Medical Research, Mwanza, Tanzania; 2Health Policy Project, Mwanza, Tanzania

Correspondence E-mail: dnyato2000@gmail.com

Little is known on social processes sustaining myths and misconceptions known to challenge adolescent’s access to sexual and reproductive health (SRH) services. We explored intersection between stigma, myths, and misconceptions and the acceptability of adolescent family planning (FP)/SRH in north-western Tanzania. We conducted 22 participatory focus group discussions and 56 in-depth interviews with youths and adult men and women. Participants were sampled using purposive and snowball techniques. Topic guides explored adolescents’ access to contraception. Thematic analysis was conducted with the aid of NVIVO-10 software. FP use by adolescents was deemed unacceptable. Abstaining from engaging in any sexual relations before marriage or before 18 years of age was part of preserving purity or taking care of oneself (kujitunza), self-respect (kujiheshimu), religious teachings, and to safeguard their own and family’s reputation.
While tacitly acknowledging that adolescents do have sex, the misconception that knowledge and access to FP by adolescents would lead to premeditated sex and promiscuity was consistently expressed. It is also believed that hormonal contraceptive use by adolescent girls would lead to future sterility, which was greatly feared. Perhaps unsurprisingly then, stigma towards sexually active adolescents, and by extension adolescent FP use, was highly prevalent. Forms of stigma included derogatory name calling, shaming, physical and social isolation, physical punishment, and the withdrawal of emotional and financial support. The findings of this study indicate myths and misconceptions are central to non-acceptability of adolescent FP use. Communities use stigma to discourage/control adolescent sexual behavior. Thus, interventionists need to incorporate messages that address contraceptive myths and misconceptions into ongoing FP campaigns, and also address the stigma-related roots of these prevailing beliefs.

MNC7: Myth and misconceptions driving adolescent girls’ risky behaviour in northern Tanzania
Daniel Nyato¹, Joyce Wamoyi¹ & Lori Heise²
¹National Institute for Medical Research, Mwanza Research Centre, Mwanza, Tanzania; ²London School of Hygiene and Tropical Medicine, London, United Kingdom
Correspondence E-mail: dnyato2000@gmail.com
Early sexual debut among adolescent girls has been linked to increased risk of HIV infection. Myths and misconceptions may shape adolescent girls’ sexual behaviors and undermines HIV prevention efforts. We set out to explore the intersection between myths, misconceptions and adolescent girls’ sexual behavior. We conducted a qualitative study involving 18 focus group discussions and 40 in-depth interviews with a purposively selected sample of adolescent girls and boys age 14–24 years and adult men and women age 25–49 from 1 rural and 1 urban ward in Tanzania. Adolescents were sampled from in-school and out of school. Thematic analysis was conducted using NVIVO 10 software. All participants acknowledged that age of sexual debut for girls is happening earlier. Sexual debut for girls is happening earlier with most starting sex before reaching menarche. Young men reported that if adolescent girls passed the age of 18 years without having sex they would develop a condition they referred to as “chekelea disease” (cajoling laughter). Both adults and young people reported that a girl who was post-menarche and had no sexual feelings, was considered abnormal. These myths further reinforced misconceptions about ‘a girl not being able to stay without a sexual partner because she had feelings’, ‘she has reached adulthood’ and she has reached menarche. Girls also confirmed that they had “boyfriends” a euphemism used to communicate that they were sexually active as it was for their female peers. We conclude that myth and misconceptions influence adolescent girls’ sexual debut. Sexual health interventions should focus on addressing powerful myths and misconceptions that increase adolescent girls’ risk of early sexual debut and ultimately risk for HIV infection.

MNC8: Teen reproductive knowledge and contraceptive use: a case of public secondary school students in Bungoma South Sub-County, Kenya
V. Negesa Justine & Rose Opiyo Atieno
Masinde Muliro University of Science and Technology, Kenya
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Turmoil, enormous vibrancy, discovery, innovation and hope that marks adolescence, present an opportune time for teens to not only gain reproductive knowledge but also to understand rights and needs therein. Equally, this is seemingly the single most challenging time in human life. While teens have continued to rely on their families, peers, schools, media and health service providers for affirmation, advice, information and skills to navigate through this period, this support has never been forthcoming for some. The subject on sex has continued to be surrounded by mystery and beclouded by dark silence, despite escalating reports on unplanned pregnancies and Sexually Transmitted Infections among teenagers in Bungoma County. This paper reports on
Form Three Students’ reproductive knowledge and contraceptive use in Bungoma South Sub-County, Kenya. Based on Albert Bandura’s Social Cognitive Theory. Data was collected from a population of 400 Form 3 students from 52 public secondary schools. Qualitative data was analysed descriptively. Results revealed significant gender variance in contraceptive knowledge and use. Media was reported to be the key source of information on contraceptive knowledge and use. This paper makes a case for a well thought out teen sex education programme in schools, sensitive reproductive health units as well as professional development of reproductive health personnel.

MNC9: Incidence, recurrence and predictors associated with recurrence of low birth weight in northern Tanzania
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Low birth weight (LBW) is an important indicator of newborn survival and is associated with higher risk of infant mortality, morbidity and long term health consequences later in life. Little has been explored on the recurrence of LBW and associated risk factors in Tanzania. This study aimed to determine incidence, recurrence and associated risk factors for in Northern Tanzania. This was a retrospective cohort study using maternally-linked data from Kilimanjaro Christian Medical Centre (KCMC) Birth Registry. A total of 48,008 births from 8,417 women who delivered live born between 2000 and 2014 were followed for subsequent deliveries. Recurrence risk with 95% Confidence Interval for LBW and associated risk factors were estimated in a multivariate log binomial model while accounting for correlation between births of the same mother. The incidence of LBW was 7.9%. The recurrence rate of LBW was 24.9% compared with 5.9% for those who had normal birth weight babies in first pregnancy. This corresponded to a relative risk of 3.7 (95% CI: 3.10–4.52). Some maternal conditions in the first pregnancy were associated with increased risk of LBW in the subsequent pregnancy. These include HIV positive status (RR 2.0; 95% CI 1.26–3.21), preterm birth (RR 1.2; 95% CI 1.03 – 1.63) and pre-eclampsia (RR 1.8; 95% CI 1.26 – 2.45). Only pre-eclampsia in the first pregnancy was associated with increased risk of recurrent of LBW (RR: 1.6 95% CI 1.01-2.54). In conclusion, although the incidence of LBW is low in the study population, but the recurrence risk is high. Pre-eclampsia in the first pregnancy was associated with recurrent LBW. Early prenatal identification of women at risk of preeclampsia to address modifiable risk factors and counsel mothers on persisting risk factors for recurrence will mitigate the risk of recurrence of LBW.

MNC10: The role of beneficiaries’ social cultural values in the implementation of maternal health policies in rural Tanzania
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Maternal mortality has been a global policy issue for decades especially in Sub Saharan countries where women are dying due to pregnancy and childbirth complications. Various national and international policy interventions have been made to ensure reduction of maternal deaths, however they are far from reaching the policy goals. To reduce maternal mortality both health and non-health policy interventions should be integrated and operate in a package but more has been invested in health system initiatives and little in non-health factors like social cultural practices which determine the extent of utilization of the maternal health care services. This study intends to explore the extent to which the beneficiaries’ social cultural values are integrated in the policy process, their political space to negotiate, influence the policy outputs and outcomes and the relationship existing between the policy practitioner and the beneficiaries
in the policy process. A qualitative study was employed in Usanda Ward, Shinyanga Rural District in Tanzania where both in-depth interviews and focus group discussions were used to generate data from women, men, practitioners from the ward and district level. The result indicated the involvement of the beneficiaries is low in relation to their power to influence policy output, how they are participated in the policy process despite the policy intentions to involve the beneficiaries which limits the integration of social cultural values in the policy implementation. The study is concluded by providing policy recommendations on how to approach the community which uses social cultural values as point of reference in decision making during the implementation of the maternal health care initiatives.

MNC11: Attendance and motivation of male partner in reproductive health services in areas with low performance of maternal and child health indicators, north western Tanzania, August 2015

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Male involvement in Reproductive Health (RH) in Africa has been shown to improve maternal and child health outcomes. This study aimed to determine the prevalence of attendance to the locally available RH services and their respective motivations among male partners in Shinyanga District, Tanzania. A survey of 204 married men using a structured questionnaire along with 20 in-depth interviews were done. The survey found only 5.4% (11/204) of married men reported they had never attended any RH service. Half (50.6%; n=103/204) of them had attended RH services more than thrice. Sexually transmitted diseases, prevention of HIV transmission from mother to child (PMTCT), and reproductive health cancer services were all attended by less than 13% of all interviewees while 75% (154/204) and 63% (129/204) of men attended HIV counseling and testing (VCT) and antenatal services (ANC), respectively. Age between 25-34 years (χ²=9.347, df=3 p-value < 0.001), female invitation (χ²=29.901, df=1 p-value <0.001) and having less than 2 children (χ²=6.201, df=2, p-value < 0.05) were associated with attendance. Only 20% (4/20) of the interviewed men who attended RH services reported being externally motivated by expectation of better health outcome upon attendance. The rest attended just because they were invited or happen to be at the clinic for other purposes. Male attendance of RH services in Shinyanga was mainly of focused VCT and ANC services. All interviewed men were not internally motivated. While expanding community wide campaigns for RH male involvement, programs should consider how best men can be motivated.

MNC12: High prevalence of Chlamydia trachomatis infection among women with primary infertility in Mwanza City, Tanzania: a wake-up call

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Chlamydia trachomatis infection has been implicated as one of the common causes of infertility in women. Despite its importance there is limited information on its magnitude among infertile women in Tanzania. This study was designed to determine the prevalence and factors associated with C. trachomatis infection among infertile women in Mwanza City, Tanzania. This cross sectional hospital based study, conducted from November 2015 to April 2016, involved 290 infertile women. Structured data collection tool was used to collect socio-demographic and other relevant information. Endocervical swabs were taken and detection of C. trachomatis was done
using cervical Chlamydia rapid antigen test device. Data were analyzed using STATA version 11. The mean age of the enrolled participants was 32±6.6 years. The prevalence of *C. trachomatis* infection was 105/290 (36.21%, 95% CI: 30.6-41.7). On multivariate logistic regression analysis; multiple sexual partners (AOR: 1.2, 95% CI: 1.019-1.415, P=0.028), history of sexually transmitted infection (AOR: 6.39, 95% CI: 3.244-12.596, P<0.001), positive HIV status (AOR: 2.08, 95% CI: 1.286-3.737, P=0.003) and having primary infertility (AOR: 2.28, 95% CI: 1.086-4.774, P=0.029) were found to predict *C. trachomatis* infection. In conclusion, a significant proportion of women with primary infertility in Mwanza City is infected with *C. trachomatis* underscoring the importance of introducing a routine screening and treatment to reduce consequences associated with this infection.

MNC13: Advanced maternal age and associated pregnancy outcomes among women delivered at Kilimanjaro Christian Medical Centre in northern Tanzania
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Deliveries at Advanced maternal age (AMA) are increasing globally. Studies in Sub-Saharan Africa have shown variations in prevalence of AMA ranging from 8-17.5%. Delivering at AMA has been associated with adverse pregnancy outcomes. Little is known about AMA and associated adverse maternal and fetal outcomes in Tanzania. This study aimed to determine the association between advanced maternal age and pregnancy outcomes among women who delivered at Kilimanjaro Christian Medical Centre (KCMC) in Moshi, Tanzania. The study involved women who delivered at KCMC from January 2004 to December 2013. This cross-sectional hospital-based study was conducted using maternally-linked data from the hospital medical registry. Women with multifetal gestations and those aged below 20 years were excluded. A total of 32,798 women were studied. Majority (84%) were aged below 35 years with a mean age of 26.82 (SD 4.05). The prevalence of AMA was 16%. AMA was associated with increased odds of having caesarean section (AOR 1.32 95% CI: 1.24, 1.41), gestational diabetes (AOR 13.16 95% CI: 3.28, 52.86), pregestational diabetes (AOR 3.15 95% CI: 1.87, 5.31) and preeclampsia (AOR 1.63 95% CI: 1.41, 1.89). In addition, AMA increased women’s likelihood of having infants with low birth weight (AOR 1.18 95% CI: 1.07, 1.31), still birth (AOR 1.47:1.12, 1.92) and transfer to neonatal intensive care unit (AOR 1.23:1.10, 1.36). In conclusion, AMA is associated with maternal and perinatal adverse effects. The findings suggest rigorous screening for preeclampsia, gestational diabetes, and overt diabetes for all pregnant women during routine antenatal care. Nonetheless, intrapartum care for all women may need more vigilance to ease early detection of complications and provide timely intervention.

MNC14: Decision delivery interval and its associated maternal foetal outcome at a referral hospital in northern Tanzania
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Decision delivery interval (DDI) is the timeline between a decision to conduct an emergency caesarean section and actual delivery of the baby. Delay in provision to emergency obstetric care can be fatal to women and the child therefore prompt intervention is vital to prevent maternal and neonatal morbidity and mortality. The feasibility and practicability of the recommended DDI in recent studies have been questioned especially in limited resource setting. This was a retrospective study of inpatient cases who underwent emergency caesarean section from January to September 2014. Data were collected from birth registry and case files of patients at Kilimanjaro Christian Medical Centre in northern Tanzania. A total of 598 women who underwent...
emergency caesarean section were recruited. Decision Delivery Interval was 60 minutes [IQR 40-120]. Only 12% were operated within 30 minutes from decision time. Shortest DDI was seen in patients with Cephalopelvic Disproportion (CPD) and uterine rupture (40 minutes and 45.5 minutes). There was no significant association between DDI and neonatal transfer, 1st and 5th minute Apgar score, maternal blood loss (OR: 5.79; 95% CI 0.63-1.64) and hospital stay (OR: 1.02; 95% 0.63-1.64). Contrary to the recommended DDI by ACOG & AAP of 30 minutes is not feasible in our setting, time frame of 75 minute could be acceptable but clinical judgment is required to assess on the urgency of caesarean section in order to prevent maternal and neonatal morbidity and mortality.

MNC15: Availability of referral system for emergence maternal newborn care in Tanzania
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Tanzania has identified many economic and social development challenges as national priorities. Consistent with the health Millennium Development Goals (MDGs), Tanzania’s national development priorities address public health and healthcare challenges including those related to maternal, new-born, and child health (MNCH). The objective of this study was to assess the availability of referral systems in reducing maternal and neonatal deaths. Data collection took place in two phases; the first phase involved eight regions while the second batch involved seventeen (25) regions. A total of 5207 Health facilities were surveyed. This study was conducted in Marc – September 2015. Sixteen regions (64%) had an average transport time of less than 2 hours during dry season. Of all the surveyed 2,405 health facilities, only a third (29.9%) had a functional means of communication in terms of landline, facility mobile phone or radio wave. Only Rukwa (65%), Dar-es-Salaam (62.5%), Mwanza (55.2%) and Dodoma (51.3%) had more than half of its emergency, obstetric and neonatal care (EmONC) facilities in possession of a functional means of communication. The commonest source of transport to referral points was hiring of a private transport (51.4%). The study showed that there are multiple problems in the referral system including poor transport, lack of ambulance and lack of means of communication in the majority of health facilities. The referral system has multiple problems most of which are general and others are specific to some of the study areas. Furthermore, more attention should be made towards the distribution and provision of EmONC services.

MNC16: Availability of emergency obstetric care services in Lake and Western zones of Tanzania
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Tanzania has a high maternal mortality rate currently standing at 410 per100,000 live births and under-five mortality rate of 54 per 1,000 live births. These are still among the major challenges facing the health sector in Tanzania. Lake Victoria zone (Kagera, Geita, Simiyu, Shinyanga, Mwanza, Mara) and Western zone (Tabora and Kigoma) of Tanzania have consistently shown poor indicators in maternal mortality rate compared with other zones. This study sought to establish availability of emergency obstetric care units in the two zones of Tanzania. The study sought to establish the number of health care facilities in Lake and Western Zones of Tanzania which provide emergency obstetric care service. All public and private health facilities providing basic emergency obstetric care (BEmOC) (n= 777) including hospitals, health centres and 10% dispensaries providing deliveries in each districts were subject of this assessment. The study was conducted between March-June 2015 in cross section study design in 8 regions of Lake and
Western Tanzania. Data were collected through quantitative, qualitative, and record reviews. The information was collected using EmOC tool developed based on modified UN indicators. BEmOC units in Lake Zone were 74% and 66% were dispensaries; BEmOC and CEmOC were 84% and 16% respectively. Mara region accounted for 15% and Geita lowest at 9%. Overall compared to World Health Organization (WHO) standards BEmOC were 91% and CEmOC 82%, respectively. We conclude that the number of units providing BEmOC/CEmOC in the two zones is low compared to WHO standards. It is important to upgrade existing units in particular units giving basic EmOC services.

MNC17: Care seeking patterns for maternal and newborn complications in two districts of rural southern Tanzania: a mixed-method study of barriers and facilitators

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The study aimed to understand community and cultural factors that facilitate or impede illness recognition, care-seeking decision-making and care-seeking for maternal and newborn complications. We carried out a mixed method study using traditional qualitative methods with additional facility assessment and secondary analysis of EQUIP survey data from the study area. The study conducted a total 53 interviews. Of these, 5 were focus group discussions (FGDs) with community leaders, 16 were maternal illness events, 8 events of maternal death, 16 events of newborn illnesses, and 8 events of newborn death. Most respondents seemed to know that they needed to do something when they recognized symptoms. Findings also shows that there is high reliance on primary care facilities. The first point of care for most maternal cases was usually at a health facility while for newborn complications, home remedies were tried first before formal care was sought. Lack of skilled staff, lack of essential medical supplies and equipment, were reported to be barriers in accessing optimal care by most respondents. In conclusion, failures of the healthcare system to meet community demand for maternal and newborn health services remains a challenge. Interventions to improve quality of care at the facility and increasing knowledge of recognizing danger signs and importance of early care seeking. However, village initiatives in supporting maternal health care through community emergency funds provide an opportunity for poor families to access health care in time. Therefore, use of community health workers and facility staff to educate mothers and youth groups on maternal and newborn danger signs and importance of using formal health facilities could have positive impact on the whole society.

MNC18: Accessibility to sexual and reproductive health and rights education among marginalized youths in selected districts of Tanzania

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Access to information, education and services is central in the promotion of sexual and reproductive health and rights (SRHR) among young people. It enables young people make informed choices on sexuality matters, hence reduce teenage pregnancies and sexually transmitted infections (STIs). This study assessed accessibility of SRH rights’ information among marginalized young people in three municipalities of Iringa, Ilala and Kinondoni in Tanzania. Across-sectional study design using mixed methods was conducted in 2013 in three selected districts of Tanzania. A total 398 young people including those with disabilities, food vendors, school truants, housemaids and those living with HIV/AIDS were randomly and purposely selected to partake in study. Quantitative data analysis was done using Statistical Package for Social Science version 20, while qualitative data was thematically analyzed. A total of 396 (99%)
participants (144 Males and 251 females), with a mean age of 20.1 years participated. The majority of them were female, out of school youths, cohabiting and had completed secondary education. Overall, 317 (79.6%) of interviewed young people had SRH rights knowledge. The leading sources of SRH rights information reported were peer educators (36.7%) and radio (22.8%). Awareness regarding laws and policies related to SRH right was 55.1%. However, young people living with HIV and school truants had more access to SRHR education and services than the other youth groups (χ² = 30.69, p < 0.0001). We conclude, generally, access to SRH rights information is high; however, it decreases when it is disaggregated across different age groups. There is a need for the diversified approaches for reaching specific groups of youth depending on their needs and circumstances.

**MNC19: Factors associated with recruitment and retention of community health workers in maternal, newborn and child health programme in Simiyu Region, Tanzania**

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Effectiveness of Community Health Workers (CHWs) in delivery of Maternal and Child Health (MNCH) programmes has been widely documented. However, their attrition continues to be a serious threat to the sustainability of such programmes. From 2011 to 2014, Amref Health Africa recruited and trained 3,924 CHWs to work in MNCH programme in north-western, Tanzania aiming at improving MNCH services by strengthening formal and community health systems. We conducted this study to understand factors associated with CHWs’ recruitment and their retention. In this cross-sectional study design conducted in October 2014 in Simiyu region, we randomly selected 341 CHWs who were working with the programme. Structured questionnaires were administered to solicit factors for recruitment, retention and attrition. A total of 341 current participated in this study. Majority of them were below 35 years (58%), women (54%) and with primary education (53%). Motivation factors for being CHW were aspiration to serve the community, desire for further training to become qualified medical practitioner, use of free time productively and financial gain. Attrition rate of CHWs over three years was 12.7%. The main reason given was relocation (p<0.001). Community recognition, and financial incentives were among the key retention reasons for the CHWs. Being married (Odds Ratio (OR) 5.9, 95% Confidence Interval (CI) 1.7-20.1), having prior-volunteer experience (OR 10.5 95% CI 12.7-40.5) and prior-employment were positively associated with retention of CHWs. Besides, married women were less likely as compared to the men counterparts to remain as CHWs. Our study found that, both financial and non-financial incentives were critical in contributing to the retention of CHWs. We recommend that CHWs programmes to carefully select its CHWs by understanding their motives beforehand; provide incentives, and regular supportive supervision to facilitate their retention.

**MNC20: Remote maternal health support system: a case of telehealth design for Tanzania setting**

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Tanzania’s health sector, like most countries in Sub-Saharan Africa is facing an acute shortage of health workers at all levels, which directly affect the delivery of health care services to the people. Maternal mortality rate is still high due to lack of access to qualified healthcare providers. This paper provides an eHealth design as ultimate solution to maternal healthcare delivery in rural settings. The objective of the study was to explore common challenges facing maternal child health care and design an eHealth solution that can reduce maternal deaths by avoiding cost and time to travel to referral physical facilities in search of maternal services. The study used
a case study (design science research) approach. The primary data were collected from two health facilities in Dodoma for system requirements and secondary data was obtained through literature and documentary review. The findings show that health worker shortage is still a major challenge on provision of quality health care services especially in rural areas. The findings show currently the health sector operates with less than half of the required health workforce. The study came up with an eHealth solution that support maternal healthcare in the rural settings. The designed computer system support healthcare providers in remote rural areas to diagnose pregnancy complications as they arise in the absence of experts. With the successful implementation of this remote maternal health support system we expect to improve access to, and availability of, healthcare services at the point-of-care by enhancing the referral system in rural areas to reduce unnecessary transportation through the use of information and communication technologies.

MNC21: Child environmental health hazards: evidence and lessons for attaining sustainable development goals in Kenya
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Over 40% of the global burden of disease attributed to environmental factors falls on children below five years of age, who account for only about 10% of the world’s population. Children especially under age five are in the dynamic stage of growth. Their immune, respiratory, and digestive systems are still developing. The impact of an unhealthy environment is felt among them because they are always close to the ground, where many contaminants settle. Environmental risk factors often act in concert, and their effects are exacerbated by adverse social and economic conditions, particularly conflict, poverty and malnutrition. World over, six groups of environmental health issues have been identified as priorities, as they cause the bulk of environment-related deaths and disease among children. These are: household water security, hygiene and sanitation, air pollution (including indoor air pollution and environmental tobacco smoke), vector-borne diseases, chemical hazards (for example lead, mercury, arsenic and the unsafe use of pesticides), and unintentional injuries. This paper discusses several child environmental hazards that have been identified and documented from studies undertaken in Kenya. These include hazards on water security; hygiene and sanitation; foetal exposures to environmental pollutants; daycare hazards; indoor air pollution and those related to stress brought about by the built environment. Regulations related to child environmental health in Kenya have gaps that do not address these concerns. The paper discusses suggestions on the way forward even as Kenya puts in place strategies to domesticate the Sustainable Development Goals (SDGs) and make poverty eradication, health and other development imperatives a reality.

MNC22: Potential biomarkers for bloodstream bacterial infection in children for developing a rapid diagnostic multistix for use in resource-limited setting
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Bloodstream bacterial infection is a major cause of morbidity and mortality among children in Africa. The existing biomarkers have limited sensitivity and specificity. Irrational use of antibiotics in non-malarial fevers increases cost, morbidity and accelerate antibiotic resistance. This study was carried out to identify biomarkers for bacterial sepsis for developing a rapid test and further combine this test with the existing mRDT into a diagnostic “multistix” for both malaria and bacterial sepsis. We obtained blood from under-five children with suspected septicaemia. Blood
cultures were performed by BACTEC technique followed by bacterial identification using conventional methods and qPCR. Using human ELISA kits, we analysed previously reported biomarkers; procalcitonin (PCT) and C-reactive protein (CRP), lipopolysaccharide (LPS) and lipoteichoic acid (LTA). A total of 79 children were recruited, 54.4% were males, mean age of 34 months. About 99% of patients had fever, and 3.8-day mean sickness duration; 92.4% completed age-appropriate vaccines; 67% received prior antibiotic therapy and 20.3% had altered consciousness. Using box plot, LTA displayed higher median than PCT and LPS. The upper quartile for PCT was similar to the lower quartile of LTA, and was higher for LPS. The inter-quartile range for LPS was smaller than for PCT and LTA. Overall, LTA displayed the most sensitivity. Further, we used ROC curves to evaluate the performance of the markers based on the subset analysis of 25 samples using qPCR results as a reference. The curves displayed comparable sensitivity for PCT, LPS and LTA based on AUCs of 0.75, 0.70 and 0.85 respectively. Consistently, CRP did not perform well in this subset analysis. In conclusion, PCT, LPS and LTA showed acceptable diagnostic thresholds for septicaemia. However, large-powered studies are required for validation prior to their use in clinical practice.

MNC23: Integrating pneumococcal vaccine in the routine immunization programme for older children than those covered by the current vaccine programme and vulnerable groups

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About 1 million children die annually due to pneumococcal disease. Strepoccocus pneumoniae infections increased in incidence and severity in people with immunodeficiency. There is lack of information on the impact of pneumococcal vaccine on children older than those covered by the routine vaccine schedule and in those with HIV. We conducted a double blind randomised control trial on efficacy of Prevenar13® (PCV13) in preventing acquisition of nasopharyngeal carriage of S. pneumoniae among HIV infected Children aged 1-14 years. Eligible participants were randomised to PCV13 (n=115) or Hib (n=111) vaccines each given at baseline and 2-3 months later. Nasopharyngeal and serum samples were collected at baseline and 4-6 months later. The primary endpoint was the presence of new vaccine serotype of S. pneumoniae isolated in PCV13 vs Hib arms and antibody response to PCV13. A total of 226 participants were enrolled from Jan 2013 to Nov 2013 in Muheza, Tanzania. Baseline socio-demographic and clinical characteristics were balanced between study arms. The efficacy of PCV13 in preventing new acquisition or clearing existing pneumococcal vaccine type carriage was 31.5% (95% CI 1.5-52.4%). It is also relevant to note a significant decline in the proportion of children carrying vaccine serotypes in the PCV13 arm by nearly 50% after receiving two doses of pneumococcal vaccine compared to pre-vaccination proportion. The immunogenicity results in our study revealed that HIV-positive children receiving PCV13 generally developed good immune responses to the majority of vaccine serotypes. Our findings suggest that the introduction of PCV13 targeting HIV-positive children is likely to be associated with a substantial decrease in the acquisition and carriage of pneumococci, which is an important marker of the likely effect of the vaccine on pneumococcal disease.
MNC24: "Are girls exploiting older partners or vice versa?" girls’ perspectives on intergenerational and transactional sex: implications for adolescent girls’ HIV prevention in Tanzania

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Intergenerational sex has been associated with increased HIV risk among adolescent girls and young women (AGYW) but little has been done to understand the dynamics of these relationships from the perspective of those involved. This paper explored how participants involved in these relationships perceived HIV-risk, exploitation and advantages/disadvantages within these partnerships. We conducted 18 participatory focus group discussions and 43 in-depth interviews with young people (14-24 years), adult men and women. Participants were sampled using both purposive and snowball techniques. Topic guides explored AGYW's intentions for entering into intergenerational sex and their perception of the relationships, motivations for men's interest in AGYW. Thematic analysis was conducted with the aid of NVIVO 10 software.

Girls described the motivations for intergenerational sex as: older partners kept promises about provision of gifts/money; gave gifts/money of higher value; were loving; were experienced in handling women; were less violent; and did not monitor their whereabouts. Having a same age boyfriend was not always approved by peers and resulted in ridicule. Girls reported exploited older men when: they accepted a gift and refused sex; and demanded larger amounts of money. Adult men's motivations for intergenerational sex included: prestige among peers; and young women's ability to perform new/creative sexual styles. Adult men's interest in young women was considered destructive and men engaged in such relationships were stigmatised using the derogatory term of “fataki” literally meaning explosive. Such men were considered high risk for HIV and other STIs. Interventions need to acknowledge the perceived advantages to intergenerational sex from the perspective of AGYW, and engage in a critical reflection process on the costs and benefits of choosing to participate in such relationships.

MNC25: Capitalizing on aspirations of adolescent girls to reduce their sexual health risks: implications for girls’ HIV prevention in Tanzania

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Little has been done to understand how young people's aspirations are key in the decisions they make and behaviours they adopt. This paper explored aspirations of young people and the strategies they used to meet them and how that relates to HIV risk. We conducted 18 participatory focus group discussions and 43 in-depth interviews with young people and adult men and women. Participants were sampled using purposive and snowball techniques. Topic guides explored the characteristics of a popular girl and boy and their aspirations. Thematic analysis was conducted with the aid of NVIVO 10 software. Girls mentioned their aspirations as: getting education; having a job; having nice clothes; an attractive body; a good life; good behaviour that is praised by everyone; having someone to take care of their needs; getting married and having children. Men were aware of the aspirations and desires of adolescent girls and mentioned: status among peers; trendy things such as smartphones, clothes; and marriage. Young men reported that a popular girl as one who has several pairs of clothes and is always in clean and neat clothes; and a smart one at school. Young men talked about their aspirations as: performing well at school and having many friends and has behaviour that is acceptable among
peers. Sex was one of the ways girls met their material and non-material aspirations. Girls aspired for young men with certain characteristics (attractive, hardworking, smart at school) to help them meet some of their long-term aspirations such as marriage and passing examination at school. There is need for interventions to capitalise on the aspirations of young women by addressing them in interventions as they are critical for their sexual decision making, sustainable development and achievement of future goals.

**MNC26: The effect of perceived stigma and discrimination on access to contraception among young people in northern Tanzania**

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Despite evidence that communication, education, and access to family planning (FP)/sexual and reproductive health (SRH) among adolescents is affected by socio-cultural factors, insight from stigma and discrimination (S&D) frameworks is rarely used. We examined how S&D shape adolescents’ access to and utilization of FP/SRH services. We conducted 22 focus group discussion (FGDs) and 56 in-depth interviews with youth young people, parents, health providers, teachers, and coordinators of local non-governmental organization (NGOs) working with youths on FP/SRH. Thematic analysis was conducted with the aid of NVIVO 10 software. S&D surrounding adolescents’ premarital sexual activity was evident at both family and community through shaming, name calling, isolation, physical punishment, and withdrawal of emotional and economic support. In health facilities stigma manifested through shaming, scolding, and excessive questioning from healthcare providers – and sometimes refusal of service. Secondary stigma felt by family members was also evident, reflecting the importance of upholding social standing and how contravening social norms governing ‘socially acceptable’ behavior undermines the social standing of both individual adolescent and their family. The power of S&D, in particular anticipated S&D, as a barrier to seeking FP/RH information and services emerged as a key theme across all groups. As a result of S&D adolescents seek to maintain confidentiality and restrict disclosure of their FP/SRH information and service needs. We conclude that stigma is a barrier to parents, teachers, and health providers providing adolescents with FP services and information and to adolescents disclosing their need for FP/SRH information and services. While changing pervasive drivers of stigma is a long-term proposition, reduce stigma and discrimination, particularly in health facilities and communities are critical in enhancing uptake of available services.

**MNC27: Acute Rubella virus infection among women spontaneous abortion in Tanzania: a need for antenatal screening**

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Acute rubella virus infection in early pregnancy has been documented as one of infectious causes of spontaneous abortion and congenital rubella syndrome. Despite being endemic the role of acute rubella virus infection in spontaneous abortion has not been studied in many developing countries. This study for the first time in Mwanza reports seroprevalence of acute rubella infection among women with spontaneous abortion, the information that may influence policy makers to consider screening of this infection during antenatal period. Women with spontaneous abortion were enrolled from November 2015 to May 2016 in different hospitals in Mwanza City, Tanzania. Detection of rubella specific IgM antibodies to confirm acute infection was done using
indirect enzyme linked immunosorbent assay (ELISA) as per manufacturer’s instructions. A total of 268 (mean age=26.3±5.6 years) women were involved in the study. The prevalence of acute rubella virus infection was found to be 9/268(3.7%, 95%CI: 1.5). As compared to previous study in the same setting reported the prevalence 0.3% in term pregnancy the observed prevalence is significantly higher(p=0.003). Only residing in urban areas (AOR: 5.65, 95% CI: 1.15-27.77, p=0.035) was found to be an independent predictor of acute rubella virus infection among women with spontaneous abortion in Mwanza city. In conclusion, about 4 out of hundred women with spontaneous abortion in the city are acutely infected with rubella virus signifying the potential of this virus in contributing to adverse pregnancy outcome in this setting.

MNC28: Prevalence and risk factors of Anaemia among Women of Reproductive Age in Northern and Southern Highlands of Tanzania

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Anaemia is among of the major cause of mortality and morbidity among women of reproductive age worldwide. In low-income countries it accounts for 26% of all deaths in women of reproductive age. Understanding the prevalence and factors contributing to anaemia in this high risk group may help to design interventions to reduce the mortality and morbidity associated with anaemia. This aimed to determine the prevalence of anaemia and associated factors among women of reproductive age in northern and southern highlands Tanzania. A cross-sectional study was conducted from November-December 2015 involving Arumeru, Monduli, Karatu, Iringa rural, Kilolo, and Njombe districts. These districts were used as pilot districts for the national food fortification program initiated in 2013. Data analysis was performed using statistical package for social science. Prevalence of anaemia was estimated as percentage while odds ratio with 95% confidence intervals for risk factors of anaemia was estimated using multivariable logistic regression models. Results showed that majority (59.1%) of the study participants were anaemic. Majority (75.2%) had mild anaemia; 9.4% had moderate and only 1.8% had severe anaemia. Anaemia was more prevalent in the North (52.7%) than in the South (47.3%). The risk factors for anaemia were: rural residency (AOR: 3.91; 95% CI: 2.85-5.36), informal education (AOR: 2.26; 95% CI: 1.069-4.755), being housewife (AOR: 3.81; 95% CI: 1.58-9.19) and being underweight (AOR: 1.21; 95% CI: 0.52-0.83). Mother’s age 15-39 years was associated with lower risk of anaemia. There was no significant association between anaemia and weekly meat consumption, number of children, marital status, occupation or knowledge on micronutrients. The prevalence of anaemia in the study area is higher compared with the national average. A number of factors were found to be associated with anaemia some of which could be preventable. Strategy to promote the importance of nutrition in preventing anaemia in the study areas is warranted.
SUSTAINING THE GAINS IN THE CONTROL OF HIV/AIDS, TUBERCULOSIS AND MALARIA

HIV/AIDS

HIV1: Hospital mortality and causes of deaths in Tanzania, 2006-2015
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Mortality of the patient is one of the most frequently used indicators of quality of health care. Periodical assessment of the causes of death in hospitals is important for monitoring the health of the population, assess quality of care, identifying priorities, improve reporting accuracy and avoid misclassification. The objective of this study was to assess data availability and determine trends and causes of deaths in hospitals of Tanzania. The study covered public hospitals in 25 regions of Tanzania from 2006 to 2015. Data was extracted from inpatient registers, death registers, burial permits, bed state reports, and daily hospital report books using structured data collection tools. A total of 39 hospitals (district=911 regional=18; zonal referral=3; special=4; national=1). Improper archiving of registers and reports was common in most hospitals. Inconsistency in filling of registers (with minimal use of standard disease nomenclature) was common. There was lack of uniform inpatient/death registers, with most hospital improvising counter books which results to differences on data variables captured between and/or within hospitals. Incomplete information was common. Some of the records were not available, and when available they were poorly written or unreadable, with missing important parameters of the deceased. Primary cause of death was mostly recorded as cardiac or respiratory failures/arrest without indicating underlying cause. Septicaemia was among the top causes of death recorded in hospitals. HIV/AIDS, tuberculosis and malaria were the major infectious diseases that caused most of the deaths. Generally, there is data inconsistency, incompleteness and poor storage of hospital data in Tanzania. Reporting of causes of death rarely conforms with the WHO recommended International Classification of Disease-10 procedure. It is recommended that hospital capacities in health management information systems be strengthened and health workers comply to the standards set.

HIV2: Measuring the burden of undiagnosed HIV infection from a population-based survey in Bukoba, Tanzania: merits of a home-based testing approach
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In Tanzania, HIV testing and counseling (HTC) is typically offered through voluntary or provider-initiated testing at health facilities, benefiting people who seek health services. Few studies in
Tanzania have evaluated acceptance and outcomes of home-based HTC (HBHTC). The objective was to investigate prior testing, test acceptance, and undiagnosed HIV infection among persons offered HBHTC. A cross-sectional, population-based survey was conducted in Bukoba Municipality, Tanzania, between November 2013 and January 2014. A one-stage, cluster sampling design was used to select 53 census enumeration areas (EAs). All households within a selected EA were visited, and survey participation was offered to all household members aged 18-49 years. Consenting persons completed computer-assisted interviews, followed by HTC using the national rapid-test algorithm. Survey data were analyzed using SAS. A total of 5,495 adults (39% men [M], 61% women [W]) from 92% (3401/3686) of contacted households participated in the survey interview. Of interviewed participants, 4,805 (89%) accepted HTC (87% M, 90% W), of whom 9.1% (6.1% M, 10.9% W) tested positive. While 62% of all participants (52% M, 68% W) reported HIV testing within the past two years, only 38% of the 436 HIV-positive participants (31% M, 41% W) were aware of their infection before the survey. The prevalence of undiagnosed HIV among all participants was 5.4% (4.3% M, 6.5% W), of whom, 47% (26% M, 56% W) reported testing in the past two years. In conclusion, HBHTC acceptance and proportional of undiagnosed HIV infection were high among both sexes, and of HIV-positive adults, nearly two-thirds were undiagnosed before accepting HBHTC. Our findings suggest that prior HTC practices did not adequately reach those who most needed testing in Bukoba. HBHTC is a promising strategy to increase HTC uptake and HIV diagnostic coverage in Bukoba and similar communities in Tanzania.

HIV3: Reaching 90% tested: an innovative provider-initiated HIV-testing model brings HTC to scale in 11 clinical settings in Bukoba, Tanzania

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In many outpatient department (OPD) clinics, provider-initiated HTC (PITC) is not available for all patients because of inadequate staffing and/or implementation. As part of the Bukoba Combination Prevention Evaluation (BCPE), a new PITC model was applied in OPDs in 11 facilities in Bukoba Municipality in Tanzania beginning October 2014. The objective was to compare PITC outcomes 18-months before and after BCPE-PITC was implemented. Previously, PITC was provided by health care workers (HCWs) when they determined patients would benefit from HIV testing. The BCPE-PITC model revised patient flow to ensure HTC was offered to all eligible clients without substantially delaying their OPD visit. Staffing at most clinics was increased by 1 HCW and 2 HIV-positive lay counselors (LCs). LCs conducted group pre-test counseling in waiting areas, screened patients on their need for testing, and routed eligible patients to HCWs for HIV testing. After post-test counseling by LCs, patients resuming their place in the clinic queue. HIV testing data were compiled monthly and analyzed using SAS. Compared with standard of care before BCPE, the BCPE-PITC model yielded 4.6 times more HIV tests (54,550 vs 11,984), 5.7 times more HIV-positive patients (2,829 vs 494) overall, and identified 5.0 and 6.2 times more positive males and female patients, respectively. Of the 2,829 HIV-positive patients BCPE-PITC identified, 2,542 (89.9%) reported being out-of-HIV care, of whom 2,178 (85.7%) were newly HIV-diagnosed (never previously tested HIV-positive). We conclude that a moderate staffing increase and an integrated PITC approach resulted in over four times more tests and at least five-times more HIV-positive male and female patients identified compared with standard of care. The model should be considered for scale-up in OPD clinics in Tanzania to help reach the first “90” of UNAIDS’ 90-90-90 targets.
In an urban lake-zone district of 143,000 people, the Bukoba Combination Prevention Evaluation (BCPE) aims to increase antiretroviral therapy (ART) coverage among eligible HIV-infected adult residents from an estimated 34% in 2013 to 80% after a 2.5 year intervention. This abstract summarizes BCPE outcomes after 21 months of intervention, October 2014-June 2016. BCPE interventions include provider-initiated (PITC) and community-based (CBHTC) HIV testing and counseling (HTC) and integrated linkage case management (LCM). Conducted in 11 facilities, PITC includes routine eligibility screening and referral for on-site HTC. CBHTC is offered at homes and at venues throughout the district. Provided to consenting HIV-infected out-of-care clients for up to 90 days, LCM includes first-visit escort and treatment navigation at 9 HIV clinics, and counseling on HIV care and disclosure. Clinical outcomes are reported of clients who completed or timed out of LCM at 90 days (closed cases). Of the 100,287 HIV tests conducted, 84,871 were among adults >15 years of age (33,355 tests among adult males). PITC accounted for 64% of all tests and 79% of 3,695 HIV-infected out-of-care persons identified (87% newly HIV diagnosed). Of 2,941 (88%) LCM cases closed through June 2016, 2,702 (92%) clients had registered for HIV care, 2,558 (87%) had a CD4 test result documented in their medical chart (of whom 55% were ART eligible), and 1,555 (53%) were initiated on ART. Similar percentages of men and women had registered for HIV care and were initiated on ART. BCPE interventions are promising methods that if brought to scale might help Tanzania achieve 90-90-90 targets. Next steps include intensifying defaulter tracing for patients who meet national ART guidelines, and in 2017, conducting the endline evaluation to assess achievement of 80% ART coverage among eligible adult residents (CD4<500).

**HIV5: Efavirenz is related to depression among adults living with HIV but not among adolescents living with HIV in Kilimanjaro, Tanzania**

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Efavirenz (EFV) is part of first line antiretroviral treatment (ART). Several studies have shown that EFV is related to neuropsychiatric symptoms varying from sleep disorders to depression, which may lead to treatment discontinuation. Only few studies have been conducted in Sub Saharan Africa on this relationship with varying results. The study objective was to explore the relationship between neuropsychiatric symptoms among adults and adolescents living with HIV in Kilimanjaro, Tanzania and efavirenz. We did a cross-sectional study among adults (age 18-65 years) and adolescents (age 12-17 years) on ART attending Kilimanjaro Christian Medical Centre in Moshi, Tanzania. Neuropsychiatric symptoms were measured using the Hospital Anxiety and Depression Scale (HADS), the Symptom Checklist 90 (SCL-90) and the Mini-International Neuropsychiatric Interview (MINI). Prevalence of symptoms were calculated and relationships
were tested using multivariate regression analyses. We included 215 adults and 150 adolescents. Of adults and adolescents, 113 (52%) and 56 (37%) were on EFV, respectively. Nine participants (5%) reported depression based on the HADS. Among adults, depression scores were higher for those on EFV, both on the HADS (p=0.01) and in the SCL-90 (p=0.04). Among adolescents, those on EFV had lower scores on depression on the HADS (p=0.02) and SCL-90 (p=0.001). Hostility scores (p=0.03) and psychoticism scores (p=0.04) were also lower for those on EFV. Among adults, twenty-one (10%) reported suicidal thoughts, but there was no difference between those on EFV and those without. We conclude that there is an association between EFV and depression among adults living with HIV. In adolescents, EFV seems to be negatively related to neuropsychiatric symptoms. Close monitoring of depression is necessary to prevent treatment discontinuation.

HIV6: Surveillance of drug resistance mutations in HIV-1 infected patients is necessary for sustainable control of HIV/AIDS in Tanzania

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Surveillance of HIV-1 drug resistance-associated mutations (RAM) in HIV infected patients is important in order to manage antiretroviral treatment programmes in resource-limited settings. In the context of clinical studies, we determined the prevalence and patterns of RAM in HIV infected patients in the Lake Victoria region, Tanzania. We analysed the presence of HIV-1 drug resistance-associated mutations in therapy naïve and treatment failure patients at the Bugando Medical Centre in Mwanza, Tanzania. RAM were identified by sequencing the protease and reverse transcriptase region of the HIV-1 polymerase. Another goal of the study was to achieve a technology transfer for routinely monitoring of HIV-1 drug resistance-associated mutations in HIV infected patients in Tanzania. HIV-1 drug resistance-associated mutations were found in 13.9% of 101 HIV treatment naïve patients with median age of 36 years. From the total of 90 immunological second line failure patients only 32 of them were also virological failure patients. From the virological second line failure patients 91 % were highly Nevirapin resistant, 81 % were highly Efavirenz resistant, 53% were highly AZT resistant, 81% were highly 3TC/FTC resistant, 47% were highly ABC resistant. Especially the high presence of NNRTI mutations complicates further treatment options. We conclude that the prevalence of HIV-1 drug resistance-associated mutations is high in Tanzania and need to be followed up to achieve a sustainable control of HIV/AIDS. Our results demonstrate the necessity of appropriate activities to monitor the prevalence of HIV-1 RAM as part of programs for expanded access to antiretroviral therapy. For that it is necessary to improve laboratory capacities and to introduce HIV sequencing methods in Tanzania.

HIV7: Urinary tract infections among HIV positive pregnant women in Mwanza City, Tanzania is predicted by low CD4+ count

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Urinary tract infection (UTI) is common among pregnant women and can lead to adverse maternal and foetal outcomes. Limited information exists on the magnitude, antimicrobial susceptibility patterns and predictors of UTI among HIV positive pregnant women so as to guide rational therapy. The objective was to determine the magnitude, antimicrobial susceptibility patterns and predictors of UTI among HIV positive pregnant women attending PMTCT clinics in Mwanza City in Tanzania. A cross sectional hospital based study involving 234 HIV positive
pregnant women in PMTCT clinics was conducted between March and May 2016. Mid stream urine samples were collected and analysed basing on the standard operating procedures. Data was analyzed by STATA version 11.0. The mean age was 28.6 ± 5.5 years. The prevalence of UTI among HIV positive pregnant women was 21.4%, 50/234 [95%CI: 16.11-26.6]. On multivariable logistic regression analysis, marital status (OR; 2.61, 95% CI: 1.12-6.09, p=0.026), low CD4 counts (OR; 2.92, 95% CI: 1.10-7.71, p=0.031) and UTI symptoms (OR; 2.52, 95%CI: 1.05-6.04, p=0.03) were found to be independent predictors of significant bacteriuria in HIV positive pregnant women. Escherichia coli (57.69%) and Klebsiella pneumoniae (23.08%) were the most predominant isolates exhibiting high resistance to ampicillin (93.3%) and trimethoprim-sulfamethoxazole (90%); compared to nitrofurantoin (16.7%), gentamicin (10%) and ceftriaxone (10%). In conclusion, a considerable proportion of HIV positive pregnant women in Mwanza have significant bacteriuria which calls for the need to introduce routine screening and specific treatment of these women so as to prevent associated complications.

HIV8: In vitro activity of Solanum carolinense extract against human fungal isolates: a case study in Mbeya, Tanzania
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Fungal infections are very common in the world. About 300 million people suffer from serious fungal infection every year, accounting for 1.35 million deaths in immunosuppressed patients. Over 3% of Tanzanians suffer from serious fungal infections annually. Absidia corymbifera is one of the common fungi found which cause zygomycosis in the form of mycotic and mucormycosis in human. The objective of this study was to isolate and test the in vitro antifungal activity of Solanum carolinense extract against human fungal isolates. This was a case study involving three samples collected from patients with suspect of fungal infections. One from infected head, leg and surgical wound. The lesion samples were transported at room temperature. A pus from infected surgical wound discharge was suspended in 0.85% normal saline, maintained at 2-8°C until laboratory processing. Samples were cultured using SDA at 37°C and confirmed by celotape technique. We adjusted the isolate to McFarland 1.0 with 0.85% saline and tested with different concentration of Solanum carolinense fruit extract (100 to 10⁻²). Fluconazole was used as a positive control. The fungal isolates presented both macroscopic and microscopic similar features as Absidia corymbifera. Testing the isolate against the extract; we found the highest antifungal activity with zones of inhibition of 30mm, 28.5mm and 13.5mm for 100, 10⁻¹ and 10⁻² for each extract dilutions. The zone of inhibition for the fluconazole control was 23.75mm. We conclude that Solanum carolinense fruit extract showed promising antifungal activity against isolated Absidia corymbifera. This finding supports the traditional use of Solanum carolinense plant for treating fungal infection in the communities. Future studies with higher sample size will provide more efficient data on proper use of this promising antifungal plant.

HIV9: Factors affecting the disclosure of sero-status among individuals diagnosed with HIV in the rural Mbeya Region: implications for linkage to HIV care
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Disclosure of HIV sero-status plays an important role in linkage to and engagement to HIV care. However, disclosure of HIV status remains a challenge among individuals diagnosed with HIV. This study aimed to describe the factors associated with failure of disclosure of HIV sero-positive status and its implication to linkage into HIV care in the rural settings of Mbeya region, Tanzania. A descriptive qualitative research design was employed. Between August 2014 and July 2015, eight focus group discussions and ten in-depth interviews were conducted with participants from a cohort of 1,012 newly diagnosed HIV positive individuals from 16 HIV testing sites. Also, 20 key informant interviews were held with health care providers. Sites and participants were purposively selected. The data were transcribed verbatim from Kiswahili and translated to English. They were then analyzed by thematic content analysis with the assistance of Atlas.ti data analysis software. Participants reported fear of stigma related to HIV/AIDS, fear of intimate partner violence and/or divorce as some of the factors affecting HIV positive individual's decision to share the knowledge of their HIV status. New relationships or marriages after the death of a previous partner was also mentioned to affect to disclosure that eventually affected linkage to care. On the other hand, participants who had disclosed their status reported having financial and moral support from their partners and other family members and were successfully linked and engaged in HIV care. In conclusion, HIV sero-positive status disclosure was reported to increase rates of linkage and engagement to care after testing HIV positive. However, more efforts are needed to overcome the factors hindering disclosure as it impedes successful linkage to care and ultimately timely initiation of ART.

HIV10: Unskilled but competent: results from an HIV rapid test competence assessment among non-medical non-laboratory staff in Tanzania

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Tanzania suffers from a human resource for health crisis in the area of HIV laboratory diagnostic and testing. Task sharing has been recommended by the World Health Organization and is taking place unsystematically across the country, where non-laboratory certified personnel working in health facilities perform HIV rapid testing (HRT), due to staff shortage. To understand this phenomenon and to devise proper response, Amref Health Africa assessed the competence non-laboratory personnel, who regularly conduct HRT in health facilities. This was a nationwide assessment targeting 8,656 testers from 1,482 health facilities. Testers were provided with blood samples and asked to perform the HRT. They were scored on the accuracy of the procedure by a team of 3 qualified laboratory personnel. Data were analyzed using Stata 10. Majority of participants were medical personnel 22.1% (1,913) non-medical working in standalone and rural health facilities. Their professionals ranged from social workers, lay counsellors and pastors. Of all non-medical 85.8% were competent in conducting rapid HIV test. Study found that a large number of unskilled health service providers are performing HRT in health facilities and proven to be competent. We recommend them for further training and accreditation, and especially to those in the lower cadres, who form the bulk of the healthcare workforce, to fully integrate them into laboratory diagnostic services.
HIV1: Hepatitis B virus among treatment experienced HIV patients in Mbeya from November, 2013 to November, 2015
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Hepatitis B virus is the leading cause of chronic liver disease and death, accounting for up to half of all cases of cirrhosis and hepatocellular carcinoma. HIV/HBV co-infection increases the morbidity and mortality beyond those caused by either infection. There is limited data on the burden of HIV/HBV co-infection in Tanzania. The objective was to determine the prevalence and characteristics of hepatitis B virus infection among treatment experienced-HIV patients in Mbeya.
Data were obtained from participants who attended screening visit for the ALISA-cohort at Mbeya Zonal Referral Hospital between November, 2013 and November, 2015. Blood samples were tested for HbsAg and extended serology, virology and Genotypic resistance testing (GRT) were performed at the Virology Department of the Technische Universitat in Munich for those who were HbsAg positive. Out of 453 patients screened 39 (8.6%) were diagnosed HBsAg-positive, with a prevalence of 6.8% in females and 11.1% in males. Out of the HBsAg-positive patients 35 could be analyzed, 24 (69%) were on lamivudine and 11 (31%) on tenofovir containing ART with a median treatment duration of 37 months, the median CD4 count was 279 cells/µL. HBeAg-positivity was seen in 13 (46%), and anti-Hbe-positivity in 20 (59%) patients. No HBV-DNA was detected in 11 (31%), low levels <2.000 c/mL in 17 (49%), and high levels >100.000 c/mL in 7 (20%) patients. High DNA levels were seen in 6 patients on lamivudine and in 1 on TDF-containing regimen. The majority had HBV genotype A1, one patient had genotype D4. GRT revealed lamivudine resistance in all patients, no tenofovir resistance was detected. ALT elevation was seen in one patient, GGT elevation was detected in 18 (51%) patients. The high burden of hepatitis B calls for more attention towards investigational and treatment capacity in treatment-experienced HIV patients in addition to the minimal available.

HIV2: Use of TASHACK traditional herbal medicine among people living with HIV in Tanga Tanzania: findings from a cross-sectional survey
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The use of traditional herbal medicine is widespread among people living with HIV infection in Tanzania and other countries. The extent of use and the plethora of herbal mixtures used for HIV-related disease symptoms have not been well documented in Tanzania. We investigated use of combination of herbs herewith referred to as TASHACK in Tanga region from the perspectives of People Living with HIV (PLWH) and traditional healers. To assess the extent of usage and the types of traditional herbal remedies, interviews and focus group discussions were conducted with traditional healers and People Living with HIV (PLWH). A total of 18 interviews involving traditional healers and eight Focus Group Discussions (FGDs) including People Living with HIV were conducted in Tanga City in north-eastern Tanzania. Our findings show that, combination of four herbs hereby referred to as TASHACK provided better outcomes in terms of improving quality of life of HIV patients, improving psychological wellbeing of HIV patients, and improving sexual performance “libido” of male HIV patients. Four herbs identified were i) Mohogora (Steganotaenia araliacea) ii) Zingiri (Pyrenacantha kaurabassana) iii) Mkusu (Harrisonia abyssinica) and iv) Mvuti (Lantana camara). In addition, a total of 17 traditional herbal remedies commonly
used by HIV infected patients were also identified. We conclude that the extent of concurrent use
of ARVs with traditional medicine is widespread in the study area. Combinations of
herbs provide better outcomes in improving quality of life in terms of improving, physical,
psychological wellbeing and sexual performance for HIV infected patients. HIV infected patients
are increasingly using ARVs in combination with traditional herbal medicines.

**HIV13: The impact of perceived health: enrollment of newly diagnosed PLHIV into care during
the Tanzania Combination Prevention Baseline Cohort Study**

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Achieving high ART coverage requires good community- and facility-based HIV testing services
(HTS) and effective linkage and retention programmes. Understanding the impact of perceived
health on PLHIV enrollment in care will help tailor programmes to achieve UNAIDS 90-90-90
goals. In Bukoba, Tanzania in 2013-14, 18-49 year-olds were recruited into an observational-cohort
from a household HTS survey and from HTS at three health facilities. Household (HP) and facility
(FP) participants were referred to HIV care. Overall, 288 newly diagnosed PLHIV completed
baseline (BL) and six-month follow-up (FU) surveys (98 men, 34.0%; 190 women, 66.0%). Medical
records were abstracted after six months. Enrollment was defined as assessed for ART eligibility
(by CD4 count or WHO stage). Analyses included 191 (66.3%) HP and 97 (33.7%) FP. Summary
statistics, Cochran-Mantel-Haenszel and chi-square tests were calculated using SAS. Similar
proportions of HP and FP were female (65.0% vs. 66.5%), more FP than HP reported poor/fair
health at BL (59.8% vs. 26.2%, p<0.001), and more FP than HP enrolled in HIV care (82.5% vs. 31.4%,
p<0.001). More participants who reported poor/fair health than good health at BL enrolled in
care (facility: 86.2% vs. 76.9%; household: 46.0% vs. 26.2%; p<0.01). Over half of FP and HP with
ART awareness at BL reported the belief that PLHIV should enter/return to care only when sick
(57.8% vs. 59.7%); at FU, more FP and HP reported this belief (73.9% vs. 75.4%), including those
enrolled in care (enrolled: 73.3%; not enrolled: 76.4%). Early enrollment in care was lower for HP
than FP, and very low (26.2%) among HP perceiving themselves in good health. Most participants
reported believing that PLHIV should delay entry into care until sick. Findings suggest enhanced
linkage and retention services, including counseling on the benefits of early enrollment, may be
important.

**HIV14: Substance abuse and risk of HIV/AIDS transmission in urban and semi-rural settings of
tanzania: a case of Tabora, Tanga and Mbeya Regions**

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Drug abuse worldwide is a major public health problem, associated with increased risks of HIV
transmission. This is due to increased chance of syringe sharing plus, raping after drugs uses and
unsafe sex practices. The objective was to assess the contribution of substance abuse on risks
behaviors to HIV/AIDS transmission in urban and semi-rural settings in the study area. This
descriptive cross sectional survey used quantitative and qualitative data collection methods from
substance abuse users by using snowballing technique. Collected data analyzed by the Statistical Package for Social Sciences (SPSS) and the NVivo software. The study was conducted from November 2014 to January 2015 in six districts sampled from three regions namely Mbeya (Momba and Rungwe), Tabora (Urambo and Tabora urban) and Tanga (Muheza and Tanga). The study collected data from 400 drugs abuse users making the response rate of 95.2%. Thirty (7.5%) participants injected drugs/used drugs in the last 12 months before this study. Slightly below half (40.2%; n=161) of drugs abuse users reported having sex with non-primary partners in the last 12 months. Of these, 153 (95.0%) had sex after using drugs and 97 (60.2%) had sex without condom. Of those who had sex without condom used marijuana 82 (84%), heroine 17 (17.5%) and cocaine 13 (13.4%). Delaying ejaculation 23 (5.8%) was reasons for initiating drugs abuse and this was significantly reported by respondents from urban than semi-rural settings (8.2% vs 3.4%, p=0.03). Lack of money to buy syringes/needles 18 (60%), high price of syringes and needles 12 (40%), trusting each other 10 (33.3%), out of stock of syringes/needles 9 (30%) and easy distribution of dosage 8 (26.7%) were the reasons for sharing needles and syringes. These findings reflect that drug abuse use and HIV/AIDS transmission is disquieting issue which calls for public health intervention, advocacy and policy change.

HIV15: Hepatitis B and hepatitis C virus co-infection with HIV among HIV counseling and testing attendees in Tanzania: a retrospective study

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Hepatitis virus co-infection is known to influence progression, management and outcome of human immunodeficiency (HIV) infection. However, there is limited published data in Tanzania on the prevalence of HIV+ viral hepatitis co-infections. Stored serum from routine blood samples collected from 2,058 clients attending Angaza HIV Testing and Counseling (HTC) sites in Tanzania from 2001 to 2007 were tested for HIV, HBsAg and HCV serology. According to ANGAZA HTC HIV rapid testing protocol, all 5th reactive (positive) and 20th non-reactive (negative) samples were submitted to Amref Health Africa Laboratory in Dar es Salaam as part of the external quality assurance retesting programme. HIV HBsAg and HCV antibodies and HbsAg were detected in 24.8%, 2.5% and 10.7% samples, respectively. Dual co-infection with HBV and HCV was presenting four sera (1.8%). HIV co-infection with HBV was detected in 61 sera (27.6%); and HIV co-infection with HCV was detected in 14 sera (2.7%). None of the sera tested had all two viruses present. In conclusion, there is a high prevalence of HIV, HBV and HCV infection among HTC attendees in Tanzania. Efforts to scale up HIV care, treatment and control programmes in the country should also seek to address HBV and HCV co-infection, especially as improved treatment regimens for viral hepatitis infection are currently available.

HIV16: Co-infection of Wuchereria bancrofti and HIV impact of HIV on Lymphatic Filariasis prevalence, incidence and treatment effectiveness

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From 2007 to 2011, a population based survey, was conducted annually in the Mbeya Region, South Tanzania evaluating prevalence and incidence values for HIV and other diseases, including lymphatic filariasis. The national mass drug administration (MDA) to eliminate lymphatic filariasis (LF) started in 2009. The objectives were: (i) to evaluate the influence of a co-infection with HIV on LF-prevalence and treatment effectiveness after 2 rounds of MDA; and (ii) to evaluate the influence of LF on HIV prevalence and incidence. TropBio® Og4C3 ELISA (detecting circulating filarial antigen (CFA) was used to test sera collected in 2007-2009 before treatment and in 2011 after 2 MDA treatment rounds. HIV testing was done using SD-Bioline RDT, with confirmation of all positive results by ELISA and Western Blot. The prevalence of lymphatic filariasis in adults above 18 years was 42.6% and 41.7 in HIV negatives and positives, respectively. The drop in prevalence was comparable in both subgroups: to 36.8% in the HIV negative and 31.1% in the HIV positive subgroup. HIV incidence in LF-positive subjects (1,91 cases per 100 person-years) was significantly higher than the incidence in LF-negative subjects (0.80 cases per 100 person-years; risk ratio 2.39). The increased risk was most pronounced in the 14-25-year-old subgroup with a risk ratio of 3.13 (95% CI 0.553 to 21.5). Among this subgroup also a significant higher HIV prevalence was measured in LF positive participants compared to the LF negative (8.3% versus 3.6%, RR 2.25, p=0.0406). A significantly increased risk of acquiring HIV was demonstrated in LF infected compared to LF negative individuals. This was reflected in a higher HIV prevalence in adolescents and young adults. In contrast, no impact of HIV on LF prevalence or treatment effectiveness of MDA could be demonstrated.

HIV17: Confirmed virological screening and drug resistance in HIV-1 infected patients on first line antiretroviral therapy from Mbeya, Tanzania

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Anti-retroviral therapy (ART) monitoring based on immunological treatment failure is limited by low sensitivity and specificity, viral load(VL) monitoring is recommended. High VL is associated with poor treatment adherence; re-enforced adherence counselling followed by second VL confirmation is recommended. The objective of this study was describe the outcome and turnaround time of a confirmed virological failure (VF) algorithm and patterns of genotypic drug resistance in HIV-positive patients on first line ART from Mbeya, Tanzania. Virological treatment screening was focused on patients with immunological failure or 1st line ART ≥2 years. The screening algorithm targeted first virological screening, followed by re-enforced adherence counselling in patient with VL >1000 copies/mL, and confirmed second VL-screening within two months. Genotypic resistance testing (GRT) was performed in patients with confirmed VF. Of 356 patients screened the median time on 1st line ART was 6.3 years, 25% showed immunological treatment failure. First VF was observed in 58 (16.3%) patients, confirmatory VL- testing was performed in 50 patients after a median of 2.8 months. Confirmed VF was seen in 45 (90%) patients, 5 (10%) re-suppressed VL after re-enforced adherence counselling. Overall, 41 patients switched to 2nd line ART after a median of 4.4 months. In 8 (15%) patients, treatment switch occurred after 6 months, in 5 (9%) no switch was performed, 7 (13%) were lost to follow-up. GRT was done in 30 patients and most accumulated high numbers of reverse transcriptase inhibitors
(NRTI) mutation (87% M184V, 7% K65R, 70% thymidine-analogue mutations (TAM), 57% ≥2 TAM’s, 40% ≥3 TAM’s), resulting into functional PI-monotherapy in 57%. Confirmed virological treatment screening supports the detection of patients with re-suppress VL, but also leads to delayed 2nd line treatment switch or poor retention. Accumulations of NRTI drug resistance mutations impact the efficacy of 2nd line ART.

HIV18: Male involvement and rights of women in prevention of mother to child transmission of HIV in Tanzania
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Prevention of mother-to-child transmission(PMTCT) of HIV is one of the programmes that promotes and enhances the rights of HIV-infected mothers and their newborns. To enhance the rights to HIV infected mothers, the World Health Organization (WHO) recommended a male involvement initiative to offer support to their spouses. The initiative has been adopted by the Government of Tanzania. However, little information is available on the impact of male involvement initiative on the rights of HIV-infected mothers and their babies. The study objective was to explore the influence of male involvement initiative on enhancing the rights of the HIV-infected mothers to child birth, to disclosure, to infant feeding decisions, to privacy and confidentiality, and to decision-making. The study was conducted in two districts of Bagamoyo and Kisarawe in Tanzania. In-depth interviews were conducted with HIV-infected mothers, their spouses and close relatives. All informants revealed positive achievement after male involvement initiative. The rights to child birth, disclosure, infant feeding decisions, privacy and confidentiality, and decision-making were enhanced and protected, the experience that was difficult to achieve in the pre-male involvement initiative period. In both districts, 12 mothers who were married to HIV-infected spouses confirmed to be living freely with this status and receiving more support from their spouses than discordant couples and those with partners whose sero-statuses were unknown. There is a need for more education to the community on the importance of male partners’ involvement in the PMTCT services and more refresher training to care providers on the human rights aspects.

HIV19: Challenges facing utilization of HIV testing and counseling services among “boda-boda” riders in Dar es Salaam, Tanzania
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The emerging population of motorcyclists popularly known as “boda-boda” riders in Tanzania involves a cohort of young active males who are more likely to share a set of high-risk behaviours such as multiple sex partners, low condom usage and low level of knowledge about HIV and Sexually transmitted infection, putting them at risk of HIV infection. However, the magnitude of the risk and utilization of HIV testing and counselling (HTC) services by this group is not known. The objective of this study was to assess the availability and utilization of HTC services among boda-boda riders in Dar es Salaam, Tanzania. This was an exploratory and cross-sectional study conducted in Ilala, Kinondoni and Temeke districts of Dar es Salaam region. Both qualitative and quantitative data on utilization of HTC services and their risky behaviours toward HIV infection were collected and a sero-survey to determine HIV prevalence among boda-boda riders was
done. Out of the 973 interviewed boda-boda riders; 508 (52.2%) were married while 432 (44.4%) were single and 33 (3.4%) were divorced. Out of these, 523 (53.6%) received HIV counselling and testing during the study. Majority 194 (37.1%) were in Ilala, 175 (33.5%) in Kinondoni and 154 (29.4%) from Temeke districts. However, the proportions were not significantly different \( \chi^2=3.8 \ p=0.147 \).

Overall, 13 (2.49%) were HIV positive. The proportion of HIV positive was higher among study participants from Temeke (7, 4.5%) as compared to their counterparts in Kinondoni (3; 1.7%) and (3, 1.6%) in Ilala. Further analysis is being performed to determine the level of utilization of HTC services and risk factors to HIV transmission in the study population. The study showed low HIV prevalence among boda-boda riders.

HIV20: Early infant diagnosis of HIV/AIDS in southern highland zone, Tanzania 2010-2013
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Early infant diagnosis strategy was adopted in Tanzania 2006. Its goal is to identify infants who are infected with HIV in order to prolong their survival by expediting their initiation into care and treatment. The analysis intended to assess the factors associated with HIV infection and trend of positivity among HIV exposed infants (HEI) accessing HIV Exposed Infant Diagnosis (HEID) from 2010 to 2013. HEID data abstracted from Mbeya Zonal Referral Laboratory and analyzed using STATA version 1.2. Descriptive analysis was conducted to determine magnitude and distribution of HIV infection among HEI accessing HEID, trend analysis to establish HIV infection trend over time and regression analysis to explore factors associated with HIV infection among HEI accessing HEID services. The HIV prevalence in southern highland zone regions was found to be 9.7%, Mbeya had a relatively higher prevalence (11.3%) than the other regions and 2011 was found to have high prevalence of 12.3% compared to other years. The trend of positivity of infant tested generally was found to decrease from 10.5% in 2010 to 7.6% in 2013. About 44% clients received results in 2 weeks from the time specimen were collected. Infant age at testing (\( P = 0.003 \)), maternal ARV (\( P = 0.034 \)) and infant ARV exposure (\( P = 0.021 \)) were factors significantly associated with HIV infection among infants. In conclusion, the prevalence of HIV among HEI accessed HEID from 2010 to 2013 was high, however, trend of positivity decreased from 2010 to 2013. Factors associated with HIV positivity in infants should addressed.

HIV21: Factors influencing the implementation of the programme for early infant diagnosis of HIV in Tanzania
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Early Infant Diagnosis (EID) of HIV makes it possible for HIV-exposed infants to receive early clinical evaluation, prophylaxis for opportunistic infections and antiretroviral therapy (ART) if indicated. Samples for early infant diagnosis are collected at health facilities, dispatched to zonal laboratories for HIV DNA-PCR analysis, and the results are later sent and handed over to parents. This has been a long and complex process with a lot of challenges. This study aimed at evaluating implementation of EID programme in order to provide evidence for improvement. This cross-sectional study involving HIV infected mothers was conducted from May to June 2016 at selected health facilities (HFs) in Iringa, Morogoro, Mwanza and Tanga regions. Interviews were done to participants attending reproductive, maternal and child health clinics and invited mothers. Documentary review was conducted to extract information on number of exposed infants who
received EID and number of HIV infected infants. Of the 827 interviewed women, majority (96.0%) tested their children for HIV using EID and the mean age of infants at testing was 1.9 months. Regarding the time from sample collection to receiving the results, 49.9% of the mothers had to wait for 5 or more weeks while only 2.8% received the results within 1-2 weeks. Majority (73.5%) of the tested children were HIV negative. Long turnaround time, was the main complaint mentioned by most (35.9%) of the women. Furthermore, stigma was mentioned by 16.2%, followed by long waiting time at the health facilities (13%) and long distance from their place of residence to the health facilities (12.2%). The study showed an increase in testing of exposed children using early infant diagnosis in the study regions. Challenges reported such as long turnaround time and stigma should be addressed in order to improve the performance of EID of HIV programme.

HIV22: Operational evaluation of HIV point of care tests for very early infant HIV diagnostics in infants born from HIV infected mothers in Mbeya, Tanzania
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Early HIV diagnostics for infants born to HIV infected mothers in Africa is currently assessed at 4-6 weeks’ post-partum using dry blood spot (DBS) HIV-DNA testing. Procedures are complicated by specialized laboratory requirement and often long turn-around time delaying the start of infant antiretroviral therapy (ART). HIV Point of Care (PoC) testing as early as birth performed at obstetric clinics would provide the option for immediate neonatal ART initiation. The is an ongoing prospective in-vitro diagnostic study evaluating HIV PoC testing for very early infant HIV diagnostics in Mbeya, Tanzania. HIV infected pregnant women were enrolled at the time of delivery, Cepheid Xpert HIV-1 Quant was performed and compared to plasma HIV-RNA. HIV exposed infants received qualitative HIVPoC testing (Cepheid Xpert HIV-1 Qual) at birth, weeks 1, 2, 3 and 6 post-partum. The reference standard for confirmation of Xpert-1 results were DBS HIV-DNA and plasma HIV-RNA (Roche COBAS TaqMan). Between July 2015 and June 2016, a total of 502 HIV infected pregnant women were included. By then 12 infants were diagnosed HIV positive (transmission rate 2.4%), of those 9 (75%) were diagnosed at birth suggesting intra-uterine infection. The Xpert HIV-1 QualPoC testing correctly identified all HIV infected and non-infected infants resulting into 100% test sensitivity and specificity. A good agreement between the quantitative Xpert HIV-1 QuantPoC test and the TaqMan plasma HIV-RNA was seen with mean difference of 0.3 log. In conclusion, we have demonstrated an excellent Xpert HIV-1 PoC test performance for both early infant HIV diagnostics and maternal viral load monitoring at delivery. Our results provide a diagnostic platform to further advance into very early neonatal antiretroviral treatment studies as well as to timely identify infants most at risk for vertical HIV transmission.

HIV23: Prevalence of HIV risk factors and challenges in delivering and utilizing HIV/AIDS services among mobile groups in Tanzania
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Mobile communities including fish-folks, artisanal miners, seasonal plantation workers and long distance truck drivers are vulnerable to HIV infection and have limited access to HIV/AIDS services. The objective was to determine the prevalence of HIV risk factors and challenges in delivering and utilizing HIV/AIDS services among mobile groups in Tanzania.

This cross sectional study utilized both quantitative and qualitative methods of data collection from fish-folks, artisanal miners, seasonal plantation workers and long distance truck drivers. The study was carried out in Rungwe, Momba and Chunya (Mbeya Region), Mpwapwa (Dodoma), Igunga (Tabora) and Njombe district (Njombe). Out of the 611 respondents, 385 (63.0%) reported to have had sexual intercourse with non-primary sexual partners and 91 (23.6%) had sex with two or more partners 12 months prior to this study. A total of 135 (35.1%) of the 385 had sex without condom. Sixty-three (16.4%) participants had sexual intercourse while they were drunk and majority 41 (65.1%) did not use condoms. Small scale miners (AOR=4.6, 95%CI 2.4-8.8), fish-folks (AOR=2.9, 95%CI 1.5-5.3) and long distance truck drivers (AOR=4.1, 95%CI 2.0-8.6) were more likely to report having risky sex with two or more non-primary partners compared to seasonal plantation labors. Current alcohol consumers (AOR=1.9, 95%CI 1.3-2.7) and those who were away from primary partners for >60 days significantly reported having sex with two or more partners as compared to non-alcohol consumers and those who were away for 30-60 days, respectively. About 52% (315/611) reported challenges which face the mobile community in accessing HIV services which included long distance to the source of HIV/AIDS services 144 (45.7%) and unavailability of the services 126 (40.0%). In conclusion, high risks for HIV transmission was reported among small scale miners, fish-folks, long distance truck drivers and current alcohol consumers. Sex without condom was common and the rate was high among those who had sex while drunk.

HIV24: Knowledge on, uptakes and barriers of utilization of HIV testing and counselling among secondary school students in rural and urban settings of Tanzania: a case study from regions with low, moderate and high HIV prevalence

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Secondary school students are exposed to HIV transmissions risky behaviours. Low uptake of HIV testing and counselling (HTC) services has been noted among students despite of having high HTC knowledge. The objective was to assess the level of knowledge, uptakes and barriers for utilizing HTC services among form II, III and IV students in rural and urban settings of Tanzania. This cross sectional study was conducted from April-June 2016 from six districts, two from each region, one being rural and another urban. These regions were sampled to represent regions with low (Singida), moderate (Pwani) and high (Mbeya) HIV prevalence. Out of 1,452 students, 1,262 (86.9%) defined HTC services precisely. Urban students (15.4% vs 10.7%, p<0.05), day schools (15.2% vs 7.6%, p<0.05) and form II had low knowledge on HTC services as compared to rural students, boarding schools, boarding students and form IV students, respectively. Out of 1,452 students, 507 (34.9%) ever tested for HIV in their lifetime and 455 (89.7%) received the results and 335 (66.1%) tested after joining secondary school. Students from region with high HIV prevalence (44.8% vs 23.8%, p<0.0001), boarding schools (44.5% vs 30.2%, p<0.0001), boarding students (43.5% vs 32.8%, p<0.001), private owned schools (49.5% vs 31.0%, p<0.0001), those aged ≥18 years (42.7% vs 32.3%, p<0.001), form IV students (39.5% vs 29.4%, p<0.05) and those with high HTC knowledge level (35.9% vs 28.4%, p<0.05) had high level of HTC uptakes than those from low
HIV prevalence region, day schools, day students, those aged 13-17 years, form II and those with low HTC knowledge, respectively. About 60% students reported existence of barriers in accessing and utilizing HTC services. These included fearing test results (45.5%, unavailability of services (37.0%, stigma and segregation (31.6%) and lack of confidentiality among service providers (31.6%). We conclude that many secondary students had high HTC knowledge, but few ever utilized the services. Various factors and barriers were associated with low level of HTC knowledge and uptakes. Designing interventions to improve HTC knowledge and uptakes should consider those factors and barriers.

HIV25: Incidence and risk factors for treatment default among HIV positive pregnant and lactating women during option B+ implementation in Dodoma Municipality, Tanzania 2014
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In Tanzania lifelong antiviral therapy (ART) for HIV positive pregnant and lactating women (Option B+) was introduced in 2013. This strategy focuses on preventing Maternal to Child Transmission (MTCT) as well as supporting scale-up of more accessible treatment in resource-limited settings. This study aimed to determine the incidence and risk factors of treatment default of Option B+ registered users. We conducted a health facility based retrospective cohort study from October - December in 2014 in Dodoma Municipality in central Tanzania. We interviewed women enrolled in Option B + using a questionnaire to identify demographic and social-economic factors. We reviewed patient HIV cards and ART registers. Survival analysis was used to calculate the incidence of treatment defaulters and Cox regression model used to determine independent predictors of defaulting. A total of 291 women were recruited, but 68 (23.27%) were lost to follow up and could not be traced. Of the 223 who were interviewed, 54 (24.8%) were defaulters (26.5/100 person-months) and the median time of default was 4 months with a range of 1-5 months. After adjusted Cox regression analysis, distance to the health facility (HR=2.5, CI: 1.3-4.9), cost as associated with travelling (HR=3.7, 95%CI: 1.9-7.3), long waiting time (HR=2.5, CI: 1.3-4.7), nondisclosure of HIV status (HR=2.5, CI: 1.3-4.3), and stigma after disclosure (HR=2.4, CI: 1.5-5.1) were significantly associated with defaulting. Estimated defaulter rate could be low than the actual due loss to follow ups with unknown outcomes. Predictors of defaulting were related to accessibility of services and stigma. These barriers for treatment must be addressed to optimize outcomes of this programme.

HIV26: Quality monitoring of peripheral blood mononuclear cellsprocessing as the baseline of immunological research in Mbeya, Tanzania
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Human peripheral blood mononuclear cells (PBMCs) are important biological specimen for clinical trials and basic research science. They are used for the evaluation of various in-vitro functional and phenotypic immunological assays. Due to limited studies on quality of PBMCs, therefore this study aimed to assess the quality of PBMCs during processing and after cryopreservation. Blood was collected into 8.5-ml acid citrose dextran (ACD)-anti-coagulated tubes from participants of different studies transported and processed in the laboratory at room temperature. PBMC were isolated from ACD-whole blood within 8 hours of collection in order to
preserve cells with optimal functional activity. Centrifugation was done at 800g for 15 minutes by Ficoll-Hypaque Plus, using Leucosep tubes. PBMC layer were harvested and washed three times with phosphate-buffered saline (PBS) by centrifuging at 310g for 10 minutes. Cell counts and viability of cells before and after cryopreservation was determined using hemacytometer. A total of 111 samples were received in the laboratory for PBMC processing between January 2016 and May 2016, all samples were processed and cryo preserved. Average total time from blood draw to cryopreservation was 2.6 hours (1.5 to 6.5). The maximum number of samples processed in a month was 30 while the cell yield per ml of whole blood collected before cryopreservation was 13.34x10^6 (5.5x 10^6 to 40x10^6) PBMC/ml whole blood. Average PBMC viability after processing of samples each month over the conduct of various studies was 99.37% before cryopreservation, while recovery rate was 78.2% after cryopreservation. Study findings suggest that processing laboratory operate in a quality standard and managed to preserve maximum number of PBMCs within required time and higher recovery rate after cryopreservation.

**HIV27: The burden of HIV infection and challenges of implementing HIV/Sexually transmitted infection interventions among female sex workers and men who have sex with other men in Sub-Saharan Africa: unpacking myths and realities**

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In most countries, female sex workers (FSWs) and men who have sex with men (MSM) are groups with highest HIV prevalence, and can also act as bridge population for HIV transmission to the general population. Inevitably, WHO has recommended countries with concentrated epidemic to prioritise HIV control interventions to the members of key populations (KPs). However, in many countries, members of KPs have encountered barriers in accessing HIV prevention and care due to stigma, discrimination and criminalisation. We reviewed literature to assess experience and challenges in implementing interventions recommended by WHO for HIV control among FSWs and MSMs. Our search strategy was restricted to studies: i) conducted in sub-Saharan Africa between 2006 and 2016, ii) written in English language, and iii) focusing on HIV burden and interventions targeting FSWs and MSM. There is a strong evidence that HIV infection is highest among key populations. For some girls, the reality is sex work is their only opportunity to earn money to sustain her and her family. Ut is not the presence of customers but economic trends and social conditions that determine the number of sex workers at any given time. Furthermore, there are assumptions that certain interventions such as lubricants promote sex work, the review has shown that lubricants significantly reduce HIV infection among key populations. Epidemiological data suggest that HIV prevention in these sub-populations is critical in prevention and control of HIV epidemic in Tanzania. However, myths and misconceptions impact negatively provision and uptake of proven interventions. Failure to prioritise key populations in HIV interventions will undermine HIV control efforts in Tanzania.

**HIV28: Experiences of intimate partner violence among women living with HIV/AIDS: a study of women attending a care and treatment clinic at Singida Regional Hospital, Central Tanzania**

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Intimate Partner Violence (IPV) is a serious public health problem globally. Tanzania has a high prevalence of all types of IPV, including physical, sexual and emotional violence. Although there is increasing focus on the issue of IPV, HIV related to IPV is not sufficiently discussed. HIV status is an important predictor of IPV against women and women tend to suffer more serious psychological, physical and pathological outcomes as a result of IPV. The objective of this study
was to explore the experiences and understanding of IPV among women living with HIV/AIDS attending the Care and Treatment Clinic (CTC) at Singida Regional Hospital in central Tanzania. This was a qualitative study involving in-depth interviews (IDIs). Content analysis was used to analyse the findings. In this study women were able to explore their views on their experience of IPV by their male partners such as physical, sexual and emotional violence. Jealousy, pregnancy, extra marital relationships and alcohol were the triggers of IPV. Fear of abandonment, stigma and discrimination and children made them stay in their abusive relationships. In conclusion, women living with HIV experienced all three types of violence: physical, sexual and emotional violence. The causes of IPV were use of alcohol, disclosure of HIV status, pregnancy, jealousy, extra marital relationships and children. Community advocacy and raising awareness of IPV are strongly recommended, as well as implementation of policies to deal with the male perpetrators and address the issue of IPV in HIV/AIDS programmes.

HIV29: Factors associated with uptake of voluntary medical male circumcision services among adult males in Ludewa District, Tanzania
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Background: Voluntary Medical Male Circumcision (VMMC) refers to the removal of foreskin of the penis by trained healthcare workers. The Tanzania VMMC programme started in Ludewa District in 2011; by early 2015, 83% of procedures performed were for clients <20 years old. Little information is available on the factors associated with the uptake of VMMC services among adult males aged >20 years. Hence, this study aimed to identify factors influencing uptake of voluntary medical circumcision services among males aged >20 years in Ludewa District in south-western Tanzania. We utilized an analytical cross-sectional study design with multistage probability sampling. A structured interviewer-administered questionnaire was used in data collection. Data were analysed using Epi-info version 3.5.1. Chi-square test was performed for bivariate analyses, and variables with p≤0.2 were entered in multiple logistic regression models to identify factors that were independently associated with uptake of VMMC services. A total of 326 adult males aged >20 years were recruited. Most (66.6%) of the study respondents were circumcised. Having secondary and higher education level (AOR=4.49; 95%CI: 2.58-7.81), available VMMC services (AOR=2.19; 95%CI: 1.21-3.96), female partner support (AOR=2.83; 95%CI: 1.63-4.93), and social support (AOR=1.78; 95%CI: 1.03-3.09) were independently associated with uptake of VMMC services. We conclude that availability of VMMC services, education level, female partner support and social support are independently associated with uptake of VMMC services. Strengthening involvement of women in the programme may assist in increasing coverage of male circumcision among adult males.

HIV30: Are men at high risk likely to accept voluntary medical male circumcision (VMMC)? a comparison of VMMC clients and Demographic and Health Survey participants in Tanzania
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We conducted a cluster randomised trial to evaluate an intervention to increase voluntary medical male circumcision (VMMC) uptake among men aged 20-34 years in Tabora and Njombe regions, Tanzania. Findings showed that the intervention increased the uptake of VMMC in men for all age groups in the 10 intervention clusters compared to the 10 control clusters. The aim of this sub-study was to compare the behaviour risk profile of a sample of the VMMC clients to that of uncircumcised men in the general population in Tanzania. Approximately 20% of the VMMC clients aged 20-34 years participating in the study were randomly selected to complete an interviewer-administered questionnaire which addressed risk behaviour, user costs, and decision-making around VMMC. The behaviour parameters were compared with similar parameters collected during Tanzania Demographic and Health Survey (TDHS) of 2010 from uncircumcised men in the 12 VMMC priority regions in Tanzania. A total of 331 men aged 20-34 years participated in the sexual behaviour survey, and 195 in the 2010 TDHS. VMMC clients were younger than the TDHS participants, and after adjusting for age, they were more likely to report two or more sexual partners (adjusted OR=2.73, 95%CI 1.85-4.02; p<0.001), and to report unprotected sex with non-marital and non-cohabiting partners in the past 12 months (adjusted OR=1.81, 95% CI 1.12-2.93; p=0.003). The mean age at first intercourse was 17.7 years in the behavioural survey participants and 16.7 years among TDHS participants (age adjusted test of significance p<0.001). We conclude that men who accepted VMMC reported riskier sexual behaviour compared to men in the general population. These findings suggest that VMMC is reaching men at a relatively high risk of HIV, and increasing uptake of VMMC through demand creation activities in adult men will continue to reduce HIV acquisition and transmission.

HIV31: Experiences from rolling-out Voluntary Medical Male Circumcision (VMMC) in Njombe, Iringa and Tabora regions
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The World Health Organization has recommended scaling-up voluntary male circumcision (VMMC) for HIV prevention in 14 countries with high HIV prevalence/low male circumcision prevalence. The Ministry of Health in Tanzania started the programme in Iringa, Mbeya and Kagera and later scaled-up services to other regions in 2010. The programme is being implemented in 12 priority regions where 1,891,549 VMMCs have been conducted to date. One pilot site was established at Iringa Regional Hospital in September 2009 followed by rapid scale-up to district hospitals and later to Njombe and Tabora regions. Using task shifting, 543 providers were trained in VMMC: 48 Medical Officers (9%), 44 AMOs (8%), 120 Clinical Officers (22%) and 331 nurses (61%). Through static, outreach, campaigns and mobile services 553,487 adolescent and adult men received services up to June 2016. 502,726 were tested for HIV; 5,074 were HIV positive (1%). 414,647 returned for at least one follow-up visit (75%) and 478 (0.1%) had a moderate of severe AE. Initial targets outlined in the 2010 National VMMC Strategy were surpassed reaching 80% saturation in Iringa and Njombe and will achieve the same level in Tabora by 2017. Through task shifting, campaigns and innovations (e.g. GIS mapping, formative research and creative demand creation) the program achieved impressive results providing guidance for other programs within the country and beyond. Quality remained high with few adverse events. Iringa and Njombe regions are now focusing on sustainability. The VMMC program in these regions has proven that VMMC services can be scaled-up with high-volume to reach targets within a reasonable time-frame. The program is now piloting strategies for sustainability of services including capacity building for RHMTs/CHMTs, integrating service to routine care and early infant male circumcision. The sustainability phase will provide useful lessons to other regions and in countries that are not yet at saturation.
HIV32: Delivery and uptake of HIV interventions among men who have sex with men in East and Southern Africa: A systematic review

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While HIV prevalence is declining in the general population in most parts of sub Saharan Africa (SSA), prevalence among men who have sex with men (MSM) is increasing. In Tanzania, HIV prevalence among MSM aged 15-49 years is between 11.1% and 30.2% as compared to 3.0% among men of the same age group in the general population. WHO recommended that countries should prioritize HIV interventions targeting sub-populations such MSM that are at an elevated risk of HIV infection. However, cultural and legal frameworks in different countries are reported to challenge the implementation of efficacious interventions. This review was set to assess delivery strategies and uptake of the WHO recommended interventions for MSM in East and Southern Africa so as to inform the ongoing HIV control efforts in Tanzania. We reviewed published and unpublished articles reporting on HIV interventions targeting MSM in East and Southern Africa between 2006 and 2016. Electronic search used a combination of terms including condom, water-based lubricant, treatment as prevention, antiretroviral therapy, pre and post exposure prophylaxis and harm reduction.

There is strong evidence that interventions targeting multilevel factors contributing to individual's HIV risk and vulnerability have the potential to reduce HIV risk behaviors and reducing vulnerability among MSM. Community based approaches particularly mobile clinics and outreach have been found to improve uptake of services among MSM. Furthermore, behavioral interventions that utilized peer-mediated approaches significantly reduced unprotected anal intercourse and increased HIV testing. Programs that included a stigma-reduction strategy at the health facilities improved disclosure and uptake of services. Combination prevention interventions are effective at reducing HIV risk behaviors and reducing the burden of HIV among MSM. In addition, programs should strive to enhance trust between MSM and healthcare providers.

HIV33: "If you are not circumcised, I cannot say yes": the role of women in promoting the uptake of voluntary medical male circumcision in Tanzania

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Voluntary Medical Male Circumcision (VMMC) for HIV prevention in Tanzania was introduced by the Ministry of Health in 2009 as part of the national HIV prevention strategy. A qualitative study was conducted prior to a cluster randomized trial which tested effective strategies to increase VMMC up-take among men aged ≥20 years. During the formative qualitative study, we conducted in-depth interviews with circumcised males (n = 14), uncircumcised males (n = 16), and participatory group discussions (n = 20) with men and women aged 20-49 years in Njombe and Tabora regions of Tanzania. Participants reported that mothers and female partners have an important influence on men’s decisions to seek VMMC. This was through both directly by denying sex, and indirectly through discussion, advice and providing information on VMMC to uncircumcised partners and sons. Our findings suggest that in Tanzania and potentially other settings, an expanded role for women in VMMC communication strategies could increase adult male uptake of VMMC services.
HIV34: Using qualitative research to inform design of a successful voluntary medical male circumcision intervention in Tanzania
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Tanzania began offering voluntary medical male circumcision (VMMC) in 2009 in 12 priority regions. Uptake of VMMC is highest in clients aged ≤20 years. Prior to launching a cluster randomised trial to increase uptake of VMMC among adult men aged 20-34 years, we conducted qualitative research to inform the design of the trial. We highlight the contribution of the qualitative research findings into the intervention of the cluster randomised controlled trial. We conducted in-depth interviews with a purposively selected sample of circumcised males (n=14) and uncircumcised males (n=16) aged ≥ 20 years in Njombe and Tabora regions. We also carried out group discussions (n=20) with adult men and women aged between 20-49 years. Data were analysed using an inductive approach. Uncircumcised males reported 3 main barriers preventing them from going for VMMC: fear of losing income during the post-operative recovery period; not having clear information on the benefits of circumcision, and fear of being attended by young female providers. Circumcised males reported their perceptions of barriers that prevented other males in their communities from utilizing the service: misconceptions about the disposal of the foreskin; being converted to a different religion; perceived reduction in sexual stamina, and fear of pain. Not understanding the benefits of VMMC was also reported. Key motivators to seeking VMMC included information they had received from the VMMC programme about the benefits, especially improved hygiene and prevention of sexually transmitted infections; encouragement from their male relatives, friends and female partners, and community mobilisation activities. Group participants reported community perceptions discouraging VMMC including lack of knowledge about the benefits of VMMC; perception that circumcision was only appropriate for children and younger males; fear of pain, perceived requirement for HIV testing, fear of losing sexual stamina, and disclosure of uncircumcised status. The findings directly informed enhanced informational messages about VMMC and the intervention that was assessed in the trial. Many of the barriers and misconceptions were specifically addressed in the intervention design. HIV prevention interventions are more likely to succeed if they use multi-disciplinary formative research before beginning a trial.

HIV35: Increasing uptake of voluntary medical male circumcision among men aged 20-34 years in Njombe and Tabora Regions, Tanzania: A cluster randomised controlled trial
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Tanzania introduced voluntary male medical circumcision (VMMC) in 2009 as part of its national HIV prevention strategy. Reaching men aged 20–34 years with circumcision may affect the most immediate reduction in HIV incidence. However, approximately 80% of VMMC clients in Tabora and Njombe regions are aged 10-19 years. This study evaluated the effect of a strategy to increase
VMMC uptake among men aged 20-34 years in Njombe and Tabora. A cluster-randomized controlled trial at 20 VMMC outreach sites was conducted in Njombe and Tabora, focusing on increasing VMMC uptake. The intervention, which was informed by formative research, included i) additional demand-creation messages (non-HIV benefits of VMMC, voluntary nature of HIV testing) ii) involvement of recently circumcised men as auxiliary peer promoters, iii) separate waiting and education areas for men aged >20 years, and iv) sessions on wound healing and post-circumcision abstinence targeting female partners. Analysis was based on cluster-level summary measures. Overall, 6,251 men were enrolled in 10 intervention sites (Njombe=1,809; Tabora=4,442) and 3,968 men in the 10 control sites (Njombe=1,035; Tabora=2,933). The proportion of clients aged 20-34 was greater in intervention sites compared to control sites (17.7% vs 13.0%; RR=1.4; 95%CI: 0.9-2.0; p=0.11) and was associated with a greater number of clients in both regions (overall mean difference=227; 95%CI 33-420; p=0.03). The effect of the intervention varied by region: in Njombe, there was little difference in attendance between control and intervention sites (11.3% vs 14.7%; RR=0.77, 95%CI 0.4-1.6; p=0.43) while in Tabora there was over a two-fold difference (27.5% vs 11.5%; RR=2.39, 95%CI 1.7-3.4; p=0.03). Similarly, the mean number of clients aged 20-34 was greater in intervention facilities in Tabora (mean difference=182; 95%CI 5-359; p=0.05) and there was little difference in Njombe (mean difference=12; 95%CI: 13-36; p=0.31). The intervention was associated with a significant increase in the proportion of VMMC clients aged 20-34 years in Tabora but not in Njombe. The lack of intervention effect in Njombe may be due to saturation, as VMMC has been available for longer. The results suggest the intervention may be more likely to be effective in areas newly targeted for VMMC.

HIV36: Uptake of antiretroviral therapy among HIV infected pregnant women and its impact on HIV mother to child transmission in Mbeya, Tanzania
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Maternal Viral Load (VL) and immunological status are important risk factors for mother to child transmission of HIV. In line with WHO recommendations (Option B+), Tanzania introduced the initiation of lifelong antiretroviral therapy (ART) in pregnant women in 2013. We present the uptake of ART and its impact on mother to child transmission. Between July 2015 and June 2016 data were obtained from HIV infected pregnant women participating in the ongoing BABY Study (ClinicalTrials.gov Identifier: NCT02545296) which evaluates Point of Care (PoC) testing in HIV Early Infant Diagnosis (HEID). Women were enrolled at the time of delivery and neonates were followed-up until 6 weeks’ post-partum. Maternal HIV-RNA was assessed at delivery, neonatal HIV diagnosis was performed using the Cepheid Xpert PoC, confirmed by qualitative dry blood spot HIV-DNA (Roche COBAS TaqMan). In total 415 HIV infected pregnant women were enrolled (median age 29 years). Nearly all women had attended antenatal care (96.4%), in 245 (59%) HIV was first diagnosed during pregnancy and in 63.8% ART was initiated within 1 week following diagnosis. At the time of delivery 368 (88.7%) women were on ART, HIV-RNA >1000 copies/mL were detected in 78 (18.9%) and a CD4 count <200 cells/µL in 63 (15.2%). The overall mother to child HIV transmission rate was 2.4% (10/415) and 7/10 neonates were HIV diagnosed at the time of birth correctly identified by PoC testing. HIV-RNA >1000 copies/ml irrespectively of ART and low CD4 count <200 cells/µL were associated with higher risk of neonatal HIV transmission. We conclude that despite the implementation of life-long ART in all pregnant women, reduction of HIV transmission from mother to children is still sub-optimal. High HIV-RNA as the main risk factor for HIV transmission irrespectively of maternal ART points out the need for maternal VL screening during the antenatal period.
HIV37: Why patients fail on ART? A description of causes from Intensified Adherence counselling reported by patients failing on ART within the ALISA study conducted at Mbeya Zonal Referral Hospital-HIV Care and Treatment Center, Tanzania

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Routine treatment shows that most of patients on ARV developed resistance from these drugs due to poor adherence. Nevertheless, intensified adherence counselling helps to ascertain the main individualised reasons for poor adherence for HIV failing patients and may reduce ART drug resistance. To describe challenging factors and operational barriers to good ART regime adherence among HIV positive patients failing on ART within the ALISA study conducted at Mbeya region in Tanzania. An Intensified adherence questionnaire was used during the counselling sessions for HIV patients noted to be failing on their ART regimes, patients screened from ALISA Cohort study for immunological, virological and clinical failure to depict individualised causes for the drug failure. A total of 456 patients were screened and 50 patients noted to be failing and adherence counselling done, but 43 patients (86%) showed that they are not taking ART timely, 3 patients (6%) they said that it’s because ART interfere with their daily life and 4 patients (8%) they said it’s because of the side effect of the drugs that’s why they are failing. Specific individualized interventions need to be developed to support intensified adherence in the management of ART to reduce drug resistance among patients.
MALARIA

MAL1: Bites before bedtime can carry a high risk of human falciparum malaria infection
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Understanding biting distribution of the potentially infective (parous) mosquitoes at different hours of the night helps to establish the likely impact of mosquito nets. The nets become highly effective when most biting by the dangerous older malaria vectors occurs at time when most people are in bed. This behaviour is however, likely to vary across ecological settings and among mosquito populations. Field experiment was conducted within Kilombero Valley, Tanzania. Two outdoor catching stations located approximately 50metres from each other were established for mosquito collection. On each night of experiment, mosquitoes were collected using the human landing catch (HLC) by a single adult male at each station from 18:00 to 7:00hrs. Sub-samples of An. arabiensis were dissected to determine whether they were parous or nulliparous. Insectary-reared An. arabiensis in the semi-field system (SFS) with known age were also released and recaptured hourly with HLC in the SFS to determine the consistency in parity distribution. Overall, there was no statistical association between the parity status and the biting time of An. arabiensis either in the field or in the SFS. The wild and insectary-reared An. arabiensis were observed to exhibit different hourly biting patterns, suggesting that the behavioral phenotype outcomes of the mosquito biting patterns which are observed in the field is probably mainly driven by phenotypic plasticity rather than any genetic change. In conclusion, the results show that mosquito biting time phenotype is not influenced by their parity status. These imply that the risk of human exposure to potentially infectious bites is equally distributed throughout the night, thus supplementary measures to protect people against bites in evenings and mornings are desirable.

MAL2: Effect of physicochemical parameters on Anopheles and Culex mosquito larvae abundance in different breeding sites in a rural setting of Muheza, Tanzania
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Malaria and lymphatic filariasis are great health burden in Tanga region of Tanzania. Main mosquito vectors for these diseases are Anopheles gambiae s.l., An. funestus and Culex quinquefasciatus. These mosquitoes vary in their breeding habitats depending on physicochemical parameters of preference. There is limited evidence in rural settings of Tanzania on physicochemical parameters of mosquito breeding sites. This cross-sectional study was carried out to assess the effects of physicochemical parameters on Anopheles and Culex larvae abundance in different breeding sites in a rural setting of Muheza, Tanzania. Mosquito larvae sampling was carried out by using a standard dipper. Physicochemical parameters were measured by using a Multiparameter pH meter in the field. It was found that, Anopheles and Culex mosquito larvae co-existed in same breeding sites. The probability of finding Anopheles larvae was 76.6%, while that of Culex was 66.9% and these were significant different ($\chi^2 = 5.73, p = 0.017$). The presence of Anopheles late instars, was significantly higher (78.2%) than that of Culex (64.5%), p = 0.017. Anopheles larvae abundance was significantly higher in waters in upper percentiles of salinity ($\geq$576.9ppm), tds ($\geq$701ppm) and conductivity ($\geq$1007µS); highly polluted compared to Culex. Upper percentiles of salinity and conductivity were significantly favourable to the presence of Anopheles larvae. The present study has revealed the occurrence of Anopheles larvae in polluted breeding sites. The possible tolerance to physicochemical parameters among Anopheles mosquito population could pose a significant threat to the success of various larvicidal products.
Development of recycle-based homemade sugar baits against *Anopheles arabiensis*

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Innovative vector control approaches are needed to reach malaria elimination. Ivermectin (IVM) has been proven to kill mosquitoes post blood-feeding on treated humans. This study aimed at determining IVM dose required to cause KD90% of *Anopheles arabiensis* when incorporated into sugar bait, the most attractive sugar bait concoctions and different prototype designs for bait delivery as well as the best deployment site for the ASB within a household. Dose response experiments to determine KD90 of IVM against *An. arabiensis* were done following a serial dilution of IVM in sugar solution in separate cages (30cm x 30cm x 30cm). Mosquito mortality was observed after 3, 6, 24 and 48 hours post introduction of the treatments. Attractivity of different fresh fruit juices (baits) were investigated inside different cages (120x120x120 cm) placed inside a tunnel. The best deployment site of the best prototype was determined in a semi-field system where the prototypes containing bait were placed in three different locations and observed for mosquito feeding success on the bait after 12hours. The findings indicate that Ivermectin proved to be toxic against malaria vectors in very low concentrations. Over 90% of *An. arabiensis* were knocked down 48 hours post sugar feeding on sucrose solutions containing at least 1‰ IVM. Results from sugar feeding preference on different fruits show that *An. arabiensis* prefer feeding on orange, watermelon and guava over papaya, tomato, mango or banana. Also bait located outdoors attracted > 68% of *An. arabiensis* compared to 32% which fed indoor. Effectiveness of the IVM at its lowest dose suggests its friendly use at domestic level as it won’t harm human and domestic animals. Also feeding success of *An. arabiensis* on outdoor deployed bait provides an advantages of reducing the outdoor biting mosquitoes which won’t be reached with the current control tools.

Colonizing mosquitoes in the laboratory; plasticity in oviposition behaviour and insecticide resistance of *Anopheles gambiae* ss

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During laboratory colonization, mosquitoes are exposed to several unnatural processes which may affect their behavioral ecology and fitness. Moreover, these mosquitoes are used in several test and behavioral assays which are extrapolated to represent the natural population in the field. The aim of this study was to investigate traits alterations when mosquitoes are transferred from their natural settings to be cultured in the laboratory. Gravid *Anopheles gambiae* mosquitoes were collected from the field and colonized in the laboratory. To understand if there are any changes in fitness and behaviour, various generations attained in the laboratory were tested on susceptibility status and oviposition patterns. The response of further generations was compared to the response of first laboratory generation. Insecticide resistance and oviposition site discrimination ability was reduced significantly with colonization. However, there was a significant increase in number of eggs oviposited as a result of laboratory colonization. Moreover, oviposition peak time was shifted to an early time and became uniform with increasing laboratory generations. Laboratory colonization affects important mosquito traits which are not conserved when mosquitoes are transferred to laboratory rearing. Compromises in such traits should be careful considered with regards to ongoing behavioural assays and insecticides evaluations which are based on laboratory reared mosquitoes. This study is very important in the design and evaluation of vector control interventions.
**MAL5: Impact of population history on liability of mosquito DNA barcoding**

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Despite their global importance, the flora and fauna of Africa's forests are understudied while deforestation and human development currently threatens these habitats. Forest fragmentation due to historical climatic change has played a major role in generating biodiversity in these forests. Conversely, the spread of forests during warm wet periods can lead to mixing and the co-location of diverse genetic lineages and closely related, morphologically indistinguishable species. This is likely to be true for the many taxa in the Aedes genus of mosquitoes that inhabit African forests. *Aedes africanus* mosquitoes are important vectors of yellow fever, chikungunya, Zika and Rift Valley fever viruses. Since the vectorial capacity and ecological characteristics among Aedes species may differ, distinguishing species is paramount for effective vector control.

The Consortium for the Barcode of Life Initiative promotes the use of the mitochondrial COI region to distinguish between species. Although this has proven useful for a large number of animals, the sole use of the COI marker may not be appropriate for use in all taxa, especially where diverse mtDNA lineages may result from allopatric fragmentation, as may be the case in *Aedes africanus*. To estimate the number of taxa within *Ae. africanus* we have generated and compared sequence data from the CO1 gene and the internal transcribed spacer 2 (ITS2) of the ribosomal DNA. This study has important implications for understanding Aedes mosquito diversity and disease transmission in Africa, as well as understanding the role of historical environmental change in generating biodiversity in African forests.

**MAL6: A cross-sectional analysis of mosquito nets in Tanzanian households in 2013**

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The Government of Tanzania has distributed long lasting insecticidal nets (LLINs) to its population for years in the efforts to intervene against malaria. With diminishing resources, it is important for the National Malaria Control Programme (NMCP) to monitor the status of LLIN interventions in gap years between mass distributions. The aim of this study was to analyse the LLIN situation two years since the last mass campaign and two years before the ongoing replacement campaign. Net ownership, access and use were assessed in Tanzanian households in 2013. Between October-December 2013, across eight districts in Tanzania, a household survey was conducted in 3,398 randomly selected households. Household members were considered to have access to a net if the household they lived in had one net for every two of its members. To evaluate the net use gap for the population that had access to a net the previous night but did not sleep under a net, the LLIN use:access ratio was calculated. Results were analysed for five socio-economic quintiles. The lowest socio-economic quintile kept their government LLINs longer while the wealthiest quintile replaced campaign nets, mostly with untreated nets. Across all socio-economic quintiles, less than 30% of households owned at least one LLIN for every two people. The overall LLIN use:access ratio was 0.7, indicating that some households own nets that were not used the previous night. The Government of Tanzania remains the primary source of LLINs. The NMCP is already exploring “Keep Up” strategies (i.e. School Net Programme). This study indicates that such distributions should be aimed at lower socio-economic quintiles and that availability of LLINs through commercial markets for wealthier quintiles should be increased.
MAL7: Progressive decline and re-emergence of malaria burden at the community level in Korogwe district, north-eastern Tanzania
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Passive case detection involving early diagnosis and prompt treatment of malaria was introduced in 2006 in four villages (two in each of the lowland and highland strata) of Korogwe district, north-eastern Tanzania. A significant reduction in the incidence of malaria and parasite positivity rates was previously reported between 2007 and 2010. We present further updates on the burden of malaria in this area with changing malaria epidemiology. In 2006, individuals with a history of fever within 24 hours or fever at presentation (axillary temperature ≥37.5°C) were presumptively treated by Community Owned Resource Persons (CORPs) using sulphadoxine-pyrimethamine. From February 2007, individuals aged ≥5 years with positive rapid diagnostic test for malaria (mRDTs) were treated with Artemether-lumefantrine (AL) while under-fives were treated irrespective of mRDT results. Chi-square test was used to assess the trend of parasite positivity and incidence rates of malaria over a period of 10 years (January 2006 to December 2015). A total of 22,829 cases aged 0 – 98.2 years (median = 12.6, IQR, 5.1 – 34.7) were attended. Majorities (68.8%) of the participants were from lowlands and under-fives accounted for 24.3%. Cases with fever at presentation accounted for 31.6% with significant differences between low and highland areas (32.9% vs 28.7%, p<0.001). Parasite positivity rate was 16.2% and the overall positivity rate was higher in lowlands than highlands (17.3% vs 13.9%; p<0.001). The positivity rate decreased by 67%, from 16.6% (n=3,499 in 2006) to 5.5% (n=948) in 2014 but it increased by 45% in 2015. The incidence rate per 1000 cases decreased by 93% (from 344/1000 in 2006 to 22/1000 in 2014) but increased to 83/1000 in 2015. There was a significant difference in malaria incidence between lowland and highland villages (121/1000 Vs 82/1000, p<0.01). Despite the decline in the burden of malaria, the proportion of fever cases remained unchanged (>30%). Although the incidence of malaria and parasite positivity rate progressively declined in study areas with a significant increase in 2015, fever cases remained unchanged over the study period. Thus further studies are needed to explore the transition of epidemiology of malaria as well as causes of non-malarial fevers in the study area.

MAL8: Trends of malaria burden in two communities of Muheza district north-eastern Tanzania: re-emergence of malaria after two decades of progressive declining transmission
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Scaled-up interventions have resulted in a decline of malaria burden in many African countries. This study assessed the possible association between point prevalence of malaria and other malariometric measures and rainfall patterns in the villages of Magoda (1992 – 2015) and Mpapayu (1999-2015) in Muheza district in Tanzania. Individuals aged 0-19 years were recruited in cross-sectional surveys to determine prevalence of Plasmodium falciparum infections and other indices of malaria burden (anaemia, splenomegaly and gametocytes). Trends of rainfall patterns in Muheza for a period of 35years (1981 to 2015) were assessed to determine the impact of changes in the amount of rainfall on the prevalence of malaria. High prevalence of P. falciparum (84-54%) was reported in both villages between 1992 and 2000. The prevalence declined sharply between 2001 and 2004 (from 52.0 to 25.0%), followed by a slight increase (≤44.0% in 2008) and a
progressive decline between 2008 and 2012 (to ≤7.0%). A significant increase occurred in 2013 (12.0%) with a further increase to ≥20.0% from 2014 onwards. Mean monthly rainfall were higher between 1981-1990 and 2010-2015 compared to 1991-2000 and 2001 – 2009. The highest long rains were recorded between March and May in 2010-2015 while the highest short rains were in October-December 1981-1990. The 12-month weighted anomaly standardization precipitation index (baseline = January 1983) showed a marked rainfall deficit between 2000 and 2010. Further analysis is underway to determine the inventions deployed, other indices of malaria and the association between changes in rainfall pattern and risk of malaria infections in the study population. The study observed a significant decline in malaria prevalence from 2001 up to 2012 followed by re-emergence in the following years possibly associated with changes in rainfall. Further analysis will be done and the findings will be presented and discussed.

MAL9: Is there halt of decline of malaria transmission in Tanzania? The current trend of malaria transmission in military camps


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Malaria remains a main cause of suffering of many Tanzanians. In the past decade research revealed reduced malaria burden. Parasitaemia prevalence declined from 78.4% (2003) to 13.0% (2008). Recent studies reported high prevalence in Kigoma (26%), Mara (25%) and Kagera (37%). We investigated malaria transmission in military camps in Tanzania from 2013-2015. Malaria surveillance was done using Deki Reader (DR) of malaria rapid diagnostic tests (mRDTs). We also conducted malaria prevalence survey to asymptomatic military recruits. Finger prick blood was used for test using mRDTs and blood smear microscopy. An active epidemiological study was conducted at Ruvu camp in Coastal (2013) and Mgambo camp in Tanga (2014) to determine malaria attack rates to recruits joining camps from areas of low and high transmission areas. Consented recruits screened negative for malaria were enrolled and followed-up biweekly for six months. Malaria case detection using DR of mRDT showed marked increasing positivity rates (PRs) over years. At Ruvu PRs increased from 11.8% (2013) to 15.7% (2014) to 30.9% (2015). PRs increased from 25.2% (2013) to 37.5% (2014) to 46.2% (2015) at Mgambo and from 36.4% (2014) to 37.0% (2015) for Rwamkoma in Mara region. Except at Bulombora site in Kigoma where PRs were decreasing, other sites showed increasing trends of PRs over years. In follow-up study, malaria attack rates were 13% and 43.3% for Ruvu and Mgambo camps respectively. Malaria prevalence rates by mRDT were 2.8% (Bulombora), 5% (Ruvu), 47.5% (Mgambo) and 39.4% (Rwamkoma). Malaria prevalence rates by microscopy were 3.4%, 5.2%, 49% and 38.5% for Ruvu, Mgambo and Rwamkoma respectively. Malaria PRs, prevalence and attack rates are higher in military camps. There is increasing trend of malaria transmission in the study areas which could be an indicator of similar trend countrywide; further studies are recommended elsewhere in the country.

MAL10: Prevalence of malaria, geohelminths and anemia among school children in Muheza District after wide scaling up of interventions

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A quarter of schoolchildren in Sub-Saharan Africa are concurrently infected with Plasmodium falciparum and hookworms. The most important consequence of these co-infections in human is anaemia. We determined prevalence of malaria, geo-helminths, co-infections and anaemia and factors associated with malaria and geo-helminths among school children in Muheza District, Tanzania, after wide scaling up of interventions. A cross sectional study was conducted in, Muheza District. Division, schools and participants were chosen using stratified and simple random sampling methods. Blood samples were collected for determining malaria parasitaemia and Haemoglobin (Hb) levels. Stool specimens were examined using the Kato-Katz technique. Bivariate and multivariate analysis using logistic regression was done to obtain associations. The mean age for 400 respondents was 10.8±2.2 SD years. Prevalence of malaria, geo-helminthiasis, co-infections and anaemia was 21.5% (82/381), 6.7% (26/387), 1.8% (7/381) and 39.1% (149/381), respectively. Those respondents who tested positive for malaria were more likely not to have slept under an insecticide treated mosquito net (ITN) (AOR=4, CI=2.24-8.51) while geo-helminth infections were independently associated with eating unwashed raw food (AOR=2.9, CI=1.9-9.2), eat food before handwash (AOR=5.81, CI=1.92-17.54) and non-use anthelminthic drug (AOR=9.2, CI=2.8-29.2). The co-infections similarly associated to aggravate low mean Hb =9.7g/dl). We conclude that high prevalence of malaria, low prevalence of geo-helminth infections and co-infections was observed to aggravate low mean haemoglobin among schoolchildren studied. Non-use ITN and hygienic practices accelerate the parasitic infections to schoolchildren for malaria and geo-helminth infections. Interventions on ITN use and proper hygiene should be advocated for malaria and geo-helminths control.

MAL11: Long-term neurocognitive assessment of children following an episode of severe malaria: the artesunate suppository trial cohort

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Estimates of the burden of malaria have naturally focused on mortality. However, evidence has been accumulating that survivors of an acute malaria episode may have persisting neurological and cognitive disabilities that can permanently alter the quality of their life. A follow up was done from 2013 to 2016 to the cohort of severe malaria children. Follow-up study conducted in 3 stages: (i) Designing of the test battery; (ii) Cohort survivals went through clinical & psychometric assessment with new instruments; and (iii) Children with CNS symptoms at baseline and an equivalent sample without CNS symptoms went through psychometric tests. Patients identified with major neurocognitive impairments and epilepsy underwent through EEG and MRI done at reference hospitals in each country, and reviewed by experienced experts on a central level. New instruments were administered to 786 children in Bangladesh, Ghana, and Tanzania with a mean
age of about 13 years (range: 7-18 years). The battery provides a psychometrically solid basis for evaluating intervention studies in multiple settings. Within-group variation was adequate in each group. The expected positive correlations between test performance and age were found and reliability indices yielded adequate values. A confirmatory factor analysis (not including the literacy and numeracy tests) showed a good fit for a model, merging the intelligence and executive tests in a single factor labeled general intelligence. Measurement weights invariance was found, supporting conceptual equivalence across the three country groups, but not supporting full score comparability across the three countries. Findings from this study will contribute to new literature, development of health science and improve of life.

MAL12: Efficacy and safety of artemether-lumefantrine for treatment of uncomplicated falciparum malaria in Tanzania

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The World Health Organization (WHO) recommends regular surveillance of antimalarial drug efficacy to monitor the performance of different drugs. The current study is being conducted to assess the efficacy and safety of Artemether-Lumefantrine (AL), the first line drug for treatment of uncomplicated malaria in Tanzania. This is a single-arm prospective study involving children aged six months to 10 years with uncomplicated falciparum malaria. Eligible patients were recruited at four sites (Kibaha, Mkuzi, Mlimba and Ujiji) and treated with AL. Follow-up was done for 28 days and the main outcomes include PCR corrected cure rates according to WHO protocol of 2009. Screening involved 954 patients and 344 (36%) were recruited, whereby 306 (89%) completed their follow-up visits. Seven patients (2%) were lost to follow-up and three (0.9%) were withdrawn. Before PCR correction, late clinical failure and late parasitological failure were reported in 35 (10.2%) and 22 (7.3%) patients, respectively. Adequate clinical and parasitological response was reported for 247 (80.7%) out of 306 patients with complete follow-up visits. Ninety-four (27.3%) patients had ≥1 episodes of adverse events (AEs) and the most common AEs were cough 44 (46.8%), abdominal pain 15 (16.0%) and vomiting 13 (13.8%). Two serious adverse events occurred; one patient was hospitalized for severe malaria and recovered completely, and the other died from neurological complications after the first dose of AL; but death was not thought to be associated with the medication. Adequate safety of AL was reported despite high recurrences (PCR uncorrected treatment failure) rates that could be due to reinfections. PCR analysis will be done to distinguish new from recrudescent infections and final results with PCR corrected cure rates, safety profile and other findings will be presented and discussed.

MAL13: Origin and patterns of sulfadoxine resistant Plasmodium falciparum in East and Central Africa

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Sulfadoxine-pyrimethamine (SP) is still being used in malaria endemic countries of sub-Saharan Africa for intermittent preventive treatment during pregnancy (SP-IPTp) and for seasonal malaria chemoprevention (SMC). However, SP resistance is now widespread and may avert the expected protective effect of these interventions. This study aimed to determine the pattern and origin of sulfadoxine resistance lineages in Democratic Republic of Congo (DRC) compared to East African dihydropteroate synthetase (dhps) alleles. We analysed 264 falciparum isolates collected from sites in Tanzania, Uganda and Democratic Republic of Congo. Samples were genotyped for PfDhps mutations and we also assayed 3 neutral microsatellites loci flanking the downstream the PfDhps gene. We found that single PfDhps mutant haplotype (SGKAA) were predominantly found in DRC while the double (SGEAA) and triple (SGEGA) mutant haplotype were commonly dispersed in Uganda and Tanzania. Low genetic diversity was only observed among double and triple mutant haplotypes with reduction in heterozygosity (He) ranging between He = 0.11-0.33 and He =0.26-0.51, respectively. Highly resistant PfDhps lineages appear to have shared origin in Tanzania and Uganda with distinct clustering in DRC. However, in Tanzania there was an independent distinct origin of PfDhps SGEGA lineage. Further analysis revealed shared geographical clustering of mutant PfDhps haplotypes in Tanzania and Uganda and distinct lineages in DRC. These results provide insight on the current genetic structure and dispersal of SP resistance in the region. Our findings underscore the need for genetic monitoring to guide implementation of SP in malaria control in the region.

MAL14: Factors influencing uptake of three or more doses of sulfadoxine-pyrimethamine for intermittent preventive therapy of malaria in pregnancy in Nyamagana and Ilemela Districts, Mwanza Region, Tanzania

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In 2013 Tanzania, a malaria endemic area, adopted the revised WHO policy recommending a minimum of three doses of Intermittent Preventive Treatment using Sulfadoxine-Pyrimethamine (IPTp-SP) that provide effective protection for pregnant women against malaria. A previous study in 2014 reported the uptake of >3 doses of IPTp-SP to be low (9%). We investigated the clients’ perspective on factors that influence the uptake of >3 doses regimen of SP for IPTp. A cross section study was conducted in six randomly selected public health facilities from Nyamagana and Ilemela districts in Mwanza, Tanzania from December 2015 through February 2016. Probability proportional to Sample Size (PPS) was used to determine participants per facility. Clients who presented at the health facility in their third trimester were randomly selected to meet the sample size. Questionnaires were administered to collect demographic, obstetric characteristics, doses of SP, and knowledge of SP. A total of 559 women were recruited. Uptake of >3 doses of IPTp-SP was 44.5%. Factors found to influence uptake of >3 doses included: having >4 ANC visits (AOR 1.80, 95%CI 1.25-2.59), living with spouse/partner (AOR 2.83, 95%CI 1.68-4.77), having booked at antenatal clinic (ANC) early, at a gestation age (GA) <16 week (AOR=1.61, 95%CI 1.11-2.34) and having adequate knowledge on IPTp-SP (AOR=2.47, 95%CI, 1.68-3.62). Absence of SP at the health facilities and administration of SP under direct observation therapy (DOT) were among the reported challenges. We conclude that the uptake of >3 doses of IPTp-SP does not meet Tanzania national target of 80% coverage. To increase the uptake, health promotion on malaria prevention in pregnancy should be prioritised along with addressing the stock-outs in health facilities. Also further studies are needed to explore facility and providers’ factors that influence uptake of >3 doses of IPTp-SP.
MAL15: In vivo antiplasmodial activity and toxicological effects of ethanolic extract of *Maytenus senegalensis* traditionally used in the treatment of malaria in Tanzania

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Medicinal plants, including *Maytenus senegalensis*, are widely used in the treatment of malaria and other ailments in Tanzania and other African countries. The aim of the present proof of claim study was to confirm the claimed in vivo antiplasmodial effect of *M. senegalensis* and evaluate its acute toxicity effects in mice. Oral antiplasmodial and acute toxicity effects of the ethanolic root bark extract of *M. senegalensis* was evaluated in experimental mice. The Peters 4-day in vivo antiplasmodial effect against early rodent malaria infection in chloroquine-sensitive *Plasmodium berghei* NK 65 strain in mice was carried out. The investigation revealed *M. senegalensis* extract to be non-toxic and the oral median lethal dose in mice was determined to be greater than 1,600 mg/kg body weight. There was a significant (P = 0.001) daily increase in the level of parasitaemia in the parasitized untreated groups and a significant (P < 0.001) dose dependent decrease in parasitaemia in the parasitized groups treated with varying doses ranging from 25 to 100 mg/kg body weight of *M. senegalensis* extract and the standard drug sulphadoxine/pyrimethamine at 25/1.25 mg/kg body weight. Overall, the dose dependent parasitaemia suppression effects were in the order of: 25/1.25 mg/kg body weight of sulphadoxine/pyrimethamine > 100 mg/kg > 75 mg/kg > 50 mg/kg > 25 mg/kg body weight of *M. senegalensis* extract. In conclusion, this study revealed and confirmed the antiplasmodial effect of *M. senegalensis* as claimed and practiced in the traditional treatment of malaria. The displayed high in vivo antiplasmodial activity and lack of toxic effect render *M. senegalensis* a candidate for the bioassay-guided isolation of compounds which could develop into new lead structures and candidates for drug development programmes against human malaria.

MAL16: Antiplasmodial, larvicidal and mosquitocidal carbazole alkaloids from *Alysicarpus ovalifolius* (Schumach)

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Three carbazole alkaloids namely, Mohanimbine, Koenimbine and Koenidine were isolated as bioactive constituents of the root bark of *Alysicarpus ovalifolius* (Schumach). These compounds were obtained by extensive silica gel column chromatography and their structures elucidated by 1D and 2D Nuclear Magnetic Resonance (NMR) as well as being assayed for antiplasmodial, larvicidal and mosquitocidal activities. Koenidine showed strong activity against chloroquine sensitive Siera Leone I (D6) and multi-drug resistant Indochicha I (W2) of *Plasmodium falciparum* with the lowest IC50 values of 63.07 and 54.19 ng/ml respectively. Larvicidal activity of Mohanimbine was equally very high. These compounds are being reported from this plant for the first time. Their structures, antiplasmodial, larvicidal and mosquitocidal activities will be discussed.
MAL17: Cluster randomized trial to determine the effects of mobile phone message reminders on malaria case management in rural Tanzania

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Timely identification of malaria cases and their treatment with artemisinin based combination therapy for malaria (ACT) is an important strategy for malaria control in Tanzania. However, health workers’ poor compliance with the national malaria treatment guidelines when managing malaria cases was shown to be an important barrier to its optimal performance. In addition to further health workers training on the guidelines conducted earlier by National Malaria Control Programme, through a cluster randomized trial we developed and delivered text message to health workers mobile phones to find its potential for improving the practices. The objective was to evaluate the effectiveness of mobile phone text message reminders in improving health workers practices in managing malaria cases with Artesunate-Lumefantrine (ALu). We conducted a cluster randomized controlled trial at 52 health care facilities in Rufiji District, rural Tanzania. Half of the health facilities were randomly allocated to an intervention group in which all health workers’ mobile phones received text message reminders on malaria case management for 6 months. The other half served as a control arm. We conducted 2 surveys for evaluation purposes; one soon after the delivery programme and the second one six months later. We did not observe any statistically significant difference in health workers’ compliance with malaria treatment guidelines in managing malaria cases with AL from a survey conducted soon after the intervention in per protocol analyses (OR=1.27; CI:0.91-1.83). However, in another survey conducted 6 months later, we observed a significant variation in health workers’ treatment practices between the sites. Health workers from the intervention site were more than twice most likely to manage the malaria cases using AL consistent with the guidelines (OR=2.4; CI: 1.3-4.6). We observed little or no difference between intervention and control arms on many provider practices for correct malaria case management. However, health facilities from intervention site were more likely to provide dispensing and counselling services to patients than in the control site. As well, the odds for health providers direct observing first dose at health facility were higher in the intervention site compared to control (OR= 5; CI: 2.89 - 8.66). The intervention demonstrated substantial improvement of ACT case management practices. The retraining in ACT case management contributed largely to this improvement. Mobile phone text messages prevented attrition of improved case management over time.

MAL18: Results from a cluster-randomized trial evaluating the effectiveness of non-pyrethroid insecticide-treated durable wall lining for malaria control: implementation of a novel vector control technology under operational conditions

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Despite substantial decline in malaria due to scaling-up of insecticide treated mosquito nets (LLINs) and indoor residual spraying, maintaining community protection is challenging. Insecticide-treated durable wall liners (ITWL) can be attached to inner house walls, releasing a mixture of 2 non-pyrethroid insecticides over 3 years. A cluster randomized trial was conducted in Muheza district in Tanzania to assess if the use of ITWL+LLINs provides extra protection against malaria, compared to LLINs alone. The success of ITWL will be determined by its efficacy, feasibility and scalability of implementation, levels of acceptability and durability. To undertake ITWL installation, we recruited 110 teams, each formed from two local residents and one ‘team leader’, who in turn were supervised by 22 supervisors, responsible for five teams each. ITWL was installed using four types of nail fixings, in 5,666 houses (67.7% of enrolled houses). ITWL installation completion rate varied between villages from 42.5% to 95.8%. Main reasons for household refusals included rumors and sceptism, unacceptable fixing materials and fear of changing house appearance. Concurrent political general elections, differences in socio-economic status and adverse events among some installation workers also strongly influenced overall uptake. Partial ITWL coverage (8% of houses), where homeowners would consent to installations in a subset of eligible rooms, was also identified as a barrier to intervention scale-up. Durability surveys conducted 3 months after installation, showed that ITWLs were no longer installed properly in 33.3% of surveyed rooms, principally due to failed installation fixings (71.8%) and that 91% of ITWLs had developed holes due to general wear and tear (44.3%) or during actual installation (23.6%). We report insights experienced during large-scale execution of a novel vector control in a community setting and recommend logistical and technical improvements if ITWL is to be considered for programmatic deployment.

MAL19: The effectiveness of non-pyrethroid insecticide-treated durable wall liners as a method for malaria control in endemic rural Tanzania: a cluster randomized trial

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Long-lasting insecticidal nets (LLINs) and indoor residual spraying (IRS) has contributed to decline in malaria but are threatened by insecticide resistance. A new product, durable wall lining (DL) treated with two non-pyrethroid insecticides may overcome this challenge. A two–arm cluster randomized trial is underway in Muheza district, Tanzania to test the hypothesis that DL + LLINs is superior to LLINs alone. Forty-four clusters were selected based on the number of children and malaria prevalence. Stratified randomization method was used to allocate clusters into study arms at the ratio of 1:1. A total of 125 children aged 6 months to 11 years were randomly selected from each of the 44 clusters (required sample size per cluster is 110 children). Demographic, behavioral and clinical information were collected by study clinical team using smartphones. Blood samples were collected for malaria test using SD Bioline for all cohort children and haemoglobin measurement by Hemocue for children <5 years. Artemether-Lumefantrine (ALU) was given at enrolment to enrolled children irrespective of mRDT result. Enrolled children are actively followed monthly to measure incidence of malaria parasitemia confirmed by SD Bioline and anemia prevalence measured every 6 months. Cohort recruitment took place from November-December 2015 where 2,395 children were enrolled in the intervention and 2,544 children in the control arm. Baseline malaria prevalence was 31.2% (25.1-37.2) in intervention arm versus 26.1% (21.0-31.2) in control arm. The overall follow up rate during the first six rounds of follow-up was 93%. Incidence of malaria parasitemia over this period of follow up was significantly higher in intervention arm than in control arm, hazard ratio=1.61 (1.51 - 1.72). The result suggests that DL +LLINs were futile when compared to LLINs alone in preventing malaria transmission.

MAL20: Experimental hut evaluation of a new non-pyrethroid insecticide-treated durable wall liners for control of pyrethroid resistant Anopheles gambiae and An. funestus sensu stricto in Muheza, Tanzania

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A new slow-release non–pyrethroid insecticide-treated durable wall liner (ITWL) made of high-density polypropylene has been developed which mimics the effect of indoor residual spraying (IRS) but is designed to last for 3-4 years. The objective was to compare the mortality efficacy of new ITWL against several interventions on wild pyrethroid resistant Anopheles gambiae and An. funestus s.s. in semi controlled environment in experimental huts condition. A 9-week experimental hut trial was conducted in Muheza, Tanzania from May-July 2015 to evaluate the insecticidal efficacy of the following interventions: new ITWL + WHOPEs recommended long lasting insecticidal net (LLIN), ITWL alone, LLIN alone, and pyrethroid wall liner alone. WHOPES protocol was used as standard evaluation method. ITWL produced relatively low levels of mortality (40-50%) for An. funestus s.s. and An. gambiae. Mortality 72hours after mosquito collections was relatively low across all interventions for both An. gambiae and An. funestus s.s. Against An. funestus ITWL alone produced 47% mortality, which was not significantly different to that of LLIN alone (29%, P=0.306) or ITWL + LLIN (35%, P=0.385). Although the numbers of An. gambiae were lower, results were similar, with ITWL producing 43% mortality compared with 26% for LLIN (P<0.05). Cone bioassays of ITWL material after the hut trial produced 98% mortality using pyrethroid-susceptible An. gambiae Kisumu from the insectary, while F1 offspring of field-collected An. gambiae showed 80% mortality. Comparison of cone and cylinder bioassays suggested some irritancy from the ITWL. Despite high mortality in cone bioassays, possible reasons for the lower mortality than expected in experimental huts may be due to behavioural avoidance. High coverage combination of LLIN with ITWL in the community may produce a significant reduction in malaria incidence, particularly in areas of highly pyrethroid resistant vectors.
MAL21: Community engagement around the implementation of trial of insecticide–treated wall lining for malaria control in rural Tanzania
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Community engagement (CE) during community trials is a complex social phenomenon that defies simple explanation or mechanization. We present findings from an assessment of the sensitization process, experiences, and challenges in improving understanding and subsequent acceptance of an insecticide-treated wall lining (ITWL) programme. The initial project sensitization plan relied on the traditional approach of inviting villagers to meetings with researchers. However, meeting schedules coincided with farming activities and Tanzania’s presidential elections, resulting in poor attendance. Sensitization was re-strategized to add door-to-door sensitization using local advocates, announcements using a megaphone, and designing and distributing brochures detailing the study objectives and consenting process. Following re-strategizing of sensitization, the ITWL acceptance rose to 86.4%. However, some clusters still had some refusals. Reasons included gender and consent, for example, in some houses the head of house (generally a man) refused installation after the wife had accepted. Old rumors resurfaced that ITWL contributed to male impotence. Some installers, initially unprotected, developed skin rashes. In one case, one resident’s skin rashes spread fear to a whole hamlet. Households with better socio-economic status cited personal ability to control malaria and feared damage to their walls by the installation process. Directives that children should not touch the wall liners and confusion from installation delays all fed into refusal rates. Rumors of side effects from the ITWL contributed much on project challenges including refusals. Re-strategizing sensitization plus continuous sensitization throughout and after the official installation period increased ITWL acceptance. Future projects should incorporate continuous sensitization and consider using specialized village research committees for improved community engagement.

MAL22: Acceptability of durable wall liners when used with LLINS for the prevention of malaria: A qualitative study
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Ambivalent reception to new health interventions is not uncommon in Sub-Saharan Africa. Qualitative feedback can generate valuable information. A cluster-randomized trial of the efficacy of non- pyrethroid insecticide-treated Durable Wall Liners (DLs) offered an opportunity to assess user acceptability to intended recipients. Focus group discussions (14) were conducted with women and men separately. Data were analyzed using content analysis approach, producing a number of themes. DL was received as an important contribution in the fight against mosquitoes that cause malaria when combined with long-lasting insecticidal nets (LLINs). Generally, the DL concept was well received by participants. The DL was well reported to beautify houses especially of those built from mud, sticks and those with cracks. However, some participants reported not using mosquito nets as a way to test if the DL actually worked. Others
reported that DLs were a positive replacement to LLINs. DL installation left a space between the wall and the liner, which in turn became hideouts for pests such as rats and snakes. Some participants perceived DL as rodent attractant. Householders felt they did not have the expertise to maintain it when it accidentally fell off particularly as specific nails were needed for permanent attachment. As a result, others resorted to re-purposing DLs to cover outdoor pit latrines, house walls and brick stacks. Better information to households about the complementary value of DL and LLINs and a slight modification to the DL installation design to fit walls more closely will be crucial to sustain its long-term use.

MAL23: Efficacy of Olyset, Olyset Plus LN a long-lasting insecticidal nets alone and in combination with Actellic indoor residual spraying against natural populations of pyrethroid resistant Anopheles funestus and An. gambiae s.l. in north-eastern Tanzania: an experimental huts study
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The success of malaria vector control is threatened by widespread pyrethroid resistance. One approach to combating resistance is to use a chemical synergist with the pyrethroid on part or all of the bed net. Moreover, the use of potential candidate alternatives to pyrethroids for indoor residual spraying (IRS) like chlorpyrifos methyl (organophosphate) and carbosulfan (carbamate) have reported to improve efficacy and slow the spread of resistance. The efficacy of Olyset Plus LN and Olyset net, alone and in combination with pirimiphos methyl (Actellic) was evaluated in experimental huts against free-flying, wild Anopheles gambiae and An. funestus in an area where the vectors are resistant to pyrethroid. The evaluation of the efficacy of Olyset Plus LN and Olyset net, on their own and in combination with Actellic was conducted in laboratory and in experimental huts following the standard WHOPES protocol. The World Health Organization method was also used to detect resistance in wild Anopheles mosquitoes exposed to 0.75% permethrin. Anopheles mosquitoes were resistance to permethrin with mortality rate of 45% [95% CI: 32.1-58.4%]. An. funestus mortality rates induced by Olyset Plus LN when in combination with Actellic IRS (77.2%) was significantly higher (p<0.05) to that induced both Actellic IRS alone and Olyset Plus alone (41.5% and 33.3%, respectively). This similar trend was observed with Anopheles gambiae results. The high efficacy of Olyset Plus LN when combined with Actellic against pyrethroid resistant An. gambiae and An. funestus reported in this study indicates that combining LLINs and non-pyrethroid IRS may be justified as a means to manage insecticide resistance and thus maintaining and sustain the efficacy of the two most common malaria prevention methods (LLINs and IRS).

MAL24: Indoor residual spraying with micro-encapsulated pirimiphos-methyl (Actellic® 300CS) against malaria vectors in the Lake Victoria basin, Tanzania
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The indoor residual spraying programme for malaria vectors control was implemented in 2014 in four districts of Lake Victoria, basin to evaluate the efficacy of pirimiphos-methyl 300 CS on different sprayed wall surfaces and its impact against malaria vectors post-IRS intervention. The residual activity of p-methyl 300 CS applied at a target dosage of 1g a.i./m2 on the sprayed surface wall was monitored for a period of 43 weeks post-IRS. The residual efficacy of p-methyl on sprayed wall surfaces was assessed using WHO cone wall bioassay method. Monthly mosquito collections were carried out from 6.00pm to 6.00am using CDC light traps and clay pot methods for 28 consecutive days in a month. PCR and ELISA were used for mosquito species identification and sporozoite detection, respectively. Based on the WHOPES recommendation, insecticides should have a minimum efficacy of ≥ 80% mosquito mortality at 24 hours post exposure on the sprayed wall surface for 30 minutes to be considered effective. In this study, p-methyl 300 CS has been demonstrated to have a long residual efficacy of 21–43 weeks post-IRS on mud, cement, and painted and wood wall surfaces. Anopheline mosquitoes were collected in lower numbers a few months post-IRS interventions in all sentinel sites. A total of 270 female anopheline mosquitoes were identified by PCR. Of 236 Anopheles gambiae s.l. complex identified 12.6% (n=34) were An. gambiae s.s. and 68.6% (n=162) were An. arabiensis. Of 34 An. funestus group indentified 91.2% (n=31) were An. parensis and 8.8% (n=3) were An. rivulorum. The overall Plasmodium falciparum sporozoite rate was 0.7% (n=2098). Pirimiphos-methyl was found to be effective for IRS in Lake Victoria basin, by killing predominant malaria vectors An. gambiae and An. funestus which feed and rest indoors.

MAL25: Benefits of combining transfluthrin-treated sisal decorations with long lasting insecticidal nets against indoor and outdoor biting malaria vectors
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Transfluthrin vapour disrupts mosquitoes’ host seeking and prevents bites. The goal of this study was to measure benefits of combining transfluthrin treated sisal decorations with long lasting insecticidal nets (LLINs) against indoor and outdoor biting malaria vectors. The protective efficacy of transfluthrin treated sisal baskets and hessian flags were measured in terms of reduced indoor density, exposure to bites and mortality of malaria vectors in experimental huts and against outdoor biting vectors in outdoor restaurants using human landing catches. Sisal decorative baskets treated with 2.5 ml and 5.0 ml transfluthrin deterred three quarters (Relative Rate (RR) [95% CI] = 0.26 [0.2, 0.34; p< 0.001, RR [95% CI] = 0.29 [0.22, 0.37]; p< 0.001) of Anopheles arabiensis mosquitoes from entering huts. Furthermore, the items increased the probability of mortality by 2 fold (OR [95% CI] = 2.69 [2.09, 3.47]; p< 0.001 and OR [95% CI] = 3.45 [2.71, 4.40]; p< 0.001) and reduced exposure to outdoor biting An. arabiensis mosquitoes ~ 90% (RR [95% CI] = 0.11 [0.09, 0.15]; p< 0.001 and RR [95% CI] = 0.14 [0.11, 0.18]; p< 0.001). The findings suggest that transfluthrin-treated sisal baskets and flags could be used to confer additional protection against indoor and outdoor-biting malaria vectors, effectively complementing existing interventions like LLINs, especially where residual malaria transmission occurs predominantly outdoors. Added advantages of these tools are as follows: 1) They release the active ingredient at room temperature, 2) they do not require any external sources energy like electricity, 3) their effectiveness can last for >6 months, 4) they do not require users to comply on daily application, and 5) they can protect multiple users occupying a particular space. It is essential to measure the epidemiological impact of these prototypes as well as determine the cost of production.
**MAL26: Recruiting pastoralists to find and treat dry-season water bodies with pyriproxyfen to control mosquito-borne diseases**

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Larviciding has potential to complement long lasting insecticidal nets (LLINS) and indoor residual spraying (IRS) in settings where resistance to pyrethroids and residual outdoor malaria transmission exist. We evaluated the impact of larviciding using pyriproxyfen (PPF), a juvenile hormone analogue in the field on development of immature stages and adult mosquitoes’ density. Dry season water bodies which are also mosquito breeding habitats were identified with assistance from pastoralists. Permanent habitats were monitored for mosquito larval productivity before intervention. Then the selected breeding habitats were treated with 0.5G PPF granules leaving untreated habitats as controls during intervention. The impact of PPF was monitored by recording emergence inhibition of larvae collected from treated habitats compared to the controls and reduction of adult mosquito density from the households close to the treated habitats. Treating mosquito breeding habitats with PPF resulted into significant reduction in emergence of adult mosquitoes from the treated habitats than the control ones (mean: 34.5± 0.1 and 0.2 ± 0.4, respectively, P<0.001). There was significant decrease in Anopheles gambiae and An. funestus density in households nearby PPF treated habitats compared with households near untreated habitats, An. gambiae s.l. (mean: 3.9±1.4 and 0.2, ±1.3 P<0.05) and An. funestus (mean: 1.3± 0.3 and 0.7±0.4 P<0.05). Likewise, density of Culex species was 2 times lower in households nearby PPF treated habitats than untreated ones, (P<0.001). In conclusion, PPF was effective in reducing the malaria vector densities and other mosquito species. Treating mosquito breeding habitats with PPF resulted into adult emergence inhibition. PPF can be used in larval source management to complement already existing vector control tools such as LLINS and IRS for malaria control and other mosquito borne diseases.

**MAL27: Protective efficacy of repellent treated footwear against mosquito bites: semi-field system and full-field setting evaluation**

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Despite dramatic reduction of malaria over the past two decades, the widely used insecticide treated mosquito nets (ITNs) and indoor residual spraying (IRS) will not be sufficient to eliminate the disease in endemic countries as increasing resistance and avoidance of the vectors to insecticides limit effectiveness of the tools. Novel effective complementary tools are required to protect people in times and places whereby ITNs and IRS cannot confer protection. This study evaluated the protective efficacy of repellent impregnated footwear, as a novel tool to supplement LLINs and IRS for protection of people outdoors and in the early evening. We treated strips of locally made sandals with 8% concentration of a pyrethroid repellent, transfluthrin and tested the sandals against malaria mosquitoes. Experiments were conducted both in the semi-field system with insectary reared Anopheles arabiensis and in the real field (Mbingu and Lupilo in Kilombero district, Tanzania) with wild mosquitoes. In each setting, experiments were conducted for 24 consecutive nights by two groups of male volunteers, one group wearing repellent treated sandals (intervention) and another group wearing sandals without repellent (control). In the semi-field system, treated sandals provided 68.87% protection [IRR=0.31 (95% C.I. 0.25-0.38, p<0.0001, z=-11.29)] against Anopheles arabiensis bites when compared to control. In the full field setting, protection by repellent treated sandals against all mosquitoes was 77.63% [IRR=0.22 (95% C.I. 0.14-0.37, p<0.0001, z=5.93)] and 68.32%, IRR=0.32 (95% C.I. 0.25-0.41, p<0.0001 z=-8.99) at both Mbingu and Lupilo study sites respectively. Overall, the repellent treated sandals conferred 70.80%, IRR=0.29 (95% C.I. 0.21-0.40, p<0.0001, z=-7.42) protection to users against Anopheles...
gambiae s.l. mosquito bites. Repellent impregnated footwear conferred significant protection against mosquito bites in the pseudo-field and field settings. Therefore, repellent impregnated footwear presents a potential tool to supplement the current interventions for mosquito control. However, community trials are required to assess the efficacy of this tool and its epidemiological impact under programmatic conditions.

MAL28: Caveat emptor: why laboratory assessment of bioactivity and safety on traditional medicinal plants need cautious interpretation
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Malaria mosquitoes control depend largely on long lasting insecticidal nets (LLINs) that prevent humans from infectious bites. However, its success is threatened by changes in vector dynamics that affect disease transmission, including mosquito feeding patterns. The objectives of the study were identifying malaria vector species and sources of their blood-meals, and determining engorged malaria vectors Plasmodium infection. Adult malaria mosquitoes were trapped from indoor and outdoor shelters in three malaria-endemic islands (Mageta, Magare, and Ngodhe) of Lake Victoria in Western Kenya. Human demographics and LLINs usage were also surveyed. Collected malaria mosquitoes were identified morphologically and by PCR and sequencing. Vector blood-meal sources were identified by high resolution melting (HRM) analysis of cytochrome b, 16S ribosomal rRNA, and cytochrome oxidase 1 (COI) PCR products, while malaria parasites were detected by PCR-HRM of cyt b in the head and thorax of mosquitoes. We collected 7,350 mosquitoes, of which 25.41% (N=1,868) were malaria mosquitoes. Humans were the most prominent blood-meal hosts of malaria vectors in all study islands, but blood-meal hosts also included diverse none-human sources (cow, chicken, goat, and rat among others). Some mosquitoes (3.61%) had fed on humans in addition to cow, goat or chicken. About 9.86% of engorged malaria mosquitoes, including Anopheles coustani, harboured malaria parasites. Overall, coverage of LLINs was approximately 67%. The malaria-endemic islands of Lake Victoria have abundant malaria mosquitoes that harbour Plasmodium falciparum, and feed primarily on humans and other animal hosts. Secondary blood-meal sources promote malaria transmission through providing alternative means for mosquito survival, potentially limiting the effectiveness of LLINs and facilitating residual malaria transmission.

MAL29: Using chicken feathers to make mosquito net
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Treated mosquito nets have dramatically reduced indoor malaria transmission. However, they are not readily accessible and affordable. Among challenges of existing nets include easily torn out and fail to inhibit blood feeding after few years of use. Here we study possibilities of using chicken feathers, a waste by-product, to produce low cost, durable, reusable, effective, and community affordable mosquito nets that adheres to WHO standards. Initial stages prior to making the nets involve laboratory tests similar to WHO cone test (i.e., regeneration time, wash-resistance, and efficacy) against pure feathers, and on fabrics material made from chicken feathers. The tests were performed on Aedes aegypti using permethrin. Preliminary results indicate that pure feathers and made fabric material can absorb and retain insecticide. Pure feathers had 100% knockdown and mortality effect, and made fabric had 80-100% knockdown and mosquito mortality, after 3 consecutive washes (i.e., 48, 72, and 96 hrs). The promising findings from initial stages indicate that there are possibilities of using chicken feathers to potentially produce effective, re-usable, durable, and affordable mosquito nets. Such nets will be subjected to semi-field WHO cone test using malaria vectors with different insecticide before comparing them against commercialized mosquito nets.
MAL30: A dramatic decline in malaria transmission in and around Ifakara, a rapidly growing town in south-eastern Tanzania, since 2000
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Ifakara is a small but rapidly growing town of about 60,000 people in south-eastern Tanzania. A steady but high increase of population in Ifakara area has resulted in a rapid urbanization of the area, which in turn has had a negative impact on malaria transmission. In 2003, Ifakara had an estimated annual entomological inoculation rate (EIR) of 29. Our study aimed at determining changes in malaria transmission over the past decade. A total of 110 households were randomly sampled from across the five wards of Ifakara area. Mosquito collection was done between June 2015 and January 2016, using CDC light traps indoors, and Suna® traps outdoors and Human Landing Catches (HLC). Anopheles mosquitoes were morphologically identified and analysed for Plasmodium sporozoites. A total of 2,658 Anopheles mosquitoes were caught. Anopheles gambiae sensu lato comprised of 92%, Anopheles funestus 3.7%, Anopheles coustani comprised 4.3% of all the Anopheles mosquitoes. Eighty-five percent of all Anopheles were collected from only two wards, which were the most rural of the five Ifakara wards. ELISA was performed on 2,658 Anopheles mosquitoes and only one, Anopheles funestus, was found positive. Plasmodium sporozoite rate was calculated as 0.04% in all Anopheles combined, and 2.8% in just the An. funestus, thus EIR was estimated as 0.128. The EIR in Ifakara has dropped by over 99% in just over a decade, compared to what was observed in 2003. The on-going transmission is concentrated in only a small and more rural section of the Ifakara area, which could be readily targeted with improved control measures towards local elimination.

MAL31: Oxidative stress “management” is essential for Anopheles survival post Plasmodium infected blood meal ingestion
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Anopheles mosquitoes like other dipterans lack the flavoenzyme glutathione reductase (GR) of the GSH pathway and therefore utilize instead a Thioredoxin (Trx) system for “stress management”. Anopheles gambiae and Anopheles stephensi mosquitoes have been shown to regulate proteins of the Trx system to protect midgut epithelial cells against reactive oxygen/nitrogen species (ROS/RNS) associated with Plasmodium berghei infection. However, this mosquito vector-parasite combination is not natural and may not necessarily reflect human malaria transmission biology in the field. Despite its importance, a complete understanding of the Trx pathway at the molecular level is missing. We used an ex vivo assay to examine the Trx response pathway following midgut exposure to ROS/RNS by measuring both protein and transcript expression levels of Thioredoxin-1 (AgTrx-1) by western blot analysis and qRT-PCR, respectively. We observed that protein levels of AgTrx-1 increase in midgut epithelial cells exposed to increased concentrations of a ROS inducer, tert-Butyl hydroperoxide, and transcript levels of AgTrx-1 and other genes of the Trx system were also up-regulated. Since it has been shown that P. berghei induces midgut cell damage in An. stephensi and An. gambiae, we anticipated the observed Trx pathway gene up-regulation at 24 hours’ post-infection with P. berghei. We then compared this spectrum of responses to oxidative stress in a more natural vector-parasite combination of An. gambiae-P. falciparum. Transcriptomics and proteomics profiles were consistent with cells undergoing extensive redox regulation. Since it is known that P. falciparum does not induce marked midgut destruction in An. gambiae, these data suggest that
An. gambiae must regulate ROS/RNS in response to an infected bloodmeal, that Trx system is crucial to this regulation, and that the cause of ROS/RNS is independent of midgut cell damage or apoptosis. We are now exploring approaches to perturb mosquito Trx regulation, which we predict will lead to unmanageable levels of ROS/RNS exposure to the parasite in the midgut, yet still allowing the mosquito to survive the dysregulation.

MAL32: Dominant role of Anopheles funestus in a residual malaria transmission setting in southeastern Tanzania
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Malaria is transmitted by many Anopheles species whose proportionate contributions vary across settings. We assessed the roles of Anopheles arabiensis and Anopheles funestus in a residual malaria transmission area in Tanzania. Monthly mosquito sampling was done in randomly selected households in three villages using CDC light-traps, back-pack aspirators between January-2015 and January-2016. Multiplex polymerase chain reaction (PCR) was used to identify members of An. funestus and An. gambiae complexes. Enzyme-linked immunosorbent assay (ELISA) was done to detect Plasmodium sporozoites in mosquito salivary glands, and identify sources of mosquito blood meals. WHO susceptibility assays were done for caught females, and physiological ages approximated by dissecting mosquito ovaries. A total of 22,391 An. arabiensis and 4,802 An. funestus were collected. The An. funestus group consisted of 76.6% An. funestus s.s, 2.9% An. rivulorum and 7.1% An. leesoni. Of all mosquitoes that tested positive for Plasmodium, 82.6% were An. funestus s.s, 14.0% were An. arabiensis s.s and 3.4% were An. rivulorum. Overall, An. funestus group and An. arabiensis contributed 93.4% and 6.6% respectively, of annual entomological inoculation rate (EIR) in the area. An. arabiensis fed on humans (73.4%), cattle (22.0%), dogs (3.1%) and chicken (1.5%), but An. funestus fed exclusively on humans. The An. funestus were 100% susceptible to pirimiphos methyl and malathion, resistant to permethrin (10.5% mortality), deltamethrin (18.7%), lambda-cyhalothrin (18.7%) and DDT (26.2%), and had reduced susceptibility to bendiocarb (95%) and propoxur (90.1%). Parity rate was higher in An. funestus (65.8%) than An. arabiensis (44.1%). The ongoing residual malaria transmission is predominantly mediated by An. funestus s.s. Effective targeting of An. funestus will be necessary to combat residual malaria transmission.

MAL33: Susceptibility status of malaria vectors to insecticides used for malaria vector control in Tanzania
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Objective: The aim of the study was to monitor the insecticide susceptibility status of malaria vectors in 11 sentinel districts of Mainland Tanzania. WHO standard methods were used to detect
knock-down and mortality in the wild female Anopheles mosquitoes collected in sentinel districts. The WHO diagnostic doses of 0.75% permethrin; 0.05% deltamethrin; 0.1% bendiocarb; and 0.25% pirimiphos-methyl 300 CS were used. In addition, CDC insecticide resistance intensity assays were conducted for permethrin and bendiocarb in five districts. The major malaria vectors in Tanzania, Anopheles gambiae s.l., were susceptible to tested insecticides in most of the surveyed sites. However, some sites recorded resistance to multiple insecticides. Resistance to permethrin was recorded in five districts. That of deltamethrin was recorded in four districts. Resistance to bendiocarb was scored in two districts and that of pirimiphos-methyl was recorded in two districts. High levels of permethrin resistance intensity were recorded in Arumeru (×5); Musoma (×1) and Muleba (×5). Target site mutation was recorded in high frequency from three districts. Metabolic resistance was recorded in four districts. Pyrethroid resistance in Mainland Tanzania is becoming more widespread while gaining strength. This occurrence potentially threatens the gains so far achieved through deployment of pyrethroid-treated nets and indoor residual spraying. While in its third year of using pirimiphos-methyl for IRS, Tanzania is experiencing emerging resistance of malaria vectors to the pirimiphos-methyl. The observed emergence of focal points with insecticide resistance is alarming. Continued monitoring is essential to ensure early containment of resistance, in areas with marginal susceptibility.

MAL34: Multiple insecticide resistance in Anopheles gambiae s.l. from Tanzania: a major concern for malaria vector control
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Malaria vector control methods in Sub-Saharan Africa are based on insecticides, such as indoor residual spray (IRS) and long-lasting insecticide treated nets (LLINs). The effectiveness of these vector control interventions is threatened by development of insecticide resistance in the major malaria vectors in Africa. This study was carried out to monitor the susceptibility status of malaria vectors to insecticides used for IRS and LLINs in mainland Tanzania. Susceptibility status of Anopheles gambiae s.l. mosquitoes was assessed by WHO bioassay tests using permethrin, deltamethrin, DDT, pirimiphos-methyl and bendiocarb. Sibling species of An. gambiae s.l., were identified using standard PCR-based methods. Quantitative PCR was used to screen for knockdown resistance (kdr) mutations. Detoxifying enzymes activities and compared with the susceptible reference strain, An. gambiae s.s. Kisumu. An. gambiae s.l. mosquitoes from seven districts were resistant to deltamethrin. Mosquitoes from five districts were resistant to permethrin. Resistance to DDT was detected in four districts. Resistance to bendiocarb was only recorded in two districts and resistance to pirimiphos-methyl was detected in three districts. An. arabiensis accounted for 52% of the sibling species identified, while An. gambiae s.s. were 48%. The target site was detected in Muleba at a frequency of 0.6%. The mean levels of non-specific esterases were significantly higher in mosquitoes from three districts. For the first time, malaria vectors showed resistance to organophosphate class of insecticide (pirimiphos-methyl) in Tanzania. This calls for urgent implementation of resistance management strategies to preserve the effectiveness of the current valuable vector control interventions.

MAL35: Acute febrile illness in children less than five years: magnitude and associated factors, Muleba District, north-western Tanzania 2013
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Acute Febrile Illness (AFI) is common among children in Tanzania. Causes of AFI are difficult to distinguish clinically and malaria is considered to be among leading causes of AFI among hospital admissions. We conducted diagnostic evaluation and determined factors associated with AFI among children <5 years in Muleba district in northwestern Tanzania. We conducted a cross-sectional study in 28 randomly selected health facilities. We recruited children <5 years with both reported history and confirmed fever lasting <72 hours. Blood was collected and tested for malaria using MRDT and microscopy while other causes of AFI were detected using real time polymerase chain reaction (RT-PCR). A questionnaire containing demographic and risk factor information for AFI was used to collect data. The median age of 300 recruited children was 22.5 (range 6-59) months with males constituting 51% of study respondents. Several causes of AFI including parasites (58%), bacteria (1.3%) and viruses (0.3%) were detected with overall identification of 73.3% (220/300). Of the samples taken 56% (168/300) tested positive for malaria, 0.3% dengue, 1% for rickettsia, 0.3% leishmaniasis, 0.3% bartonella, 0.3% Crimean Congo hemorrhagic fever, 0.3% *Trypanosoma brucei*. Bed net ownership was 88% (264/300) with 66.3% (175/264) of bed nets being in good physical condition, and 86% (227/264) of owners slept under bed net every night. Of those without bed net 72.2% (26/36) had AFI. Children with incomplete immunization for their age were 1.8 (95% CI; 0.78-4.19) times more likely to experience AFI than those with complete immunization. In conclusion, pathogens other than malaria were identified among children with AFI in Muleba. Approximately a quarter of children with AFI had no malaria. There is a need to fully explore other causes of AFI other than malaria in order to promptly manage the patients presenting with AFI.

MAL36: Clinical characteristics and determinants of dengue infection among febrile patients in Dar es Salaam, Tanzania, 2014

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Residents of Dar es Salaam experienced a dengue outbreak in 2014. We conducted a study to determine clinical characteristics and determinants of dengue infection during the outbreak. We conducted an unmatched case-control analysis of secondary data from a cross sectional dengue outbreak investigation surveyin Ilala, Kinondoni, and Temeke districts of Dar es Salaam in June 2014. The survey recruited febrile patients seeking care at selected health facilities. Cases were serologically-confirmed dengue-positive using SD Bioline Duo dengue rapid test while controls were serologically confirmed dengue negative patients. A questionnaire was used to collect clinical, demographic, behavioural, and environmental information. Chi-square test and logistic regression analysis identified clinical characteristics and determinants of dengue infection. A total of 81 cases and 281 controls were included in the analysis. Most cases and controls were males (64.2% vs 54.1%; P=0.137) and were >15 years (88.9% vs 72.9%; P=0.003). More cases presented with joint (P< 0.0001), muscle (P<0.0001), and abdominal (P< 0.005) pain than controls. Living in Kinondoni (aOR=4.28; 95% CI: 1.74-10.53) compared to Temeke, being employed (aOR=2.06; 95% CI: 1.06-4.04), having piped water at home (aOR=2.63; 95% CI: 1.40-4.95), having screened windows at work/home (aOR=2.65; 95% CI: 1.03-6.78) and visiting a health facility in a previous month (aOR=1.94; 95% CI: 1.11-3.38) were significant risk factors for dengue infection. In conclusion, the 2014 dengue outbreak in Dar es Salaam was characterised by joint, muscle, and abdominal pain. Occurrence of dengue was associated with district of residence, being employed, housing condition, having piped water, and visiting a health facility. Preventive strategies that target described risk factors may mitigate and control further outbreaks of dengue.
MAL37: “Take them or leave them”: a qualitative study to understand the social, cultural and ethical issues related to the life cycle management of long lasting insecticidal nets in Tanzania

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Insecticide-Treated Nets (ITNs) are a highly effective means of reducing malaria mortality and morbidity compared to no net or non-treated net. However, the effectiveness with time and need to be replaced at some point in order to continue to provide effective malaria protection. This study investigated social, cultural and ethical issues for life cycle management of long lasting insecticidal nets (LLINs). Both qualitative and quantitative methodologies were conducted in three districts of Mtwara rural, Kilombero and Muheza in Tanzania in December 2011. Data on proportion of households with bed nets, the characteristics of bed nets, their statuses and sources of acquisition were collected from 1,080 households. Results show that, LLINs are acceptable and used by majority of community members in all the studied communities. For majority of community members, net recycling was less perceived as one way of a sustainable way of using and re-using nets throughout their life cycles. Moreover, it was considered feasible given establishment of effective infrastructures for collection and disposal. Poverty was pointed out as one of the major driving forces towards alternative uses of nets which are declared as waste. The findings are expected to assist the country’s National Malaria Control Programme in developing a national specific and environmentally friendly LLINs replacement strategies. This will ensure sustained protection of vulnerable populations against malaria while considering local social, ethical and cultural issues surrounding the life cycle of LLINs.

MAL38: Do field and semi-field conditions provide the same results in a Phase II long lasting insecticidal nets evaluation?

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The emerging resistance to pyrethroid insecticides among mosquitoes arise the need to improve vector control tools. New generation of long lasting insecticidal nets (LLINS) that combine piperonyl butoxide (PBO) potentiates the efficacy of pyrethroid insecticides. We conducted a standard phase II evaluation of the LLNs in experimental hut in the field and repeated the test the semi-field system. A fully randomized Latin square design was used to evaluate unwashed Veeralin LN and MAGNet LN® against Anopheles arabiensis. Sleepers and treatments were randomly assigned to each of the experimental huts and rotated at 19:00hrs. For both studies, mosquito collections from inside the huts and exit traps were done at 06.00hrs. Mosquitoes were observed for 24hrs mortality. Data were analyzed by linear mixed effects regressions with an appropriate distribution (poisson or binary) and paired measurements were evaluated with Bland Altman methods. The mosquitoes exiting rate was relatively lower in the semi-field than recorded in the field for MAGNet LN and Veeralin LN. The unwashed MAGNet LN and Veeralin LN causes higher mosquitoes mortality in the semi field (87% and 97% respectively) than in the field. The Bland Altman plot for comparison of the field and semi-field bioassays for feeding success and mortality showed that data are evenly distributed around the mean. The field and semi field system methods showed similar trend thus can be used interchangeable.
MAL39: Comparative evaluation of six outdoor sampling traps for disease-transmitting mosquitoes in reference to human landing catch in rural Tanzania
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There is a growing concern on how mosquito sampling methods can be safely performed in malaria endemic countries. Human landing catch is the best mosquito sampling method, it is labor intensive and exposes individual to malaria transmission risks. The ongoing study is assessing the different traps and aiming to find an alternative for HLC in terms of effectiveness, densities, diversities and behaviors of disease-transmitting mosquitoes. Seven traps, Mosquito Magnet (MMX), BG-Sentinel, Suna trap, Ifakara Tent Trap-C (ITT-C), M-Trap and M-Trap fitted with CDC Light trap were used. The traps were comparatively evaluated with reference to the Human Landing Catch (HLC). 7X7 latin square experiments were conducted in 6 different villages in 12 months. Seven position were identified to each of this villages with the distance of 100m from one trap to another. The traps rotated to the seven positions, that at the end of a 7-day rotation, each trap type had been to each of the seven locations at least once. The experiments were replicated 3 times for 21 nights, start from 18:00hrs to 06:00hrs. A total of 62,317 female mosquitoes were collected from six villages for both seasons wet and dry, where BG-Sentinel n=5571 (8.94%), HLC n=13909 (22.32%) ITT-C n= 3775 (6.06%) MMX n= 4468(7.17%) M-Trap n= 8429 (13.52) M-Trap with CDC Light trap n=12011(19.27%) and Suna trap n=14003 (22.47%). The result is showing there is no significant different between HLC, Suna trap and M-Trap fitted with CDC for all total number of female mosquitoes but there is a different between HLC, against M-Trap, BG-Sentinel, MMX and ITT-C in the first round.

MAL40: Visual effects of colours on host seeking mosquitoes
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Vision plays a significant role in guiding mosquito flight paths, especially during goal-oriented flights. Role of vision includes location of food sources, hosts, mates, resting sites and oviposition sites. It has been well documented that ovipositioning mosquitoes prefer darker colors. However, effects of color in host seeking mosquitoes, particularly the malaria vectors are not well understood. Due to the shift in mosquito biting behavior from late at night to early in the morning and evening, it is necessary to identify role of visual cues, particularly color in mosquitoes’ host selection. In this study, five Ifakara Tent Traps-B (ITT-B) were fitted with ten different colors; two colors per tent. One adult male volunteer slept in each tent trap. Colors were randomly assigned to each trap on a daily basis, and mosquitoes entering through each colored trap were collected. This study was done for 60 days in both the screen house with laboratory-reared mosquitoes, and in field settings with wild mosquitoes. In the screen house, a total of 15,000 An. gambiae mosquitoes were released and 518 mosquitoes were recaptured. Black, gray, red were the most popular colors, each catching 27%, 18% and 18% of all recaptured mosquitoes respectively. Yellow, pink and white altogether had only 10% of all recaptured mosquitoes. In the field a total of 1,545 mosquitoes were trapped. Culex species comprised of
95% of all the mosquitoes. Among the Culex species, black, purple and red each had 25%, 15% and 13% of all the mosquitoes, respectively, while white, pink and yellow altogether had 15% of all the mosquitoes. We conclude that host seeking mosquitoes are more attracted to darker colors compared to lighter colors. This information is essential in increasing our understanding of current mosquito behavior. Additionally, this information will be useful when designing various mosquito attractants or repellents.

**MAL41: Data management tools applicable to diverse mosquito studies**
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Studies of malaria vectors encompass a remarkably diverse array of designs and rapidly generate large data volumes. Data management tools are essential to ensure that the data generated in the field and laboratory is accurately recorded and stored in standardized formats across multiple experiments, projects, and study sites. We have developed (i) a generic schema, (ii) paper-and electronic-based customizable data collection forms, and (iii) a database web-based application - to provide structure to data at the point of mosquito data collection and streamline use of databases that consistently link field and laboratory data. The generic paper and electronic based data collection forms developed can be used across diverse mosquito studies. The online repository can store and links data, generates summarized reports, enhances data sharing and dissemination. Currently, the system use includes over 20 experiments, 10 projects, and 20 users at 3 research and control institutes in 3 African countries, resulting in 13 peer-reviewed publications. We have developed data management tools for diverse mosquito studies to improve field and laboratory data collection (either in paper form or electronically) processes resulting into better data quality. This will enhance vector control research by providing better data and streamlined processes especially for resource-limited tropical settings lacking specialized software or informatics support.

**MAL42: Attacking the mosquito on multiple fronts: insights on vector control optimization model**
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Despite great achievements by long-lasting insecticide-treated nets (LLINs) and indoor residual spraying (IRS), research demonstrates that these tools are insufficient to eliminate malaria transmission in many settings today. Fortunately, field experiments indicate that there are many promising vector control interventions that can be used to complement LLINs and/or IRS by targeting a wide range of biological and environmental mosquito resources. The majority of these experiments were performed to test a single vector control intervention in isolation; however, there is growing evidence and consensus that effective vector control will require a combination of interventions tailored to the target ecological and epidemiological settings. We propose a mathematical modeling framework designed to examine combination interventions prior to empirical field trials. The model framework incorporates all stages of the mosquito life cycle from egg, larva, pupa, adult, and, crucially, the female gonotrophic cycle whereby females blood feed and lay eggs. We describe how the framework may be used to evaluate the impact of combining existing and novel interventions in synergistic ways in areas where LLINs and/or IRS
are widely used but where malaria transmission persists. We consider the following vector control interventions in addition to LLINs and IRS: larvaciding (conventional and aerial), attractive toxic sugar baits (ATSBs), insecticide spraying of male mating swarms, mosquito-proofed housing, spatial and topical mosquito repellents, systemic and topical insecticide-treatment of cattle, odor-baited traps and space spraying. We describe optimal combinations of these interventions needed to significantly reduce entomological inoculation rate (EIR), a widely accepted measure of malaria transmission, in a range of ecological and epidemiological settings. Preliminary model simulations recommend a combination of interventions using larvaciding, insecticide treatment for livestock, mosquito proofed housing, and baited traps to control and eliminate malaria in addition to scaling up LLINs and/or IRS in most transmission scenarios. The model framework developed may be used to simulate and optimize the impact of current and novel tools on malaria control and elimination.

MAL43: The use of Fionet™ technology as a tool in identifying the problems with rapid diagnostic tests’ quality in military health facilities of Tanzania

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Over 93% of the Tanzanians are at risk for malaria infection. In the past, malaria diagnosis relied on clinical diagnosis. The World Health Organization advocates the use of Rapid Diagnostic Tests (RDTs) where microscopy is not feasible. Despite the promising use of RDTs, quality control (QC) is challenging. Cross-checking RDTs by off-site personnel can be unreliable because RDT result lines begin degrading within hours. Fionet™ technology is a web-based workflow guidance system that addresses RDT QC issues. The system uses the Deki Reader (DR) and standard mobile devices to provide step-by-step guidance for performing RDTs, and to capture and transmit digital records of each test. RDT QC through Fionet was implemented at Tanzanian military facilities in collaboration with the US Army. Images of RDTs performed at the sites were viewed through the web portal for preparation problems and discordant results between device and human interpretations. Concerns were communicated remotely with health workers at the point of service for improvement. In 2014, 2.9% (960/32655) and 0.1% (26/32655) of all uploaded images were identified to have quality problems related to interpretation of results and RDT preparations respectively. Of the false results, 56% (539/960) were false negative and 44% (421/960) were false positive. False positive interpretations were commonly found in double line positive RDT (64.5%; 247/383); false negative interpretations were found more in single line positive RDT (54.5%; 294/539). The main factors leading to errors in RDT interpretations were assumption of presence of positive line (44.5%; 150/337) and missing weak positive test lines (35.9%; 121/337). Fionet has successfully improved field performance and oversight of RDT, RDT QC, real-time malaria data tracking, reporting and case management.

MAL44. Using Community Health Workers to improve prompt access to malaria diagnostics and treatment in rural remote areas in Kilosa district, Tanzania: Effectiveness of a profit-motive intervention strategy

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This intervention study aimed at improving prompt access to effective malaria diagnostics and treatment to under-five children in rural remote areas through an innovative strategy that involved training community health workers (CHWs) to diagnose malaria in under five children using malaria rapid diagnostic test (m-RDT) and treat the positives with artemether-Lumefantrine (ALu) at a fee to recover capital investment and realize a small profit; buying m-RDT and ALu at market price from accredited drug dispensing outlet (ADDO) providers; and using motorcycle transport to reach remote areas. Pre-and post intervention cross-sectional studies were conducted in Kilosa district in 2013. Hamlets located 5 km or more from a nearby public health facility (PHF) or drug shop were identified in intervention and non-intervention areas. Children under-five years were selected through systematic random sampling. Caretakers were interviewed to obtain information on fever episode within 2 weeks as well as source of care and treatment. A total of 870 caretakers were interviewed during baseline study; 53.7% from intervention and 46.3% from non-intervention area. Post-intervention, 1127 caretakers, 54.2% from the intervention and 45.8% from the non-intervention area, were interviewed. Pre-intervention, 65% of febrile children were promptly treated with ALu in intervention compared to non-intervention area (72.1%) tendency that reversed post-intervention (88.1% intervention and 66.7% non-intervention). This is a net difference of 28%, attributable to intervention. A net pre and post intervention decrease (24.1%) in the proportion of febrile children taken to PHFs was also observed, signifying a decrease in workload. Incidentally, a significant increase in knowledge on malaria treatment (11% - 21%) was also observed. Using profit incentive approach, we were able to significantly improve prompt access to diagnostic and effective malaria treatment in areas situated 5 km or more from a nearby PHF or ADDO. Scaling up of this strategy is likely to speed up the pace towards attaining national target of achieving accurate diagnosis and appropriate treatment by 80% in 2020.

MAL45: Experiences in implementing a profit-driven strategy to ensure sustainability of Community Health Workers’ malaria treatment services in rural remote areas in Kilosa district, Tanzania

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Many intervention strategies have been implemented to improve access to malaria diagnostics and treatment especially in rural areas where the burden of malaria is high and people’s purchasing power is low. Community health workers (CHWs) have often been utilized owing to their advantages of, among others, residing within the community and sharing common values. However, the biggest challenge has been sustainability of their services which are compromised by a high drop-out rate. The objective was to implement a profit-driven strategy so as to enhance sustainability of CHWs services in the diagnosis and treatment of malaria in under-fives in rural remote areas. An intervention study was conducted in Kilosa district from March 2013 to September 2014. The strategy took advantage of i) existing CHWs to provide malaria diagnostics and treatment services at an acceptable fee in order to recover cost and realize a small profit ii) existing accredited drug dispensing outlets (ADDOs) to ensure uninterrupted supply of commodities iii) the mushrooming motorcycle transport business to reach remote areas and iii) existing village leaders to mobilize people. Data were collected using in-depth interviews with CHWs, caretakers and village leaders; records kept by CHWs and direct observations. While caretakers appreciated getting services within reach, thus offsetting transport costs to ADDOs, CHWs reported experiencing no malaria deaths during the whole study period. CHWs charged equivalent of USD 0.57 for mRDT and 1.32 for ALu thus realizing a profit of about USD 0.10 to 0.32 per child. With this small profit, CHWs were observed to provide services with high level of enthusiasm, no drop-out and no other forms of payment. The intervention was however
challenged by the existence of segments of financially marginalized populations that could not afford the services. Unhealthy competition was observed in some areas. Using the profit-driven strategy, CHWs were motivated to provide malaria diagnostics and treatment services. In the wake of the Universal Health Coverage, effort to scale up the strategy will need to be paired with strategy to cover treatment cost for the extreme poor.

MAL46: In vitro anti-malarial activity of Bersama abyssinica, Hypoestes forskaleii and Rubus keniensis East African medicinal plants

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Many plants are known to produce anti-malarial agents that are presently in clinical use for example artemisinin from Artemisia annua and quinine from cinchona tree. Bersama abyssinica, Rubus keniensis and Hypoestes forskaleii have been used traditionally to treat various ailments malaria included without knowledge of efficacy, safety and bioactive principles. Malaria parasites have developed resistance to most available drugs. Therefore, there is need for search of new and more effective anti-malarials. In search for new anti-malarial drugs, the three plants were chosen for analysis. The plants were collected from Mau forest in Kenya, air dried and ground into powder. Solvent extraction was done using Dichloromethane: Methanol (1:1) and 5% H2O/Methanol to obtain crude extracts. The crude extracts were tested for anti-plasmodial activity using Plasmodium falciparum strains W2 and D6. The following anti-plasmodial activity obtained: R. keniensis (DCM: MeOH: IC50 34.52 µg/ml (D6), IC50 19.45µg/ml (W2), 5% H2O/MeOH: IC50 12.52µg/ml (D6), IC50 9.82 µg/ml (W2). H. forskaleii DCM: MeOH, IC50 5.51µg/ml (D6); IC50 5.48 µg/ml (W2); 5% H2O/MeOH: IC50 5.46µg/ml (D6), IC50 7.04µg/ml (W2). B. abyssinica (DCM: MeOH, IC50 = 12.85 µg/ml (D6), IC50 8.5µg/ml (W2) and 5% H2O/MeOH: IC50 19.2µg/ml (D6), IC50 12.1µg/ml (W2). The crude extracts were tested for cytotoxicity assay using vero cells and the following results noted: R. keniensis (DCM: MeOH: IC50 47.60 µg/ml; 5% H2O/MeOH: IC50 28.66µg/ml, B. abyssinica (DCM: MeOH: IC50 38.43 µg/ml; 5% H2O/MeOH: IC50 28.96µg/ml and H. forskaleii (DCM: MeOH: IC50 26.22 µg/ml; 5% H2O/MeOH: IC50 10.76µg/ml. The results showed that the crude extracts of the three plants were active and are potential sources of anti-malarial drugs. Further work is being done to isolate the bioactive principles.

MAL47: Developing a home based geo-information system to optimize local level interventions against malaria mosquitoes

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Need for reliable and cost-effective techniques that can be used for small-scale, programmatic monitoring of densities of outdoor disease-transmitting mosquitoes. The study tested the concept of using a home-based geo-information system to map intra-village variations of malaria vector density and malaria transmission risk, therefore enabling improved targeting of any new interventions used to complement current control measures towards malaria elimination. Participatory mapping was applied in three districts of Tanzania, Ulanga district as rural, Kilombero district as peri urban and Ilala district as urban setting. Entomological survey using the M-trap and Human Landing Catches were conducted in selected places that had key features usually associated with high, medium and low vector abundance. A total of 18,618 mosquitoes of all species were caught in all density distributions in the study villages. In high density regions 19
median with an interquartile range (IQR) of (25th percentile: n = 4, 75th percentile: n = 25) for Culicine species, and 6 median with an IQR of (25th percentile: n = 1, 75th percentile: n = 5) for Anopheline species. In medium density 12 median with IQR (25th percentile: n = 2, 75th percentile: n = 16) for Culicine species and 2 median with an IQR of (25th percentile: n = 1, 75th percentile: n = 11) for Anopheline species. While in low density areas, 4 median with an IQR of (25th percentile: n = 2, 75th percentile: n = 6) for Culicine species, and one median with an IQR of (25th percentile: n = 1, 75th percentile: n = 3) for Anopheline species. These results show that, we can simply rely on change in environmental variables and anthropogenic features to identify areas where mosquitoes are most abundant for intervention. There is a fewer number of mosquitoes in urban area compared to peri urban and rural area.

MAL48: Seasonal variation in abundance and biting behaviour of malaria vectors, Anopheles gambiae s.l. and An. funestus using climate data in rural Tanzania
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Malaria prevalence can be highly influenced by climatic conditions that drive the abundance and seasonal dynamics of Anopheles vectors. In particular, rainfall influences the breeding habitats while micro-climatic conditions determine the survival and biting behaviors of adult Anopheles mosquitoes. Data were obtained from a one-year (616 night traps) longitudinal study conducted in four villages in a malaria endemic area. Climatic information (temperature and relative humidity) were recorded simultaneously with mosquito collection. Daily rainfall data were aggregated in three different time bands 1-2, 2-3 and 3-4 weeks before sampling day. Both aggregated and current rainfall records were used to explain mosquito abundance. Anopheles gambiae s.l. was observed to be more abundant during the high rain season, while An. funestus were observed to be more abundant during the month of no rainfall (dry season). An increase in mean temperature of 1°C caused an increase in An. arabiensis abundance by approximately 18% and An. funestus by 95%. An. gambiae s.l. abundance was positively influenced by rainfall 1-2 weeks before the sampling day while An. funestus abundance was positively influenced by rainfall 3-4 weeks before. An increase in 1°C indoor relative to outdoors resulted in high proportional of An. gambiae s.l. biting outdoors while An. funestus ability to rest outdoor was not significantly influenced by an increase in indoor temperature relative to outdoor. These findings provide a combined estimate on how exposure to malaria vectors varies seasonally with variation in micro-climatic conditions. With these results it is possible to say that, the effectiveness of the vector control currently in place varies throughout the year with changes in micro-climatic condition.

MAL49: Evaluation of wild and sterile Lantana camara against Anopheles arabiensis and An. gambiae in rural Tanzania
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A previous study conducted in northwestern Tanzania investigating wild strains of Lantana camara plants reported to deter Anopheles gambiae and Anopheles funestus when potted around households. Other studies have observed a holistic reduction in mosquito fitness after exposure to L. camara. Despite evidence that wild Lantana may be useful as a cheap and sustainable method to reduce mosquitoes in rural poor houses its use cannot be advocated, as it is an invasive weed and listed for eradication in Tanzania by environmental authorities. The present study aims at comparing the wild L. camara and its non-invasive sterile version, assessing their
effect on mosquito fitness and rigorously determining if sterile L. camara can deter or repel An. gambiae and An. arabiensis. Both mosquito species were exposed to wild and sterile L. camara potted into 120cm x 120cm x120cm cages for 16 hours. Mosquitoes were recaptured and kept in the insectary where they were monitored for mortality rate, blood feeding rate, oviposition rate and egg-hatching rate. Results showed that wild L. camara was capable to kill 17.5% of An. gambiae within 16 hours of exposure and 29.4% after 24 hours post exposure to the plants while sterile L. camara killed < 10% of both mosquito species after 24hrs post exposure. Neither wild nor sterile L. camara lowered blood feeding rate, oviposition rate and egg-hatching rate for both mosquito species at significant level. Further experiments are conducted in a biodome containing experimental huts to determine the deterrence and repellence properties of wild and sterile Lantana.

**MAL50: The Immunogenicity of RTS,S/AS01 malaria vaccine candidate primary course in children and infants when administered using 0,1,2 schedule in a phase III trial across 11 sites in Africa**

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The RTS,S/AS01 vaccine is a pre-erythrocytic candidate malaria vaccine which induce immune response against the circumsporozoite (CS) protein of Plasmodium falciparum. Previous studies have shown that it could be administered safely with other childhood vaccines and provided protection against clinical malaria. This was a randomized, controlled, double-blind trial to evaluate vaccine efficacy, safety, reactogenicity, and immunogenicity in children up to 32 months’ post dose-1. The trial enrolled infants 6-12 weeks and children 5-17 months of age at the time of receiving the first dose of study vaccine. One of study objectives was to assess humoral response against CS protein one-month post dose 3. There was passive surveillance for clinical malaria cases from dose 1 until study end. Blood sample for anti-CS antibodies was collected at enrolment and one-month post dose 3 in the first 200 subjects enrolled from all sites in each age category. Subjects with antibodies ≥0.5 Elisa unit/milliter (EU/mL) considered seropositive. In the 6-12 weeks’ cohort, a total of 1,234 and 627 subjects were tested at screening in the intervention and control arms, respectively. One-month post dose 3, seropositivity rate was 99.9% in intervention arm with geometric mean titre of 210.5 (95% CI; LL 198.2 UL 223.6) compared to seropositivity level of 5.7% in the comparator arm with GMT of 0.3 (95% CI; LL 0.3 UL 0.3). In the 5-17 months’ cohort, we tested 1,036 and 526 children in the intervention and control arms, respectively. One-month post dose 3, the seropositivity was 99.9% in the intervention arm with GMT 621 (95% CI LL 591.5 to UL 651.9) compared to seropositive level of 5.9% in the comparator arm and GMT 0.3 (95% CI; LL 0.3 UL 0.3). In conclusion, children 5-17 months’ cohort had a better immune response following vaccination with experimental Malaria vaccine compared to infants’ cohort.

**MAL51: Malaria vectors and their blood-meal sources in three small islands of Lake Victoria in western Kenya**

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Malaria mosquitoes control depend largely on long lasting insecticidal nets (LLINs) that prevent humans from infectious bites. However, its success is threatened by changes in vector dynamics
that affect disease transmission, including mosquito feeding patterns. The objectives of the study were identifying malaria vector species and sources of their blood-meals, and determining engorged malaria vectors Plasmodium infection. Adult malaria mosquitoes were trapped from indoor and outdoor shelters in three malaria-endemic islands (Mageta, Magare, and Ngodhe) of Lake Victoria in Western Kenya. Human demographics and LLINs usage were also surveyed. Collected malaria mosquitoes were identified morphologically and by PCR and sequencing. Vector blood-meal sources were identified by high resolution melting (HRM) analysis of cytochrome b, 16S ribosomal rRNA, and cytochrome oxidase 1 (COI) PCR products, while malaria parasites were detected by PCR-HRM of cyt b in the head and thorax of mosquitoes. We collected 7,350 mosquitoes, of which 25.41% (N=1,868) were malaria mosquitoes. Humans were the most prominent blood-meal hosts of malaria vectors in all study islands, but blood-meal hosts also included diverse non-human sources (cow, chicken, goat, and rat among others). Some mosquitoes (3.61%) had fed on humans in addition to cow, goat or chicken. About 9.86% of engorged malaria mosquitoes, including A. coustani, harboured malaria parasites. Overall, coverage of LLINs was approximately 67%. The malaria-endemic islands of Lake Victoria have abundant malaria mosquitoes that harbour Plasmodium falciparum, and feed primarily on humans and other animal hosts. Secondary blood-meal sources promote malaria transmission through providing alternative means for mosquito survival, potentially limiting the effectiveness of LLINs and facilitating residual malaria transmission.
TUBERCULOSIS

TB1: Healthcare seeking behavior among coughing tuberculosis suspects in Tanzania: Findings from a prevalence survey
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The study was done within a nation-wide population-based tuberculosis (TB) prevalence survey in the adult population in Tanzania. The objective was to assess the healthcare seeking behavior of coughers suspected having TB. A survey where participants were screened for TB using a symptom questionnaire and chest X-ray (CXR). Suspects with cough for at least two weeks and/or coughing blood were interviewed about their healthcare seeking behavior, socio-demographic and clinical factors. Of the 3,388 TB-suspects, 31.0% (1051/3388) had sought treatment for their symptoms. About 42% (445/1051) went to seek care at sites with TB diagnostic capacity, where examination of sputum was done in 37.1% (165/445) and CXR in 28.1% (125/445). In sites with limited TB diagnostic capacity, referral for examination of sputum or CXR was done in less than one percent. Individuals having additional symptoms were more likely to seek treatment. Knowledge of TB was significantly associated with care seeking at sites with TB diagnostic capacity.

In conclusion, a third of the persons with cough symptoms consistent with TB had sought health care. About 42% sought care in sites with TB diagnostic capacity but most of them were not offered TB-diagnostic procedures, precluding a timely diagnosis.

TB2: Distinct patterns of clinical characteristics in adult tuberculosis patients from urban compared to rural settings in Tanzania
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Rural-urban settings could account for some of the differences in the epidemiology of tuberculosis (TB) in Tanzania. We aimed to study the epidemiology of TB and co-infections in adult patients from in Dar es Salaam and Ifakara in Tanzania. We included patients (>18 years) with smear-positive pulmonary TB in two ongoing cohort studies in Dar es Salaam (urban), and Ifakara (rural). Clinical and laboratory data were collected electronically. Stool and urine were examined for intestinal helminths using Kato-Katz, Baermann, urine filtration and Circulating Cathodic Antigen tests. Differences between groups were assessed by Chi-square or Wilcoxon rank sum test. We analyzed 242 participants enrolled between August 2015 and February 2016 (urban= 162; 66.9%; rural 80; 33.1%). The median age was 35.5 years (interquartile range [IQR] 29-42 years). 159 (65.7%) were men, and 44 (18.2%) were HIV-positive with a median CD4 cell count of 150 (IQR 128-220 cells/µL). TB patients from the rural site were significantly older (median age 38 vs. 34 years, p=0.006), had a lower mean body mass index (18.0 ±SD 2.06 vs 19.2 ±SD 2.52 g/dl, p=0.005), a lower mean hemoglobin concentration (10.2 ±SD 2.06 vs 11.3 ±SD 2.52 g/dl, p=0.006), and a higher proportion of relapse cases (13.8% vs 0.6%, p<0.001) compared to the urban site. There was no significant difference in the prevalence of HIV and diabetes mellitus. The overall prevalence of intestinal helminth co-infection was 27.7% (67 patients), with a higher prevalence of Schistosoma mansoni (10% vs. 3.7%, p=0.001) in the rural site. In conclusion, clinical and sociodemographic characteristics differ in TB patients from urban and rural Tanzania. This underline the need for different public health interventions to improve clinical outcomes of TB and co-infections.
TB3: Tuberculosis case finding at pharmacies using trained pharmacists and an electronically monitored referral system in Tanzania
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Introducing new tuberculosis (TB) diagnostics is critical, but additional interventions are needed to bring patients suspected with TB to care. There is evidence that presumptive TB patients use un-prescribed antibiotics to relieve their symptoms. We evaluated a referral system at pharmacies to detect TB cases who were missed or delayed by the routine health care system. We established an electronic referral system using android tablet computers at six pharmacies in a densely populated area of the Ilala District, Dar es Salaam. Pharmacists were trained to refer any customers with cough or any other TB related symptoms. Anonymous referral cards were given and an automatic follow-up sms reminder were sent to customers who did not report within 3-5 days. TB diagnosis was either done by sputum microscopy, chest X-ray or based on clinical findings. Until February 2016, the pharmacies referred 1,678 presumptive TB patients. The median age was 41 years (Interquartile range [IQR]: 32-48), and 985 (58.7%) were men. Apart from coughing, 1,412 (84.1%) patients reported fevers, and 1151 (68.6%) reported to excessive night sweat. The most commonly purchased antibiotics at the pharmacies were ampiclox in 748 (44.6%) customers and amoxycillin in 654 (39%) customers. Overall, 1,631 (97.1%) of the referred customers reached the TB diagnostic center. Presumptive TB patients with TB investigation results were 78.3% (1,277/1,631). Of the 1,277 patients, 113 (8.8%) were diagnosed with TB. We successfully demonstrated the feasibility that presumptive TB patients visiting pharmacies, can be referred to a TB diagnostic center. If this low-cost case finding strategy could be scaled-up, it may have a huge impact on TB control by increasing early diagnosis and thus reduce transmission in the community.

TB4: Five years of implementation of Xpert/MTB RIF Assay at Mbeya Research Centre, Tanzania: challenges, experiences and lesson learned
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Xpert MTB/RIF Assay is a cartridge based nucleic acid amplification test that detect DNA specific to Mycobacterium tuberculosis and rifampicin resistance by probing the rpoB gene. With minimal sample preparation it provides results within 2hours. The objective was to determine the reasons for failures of Xpert MTB/RIF tests at Mbeya Research Centre in the past five years. We analyzed the Xpert MTB/RIF tests done at Centre mycobacteriology laboratory from Januaruy 2011-December 2015. We looked for all successfully and unsuccessful Xpert MTB/RIF data by counting test result messages which was reported as displayed in the machine in the form of errors, invalid and no results. Resulting data were copied and pasted in the GeneXpert excel sheet software developed by National Tuberculosis and Leprosy Control Programme (NTLP), errors were further analyzed into their respective error codes. A total of 7,644 GeneXpert tests were performed. Successfully tests (MTB detected/ not detected) were 7,117 (93.1%) and unsuccessfully tests (error, invalid, or no result) were 527 (6.9%). Among unsuccessfully tests 383 were errors (72.7% of unsuccessful test and 5% of the overall total tests), invalid tests were 112 (21.2% of unsuccessfully
tests and 1.5% of the overall total tests). Only 32 tests (6.1% of unsuccessful tests equivalent to 0.4% of total tests had no results. Errors with codes 5011, 5007, 2008 and 5006 were more dominant with occurrence rate of 56.1%, 25.3%, 10.1% and 3.4% respectively. We conclude that most of the unsuccessfully tests were due to system component failure and sample viscosity.

TB5: Assessment of the rapid TBic test for accurate confirmation of Mycobacterium tuberculosis complex in cultured isolates, Mbeya, Tanzania
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Tuberculosis (TB) has remained a persistent global public health problem over 20 years since declared as global emergence disease in 1993. The current WHO vision and post 2015 millennium developmental goals (MDG), are aiming to reduce TB mortality by 95% in 2035. Low disease burden countries could easily achieve these targets but higher burden countries will require more investments on better TB diagnostics, treatment monitoring and laboratory infrastructure with capacity for resistance testing, rapid and accurate culture confirmatory tests. The objective of this study was to assess the accuracy of TBic culture identification test (MPT64 Ag) for rapid confirmation of Mycobacterium tuberculosis (MTB) and compare its performance with PCR based assay. A total of 116 cultured isolates obtained from a Multi Arm Multi Stage (MAMS) anti-tuberculosis trial were analyzed. These isolates were initially confirmed by Ziehl’s Neelsen stain prior to MPT64 Ag testing and DNA extraction for PCR with genotypes MTBC and CM. Negative isolates by MPT64 Ag were tested with CM and positive samples with MTBC following the manufacturer’s recommendations. About two thirds (64%; 74/116) of the isolates were Mtb positive by both MPT64 Ag and MTBC-PCR while 3% (4/116) were only positive by MPT64 Ag test but negative by MTBC-PCR. Another group of 13 isolates (11%) MTBC-PCR positive had 4 isolates (3%) which were negative by MPT64 Ag while 9 isolates had no MPT64 Ag results. 25 isolates (22%) were negative by both tests and confirmation with CM-PCR revealed the non-tuberculosis mycobacteria (NTM). Performance of MPT64 Ag was comparable to MTBC-PCR. The MPT64 Ag was quick, easy to perform and can be used in place of PCR. Although culture is the most accepted gold standard, its specificity is poor and therefore confirmation of isolates remains important for accurate diagnosis of TB and discrimination from NTM.

TB6: Quantitative sputum culture comparison of the standard 7H11S and 7H11S+C media for isolation of Mycobacterium tuberculosis
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Early bactericidal activity (EBA) studies measures the decline of Mycobacterium tuberculosis (Mtb) bacillary load in sputum during the first 14 days of treatment and are frequently conducted in phase 1 and 2 of TB drug trials. The 7H11S media is the main method for EBA trials, although it is labor intensive, prone to contamination and concerns are now growing with carry over antibiotics from sputum inhibiting the growth Mtb. This study aimed to compare the performance of standard 7H11S and 7H11S media supplemented with 0.4% of charcoal for isolation of Mtb. In the standardization of NC005 trial procedures in Mbeya, H37Rv suspension was prepared using 7H9 broth and adjusted to McFarland 1.0 and 0.5. Serially diluted from 100 to 105
and inoculated in 7H11S and 7H11S media with 0.4% of charcoal. Another batch of 16 confirmed TB sputum samples were homogenized for 30 minutes with a magnetic stirrer. Serially diluted to obtain 100 to 105 dilutions and inoculated into the two media which were incubated at 37°C for 42 days. Weekly observations were conducted to check bacterial growth and counting of Mtb colonies and photographing at 21, 28, 35 and 42 days of incubation. There was no statistical difference on the performance of the standard 7H11S media compared to 7H11S media with 0.4% of charcoal on pure H37Rv strain (p<0.0873). However, the performance of the two media were statistically different on patient’s sputum specimensp>0.0001). 7H11S media with and without charcoal successfully, used for standardization of pure H37Rv strain. Supplementing charcoal in 7H11S media increases culture contamination for human sputa specimens by absorbing the PACT antibiotic added in the media to control contaminants, fungi and bacteria but its effect is small in pure H37Rv strain.

TB7: Countrywide audit of multidrug-resistant tuberculosis cases reported: treatment delay and outcomes in Tanzania

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According to the Ministry of Health in Tanzania, patients diagnosed with multidrug-resistant tuberculosis (MDR TB) must be referred to Kibong’oto Hospital for treatment initiation. MDR TB is difficult to diagnose and the centralised referral model is beset with challenges that contribute to treatment delays. This study aimed to determine total number of MDR-TB cases detected in the country, delay between diagnosis and treatment initiation, and its effect in treatment outcomes. The retrospective cross sectional study involved review of records from a cohort of MDR TB patients enrolled from November 2009 to December 2015. Analysis was done comparing two groups, delayed and those who did not delayed. Since MDR TB management programme started in Tanzania to December 2015, a total of 471 patients were diagnosed and initiated on treatment. Of these patients, over two third were males between 25 to 54 years from the Eastern zone, where 43.7% were from Dar es Salaam. Mean (SD) total health system delay was 206 (151.4) days and most of the total delays were contributed by the time taken for the patient to get DST results with a mean of 118.5±88.4 days. Of all the patients, it takes over 105 mean days (SD137) from the day of drug susceptibility testing (DST) results to when treatment is initiated at Kibong’oto. Treatment outcome did not differ between patients who were delayed and those who did not delay. Risk factors for total health system delay included age group of 35-54 years and type of technique used to diagnose MDR TB. We conclude that there is a significant delay in initiating definitive management for MDR TB; however, treatment outcome did not differ between the two comparison groups. Decentralization of MDR TB services provision in the country should be enhanced to reduce the overall delay in MDR-TB management.

TB8: Adherence to National Guidelines for treatment follow up of patients treated for multidrug-resistant tuberculosis and treatment outcomes in Tanzania

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Rapid diagnosis of multi-drug resistant tuberculosis (MDR TB), prompt treatment and closely follow up is important in ensuring favourable treatment outcome. However, little is known about level of adherence to national guidelines for MDR TB treatment in Tanzania. This study aimed to determine the level of adherence to national guidelines for MDR treatment follow-up and its effect on treatment outcome. We conducted retrospective cross sectional study involving review of records from cohort of MDR TB patients enrolled on treatment from November 2009 to December 2015. Of 471 MDR-TB patients registered in Tanzania since 2009, 319 (67.7%) were males, between 25 and 44 years (n = 241, 51.2%). Among 207 patients with treatment outcome (2009-2013 cohort), 181 (87.4%) had complete treatment outcome records. Total of 102/181 (56.4%) were cured, 31 (17.1%) completed treatment; 31 (17.1%) died; 15 (8.3%) defaulted and 2 (1.1%) failures. Only 130 (33.9%) patients had smear performed monthly for eight months while 90 (23.4%) had culture performed monthly for eight months. Only 83 (21.6%) had both smear and culture done for all eight months. Of the 120 culture positive patients in month one, only 21 (17.5%) had first line drug susceptibility testing (DST) results. Two hundred patients underwent MDR TB treatment based on Gene Xpert results alone. Patients with culture done for all 8 months and those with culture done at month 0 and 6 had OR of 3.6 (95 CI: 1.6-7.8) and 7.4 (95 CI: 3.4-16.4) respectively, of having favourable treatment outcome. In conclusion, adherence to MDR TB treatment guidelines is poor and this affected treatment outcome unfavourably. Significant numbers of MDR TB patients are treated with Rifampicin mono resistant results alone. We recommend to the National Tuberculosis and Leprosy Control Programme to reinforce monitoring of MDR TB treatment follow up according to the guidelines.

TB9: Baseline bacterial load and rifampicin exposure are associated to culture conversion in a two-month study of tuberculosis

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Early bactericidal activity (EBA) during the first two weeks of anti-tuberculosis (TB) treatment is an important method for early efficacy evaluation of new anti-tuberculosis agents. The study aimed at building capacity for two Tanzanian sites to perform planned EBA studies on new TB drugs. We performed an observational study in two-site clinical study in Tanzania in patients with newly diagnosed pulmonary TB during the first eight weeks of standard HRZE. Baseline and treatment-related covariates including X-ray, baseline bacterial load and rifampicin pharmacokinetics were analyzed for their correlation to treatment success. From November 2011 to July 2013 we enrolled 74 pulmonary TB patients from Moshi (41) and Mbeya (33). Mbeya participants had a higher baseline bacterial load measured by log time to positivity (TTP) in the MGIT culture system (median 1.29; IQR 1.09-1.46 vs 1.58; IQR 1.44-1.87; p<0.001). Overall, 56/68 (80%) of patients achieved a negative solid media culture, and 28/59 (47%) achieved a negative liquid culture at 8 weeks. Median time to negative on LJ culture was 45.5 days (IQR 21-56), in liquid culture 56 days. The strongest association with outcome for any covariate was found for baseline bacterial load: patients with a positive week 8 LJ culture had a median logTTP of 1.20 (IQR 0.94 - 1.35); patients with a negative week 8 culture had 1.48 (1.29-1.73; p=0.006). In exploratory analysis, rifampicin area under the concentration curve (AUC) was associated with shorter time to LJ culture conversion in patients who achieved negative culture, (hazard ratio 1.05, p= 0.038), but not in the total population. This observation EBA (OEBA) study using standard HZRE was successfully implemented with methodologies thus far established for the first time at the two Tanzanian sites. Baseline bacterial load was confirmed as an important predictive parameter.
**TB10: Magnitude and factors associated with pre-diagnosis loss in the cycle of health care for presumptive tuberculosis suspects in Musoma, Tanzania**

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Despite National Tuberculosis (TB) and Leprosy Control Programme’s efforts in Tanzania, pre-diagnosis loss to follow-up among TB suspects is still a major problem. This study therefore, aimed at exploring pre-treatment defaulter’s characteristics, reasons and factors that lead them to default in Musoma in Tanzania. We did a cross-sectional study from December 2014 to April 2015 including TB suspects registered between May and November 2014, traced and interviewed all lost to follow up TB suspects. We then randomly selected and interviewed TB suspects who completed diagnostic algorithm as control group. For those who did not show up either to bring the morning sample or collect the sputum results were traced and questionnaire administered physically in their households. From May to November 2014 a total of 620 TB suspects were registered; 521 (84.0%) completed TB diagnostic algorithm while 99 (16.0%) did not. Two thirds (65.7%) submitted only spot sample and 34/99 (34.3%) submitted both samples but did not pick up results. Three out of 99 (3.0%) who did not complete diagnosis algorithm had TB both by LED and MTB Rif assay compared to 75/521 (14.4%) who completed TB diagnostic algorithm. To ascertain risk factors for TB pre-diagnosis loss, we randomly interviewed 231 TB suspects; 132 completed TB diagnostic algorithm and 99 did not. The main reasons for not completing diagnostic algorithm were lack of transport fare 23/99; long distance to the hospital 10/99; doing other economic activities 20/99 and opted to go to other health care facilities 33/99. Males were 1.6 (1.02-2.90) times more likely to complete TB diagnostic algorithm. We conclude that the magnitude of TB pre diagnosis loss is very high. Long distance to the healthcare facilities and lack of transport fare were the main reasons for not completing diagnostic algorithm. Active tracing of TB suspects and bring them back to care is highly recommended.

**TB11: Challenges facing prison workers in diagnosis and management of tuberculosis in Mbeya, Tanzania**

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Tuberculosis (TB) diagnosis, treatment and subsequent control in prisons remain a major challenge. The objective of this study was to assess knowledge amongst prison staff regarding transmission of TB, as well as signs and symptoms of active tuberculosis and to screen prison staff for active TB. A simple questionnaire was administered to 140 prison staff, assessing their knowledge on TB transmission, and signs and symptoms of active TB infections. In addition, from 2012 to 2015, Xpert MTB/RIF® assay was done to diagnose TB infections amongst prison workers in four prisons of the Southern Highland Zone in Tanzania (Ruanda, Songwe, Tukuyu and Mbozi prisons). More than 60% of prison workers had no knowledge on TB transmission, or signs and symptoms of active TB. Xpert MTB/RIF® results showed that 12 (8.6%) of 140 samples from interviewed prison staff tested were positive (Mtb detected), which is far higher than the average TB burden in the general population. Prison staffs are at a higher risk than the general population to acquire active TB and hence contribute to the burden of TB in prisons. Therefore, Government commitment, partnership, and sustained financing are needed to create awareness among prison workers to improve TB control in prison settings to ensure early detection of TB infections among prison staffs.
CHRONIC NON-COMMUNICABLE DISEASES IN SUB-SAHARAN AFRICA: CURRENT BURDEN AND CHALLENGES

NCD1: Acculturation of trust in patient-doctor relationship as a tool for improving non-communicable diseases/hypertension service uptake and adherence of medications in low income Africa
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The growing burden of non-communicable diseases (NCDs) in low income Africa is characterized by low biomedical service uptake and non-adherence to medications, hence, late or underdiagnosis, inadequate treatment and control. This is expected to persist courtesy of rural-urban migration, urbanization of rural settlements and population aging consequently increasing cardiovascular risk factors. Also, the concerns of unpreparedness of the public health facilities which are the major source of care for NCD management are evident, however, a sustainable alternative is far from availability. Amidst these complexities, a growing body of literature heavily, originating from high income contexts is overemphasizing on the role of patient trust in doctors on health care seeking behaviors, participation in care, adherence to medications, positive health outcomes and continuity. On the contrary, little is known on the topic in low income Africa. It is within this context, the ongoing study explores the notion of trust in a low income rural primary health care setting using hypertension and Tanzania as exemplars. This marks the initial step of acculturation of patient trust in doctors as a tool for NCD control in low income countries. A presentation highlights on the major thematic areas of forty-four qualitative semi-structured interviews with patients and providers in both western and traditional care conducted in Shinyanga region between September 2015 and February 2016.

NCD2: Pre-diabetes and diabetes associations with body composition among HIV-infected patients after 2 years of antiretroviral therapy in Mwanza: a follow-up cross-sectional study
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Data on pre-diabetes (PD) and diabetes mellitus (DM) among HIV-infected patients on antiretroviral therapy (ART) in Africa are limited. We determined the prevalence of PD/DM among HIV-infected patients on ART for 2 to 3 years and investigated the association of PD/DM with body composition. Malnourished HIV-infected patients enrolled in a nutritional trial from 2011 to 2013 were followed-up from March to August 2015. Anthropometric, fat mass and fat-free mass data were collected at baseline and follow-up. At follow-up, we defined fasting glucose of 6.1-6.9 mmol/L as impaired fasting glucose (IFG) and 2-hour oral glucose tolerance test (OGTT) glucose of ≥7.8 to <11.1 mmol/L as impaired glucose tolerance (IGT). Both of these were considered PD. Fasting glucose of ≥7.0 mmol/L or impaired glucose tolerance of ≥11.1 mmol/L was defined as DM. The relation of PD/DM with body composition was assessed using logistic regression. A total of 273 (57%) of 478 patients who were alive at trial conclusion were followed-up. The mean age was 41.5 (SD 9.8) years and 65.2% (178) were females. The mean follow-up BMI was 19.9 (SD 2.8) kg/m², 12 (4.4%) were either overweight or obese, and 61 (22.3%) patients had PD/DM. In multiple regression, upper tertiles of baseline hip circumference (OR: 0.41, 95% CI: 0.2, 0.8) and fat mass index (OR: 0.20 (0.1, 0.5), and upper tertiles of follow-up waist circumference (OR: 0.22 (0.1, 0.5),
BMI (OR: 0.32 (0.1, 0.7), fat mass index (OR: 0.19 (0.1, 0.5) and the middle tertile of follow-up fat-free mass (OR: 0.36, 95% CI: 0.1, 0.8) were associated with lower risk of PD/DM (P<0.05 for all). In conclusion, low rather than high measures of adipose tissue were associated with increased risk of PD/DM. Further studies are needed to investigate the role of body composition in the pathogenesis of DM among HIV-infected people in Africa.

NCD3: Knowledge and perception on diabetes type2 and hypertension among HIV clients utilizing care and treatment services in Tanzania

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The objective of this study was to assess the level of diabetes type2 and hypertension knowledge and perception among HIV positive clients utilizing care and treatment clinic (CTC) services. This cross sectional study was conducted in randomly selected 12 CTCs between October 2011 and February 2012. Out of 754 people living with HIV (PLHIV) and receiving HIV services, 671 (89%) from Dar es Salaam and Mbeya regions consented for the study. Data for demographic characteristics, diabetes type2 and hypertension knowledge and perception were collected from the study subjects. Overall 276/671(41.1%) respondents had low knowledge on diabetes type2 and hypertension risk factors and their associated complications. Locality (rural) (AOR=2.2; 95%CI 1.4-3.4); never/not recalling if ever measured blood glucose in life (AOR=2.3; 95%CI 1.1-4.7), being not aware that HIV/ART are associated with diabetes type2/hypertension (AOR=2.8; 95%CI 1.4-5.7) were significant determinants of low knowledge among clients on ART. Being currently not having HIV and Diabetes type2/hypertension co-morbidities (AOR=2.2; 95%CI 1.0-4.9) was the only determinant of low knowledge among ART naïve clients. For the perception, 293/671(43.7%) respondents had negative perception. Sex (female) (AOR=2.0, 95%CI 1.2-2.9), being aged <40 years (AOR=1.6; 95%CI 1.1-2.5) and education (primary or no formal education) (AOR=4.4; 95%CI 2.0-9.8) were determinants for negative perception among clients on ART while for ART naïve clients; HIV and NCD co-morbidities (AOR=2.0; 95%CI 1.0-4.6) was the determinant. We conclude that a considerable number of respondents had low level of knowledge regarding diabetes type2 and hypertension risk factors and their associated complications and negative perception towards healthy practices for mitigating risk behaviors of the diseases. There is need for promoting awareness creation regarding risk factors and complications by considering determinants of low knowledge and negative perception among study strata.

NCD4: Cardiovascular risk factors among HIV patients on Protease Inhibitor containing second line antiretroviral therapy from Mbeya – ALISA Cohort

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Non-communicable diseases are of concern in patients on long-term antiretroviral therapy (ART). Protease Inhibitor (PI) containing ART is associated with metabolic toxicities potential leading to cardio-vascular disease (CVD). The objective was to describe cardiovascular risk factors and
disease among HIV patients on 2nd line ART in Mbeya, Tanzania. Data were cross-sectional collected from patients included into the ALISA cohort study. Data involved history of CVD, blood pressure, BMI, smoking habits, ECG-assessment and laboratory analysis of cholesterol, HDL, LDL and blood glucose. The Framingham Score indicating the risk for CVD within the next 10 years was calculated. Out of 99 patients (55% female, median age 44 years, median CD4-count 330 cells/µl, 84% with HIV-RNA <1000 copies/ml) the median time on 2nd line ART was 3 years, 81 (82%) were on a LPV/r and 18 (18%) on an ATV/r based regimen. A history of hypertension was reported in 12 (33%) received antihypertensive drugs, stroke in 4, and diabetes in 5 patients (40% received antidiabetic drugs). CVD risk factors involved high systolic blood pressure in 14%, previous or current smoking in 17%, overweight in 15% and obesity in 13% of patients. ECG assessments revealed a high proportion of patients (56%) with probably clinical insignificant abnormalities (early repolarization, positive Sokolow-Lyon Index for left ventricular hypertrophy (LVH)), significant ECG abnormalities indicating cardiac disease (LVH and repolarization abnormalities) was seen in 3 patients. A Framingham Score indicating a ≥10% risk for CVD within the next ten years was calculated for 19% of patients. No difference in CVD risk factors or disease was seen between patients receiving LPV/r or ATV/r. We conclude that, CVD risk factors and disease are detected in a substantial number of patients on PI containing ART, which points out the need for focused monitoring, counselling and prevention.

NCDs: Rates and risk factors of hypertension in adolescents and adults with sickle cell anaemia in Tanzania: 10 years’ experience

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Data on the magnitude and risk factors for hypertension in sickle cell anaemia (SCA) are limited. This study was designed to determine the prevalence, incidence and risk factors for hypertension among SCA patients. This was a retrospective analysis of data from individuals with SCA at Muhimbili National Hospital (MNH), in Dar es Salaam, Tanzania. Individuals with SCA [homozygous hemoglobin SS (HbSS)], ≥ 15 years and prospectively enrolled in the Muhimbili Sickle Cohort between 2004 and 2014 were included. Follow-up visits are scheduled for SCA patients every 3–9 months. Hypertension was defined as systolic blood pressure ≥140 or diastolic blood pressure ≥90mmHg. A total of 1,013 individuals with SCA were analyzed, of whom 571(56%) were females. The median age was 17 years (interquartile range: 15-22). 476(48%) of the patients had normal blood pressure values, 441(44%) had relative hypertension and 79(8%) had hypertension. The incidence of hypertension was 64/1000 person years of observation and the 5-year survival rate free from hypertension was 0.71(95%CI: 0.67-0.75). In multivariate analysis, age>18 years, HR 1.50 (95%CI: 1.03-2.18); pulse pressure, HR 0.64 (95%CI:0.42 - 0.98); pulse rate, 1.02 (95%CI:1.01- 1.03); body mass index, HR 1.08 (95%CI:1.03-1.13); blood transfusion, HR 2.50 (95%CI:1.01-6.21) and hemoglobin, HR 1.12 (95%CI:1.05-1.33) were independently associated with hypertension. Despite the younger age, hypertension in this population was higher than that reported in others studies. Age, body mass index, pulse pressure and hemoglobin were independently associated with hypertension in SCA.
NCD6: Demystifying socio-cultural suppositions about hysteria: revamping sustainable mental health programmes for pubescent girls and their parents
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A lot of theories try to explain episodes of hysteria, but one outstanding notion about this condition leans towards exorcism, that is, “woman’s evil disease”. Such explanations more often than not, result into more extreme psychological complications among victims and severe emotional distress to girls’ parents and relatives. For psychiatric researchers, this is a psychological issue whose management requires a well thought out mental health programme during such emotionally and psychologically intense periods. This paper presents sentiments and experiences of 13 Mental Health Specialists in Kakamega and Bungoma County health units based on a qualitative approach. This paper reports on biophysical and psychological manifestations of hysteria among pubescent girls in Kenya. Equally, it explores popular socio-cultural references to this phenomenon among parents, school officials and health professionals. Through qualitative interviews, it explains what works in management of this condition. The paper goes ahead to offer key policy recommendations that would engender development of sound professional mental health programmes. In particular, this paper makes a case for stable and supportive spaces for both adolescent girls and their parents during hysteric episodes.

NCD7: Prevalence, types and risk factors of preconception anaemia among rural women in north-eastern Tanzania
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Anaemia affects one quarter of world population; women of child bearing age are most affected. Although anaemia early in pregnancy may influence early critical foetal developmental processes many women enters pregnancy with low haemoglobin or depleted iron stores. However, in Tanzania it is not well known how many women suffers from anaemia before they become pregnant. We present the preliminary results of prevalence and factors associated with pre conception anaemia among women aged 18-40 in Korogwe, northeastern Tanzania. A cross-sectional survey was conducted from November to 2014 to July 2015 on 1022 women age 18-40 wishing to become pregnant. Sociodemographic and anthropometric data were collected using a pre-tested questionnaire. Anthropometric indicators were measured using standard procedures. Sysmex haematological analyzer was used to measure hemoglobin concentration from a venous blood. Data analysis was done using STATA Version 12. The association between predictors of low haemoglobin levels/or anaemia and outcome variables was measured by using Chi² test with significant level of 0.05 and logistic regression for multivariate analysis. A total of 1022 were enrolled. The mean age was 28.6 (SD ± 6.9) years. The mean Hb level was 11.7 (SD ± 1.6 g/dL). The overall prevalence of anaemia was 52.4%. Of these, 2.2%, 26.4% and 23.8% had severe (Hb <8g/dl), moderate (Hb= 8.1-10.9g/dl and mild anaemia (Hb= 11-11.9g/dl)), respectively. Ethnic group, maternal education domestic water source, type of roofing materials, short stature and number of children were significantly associated with pre conception anaemia. Anaemia before conception is a major public health problem in Korogwe. The implications of these findings are important, particularly in light of recommendations to improve preconception care. Interventions to prevent pregnancy associated anaemia should focus on preconception period.
NCD8. Use of *Hibiscus sabdariffa* juice to correct iron deficiency anaemia in adults
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Anaemia, one of the most common and widespread blood disorders, is a public health problem in both developing and developed countries. Interventions are currently employed with little gain. This study evaluated the efficacy of frequently used local herb in correcting iron deficiency anaemia in human. Ethno-medical survey was conducted. Local healers were investigated on how they diagnosed and treat anaemia. Then farmers were identified and trained on good agricultural and collection practice to produce Roselle. Response surface methodology (RSM) was used to optimize extraction of key ingredients from the Roselle calyces. Stability indicating HPTLC method was developed and validated to monitor quality of Roselle product. Finally, the standardized juice was tested to 130 anemic adults to assess its efficacy and documents safety. Ethno-pharmacological survey of 31 local healers established about 28 plant species used to treat anaemia. *Hibiscus sabdariffa* was the most mentioned species. Optimized extraction parameters were determined at soaking time 48 minutes, solid-solvent ratio 44% and extraction temperature 55°C. Under these extraction conditions, amount of L-ascorbic acid and ferrous extracted were 83.1 and 7.8 mg/100g respectively. Efficacy of standardized Roselle on anemic adults revealed a significant increase in iron store in a group receiving a dose of 1500 ml/day for a month. There was no significant safety concerned with regard to its use. Local healers possess a rich traditional knowledge of medicinal plants species for anemia treatment. *Hibiscus sabdariffa* juice could be an alternative herbal therapy for treating iron deficient anemia in adults. It is therefore recommended to carry out large scale trial to evaluate its safety.

NCD9: The 2H study in Mbeya from April 2013 to June 2016
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Cervical cancer (CC) is the most prevalent cancer in women living in Sub-Saharan Africa, and the leading cancer-related cause of mortality. CC screening in Tanzania is based on a single-visit approach using visual inspection methods. This 2H study aims to describe distribution of cervical abnormalities, risk-factors associated with high-grade intraepithelial lesions (HSIL/CIN2-3) or CC by HIV status. Cross-sectional analysis of cervical lesions in association with socio-behavioural, reproductive and HIV-related risk-factors was undertaken. The study enrolled women attending CC screening in Mbeya. Tests performed included VIA, cytology and histology. Out of 1,607 women, 734 (46%) were HIV-infected with a median CD4 count of 464 cells/µL. CC was detected in 89 women (5.9%), and HSIL/CIN2-3 in 40(2.6%), the latter significantly often observed in HIV-infected women (p<0.001). Median age at cancer diagnosis was younger in HIV-infected compared to non-infected women (44 versus 56 years; p<0.001), and HIV-infected women presented less often with normal cytological findings. The risk of acquiring cancer or HSIL/CIN2-3 significantly increased with age among HIV-negative women, in contrast to HIV-infected women who had higher proportion of cases among younger-age category. Risk-factors of having HSIL/CIN2-3 or cancer among HIV-negative women included age at first sexual intercourse and first delivery below 18years, lack of formal education and having an uncircumcised partner. These
risk factors showed no association among HIV-infected women. HIV infection appears to exacerbate the process of developing CC and masks other profound risk factors to the disease. It is important to emphasize CC screening among HIV-infected women irrespective of their age and continue health education on CC risk-factors among sexually naïve girls. Visual inspection methods promote early detection of cervical abnormalities.

NCD10: Prevalence, risk factors and clinical correlates of chronic obstructive pulmonary disease in a rural setting in Tanzania
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Chronic obstructive pulmonary disease (COPD) is an important cause of burden of disease in developed countries with limited data in Africa. Besides cigarette smoking, air pollution is a potential risk factor. The objective of this study was to estimate the prevalence of COPD and identify factors associated with risk and disease exacerbation in Tanzania. We conducted a cross-sectional survey in Maswa district, Tanzania. Adults aged ≥ 35 years were randomly selected from 150 households in 6 villages. We collected data on respiratory symptoms, occupation and exposure to biomass using BOLD questionnaire. Spirometry was performed using NDD EasyOneTM spirometer with COPD based on post-bronchodilator FEV1/FVC<70%. Air pollution level was monitored using Langan T15x samplers. A total of 869 participants (427; 49.1% women) completed questionnaires. Of these, 57% completed post-bronchodilator spirometry, and 25% were smokers. The prevalence of COPD was estimated at 17.50% (21.7% in men, 12.9% in women). COPD was associated with the level of education and cigarette smoking (p<0.001 and p<0.002) and its severity was associated with cough, phlegm and wheezing (p<0.025, p<0.028 and p<0.002). Forty-two percent of current smokers had significant nicotine dependency which was associated with smoking duration (p<0.01). Half of COPD patients had cough and 85% had mild to moderate airway limitation. Over 35% of women had dyspnoea and increased exacerbation while men had poor FEV and FVC parameters. Patients generally, received aminophylline administered intermittently as oral pills. Pulmonary tuberculosis was reported in about 10% of patients. The majority of households revealed high level of pollution. In conclusion, COPD is enormous in Tanzania with cigarette smoking and indoor pollution being important risk factors. There is lack of awareness by patients and healthcare providers resulting in misdiagnosis and sub-optimal therapy.

NCD11: Studies on the prevalence of human papillomavirus in mouthwash samples and tonsils of patients undergoing tonsillectomy in 2015, Stockholm, Sweden
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A number of reports have shown that there has been a rise in the incidence of human papillomavirus (HPV) driven oropharyngeal cancers in the western world. The largest proportions of these cases are tonsillar and base of tongue cancers. It is however not clear if HPV detected in the mouth is shed from the tonsils, or potentially which part of the infected tonsils harbours HPV and finally the current prevalence of oral HPV within the general public in Stockholm is unknown. The objectives of this study were to determine HPV prevalence within Stockholm, correlate HPV
types detected in mouthwash samples to tonsils and finally determine which part of tonsils possibly harbours HPV infection. Samples were obtained from persons undergoing tonsillectomy within Stockholm County followed by DNA extraction from mouthwash samples and resected tonsils using optimised kits. HPV DNA was amplified by using three set of primers (BSPGP5+/6+, HPV16 and 33 E6 primers) and finally HPV genotyping was done by a bead based assay optimised to detect 27 HPV types. Data analysis was done by Graphpad prism. An overall prevalence of 10.3% (24/232) was detected in 232 mouthwash samples, with HPV 69 being the most dominant type (10/24). Other types detected include: HPV 16 (2/24), HPV 33 (3/24), HPV 35 (1/24), HPV 45 (1/24), HPV53 (1/24), HPV56 (1/24), HPV59 (1/24), HPV70 (1/24), HPV 82 (2/24). All the tonsils resected from patients whose mouthwash samples were positive for HPV, were negative for the HPV types tested. There was no correlation between the viral types detected in the mouthwash samples to tonsils corresponding to HPV positive mouthwashes. Further studies are needed to determine to which extent and which part of the tonsils are infected by HPV and to determine other sites that may contribute to presence of HPV in mouthwash samples.

NCD12: Cell phones and psychosis: a pilot study connecting traditional healers and biomedical staff in rural Tanzania
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Due to cultural beliefs and lack of rural biomedical services, majority of Tanzanians seek mental health care from widely accessible traditional healers who tend to treat the spiritual causes of psychosis, a recognizable and prevalent condition. Without integrated systems of care, biological symptoms of psychosis may go untreated and reach chronic stages. Innovative and comprehensive models that integrate both traditional and biomedical practices to effectively bridge the treatment gap for mental illness such as psychosis is needed. A pilot study aimed to determine the feasibility and effectiveness of using a mobile app for facilitating collaboration between traditional healers and biomedical professional’s in order to better address psychosis in rural Tanzania was conducted for 18 months. The pilot project involved several processes such as partnership building, mobile app development, training of traditional healers and biomedical professionals and patients screening, referral and treatment. A total of 32 traditional healers and two biomedical professionals in the participating hospital were trained on using the mobile app. Findings from the study support that collaboration between traditional healers and biomedical professionals is feasible. The use of a mobile app for screening patients for psychosis and aiding cross referrals between the two systems of care was demonstrated including utilization of the mobile app by the traditional healers. A total of 52 patients who sought services from traditional healers were successfully screened for psychosis using the app. A significant proportion of patients who screened positive for psychosis (n=36) using the app were referred for further diagnosis and treatment at the rural hospital. Recommendations for scaling up of this project have been proposed to other regions including adapting similar models to other mental health or medical conditions.

NCD13: Promoting the use of Moringa oleifera leaf powder for reducing anaemia in children aged 6 to 24 months: the case of Kisarawe District, Tanzania
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More than 75% of children under two years in Tanzania are affected by anaemia. Nutritional anaemia is the main contributing factor to the problem since Iron deficiency account to about
50%-60% of anaemia cases. Children below two years are highly affected by the problem than other groups due to rapid growth that increases demand for more nutrients. Communities who consume monotonous plant-based food in malaria endemic areas have higher risks to the problem. Addressing this problem is important because it affects child immunity, cognitive development, and future performance in school. This study aimed at promoting the use of *Moringa oleifera* leaf powder as a complementary food for reducing the risk of anaemia in children aged 6 to 24 months. The study was community interventional trial where by the intervention group received Moringa leaf powder and health education while the control group received only health education for the period of 7 months. Study findings show significant improvement in mean haemoglobin level in the intervention group than in control group, 2.5 and 1.6 g/dl, respectively. Other benefits found was improved weight gain which indicates the potential of *Moringa oleifera* leaf powder in reducing malnutrition problem in children. We conclude that the use of *Moringa oleifera* leaf powder significantly proved its potential in reducing anaemia in children. Food based strategy remained to be a long-term and sustainable approach in fighting against malnutrition problem in the country, hence improving nutrition security at the household level should be given a national priority. Multi-sector collaboration and partnership should be strengthened in identifying and promoting cultivation and use of plants with high nutritional composition as a strategy to fighting against malnutrition problem in the country.

**NCD14: Pre-conception anaemia and body mass index among participants of a study evaluating foetal programming for non-communicable diseases in Tanzania**

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Overnutrition has dramatically with nutrition transition and micronutrients persist in developing countries. Poor nutritional status early in pregnancy may partially influence foetal programming for non-communicable diseases but little is known on its magnitude in the preconception period. Clustering of opposite ends of malnutrition spectrum can present a unique challenge for public health intervention. The objective was to assess the magnitude of underweight, overweight, obesity and anaemia among 684 non-pregnant women aged 18-40 years and explore sociodemographic patterns influencing intra-individual double burden of malnutrition in a cohort of women in north eastern Tanzania. Baseline sociodemographic information, anthropometric measurement and haemoglobin levels and serum micronutrients were taken from women to determine magnitude of intra individual double burdens of anemia/micro-nutrient deficiencies and overweight/underweight or obesity before conception. Overall, 37% of women had anaemia before conception. Out of which 21(3%) had anaemia. Majority of mild to moderate anaemia cases were normocytic normochromic while over 90% of severe anaemia cases were microcytic hypochromic type. The prevalence of obesity, overweight and obesity were 13%, 20% and 11%, respectively. Marital status, short stature, having no toilet, current occupation and parity were significantly associated with anaemia while occupation and parity were associated with overweight and obesity. We conclude that a substantial number of women have poor nutritional status before conception that could have short and long term adverse effects new born and maternal health.
WATER SANITATION AND HYGIENE TOWARDS ACHIEVING SUSTAINABLE DEVELOPMENT GOALS

WASH1: The socio-economic determinants of attaining optimum water, sanitation and hygiene in Kenya: a review of evidence
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Several global initiatives have attempted to promote the agenda on water and sanitation provision for all. These include the Millennium Development Goals; The Johannesburg Plan of Implementation adopted at the World Summit on Sustainable Development in 2002; The UN resolution declaring 2008 as an International Year of Sanitation among others. In 2014, UN-Water came up with five measurable and interconnected targets: universal access to safe drinking water, sanitation and hygiene; improving the sustainable use and development of water resources; strengthening water governance; improving water quality and wastewater management; and reducing risks of water-related disasters. These suggestions were largely incorporated into the recommendations for the 17 Sustainable Development Goals. On the local scene, Kenya envisions a national availability of and access to water and sanitation by 2030. The Constitution of Kenya states that every Kenyan has a right to clean and safe water and sanitation. While MDG goal Number 7 aimed to halve by 2015, the proportion of people without access to safe drinking water and sanitation, indications are that this was not achieved. Approximately 80% of hospital attendance in Kenya is still caused by preventable diseases out of which 50% are related to WASH. This is despite concerted efforts of government and collaborating institutions to increase water supply and sanitation through various strategies. A prevailing disparity in WASH that is seen in communities living within the same environment could be attributed to a number of socio-economic determinants ranging from resource allocation, governance, macroeconomic policies, behavior, income, education, living condition, to availability of health services. This paper highlights several studies undertaken in various parts of the country by researchers at Egerton University highlighting socio-economic determinants that have been shown to contribute to this current scenario.

WASH2: Cholera in Tanzania: a neglected but persistent epidemic
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Cholera is the commonest and persistent infectious disease outbreak in Tanzania. The first outbreak of cholera in Tanzania was reported in Rufiji District in October 1977. Cholera has now become endemic to Tanzania with small outbreaks being reported every year and a much larger outbreak occurring every 4-5 years. This review was conducted to document the occurrence of cholera outbreak during past four decades. Documentary review of surveillance reports, World Health Organization outbreak reports and published literature to cover the time period of ten years. There was an increase in the number of cholera cases from 2007 (2860) to 2009 (6,244), then a decrease to 343 in 2012 followed by another increase in 2015/2016. On average, there were 3,101 cases of cholera per year. The larger cholera epidemics were reported in 1977, 1983, 1988, 1993, 1997, 2002, 2006, 2009 and 2015/2016. The overall mean annual case fatality rate (CFR) is 1.96% (range=1.2-4.07%), which is unacceptably high, exceeding the WHO recommended rate of below 1%. There are variations both in number of cases and CFR between regions. Significant
Regional variations in the number of cases, deaths and CFR are being observed. Over the past six years, Shinyanga (8.13%) and Rukwa (5.70%) reported the highest average annual CFR. Most cases of cholera during the recent past were reported from Tanga (accounting for 16.87%) followed by Dar es Salaam (16.43%), Morogoro (9.47%), Kigoma (9.20%) and Manyara (9.05%). Cholera has remained the most common infectious disease outbreak in Tanzania. It is important that studies on the dynamics and drivers of the outbreak are carried out, while its surveillance is being strengthened.

WASH3: Assessing household drinking water quality and their associated factors in highly cholera affected wards in Dar es Salaam, Tanzania, 2015

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Epidemic cholera still a challenge in Tanzania. Between 15 August and 03 November 2015, Dar-es-Salaam reported 4004 cases and 36 deaths. Contaminated water was mainly associated with the outbreak. Supply points had always treated but contamination at home is common. Majority store water at home, information on microbial quality of stored drinking water is limited. We assessed the quality of household drinking water and contamination predictors in highly cholera affected wards in Dar es Salaam. A cross sectional study conducted in February 2016 in five highly cholera affected wards in Dar es Salaam using two-stage population-proportional-to-size cluster sampling. Estimated sample were 768 households. Questionnaires about water, sanitation and hygiene (WASH) were used. FCR level and Escherichia coli of household’s drinking water were tested. Predictors of fecal contamination determined by Logistic regression. We interviewed in 640 (83%) households. 440 (69%) reported to treat drinking water. Of households reported to boil, 213 (81%) had E. coli. Water in 527 (88%) households had FCR < 0.2 mg/L and in 141 (45%) had E. coli. Improved latrine (AOR=0.34; p-value<0.0001) and handwashing with soap (AOR=0.39; p-value=0.0002) were significant protective from fecal contamination. Water with FCR<0.2mg/L (AOR=4.19; p-value=0.002) and drawing water from storage container by dipping (AOR=1.87; p-value=0.013) were significantly associated with water contamination. We conclude that the majority of the households in Dar es Salaam draw water from storage container by dipping which is unsafe. Improved latrine and hand wash station with soap were protective to contamination, but majority don’t have. Drinking water had insufficient FCR to prevent reinfection. Nearly half, drink contaminated water. We recommend health education focusing on proper treatment of household’s stored water, use of improved latrine, handwashing with soap.

WASH4: Characterization of cholera outbreak for control measures Tanga Region, Tanzania, 2016

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A large cholera outbreak affecting 21,097 cases and 391 deaths, case fatality rate (CFR) 1.6%) from all regions of Tanzania since August 2015. Six out of 11 districts of Tanga region were affected, reporting 891 cases and 12 deaths (CFR 1.3%). We characterized cholera cases in Tanga in order to guide control measures. Hospital records between August 2015-April 2016 from six of the 11 districts were reviewed and active case finding was done to identify cases. A case was defined as any person two years and above with watery diarrhea, with or without dehydration from October
2015. A line-list was updated regularly and 85 stool samples were tested for *Vibrio cholerae*. Data was entered in MS Excel and descriptive analysis performed. The index case was reported on 6 October 2015 in Muheza District and 1,610 cases with 17 deaths (CFR 1.1%) were reported up to April 18 2016. The overall attack rate was 72 cases/100,000 population with Korogwe district reporting 851 (52.9%) cases. The district specific CFR ranged between 0.3% and 15.8%. The age-specific CFR was highest among individuals 26-35 years (3.0%). The epidemic curve showed four peaks with decrease in the number of cases over time. Six out 11 districts reported cholera cases during the first peak while for the following peaks, few districts reported cases. *Vibrio cholerae* 01 Ogawa was isolated in 45 (52.9%) of 85 stool specimens analyzed. We concluded that this was person to person type of an outbreak characterized by several peaks and high attack rate.

**WASH5: Improving sanitation and hygiene through the WHO-funded construction of improved pit latrines fitted with handwashing facilities in cholera hotspot communities in Tanzania**

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Tanzania has experienced one of the worst cholera outbreaks in its history. The big outbreak extended well over 6 months from August 2015 through April 2016 and sporadic new cases are still being reported till the end of August, 2016. Promotion of adoption and use of improved latrines, improving water safety at household and community levels, and hand hygiene are arguably vital for controlling of the current cholera outbreak. WHO is supporting effective delivery of such interventions in badly affected communities in Tanzania to help curb the ongoing outbreak and protect communities from possibility of future outbreaks. The objective was to improve the standard of living for communities in cholera outbreak hotspot areas of Mwanza, Mara, Dodoma, and Morogoro regions in Tanzania through effectively strengthening the effectiveness of, and access to sanitation and hygiene facilities. Promotion of adoption and use of improved latrines, improving water safety at household and community levels, and hand hygiene through community mobilization, sensitization, capacity building and construction of demonstration latrines fitted with handwashing facilities at household level. Success is attributable to high level political commitment, state or division level action and community mobilization by village level authorities. Multi-level efforts such as planning meeting, training sessions and house-to-house visits by village leaders, health officials and project staff have raised greater awareness of sanitation and hygiene issues and led to construction of 187 latrines in 8 targeted villages on a partial self-help basis with support from the project. The challenge ahead is to give greater attention to the ‘hard to reach’ who live in less accessible areas and are more resistant to change.

**WASH6: Enhance integrated delivery of Water, Sanitation and Hygiene and Neglected Tropical Diseases control programmes**

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Improvements of WASH infrastructure, repeated drug administration (MDA) to at risk population and appropriate health seeking behavior are essential to achieving sustained control, elimination,
or eradication of many neglected tropical diseases (NTDs). The objective was to evaluate the effect of Enhanced Development Governance (EDG) model in improving the performance of integrated delivery of WASH and NTDs control activities and health outcomes. The project was implemented in Mkuranga (control) and Rufiji (intervention) districts of Pwani region in Tanzania. Household and school-based surveys were conducted to collect data on diarrhea and schistosomiasis respectively in both districts before and after the implementation of EDG Model. Other methods used in data collection and project implementation included in depth interviews (IDIs) with key informants, focus group discussions (FGDs), rural participatory approach (RPA) and strengthening capacity of SSCs to deliver integrated WASH – NTDs control activities. The intervention resulted in a significantly larger reduction in Schistosoma mansoni, S. haematobium, and either infection prevalence when compared to the control district. Both the control and intervention districts demonstrated a similar significant reduction in diarrheal-disease incidence, so the intervention did not have a significant effect overall. NTDs – WASH knowledge among community members in Rufiji increased from 44.2% at baseline to 76.1% after intervention. Both districts saw decreases in the presence of feces around the compound (a marker for open defecation). However, this decrease was larger in the intervention district, making the intervention effect significant [ROR = 13.84 (1.53 – 125.12)]. There was a significant decrease in parents rarely/never using soap during handwashing in the intervention district [ROR = 0.49 (0.27 – 0.92)]. Improving self-organizing capabilities of the SSCs and interaction between village entities in the intervention arm. Strengthening the capacity of village bodies using EDG model yields positive impact on health outcomes and improved performance of delivery of integrated NTD-WASH activities. EDG model led to a greater improvement in interaction between village entities.

**WASH7: Sanitation and hygiene situation in health care facilities in eastern and southern zones in Tanzania**

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Inadequate sanitation and hygiene services in health-care facilities (HCFs) is long recognized to lead to infectious diseases. The aim of this study was to assess among others the availability, quality and coverage of sanitation and hygiene services in HCFs and thereafter generating evidence-based policy options for actions geared towards improving maternal, newborn and child health conditions by effectively preventing and controlling infections. The study adopted a cross-sectional survey design and was implemented in seven districts marked as UNICEF Programme Districts: Temeke, Makete, Njombe, Iringa, Mufindi, Mbeya and Mbarali. Finding from 96 HCFs show that 10% of them use unimproved pit latrines. Majority of the toilet facilities (64%) were dirty during the survey. More than 50% of latrines in health centres and dispensaries were in bad state of repair. It was further revealed that, 25% of HCFs lacked handwashing facilities at service points and that HCW were not washing hands after examining patients. The available handwashing facilities in 50% of consultation rooms and 66.6% in labor wards were mostly improvised 20L buckets with or without taps. Soap for hand washing was present in 51% of
consultation rooms and 79% of delivery rooms. Antiseptic hand rub only available at hand washing points in 9% and 12% of the facilities in consultation room and delivery rooms respectively. Healthcare facilities in the surveyed areas suffer from inadequate sanitation and hygiene infrastructures and poor infection prevention and control (IPC) practices. Common problems include inadequacies in water supply and storage, blocked latrines, lack of personal protective equipment for staff, improper management of healthcare waste resulting in visibly dirty facilities and poor handwashing practices.

WASH8: Governance and priority setting issues in the provision of water, sanitation and hygiene interventions in health care facilities in Tanzania: the gap between rhetoric and reality
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When Ebola epidemic occurred in West Africa in 2014, one of the key challenges were the situation of water, sanitation and hygiene at health care facilities that was inadequate. We investigated situation of these facilities in Tanzania and identified governance issues and areas for improvement. A cross-sectional design undertaken in seven districts of UNICEF Programme sites of which 31 key informant interviews (officials responsible for WASH activities) were conducted from Ministries of Water and Health, development partners, regional and district levels. The findings indicate less than one percent of resources were planned and budgeted for interventions at health care facilities in 2014. All financial resources for WASH at the Ministry of Health were donor funded, there were no resources planned and allocated by government. It appeared that WASH interventions at health facilities was not a priority in the studied districts. There were no resources allocated from own sources and central government to address WASH problems other than funds from School WASH (SWASH) program. Key governance ingredients identified in implementing SWASH program including joint planning, joint implementation, joint monitoring and evaluation of activities, transparency in the use of financial resources at all stages of implementation of project, good and effective leadership in bringing the actors together and in resolving problems when they arise. There were no similar mechanism focusing on health care facilities. We conclude that, since WASH situation is alarmingly poor in most of the surveyed health care facilities, the government of Tanzania should urgently work to forge a framework for the reform of WASH in HCFs, generate policy, guidelines and standards to support the sector’s reform process.

WASH9: Point-of-use chlorination of turbid water: results from a field study in Tanzania
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Household-based chlorine disinfection is widely effective against waterborne bacteria and viruses, and may be among the most inexpensive and accessible options for household water treatment. The microbiological effectiveness of chlorine is limited, however, by turbidity. In Tanzania, there are no guidelines on water chlorination at household level, and limited data on whether dosing guidelines for higher turbidity waters are sufficient to produce potable water. This study was designed to assess the effectiveness of chlorination across a range of turbidities
found in rural water sources, following local dosing guidelines that recommend a ‘double dose’ for water that is visibly turbid. We chlorinated water from 43 sources representing a range of turbidities using two locally available chlorine-based disinfectants: WaterGuard and Aquatabs. We determined free available chlorine at 30 min and 24 h contact time. Our data suggest that water chlorination with WaterGuard or Aquatabs can be effective using both single and double doses up to a limit of 20 nephelometric turbidity units (NTU), or using a double dose of Aquatabs up to 100 NTU, but neither was effective at turbidities greater than 100 NTU. These results suggest that point-of-use chlorine disinfection is effective but with limitation across a wide range of water turbidities.

WASH10: Microbiological effectiveness of household water treatment technologies under field use conditions in rural Tanzania
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Health impacts through drinking water may be driven by a number of context specific factors, including the underlying risk of waterborne diseases, effectiveness of technologies in reducing microbes in water, and achieving high adherence to the practice. The objective was to assess the microbiological effectiveness of several household water treatment and safe storage (HWTS) options in situ in Tanzania, before consideration for national scale-up of HWTS. Commonly available and novel technologies with potential for scale were selected by UNICEF and the study team for field testing. These included boiling, chlorination (sodium hypochlorite solution and NaDCC tablets), locally produced ceramic pot filters, ceramic siphon filters and combined flocculent/disinfectant sachets. Participating households received supplies and instructions for practicing six HWTS methods on a rotating 5-week basis. We analysed 1,202 paired samples (source and treated) of drinking water from 390 households, across all technologies. Samples were analysed for thermotolerant (TTC) coliforms, an indicator of faecal contamination, to measure effectiveness of treatment in situ. All HWTS methods improved microbial water quality, with reductions in TTC of 99.3% for boiling, 99.4% for Waterguard brand sodium hypochlorite solution, 99.5% for a ceramic pot filter, 99.5% for Aquatab tablets, 99.6% for P&G Purifier of Water flocculent/disinfectant sachets, and 99.7% for a ceramic siphon filter. Microbiological performance was relatively high compared with other field studies and differences in microbial reductions between technologies were not statistically significant. Given that microbiological performance across technologies was comparable, decisions regarding scale-up should be based on other factors, including uptake in the target population and correct, consistent, and sustained use over time.

WASH11: Household sanitation, hygiene practices and influencing factors in Mkinga District, Tanzania, 2014
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Unimproved sanitation and hygiene practices remain a challenge in Tanzania, with only 13% of households countrywide in 2010 and 15% in Mkinga district using improved sanitary facilities in
The National Sanitation Campaign (NSC), initiated during 2012, aimed to improve household sanitation and hygiene. NSC has been implemented in seven of 21 wards in Mkinga district in north-eastern Tanzania. A cross-sectional study was conducted in wards with and without NSC implementation selected by stratified multistage cluster sampling. Heads-of-households were interviewed using structured questionnaires. Logistic regression determined factors associated with sanitation and hygiene practices. Sanitary facilities were categorised according to WHO/UNICEF Joint Monitoring Program criteria. We enrolled 443 heads-of-households, 152 (34.3%) in NSC areas. Of these, 297 (67.0%) households had sanitary facilities, of which 168 (56.6%) were improved. Having an improved sanitary facility coverage was associated with high socioeconomic status (aOR 8.31, 95% CI [3.63–19.02]), flat lands, as opposed to hills or mountains (aOR 2.78, 95% CI [1.25–6.15]), and NSC implementation (aOR 2.34 95% CI [1.25–4.38]). Among households with sanitary facilities, 31 (10.4%) had hand-washing facilities with water and soap within <10 paces of their facility.

In conclusion, coverage of improved sanitary facilities was high compared to district estimates. However, hand washing with soap after toileting was infrequent. NSC should be implemented in the remaining wards in Mkinga, emphasizing increase of coverage of improved sanitary facilities and hand-washing with soap.

**WASH12: Effect of Takasamaji and safe drinking water storage container on episodes of diarrhoea: cluster randomized field trial in Mkuranga district Tanzania**

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Diarrhea remains a leading cause of mortality among children under 5 years of age around the world. The health consequences of inadequate water supplies include an estimated 4 billion cases of diarrhea and 1.87 million deaths each year, mostly among young children in developing countries. Evidence shows that point-of-use water quality interventions could reduce diarrhea episodes by roughly 50 – 70% or more. The aim of the study was to assess whether a combination of Takasamaji and drinking water safe storage container technology is effective in prevention of diarrhea among under-fives in Mkuranga district, Tanzania. Ten villages from two wards, Nyamato and Panzuo in Mkuranga district were selected for the study. Five villages were randomized to intervention arm and were supplied with Takasamaji and safe drinking water container for treatment and storage of their drinking water, and the remaining five villages continued with their usual water collection, treatment and storage practices. Research team paid one visits per week for 17 weeks to all households enrolled for the study to take note of all recorded diarrhea episodes for children under five years of age. The quality of water before and after use of Takasamaji was assessed. The prevalence of diarrhea for the period of 17 weeks was 11.4% and differed significantly between control arm (14.8%) and intervention arm (7.3%) p = 0.001. Diarrhea incidence rate was significantly higher in control arm (2.91%) than in the intervention arm (1.38%), and the incidence rate ratio was 0.46 (95% CI: 0.28, 0.76). Takasamaji was able to reduce the quantity of E. coli concentration and levels of turbidity by 80% and 70% respectively. We conclude that Takasamaji and safe water drinking storage technology reduced episodes of diarrhea among children under the age of five years by 54%. Once the formula of Takasamaji is improved, its use should be promoted.

**WASH13: Microbiological effectiveness of locally produced Takasamaji filters for drinking water treatment in Tanzania**

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Low-cost options for the treatment of drinking water at the household level are being explored by the National Institute for Medical Research (NIMR) in Tanzania. The Takasa-maji water purifier (TWP), a locally produced, low-cost semi-synthetic biopolymer filter, is being optimized for large scale use for drinking water treatment with particular emphasis to the rural context in the provision of safe drinking water in Tanzania. Three candidate filters (TWP 1, TWP 2 and TWP 3) were tested for the reduction of field water bacteria that are waterborne pathogens using representative unsafe drinking water source, the Mpalanena dam in Kibaha district in Pwani region. Results indicate that filters were capable of reducing key microbes in the field trial with mean reductions of Escherichia coli of approximately 99.9% and log reductions ranging from 3 log reduction (99.9%) for TWP 2 whereas TWP 1 and 3 were the most efficient recording 4 log reductions with 99.99% removal of E. coli. The findings suggest that all the three tested TWP filters showed high effectiveness in removing pathogenic microbes in drinking water. The optimized TWP is expected to cost around Tshs 16,500 (US$ 8) per filter, locally produced filters may be a promising option for drinking water treatment and safe storage at the household level to meet human health needs in the prevention and control of waterborne diseases.

WASH14: Faecal contamination of drinking-water in Dar es Salaam, Tanzania: implication on health of the consumers
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Cholera outbreaks in Dar es Salaam, Tanzania have been occurring almost each year since 1974 with a Case Fatality Rate (CFR) averaging to 10.5%. This study analyzed major source waters for the city to ascertain safety for human consumption. The objective of the study was to determine the extent to which borehole and tap water meet the recommended drinking water quality standards by domestic and international organizations. Total viable and coliform counts were evaluated using the standard plate count method. The physicochemical parameters were analyzed using standard methods. With respect to the World Health Organization (WHO) standards, all water samples passed the pH and TDS parameters. With exception of tap water, all borehole water samples failed on turbidity standard maximum of 5 NTU for drinking water. Seven out of eleven (63.6%) borehole water samples and tap water samples failed on microbiological purity of drinking water standards and considered unfit for human consumption as revealed with the presence of unacceptable levels of fecal coliforms. The implication of these findings is that, large number of Dar es Salaam city dwellers sourcing drinking water from boreholes and tap water are continuously ingesting fecally contaminated water that predispose them to infectious microbial risks of pathogenic gastrointestinal bacteria. Household based water treatment and safe storage (HWTS) is highly recommended to safeguard health of consumers of water from these sources. Regular assessment of all parameters mentioned in this study is advocated.

WASH15: Choo Chapchap – container based sanitation and waste treatment in rural Tanzania
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Unhygienic management of faecal waste in developing countries causes an array of health issues, many communities seek improved sanitation and technologies are already available; however,
affordability is a major challenge hindering sustainable development. A non-governmental organization, namely MSABI, aimed to develop an affordable subscription of container-based sanitation (CBS) system for full cycle faecal waste management, planning to incubate a local enterprise, financially sustainable through economy of scale. The service aimed to include latrine infrastructure, collection service and waste treatment with the goal of producing a valuable end product of compost or charcoal. Following extensive community consultation and literature review, a latrine prototype was developed and piloted with 35 clients, regular client feedback is collected. A waste treatment facility was constructed for drying and composting faecal sludge, research is currently underway using effective microorganisms and a variety of carbon rich organics. Baseline surveying revealed more than 90% of community members are interested in a CBS service and roughly 75% are willing to pay more than TSh. 5,000 for monthly collections. Client feedback indicated that less than 5% have issues with the service received and 90% are currently up to date with payments. Financial analysis shows a required increase in profit to ensure sustainability as an enterprise. Early results from treatment research are promising with sludge adequately dewatered in less than 4 weeks and composting temperatures up to 68°C recorded. In conclusion, CBS has potential as a profitable enterprise and adequate demand has been observed. Rural conditions are harsh and increase running costs, indicating that CBS services may be better suited to urban environments. Production of a rich fertiliser from human waste will close energy and nutrient cycles, reducing wastages. Choo Chapchap eliminates uncontrolled exposure of faecal waste to the surrounding environment, creating a barrier to the spread of pathogens, thereby improving communities’ health in a sustainable manner.

WASH16: Risk factors for salmonellosis among livestock keepers in Buhigwe, Tanzania 2015
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Salmonellosis is one of the most common food borne diseases. It continues to be a major public health problem worldwide. In March, 2015 the Tanzania Ministry of Health was notified by the Kigoma Region Health Management Team of an outbreak of unknown disease in Kasumo Village, Buhigwe District where patients were presenting with fever, headache and prostration. We carried out the investigation to determine the risk factors associated with the outbreak. We conducted unmatched 1:1 case control study where cases were identified from medical records and traced for interviews. A case was defined as any person of any age from Kasumo village who present with fever, headache with or without general body malaise, abdominal pain, diarrhea, and vomiting since outbreak starts. Neighbourhood control were selected randomly from the community. A standard questionnaire was administered to both cases and control. Univariate, bivariate and multivariate analyses were done and confidentiality ensured. A total of 131 cases and 131 control were enrolled. The mean age of cases was 19.3 years ±17.9 with below 5 years old accounting for 21%. The odds of developing Salmonellosis were 2.9 times (95% CI 1.18-7.73) higher among those used untreated drinking water. Those who didn’t wash hand after visiting toilet were 2.02 [AOR = 2.02; 95%CI: 1.0231-3.9996] times more at risk of developing Salmonellosis. Those who washed hands with water and soap were protected [AOR = 0.32; 95%CI: 0.1707-0.6048] from getting Salmonellosis. In conclusion, not washing hands, using untreated water and washing hand with water and soap were associated with increased odds of developing Salmonellosis. There is need to sensitize the community on the importance of personal hygiene and water treatment through health education.
WASH17: Investigation of selected pathogens in raw vegetables: A case study in Morogoro, Tanzania

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Escherichia, Shigella and Salmonella species are Gram negative bacilli, non-motile, non-spore-forming bacteria, belong to the family Enterobacteriaceae which cause enteric fever. Leafy vegetables can be contaminated by enterobacteria due to water sources contaminated by faecal derived organisms this has been reported elsewhere. The objective was to investigate and isolate the bacteriological status of selected raw leafy vegetables with regards to Escherichia coli, Shigella and Salmonella species contamination. This was a case study whereby a total of 27 samples of Lettuce sativa, Brassica oleracea and Amaranthus hybridus were collected and transported at room temperature. Samples were washed by sterile distilled water and washed materials were collected and inoculated in culture media SB, BA, MCA and XLD agar for colonial morphology after incubation at 37°C, followed by Gram reaction (Gram stain) and biochemical test; TSI, Sugars and IMVC. Among 27 leafy vegetable samples 18 (67%) were found to contain E. coli, 3 (11%) were found to contain Shigella species. Samples were found to be positive by 78% of total samples. Of the Escherichia coli infected vegetables, 26% were from Morogoro Municipal markets, 22% from Mji mpya market and 18% Mawenzi market. With regards to Shigella infection, 7% were from Morogoro Municipal market and 4% from Mji mpya market. No Salmonella species was isolated. This case study observed that leafy vegetables were highly contaminated with the selected pathogens due to the use of manure, stagnant and slow moving water for watering vegetables. The sample size was small that can have effect to these findings in future studies with higher samples will provide more information.

WASH18: Hand hygiene intervention to optimize helminthic infections control: a cluster-randomized controlled trial in north-western Tanzania

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Soil transmitted helminth infections (STH), are frequent infections in childhood strongly associated with malnutrition, poor physical and cognitive development. STH are associated with poor access to water supply, sanitation and hygiene. Control of STH has largely depended on the administration of anthelmintic drugs though with limited impact. There is rapid re-infection reaching pre-treatment levels within six months’ post-treatment. The current study aims to establish whether the effect of routine deworming campaigns can be enhanced by combining with Water, Sanitation and Hygiene (WASH) behaviour change intervention. The study will be a cluster-randomised behavior change intervention trial in 14 schools in Kagera Region that will demonstrate maximum reductions in prevalence and intensity that hand-washing with water and soap can achieve, after deworming. This population has a high prevalence of Ascariasis and Trichuriasis of up to 50% or more. Seven among the 14 schools will be randomly assigned to the intervention arm and the rest to the control arm. Implementation will be school-based, but will involve children’s parents and guardians. Preliminary findings of a survey of 2,000 children from 34 primary schools in Kagera region demonstrated high prevalence of ascariasis and trichuriasis of 16.4% (range range 0–71%) and 11.6% (range 0–58%), respectively. The prevalence of hookworm infection was 19.7% (range 0-50%). The study will establish the effectiveness of a hand washing hygiene intervention to compliment and sustain gains of current deworming campaigns among school aged children. The study will act as a proof of concept for the use of appropriate Water, Sanitation and Hygienic interventions in the control of STH and other tropical diseases in resource limited settings.
Contamination of inanimate hospital environment has been linked to several outbreaks of healthcare-associated infections caused by multidrug-resistant gram-negative (MDR-GN) bacteria. The study was performed to assess the magnitude of Bugando Medical Centre (BMC) hospital surfaces contamination by MDR-GN bacteria and genotyping the isolates. A total of 138 non-repetitive hospital surfaces were swabbed between June and August 2015. Specimens were cultured onto MacConkey Agar. Extended spectrum beta lactamase (ESBL) screening was done using MacConkey Agar supplemented with 2µg/ml of cefotaxime. Identification and antimicrobial susceptibility testing were confirmed by VITEK-MS and VITEK® 2 system respectively. Characterization was done using multilocus sequence typing. Data were analyzed using STATA-13 software. Of the 138 BMC hospital surfaces swabs, 48 (34.7%) had positive gram negative growth. Isolated bacteria were Enterobacter cloacae 18 (37.5%), Acinetobacter baumannii 13 (27.1%), Klebsiella pneumoniae 12 (25%) and Escherichia coli 5 (10.4%). All 48 isolates were resistant to at least 3 classes of antimicrobials, 34 (70.8%) were ESBL positive and one A. baumanii was resistant to carbapenems. E. coli ST405 was found to circulate in different BMC wards with an exception of the premature unit resuscitation bed which had E. coli ST410. Neonatal intensive care unit (ICU) weighing scale and Adult ICU bed were found to be contaminated with E. cloacae ST513. BlaOXA-23 gene was detected in carbapenemase-producing A. baumanii. We conclude that, contamination rate of hospital surfaces with MDR-GN bacteria is alarmingly high. Detection of ESBL-producing E. coli strains having STs 405 and 410 that were previously detected in clinical isolates in the same hospital calls for urgent review of infection and prevention methods to combat antimicrobial resistance burden.

Escherichia coli is among the most common causes of diarrheal diseases in children below five years of age in developing countries. The burden in developing countries is still high, ranking the second most common cause of morbidity and mortality after acute respiratory illness. The study was done to determine the magnitude of STEC infection among underfives with diarrhea in Mwanza, Tanzania. Between July, 2015 and March, 2016, a total of 304 underfives with diarrhea were enrolled. Demographics and relevant information were recorded. Stool specimens were inoculated onto MacConkey and Salmonella-Shigella Agars. Confirmed E. coli isolates were subcultured onto STEC chromAgar to screen for STEC. Antimicrobial susceptibility testing was performed to pathogenic bacteria using disc diffusion method. Data were analyzed using STATA-
The mean age of the enrolled children was 1.43 ± 1.03 years. Two hundred and eighty-three (93.1%) of the 304 children with diarrhea had positive culture, of which 32 (10.5%) were due to STEC infection. Pathogenic bacteria (Salmonella spp., Shigella spp. and STEC) contributed to 14.5% (44/304) of all diarrheal cases. Among 32 STEC isolates 22 (68.8%) and 20 (62.5%) were resistant to amoxicillin/clavulanic acid (AMC) and trimethoprim-sulfamethoxazole (SXT), respectively while 3 (9.4%) were ESBL. Number of children within the family and use of water from wells were found to be significantly associated with diarrhea caused by pathogenic bacteria (p= 0.034 vs 0.006). In conclusion, it is time for clinicians to consider STEC among potential pathogens causing diarrhea in the region. More than 60% of pathogenic bacteria were resistant to commonly prescribed antimicrobials like AMC and SXT. Provision of safe water, health education together with improvements in sanitation and personal hygiene are key factors to reducing these infections.
NEGLECTED TROPICAL DISEASES IN SUB-SAHARAN AFRICA: PROSPECTS FOR ELIMINATION

NTD1: Trends and issues with impact on Tanzania Neglected Tropical Disease control and elimination programme sustainability beyond 2020
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Country ownership and sustainability is a desired goal to be attained by large health intervention programs in developing countries. ENVISION is not exception in looking ahead towards the end of funding in the year 2020 and the possibility of sustaining the gains achieved in control and elimination of NTDs. The purpose of this paper is to examine what ENVISION program has implemented to lay grounds for country ownership and program sustainability. Achievements: Political leaders awareness, willingness and acceptance of the program created through repeated Regional and District advocacy; Established and Trained government supported Regional and District NTD teams to coordinate and manage the program at regional and district levels; Established and Trained government supported zonal coordinators to provide supportive supervision and data collection support to frontline health workers and CDDs; Created a joint program management between the ministries of education and health; Trained CDDs and teachers who are motivated to volunteer to work with their respective communities and school during drug distribution. Forty-five districts have stopped community MDAs after reaching the lowest margin of disease transmission and therefore can continue School MDA with minimum supervision. NTD program activities incorporated on CCHP and some districts provided funding to cover activities not funded by the program. Challenges include staff attrition and government leadership changes after election which can affect up to 15% of NTD trained staff. Envision has managed to put in place all the necessary infrastructure for country ownership and sustainability of the program but still government direct funding of program activities is still inadequate.

NTD2: Schistosoma mansoni infection and its related morbidity among adults living in selected villages of Mara region, north-western Tanzania: a cross-sectional exploratory study
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Schistosoma mansoni is highly endemic in Tanzania and affects all age groups at different degrees. However, its control approach focus only in school aged children. Yet the adult individuals who are equally at risk and infected are not included mass drug administration (MDA) programme. To justify the inclusion of adult individuals in MDA programs, the present study focused on determining the prevalence of S. mansoni infection and its related morbidities among adult individuals. This was a cross sectional study conducted among adult individuals aged 18-89 years living in selected villages of Rorya and Butiama districts located along the shoreline of the Lake Victoria in Tanzania. A pretested questionnaire was used to collect socio-demographic and socio-economic information of participants. Ultrasonographical examination was conducted for all study participants using the Naimey protocol. A single stool sample was obtained from all study participants and examined for S. mansoni using the Kato Katz technique. The study revealed high prevalence of S. mansoni (56.3%) and majority of infected individuals had light intensity of infection. Ultrasonographical findings revealed that 22.4% of adult individuals had
periportal fibrosis (grade C-F), with 18.4% having grade C and D and 4% having grade E and F. Males had the highest prevalence of periportal fibrosis (31.7% versus 10.8%, \( P<0.001 \)). Organomegally was common with 28.5% and 29.6% having splenomegaly and hepatomegaly, respectively. We conclude that *Schistosoma mansoni* infection and its related morbidities periportal fibrosis, hepatomegaly and splenomegaly is common among adults living in study villages in Mara region. To reduce the level of transmission of *S. mansoni* infections, planned mass drug administration campaigns should include adults living in the area.

**NTD3: Assessment of soil transmitted helminthes and schistosomiasis infection prevalence in north western great lakes of Tanzania**

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Schistosomiasis (SAC) both due to *Schistosoma haematobium* and *S. mansoni*, and Soil Transmitted Helminthiasis (STH) are endemic throughout Tanzania but are more prevalence along Lake Victoria zone. These infections pose a serious public health problem particularly to school age children (SAC) and women of child bearing age. It is estimated that over 10 million SAC in Tanzania are at risk of infection and over 40% of them reside along the Lake Victoria basin. The Neglected Tropical Diseases (NTD) control program following the World Health Organization (WHO) guidelines is scaling-up STH and SCH control activities and plans to introduce preventive chemotherapy (PCT) with Praziquantel and Albendazole in the lake zone. A baseline assessment was conducted in March 2016 through sentinel sites. Prevalence of SCH was determined by microscopic identification and counting of *S. haematobium* ova in using filtration technique and for *S. mansoni* ova – using the Kato Katz technique. Urine and stool samples were collected from 3 to 7 pupils aged 8 to 14 years, from selected sites in 20 councils along the lake zone. Furthermore, STH prevalence- specifically Ascaris, Hookworm (*Necator americanus* and *Ancylostoma duodenale*) and *Trichuris trichiura* was assessed the same stool samples. A total of 2,400 pupils from 20 councils from Mwanza, Kagera, Mara, Shinyanga and Kigoma regions were examined. Preliminary results revealed prevalence of any STH ranging from 5 to 71%, with the most common STH being hookworm. Kagera region registered over 9% high intensity of infections. Prevalence of *zchistosomiasis* ranged from below 10% to 60%. *S. haematobium* is still the most common except in Kigoma where intestinal schistosomiasis is predominant. About 14% of individuals had high intensity of *S. mansoni* infection. PCT is highly needed and will help reduce not only morbidity but also alleviate suffering caused by STH and SCH in these councils. In future, program impact can be measured using these baseline prevalence levels.

**NTD4: High prevalence and intensity of urinary schistosomiasis in Pemba district despite of repeated rounds of mass drug administration with praziquantel**

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As part of a urinary schistosomiasis control/elimination programme on Zanzibar Islands, several mass drug administration (MDA) rounds with praziquantel have been implemented. The objective was to determine the prevalence and intensity of urinary schistosomiasis among primary school children in Uwandani, Chake District in Pemba. This descriptive cross sectional study was conducted  from March to April 2016. History of haematuria was collected and urine samples were examined for *Schistosoma haematobium* eggs with a single urine filtration. The overall prevalence rate of *S. haemotobium* infections among primary school children was 37.7% (95%CI=31.2-46.8%). The intensity of infection varied with mild infections 24% (95%CI=17.2-30.8%) and heavy infection (>50eggs/10ml urine) 14.7% (95%CI=0.84-19.6%). The overall prevalence of history of haematuria was 69.3% and dysuria 70.7%. Higher prevalence and intensity of urinary schistosomiasis was found in the study area. This, calls for additional interventions focused on exploration of knowledge, attitude and practices for school children and community members.
**NTD5: Wuchereria bancrofti** infection doubles HIV incidence in southwest Tanzania: a prospective cohort study

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The last decades have seen an ongoing controversial debate of whether the immune activation induced by helminths has an impact on the susceptibility to human immunodeficiency virus (HIV). The incidence of HIV in individuals with and without history of lymphatic filariasis (LF) was determined in a population-based cohort in Southwest Tanzania. Randomly selected subjects of all ages were followed for four years and tested for HIV and circulating filarial antigen, an indicator of *Wuchereria bancrofti* adult worm burden, the pathogen causing LF in Africa. Amongst 1,055 initially HIV-negative adolescents/adults with clearly determined LF-status, 32 HIV new infections were observed amongst 2,626 person years. HIV incidence in LF-positive subjects (1.91 cases per 100 person-years) was significantly higher than the incidence in LF-negative subjects (0.80 cases per 100 person-years). The age and gender adjusted incidence rate ratio was 2.17 (95% CI = 1.08 to 4.37, p = 0.0300). LF-status remained an independent and significantly relevant risk factor for HIV infection when controlled for other known risk factors such as sexual behavior and socio-economic factors. To our knowledge this is the first prospective study demonstrating a significantly increased risk of acquiring HIV for LF infected individuals. We hypothesize that the known long disease duration of LF enables the postulated T cell activation mechanisms to come into effect and cause increased HIV susceptibility. Both, immunological studies as well as interventional treatment studies that eliminate the adult worms and not only the microfilaria are needed to follow up on the results presented.

**NTD6: Epidemiological assessment of bancroftian filariasis in the endemic communities during the era of elimination towards eradication in north-eastern Tanzania**

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Tanzania started national-wide lymphatic filariasis elimination programme in 2000 adopting Mass Drug Administration (MDA) strategy using combination of ivermectin and albendazole. However, there is paucity of information on the epidemiological trend of the programme and impact of the scale in endemic communities where implementation is on-going. The aim of this study was to assess current status of infection rate and morbidity of the disease where MDA has been administered for over eight rounds. This cross-sectional, descriptive study involved individuals (>18 years) from endemic communities in Tanga Region in north-eastern Tanzania, where MDA is being implemented since 2004. Patients’ social-demographic, clinical and parasitological data collected including information on the aetiology and the behavioural patterns. The rapid test immuno-chromatographic card test (Binax NOW®, Scarborough, Inc., USA) was used to detect
circulating filarial antigen (CFA). A total of 472 individuals screened, 65.1% (n=307) were females while 34.9% (n=165) were males although enrolled as per inclusion criteria were 57.6% (n=272). The overall rate of circulating filarial antigens was 5.51% (15/272). Hydrocele and elephantiasis rates were 73.16% (199/272) and 15.80% (43/272), respectively. The co-morbidity of both hydrocele and lymphoedema was 5.51% (15/272). Our findings have shown a considerable reduction in filarial infection. However, there is clear indication of on-going transmission despite the 8 rounds of MDA. It is unlikely that annual MDA would interrupt transmission to achieve elimination goal and therefore new treatment strategies are inevitable.

**NTD7: Hydrocele camps experience: lessons learnt from three coastal districts of Tanzania**

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Lymphatic Filariasis (LF) is one of the five Neglected Tropical Diseases endemic in Tanzania. Efforts Control this disease started in 2000 in the endemic districts. Tanga and Mtwara regions are endemic with LF; medicines to prevent this disease have been distributed once a year for the past 12 years in all the districts under the Neglected Tropical Diseases Control Program. The medicines used are Ivermectin and Albendazole, which are distributed to the population of five years and above, during mass drug administration campaigns (MDA). However, there are people with the chronic manifestation of LF, which are lymphoedema and hydrocele. These people need proper management of hydrocelectomy and lymphoedema care. In 2015, the neglected Tropical Diseases Control program was supported by different partners to operate patients with hydrocele in three districts of Muheza, Pangani and Mikindani. The burden of hydrocele cases was above ~2000 from these districts. The objective of this camp was to conduct hydrocele surgery to 550 patients from Muheza, Pangani, and Mikindani Districts. Patents were identified from their villages and listed by village health care workers. These listed patients were screened at the identified health facilities where the camps would be conducted. Patients found to have other conditions such as Hernia were excluded and the eligible patients were invited for operations on a specified date. Patients were admitted a day before the procedure, and all the important measures were taken before surgery. Post operatively patients were given antibiotics and analgesics and discharged one day after surgery and seen after seven days by the district surgeons. While at their home Village health workers were trained to visit the patients and advice in case of wound infections or any complications. In total 564 patients with hydrocele were operated in the three camps and there were no any major complications. However, 110 patients were found to have both hernia and hydrocele and 2 patients had testicular tumor. Hydrocele camps are important in reducing the burden of patients who are already affected with Lymphatic Filariasis. From these camps it has been seen that there are still many patients in need of the service and they are too poor to afford the costs for surgery. It is important that many development partners now focus in supporting surgeries for hydrocele patients in countries that are in need.

**NTD8: Assessing impact of Ivermectin and albendazole mass drug administration on lymphatic filariasis through sentinel and spot check sites: a case of Mafia Island, Tanzania**

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Lymphatic Filariasis due to *Wuchereria bancrofti* is widely endemic in mainland Tanzania, putting all 50 million residents at risk of infection. Control efforts mainly focus on interruption of transmission through annual combination treatment of ivermectin and albendazole to eligible populations. The world health organization five (5) rounds of MDA with epidemiological coverage of ≥65% could interrupt microfilaria transmission as evidenced by circulation filarial antigenaemia of <2% or microfilaraemia <1% in humans. A 15-year follow up of epidemiological treatment coverage and disease levels in Mafia district is hereby reported. Circulating filarial antigen (CFA) was longitudinally monitored using immunochromatographic cards: baseline (in 2000), midterm (in 2003), and follow up surveys (in 2006, 2013, and 2016), eight villages were set as sentinel /spot check sites. Microfilaraemia was determined using the counting chamber technique. In 15 program years, MDAs were implemented 8 times with coverage as follows, 2001 (44.1%), 2002(67.4%), 2003(79.0%), 2004(65.0%), 2006 (73.7%), 2007 (76.5%), 2011(74.0%), 2012 (76.0%), 2013 (81.30%), 2014 (68.99%), 2015 (76.0%), 2016 (76.0%). Antigenaemia levels have steadily declined from 46% at baseline (2000), to 30%, 24% after the first 3, 5 MDA rounds respectively, and to 4% after 2 more rounds of MDA that followed a 3-year treatment skip and to 4.1% in 2016. It is then noted that, Interrupting LF transmission through MDA requires control programs to achieve and sustain high coverage. Despite the 15 years of intervention, and the decline in CFA, infection levels still warrant more treatment rounds. Sentinel and spot check sites, if well set and regularly assessed facilitate programs make informed decisions in combating the diseases. They are practical and less expensive but still provide key data on end points.

**NTD9:** Sustained transmission of lymphatic filariasis in Mafia Island, eastern Tanzania: evidence from xenomonitoring in mosquito vectors

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Lymphatic filariasis (LF) is a chronic nematode infection caused by *Wuchereria bancrofti* and transmitted by mosquitoes. The disease is targeted for global elimination by 2020 using repeated community-wide mass drug admistration (MDA). However, of recently, there has been a growing recognition of the potential role of including vector control as a supplement to MDA to achieve the goal of LF elimination. The current study explored for the major LF vector in Mafia Islands as a prerequisite for a search for appropriate vector control method to complement the ongoing MDA campaign. Mosquitoes were collected indoor and outdoor using Centre for Disease Control (CDC) light and gravid traps respectively. Collected mosquitoes were identified based on their differential morphological features and Anopheles vectors caught were further identified to their respective sibling species by polymerase chain reaction (PCR). Filarial mosquito vectors were then examined for infection with *W. bancrofti* by microscopy and PCR technique. Overall, a total of 35,534 filarial mosquito vectors were collected, of which *Culex quinquefasciatus* Say accounted for 98.2% of the vectors. Of 7,936 mosquitoes examined for *W. bancrofti*, infection and infectivity rates were 0.18% and 0.08%, respectively. Using pool screen PCR technique, analysis of 324 mosquito pools (each with 25 mosquitoes) resulted to an estimated infection rate of 1.7%. The study has shown that *Cx. quinquefasciatus* is the dominant mosquito in Mafia Islands and *W. bancrofti* infection is confined to this vector group. By using mosquito infectivity as proxy to human infection, the study indicates that *W. bancrofti* transmission is still ongoing on Mafia Islands after more than a decade of control activities based on MDA.
Efficacy of grass infusion and neem seed cake extract in the control of the filariasis vector, Culex quinquefasciatus in semi-field and field conditions of Tanzania

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Lymphatic filariasis (LF) is caused by Wuchereria bancrofti and transmitted by Culex quinquefasciatus, Anopheles gambiae and An. funestus. With scaling up of malaria vector interventions, Cx quinquefasciatus has remained the most important LF vector in Tanzania. The objective of this study was to assess the efficacy of a combination of natural mosquito oviposition attractant and biolarvicide in the control of Cx. quinquefasciatus. Semi field and field experiments to test the efficacy of mosquito attractants and biolarvicides were carried out in Muheza and Mafia Island in Tanzania, respectively. Specialised pheromone lure and application technology (SPLAT-BAC) and combination of grass infusion (GI) and neem seed cake extract (NSCE) were tested for their efficacy in attracting and killing larvae of Cx quinquefasciatus. In the semi-field conditions, Cx quinquefasciatus were found to oviposit more egg rafts in water containers treated with SPLAT-BAC and GI than in tap water. Overall, GI was superior to SPLAT-BAC in attracting gravid Cx. quinquefasciatus. The attractive potential of SPLAT BAC declined significantly when moving from controlled environment to field conditions. The majority of Cx quinquefasciatus egg rafts were oviposited in bowls with GI (450; 59%) followed by NSCE (269; 35%). In the field conditions, majority of the Cx quinquefasciatus egg rafts were oviposited in GI+NSCE than in NSCE alone or water alone. None of the egg rafts oviposited in GI+NSCE hatched. GI+NSCE remained effective for a period of 10 days. In conclusion, NSCE alone and combination of GI and NSCE performed well both in terms of attracting gravid Cx quinquefasciatus to lay their eggs in treated bowls, but also to prevent the eggs from hatching to larval stages. In conclusion NSCE and a combination of GI and NSCE offer an excellent potential for developing an environmentally friendly mosquito management tool that could supplement currently available strategies.

Presence of Wuchereria bancrofti infection in mosquitoes from Pangani District, North Eastern Tanzania

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Wuchereria bancrofti is the most widely distributed of the three nematodes known to cause lymphatic filariasis. The main vectors in Tanzania are Anopheles gambiae and An. funestus. However, the relative role of Culex quinquefasciatus as a vector is becoming increasingly important in coastal East Africa, especially in urban and semi-urban areas. The objective was to determine the presence of Wuchereria bancrofti, vector abundance and to estimate rate of infection in mosquitoes. Mosquitoes were sampled from five randomly selected villages of Pangani district namely Bweni, Madanga, Meka, Msaraza and Pangani West. Sampling of mosquitoes was done using standard Centre for Diseases Control and Prevention (CDC) light trap with an incandescent light bulb. The presence of W. bancrofti in mosquitoes was determined by Polymerase Chain Reaction (PCR) using primers NV1 and NV2 while Poolscreen2
software was used to determine *W. bancrofti* estimated rate of infection (ERI) in mosquitoes. A total of 951 mosquitoes were collected. Out of 951 mosquitoes, 99.36% were *Culex quinquefasciatus*, 0.32% *Anopheles gambiae* and 0.32% other *Culex* species. The *W. bancrofti* vector estimated rate of infection in the present study was found to be 3.3%. This is the first study employing the use of poolscreen PCR to detect *W. bancrofti* circulating in mosquito vectors. The presence of *W. bancrofti* in mosquitoes is an indication that transmission of the parasite is ongoing in the area. A higher abundance of *Cx. quinquefasciatus* calls for integrated mosquitoes control interventions in order to reduce the chances of *W. bancrofti* transmission in the population.

**NTD12: Use of live potted lemon grass for outdoor mosquito control**
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Mosquito and mosquito borne disease are among the the major threats to public health and economic development. Mosquito control is faced by a number of challenges. For instance, the effectiveness of insecticide-treated mosquito nets and indoor residual spraying targeting indoor biting mosquitoes, are threatened by the changing biting behaviour of mosquitoes from night and inside houses to daylight and outside houses, and by their increasing resistance to insecticides. We evaluated the effectiveness of live potted lemon grass, *Cymbopogon citratus*, on the population and biting pattern of malaria transmitting mosquitoes. The quasi experimental pre and post-test study design was used. Collection of mosquitoes was done for five days consecutively in each household. Malaria testing among children below five years was done to determine malaria prevalence. Interviews were done for history of malaria and head of households’ knowledge and attitude. A total of 5203 and 3897 female *Culex quinquefasciatus* mosquitoes were collected at baseline and at the endline respectively. This study could not establish malaria reduction, as there were no children with malaria at the baseline as well as endline. In conclusion, potted lemon grass reduced population of mosquitoes in the houses by 25%.

**NTD13: Lymphatic filariasis elimination efforts in Rufiji, eastern Tanzania: Transmission rates in mosquito vectors after 12 rounds of mass drug administration**
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The Tanzania National Lymphatic Filariasis Elimination Programme using Ivermectin and Albendazole Mass Drug Administration (MDA) in Rufiji district started in 2000. It was anticipated that four to six rounds of MDA with at least 65% minimum effective coverage of the total population would interrupt lymphatic filariasis (LF) transmission. The common measure used to assess the impact of MDA include detection of infection in humans. These indicators may persist in humans during and after LF interventions. Detection of filarial DNA in competent mosquito vectors indicates infection uptake from human hosts whilst the presence of filarial DNA in the head indicates the possibility of local transmission to humans. This study was conducted to establish the transmission rates (infection and infectivity rates) in vector mosquitoes after twelve rounds of MDA in Rufiji district in eastern Tanzania. A cross-sectional survey was carried out in Rufiji district from April 2015 to May 2015. Mosquitoes were collected from the 50 purposefully selected houses from five different villages using CDC light traps placed in sleeping rooms and gravid traps placed outside the house. Vector mosquitoes from light traps were dissected while mosquito DNA extracted from gravid trapped mosquitoes was screened in pools of five using Taqman qPCR analysis for filarial infection and infectivity. A total of 3,334 mosquitoes were
caught using light traps. Out of these mosquitoes, the vector species found were 69 \textit{Anopheles gambiae} and 1,054 \textit{Culex quinquefasciatus}. Upon dissection, 1,165 vector mosquitoes were found negative. A total of 5,460 gravid \textit{Culex quinquefasciatus} mosquitoes were caught using gravid traps and tested for \textit{Wuchereria bancrofti} DNA. Of 1,092 pools tested, 5 pools (0.1\%) were positive. When the heads from the positive pools were re-tested, none was found positive. Transmission from mosquitoes to humans is highly unlikely to occur, however, presence of infection in mosquitoes suggests the existence of very few human microfilariae carriers with potential to infect mosquitoes.

**NTD14: Perceptions of Tanzanian pastoralist communities on neglected tropical diseases and mass drug administration: a qualitative study**

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The study was conducted in two districts of Tanzania and assessed the knowledge, attitudes and perceptions of target communities towards neglected tropical diseases (NTDs) and mass drug administration (MDA). In addition, communities’ perceptions and participation in national health campaigns that involve MDAs were explored. This study employed a qualitative research method. Focus Group Discussions and in-depth individual interviews were carried out in selected Wards and communities. The assessment found that the communities studied have inadequate knowledge and awareness of NTDs and MDA. Women and children were considered to be at high risk of NTDs compared to youth and men. Communities’ perception in national health campaigns was fairly good; however, participation in MDAs and compliance was found unsatisfactory. Those identified perception-related issues need to be addressed. These include, among others, adequate involvement and training of local traditional leaders and drug distributors. More importantly, a well-planned and organized community sensitization and mobilization activities would be required before the conduct of MDAs. It is also recommended that an integrated approach that connects various stakeholders at the community level would yield positive results. Tailored approaches addressing local situations should be critically considered.

**NTD15: Integrating mass drug administration for neglected tropical diseases to livestock extension services in the selected nomadic communities in Tanzania**

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Neglected Tropical Diseases (NTDs) are infectious diseases affecting poorest, underserved populations in tropics. Diseases are chronic, few can be acute. Lymphatic filariasis is caused by \textit{Wuchereria bancrofti}, \textit{Brugia malayi} and \textit{B. timori}. The soil transmitted helminthes are caused by \textit{Ascaris lumbricoides}, \textit{Trichuris trichiura}, \textit{Necator americanus} and \textit{Ancylostoma duodenale}. In our study, we focused on LF and STH. This affects communities causing hydrocele and/or swellings of the lower limbs or breasts (LF), anaemia, malnutrition and stunting (STHs). In Tanzania NTDs are controlled by preventive chemotherapy through Mass Drug Administration (MDA) programme using Ivermectin and Albendazole The study aimed at increasing MDA access and coverage for LF and STH in nomadic communities by integrating provision of anthelmintics with livestock extension services. In-depth interviews with village leaders, council NTDs and livestock coordinators were conducted in order to get knowledge concerning LF and STH. Key informants (KIs) were interviewed on knowledge attitude and practice regarding NTDs including participation in previous MDAs. KIs were asked about number of household members and
livestock kept. Focus group discussions were conducted. Additionally, retrospective review of coverage of MDA and livestock extension services in the community was done. Key findings indicated that respondents were aware of the disease, local names and people affected but not the cause of those diseases. As regards to treatment, many people said to rely on modern medicine and also traditional practice. According to the review on the MDA coverage, it rose to 80.8% from the previous range of 50-65.5%. Among the key factors to improvement in coverage were the integrating provision of livestock extension services to MDA and continuous health education.

**NTD16: Evaluation of the presence of Onchocerca volvulus infection in black fly vectors in the Tukuyu focus of Tanzania**

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Onchocerciasis can be prevented by treating communities at risk every year with a dose of Ivermectin. Evidence suggests that Ivermectin can be used to eliminate the parasite permanently from the community. The World Health Organization (WHO) guidelines for the elimination of onchocerciasis requires the evaluation of infection in black flies in order to calculate annual transmission potential. The objective of this study was to evaluate the presence of *Onchocerca volvulus* infection in blackflies in the Tukuyu focus in Tanzania that had more than a decade of mass drug administration (MDA) with Ivermectin so as to confirm that transmission may have stopped. Wild adult female flies were collected as per standard method of human landing collection. Flies were analyzed by pool screening technique of PCR. ELISA techniques were carried out as specified in the protocol for O-150 PCR analysis *O. volvulus* infection. A total of 8,934 adult *Simulium damnosum* complexes were collected. Of all flies, 104 samples in pools of 100 heads and bodies of flies were analyzed by PCR and all tested negative for *O. volvulus*. The mean plus 3 SD of the negatives were below 0.1 which was the cut off for optical density set for this assay. We conclude that there is noticeable biting activity of *S. damnosum* sl in the Tukuyu focus. However, all collected flies were negative for *O. volvulus* infection suggesting that transmission of the parasite might have been successfully interrupted with long term MDA with Ivermectin.

**NTD17: Knowledge, attitude and practices on soil transmitted helminthes among secondary school students in Mbeya, Tanzania 2014**

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Soil-transmitted helminthes (STH) are a group of nematodes that infect more than a billion people worldwide. Helminthes of particular public health importance are *Ascaris lumbricoides*, *Trichuris trichiura* and hookworms. *Strongyloides stercoralisis* also a STH, although detailed information on the prevalence is lacking. The objective of the study was to assess the knowledge, attitude and practices among secondary school students towards STH in Mbeya Urban district in south-western Tanzania. A cross sectional study design, cluster samples was used to obtain 400 students of form one to form four from two secondary schools which are Southern Highland and Nsoho. Questionnaires were administered to obtain demographic information, knowledge and
practice related to soil transmitted helminthes infection. Data collected were analyzed by SPSS version 16. The students who heard about STH were 87.2%, among those who heard only 13.8% knew the causative agents of the diseases. Only 23% they have soap for washing hands, 33.5% treat water for drinking, 30.5% wash their hands after toilet and 20.5% never take anthelmintics. Health promotion activities to enhance awareness are important to insuring that the risks for being infected with STH are minimal if not eliminated. Regular mass treatment should be maintained so as to ensure that the prevalence of soil transmitted helminthes remains low.

NTD18: Integrated Community Directed Treatment of schistosomiasis and soil transmitted helminths in Chato District, northwestern Tanzania
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Schistosome and soil-transmitted helminths (STH) infections are recognized as major global public health problems, causing severe and subtle morbidity, including significant educational and nutritional effects in children. Although effective and safe drugs are available, ensuring access to these drugs by all those at risk is still a challenge. Community-directed treatment (CDT) has been used successfully for mass distribution of drugs for other diseases such as onchocerciasis and lymphatic filariasis and has shown to be a cost-effective strategy for reaching most affected communities. This study aimed to evaluate the feasibility and effectiveness of the CDT strategy in the control of schistosomiasis and STHs, in Bwina ward, Chato district, northwestern Tanzania that is highly endemic for both infections. Pre-treatment prevalence of Schistosoma mansoni in 2012 averaged 58% (range 48-68%) in the three communities that make the Bwina ward. Treatment coverage in the three villages ranged from 78.9% in Bwina to 87.6 % at Mulumba as per community drug distributors (CDDs) records. One year after, the CDT exercise coverage increased from 83.4% to 94.7% at Mbuye and Mulumba, respectively. Overall reduction of S. mansoni was 71.2% in school children (from 40.6% to 11.7%, p value= 0.000) and by 68.9% among adult (from 32.2% to 10.0%, p value= 0.0000). The reductions in prevalence of hookworm and Ascaris lumbricoides were 60.1% and 83.3%, respectively. This study shows that CDT is an accepted and effective strategy in the mass treatment of schistosomiasis and STH infections in resource constrained communities in Tanzania. A controlled trial comparing CDT and school based mass drug administration to demonstrate their relative advantages are discussed.

NTD19: Generation and characterization of anti-Trypanosoma brucei transferrin receptor nanobodies®
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African Animal Trypanosomosis is a major threat to animal health and production in endemic areas. There is currently no vaccine available against the disease. Control relies on treatment of infected animals with trypanocidal drugs, of which drug resistance is a major challenge. Targeting a trypanolytic molecule or surface receptors for nutrients would be ideal in controlling parasitemia. The bloodstream forms of trypanosomes fulfill their iron requirements by taking up host transferrin via the trypanosomal transferrin receptor, a heterodimeric protein that bears no similarity to the mammalian transferrin receptor hence ideal target by trypanocidal molecules. This study aimed to generate and characterize high-affinity anti-T. brucei transferrin receptor Nanobodies® both as monovalent formats and half-life extended formats through fusion of the
Nanobody® to an anti-serum albumin Nanobody®. Three anti-T. brucei transferrin receptor Nanobody® sequences were first subjected to sequence redundancy check according to the alignment of complementarity determining region 3 and demonstrated high CDR3 hypervariability. In silico characterization of the Nanobodies® revealed highly stable proteins with a molecular weight of approximately 15 kDa. A ThermoFluor® assay confirmed the Nanobodies® thermal stability with a melting temperature of approximately 70°C. Collectively, the generated Nanobodies® bound to different cell lysates as detected in an Enzyme-Linked Immunosorbsorbent Assay. The Alexa Fluor® 647 labelled Nanobodies® were able to bind to their antigen in live and intact monomorphous Trypanosoma brucei brucei parasites as assayed by Flow Cytometry indicating their potential in vivo application. However, generating the serum half-life time extended Nanobodies®, which might be required to increase their in vivo circulation time/efficiency, was hampered by poor recombinant protein expression and purification.

NTD20: Trachomatous trichiasis specific survey: a pilot test in Monduli district of northern Tanzania
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Trachoma is neglected tropical disease, a leading cause of preventable blindness worldwide and is endemic in 42 countries. The World Health Organization has endorsed surgery for trichiasis alongside the antibiotics, facial cleanliness and environmental interventions for trachoma control (SAFE strategy). Previous survey in Monduli in northern Tanzania in 2004 showed trichiasis prevalence among 15 years and above of 4.42%; however, these earlier surveys were not powered to estimate very low prevalences. Since the 2004 survey, implementation of SAFE in Monduli has been patchy. This survey aimed to estimate the prevalence of trichiasis within a population with precision to detect the WHO target for elimination of trachoma of 1/1000 population. A cluster random survey was undertaken in Monduli district. A total of 60 clusters and 36 households in each cluster were selected. All household members aged 1 year and above were examined for trachoma trichiasis (TT) and trachomatous scarring (TS) based on the WHO simplified grading system. Prevalence estimates were standardized to account for the age-sex differences in TT. TT was defined as the presence of trichiasis. A total of 7,537 people (91.4% of those enumerated) of whom 60.1% were female, were examined for trachoma signs. Overall prevalence of TT in the population aged 15 years and above was 1.21%; 95% confidence interval [CI] (0.85-1.60). Prevalence of TT in people aged 40 years and above was 2.97%; 95% CI (2.06-4.10). Despite the sporadic implementation of SAFE, this survey showed that TT burden in Monduli is much less than previously estimated more than a decade ago. The results will facilitate planning of TT surgery services and elimination in Monduli. Further TT only surveys are needed in trachoma endemic districts where recent surveys have not been undertaken to facilitate planning of SAFE.

NTD21: The shrinking trachoma map in Tanzania: results of impact surveys in 54 districts
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The World Health Organization recommends (WHO) evaluation of the surgery, antibiotics, facial cleanliness and environmental change (SAFE) strategy after at least three years of implementation. In Tanzania, a total of 96 districts were surveyed for baseline prevalence of trachoma between 2004 and 2014. A total of 61 districts were eligible for SAFE implementation.
We investigated: i) the prevalence of trachomatous inflammation-follicular (TF) in children aged 1-9 years in districts that were eligible for impact surveys; ii) prevalence of trachomatous trichiasis (TT) in people aged 15 years and above; and iii) estimated TT backlog in all endemic districts. Impact surveys were conducted in districts where SAFE had been implemented for 3 years or more. Two-stage cluster random survey design was used to select the sample: clusters (villages) were selected in the first stage; households were selected in using systematic random sampling in the second stage. In sampled households, children aged 1-9 years were examined for TF and persons aged 15 years and above were examined for TT using World Health Organization (WHO) simplified grading system. Of the 54 districts surveyed, 42 had reached the WHO threshold for stopping mass drug administration (MDA) of TF prevalence of <5%. A total of 5 districts had TF prevalence of 5-9.9% thus MDA was needed for one more annual round before another impact survey could be undertaken. Five districts had TF of >10% thus another 3 rounds of annual MDA were warranted. Prevalence of TT by district ranged from 0% to 4.42. TT backlog was estimated to be 78,000. Survey findings suggest that the ultimate intervention goal for TF of <5% has been attained in 42 districts therefore MDA with Zithromax® should be stopped and surveillance surveys undertaken after 2 years. However, in many districts TT is still a public health problem and therefore trichiasis surgery is required to clear the TT backlog.
STRENGTHENING HEALTH SYSTEMS THROUGH A NEW GLOBAL DEVELOPMENT FRAMEWORK

HS1: Bridging Community Health Workers skills and capacity gaps for malaria prevention and control: an implementation research approach in Malindi, Kenya
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There is increased global focus on universal health coverage to overcome health inequities and gaps between the poor and the less poor. One way is to expand access to essential health services for malaria. In Kenya, the community health workers (CHWs) are included as key actors in the community health strategy. This paper is based on an ongoing implementation research project aimed at using implementation research to increase Community Health Workers involvement in prevention and control. The two-year project is implemented in two sub-locations (Malimo and Kakuyuni) in Malindi sub-county, Kenya. Sixty-seven (67) CHWs were identified and a needs assessment conducted. A CHWs curriculum was developed based on these results. Further, twenty (20) out of the 67 CHWs were selected to participate in community level malaria prevention and control activities, using the home management of malaria (HMM) strategy. The 20 CHWs underwent one-week training to bridge knowledge, skills and capacity gaps. More females (65.7%) than males (34.3%) CHWs were covered. Most of them (47.8%) focused on general health and none on malaria prevention. This was attributed to their prior training on general community health issues, sanitation and community strategy. Some CHWs (47.8%) had received training on malaria. However, the training lasted less than one-week for with no follow-up activities, hence their low involvement in malaria activities. Nonetheless most CHWs had correct knowledge about the symptoms, transmission modes, diagnosis and control of malaria, albeit some gaps which were filled during the training. In conclusion, CHWs can play an important role in improving community level management of malaria. Training and follow-up of CHWs is necessary to bridge skills and capacity gaps and enhance their effective involvement in malaria prevention and control.

HS2: Uptake and scale-up of paid community health workers – addressing the challenge of supervision systems
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Tanzania faces critical shortage of trained health workers. Community health workers (CHW) provides continuum through the health system – stimulating demand, providing preventive services and basic treatments at community level as well as initiating referral. However effective supervision of CHW is not well developed. Here we report experiences of CHW supervision systems for volunteers CHW and paid CHW and their health impact. Two randomized controlled CHW trials, one used female volunteer standard seven and the second used male and female form four paid CHW were recruited from and by their communities through sensitization meetings and advertisements in villages and then interviewed by village health committee and local education officials. The formal was trained for a week on basic counseling skills and maternal and newborn danger signs identification. The later was trained using a competency-based curriculum optimized for government adoption. The volunteer CHW were supervised at community level by Village Executive Officers. Health facility workers initially visited volunteer CHW in their communities, later this was found difficult and changed where the volunteers were
visiting the health workers in the facilities for technical guidance. The paid CHW received support from selected and trained community members appointed by village council. Facility health workers from nearby health facility provided clinical supervision to paid CHW but this was limited due to infrequent village visits. The volunteer CHW improved birth preparedness and increased facility delivery from 50% to 80%. The paid CHW improved child mortality and improved family planning on the use of injectables at community level. We conclude that mixed Community and facility supervision is effective when linked to district level managerial support and accountability. The impact on mortality requires overall system strengthening.

**HS3: A time-use study of community health worker service activities in three rural districts of Tanzania**

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Despite expanding international commitment to community health worker (CHW) deployment, little is known about how such workers actually use their time. This study investigates this issue for paid CHWs named “Community Health Agents” which in Kiswahili is “Wawezeshaji wa Afya ya Jamii” (WAJA), trained for nine months in primary health care service delivery and deployed to villages as subjects of a randomized trial of their impact on childhood survival in three rural districts of Tanzania. The objective was to capture information about time allocation. A total of 30 WAJA were observed during conventional working hours by research assistants for five days each over a period of four weeks. Results were presented in term of percentage time allocation for direct client treatment, documentation activities, health education, health promotion non-work-related activities and personal activities. During routine 8-hour workdays, 59.5% of WAJA time was spent on the provision of health services and other work-related activities. Overall, WAJA spent 27.8% of their work on traveling from home to home, 33.1% on health education, 9.9% of health promotion and only 12.3% on direct patient care. Other activities related to documentation (7.8%) and supervision (2.5%). Results reflect the pressing obligations of WAJA to engage in activities other than direct work responsibilities during routine work hours. Time spent on work activities is primarily used for health education, promotion, moving between households, and direct patient care. However, greater effort should be directed to strengthening supervisory systems and follow-up of challenges WAJAs facing in order to increase proportion of working hours.

**HS4: Assessment of healthcare service quality at public hospitals in Tanzania: the case of Amana Regional Referral Hospital**

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Healthcare service is one of the essential human service in this current era of technology and globalization. Assessing healthcare service quality is very crucial but can be challenging as it may involve multiple factors and actors. According to the World Health Organization (WHO), healthcare is said to be of high quality if it is effective, safe, centred on the patient’s needs and given in a timely fashion. Regardless of the governments’ efforts to improve quality of care, the health service provision is yet to be achieved. The study intended to assess the quality of healthcare service at Amani Regional Referral Hospital in Ilala, Dar es Salaam, Tanzania. This cross sectional study was conducted in May 2016. A sample of 141 patients and 79 healthcare providers participated in the study. The SERVQUAL instrument was adopted and provided to the patients. Data were analysed using SPSS v.16 for descriptive statistics and patients’ satisfactions were determined by the service quality gap model. The patients' perceptions did not exceed their
expectations, as they were dissatisfied with the level of healthcare services. The mean of service quality gap score was -6.5. The highest gap score was in tangibility dimension (-15.4) followed by assurance dimension (-7.6) while the lowest gap score was in responsiveness dimension (-2.6). Female patients had higher level of perception while male patients had lower level of expectation on quality of healthcare service (p<0.0001). Although other dimensions of job satisfaction like coworkers, benefits were highly satisfied with more than 80%, healthcare providers were not satisfied with the payments (56%) and the operating procedures (51%). We conclude that the critical interventions must be taken to decrease the gap between the perception and expectation of the patients. This will then help health professionals identify where service improvements are needed.

**HS5: Can a decentralized public purchaser facilitate the purchase of primary health care services? a case from the Tanzanian Local Government authority health system**

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In Tanzania, purchasing public sector primary health services for the population, including district hospital services is undertaken by Local Government Authorities (LGAs). This study critically examined how the decentralized purchasing system facilitates the purchase of primary health care services and the occurrence of strategic purchasing in the public integrated health system. This study applied a case study approach with rural and urban councils selected for in-depth investigation. In-depth interviews, focus group discussions and document reviews were the main sources of data. A thematic approach was used to analyse the qualitative data. Findings indicate that the LGAs are both purchasers and managers of health services and are responsible for ensuring that human resources and needed supplies are available for health service provision at all public facilities. While the LGA controls all finances that flow to public providers, including those from complementary schemes such as Community Health Fund, the overall purchasing function at the LGA is limited, including for the purchase of clinical services from private facilities, as purchasing must follow a pre-determined budget ceiling provided by the Ministry of Finance and Economic Affairs. The Government uses a population-based formula to guide the allocation of public resources to districts but the formula does not consider other factors and the budget can be unrelated to local needs. Limited funding from the central government to LGAs affected the flow of supplies to providers and quality of health services. We conclude that resource allocation formula should encompass broader needs of the people when it comes to the allocation of public resources. Community and provider engagement plays a crucial role to guarantee strategic purchasing in using public health care resources.

**HS6: Understanding strategies to increase enrolment in community-based health insurance: the community health fund and its implementation in Tanzania**

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Ensuring uptake and enrollment in the voluntary contributory health insurance schemes have been challenging, making coverage in many settings low. This study aims to explore the set of strategies designed by districts to enhance enrollment in the Community Health Fund (CHF) in Tanzania, their implementation and factors that enabled or hindered implementation. Qualitative data were collected in two rounds, in two rural districts implementing CHF for more than 10 years. Analysis was framed by looking at the demand-side strategies that aim at influencing preferences and prices, while the supply-side strategies aimed to improve the accessibility, quality and breadth of the related health services. Findings indicate that the demand-side
strategies included awareness raising, changing the price of substitutes, premium payment by installment, subsidizing the poor, announcement of future increases in premium and group enrollment. Supply-side strategies to increase number of health facilities, the extension of the CHF benefit package and portability of the scheme; having district drugs buffer stock; additional funding from the increase in premium and the matching grants that improved service delivery, and incentive packages to supply-side actors such as providers and village leaders. The technical and financial support provided by the National Health Insurance Fund and their close collaboration with district was critical for successful implementation of the strategies. The desire for change among districts managers and the increasing involvement of top district officials was necessary, however affected by limited funding from the government to support the implementation. In conclusion, balancing the demand and supply-side strategies is crucial for sustainable enrollment to voluntary contributory insurance schemes and enables members to have access to needed health care services.

**HS7: Monitoring of timeliness and completeness of reporting of epidemic prone diseases in Handeni District, Tanzania 2015**

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The Integrated Disease Surveillance and Response Strategy (IDSR) has been implemented in Tanzania since 1998. Monitoring the effectiveness of reporting is important to ensure a complete picture of the health situation is understood and response is quickly taken when an event is detected. We monitored the timeliness and completeness of weekly reporting of epidemic prone diseases for 22 weeks for 42 health facilities (HFs) in Handeni District before and after sensitizing health care workers (HCWs) on the reporting requirements of IDSR. Timely reporting was defined as submission of report (paper or phone text) by Wednesday of each week (target=80%) and completeness as the proportion of the reports received from all expected HFs (target=80%). We established baseline trends of reporting and conducted an analysis of the strengths, weaknesses, opportunities and threats (SWOT) to the surveillance system. During the one-month baseline period none of the 42 HFs submitted any report either timely or late. SWOT analysis identified that HCWs were not aware of the notifiable diseases or reporting requirements of IDSR. There were no reporting forms provided to the HFs. By week 22, 21 (50%) HFs had submitted at least one weekly report. Out of 22 reports, overall rates of timely submission ranged from 0%-68.2%, median value 4.5%. The completeness of reporting increased from 0% to 50% by week 22. Accessibility by road of the facility did not significantly determine report submission (OR 2.9, 95%CI 0.78-10.89 p=0.11). SWOT analysis and assessment of the timeliness and completeness weekly reporting of IDSR epidemic prone diseases in Handeni district was useful to identify gaps and implement remedial measures. Continued sensitization and supervision is expected to improve completeness and timeliness even further.
HS8: Self-reported impact on engagement of surveillance activities among trainees of frontline course, Tanzania 2015
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The goal of the Tanzania Field Epidemiology and Laboratory Training Programme (TFELTP) is to strengthen the capacity of the health system to conduct public health surveillance and response through competency based training. TFELTP offers courses to health workers at the district level to develop essential competencies in epidemiology, public health surveillance and response at the frontline. The course are approximately three months long with two intermittent one-week classroom sessions and about nine weeks of field assignments. We gauged the impact of the course on 24 trainees from the first cohort in 2015. We administered a questionnaire at the start of each workshop to determine trainees’ engagement in surveillance activities and practices. Responses from two workshops were compared to show improvement, deterioration or static progress. Improvement was defined as increase in desirable positive practices or decrease in negative practices while deterioration was defined as increase in negative practices or decrease in desirable positive practices. The proportion of trainees reporting that they never prepare surveillance reports decreased from 30% in workshop one to 0% workshop two. More trainees (4% workshop one to 33% workshop two) reported to always engaging in analysis and interpretation of data. Trainees who did not know the status of nine surveillance monitoring indicators ranged from 25% to 45% in workshop one and from 0%-4.2% in workshop two. At workshop one none (0%) of the trainees thought that 76%-100% of the summary surveillance reports had interpretation of the data which changed to 37.5% at workshop two. There appeared to be improvement in engagement of surveillance related job activities on a weekly basis, increased awareness of performance of IDS surveillance after the course. Trainees appeared to be more comfortable with analysis and interpretation of data.

HS9: Challenges facing mobile phone reporting system: an evaluation of electronic integrated disease surveillance and response system in Tanzania (eIDSR)
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Electronic Integrated Disease Surveillance system (e-IDSR) is the use of mobile communication technology, such as mobile phones and PDAs, to assist in diseases surveillance, prevention and response to disease outbreaks, conditions and public health events of international concerns. We evaluated e-IDSR in Dar es Salaam, Tanzania on its ability to ensure early reporting and epidemic detection for timely response and feedback. Data review from the Electronic Integrated Disease Surveillance and Response facility registers was done in comparison with the data available at the national level from those facilities. Interview with facility IDS focal persons and epidemiology staffs at the national level was also done. Since its start in 2013, the system has not yet detected any disease outbreak, despite the occurrence of cholera outbreaks in Dar es Salaam. The system reports 25 disease conditions, which requires 21 steps for each disease (525 steps) that takes an average of 8 hours to successfully submit the report. The system is not timely as it takes some days to send the report, this leads to late reporting. Facilities that send report to the Ministry of Health range from 0% to 60% against the recommended coverage of 80%. Only 10% of data is received at the Ministry level while only 40% of the registers are filled completely by the clinicians. The system is affected by the mobile phone network failures that make submission of the report to take a day to several days after repeated trials. Lack of ongoing eIDSR trainings to health care workers was reported. In conclusion, efforts should be taken to correct the observed challenges prior to expansion of the system to other regions. Supervision and mentoring should be done consistently.
HS10: Community vaccine perceptions and its role on vaccination uptake among children aged 12-23 months in Ileje District, Tanzania: a cross sectional study
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Underutilization of vaccines still remains a challenge in many regions across the world. Ileje district is one of the districts in Tanzania with consistently low pentavalent vaccine uptake (69%) and with drop out of 15%. We determined the vaccination completion with regard to Oral Polio virus, Measles, Bacillus Calmette–Guérin, and pentavalent vaccines and its association with community perceptions on vaccines. We conducted a cross sectional study in Ileje district from October to December 2013. We sampled 380 mothers using a multistage random sampling technique. We analysed data using EPI INFO. We summarized descriptive variables using mean and standard deviation and categorical variables using proportions. We conducted bivariate and multivariate logistic regression to identify factors influencing vaccination uptake, statistical significance was assessed at 95% confidence interval. The mean age of the mothers was 27 years (SD 6.5 years) while that of their children was 16 months (SD 3.6 months). Fully vaccinated children were 71.1% and partially vaccinated were 28.9%. Majority (99.2%) were vaccinated with BCG vaccine and 73.4% were vaccinated with all OPV vaccine. Predictors of vaccination completion included negative perception on the vaccine provider-client relationship (AOR 1.86, 95%CI 1.03–3.35), perceived satisfaction with vaccination services (AOR 2.63, 95%CI 1.1–6.3). Others include child being born in the health facility (AOR 13.8 95% CI 8.04 – 25.8) and younger age of a child (AOR 0.51, 95%CI 0.29 – 0.9). Improving quality of vaccination services, promoting health education and sensitizing community on health facility delivery will improve child vaccination completion in the district.

HS11: Antibacterial activity of traditional medicinal plants used in traditional medicine in Tanzania
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The evolution and spread of antibiotic resistance, as well as the evolution of new strains of disease causing agents, is of great concern to the global health community. Our ability to effectively treat disease is dependent on the development of new pharmaceuticals, and one potential source of novel drugs is traditional medicine. This study explored the antibacterial properties of some plants used in traditional medicine in Tanzania. We tested the hypothesis that extracts from medicinal plants used to treat symptoms often caused by bacterial infection would show antibacterial properties in laboratory assays. After identification, harvesting, drying and pulverizing, a total of 10 different aqueous and ethanolic extractions were made from 8 plant species. Antibacterial activity against Escherichia coli, Pseudomonas aeruginosa and Staphylococcus aureus microbes was inferred through replicate disc diffusion assays; and observed and statistically predicted minimum inhibition concentration (MIC) values were determined through replicate serial dilution assays. There was almost a complete concordance between the traditional use of medicinal plants and antibacterial activity. Our data support the hypothesis that the selection and use of these plants to treat disease was not random. In particular, all plant species exhibited strong to moderate antibacterial properties relative to ciprofloxacin at 200µg/mL and 20µg/mL as expected (Annickia kummeriae, Adansonia digitata, Persea americana, Aspilia mossambicensis, Harrisonia abyssinica, Artemisia afra and Zanthoxylum chalybeum), with particularly strong effectiveness against Pseudomonas aeruginosa and Staphylococcus aureus. Our data suggest that further phytochemical screening of plants used in traditional medicine is warranted, and we put forward these species for further investigation of the antibacterial compounds.
HS12: Designing and development of low-cost multiplex diagnostic platforms for health-related point-of-care applications

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Diagnosis is the first step towards treatment of a disease. However, access to reliable diagnostics is poor in resource-limited areas. Current global health efforts aim to ensure availability and access to diagnostics by in-need populations. This work aims at designing low-cost multiplex microfluidic diagnostics using paper and threads. Laser-cutting and wax printing methods were used to create microfluidic channels for paper-based devices. Thread-based analytical devices were fabricated using polyester thread and mounting adhesive tape. Hydrophobic threads were treated with bovine serum albumin (BSA), sodium carbonate and sodium hydroxide to render them hydrophilic. Glucose, uric acid and BSA were used to test colorimetric thread-based devices. Human IgG, Hepatitis B antigen and Helicobacter pylori were tested on immunochromatographic thread-and-paper devices. The limit of detection (LOD) was determined using serially-diluted analyte solutions. Three microfluidic paper-based designs were developed: laser-cut, wax-printed, and single-strip. All were tested and the signal was imaged. The LOD was found to be 300ng/ml. Treatment with sodium hydroxide was found to be the best way for enhancing thread wicking properties. Reagent storage on discs and subsequent release along threads was modelled using food dyes, and various designs tested were imaged, with promising application on real diagnostics. Model devices are being developed for simultaneous detection of glucose, proteins and uric acid in urine, as well as antibodies, Hepatitis B, and H. pylori in blood. Simple approaches for developing low-cost diagnostics can easily be adopted in Tanzania. Building on this will improve access to healthcare in areas with limited diagnostic capacity.

HS13: Factors affecting ELISpot assay: experiences and challenges in Mbeya, Tanzania

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Enzyme Linked ImmunoSpot (ELISpot) is a sensitive immunoassay which is widely used for detection cytokines of cellular immune responses from peripheral blood mononuclear cells (PBMCs). It is standard tool to investigate specific infections, autoimmune diseases, development and monitoring of new vaccines; Malaria, HIV, Cancer and Tuberculosis. Furthermore, there is limited information on factors affecting immunological results. This study aimed to reveal the experience and challenges based on factors affecting ELISpot immunoassay. Peripheral Blood Mononuclear cells (PBMCs) from different studies (2010 to 2015) were performed by using IFNγ-ELISpot assay which incorporate Antigen-stimulated and control cells, Anti-IFNγ–biotin detection, streptavidin-ALP and TMB substrate. However, evaluations of Internal and external quality control samples were assessed as to observe the quality of ELISpot assay. Total 618 samples were randomly selected from 2010 to 2015 whereby 85.55% passed with no background, 14.23% samples did not pass, where 9.54% (59/88) were samples due to improper inactivation of Fetal Bovine Serum (FBS) and Complete media contamination, 2.72% samples with background caused by Technical errors and 0.5% samples with no spots response caused by TMB substrate/no antibodies added in plate wells. The study findings revealed that backgrounds were due to improper inactivation of Fetal Bovine Serum aggregates and complete media Contamination, Technical staff errors and TMB Substrate Precipitates. Therefore, proper inactivation of FBS and aseptic technique are required as to minimize background during ELISpot assay.
ONE HEALTH APPROACH TOWARDS ACHIEVING GLOBAL SECURITY AGENDA

OH1: Emerging and re-emerging mosquito-borne diseases in Sub-Saharan Africa: the need for paradigm shift from single to multiple inter-sectoral mosquito control strategies
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The three main mosquito genera, Anopheles, Culex and Aedes transmit, respectively, malaria, lymphatic filariasis and several viral infections including Dengue, Chikungunya, Yellow fever and Zika. Decades of mosquito-borne disease control strategies have proved unsuccessful, and there still is a substantial impact on morbidity and mortality from emerging and re-emerging mosquito-borne diseases, mainly in sub-Saharan Africa (SSA). A systematic literature review was conducted to document the burden, including recent prevalence and incidence of mosquito borne diseases in SSA and highlights the current control measures. The It is becoming evident that while the incidences of malaria and lymphatic filariasis are on the decline, mosquito-borne viral diseases are increasing globally and threatens the well-being of populations in low and middle income countries including SSA. In recent years, Dengue infections have been reported in a number of countries in SSA including Tanzania, Ghana, Comorros and Kenya. Chikungunya, an outbreak first reported in southern Tanzania in 1952, is now widespread, occurring in epidemic proportion in a number of countries. Despite the availability of a very efficacious vaccine, yellow fever is still a major public health problem-occurring in 34 countries in Africa. Recently, Zika has affected Guinea Bissau and Cape Verde, and there is potential for wide spread to un-affected areas partly because of increased movements of human and commodities and climate variability/change. The review suggests that the higher seroprevalence and incidence of arbovirus infections in Sub-Saharan Africa clearly indicate the existence of these infections and potential disease burden in the region. Unfortunately, in most SSA, stand-alone vertical programmes specifically targeting vectors of malaria and lymphatic filariasis are a common scenario. It is time that a holistic approach in mosquito control to address all the three genera of mosquitoes is adopted. This would require innovative and intersectoral approach in disease management and control.

OH2: Epidemiology and surveillance of arthropod borne viruses in febrile patients in Southwestern Tanzania
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Fever is one of the major causes of illnesses in Sub Saharan Africa. However, accurate management of fever is limited by diagnostic capacity of viral and bacterial pathogens, which are increasingly common in febrile patients marked by decrease in malaria incidences. The aim of this study was to determine the viral causes of fever among febrile patients in Southwestern Tanzania. Individuals with >37.5°C fever, and aged > 1 year, are being enrolled into the study, since March 2015. Clinical assessment, questionnaire on socio-economic and environmental covariates, and laboratory tests including malaria, RNAse Polymerase Amplification (TwistDx, UK) and IFT (Euroimmun) against 6 different viruses including Rift Valley Fever virus, Chikungunya virus, Yellow Fever Virus, West Nile virus, and Dengue (1-4) viruses were performed. Of 1080 patients
enrolled, 59.1% were females, 32.3% children of less than 5 years of age. A total of 466 were tested in the IFT so far. 120 were positive for at least one pathogen tested through IgM and IgG antibody responses. RVFV IgM was detected in three patient and ChikV IgM in two patients. A tendency of mixed infections demonstrated by IgG of two or more viruses was detected in 19% (n=58) of tested patients. Increase in seropositivity with an increase in age was exhibited, a tendency indicating an endemic nature of the diseases within the community and majority of cases were clustered close to lake Nyasa. In conclusion, there is endemic circulation of viral pathogens around lake Nyasa. Detected RVFV by IFT and RPA may indicate the presence mild transient outbreaks that are normally undetected. This information provides important information that warrants further investigation to underpin the epidemiological links and strengthen surveillance for possible impending outbreaks.

**OH3: Climate change influence on emerging risk areas for Rift Valley Fever epidemics in Tanzania**

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Rift Valley Fever (RVF) is a climate-related arboviral infection of animals and humans. Climate is thought to represent a threat towards emerging risk areas for RVF epidemics globally. The objective of this study was to evaluate influence of climate on distribution of suitable breeding habitats for *Culex pipiens* complex; potential mosquito vector responsible for transmission and distribution of disease epidemics risk areas in Tanzania.

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) approach to evaluate model predictive performance and significance. The findings indicate that habitat suitability for *Culex pipiens* complex indicated broad-scale potential for change and shift in the distribution of the vectors and disease for both 2020 and 2050 climatic scenarios. Risk areas indicated more intensification in the areas surrounding Lake Victoria and North-eastern part of the country through 2050 climate scenario. Models show higher probability of emerging hotspots spreading towards the western parts of Tanzania from north-eastern areas and decrease in the southern part of the country. In conclusion, results presented here identified sites for consideration in order to guide surveillance and control interventions to reduce risk of RVF disease epidemics in Tanzania. A collaborative approach is recommended to develop and adapt climate related disease control and prevention strategies.

**OH4: Investigating use of anomaly detection systems to identify temporal patterns associated with Rift Valley Fever epidemics**

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Timely prediction of temporal RVF epidemics is limited by absence of time-series data as disease epidemics occur for a short period of time after every seven to fifteen years’ episodes. This necessitates the use of anomaly detection systems (ADS) that would detect unusual behaviour within simulated data as a clue for temporal predictions of disease epidemics. The objective was to identify unusual patterns within simulated data that can be associated with disease epidemics and extend model application for epidemics detection. ADS was implemented in MATLAB R2015b.
to detect patterns in population dynamics of Culex pipiens complex and temperature data associated with RVF epidemics. Data was fit to a model to estimate the parameters ($\mu, \sigma^2$) of a machine learning (ML) Gaussian distribution model. The model algorithm was implemented to select the threshold epsilon; $\epsilon$ using the F1 score values on a cross validation set to determine low probability being more likely to be the anomalous. Preliminary results show Gaussian fit to computed probability density function for anomaly detection with best epsilon found using cross-validation was $8.947268 \times 10^{-3}$ for a small data whereas the best F1 on cross validation set was 1.2195x10^-2. Model testing of larger dataset had the best epsilon on cross-validation of $1.189075 \times 10^{-5}$ with the best F1 on cross validation set found to be $9.52381 \times 10^{-1}$. For a daily period from 01 January 1994 to 30 December 1999, ADS was able to identify 85 days related with RVF epidemics suggesting the possibly of disease epidemics occurrence. ADS provide alternative technique to identify temporal epidemics correctly based on a few true epidemics in simulation data. Further work will focus on applying this model to high dimension dataset and comparing results with other ML algorithms such as support vector machines (SVM) and artificial neural networks (ANN).

OH5: Seroprevalence and spatial distribution of Rift Valley Fever in humans residing in agro-pastoral and pastoral communities during inter epidemic period in the Serengeti ecosystem, northern Tanzania, 2014

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In 2006/7, Tanzania suffered a huge RVF outbreak with cases fatality rate as high as 47%. The outbreak had profound health and socio-economic impacts particularly in communities where resilience was low. A study carried out in 2012/13 in Serengeti ecosystem found active circulation of viruses in insects, wildlife and domestic animals. To understand the current disease status in humans we determined the sero-prevalence, spatial distribution and factors associated with RVF. Hospital based cross-sectional study was conducted in Serengeti ecosystem in June -December 2014. Patient’s sera were collected and tested for general exposure by detecting anti-RVF IgG and for recent infection by detecting anti-RVF IgM using ELISA techniques. Univariate, bivariate and Multiple logistic regression were conducted to identify factor associated with RVF infection. The median age of 751 enrolled study respondents was 35.5 year (range 5 -90 yrs) with females contributing 58.5%. Of the 751 respondent, 4.5% (34/751) tested positive for IgG. Of the 34 positive IgG, six (17.6 %) tested positive for IgM. Those who tested positive for RVF were more likely to be from pastoral community (aOR 2.9, 95% C.I: 1.21, 6.89, p <0.01) and the odds of developing RFV was higher among those who had exposure to both domesticated animals and wildlife (aOR 1.8, 95% C.I 1.14, 3.39, p = 0.03). Hotspot areas were Malambo, Olbalbal, Piyaya, and Lamadi villages. The high prevalence of RVF and detection of IgM suggest ongoing transmission of RVF between humans and animals during inter epidemic periods. Animal rearing communities and those with high contact with domestic and wild animals are at high risk of developing the disease. Establishing a systematic way of monitor RVF cases in the Serengeti ecosystem may help preventing future disease outbreak.

OH6: Progress towards rabies elimination from Pemba Island, Tanzania

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Rabies is endemic in Tanzania and has circulated on Pemba Island since the late 1990s. In 2010, a rabies elimination programme was initiated to demonstrate that human rabies deaths can be eliminated through mass dog vaccinations. We investigated the transmission dynamics of rabies on Pemba whilst vaccination programmes were conducted, to gain a greater understanding of the extinction dynamics and determinants of persistent foci of infection. Government census data, and post-vaccination transects were used to estimate the dog population and coverages achieved by vaccination campaigns. Routine surveillance data and active contact tracing were used to identify cases and human exposures. Epidemic trees were constructed using spatiotemporal distances between cases and used to estimate the effective reproduction number (Re). We examined factors affecting rabies incidence and transmission using generalized linear mixed models. We estimated a small dog population of 4,095 and low dog:human ratio ~1:105. The overall island-wide vaccination coverage increased from 16.8% in 2011 to 68.2% in 2014. We found a further 48 exposures (343%), who either were not reported or did not obtain post exposure prophylaxes (PEP), and passive detection of animal rabies cases being less than 10% (~8.75%). There was a rapid decline in the number of cases from 42 before mass dog vaccinations were implemented in 2011, to 2 cases observed in 2014. Since May 2014, no rabies cases have been detected. Similarly, redeclined from 1.02 to 0. A significant relationship between cases and vaccination coverage (p= 0.013) was observed. We conclude that rabies has been eliminated from domestic dog populations on Pemba over the four consecutive periods of vaccination campaigns implemented. Continued surveillance and investigations of any bite incidents are thus needed to ensure subsequent incursions are controlled and freedom from rabies is maintained.

OH7: Trends of ESBL genotypes in humans, animals and environment in north-western Tanzania: preliminary insights for action

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The growing burden of multidrug resistance bacteria across the globe is worrisome due to cost, complications and deaths. Limited information exists on circulating genotypes underscoring the genomic approach to delineate transmission potential. The objective of this study was to assess the circulating ESBL genotypes in humans, animals and environment in the north-western Tanzania. We reviewed 6 studies (2 on colonization and 4 on infections) from 2011 to 2016 and unpublished data. The proportions of ESBL isolates colonizing humans and animals were 16.5% (55/334) and 21.7% (130/600), respectively; with predominance of Escherichia coli. Age, history of antibiotic use and admission in humans and exotic breed in animals predicted ESBL carriage. ESBL attributable infections in hospital ranged from 29% to 50% and were largely caused by Klebsiella pneumoniae, E. coli and Enterobacter spp. Moreover, ESBL accounted for 57% (40/70) of samples from environment sources. Multiple genotypes were found circulating with predominance of Escherichia coli ST 131 and Klebsiella pneumoniae ST 14 in humans and Escherichia coli ST 617 in animals. Surprisingly, Escherichia coli ST 131 was also found among animals and in the
environment. Over 75% of ESBL isolates expressed blaCTX-M-15 allele, mostly in conjugative IncF and IncY plasmids connoting transmission potential. ESBL associated neonatal sepsis mortality was 19% to 26%. In conclusion, multiple ESBL genotypes are circulating between humans, animals and environment. The global clone *Escherichia coli* ST 131 was found in both humans, animals and environment calling for immediate response to tackle sources using one health genomic approach.

**OH8: Monitoring blood culture contaminants for provision of quality results in septic patients with febrile illness**

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Blood culture testing is an essential tool for diagnosis and management of blood stream infections in patients. Contamination of blood cultures during the procedure is a common source of false positive test results which can lead to adverse patient outcomes and wasted healthcare resources, however it can be effectively preventable. Therefore, regular monitoring of culture contaminants could provide accuracy in patient management. Patients with febrile illness were enrolled in an ongoing HOMA study between March 2015 to August 2016. Blood culture was done using liquid media in BD Bactec culture vials (Becton & Dickinson, UK) for blood stream bacterial infection and confirmed using biochemical test. Each step of blood culture testing was observed for possibility of contamination and results of blood cultures were analyzed on a regular basis. Moreover, we investigated the change in blood culture contaminants while comparing two disinfection methodologies: 1) 70% isopropyl alcohol during phlebotomy (March 2015- Febr. 2016), 2) 70% isopropyl alcohol together with iodine tincture (March 2016 to August 2016) for skin disinfection before venous puncture. A total of 130 out of 1,055 (12.3%) blood cultures appeared positive, 14.6% were gram negative bacteria and 85.4% gram positive bacteria. Contaminant bacterial isolate Coagulase Negative Staphylococci were detected in 35.4% of culture positive patients of which >90% were detected in immunocompetent adults. Only 18.5% of total culture positive were identified as pathogenic Bacillus species. Thus contamination level was higher by 6.2% when 70% Isopropyl alcohol alone was used as disinfection procedure before venous puncture compared to 2.4% when both 70% Isopropyl alcohol followed by Iodine were used. Using 70% isopropyl alcohol alone seems to be less effective than combination of 70%isopropyl alcohol and iodine tincture during phlebotomy.

**OH9: Serological makers and placental histopathological changes of *Toxoplasma gondii* infection among women with spontaneous abortion in Mwanza city, Tanzania**

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Toxoplasma gondii infection in pregnancy has been associated with adverse pregnancy outcomes. We investigated the serological and histopathological changes of *T. gondii* infection among women with spontaneous abortion in Mwanza city, Tanzania. A cross sectional study involving 260 women with spontaneous abortion was conducted between November 2015 and April 2016 in Mwanza city. Blood and small portion of conceptus products were collected. Detection of specific T. gondii antibodies was done using indirect enzyme linked immunosorbent assay while tissues were stained with haematoxylin and eosin to demonstrate histopathological changes.
Data were analysed by using STATA version 13. The mean age of enrolled women was 26±5.9 years. The seroprevalence of IgG antibodies was 144/260 (55.4%, 95% CI: 49-61). Of 198 women in the first trimester, 117 (59.09%) were IgG seropositive compared to 27/62 (43.5%) in second trimester (P=0.03). The seroprevalence of IgM antibodies was found to be 6/260 (2.3%, 95% CI: 3-8). Low gestation age (OR: 1.11, 95% CI: 1.02-1.20, P=0.02) was found to predict IgG seropositivity while keeping cat (OR: 11.80, 95% CI: 1.32-10.5, P=0.03) was found to predict IgM seropositivity on multivariate logistic regression analysis. Presence of inflammation (OR: 1.95, 95% CI: 1.05-3.64, P=0.03), calcification (OR: 3.28, 95% CI: 1.01-10.63, P=0.04), necrosis (OR 2.86, 95% CI: 1.39-5.89, P=0.04) and lymphocyte infiltrations (OR: 2.24, 95% CI: 1.17-4.24, P=0.01) were significantly associated with IgG seropositivity. These findings suggest that a substantial proportion of women with spontaneous abortion in Mwanza have T. gondii IgG antibodies associated with placental histopathological changes suggesting of toxoplasmosis. There is a paramount need for T. gondii screening and provision of appropriate treatment among antenatal attendees to reduce consequences associated with toxoplasmosis in Tanzania.

**OH10: Prevalence, risk factors and performance characteristics of serological tests for neurocysticercosis in epileptic patients in Kinondoni District, Tanzania**

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Neurocysticercosis (NCC) is a specific form of the infectious parasitic disease in the central nervous system which is caused by Taenia solium, a tapeworm found in pigs and human. Presence of oncosphere in human brain causes epileptic seizures. This study was conducted to determine the prevalence, associated risk factors and the performance characteristics of different serological tests for diagnosis of neurocysticercosis, among epileptic patients. A cross-sectional study was conducted in Kinondoni and Mbulu districts in Tanzania in 2013/2015. A total of 724 people with epilepsy were screened for presence of cysticercal IgG antibodies and antigens due to infection by Taenia solium using ELISA and western blot methods. Head CT-scan was done to confirm NCC also risk factors were assessed. A total of 303 people with epilepsy were recruited from Kinondoni district. Their median age was 23 SD ±4.3; IQR, 6-75 years. Males were 143 (47.2%) and females were 160 (52.8%). The overall prevalence of cysticercosis by monoclonal antibody ELISA was 2.1% (15/724), antibody-ELISA, crude local antigen was 20.1% (145/724), Ab-ELISA, crude pooled antigen 18.1% (131/724), western blot, crude local antigen 23.2% (168/724) and for western blot, crude pooled antigen was 7.6% (55/724) Overall CT-scan was 2.3%. (17/724). A comparison of CT-scan findings and antigen-ELISA positive showed there was an association with significant level 0.01. Risk factor findings showed that age above 35 years had 5.5 higher chance of getting disease, (95%CI; 1.1-20.1, P=0.04). Likewise, to those who eat pork, (95%CI; 1.3–14.9, P=0.00), not drinking boiled water, (95%CI; 5.5–10.1, P=0.00), and not using latrine, (95%CI; 1.3–14.9, P=0.00). Findings show the participants who wash hands before eating had 61% less of not getting disease, (95%CI; 0.03–0.4, P=0.01), likewise to those who use latrine had 68% less, (95%CI; 0.1–0.3, P=0.01). The results showed that the usefulness of serological test is extremely important in the diagnosis of NCC. There was significant association between Ag-ELISA with CT-scan findings. This study demonstrated that crude antigen immunoblot and Ab-ELISA crude antigen tests had acceptable sensitivity and specificity.
OH1: Local knowledge and perceptions on zoonoses among pastoralists in northern and eastern Tanzania: An explorative study

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Suspected zoonoses account for the most commonly reported emerging and re-emerging infectious diseases in Sub-Saharan Africa. Zoonoses are increasingly being reported through the medical authorities among pastoral communities in Tanzania. There is however limited knowledge on how pastoral communities understand zoonoses in relation to their livelihoods, culture and their wider ecology. This study was carried out to assess knowledge and perceptions on zoonoses among pastoralists in Ngorongoro, Kibaha and Bagamoyo Districts. Qualitative approaches were used. They included focus group discussions, observations, interviews and participatory epidemiology. The understanding amongst pastoralists of zoonotic disease in these areas is still evolving, as there is no specific term in the local language that describes it. Pastoralists from Ngorongoro possessed a higher understanding on the existence of a number of zoonoses than others. Understanding of zoonoses could be categorised into: a local syndromic framework, whereby specific symptoms of a particular ailment in humans concurred with symptoms in animals, and the biomedical framework where a case definition is supported by diagnostic tests. Some pastoralists understand the possibility of some few infections that could cross over to humans from animals but harm from these are generally tolerated and are not considered as threats. While the knowledge about zoonoses is increasing, social and cultural practices maintaining social cohesion will still put pastoralists at risk. These findings show how health trends are perceived, and how epidemiology and biomedicine are shaping pastoralists health perspectives. It should be a priority for public health stakeholders to address more people’s framings of their knowledge about zoonoses and use research based evidence to address known risky practices, by considering the pastoralists wider social, cultural and economic set up.

OH2: A techno-health approach to participatory community-based One Health disease surveillance in pastoral communities of East Africa

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Infectious disease surveillance is recognized as the foundation of human and animal health decision-making and practice. Complementing the international disease surveillance strategies with participatory engagement of local communities is our strategy for improving the efficiency of disease surveillance systems in Africa. The objective of our project was to promote Community Level One Health Security through empowering community-based human and animal health reporters with training and ICT-based solutions facilitate disease detection, reporting and response at community level and thence national, regional and global levels. Through a project
on ‘Enhancing community-based disease outbreak detection and response in East and Southern Africa (DODRES)’, we have developed ICT prototypes to support community-based One Health disease surveillance. This has started with training of community health reporters (CHRs) and officials from animal and human health sectors in two districts in Tanzania. The project has developed the ICT tools packaged as AfyaData tools. The tools support technical solution for near real time data collection at community and health facility levels as well as provision of feedback to reporters. A One Health Knowledge Repository application has also been developed to provide health information on case definition of disease syndromes in people and animals and synthesize advice that can be transmitted to Community Health Workers with advice “next step” response activities or intervention. Within the first month (August 2016) of tool deployment in the field, a total number of 83 clinical cases have been reported in Morogoro Urban (18) and Ngorongoro (65) districts of Tanzania. Cumulative efforts by SACIDS has, to date, contributed to training and empowerment of 82 CHRs, 41 facility-based health officials, 33 Livestock field officers and 14 data managers and analysts based at district medical and veterinary offices in Tanzania, Zambia, Burundi and Kenya. Innovative creation of WhatsApp groups has contributed to sustained interactions between community members, government officials and DODRES team members. We conclude that the community level One Health security model offers an opportunity for One Health engagement of people in their own communities, irrespective of distance from metropolitan centers to identify threats to their own health and that of their livestock, thereby contributing to the national, regional and global health security agenda. Participatory approaches supported by mobile technologies should be promoted for enhanced contribution early disease detection and response at the community, national, regional and global levels.

**OH13: Azole resistant Aspergillus fumigatus with TR34/L98H resistance allele from environment and clinical samples in Tanzania**

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Azole resistant Aspergillus fumigatus (ARAF) is being reportedly worldwide and has been found to be associated with fungicides use in agriculture and inappropriate use of azole in humans. Here we report the existence of TR34/L98H allele in both clinical and environmental samples. A total of 410 non-repetitive ear swabs and 364 soil samples were collected and analyzed. To isolate Aspergillus fumigatus strains, culture followed by identification using MALDI-TOF MS was performed. Drug susceptibility pattern against itraconazole, voriconazole and posaconazole was determined using broth microdilution method following EUCAST guidelines. PCR-RFLP of cyp51A gene was done on all clinical ARAF and 99 randomly selected ARAF from environment to detect the presence of TR34/L98H mutation. Out of 410 non-repetitive ear swabs, 5 (1.2%) were positive for Aspergillus fumigatus while 202 (55.5%) of 364 environmental samples had A. fumigatus. All A. fumigatus from clinical samples were resistant to itraconazole and showed reduced susceptibility to voriconazole and posaconazole. In addition, out of 202 A. fumigatus from environmental samples, 182 (90.1%) were ARAF. TR34/L98H was detected in all clinical isolates and in 93.9% of 99 environmental isolates tested. The environmental occurrence of TR34/L98H allele is of clinical relevant in Tanzania. Further studies to compare ARAF genotypes from environment and clinical samples are highly warranted.
OH14: Assessment of dermal irritation and acute toxicity potential of extracts from **Synadenium glaucescens** on healthy rabbits, Wistar albino rats and albino mice

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In Tanzania like many other countries, the use of traditional medicament for skin related problems in human and livestock are a common phenomenon. Synadenium glaucescens is among of the Tanzanian traditional medicinal plants which is known for many traditional applications in human and animals including healing wounds, boils, HIV, worms and application on the swollen lymph nodes of cattle suffering from East Coast Fever. This study was conceived for the purpose of evaluating dermal toxicity potentials of extracts from *Synadenium glaucescens* as it is widely used to control and treat ectoparasites, and skin disorders. The dried plant materials were subjected to sequential solvent extraction using organic and aqueous solvents. All test animals were obtained from Sokoine University of Agriculture (SUA), Tanzania. Thus, irritation, and acute dermal toxicity tests were respectively conducted in healthy rabbits and albino rats using the Organization for Economic Cooperation and Development (OECD) guidelines. Albino mice were used to test skin sensitization using method developed by Sailstad. Irritation indices ranged from 3.2 and 0.05, thus according to Draize these are considered as mild and moderate irritants since none of them could reach PII of 5. On the other hand, findings from acute dermal toxicity tests showed no any overt signs of toxicity after two weeks of treatment. Similarly, the extracts did not produce any sensitization reaction based on the mouse ear diameter taken by Vernier callipers. We conclude that *S. glaucescens* exhibit neither sensitization nor acute dermal toxicity effects except for mild to moderate irritancy. Extracts from dried plant parts of *S. glaucescens* do not cause adverse effects both externally and internally when applied to animals.

OH15: Occurrence of bacterial infections in two commonly cultured fish species reared in hatcheries in three fish farms of Kenya

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The present research work was conducted from March 2015 to July 2015 to investigate intensity of infections by bacteria in fingerlings reared in three fish farms of Kenya. These were sagana fish farm which has concrete and glass aquaria hatcheries, Jambo fish farm in Nairobi County which utilizes borehole water and has a recirculation aquaculture system (RAS); Mwea fish farm which has hexagonal plastic tanks with inlet and outlet pipes system. 150 tilapias (*Oleochromis niloticus*) and 150 african catfish (*Clarias gariepinus*) 5 weeks old, 5-6 g in weight were stocked as follows: in every hatchery 25 male and 25 female fingerlings of each species. Results showed considerable variation in different months during the study period. The results revealed that there was a significant difference in the mean of bacteria species in the three fish farms as indicated by a p-value of 0.016. Aeromonas spp had a mean of 9.0±2.8, Escherichia spp 31.0±7.1, Klebsiella spp 6.0Â±1.4, Salmonella spp 22.0Â±7.1, Streptococcus iniae 26.5±7.8 while Vibrio spp had a mean of 10.0±2.8. The results showed that Jambo fish farm had low levels of bacterial agents while Sagana and Mwea with higher levels of the agents than expected. Findings of the present study suggest that Nile tilapia was more susceptible to disease compared to Catfish due to its feeding and body morphology. The higher microbial load in Mwea and Sagana fish farm were due to mass pollution of the environment due to use of river water. Jambo fish farm had normal acceptable levels of bacteria that confirms bore hole water as an alternative for use in aquaculture. Diseases were more in farms that utilized formulated feeds as opposed to those that used commercial feeds. It was recommended that all farms apply epidemiology and surveillance, disease reporting, risk analysis, laboratory diagnosis, disease control inspection and drug management.
SOCIAL DETERMINANTS OF HEALTH IN THE POST-2015 DEVELOPMENT AGENDA

SDH1: Traditional knowledge and practices used by farmers in storage of maize grains against insect pest infestation in Arumeru District, Tanzania

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Infestation of maize by insect pests commences in the field, but most of damage occurs during storage. Damaged grains have reduced nutritional values, low germination capacity, reduced weight and market values. The objective was to investigate and document traditional pre and post-harvest knowledge and practices in the protection of maize against infestation by *Sitophilus zeamais* and *Prostephanus truncatus*. This was a cross-sectional study carried out in Ngongongare village in Arumeru district, Tanzania used qualitative method was employed. Focus Group Discussions (FGDs) and In-depth interviews were conducted using guided questions. Obtained data were transcribed and translated into English language. Farmers in Ngongongare were found to practice both traditional and modern maize storage methods. These include spreading and exposing maize grains to sunlight so as to get rid of the pests. Majority of respondents said that, pests that destroy stored maize were a major problem in their village. Also 90% participants knew these common types of pests. Our findings revealed the existence of indigenous knowledge on pesticidal products used by farmers in the community. Respondents identified three types of products frequently used namely; pesticidal plants, animal by-products and minerals. Farmers have recognized that synthetic pesticides protect stored maize for a maximum of 3 months hence less effective expensive. It was also reported that, prolonged health problems resulted from using synthetic pesticides have made people to think on alternative traditional pesticides. Further research is needed to unveil the amount for mixture, appropriate treatment, and application rate to ensure optimum concentration of traditionally made pesticides. However, understanding of active compounds in their formulations, chemical composition analysis of properly prepared solutions is required. This project was funded by Grand Challenges Canada.

SDH2: Storing fruits of *Solanum lycopersicum* at room temperature affects carotenoid levels, total phenolic content and antioxidant activity

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Almost three quarters (28 million) of non-communicable diseases (NCDs) occur in low- and middle-income countries thus being economically burdening for the nations. The cause is partly attributed to unhealthy diets while the major contributing factor is the production of reactive oxygen and nitrogen species in biochemical reactions in human cells. The edible, often red berry-type fruit (tomatoes) of *Solanum lycopersicum* contains carotenoids and phenolic antioxidants that are key to terminate the mentioned production. This paper addresses the question, “does storing tomatoes at room temperature (RT) affect levels of β-carotene, lutein and lycopene carotenoids and phenolics?” Varieties, of tomatoes grown in Mwea, Kenya were studied for carotenoid levels; antioxidant activity (AA) and total phenolic content (TPC) within 14 days’ storage period at RT. The methods employed were HPLC, FCR and DPPH assay. The effect of storage on the nutritional values was shown by a general decrease on levels of β-carotene, lycopene, AA and TPC while lutein levels increased. There were significant differences (p<0.05) in measurements of carotenoids, AA and TPC between *Solanum lycopersicum* varieties. Storing tomatoes for up to 14 days has both negative and positive implications on the carotenoid and total phenolic levels but clearly reduces the antioxidant activity which in turn questions the effectiveness on the fight against NCDs.
SDH3: Chemical profile and insecticidal activity of essential oils from Chenopodium ambrosioides and Tagetes minuta against maize weevils

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The control of insects in stored grains is based on the application of synthetic pesticides and fumigants. However, due to pest's re-infestation of the stored grains, and development of resistance against synthetic pesticides, necessitates the search for alternative pesticides. Essential oils of Chenopodium ambrosioides and Tagetes minuta are potential insecticidal agents.

The objective was to investigate the chemical composition of essential oils from the aerial parts of C. ambrosioides and T. minuta and determine their insecticidal activity against maize weevils, Sitophilus zeamais and Tribolium castaneum. Steam distillation of the aerial parts of C. ambrosioides and T. minuta was carried out using Clavenger type apparatus. The chemical profiles of the essential oils were obtained using GC-MS analyses. Insecticidal activity of the essential oil was determined using fumigant toxicity assay. The GC-MS analysis of the essential oil of C. ambrosioides revealed six major components while that of T. minuta had ten major chemical compounds. The common compound of the essential oil found in both plant species was 4-hydroxy-methyl-2-Pentanone. The essential oil of C. ambrosioides exhibited strong fumigant toxicity against adult S. zeamais. An 8µg/ml concentration of the oil caused 100% mortality of S. zeamais 90 minutes after treatment. On the other hand, the essential oil of T. minuta exhibited weak activity against test organisms. In conclusion, the aerial parts of C. ambrosioides contain essential oil which has strong insecticidal activity. Further study on the safety and stability of the essential oil is required prior to developing a natural insecticide for controlling maize weevils' infestations in farms and stores.

SDH4: Poor storage facility and improper use of food produce as a call for innovative low-cost food banking scheme for preventing malnutrition among under five children among farmers in Tanzania

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Malnutrition among other health problems in under-five children, contributes about 50% of all child mortality in Sub-Saharan Africa. A malnourished child during the first five years of his/her life leads to slowed physical and mental development. A child’s physical growth, cognitive development and overall performance depend much on food availability and feeding patterns during the first five years. So this study aimed to investigate feeding patterns and food availability within the households and their impact to child health before introduction of low-cost food banking scheme within the study villages. We conducted a cross sectional study in five villages with a sample 292 households among farming communities. Mothers and care givers were recruited from the houses that have under five children. Malnutrition diagnostic test was performed to all children understudy to get their status. Mothers and care givers also identified all food products which are locally available, storage and the feeding patterns within the household and their priority on nutritional feeding. Food insecurity was identified to be seasonal and mostly experienced during dry season. It also impacts feeding patterns from three meals to two then to one meal per day while children have access to only leftover food from previous night. Over cooking and poor storage was also identified to be the main practises that diminish the quality of foods. Main food product was rice, with low production of other food products such as maize, beans, cassava and potatoes. Rice production goes up to 3,000kg per household...
but only 1500kg is stored. The storage facilities are poor and cannot protect the produce from rodents, fungal growth and insect attacks which deteriorate quality of the grains. Food is available but use and poor storage lead to food insecurity. Education on child food preparation and feeding patterns is well a great importance. Proper and innovative vermin proof storage facility is of great importance to reduce food insecurity, ensure constant availability and quality of grains produced to reduce child malnutrition.

**SDH5: Outbreak Investigation of the Paralytic Shellfish Poisoning in Wete Pemba, 2015**
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Paralytic shellfish poisoning (PSP) is a food borne illness caused by consumption of shellfish which contain neurotoxins. In July 2015, we conducted an investigation after notification of food poisoning cases in Gando Pemba, Tanzania. We aimed to confirm the presence of an outbreak, determine the magnitude and assess risk factors in order to institute control measures. We conducted a case control study. A case was defined as any person from Gando shehia presenting with numbness of limbs, body itching, palm or limb needle pricking pain between July 3 and 27, 2015. Controls were defined as any person residing in Gando Shehia without any of the reported sign or symptoms. Questionnaire containing demographic and risk-factor information was administered. Univariate, bivariate and multivariate analyses were done and aOR was used as measure of association. Cases were 75(48%) and 81 controls. Majority (69%; n=52) of cases were females and age ranged from 2 to 80 years with a median age of 23 years. Majority (80%) were from Gando village. Of 75 cases, 59(79%) reported numbness of limbs, 56(75%) palm needle prickling pain, and 53(70%) body itching, 47(63%) limb needling pain. Cases were 7.9 time more likely to have eaten shellfish (95%C.I 3.8 to 16.2) while those who ate fish (OR= 0.27, 95%CI= 0.08 to 0.88) and dagaa (OR=2.3, 95%CI=0.7 to 7.1) were protected. Consuming shellfish was independently associated with shellfish poisoning illness (AOR= 9.8, p=0.000, 95%CI = 4.4 to 21.7). The clinical features closely resemble Paralytic Shellfish Poisoning (PSP). Epidemiological analysis of food consumption suggests that consumption of shellfish was significantly associated with illness. Residents should avoid eating seafood during June-October tides where bivalve Mollusca shellfish can contain PSP toxins.