The 29th Annual Joint Scientific Conference
and
35th Anniversary of the National Institute for Medical Research, Tanzania

Advancing health and well-being through innovative research: addressing the double burden of
diseases in Sub-Saharan Africa

Julius Nyerere International Convention Centre, Dar es Salaam, Tanzania

Abstract Book and Conference Programme, 2015

October 13-15, 2015
CONFERECE ORGANIZATION

Conference Organizing Committee

Dr. Mwelecele N. Malecela - Chairperson
Dr. Julius J. Massaga
Dr. Kijakazi O. Mashoto
Mrs. Virdiana P. Mvungi
Ms. Anna Meela
Mr. Obedi Ole Kaondo
Mrs. Hortencia Malima
Dr. Susan Rumisha
Ms. Irene R. Mremi
Ms. Bupe Ndelwa
Dr. Leonard E.G. Mboera – Secretary

Conference Secretariat

Dr. Leonard E.G. Mboera - Chairman
Ms. Virdiana P. Mvungi
Ms. Irene R. Mremi
Mr. Emmanuel Peter
Mr. Emil R. Msisiri
Mr. Charles Lusinde
Dr. Susan F. Rumisha
Ms. Grace Luambano
Dr. Kijakazi O. Mashoto
Ms. Stella Kilima - Secretary

Abstract Review Committee

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Mr. Andrew M. Kilale
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Dr. Bilali Kabula
Dr. Calvin Sindato
Dr. Celine Mandara
Dr. Deus Ishengoma
Mr. Emmanuel Peter
Dr. Eliningaya Kweka
Ms. Elizabeth Shayo
Dr. Esther M. Mwakitalu
Dr. Joel M. Francis
Dr. Justin Omolo

Dr. Mercy Chiduo
Dr. Ndekya Oriyo
Dr. Neke Nyasule
Dr. Nyagosya Range
Dr. Nyanda E. Ntinginya
Dr. Patrick Tungu
Dr. Paul E. Kazyoba
Dr. Peter Mangesho
Dr. Safari Kinung’hi
Ms. Stella P. Kilima
Ms. Virdiana P. Mvungi
Dr. Kijakazi O. Mashoto
Dr. Yahya A. Derua
Ms. Irene R. Mremi - Secretary
Annual Joint Scientific Conference

Historical background

The National Institute for Medical Research (NIMR), established 1979 by Act No 23 of the Parliament of the United Republic of Tanzania, has among its mandates “to establish a system of documentation and dissemination of information on any aspect of medical research carried out by or on behalf of the Institute”. In realizing this, NIMR established an annual scientific conference namely, Annual Joint Scientific Conference (AJSC) during its second birth day in 1982. The Conference objectives over the years have remained to: (i) promote health research for sustainable socio-economic development in Tanzania and Sub-Saharan Africa; (ii) share findings of health research with key stakeholders and the general public; and (iii) discuss and explore new health research and service priority areas.


The Conference will be held at the Julius Nyerere International Convention Centre in Dar es Salaam. The conference has already attracted registration of various delegates from Tanzania, Uganda, Cameroon, Kenya, Ethiopia, Democratic Republic of Congo, India, Japan, Denmark, Switzerland, United Kingdom, Canada, United States of America and other countries around the world. The main theme is “Advancing health and well-being through innovative research: addressing the double burden of diseases in Sub-Saharan Africa”. This conference will have Keynote addresses, Panel Discussions, Research Presentations, Round Table Discussions, Researcher-Policy Makers Dialogues. There will be parallel sessions addressing three sub-themes with specific topics. These are as follows:

1. Biomedical Research
   a. Addressing the double burden of diseases in Sub-Saharan Africa in the Post 2015 era
   b. Post-2015 Research and Control strategies for Endemic Communicable Diseases in Sub-Saharan Africa
   c. Livelihoods and Emerging Infectious Diseases in Africa
   d. Food, Nutrition and Water-borne diseases: neglected public health challenges

2. Health Systems and Policy
   a. Towards universal health coverage in Sub-Saharan Africa: Strengthening Health Policies and Systems
   b. Ecosystems and One Health: Cross sectoral approach in the management of diseases
   c. Application of Information technologies for healthcare delivery and management

3. Social Determinants of Health
   a. Maternal, neonatal, and child survival in Sub-Saharan Africa: social and health implications
   b. Linking evidence to action on social determinants of health
   c. Social dimensions of climate change

Three symposia will also be held during the 3-day conference:

1. Bridging the Worlds of Research and Policy in Tanzania: Setting Health Research Policy Agenda for 2015 and Beyond
2. The threats of antimicrobial drug resistance are real and growing: experiences from Tanzania
3. Non-malarial febrile illnesses in Tanzania

It is a great pleasure to invite you to the 29th Annual Joint Scientific Conference. The focus this year is to provide a premier inter-multi-trans-disciplinary forum for researchers, academia, practitioners and decision and policy makers to present and discuss the most recent innovations, trends, and concerns, practical challenges encountered and the solutions adopted in the field of biomedical, social determinants of health, and health systems.
The organizing committee is gearing up for an exciting and informative conference program including plenary lectures, symposia, round table and satellite meetings on a variety of topics, poster presentations and various social programs for over 350 participants from around the world. We believe this conference will be a highly rewarding educational and networking experience for all.

Contact
Leonard E.G. Mboera, BVM, MSc., PhD, DIC
Secretary, Conference Organizing Committee
The 29th Annual Joint Scientific Conference
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Tel: +255-22-2121400; Telefax: +255-22-2121360
Website: http://www.nimr.or.tz
## CONFERENCE PROGRAMME

**Day 1: Tuesday, October 13, 2015**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Organizer</th>
</tr>
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<tbody>
<tr>
<td>07:30-08:30</td>
<td>Registration</td>
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<tr>
<td>07:30-08:30</td>
<td>Conference participants to be seated</td>
<td>Director of ceremony</td>
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<tr>
<td>08:30-08:35</td>
<td>Arrival of guest of Honour</td>
<td>Guest of Honour</td>
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<tr>
<td>08:35-08:45</td>
<td>Introductory Remarks</td>
<td>Dr. Mwelecele Malecela</td>
</tr>
<tr>
<td>08:45-08:55</td>
<td>Welcome Statement</td>
<td>Prof. Samuel Massele</td>
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<tr>
<td>08:55-09:00</td>
<td>Invitation of the Guest of Honour</td>
<td>Minister for Health and Social Welfare</td>
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<tr>
<td>09:00-09:30</td>
<td>Opening address</td>
<td>Guest of Honour</td>
</tr>
<tr>
<td>09:30-09:35</td>
<td>Vote of thanks</td>
<td>Member of the NIMR Council</td>
</tr>
<tr>
<td>09:35-10:05</td>
<td>Key note speaker</td>
<td>Prof. Angwara Kiwara</td>
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<tr>
<td>10:05-10:20</td>
<td>Panel discussion</td>
<td>Dr. Matshidiso Moeti</td>
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<td></td>
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<td>Prof. Charles Mgone</td>
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<td>Hon. Jessica Eriyo</td>
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<td></td>
<td>Prof. Carel IJsselmuiden</td>
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<td></td>
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<td>Dr. Stegomena Tax</td>
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<td></td>
<td></td>
<td>Dr. Nyagosya Range</td>
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<tr>
<td>10:20-10:25</td>
<td>Citation of awards</td>
<td>Dr. Mwelecele Malecela</td>
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<tr>
<td>10:25-10:45</td>
<td>Award presentation</td>
<td>Guest of Honour</td>
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<tr>
<td>10:45-10:55</td>
<td>Group photograph</td>
<td>Guest of Honour</td>
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<tr>
<td>10:55-11:25</td>
<td>NUTRITIONAL BREAK</td>
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<tr>
<td>Time</td>
<td>Speaker</td>
<td>Title</td>
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<tr>
<td>11:35-11:55</td>
<td>Contribution of R&amp;D Institutions to improved practices and policy in health service delivery in Tanzania</td>
<td>Director General, NIMR</td>
</tr>
<tr>
<td>11:55-12:10</td>
<td>Health policy making process in Tanzania</td>
<td>Director of Policy and Planning, MoHSW</td>
</tr>
<tr>
<td>12:10-12:25</td>
<td>Strategies for translation and implementation of research findings into practice</td>
<td>Julius Massaga</td>
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<tr>
<td>12:25-12:40</td>
<td>Challenges to Communicating One Health</td>
<td>Mark Rweyemamu</td>
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<tr>
<td>12:40-12:55</td>
<td>Institutional capacity for health research communication in Tanzania</td>
<td>Leonard Mboera</td>
</tr>
<tr>
<td>12:55-13:15</td>
<td>GENERAL DISCUSSION</td>
<td></td>
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<tr>
<td>13:15-14:15</td>
<td>NUTRITIONAL BREAK</td>
<td></td>
</tr>
<tr>
<td>14:15-14:25</td>
<td>Integrating pneumococcal vaccine in the routine immunization programme</td>
<td>George Mtove</td>
</tr>
<tr>
<td>14:25-14:35</td>
<td>Integration of vaccine induced sero-positivity testing in the National HIV Counseling and Testing Guidelines in Tanzania</td>
<td>Doreen Pamba</td>
</tr>
<tr>
<td>14:35-14:45</td>
<td>Alcohol use in young people in Tanzania: time for interventions</td>
<td>Joel Francis</td>
</tr>
<tr>
<td>14:45-14:55</td>
<td>Population wide versus individual high risk approach for Non-communicable Diseases prevention: what is the best buy?</td>
<td>Mary Mayige</td>
</tr>
<tr>
<td>14:55-15:05</td>
<td>A simple innovation for a life-saving Translational Research Practice in advanced HIV disease</td>
<td>Sayoki Mfinanga</td>
</tr>
<tr>
<td>15:05-15:15</td>
<td>Impact of Maternal and child health policy on health service delivery in Tanzania</td>
<td>Godfrey Mubyazi</td>
</tr>
<tr>
<td>15:15-15:25</td>
<td>Magic bullet for newborn survival</td>
<td>Fatuma Manzi</td>
</tr>
<tr>
<td>15:25-15:35</td>
<td>Discussion</td>
<td></td>
</tr>
<tr>
<td>15:35-16:00</td>
<td>NUTRITIONAL BREAK</td>
<td></td>
</tr>
<tr>
<td>16:00-16:10</td>
<td>Including Basic Education on Neglected Tropical Diseases in Primary School Curriculum</td>
<td>Esther M. Mwakitalu</td>
</tr>
<tr>
<td>16:10-16:20</td>
<td>Geographical differences and multi-factors associated with risk of Rift valley fever occurrence in Tanzania highlights the need for inter-sectoral strategic control approach</td>
<td>Calvin Sindato</td>
</tr>
<tr>
<td>16:20-16:30</td>
<td>Inter-sectoral approach in malaria control in Tanzania</td>
<td>Theresia Nkya</td>
</tr>
<tr>
<td>16:30-16:40</td>
<td>Challenges of sustaining of results after the completion of projects: the case of upgraded health centres</td>
<td>Selemani Mbuyita</td>
</tr>
<tr>
<td>16:40-16:50</td>
<td>Confusion of decentralization in human resources for health management</td>
<td>Hadija Kweka</td>
</tr>
<tr>
<td>16:50-17:00</td>
<td>National Health Research and Policy Hub</td>
<td>Daudi Simba</td>
</tr>
<tr>
<td>17:00-17:30</td>
<td>DISCUSSION AND CLOSING</td>
<td></td>
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## DAY 2: WEDNESDAY, October 14, 2015

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>07:30-08:30</td>
<td>Registration</td>
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<tr>
<td><strong>SELOUS HALL</strong></td>
<td><strong>PLENARY SESSION</strong></td>
</tr>
<tr>
<td>Chair</td>
<td>Julius Massaga</td>
</tr>
<tr>
<td>Rapporteur</td>
<td>Joseph Mwanganga, Lesikari Sokoine</td>
</tr>
<tr>
<td>08:30-08:50</td>
<td>Towards universal coverage in Sub-Saharan Africa: Strengthening health Policies and Systems (Prof. Don de Savigny)</td>
</tr>
<tr>
<td>08:50-09:10</td>
<td>Toward Universal Health Coverage: Japan’s strategy on Global Health Diplomacy (Prof. Etsuji Okamoto)</td>
</tr>
</tbody>
</table>

| 09:10-09:25   | Discussion                                                    |
| **LOCATION**  | **MIKUMI HALL**                                              |
| **SADANI HALL** | **UDZUNGA**                                                  |
| Biomedical    | Maternal, Neonatal & Child Health                            |
| Social Determinants & Health Systems          |
| Chair         | Gibson Kibiki, John Changalucha, Nsoori Nnko                 |
| Rapporteur    | Amos Kahwa, Kidola Jeremiah, Dorren Pamba                    |

| 09:30-09:40   | BMR 1, MNC 1                                                  |
| 09:40-09:50   | BMR 3, MNC 2                                                  |
| 09:50-10:00   | BMR 4, MNC 3                                                  |
| 10:00-10:10   | BMR 5, MNC 7                                                  |
| 10:10-10:20   | BMR 6, MNC 8                                                  |
| 10:20-10:30   | Discussion                                                    |

| 10:30-11:00   | NUTRITIONAL BREAK                                            |
| 11:00-11:10   | BMR 11, MNC 9                                                 |
| 11:10-11:20   | BMR 12, MNC 10                                                |
| 11:20-11:30   | BMR 13, MNC 11                                                |
| 11:30-11:40   | BMR 14, MNC 12                                                |
| 11:40-11:50   | BMR 15, MNC 13                                                |
| 11:50-12:00   | Discussion                                                    |

| 12:00-12:10   | BMR 16, MNC 16                                                |
| 12:10-12:20   | BMR 17, MNC 18                                                |
| 12:20-12:30   | BMR 19, MNC 19                                                |
| 12:30-12:40   | BMR 20, MNC 20                                                |
| 12:40-12:50   | BMR 21, MNC 21                                                |
| 12:50-13:00   | BMR 22, MNC 23                                                |
| 13:00-13:10   | BMR 25, MNC 24                                                |
| 13:10-13:20   | BMR 27, Discussion                                            |
| 13:20-13:30   | Discussion                                                    |

| 13:00-14:00   | NUTRITIONAL BREAK                                            |
| Topic         | Biomedical, Cancer in Tanzania, Adolescent health             |
| Chair         | Gibson Kibiki, Sayoki Mfinanga, Eusebia Marandu              |
| Rapporteur    | Amos Kahwa                                                   |
| 14:00-14:10   | BMR 32                                                       |
| 14:10-14:20   | BMR 33                                                       |
| 14:20-14:30   | BMR 35                                                       |
| 14:30-14:40   | BMR 35*                                                      |
| 14:40-15:00   | Discussion                                                   |

| 15:00-15:15   | NUTRITIONAL BREAK                                            |
| 15:15 - 17:00 | Posters I: BMR (2, 7-10, 18, 23, 24, 26, 28-31, 34, 36, 39, 45, 49, 63-64): MNC (5-7, 14, 15, 17, 22) |
|               | Posters II: HSP (2, 5, 7-11, 19-20, 22-24), AMR (14, 18, 23-24, 25), WFS (1-2, 4-5) |
# DAY 3: THURSDAY, October 15, 2015

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td><strong>07.30-08.30</strong></td>
<td>Registration</td>
<td>All</td>
</tr>
<tr>
<td><strong>MIKUMI HALL</strong></td>
<td><strong>PLENARY SESSION</strong></td>
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<tr>
<td>Chair</td>
<td>Leonard Maboko</td>
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<tr>
<td>Rapporteur</td>
<td>Lucas Matemba, Calvin Sindato</td>
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<tr>
<td><strong>08:30-08:50</strong></td>
<td>Livelihoods and emerging infectious diseases in Africa (Prof. Gerald Misinzo)</td>
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<tr>
<td><strong>08:50-09:10</strong></td>
<td>Antimicrobial resistance in Sub-Saharan Africa: A silent and formidable threat to public health (Prof. Stephen Mshana)</td>
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<tr>
<td><strong>09:10-09:25</strong></td>
<td>Discussion</td>
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<tr>
<td><strong>LOCATION</strong></td>
<td><strong>SADANI HALL</strong></td>
<td><strong>MIKUMI HALL</strong></td>
</tr>
<tr>
<td>Topic</td>
<td>Neglected Tropical Diseases</td>
<td>Antimicrobial Resistance</td>
</tr>
<tr>
<td>Chair</td>
<td>Esther Mwakitalu</td>
<td>Stephen Mshana</td>
</tr>
<tr>
<td>Rapporteur</td>
<td>Calvin Sindato</td>
<td>Ireen Kiwelu</td>
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<tr>
<td><strong>09:30-09:40</strong></td>
<td>AMR 1</td>
<td>NMF 1</td>
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<tr>
<td><strong>09:40-09:50</strong></td>
<td>AMR 2</td>
<td>NMF 2</td>
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<tr>
<td><strong>09:50-10:00</strong></td>
<td>BMR 37</td>
<td>AMR 3</td>
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<td><strong>10:00-10:10</strong></td>
<td>BMR 38</td>
<td>AMR 4</td>
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<td><strong>10:10-10:20</strong></td>
<td>BMR 40</td>
<td>AMR 4</td>
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<td><strong>10:20-10:30</strong></td>
<td>BMR 41</td>
<td>AMR 6</td>
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<td><strong>10:30-10:35</strong></td>
<td>Discussion</td>
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<td><strong>10:30-11:00</strong></td>
<td>NUTRITIONAL BREAK</td>
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<td><strong>11:00-11:10</strong></td>
<td>BMR 42</td>
<td>AMR 7</td>
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<td><strong>11:10-11:20</strong></td>
<td>BMR 43</td>
<td>AMR 8</td>
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<td>BMR 44</td>
<td>AMR 9</td>
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<td><strong>11:30-11:40</strong></td>
<td>BMR 46</td>
<td>AMR 10</td>
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<td><strong>11:40-11:50</strong></td>
<td>BMR 47</td>
<td>AMR 11</td>
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<tr>
<td><strong>11:50-12:00</strong></td>
<td>WFS3</td>
<td>AMR 12</td>
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<tr>
<td><strong>12:00-12:10</strong></td>
<td>Discussion</td>
<td>AMR 13</td>
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<tr>
<td><strong>12:10-12:20</strong></td>
<td>AMR 15</td>
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<td>Discussion</td>
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<td><strong>13:30-13:40</strong></td>
<td>AMR 16</td>
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<td><strong>13:40-13:50</strong></td>
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<td>AMR 22</td>
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<td><strong>14:30-14:40</strong></td>
<td>AMR 23</td>
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<td><strong>14:50-15:00</strong></td>
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<td><strong>15:00-15:15</strong></td>
<td>NUTRITIONAL BREAK</td>
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## DAY 3: THURSDAY, October 15, 2015: CLOSING CEREMONY

**Chairman:** Prof. Samuel Massele  
**Rapporteur:** Dr. Julius Massaga

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>15:30-15:45</td>
<td>Conference Participants to be seated</td>
<td>All</td>
</tr>
<tr>
<td>15:45-16:00</td>
<td>Presentation, discussion and consensus on the Conference Recommendations</td>
<td>Leonard Mboera</td>
</tr>
<tr>
<td>16:00-16:05</td>
<td>Remarks from NIMR Director General</td>
<td>Mwelecele Malecela</td>
</tr>
<tr>
<td>16:05-16:10</td>
<td>Background and presentation of Scientific awards</td>
<td>Mwelecele Malecela</td>
</tr>
<tr>
<td></td>
<td>1. The Mount Kilimanjaro Scientific Award</td>
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<tr>
<td></td>
<td>2. Dr. Maria Kam Best Young Woman Scientist Award</td>
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<td></td>
<td>3. Prof. Wen Kilama Best Upcoming Scientist Award</td>
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<tr>
<td>16:10-16:20</td>
<td>Presentation of the Award</td>
<td>Guest of Honour</td>
</tr>
<tr>
<td>16:20-16:25</td>
<td>Invite Guest of Honour to deliver Closing Speech</td>
<td>Prof. Samuel Massele</td>
</tr>
<tr>
<td>16:25-16:55</td>
<td>Closing Speech</td>
<td>Guest of Honour</td>
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<tr>
<td>16:55-17:00</td>
<td>Vote of thanks</td>
<td></td>
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<tr>
<td>17:00</td>
<td><strong>End of Day 3</strong></td>
<td>All</td>
</tr>
<tr>
<td>17:05-18:30</td>
<td>NIMR Annual General Meeting</td>
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BRIDGING THE WORLDS OF RESEARCH AND POLICY IN TANZANIA: SETTING RESEARCH POLICY AGENDA FOR 2015 AND BEYOND

SRP 01: Integration of vaccine induced sero-positivity testing in the National HIV Counseling and Testing Guidelines in Tanzania
Doreen Pamba¹, Erica Sanga¹, Lucas Maganga¹, Revocatus Kunambi¹, Leonard Maboko¹ & Theopista Lotto²
¹National Institute for Medical Research, Mbeya Research Centre, Mbeya, Tanzania; ²Mbeya District Council, Mbeya, Tanzania
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Participants in HIV vaccine trial can potentially have an immune response in their blood, which is a result of receipt of an active ingredient of a vaccine. This response is known as Vaccine Induced Sero-Positivity (VISP) and it is easily detected by routine EIA or rapid HIV antibody tests that are used in health facilities for HIV infection screening. HIV vaccine testing activities are been scaled up by various institutions in Tanzania and therefore the number of people that potentially shows VISP is likely to increase with time. It is of outmost importance to integrate Vaccine Induced Sero-Positivity Testing in the National HIV Counseling and Testing Guidelines to enhance awareness and knowledge of VISP among health care workers who are firstline contacts of clients seeking HIV testing services. The HIV field is advancing very rapidly and therefore, new knowledge need to be timely incorporated in the guidelines. It is important for all stakeholders to have a clear understanding of the participatory process of guidelines development. The conduct of regular platforms that convene scientists and policy-makers is likely to close some of the barriers and challenges in integration of VISP in the guidelines. Such platforms will identify and address issues that cause deficiencies and delays in release of updated guidelines that have sufficiently exhausted advances in the HIV field.

SRP 02: Challenges of Decentralization in Human Resources for Health Recruitment and Posting in Tanzania
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Human resources for health shortage is a normal phrase in discussing health systems challenges. However, the analysis of the causes of shortage often disappoints in their ability to unveil limitations emanating from other national initiatives to improve efficiency in the public sector such as decentralization. This is because the explorations of what causes or contribute to crisis in most cases are based on factors that are intrinsic to MOHSW, health providers as individuals, work environment and less is emphasized on organizational and structural arrangements influences in decentralized settings. Decentralization is championed as a means of increasing efficiency with little proofs on how efficiency can be achieved for issues that are attended by more than one sector. This presentation focuses on challenges of the process of recruiting and posting human resources for health in Tanzania. The objective was to establish success and challenges in recruiting and posting health workers in order to address the alarming shortage of health workers in the country especially in hard to reach districts. This was mainly qualitative study. Quantitative data was used to assess the absorption of granted permits. We mapped the process and actors involved in health workers recruitment and Postings. We conducted key informant interviews to identify strengths and limitations of health workers recruitment and posting process in Tanzania as part of the final evaluation of HRH Strategic plan of 2008-2013. The recruitment process is long. Districts receive less than what they requested. On the other hand the granted permits are not fully absorbed and for those who have been posted some do not report. Districts are challenged by delays in enrolling the new recruits into the payroll. The study also found initiatives by government to address the problems. Some districts have attempted
variety of strategies to retain new recruits while waiting for them to be enrolled into payroll. To enhance efficiency in recruiting and posting health workers coordinated efforts for all involved in recruitment and posting process is important.

SRP 03: Population wide versus individual high risk approach for Non Communicable Diseases prevention: what is the best buy?
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In Tanzania like many developing countries the burden of NCDs has been increasing steadily. WHO country estimates of 2010 showed that NCDs accounted for 27% of all deaths in Tanzania. NCDs in developing countries lead to premature mortality and loss of productivity; in 2008, it was estimated that NCD caused a total of 75.7 and 58.8 deaths per 1000 population, of which 42.8% and 28.5 were below the age of 60 years among males and females respectively. Age standardized death rates per 100,000 were 874 and 614.3 in males and females respectively. Risk factors for NCDs are also high: current tobacco users (15.9%), current alcohol drinkers (29.3%), ate less than 5 servings of fruit and/or vegetables on average per day (97.2%), overweight and obese (26%), raised cholesterol (26%) and raised triglycerides (33.8%). Current data also reveals high prevalence of diabetes (9.1%) and hypertension (25.9%). Prevention and control of non-communicable diseases should be given a priority if the current trends are to be reversed. There are two main approaches suggested for the control and prevention of non communicable diseases, there are interventions that target the individuals who are at high risk and interventions that target the whole population. While a population-wide strategy for prevention targets at controlling the NCD risk factors in the population as a whole, an individual-based (also known as high-risk) strategy for prevention targets high-risk susceptible individuals. The two approaches have their inherent pros and cons. This policy review will summarize the available evidence for both approaches. The aim of this review is to provide guidance and provoke discussion and action towards strengthening and or implementation of the NCD prevention and control strategies in Tanzania.

SRP 04: Inter-sectoral Approach in Malaria Control in Tanzania
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Malaria is one of the most important public health problems in Tanzania. Livelihoods and development projects are among the major drivers in malaria transmission and control. The fact that there are linkages between environment, livelihoods and malaria requires an inter-sectoral approach in its control strategies. The objective is to provide a rational for establishing an intersectoral approach in future malaria control in Tanzania. A desk review was carried out to identify livelihoods and development activities that contribute to malaria transmission in the country. Challenges and opportunities for inter-sectoral collaboration have been identified. Inter-sectoral strategic approaches to be considered in future malaria control are proposed. Evidences show that development and livelihoods activities including irrigation agriculture and plant protection contribute to increased mosquito production and impact on mosquito interventions negatively. Construction activities, house designs and occupational factors contribute to malaria transmission and control. Uncontrolled, overuse and misuse of pesticides for crop protection and animal health contribute to the development of insecticide resistant strains of malaria mosquitoes. Despite these facts, sectors other than health have rarely been involved in malaria control. In this policy brief it is proposed that collaboration between sectors need to be strengthened to address malaria control holistically. Formulation of a national policy that guides different level of authorities on issues of intersectoral collaboration and establishment of a national and district steering fora to coordinate the intersectoral approach in malaria control are needed. Implementation considerations include development of a national and district
framework on inter-sectoral collaboration. Involvement of several sectors in planning and implementation of malaria control intervention is proposed to improve the future malaria control in line with the millennium goal of sustaining development.

**SRP 05: Challenges of sustaining results after the completion of projects. the case of Upgraded Health Centres**

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Development assistance has both negative and positive effects. These are the products of inter-relationships (formal or informal) between the coordinating agents, the implementers of the development assistance and the recipients. We conducted a study to assess how happy or frustrated the Council Health Management Teams (CHMTs) are after projects and project support have ended. We used a case study of health centres which were upgraded to provide comprehensive emergency obstetric care through the Empower project implemented by Ifakara Health Institute. The project team and CHMTs in Kilombero, Ulanga and Rufiji districts identified locations with high populations and from which more maternal complication cases were noted to come from and referred to district hospitals. Health centres from such locations were selected for upgrading. The “upgrading” involved construction of operating theatres, equipping the theatres with theatre equipment and other facilities, expansion and renovation of maternity wards, erection of power sources and putting in place reliable water sources. After two years of implementation and exit of the Empower project, a follow up assessment was conducted to assess sustainability of the innovation. Key informant interviews and focus group discussion with RHMTs, CHMTs and some development partners were conducted. The facility delivery records increased by more than 63% only within 12 months after opening the use of the theatres. Within the same period, obstetric referrals to district hospitals decreased by 56%. Number of CS cases managed in these obstetric health centres rose from 0 to 1680. Outcome of these CS in this period recorded zero deaths during or after the CS. There was a decrease of 129% of workload of conducting CS in district hospitals. District health systems experience resource gaps due to high demand and expectations created by such programs. With meagre resources, quality of service delivery tend to drop abruptly. As a result community tends to blame the systems and cause mistrust. Many programs yield very good positive results and outcomes. However, such positive results are often during the program life. Programs should integrate exit strategy during entry by incorporating activities into CCHP.

**SRP 06: Antimicrobial resistance trend and multi-drug resistant genotypes in a tertiary hospital in Tanzania**

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Healthcare-associated infections (HAIs) due to extended spectrum beta-lactamase (ESBL) producing bacteria and methicillin resistant Staphylococcus aureus (MRSA) have emerged as global health concern. In developing countries, the rate of HAIs ranges from 2.5% to 14.8%, which is twice as high as the average in developed countries. Emergence and genotypic diversity of multi-drug resistant (MDR) bacteria complicates efforts to control bacterial infections especially in Africa where treatment options are limited. Susceptibility profiles and genotypes of different research articles from Bugando Medical Centre (BMC) published from 2009 to 2014 were reviewed. These articles were searched through PubMed/Medline, Embase, Popline, Global Health, Google and Web of Knowledge. There is an increase in ESBL and MRSA isolation at BMC, with MRSA isolation having increased from 16% to 41% and ESBL producing E. coli from 25% to
about 50% between 2009 and 2014. Though the rate of ESBL producing *Klebsiella pneumoniae* isolates have remained at 50%, we have observed increased invasive infections due to ESBL producing *Klebsiella pneumoniae* ST14 in neonates. In addition a novel *Enterobacter* spp. carrying CTX-M-15 was isolated from neonates. Of 37 *Staphylococcus aureus* isolates; 14 sequence types were detected with an evidence of clonal spread of a new ST1797 MRSA. From human clinical specimens, multi-resistant *Staphylococcus* spp. of animal origin such as *Staphylococcus sciuri*, *S. lentus* and *Staphylococcus haemolyticus* have been isolated. Evidently there is an increase in ESBL and MRSA isolates at BMC causing invasive infections associated with increased morbidity and mortality. High variability of *S.aureus* genotypes and *Escherichia coli* call for surveillance of HAIs nationwide. Furthermore, there is a need to deploy a one health approach and antibiotic stewardship strategy for combating antimicrobial resistance in Tanzania.

**SRP 07: Age specific prevalence of rubella seromarkers and correlates of infection among children and adolescents in Mwanza city in the pre vaccination era. Are we in the right track?**

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World health organisation (WHO) recommends countries without vaccination programmes to assess the burden of rubella and CRS by sero-epidemiological surveys and surveillance programmes. However; in many African countries including Tanzania the data for rubella and CRS are scarce. This study was undertaken to assess the sero-makers for natural rubella infection in Tanzania during pre-vaccination era so as to ascertain the gap for future research and prevention strategies. A cross sectional study was done between September and October 2014. A standardized data collection tool was used to collect demographic and other risk factors. Rubella antibodies were determined used commercially available ELISA kits. Data were analyzed using STATA version 11. A total of 723 participants were enrolled of which 230(31.8%) were under-fives. Of 723 participants; 223 (58.5%) and 94 (13%) were IgG and IgM sero-positive respectively. IgG seropositivity rates were 26.1%, 35.9%, 89.2% and 86.1% for the age groups of <5, 5-9.9, 10-14.9 and >15 years respectively. For each unit increase in age the seroprevalence rate increased by 4.5% (p<0.001). IgG seropositivity was significantly higher among participants from rural and periurban (p=0.01) whereas IgM seropositivity was significantly higher among Urban participants (p=0.02). There is 1.5 times risk of contracting rubella with a unit increase in number of siblings. Population above 10 years and 15 years had no significant difference in natural immunity (87.7% vs. 86.1%).Our data indicates that significant proportion of women might be still susceptible for acute rubella infection hence at risk for CRS. Results from this study necessitate a need to change the upper age limit of vaccination in Tanzania. Screening and vaccinating all women above 15 years of age may be cost effective campaign to prevent CRS in Tanzania.
BIOMEDICAL RESEARCH

BMR 01: Epidemiological assessment of malaria transmission intensity using parasite prevalence and serological conversion rates in Korogwe district, Northeastern Tanzania

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Malaria is a disease of public health importance especially in sub-Saharan Africa & children are mostly affected. Acquired immunity to malaria develops overtime depending upon frequency and duration of parasite exposure from birth. Malaria is controlled by the use ITNs, early diagnosis and treatment, environmental manipulation and vaccines, The aim of this study was to investigate the malaria transmission intensity caused by Plasmodium falciparum using parasite prevalence and serological conversion rates. The objective was to determine malaria parasite prevalence (PP) and to assess the longitudinal estimates of Parasite rate (PR) and serological conversion rate (SCR) in the study area. Three cross-sectional malariometric surveys were conducted between May to September 2011, 2012 and 2013 in 34 villages of Korogwe and Handeni districts in Tanga region. Enrollment of participants included 400 children ≤ 5 years, 200 individuals 5–19 years and 200 individuals ≥ 20 years old making a total of 800 participants. Finger prick blood samples were taken for malaria parasite diagnosis. Haemoglobin levels were estimated using haemocue machine. Filter paper blood was taken for the evaluation of serology conversion rate (SCR) by ELISA. Overall malaria prevalence in 2011, 2012 and 2013 was 4.7%, 1.4% and 3.1% respectively. Prevalence in children ≤ 5 year old was 5.1%, 0.5% and 2.8% and in 5–19 years old, prevalence was 6.4%, 3.5% and 4.8% and in adults ≥ 20 years old prevalence was 2.5%, 1% and 2.3% respectively. There was no trend in the prevalence of malaria in the study area over 3 years (χ² = 3.5, P = 0.06). Measurements of SCR showed that Apical Membrane Antigen-1 was more immunogenic than Merozoite Surface Protein-1 (P < 0.001). Low malaria transmission intensity was observed in Korogwe district based on parasite prevalence and seroconversion to blood stage antigens (AMA-1 & MSP-1).

BMR 02: Risk factors associated with malaria epidemiology in Zanzibar: the role of travel


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Travel poses a great challenge in malaria epidemiology in Zanzibar and therefore must be addressed to achieve malaria elimination. Currently, imported cases tend to make up the majority of reported cases in Zanzibar where importation has contributed to resurgences of malaria. The objective was to identify the risk factors associated with malaria epidemiology in Zanzibar. Malaria surveillance data were collected between August, 2012 and September, 2014. For each case, a message was sent from health facility to a Central server which generated an SMS alert to the District Malaria Surveillance Officer’s (DMSO) mobile phone. Data included patients’ names and villages, which enabled the DMSO to follow up patients to their households. All household members included in the index cases were tested for malaria using rapid diagnostic tests (mRDT). Household members tested malaria positive were treated with artemisinin-based combination therapy (ACT). For univariate and multivariate analysis, Logistic regression model was used to identify the risk factors. Among 18,640 patients followed, 6.2% (1158) were malaria positive, of which 17.9% (207) were below 5 years. Among positive cases, those aged 5-14 years and who didn’t sleep under treated net previous night, were found to have...
significantly increased odds of being malaria positive [OR: 1.6; 95% CI: 1.4-1.9; OR: 1.4; 95% CI: 1.2-1.7]. In addition, those with history of fever in the last 2 weeks, who travelled outside Zanzibar in the past one month and patients without nets were found to have significantly increased odds of being malaria positive [OR: 23.2; 95% CI: 19.7-27.4, OR: 9.8; 95% CI: 8.3-11.6 and OR: 1.3; 95% CI: 1.1-1.6 respectively]. Travel is a major driver of malaria cases in both high and low transmission periods. Identification of gaps in knowledge, relevant types of human movement and development of strategies is highly recommended.

BMR 03: K13-propeller polymorphisms in Plasmodium falciparum parasites from sub-Saharan Africa

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The emergence of Plasmodium falciparum parasites resistant to artemisinins, recently documented in Southeast Asia (SEA) threatens to reverse the gains in malaria control worldwide and presents a major roadblock to eliminating malaria. Although in vivo efficacy studies are widely used for tracking artemisinin resistance in SEA, in Africa and other malaria endemic regions, there is a need for concerted efforts to develop in vitro or ex vivo assays and to identify genetic markers of artemisinin resistance. Mutations in the P. falciparum K13-propeller domain have recently been shown to be important determinants of artemisinin resistance in South-East Asia. This study investigated the prevalence of K13-propeller polymorphisms across sub-Saharan Africa. A total of 1212 P. falciparum positive blood samples were collected in 2013-2014 from twelve sub-Saharan African countries, from which members of the African Plasmodium Diversity Network (PDNA) consortium are drawn. The samples were sequenced using Sanger sequencer standard methods provided by Applied Biosystems 3730xl. Sequence data was analyzed using the Genome Assembly Program GAP 4 software to identify Single Nucleotide Polymorphisms (SNPs) which were called using 3D7 reference genome. None of the K13-propeller mutations previously reported in South-East Asia were found, but 21 unique mutations were detected, of which seven were non-synonymous. Allele frequencies ranged between 1-3%. Three mutations were observed in more than one country, and the A578S was present in parasites from five countries. Kenyan samples had the largest number of non-synonymous mutations, where three of the five SNPs detected were non-synonymous. The majority of the mutant alleles appeared in low frequencies, with the highest frequency SNPs observed in Ghana (~3% for the non-synonymous V566I and synonymous C469G). This study provides baseline prevalence of K13-propeller mutations in sub-Saharan Africa and this information will be critical in tracking the emergence and or spread of P. falciparum resistance to artemisinin in sub-Saharan Africa.
BMR 04: Malaria and anemia prevalence and nutritional status in Tanzania’s Mvomero District: Baseline results of a cluster-randomized health experiment

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A critical component of developing and assessing the impact of malaria control strategies involves understanding target population health conditions. We report on baseline health characteristics in the larger context of a cluster-randomized study utilizing a 2x2 factorial design to determine the impacts of vector control and disease management interventions in the Mvomero District of Tanzania. Health-related data for a representative sample of members from approximately 40 study households in each of 24 randomly selected villages was collected in April/May 2011. A total of 2472 participants (693 of them 6 months to less than 5 years of age) participated. Assessments included height, weight, arm circumference, splenomegaly, temperature, anemia status, and malaria parasitemia. Overall, 5.6% of study participants were positive for malaria parasitemia at baseline, a sharp reduction from 34.5% prevalence reported in the district in 2008. The average number of cases was 5.7 per village, but variability across villages was high. The proportion of all study participants with anemia at baseline was 52.4% (22.5% mild, 28.1% moderate, and 1.8% severe, per WHO criteria), with anemia prevalence even more pronounced among children under five years of age. Preliminary results indicate 29.2% of children under five were classified as stunted, 9.4% as underweight, and 1.5% as wasted compared to the WHO growth reference population. An understanding of community health characteristics is key to the development and assessment of contextual intervention strategies. Future analysis of baseline and follow-up surveys will compare intervention effects and provide new information for use in evidence-based malaria control policymaking.

BMR 05: Malaria prevalence among rice farming communities in Kilangali, Kilosa in Central Tanzania: Baseline survey

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Malaria remains the most important cause of morbidity and mortality in Tanzania. However, its prevalence varies from area to area depending on various ecological, socio-economic and health system factors. This study was carried out to determine malaria prevalence among rice farming communities in Kilangali village of Kilosa District in central Tanzania to generate baseline data for a larger study on integrating application of biolarvicides and fertilizer in rice fields to control malaria and increase rice yields. Kilangali Seed Farm and the community around the farm were selected as study sites. The study involved individuals of all age groups living in five sub-villages namely, Mlegeni-Kisiwani, Makululwili, Kwanumungu, Pogoroni and Chamwino. The sub-villages are located at different distance from a large Kilangali Rice Seed Farm irrigation scheme. All primary schoolchildren were also examined. Fingerprick blood samples were collected and malaria rapid diagnostic tests were employed in determining malaria point prevalence. A total of 1,155 persons were examined for malaria infection. The overall malaria prevalence was 18.5% (n=214). The malaria prevalence among schoolchildren was 27.2%. There was variation in malaria prevalence between subvillages. Malaria prevalence was highest in Mlegeni-Kisiwani (20.7%) followed by Makululwili (16.5%), Chamwino (14.7%), Pogoroni (12.7%) and Kwanumungu (9.1%). Malaria
prevalence was higher among residents of sub-village bordering the irrigation scheme (Mlegeni-Kisiwani and Makuluwili) than those relatively far from the irrigation scheme (Kwamtunga and Pogoroni). Significant variations in the prevalence of malaria infection between sub-villages within a rice irrigation community in Kilosa district were observed. These variations are likely to be attributed to the socio-economic factors and distance from the irrigation scheme.

BMR 06: Examination of 2006-2013 malaria incidences in relation to the scaling of preventative control interventions in Muleba District in north-west Tanzania

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Intensive malaria control interventions, including Indoor Residual Spraying (IRS), and distribution of Long-Lasting Insecticidal Nets (LLINs) were introduced in 2006 following outbreak of malaria in Muleba district in Tanzania. However, due to universal attainment of LLINs in 2011, as well as limited resources, IRS was scaled down in 2012-2013, with the last round targeting only 25% of the district. After 2011, no significant efforts have also been made to keep up LLIN coverage. We compared health facility based malaria incidence per 1000 population of respective village catchment areas from January 2006 to May 2013 and evaluated the association between vector control interventions and malaria burden in the district. Yearly information (January 2006-May 2013) on clinically and laboratory confirmed cases of malaria, outpatient attendance, inpatient admissions, outpatient and inpatient malaria cases and deaths were obtained from all health facilities in Muleba through the Health Management Information System booklets. The data was aggregated by age (<5 and ≥5), month and year and malaria positivity and incidence was analyzed and compared for the specified period. District incidence in 2006 (pre-control period) was 118 per 1000, with the rate declining to its lowest level of 37 per 1000 in 2010. This peak decrease of 67% in malaria incidence in 2010 compared to 2006 was most likely due to intensification of effective multiple control interventions over that period. However from 2011 onward, scale down and/or low maintenance of control interventions, coupled with reported stock-outs of artemisinin-based combination therapy and low net use likely contributed to a rise in malaria incidence; by 2013, increasing to 181 per 1000. The 2013 rate was 35% higher than the pre control era of 2006. These findings suggest that scaling-down malaria control efforts are likely to results into loss of initial gains in controlling malaria. This could have serious implications with possible rebound of malaria to pre-intervention levels as well as frequent malaria outbreaks. Once control of malaria has reached to manageable levels, it is important to advocate for effective monitoring and response so as to sustain the fight against malaria.

BMR 07: Assessing the var gene expression of CIDRA1-subtypes associated with EPCR-binding in Plasmodium falciparum parasites isolated from hospitalized Tanzanian children

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Severe malaria syndromes are precipitated by Plasmodium falciparum parasites binding to endothelial receptors on the vascular lining. This binding is mediated by the highly variant P. falciparum erythrocyte membrane protein 1 (PFEMP1) family. Previously it was identified as a subset of PFEMP1 associated with severe malaria1 and found that the receptor for these PFEMP1 variants is Endothelial Protein C Receptor (EPCR). The binding is mediated through the amino-terminal cysteine-rich interdomain region (CIDRa1) of Domain Cassette 8 (DC8) and group A PFEMP1 subfamilies. However, it is still unresolved if particular CIDRa1 variants confer
particular/expressed during severe malaria. In this study parasitized blood samples were collected from hospitalized Tanzanian children presented with severe malaria syndromes. The isolated parasites were cultured, purified and tested for their ability to bind EPCR on petri dishes. PfEMP1 var genes expression was tested by quantitative PCR using CIDRa1 specific primers targeting CIDRa1 subtypes and assessed for interplay between CIDRa1 variants expression and parasites binding phenotypes. About 30% bound rEPCR. There were very high transcript levels of CIDRa1, both of DC8 and group A var genes: Though there were very high CIDRa1 transcript levels in some isolated parasites that did not bind EPCR. Around 30% of 50 isolated and cultured parasites from hospitalized children bound to rEPCR in our assay and showed very high transcript levels of CIDRa1, both of DC8 and group A var genes. However, the CIDRa1 transcript levels were also very high in some parasite isolates that did not bind EPCR. Hence, it seems that the static petri dish assay used is not optimized to define the EPCR phenotype of patient isolates. Antibodies obtained to future CIDRa1 vaccine candidates may be tested in this assay, bearing in mind the limitations of the number of working assays.

BMR 08: More than a means to an end: Spatial data architecture for a complex field-based malaria intervention trial
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A spatially-enabled database was designed, implemented, and evaluated. This database was developed for the collection, quality assurance and quality control (QA/QC), and analysis of datasets generated from a multiyear cluster-randomized health experiment seeking to determine the human impacts of malaria vector control and disease management interventions. We sought to establish a spatially resolved data infrastructure to flexibly support a complex field-based health intervention. The data infrastructure was designed to: 1) accommodate the research design; 2) respond to the unique research needs and organizational constraints of collaborating partners; 3) safeguard the protected health information of study participants; and 4) provide the flexibility required for a multiyear research project. We designed the database for the paper-based field collection and digital capture of a number of spatially referenced datasets including patterns of malaria and anemia, environmental conditions, and social characteristics for study participants in the Mvomero District of Tanzania. We established a data infrastructure within NIMR to support the development and maintenance of the spatial database. The key components of the spatial database, the factors precipitating their development, and their effectiveness over the course of the research project are discussed. Spatial data architectures encourage both data standards and a set of readily available tools in support of data interoperability - an essential element for successful interagency research collaborations. Spatial data architecture is built on an integrated foundation of hardware, software, data, and policies. Recognizing the challenges of this integrated approach, we offer key lessons learned from our multi-stakeholder research collaboration. We have identified several appropriate data infrastructure policies and practices that enhance the ability of host country research organizations and their international collaborators to implement spatial data architectures.

BMR 09: Views, experiences and behaviors of itinerant rice farmers towards mosquito borne illnesses and their control, while in the rice paddies
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Most of the subsistence rice farmers in rural southeast of Tanzania are itinerant, often spending months in distant rice fields, sometime with young children. While there, they live in improvised open shacks with minimal protection against mosquito entry and bites. The rice farms are far away from health facilities so the families have poor access to treatment. We conducted a qualitative study to assess whether (a) itinerant rice farmers know about mosquito-borne diseases and how they are spread, b) which tools they use to protect themselves while in the rice field, c) which evening activities may put them at a risk of being bitten by mosquitoes, and d) what their view was on a new portable mosquito-proof house that we have designed and tested to protect such farmers. This study was conducted in rural southeastern Tanzania, in four villages of Ulanga district. A total of 64 itinerant rice farmers were recruited for interviews so as to capture their views and experiences. From the 64 itinerant farmers, 32 individuals (8/village) were recruited and trained to fill observation forms for the activities that their families conduct every evening from 1600hrs to 0600hrs while living in the rice farms, so as to identify activities that expose them to the greatest risk of being bitten by mosquitoes. The participatory observation approach was designed to prevent any external observer biases like the Hawthorne effect. More than 95% of itinerant rice farmers have knowledge of malaria, 14% know that mosquitoes transmit malaria and other mosquito-borne diseases. We found that 93% prefer to use bed nets indoors. However, when outdoors, 64% prefer to fan themselves with hands, twigs or cloth, 21% prefer to sit near fires, while 9% prefer to wear long sleeved clothes. We observed numerous outdoor activities namely: cooking, eating, storytelling, and others where the farmers had minimal protection. Respondents also confirmed that they were mostly bitten outdoors from 6pm to 11pm when they go to sleep under a bed net. Overall, the communities complained on persistent nuisance biting and were willing to use and contribute towards financing of the Portable mosquito exposure free hut. Providing better housing like a portable mosquito-proof huts that are easy to use and transport, and are also affordable can contribute substantially in reducing mosquito borne illnesses.

BMR 10: Perceptions on malaria and its control methods with a focus on the utilization of mosquito bed nets in Muheza, Tanzania

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Although there is a good documentation of the uptake of health interventions ambivalent towards its use is not a new phenomenon and in some cases increasing. Uncertainties towards health interventions aimed at controlling diseases have had far reaching consequences in sustaining initial gains for longer periods in some projects. During an initial survey results showed that out of 99% of household members interviewed and owned a net only 66% slept under a bed-net the last night before the survey. The objective of the study was to assess participant’s perceptions of malaria and associated control methods with a focus on none use of bed nets among participants who reported not to use a bed net in an ongoing trial. The study employed mainly in-depth interviews. A simple random selection of twenty (20) village clusters with a total of 35 households was performed out of 47 village clusters reported not to use nets. Data was analyzed using content analysis approach producing a number of themes. The main malaria control methods mentioned were use of bed nets, burning of coils, repellents, cleaning the environment and wearing of long clothes. Most nets were obtained from research projects, campaigns, donations, and via subsidies. Non bed net use was associated with: Rumors around
side effects (infertility to men and general body rashes). Others were costs of bed nets including its manageability in relation to bed sizes. A developing theme revolved around expectations to anticipate free bed nets such that they do not strive to invest from their own resources. In addition it was reported that high altitudes and cooler climates had little mosquitoes to use mosquito nets. Social behavioural factors such as drunkenness, tiredness and social events were also mentioned. More efforts are needed to advocate on the importance of using bednets while allaying fears around perceived misconceptions on the harmlessness of insecticides, altitudinal and climatic conditions. Additional malaria control methods are important to supplement mosquito nets to reach maximum protection.

BMR 11: Association of concurrent gastrointestinal nematode infections with antimalarial total IgG in asymptomatic school aged children
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Gastrointestinal nematode infections are common in malaria endemic areas. An interaction between the two parasites would be of considerable public health importance. The present study was designed to investigate the effects of concomitant malaria and GINi on the anti-malarial total immunoglobulin Gamma level in schoolchildren in Mfou (Cameroon). Overall 503 school children aged between 3-16 years were examined. Finger prick blood samples were collected. Thick and thin blood smears were made and examined for the presence of malaria parasites, parasites species and densities. Fresh stool samples were collected, processed and examined for gastrointestinal nematodes using the Kato Katz technique. Immunoglobulin gamma levels were determined using ELISA for three asexual stage recombinant antigens. A total of 69 (33.82%) had simple or mixed co-infection with a predominance of P. falciparum/A. lumbricoïdes. Sixty six children (75%) tested by ELISA were classified as higher anti-malarial total IgG producers. Mixed co-infected children had higher total IgG than those with simple co-infection but the difference was not significant. These findings reveal that malaria/GIN co-infection have no effect on the production of antimalarial total IgG in the studied population. However, future studies should be carried out to examine the effect of malaria/helminths co-infection on antimalarial IgG subclasses.

BMR 12: Febrile illness among children in Tanzania: A study co infection of P. falciparum and Salmonellae in an area of declining malaria transmission
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Systemic bacteremia has been reported in children with severe Plasmodium falciparum malaria in Sub Saharan Africa, making the identification or exclusion of concurrent infections a prerequisite for adequate treatment. Co-infections with bacteria especially NTS are expected to occur because of their overlapping geographical distribution, but accumulating evidence indicates that malaria is a risk factor for NTS. Antimicrobial resistance is becoming widespread among Salmonella species making empirical treatment problematic. Observational studies indicate that interventions to reduce malaria transmission might also have a substantial impact on decreasing the incidence of NTS bactereamia. The objective was to determine the prevalence of co infection with P.falciparum and NTS and their antibiotic resistance patterns from hospitalized febrile children with or without malaria in Korogwe district hospital, Tanzania, an area of declining malaria transmission intensity. Malaria diagnosis and blood culture were performed for all febrile children and/lumbar puncture or chest X ray when clinically indicated. We assessed the frequency of microscopically confirmed malaria and species distribution of
Salmonellae isolates from blood and their antimicrobial susceptibility patterns. Out of 12,155 children febrile episodes detected, 1,991 (16.4%) had P. falciparum malaria. P. falciparum and bacterial co-infection was detected in only 21/246 (8.5%) malaria positive samples that met inclusion criteria. The association between NTS and P. falciparum malaria infections was not statistically significant. Salmonella typhi was the predominant isolate (27%) followed by Streptococcus pneumoniae (20%), non-typhoidal Salmonellae (NTS) (11.8%) and E. coli (9.8%). Resistance against first line antibiotics was high for both NTS and S. typhi isolates. Co-infection of P. falciparum and NTS is uncommon in Korogwe. Despite low isolation rates majority of Salmonellae isolates were highly resistant to first line therapy. Efforts to reduce antimalarial prescription should also address antibiotics over prescription.

BMR 13: Distribution and risk factors for Plasmodium and helminth co-infections: a cross-sectional survey among children in Bagamoyo District, Tanzania

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Plasmodium and soil transmitted helminth infections (STH) are a major public health problem particularly among children. There are conflicting findings on potential association between these two parasites. This study investigated pattern and predictors of the Plasmodium and helminth co-infections among children aged 2 months to 9 years living in Bagamoyo district, coastal region of Tanzania. A community-based cross-sectional survey was conducted among 1033 children. Stool, urine and blood samples were examined using a broad set of quality controlled diagnostic methods for common STH (Ascaris lumbricoides, hookworm, Strongyloides stercoralis, Enterobius vermicularis, Trichuris trichura), schistosoma species and Wuchereria bancrofti. Blood slides and malaria rapid diagnostic tests (mRDTS) were utilized for Plasmodium diagnosis. Out of 992 children analyzed, the prevalence of Plasmodium infection was 13% (130/992), helminth 28.5% (283/992); 5% (50/992) had co-infection with Plasmodium and helminth. The prevalence rate of Plasmodium, specific helminth and co-infections increased significantly with age (p < 0.001), with older children mostly affected except for S. stercoralis monoinfection and co-infections. Spatial variations of co-infection prevalence were observed between and within villages. There was a trend for STH infections to be associated with Plasmodium infection [OR adjusted for age group 1.4, 95% CI (1.0 - 2.1)], which was more marked for S. stercoralis (OR= 2.2, 95% CI (1.1 - 4.3). Age and not schooling were risk factors for Plasmodium and helminth co-infection. The findings suggest that STH and Plasmodium infections tend to occur in the same children, with increasing prevalence of co-infection with age. This calls for an integrated approach for the control of both parasitic infections among all children, including those not attending school regularly. Novel interventions targeting more specifically Plasmodium and S. stercoralis infection such as ivermectin distribution, should be evaluated in young children in areas of intense transmission.

BMR 14: Geo-ecological distribution of malaria and helminth co-morbidity among schoolchildren in a rural district of central Tanzania

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Malaria and helminth infection overlap in distribution. This study was undertaken to determine the prevalence of malaria and helminth co-infections among schoolchildren in relation to agro-ecosystems and livelihoods in a rural district in central Tanzania. The agro-ecosystems were categorised as sugarcane, traditional flooding rice irrigation, improved non-flooding rice irrigation and savannah. Schoolchildren had their blood examined for *Plasmodium falciparum* and *Wuchereria bancrofti*; urine for *Schistosoma haematobium* and stool for intestinal helminths. A total of 578 schoolchildren (mean age = 7.96 years) were involved in the study. Overall, 60% of all schoolchildren had at least an infection of either *P. falciparum*, *W. bancrofti*, *S. haematobium* or hookworm. The highest prevalence single infection of *P. falciparum* (75.3%), *W. bancrofti* (62.9%) and hookworm (24.7%) infections were observed among children in flooding rice irrigation ecosystem. *P. falciparum+S. haematobium* (10.9%) and *P. falciparum+W. bancrofti* (11.1%) were the most prevalent types of co-infection in the area. The risk for acquiring co-infections of *P. falciparum+W. bancrofti* was significantly higher among children in the flooding rice irrigation ecosystem. Forty-five (7.8%) children were co-infected with three types of parasitic infections. The risk of acquiring triple infection among children from flooding rice irrigation was higher for *P. falciparum+S. haematobium+W. bancrofti* ($P<0.001$). Seven schoolchildren (1.2%) were found infected with four parasites and all were from the flooding rice irrigation ecosystem. Significantly high geometric parasite density of *P. falciparum* gametocytes were observed among children co-infected with either *P. falciparum+hookworms* or *P. falciparum+W. bancrofti* than in those with *P. falciparum* alone or *P. falciparum+S. haematobium* coinfections ($p<0.001$). Malaria-helminth co-infections are prevalent among schoolchildren in rural Tanzania and the pattern varies between agro-ecosystems/livelihoods.

BMR 15: Aetiology of acute febrile episodes in children attending Korogwe District Hospital in north-eastern Tanzania

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Although the burden of malaria in many parts of Tanzania has declined, the proportion of children with fever has not changed. This situation underscores the need to explore the possible causes of febrile episodes in patients presenting with symptoms at the Korogwe District Hospital (KDH). A hospital based cross-sectional study was conducted at KDH, north-eastern Tanzania. Patients aged 2 to 59 months presenting at the outpatient department with an acute medical condition and fever (measured axillary temperature ≥ 37.5˚C) were enrolled. Blood samples were examined for malaria parasites, human immunodeficiency virus (HIV) and bacterial infections. A urine culture was performed in selected cases to test for bacterial infection and a chest radiograph was requested if pneumonia was suspected. Diagnosis was based on both clinical and laboratory investigations. A total of 867 patients with a median age of 15.1 months (Interquartile range 8.6-29.9) were enrolled from January 2013 to October 2013. Respiratory tract infections were the leading clinical diagnosis with 406/867 (46.8%) of patients diagnosed with upper respiratory tract infection and 130/867 (15.0%) with pneumonia. Gastroenteritis was diagnosed in 184/867 (21.2%) of patients. Malaria infection was confirmed in 72/867 (8.3%) of patients. Bacterial infection in blood and urine accounted for 26/808 (3.2%) infections in the former, and 66/373 (17.7%) infections in the latter. HIV infection was confirmed in 10/824 (1.2%) of patients. Respiratory tract infections and gastroenteritis were frequent in patients under 36 months of age (87.3% and 91.3% respectively). Co-infections were seen in 221/867 (25.5%) of patients. The cause of fever was not identified in 65/867 (7.5%) of these patients. The different proportions of infections found among febrile children reflect the causes of fever in the study area. These findings indicate...
the need to optimise patient management by developing malaria and non-malaria febrile illnesses management protocols.

BMR 16: Diagnostic accuracy of malaria rapid diagnostic tests and case management of malaria among under-fives in areas of low transmission in Tanga city, North Eastern Tanzania
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Accurate diagnosis of malaria and prompt treatment is essential for successful control of malaria. Traditionally, malaria has been diagnosed clinically using fever as a reference. The decline in malaria transmission and low proportion of fevers due to malaria are known to affect the accuracy of clinical diagnosis and rapid malaria diagnostic tests (mRDT); and therefore necessitates improvement of the capacity for diagnosis of febrile illnesses. The objective was to assess the diagnostic accuracy of RDTs and clinical diagnosis compared to microscopy for diagnosis of falciparum malaria among under-fives living in an area of declining malaria transmission. A cross sectional survey was carried among 510 under-fives with febrile illnesses (axillary temperature >37.5°C or history of fever past 24 hour) from 8 primary health facilities of Tanga city. Finger prick blood was obtained to determine malaria positivity rate by mRDT and microscopy. The accuracy of mRDTs and clinical diagnosis (sensitivity, specificity, positive - PPV and negative predictive values - NPV) was compared to microscopy. Of the 510 under-fives examined, 244(47.8%) had fever at presentation (axillary temperature >37.5°C), 33 (6.5) % were positive by microscopy while 35(6.9%) had positive mRDT results. Fever had a very high sensitivity (93.9%) and negative predictive value (99.1%) but very low specificity (11.3%). The sensitivity and specificity mRDTs when compared to microscopy were 81.8% and 98.3% respectively. Of the 162 patients treated with antimalarials, only 35 (21.6%) were mRDT positive. Fever was a poor marker of malaria due to low specificity while mRDTs had higher accuracy despite a relatively lower sensitivity caused by a large number of patients with false negative results. Majority of the patients were treated with antimalarial despite negative mRDT results. Further studies are required to assess the determinants of non-adherence to mRDT results and to establish better options for improving malaria diagnosis and case management in areas with low malaria transmission.

BMR 17: Analysis of adverse events of duocotexin (dihydroartemisinin + piperaquine) malaria therapy in Tanzania: cohort event monitoring, 2011
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Due to increasing resistance of the malaria parasite to previously effective monotherapies, WHO endorsed the potential of artemisinin-based combination therapy (ACT) for drug-resistant malaria. WHO recommended that governments of malaria endemic countries with large-scale deployment of ACTs should consider establishing effective pharmacovigilance systems. Tanzania Food and Drugs Authority (TFDA) established active surveillance of adverse events associated with the use of Dihydroartemisinin + Piperaquine (DHA+PPQ) in selected private health facilities in Tanzania using Cohort Event Monitoring (CEM) approach. This study aimed to determine social demographic distribution of the reported adverse events of duocotexin drug use and its magnitude and the cumulative incidence. Conducted a review of secondary data (adverse events information) collected in 2011 and extracted from a web based database (CEMFlow) at TFDA headquarter. Data were analysed using CEMFlow web based database. Tables, graphs and charts were constructed using MS excel programme. Among 10,000 malaria patients, 15.3% were
enrolled during the period of active surveillance. 160 adverse events were reported; 87 (54.4%)
were male patients. There was no difference in proportion of occurrence of adverse events
between male patients (10.5%) and female patients (10.7%). Mwanza reported 30.6% events
followed by Dar es Salaam (29.4%). Leading events were headache 37 (23.1%), nausea 23 (14.4%),
diarrhoea 15 (8.1%) and vomiting 12 (7.5%). 95% of reported AE recovered but no information was
captured weather it was a natural process or treatment effect. Cumulative incidence of reported
AE was 8.6%. Severity status of 90 AEs (56.3%), was not known, 55 (34.4%) were mild, 11 (6.9%)
were severe and 1 (0.6%) were moderate. Duocotexin use does not have serious drug - related
adverse. CEM was not successful as few patients were enrolled compared to expected number of
patients to be included in the surveillance. This affects validity of the surveillance and results
cannot be generalised to the whole population.

**BMR 18: Performance characteristics of malaria rapid diagnostic test and its utilization in
management of febrile patients in Korogwe District, Tanzania**
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Malaria is a public health problem caused by protozoa parasite of the genus Plasmodium and
illness occurs, following bite of infected female anopheline mosquito. Malaria diagnosis
continues to be foremost among challenges in malaria control strategies in Sub-Saharan countries
including Tanzania. World Health Organization changed malaria treatment Guidelines in 2010 to
restrict the use of antimalarial drugs to parasitologically confirmed malaria cases in response to
overuse of antimalarial drugs. Malaria rapid diagnostic tests (mRDTs) have been presented as a
means to realize the new guidelines for malaria parasitologically confirmed cases prior to
initiating antimalarial drug therapy for mRDT positive patients. This study assessed performance
characteristics of malaria rapid diagnostic test and its utilization in management of febrile
patients. A hospital-based cross-sectional study among patients with fever and malaria-like
symptoms was done between May and June, 2014 in Korogwe district hospital. A convenient
sampling method was used to enroll patients, blood samples were collected for mRDT and smear
microscopy. Data was analysed in Epi-Info version 3.5.4 computer software and P-value set at
0.05. Results revealed sensitivity, specificity, positive predictive value and negative predictive
value of mRDT at 95% CI was 97.6%, 97.4%, 91.0% and 99.3% respectively. All patients with positive
mRDT were prescribed antimalarial drugs, while patients with negative mRDT results prescribed
either antimalarial (P-value = 0.001) or antibiotics (P-value = 0.005) at 95% CI. Patients with
negative mRDT results were less likely to be offered further investigation at 95% CI (P-value =
1.000). The overall hospital malaria prevalence at 95% CI was 23.1% and 21.6% by mRDT and
microscopy respectively. In rainy season hospital base malaria prevalence is still high and under
five children are most affected age group. The mRDT had good sensitivity and specificity as
compared with blood slide microscopy. Clinicians adhered to malaria guidelines to patients with
positive mRDT result; however, they did not adhere in negative mRDT result.

**BMR 18: Performance of malaria rapid diagnostic tests when used for screening of patients to
be enrolled in clinical trials and other studies**
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Malaria rapid diagnostic tests (mRDTs) are now widely used for malaria diagnosis in the public
sector in Tanzania, but their applicability in clinical trials for patients screening and management
has not been well assessed. This study assessed the performance of mRDTs when used for screening of patients to determine their eligibility for enrolment in clinical trials and other studies. The data was obtained from completed studies at four sites of Mkuzi and Muheza, Nachingwea and Rubya in three districts of Muheza, Nachingwea and Muleba respectively. Patients aged 6 months and above were screened initially with mRDTs followed by microscopy for possible inclusion in clinical trials and a genomic study of malaria parasite diversity. The performance of mRDTs was compared with microscopy as a gold standard, and factors affecting their accuracy were explored using multivariate logistic regression models. A total of 1,110 participants were screened and 56.9% were positive for mRDTs while <50% had malaria parasites by microscopy. The mRDTs had high sensitivity (ranging from 97.3% to 99.3% at all sites) while the specificity was relatively lower (ranged from 64.9% at Muleba to 87.5% at Muheza). After adjusting for age of patients, fever status, site and the study type, the sensitivity of mRDT was significantly higher in patients with parasite density ≥4000 asexual parasites/ul (OR=6.70, p=0.030). The specificity of mRDT was similar in all patients even after adjusting for the effects of fever status and age of participants (p>0.190). The high sensitivity of mRDTs in patients with different levels of parasitaemia suggest that mRDTs can be useful in initial screening of patients followed by confirmation with microscopy and save time and other resources. However, the relatively low specificity could lead to enrolment of some patients without malaria parasites and compromise the quality of the trials.

BMR 20: Healthcare seeking, testing and prompt use of recommended antimalarials among febrile children in Tanzania
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Malaria is still a public health problem in Sub-Saharan Africa. Malaria causes mortality mostly in children under-five years. Early detection and prompt treatment using recommended antimalarials is a key in malaria control. However, in Tanzania, contrary to the national goals, large proportion of children with fever taken to health facilities are not tested for malaria and those tested positive are not promptly treated using recommended antimalarials. The aim of this study was to determine factors associated with malaria testing and prompt use of recommended antimalarials among under-five children with fever in Tanzania. This was a secondary analysis of Tanzania HIV and Malaria Indicator Survey (THMIS) data 2011-12 obtained from a national cross sectional survey. The analysis involved children aged 6-59 months whose mothers reported they had fever two weeks preceding the survey. Factors associated with testing and uses of recommended antimalarials were obtained using logistic regression. Of the 1675 under-five children with fever, 951 (56.8%) were taken to the health facilities. Of the 951 children, only 394 (41.48%) febrile children were tested for malaria. Of those tested, 291 (78.91%) were diagnosed with malaria. Of those diagnosed with malaria, only 124 (42.68%) children used recommended antimalarials within 1st 24 hours of diagnosis. In multivariate analysis, children taken to health centers (OR 1.79; 95%CI: 1.07 - 3.00) and to the hospitals (OR 3.4; 95%CI: 1.75 - 6.77) had higher odds of being tested compared to those taken to dispensary and other lower level health facilities. Children were more likely to use recommended antimalarial promptly if had a caretaker with secondary education and more (OR: 4.07; 95%CI: 0.61 - 2.68) or living in the rural area (OR: 3.21; 95%CI: 1.09 - 9.44) compared to those with caretaker with no education or from urban area. Training on malaria testing and treatment guidelines, preventing stock outs of malaria testing kits and medications at dispensary level should be strengthened as it is the first point of health care for most Tanzanians. Reasons on why urban people are less likely to use recommended antimalarials need to be investigated and addressed for proper malaria management.
**BMR 21: Cost-effectiveness of dihydroartemisinin-piperaquine compared with artemether-lumefantrine for treating uncomplicated malaria in children at a district hospital in Tanzania**

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Dihydroartemisinin-piperaquine (DhP) is highly recommended for the treatment of uncomplicated malaria. This study aims to compare the costs, health benefits and cost-effectiveness of DhP and artemether-lumefantrine (AL) alongside “do-nothing” as a baseline comparator in order to consider the appropriateness of DhP as a first-line anti-malarial drug for children in Tanzania. A cost-effectiveness analysis was performed using a Markov decision model, from a provider’s perspective. The study used cost data from Tanzania and secondary effectiveness data from a review of articles from sub-Saharan Africa. Probabilistic sensitivity analysis was used to incorporate uncertainties in the model parameters. In addition, sensitivity analyses were used to test plausible variations of key parameters and the key assumptions were tested in scenario analyses. The model predicts that DhP is more cost-effective than AL, with an incremental cost-effectiveness ratio (ICER) of US$ 12.40 per DALY averted. This result relies on the assumption that compliance to treatment with DhP is higher than that with AL due to its relatively simple once-a-day dosage regimen. When compliance was assumed to be identical for the two drugs, AL was more cost-effective than DhP with an ICER of US$ 12.54 per DALY averted. DhP is, however, slightly more likely to be cost-effective compared to a willingness-to-pay threshold of US$ 150 per DALY averted. Dihydroartemisinin-piperaquine is a very cost-effective anti-malarial drug. The findings support its use as an alternative first-line drug for treatment of uncomplicated malaria in children in Tanzania and other sub-Saharan African countries with similar healthcare infrastructures and epidemiology of malaria.

**BMR 22: Safety of artemether-lumefantrine exposure in first trimester of pregnancy: an observational cohort**

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There is limited data available regarding safety profile of artemisinins in early pregnancy. They are, therefore, not recommended by WHO as a first-line treatment for malaria in first trimester due to associated embryo-foetal toxicity in animal studies. The study assessed birth outcome among pregnant women inadvertently exposed to artemether-lumefantrine (AL) during first trimester in comparison to those of women exposed to other anti-malarial drugs or no drug at all during the same period of pregnancy. Pregnant women with gestational age <20 weeks were recruited from Maternal Health clinics or from monthly house visits (demographic surveillance), and followed prospectively until delivery. A total of 2167 pregnant women were recruited and 1783 (82.3%) completed the study until delivery. 319 (17.9%) used anti-malarials in first trimester, of whom 172 (53.9%) used (AL), 78 (24.4%) quinine, 66 (20.7%) sulphadoxine-pyrimethamine (SP) and 11 (3.4%) amodiaquine. Quinine exposure in first trimester was associated with an increased risk of miscarriage/stillbirth (OR 2.5; 1.3–5.1) and premature birth (OR 2.6; 1.3–5.3) as opposed to AL with (OR 1.4; 0.8–2.5) for miscarriage/stillbirth and (OR 0.9; 0.5–1.8) for preterm birth. Congenital anomalies were identified in 4 exposure groups namely AL only (1/164[0.6%]), quinine only (1/70[1.4%]), SP (2/66[3.0%]), and non-anti-malarial exposure group (19/1464[1.3%]). Exposure to AL in first trimester was more common than to any other anti-malarial drugs. Quinine exposure was
associated with adverse pregnancy outcomes which was not the case following other anti-malarial intake. Since AL and quinine were used according to their availability rather than to disease severity, it is likely that the effect observed was related to the drug and not to the disease itself. Even with this caveat, a change of policy from quinine to AL for the treatment of uncomplicated malaria during the whole pregnancy period could be already envisaged.

BMR 23: Bisbenzylisoquinoline and hasubanane alkaloids from *Stephania abyssinica* (Dillon & A. Rich) (Menispermeae)

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Two new bisbenzylisoquinoline and one hasubanane alkaloids compounds were isolated from leaf extract of *Stephania abyssinica*, a plant used in traditional medicine in South Nyanza in Kenya. The compounds were identified as (−)-pseudocurine, (−)-isocurine and (−)-10-oxoaknadinine, respectively. The compounds were characterized using 1D (1H and 13C) and 2D (COSY, DEPT, HMOC and HMBC) NMR techniques. (−)-Pseudocurine and (−)-isocurine exhibited strong to moderate anti-plasmodial activity while (−)-10-oxoaknadinine showed moderate to mild activity.

BMR 24: Protoberberine and aporphine alkaloids from *Annickia kummeriae*: Potent in vitro antiplasmodial, antitrypanosomal and antileishmanial drug leads

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Nature has been the major source of natural products as medicinal agents for thousands of years and the use of plants for prevention and treatment of various diseases has been in practice from time immemorial. One of the most important plant families is Annonaceae. Biologically active components of the family Annonaceae exhibit interesting biological properties like antimalarial, anti-HIV, antimicrobial and anti-cancer effects. *Annickia kummeriae* (Engl. & Diels) Setten & Maas formerly known as *Enantia kummeriae* (Engl. & Diels) used for the treatment of medical conditions, such as dysentery, hepatitis, malaria, skin diseases, intestinal worms, inflammation of the eyes, HIV, and cancer. Solvent extracts from *Annickia kummeriae* leaves, stem and root barks were tested for anti-protozoal activity whereby they exhibited strong to moderate in vitro anti-plasmodial activity (IC50 0.12±0.01–6.70±1.53 μg/ml), moderate anti-trypanosomal activity (IC50 2.3±0.43–5.40±0.64 μg/ml) and with mild anti-leishmanial activity (IC50 9.25±0.54–9.79±2.5 μg/ml). The strong anti-plasmodial, moderate anti-trypanosomal and mild anti-leishmanial activity of the methanolic extract of *A. kummeriae* leaves encouraged the isolation of anti-protozoal compounds. Bioassay-guided chromatographic fractionation led to the isolation of five pure alkaloids, lysicamine (1), trivalvone (2), palmatine (3), jatrorrhizine (4), magnocurarine (5), columbamine (6) and (−)-tetrahydropalmatine (7). The alkaloids showed strong to moderate antiplasmodial activity (IC50 0.08 ± 0.001 – 2.4 + 0.642μg/ml, SI 1.5–1,154), moderate to very weak antitrypanosomal activity (IC50 2.80 + 0.001 – 14.3 + 0.001μg/ml, SI 2.3–28.1) and also moderate to very weak antileishmanial activity IC50 2.7 ± 0.001 – 20.4 + 0.003μg/ml, SI 1.7–15.6). The high antiplasmodial activity makes these alkaloids to serve as candidates and lead structures for new antimalarial, antitrypanosomal and antileishmanial drug development programs.

BMR 25: Efficacy of RTS,S/AS01 malaria vaccine in Tanzanian children

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Plasmodium falciparum malaria is the most life-threatening disease transmitted by Anopheline mosquitoes. A malaria vaccine is envisioned to be a complimentary tool towards control of malaria whose morbidity and mortality remains high due to the development of resistance by mosquitoes to insecticides and by the parasite to the available drugs. To assess efficacy, immunogenicity and safety of RTS,S/AS01 malaria vaccine candidate in children aged 6 weeks to 17 months. Phase III RTS,S/AS01E malaria vaccine trial was conducted in 11 centres in 7 countries in Africa. In Tanzania two centres participated, Bagamoyo under IHI and Korogwe under NIMR. The study started in 2009 and came to an end on 31st Dec 2013. Analysis was done to determine the overall and site-specific efficacy (VE), safety and immunogenicity. 6,537 infants aged 6–12 weeks and 8,923 children aged 5–17 months were randomized to receive three doses of RTS,S/AS01 or comparator vaccine. VE against clinical malaria in children during the 18 months after vaccine dose 3 (per protocol) was 46% (95% CI 42% to 50%) (range= 40% to 77%; VE, p<0.01 across all sites). VE against clinical malaria in infants was 27% (95% CI 20% to 32%, per protocol; 27% [95% CI 21% to 33%] across all sites. In Bagamoyo, VE for 5–17 months was 49.5% (95% CI: 29.2% to 64.0%) and 37.8% (95% CI: -13% to 65.7%) for the 6–12 weeks cohort. In Korogwe VE was 55.7% (30.6% to 71.7%) in 5–17 months cohort and 48.3% (95% CI: -48 to 74.5%) in 6–12 weeks cohort. The RTS,S/AS01 malaria vaccine prevented approximately half of the malaria episodes in children and one-third of the episodes in infants during the 18 month of follow-up. The RTS,S/AS01 could be incorporated as a complimentary tool in the control of malaria. The vaccine efficacy was highest during the first part of the study and waned during the follow-up. Some of the infant and children received a fourth vaccine injection at month 20, and the impact of this booster dose on vaccine efficacy will be reported.

BMR 26: 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 to target 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. Study Design: 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. Parents of study subjects were encouraged to seek care at the nearest health facility for any illness and transport was facilitated. 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) were considered seropositive. A total of 1,234 and 627 subjects were tested at screening in the intervention and control arms, respectively. At baseline, 34.4% and 35.2% subjects were
considered seropositive in the intervention and control arms, respectively. One month post dose, 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 subjects in the intervention and control arms, respectively. One month post dose, the seropositivity was shown to be 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). Children 5-17 months age cohort had a better immune response following vaccination with experimental Malaria vaccine compared to infants cohort.

**BMR 27: Safety of the RTS,S candidate malaria vaccine in multi-centre phase III randomized double-blind trial in African children, 20 months after primary vaccination**

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There has been progress in malaria control strategies in recent years with improved diagnostic tool, availability and use of artemisinin based combination therapy for treatment of malaria and use of long lasting insecticides treated nets as protective measure against mosquito bites. Affordable and effective vaccine is needed to complement existing malaria control tools in the fight against the disease. The RTS,S candidate vaccine has been tested in 15460 infants and children in a phase 3 trial conducted in 7 African countries (NCT00866619). The objective was to determine safety of the RTS,S/AS01 Candidate Malaria vaccine 20 months after primary vaccination. 8923 children 5-17 months of age and 6537 infants 6-12 weeks at the time of first vaccination, who were randomised to receive RTS,S or a comparator vaccine administered at one-month intervals, were followed-up at satellite dispensaries or inpatient facility to detect any adverse event reported whether serious or non-serious. Data on serious adverse events were collected by passive surveillance and verbal autopsies were conducted on death that occurred outside hospital. SAE were less frequent in children vaccinated with RTSS,S/AS01 than in control children,18.6% (95% CI 17.6% to 19.6%) versus 22.7% (95% CI 21.2% to 24.3%). While no difference in frequency was found between vaccinated and control young infants, 22.0% (95% CI 20.8% to 23.3%) versus 23.1% (95%CI 21.3% to 24.9%). Meningitis was reported as an SAE in 17 children and 12 in young infants. Pathogen was identified in six children only and in infant group pathogen was found in seven cases. Six children with reported meningitis died, five in RTS,S/AS01 group and one in control group while in Infants four died two from each arm. Meningitis cases were not temporary related to vaccination. Results on safety shows that RTS,S malaria vaccine candidate has an acceptable safety profile and more follow up is needed for cases of meningitis.

**BMR 28: Evaluating preservation methods for identifying Anopheles gambiae s.s. and Anopheles arabiensis complex mosquitoes species using near infra-red spectroscopy**

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Near-infrared spectroscopy (NIRS) has been successfully used on fresh and RNAlater®-preserved members of the *Anopheles gambiae* complex to identify sibling species and age. No preservation methods other than using RNAlater® have been tested to preserve mosquitoes for species identification using NIRS. However, RNAlater® is not the most practical preservative for field settings because it is expensive, requires basic laboratory conditions for storage and is not widely available in sub-Saharan Africa. The aim of this study was to test several cheaper and more field-friendly preservation methods for identifying sibling species of the *An. gambiae* complex using NIRS. In this study we describe the use of NIRS to identify sibling species of preserved *An. gambiae* s.s. and *An. arabiensis*. Mosquitoes of each species were placed in sample tubes and preserved using one of the following preservation methods: (i) refrigeration at 4°C, (ii) freezing at -20°C, (iii) drying over a silica-gel desiccant, (iv) submersion in RNAlater® at room temperature, (v) submersion in RNAlater® at 4°C, and (vi) submersion in RNAlater® at -20°C. Mosquitoes were preserved for 1, 4, 10, 32 or 50 weeks before they were scanned. Storage at 4°C was the only preservation method that, up to 32 weeks, did not result in significantly lower predicted values than those obtained from fresh insects. After 50 weeks, however, refrigerated samples did not give meaningful results. When storing for 50 weeks, desiccating samples over silica gel was the best preservation method, with a partial least squares regression cross-validation of >80%. Predictive data values were analyzed using a generalized linear model. NIRs can be used to identify species of desiccated *An. gambiae* s.s. and *An. arabiensis* for up to 50 weeks of storage with more than 80% accuracy.

**BMR 29: A passive, cheap and long lasting device for attracting and killing outdoor biting mosquitoes around houses**

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Outdoor baited traps are promising complimentary tools to long lasting insecticide treated nets (LLIN) and indoor residual spraying (IRS), yet this technology is difficult to implement in resource areas because of the expensive source of carbon dioxide (CO2), delivery of synthetic attractants and power source. This study aimed to develop prototype device, to determine synthetic attractive blend, bioactive and the source of CO2 that are required to be incorporated inside a passive device to sustainably attract and kill malaria vectors outside houses. A prototype was used either treated with bioactive or untreated during experiments. This device was hanged inside an experimental hut 75cm from the ground, a total of 200 female *Anopheles arabiensis* were released and left to forage overnight. The recaptured mosquitoes were identified as either dead or alive and held in the insectary to record 24 hours mortality rates. The proportion of dead mosquitoes was compared between treated and untreated. Further experiments were conducted to evaluate the potential of CO2 to improve attractiveness of synthetic attractants and light by hanging: One trap with source of light, CO2 and synthetic attractants such as BG lures and another trap only source of light as control. The catches of mosquitoes by the traps were compared between treatment and control traps. These experiments were replicated three times. The attractants in the passive device had significantly improved its killing effect than untreated device (worn socks: \( \chi^2 = 14.01, P < 0.001 \), Ifakara blend: \( \chi^2 = 20.60, P < 0.001 \), and mbita blend: \( \chi^2 = 15.26, P < 0.001 \)). The source of CO2 had significantly improved the attractiveness of BG lures by >80% (lactic acid: \( \chi^2 = 362.44, P < 0.001 \), ammonia: \( \chi^2 = 100, P < 0.001 \), and light source: \( \chi^2 = 48, P < 0.001 \)) relative to lure or light without CO2. The source of CO2 has strongly improved attractiveness of synthetic attractants by 2–3 times more than that of light source. The passive, cheap and long lasting device requires slow release of synthetic attractive blends, sustainable source of CO2 and bioactive to kill >90% of attracted mosquitoes. Therefore,
experiments are ongoing to exploit a sustainable source of CO2 from human dwelling houses and testing slow release “granular” formulations of synthetic attractive blends.

**BMR 30: Efficacy evaluation of the odour baited mosquito landing box fitted with electrocuting grids for controlling and monitoring of outdoor malaria vectors in rural Tanzania**

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Efficacy evaluation of the odour baited mosquito landing box (MLB) fitted with electrocuting grids for controlling and monitoring of outdoor malaria vectors in rural Tanzania. Despite tremendous successes of frontline interventions against malaria such as long lasting insecticides treated nets and indoor residual spraying; still there is a significant level of residual malaria transmission that kills nearly 620,000 people annually. These residual transmissions are fueled by mosquitoes that bite people outdoors when they are conducting their routine activities before going to bed. Field experiment was conducted against wild mosquitoes whereby a comparative study was done using Mosquito Landing Box (MLB) equipped with three commercially-available electrocuting grids. The comparative evaluation was done against Mosquito Magnet X (MMX), BG Sentinel (Biogents) and medically supervised Human Landing Catch (HLC) as a standard method. All the sampling methods except HLC which relied on the attractants from natural human being were baited with Ifakara synthetic blend that was tested to be more attractive than human at a wide range. A total of 14462 female mosquitoes were collected from the four sampling methods, whereby of 7% (994) were instantly killed and collected from MLB fitted with grids; 10% (1457) were collected from HLC; 30% (4371) were collected from BG Sentinel and 53% (7640) were collected from MMX. Significantly more mosquitoes were collected from MMX and BG Sentinel respectively. Slightly more number of mosquitoes were sampled using HLC than MLB fitted with electrocuting grids. The higher number of mosquitoes collected from MMX and BG Sentinel might be due to suction and trapping mechanism of the devices that also contain the sampled mosquitoes from escaping once they either attempt or make contact as they are looking for host unlikely HLC neither MLB which doesn’t have trapping and suction mechanism. We conclude that it is possible to target outdoor mosquitoes using Mosquito Landing Box equipped with low-cost electrocuting grids. Furthermore this device could offer a safe and affordable means of monitoring mosquito population density and disease transmission intensity outdoor that replace HLC methods which has lots of limitations. Further studies are on going to optimize the MLB by covering the wide surface area of the MLB with the electrocuting grids, thus, increasing the mosquito mortality.

**BMR 31: Attracting and killing outdoor-biting malaria vectors using odour-baited mosquito landing boxes fitted with low-cost electrocuting grids**

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On-going residual malaria transmission is increasingly due to outdoor-biting vector populations, even in communities where the common indoor insecticidal interventions like indoor residual spraying (IRS) and long-lasting insecticide treated nets (LLINs) are used. In most cases the vectors are also physiologically resistant to the insecticides and therefore this is a major obstacle to the goal of malaria elimination. A recently developed odour-baited device, i.e. the mosquito landing box (MLB), was improved by fitting it with low-cost electrocuting grids. An automated water-proof light sensor was added to automatically switch the attractant-dispensing and
mosquito-killing systems on and off, thus conserving energy, improving safety and reducing need for human handling. Three MLBs fitted with, one, two or three grids were comparatively in a malaria endemic village in south-eastern Tanzania in dry and wet seasons. The number of mosquitoes killed was significantly higher when the MLBs had two grids or three grids, relative to one grid (P<0.05), regardless of species or season. During the wet season, MLBs with two or three grids killed more Anopheles arabiensis (P<0.001) but equal numbers of Anopheles funestus (P>0.05) compared to MLB with one grid. In dry season tests, MLB with three grids killed more An. arabiensis (P<0.001), but equal number of An. funestus (P=0.515) as one grid, while MLB with two grids killed more of both An. arabiensis and An. funestus (P<0.001). The MLBs were most efficient against An. arabiensis, for which estimated mean numbers [and 95% confidence intervals] killed per night using one, two or three grids were 13.8[9.9-19.3], 22.0[19.0-25.5] and 36.0[9.2-141.8] respectively in dry season, and 17.7[15.6-20.0], 32.7[29.1-36.7] and 28.8 [25.5-32.5] in wet season. Of all mosquitoes killed, 99% were non-blood fed, suggesting they were host-seeking. Odour-baited MLBs fitted with low-cost electrocuting grids and light-based on/off automation can effectively kill outdoor-biting disease transmitting mosquitoes, including the major malaria vectors, even if the mosquitoes are behaviourally or physiologically resistant to current interventions like LLINS and IRS. These devices could therefore have potential either for surveillance or for complementary passive control to accelerate malaria elimination efforts, particularly in communities where outdoor-biting and outdoor-transmission is increasingly important.

BMR 32: Mosquito host preferences affect their response to synthetic and natural odour blends
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The anthropophilic malaria mosquito Anopheles gambiae sensu stricto (hereafter termed Anopheles gambiae) primarily takes blood meals from humans, whereas its close sibling Anopheles arabiensis is more opportunistic. Previous studies have identified several compounds that play a critical role in the odour-mediated behaviour of Anopheles gambiae. This study determined the effect of natural and synthetic odour blends on mosquitoes with different host preferences to better understand the host-seeking behaviour of mosquitoes and the potential of synthetic odour blends for standardized monitoring. Odour blends were initially tested for their attractiveness to Anopheles gambiae and Anopheles arabiensis in a semi-field system with MM-X traps baited with natural and synthetic odours. Natural host odours were collected from humans, cows and chickens. The synthetic odour blends consisted of three or five previously identified compounds released with carbon dioxide. These studies were continued under natural conditions where odour blends were tested outdoors to determine their effect on species with different host preferences. In the semi-field experiments, human odour attracted significantly higher numbers of both mosquito species. However, Anopheles arabiensis was also attracted to cow and chicken odours, which confirms its opportunistic behaviour. A five-component synthetic blend was highly attractive to both mosquito species. In the field, the trap catch of An. arabiensis and An. funestus depended on the odour bait used, while no differences between treatments were found for Culicines. The synthetic odour blend caught significantly more An. funestus than traps baited with human odour, while no difference was found for An. arabiensis. Catches of Anopheles arabiensis and Culicines contained large numbers of blood-fed mosquitoes, mostly from cows, which indicates that these mosquitoes had fed outdoors. Different odour baits elicit varying responses among mosquito species. Synthetic odour blends are highly effective for trapping mosquitoes; however, not all mosquitoes respond equally to the same odour blend. Combining fermenting molasses with synthetic blends in a trap represents the most effective tool to catch...
blood fed mosquitoes outside houses, which is essential for understanding outdoor malaria transmission.

**BMR 33: Malaria mosquito abundance and infectivity rate before and after vector and disease interventions in Mvomero District, Tanzania**

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In Sub-Saharan Africa, malaria is most important mosquito-borne disease. This study was carried out to determine mosquito population and malaria transmission intensity before and after interventions. The study was carried out from April 2011 to July 2013 in Mvomero District in Tanzania and covered 24 villages. In each study village, adult mosquitoes were sampled using CDC light traps in 9 rounds in different seasons of the year in 2011, 2012 and 2013. Baseline mosquito indices were compared with those after interventions. The interventions were: larviciding; larviciding+early diagnosis and prompt treatment (EDPT); EDPT; and control. A total of 28,845 female *Anopheles gambiae* sensu lato (98.6%) and *An. funestus* (1.4%) were collected. There was a substantial village to village variation and seasonality in the density of Anopheles mosquitoes, with peaks during the long rainy season. The mean *An. gambiae* per round was 4,584 and 1,987 before and after intervention, respectively. *An. funestus* density per round was 79 and 17, before and after intervention, respectively. The overall sporozoite rates for *An. gambiae* and *An. funestus* were 0.50% (7/1398) and 0% (0/8), respectively. Sporozoite rate in *An. gambiae* was 0.44% (2/455) before and 0.53% (5/943) after intervention. There was a significant reduction in *An. gambiae* density within similar season before and after the intervention. The overall entomological inoculation rate (EIR) dropped significantly two months after the initiation of the interventions and lasted for 12 months. The lowest EIR was in the villages with larviciding + EDPT intervention. Malaria control should consider an integration of vector control and disease management strategies.

**BMR 34: Bio-efficacy of Duranet nets against wild populations of *Anopheles gambiae* s.l. in experimental huts, Magugu, Tanzania**

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The resistance of mosquitoes to insecticides used in public health vector control is becoming a major problem globally. A new generation of long-lasting insecticidal bed nets (LLIN) has been developed with increased efficacy against these resistant mosquitoes. DuraNet is a pyrethroid (alphacypermenthin, 5.8g/kg±25%) treated rectangular LLIN. The present study therefore sought to test the efficacy of the pyrethroid LLIN Duranet versus the registered LLIN PermaNet® 2.0, PermaNet® 3.0 in an Eastern Africa hut design in Magugu in northern Tanzania, wild mosquitoes population has been identified as *An. gambiae* s.l. WHO Standard laboratory bioefficacy evaluations of DuraNet, PermaNet® 3.0, untreated polyethylene and PermaNet® 2.0 that were unwashed or had been washed 20 times.. Standard experimental hut evaluations were conducted in an area with highly population of *An. gambiae* s.l. Blood feeding inhibition for PermaNet® 2.0 and PermaNet®3.0 unwashed and washed 20 times was 95% while for Duranet unwashed was 98.9% and for 20 times washed was 95.5%. The adjusted mortality of the wild mosquito population in the PermaNet® 3.0 was 90% for both unwashed and washed, PermaNet® 2.0 was 80% and 70% for unwashed and washed respectively, while DuraNet was 90 and 100% for
unwashed and washed respectively. DuraNet having a significantly higher killing effect than the other treatments. No significant difference in deterrence or induced exophily was detected between the treatment arms. There were no adverse effects reported among sleepers in the experimental huts. Results indicate that the pyrethroid net DuraNet® fulfills the WHO criteria for an LLIN, and that it has increased efficacy compared against the other pyrethroid-only LLIN PermaNet® 2.0 and PermaNet® 3.0, a pyrethroid-synergist when evaluated against wild population of An. arabiensis from Northern Tanzania. Based on the outcomes of this study, Duranet have shown the same efficiency as registered products on protection. Duranet can be deployed for community use in Tanzania.

BMR 35: Bio-efficacy of the liquid formulation of Griselesf and Bactivec biolarvicides under laboratory and semi field conditions against three mosquito species
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Malaria, Filariasis and Dengue vector control efficient tools are of priority in making up a healthy community. Targeting larval habitats seems novel and successful in complementing existing tool as larvae are immobile. This study evaluated bioefficacy two biolarvicides, Griselesf and Bactivec against Anopheles gambiae s.s., Culex quinquefasciatus and Aedes aegypti in laboratory and semi-field conditions. Healthy mosquito larvae were used for three species at third instars of An. gambiae s.s., Cx quinquefasciatus and Ae. aegypti. Both larvicides stock solutions were diluted into six serial solutions 1000, 500, 250, 125, 62.5 and 31.25ppm. Each dosage had six replicates for each dilution each with 20 larvae of third instar. Mortality was scored in 24, 48 and 72 hours. Mortality recorded for both biolarvicides was found to be 100% for An. gambiae s.s and Cx quinquefasciatus. For Ae. aegypti mortality ranged from 89 to 100 in laboratory and semi-field conditions, respectively. Overall LC50 and LC95 varied between the biolarvicides. The mortality results observed in these biolarvicides was conclusive for WHO to be used at community level. We recommend these bio-pesticides to be registered in Tanzania to be used for control of An. gambiae s.s., Cx quinquefasciatus and Ae. aegypti.

BMR 35*: Persistence of pyriproxyfen in mosquito breeding habitats
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Malaria prevention by mosquito population control needs effective measures to control mosquito at their immature stages. The aim of this study was to determine the persistence of PPF larvicide in the resting sites (pots) and in breeding habitats when autodisseminated by the ovipositing mosquitoes. In two different sections of a semi field system (control and PPF treated SFS sections), mosquitoes were released in both control and treated sections and allowed to feed on a calf within the sections. Small basins with soil and water were used as breeding habitats. Several releases of mosquitoes were made at different intervals to determine the persistence of PPF powder in pots. When there were no more larvae in contaminated basins, several introductions of stage three An. arabiensis larvae were done at different intervals of time, to determine the persistence of PPF in basins. In pots PPF was still biologically active even at 53 days post pots’ dusting when transferred into breeding habitats. In conclusion, pyriproxyfen is a potent larvicide, which can be used extensively to control mosquitoes at aquatic stages.
NEGLECTED TROPICAL DISEASES

BMR 36: Epidemiological and clinical Investigation of Dengue infection in Dar es Salaam, Tanzania
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In recent years, Tanzania has experienced Dengue epidemics in 2010, 2012-2014. The objectives of this study were to (i) determine the incidence of dengue virus in patients with febrile illness; and (ii) assess clinical signs; symptoms and complications associated with dengue and validate the clinical case definition. This cross-sectional study was conducted in Dar es Salaam, involving seven health facilities from the three districts. Patients with fever ≤ 7 days were tested for dengue and malaria using rapid diagnostic tests. Dengue warning signs were recorded. Demographic, environmental and clinical data were collected from patients using a questionnaire. A total of 483 patients presenting with fever were enrolled. Majority of patients (37.4%) were 15-29 years old. Out of the enrolled patients, 110 (22.8%) had recent or past dengue infection. Warning signs were seen in 42 patients (41.6%). The incidence of acute dengue infection (Ag/IgM) was 101 (20.9%) while 9 (1.9%) were IgG positive indicating past infection. Kinondoni had the largest number of patients with dengue infection (48.5%). Risk of acquiring acute infection in the 15-44 year age group was 3 times more than other age groups. Patients with dengue infection were more likely to have previous or were on anti-malarial treatment than patients without acute infection. The odds of acquiring acute infection was 2.5 times higher in employed than unemployed patients. Acute dengue infection was associated with myalgia and arthralgia. Twenty-one (20.8%) patients with acute infection were positive for malaria by rapid test.

In conclusion, the incidence of dengue among febrile patients was high with 20.8% co-infected with malaria. Important risk factors associated with dengue infection in Dar es Salaam were age and employment. Clinical symptoms associated with acute infection were fever, myalgia and arthralgia. Guidelines and diagnostic capacities need strengthening for better patient management.

BMR 37: Entomological investigation of the risk of dengue transmission in Dar es Salaam, Tanzania
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In recent years, Tanzania has experienced four dengue epidemics in 2010, 2012, 2013 and 2014. The objectives of this study were to determine the (i) abundance and pattern of Aedes aegypti infestation and container productivity; and (ii) infection rate of the mosquito vectors. This cross-sectional study was conducted in Ilala, Kinondoni, and Temeke districts. Adult and immature stages of mosquitoes were sampled using standard techniques. Dengue virus infection in mosquitoes was determined using real time reverse transcription polymerase chain reaction. A total of 991 adult mosquitoes were collected using Mosquito Magnet traps; most of them were collected in Kinondoni District (59.9%). Aedes aegypti accounted for only 17.2% of the mosquito collected. The most common breeding containers for the Aedes mosquitoes were discarded plastic containers and used tyres. Of a total of 796 houses inspected, 38.3% had water-holding containers in their premises. Kinondoni had the largest proportion (57.7%), followed by Temeke (31.4%) and Ilala (23.4%). House Aedes indices were 18.1% in Ilala, 35.3% in Kinondoni and 25.5% in Temeke. The respective container indices were 77.4%, 65.2% and 80.2%. Of the reared larvae and pupae, 5,250 adult mosquitoes emerged. Of these, 3,250 (61.9%) were Aedes aegypti, 800 (15.2%) Aedes simpsoni and 1,200 (22.9%) Cx. quinquefasciatus. An overall 8.2% of the mosquitoes were infected
with dengue viruses. Based on molecular detection of dengue virus in the laboratory, mosquito infectivity was highest in Ilala (10.3%) followed by Temke (8.5%) and Kinondoni (6.8%). This study has established that Aedes aegypti is the main vector of dengue in Dar es Salaam and breeds mainly in medium size plastic containers and tyres. The overall and site specific house indices were over 10% indicating that all three districts were at high risk of dengue transmission.

**BMR 38: Modelling climate change influence on distribution of dengue fever epidemics risk areas in Tanzania**

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Dengue fever is the second globally important vector-borne disease of humans after malaria. Dengue has recently dramatically increased in frequency possibly due to climate change. Model climate projections in Tanzania indicate future increases in average annual temperatures of 1°C to 3°C above the baseline by 2050s. The objective was to assess the influence of climate change on distribution of dengue fever vectors in relation to disease epidemic risk areas in Tanzania. We used ecological niche models to estimate distribution of Aedes aegypti based on dengue fever cases presence only data approach. Vectors data from recent outbreak in Dar es salaam and climatic predictors for the current and future projections were used as model inputs. Model prediction indicated habitat suitability for Aedes aegypti for current scenario to be highly localized in the coastal areas such as Dar es salaam, Pwani, Tanga and Zanzibar while spreading towards the southern coastal areas. Model indicates other risk areas around Lake Victoria, Kigoma and Mbeya regions. For 2020 scenario, anticipated high risk areas are spreading towards the central region of Tanzania indicating more emerging risks in Tabora, Arusha and Manyara regions. However, the risk seem to disappear in part of Lake Victoria, Kigoma and near Lake Nyasa. For 2050 year, predicted habitat suitability indicated slightly similar potential for change as for 2020 but with a slightly more shift in the risk distribution towards the central and north-eastern parts. Generally, model findings indicated areas around Dar es salaam, Tanga and Mtwarra regions and Zanzibar will continue to remain at high risk through 2050. Climate change represents a threat to emergence of more risk areas for dengue fever epidemics in Tanzania. A collaborative approach is recommended to develop and adapt control and prevention strategies that will help manage the risk.

**BMR 39: Spatial heterogeneity of habitat suitability for Rift Valley fever occurrence in Tanzania; ecological niche modelling and relative risk mapping**

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From 1930, when Rift Valley fever (RVF)-like disease was reported for the first time in Tanzania, a total of 10 outbreak waves had been reported in the country. This study was designed to identify suitable habitats for the occurrence of RVF in Tanzania in order to guide surveillance, prevention and control strategies. The bioclimatic, anthropogenic, geographical, weather and topographical
predictor variables were the inputs into the MaxEnt software. The optimal combination of predictor variables into the final model was the one that generated the highest area under the receiver characteristic curve (AUC) but lowest Akaike’s information criterion (AIC), sample-size corrected Akaike’s information criterion (AICc), Bayesian information criterion (BIC) and minimum AUCDiff. The habitat suitability map produced from the MaxEnt output was converted to raster layer using ArcGIS 10.2. The best fit model was the one that included the rainfall pattern, livestock density, soil types, elevation and proximity to forest. The highest probability of disease occurrence was 0.867 and this coincided with the locations in the north-eastern, central and lake zones in Tanzania. Locations in the north-western and southern-highlands of the country had medium risk whereas the western and southern locations of the country had low risk of disease occurrence. The mean AUCtest of the model was 0.738. The findings of this study illustrate the current extent of suitable habitat for RVF occurrence throughout Tanzania. The results suggest that, the main determinants of habitat suitability for RVF are rainfall pattern, livestock density and soil types. The north-eastern, central and lake zones of the country have larger amount of suitable habitat for RVF occurrence than the western and southern parts. The findings of this study would provide guidance to planners to the targeted cost-effective usage of disease surveillance, prevention and control resources.

**BMR 40: Mosquito abundance and transmission indices of Wuchereria bancrofti after nine rounds of mass drug administration on Mafia Islands, eastern Tanzania**

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Lymphatic filariasis (LF) is a chronic infection caused by Wuchereria bancrofti and transmitted by mosquitoes. Mosquito vector control interventions using insecticide treated materials have proved to be inefficient in controlling expanding population of Culex quinquefasciatus due to its reduced susceptibility. The objective of this study was to determine mosquito abundance and transmission of lymphatic filariasis in Mafia Island in Tanzania after 9 rounds of mass drug administration. This study was carried out in Mafia Island in eastern Tanzania. Adult mosquitoes were sampled indoors in three villages namely Chole, Kiegeani and Kilindoni. To complement CDC light trap mosquito catches, CDC gravid traps were used to collect gravid Cx. quinquefasciatus outdoors. Trapped mosquitoes were dissected and examined for Wuchereria bancrofti infection using microscopy and PCR technique. Overall, a total of 38,655 mosquitoes were collected using CDC light trap (46.1%) and Gravid trap (53.9%). Cx. quinquefasciatus accounted for the largest proportion (90.3%) of mosquitoes collected. There was village to village variation in the abundance of mosquitoes, with most of them being collected in Kiegeani (76.7%) followed by Kilindoni (16.6%) and Chole (6.7%). Six (0.17%) of the dissected Cx quinquefasciatus were found to be infected with an infective L3 W. bancrofti. Infective Cx. quinquefasciatus were only found in Kiegeani (0.10%). Using PCR technique, of 323 pools tested, 34.8% were infected with at least a larval stage of W. bancrofti. Mosquito filarial infection rate was highest in Kiegeani (41.6%) and lowest in Chole village. Cx. quinquefasciatus is the dominant man-biting mosquito in Mafia Islands. W. bancrofti transmission is prevalent on the Island with an infectivity rate of 0.09%. It is important that the control of Cx. quinquefasciatus are emphasised to contain the on-going transmission of W. bancrofti on the Islands.
BMR 41: 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), neem seed cake extract (NSCE) and NSCE plus grass infusion (GI) 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 was remained effective for a period of 7 days. NSCE alone and GI+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 GI+NSCE offer an excellent potential for developing an environmentally friendly mosquito management tool that could supplement currently available strategies.

BMR 42: Pastoralist livelihoods and perception of risk relating to human and animal diseases in Ngorongoro District, northern Tanzania

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The burden of poverty and disease continue to affect pastoralists in Tanzania. Their knowledge of seasons and the ecosystems and their coexistence with the wildlife has evolved over centuries to manage human and animal health problems, including food insecurity. Changing social, environmental, economic and political conditions arising locally and globally are reducing their resilience to disease and food scarcity. However, this conflict has neither been adequately explored nor resolved. The objective was to assess pastoralists’ perception, knowledge and practices on human and animal diseases and their risk factors in Ngorongoro District, northern Tanzania. A situational analysis using focus group discussions, interviews and observations was employed to collect preliminary data on perceived contemporary human and animal disease syndromes including their risk factors with high impact on food security. Findings show that the changing institutional setting of land management has an impact on pastoralist’s capacity to address human and animal diseases. The pastoralists had high knowledge on animal compared to human diseases. Pastoralists, increase resilience to food insecurity and stochastic disease or...
drought events by herd maximization and in this way mitigate against poverty. Modern medical and veterinary systems exist but fail to address the problems locally, across the landscapes and in a timely manner, putting further burden on the pastoral economy through the extra cost of losses, accessing diagnostics, medicine and treatment. Inability to reach diagnosis compels people to implement decisions relying on disease syndromic knowledge alone resulting in extra social and economic costs through misdiagnosis and inappropriate treatment or control measures applied. Perceived risks to diseases versus local lifestyles and consequently health seeking options seem not to match disease control possibilities. Participants were conversant of the interactions between their livelihoods and ecosystem and how these may lead to diseases. A consideration of pastoralist’s livelihoods in their ecosystem is crucial for disease control. However more disease focused ethnographic and socio-economic studies are needed to further understand the broader dynamics on how pastoralists make decisions to identify and address health issues within their broader ecology.

43: Leptospirosis burden in Africa with recent updates from Tanzania
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Leptospirosis is a zoonotic bacterial disease affecting humans and animals worldwide. Africa has the highest burden of leptospirosis globally. Mean annual incidence of leptospirosis in Africa is 95.5 people per 100,000 individuals. In Western Pacific is 66.4, Americas 12.5, South East Asia 4.8 and Europe 0.5. Surprisingly, in Africa leptospirosis is most neglected and is not diagnosed. Awareness of leptospirosis among medical personnel, animal health workers and the general public is largely lacking across Africa despite higher prevalence. The objective of this study was to give insights and updates on current status of the burden of leptospirosis in Africa with recent findings from Tanzania covering humans, domestic animals, small mammals and fishes. To highlight the common Leptospira strains from diverse reservoir hosts for potential use in the diagnosis of leptospirosis in Tanzania and across Africa. Leptospirosis was detected by gold standard microscopic agglutination test (MAT) for anti-leptospiral antibodies in serum samples serially diluted before mixing equal volume with live leptospires, incubating at 30°C for 4 hours and examining for agglutination under dark-field microscopy. Human leptospirosis prevalence in Tanzania is higher (9%-15%). The disease is widespread in rodents (17%), bats (20%), pigs (41%), dogs (37%) and fishes (54%) in Tanzania. Local serovars Sokoine, Kenya, Lora, Mwogolo, Canicola and Grippotyphosa were isolated from animal urine and kidneys. Major factors limiting awareness and diagnosis of leptospirosis in Tanzania and other African countries include absence of Leptospira specimens for teaching in medical schools, and insufficient knowledge and inadequate availability of live local Leptospira strains for diagnosis. In conclusion, high prevalence of leptospirosis in various animal hosts interacting much with human calls for urgent control interventions to improve livelihood and livestock productivity. Scaling-up the diagnosis of leptospirosis currently only conducted at Sokoine University of Agriculture, for research purposes, should be highly prioritized.

44: TORCH antibodies among pregnant women and their newborn receiving care at Kilimanjaro Christian Medical Centre in northern Tanzania
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Toxoplasmosis, Rubella, Cytomegalovirus and Herpes simplex Virus-2 (TORCH) are infections affecting both mother and her foetus with adverse short and long term outcome to the foetus. Majority of infected mothers are asymptomatic and this leaves only speculation as to the
probable cause of many congenital anomalies, still births, prematurity and death seen in TORCH infections. The main objective of this study was to investigate the seroprevalence of TORCH antibodies among pregnant women and their newborn receiving care at Kilimanjaro Christian Medical Centre (KCMC), Moshi, Tanzania. This was a cross-sectional hospital-based study which was conducted from December 2013 to April 2014. We recruited and tested 347 pregnant women attending antenatal clinic and who opted to deliver at KCMC. We tested 308 newborns born to these mothers. TORCH antibodies were identified by ELISA testing for IgG and IgM for mothers and IgM only for neonates. A structured questionnaire was used to collect data of mothers and their newborns. The seroprevalence of TORCH IgG antibodies among pregnant women were 44.4% for *Toxoplasma gondii*, 89.6% for Rubella, 98.6% for Cytomegalovirus (CMV) and 99.7% for *Herpes simplex* virus type 1 and 2. For Herpes 1 and 2, the IgM antibodies were found in 137 (39.5%) of the 347 pregnant women included in this study. A total of 11 newborns had IgM antibodies to Herpes 1 and 2 giving a seroprevalence of 3.6%. Only one newborn had IgM antibodies to Rubella giving a seroprevalence of 0.3%. None of the newborn had antibodies to Toxoplasmosis and CMV. Exposure to TORCH was high among pregnant women in our population. Seroprevalence to HSV1 and 2 amongst pregnant mothers and their newborn may disturb maternal, fetal, and neonatal health hence antenatal screening is reasonable.

**BMR 45:** Existing Ebola treatment in medicinal plants: First Ebola cure from tobacco and the possibility for discovery of more anti-Ebola drugs from traditional medicine

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Ebola virus causes severe viral hemorrhagic fever with a high case fatality rate. Five Ebola virus species within the genus Ebolavirus are known including four that cause Ebola virus disease (EVD) in humans (a fifth species has only caused disease in nonhuman primates). The 2014 outbreak of EVD in West Africa, caused by Ebola virus (Zaire ebolavirus species), is the largest outbreak of EVD in history. Ebola virus subtype Zaire (Ebo-Z) induces acute haemorrhagic fever and a 60–80% mortality rate in humans. Ebola virus can be transmitted by direct contact with blood, body fluids, or skin of EVD patients or persons who have died of EVD. Infection with Ebola hemorrhagic fever (EHF) results to the production of virus-specific immunoglobulins (IgG and IgM) antibody titres in patients. Survivors from Ebola infection presents rise in IgG five to 18 days after infection and persist at least 21 months. Survivors of an Ebola infection typically have produced effective antibodies (IgG and IgM) against the virus (otherwise they wouldn't have survived) and that, transusions of their blood into a newly infected individual help that person survive from Ebola disease. On this background, a number of immunomodulatory medicinal plants such as tobacco that stimulate specific immunoglobulin production (IgG and IgM) may similarly have curative effects on the Ebola disease. The first treatment prepared from tobacco has already shown to cure two United States Ebola patients. This paper presents and discusses the tobacco anti-Ebola treatment and immunomodulatory medicinal plants that enhance immune function by increasing antigen-specific immunoglobulin production similar to serum from patients used in the treatment of Ebola as well as for their potential in the treatment and control of Ebola.

**BMR 46:** Developing an epidemic preparedness framework in the Southern Highlands in Tanzania

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The Ebola outbreak in West Africa has shown the need to establish efficient structures within the local health services which are prepared to identify, contain and manage outbreaks. The Southwest zone of Tanzania has high human population mobility to and from neighboring countries, namely Democratic Republic of Congo (with confirmed history of Ebola outbreaks), Zambia (with confirmed history of Lujo virus infection) and Malawi. Hence the development of a Zonal Outbreak Preparedness Plan (ZOPP) for this region is crucial. The Ministry of Health and Social Welfare has issued guidelines to the Regional Medical Officers and identified the Mbeya Zonal Referral Hospital (MZRH) as a Regional Preparedness Focal Point (RPF) who will be crucial actors in the ZOPP. We aim to develop a ZOPP, which is led by a Core Epidemic Response Unit (CERU) composed of representatives from the seven regions in the South East Zone and the MZRH as RPF. We further aim to integrate and utilize the research activities carried out by the National Institute for Medical Research (NIMR) aimed to characterize the epidemiology and the circulating viral strains of acute febrile illness in the zone. The MZRH in collaboration with NIMR and international partners will develop a contingency plan for the southern zone through a participatory approach involving various stakeholders to harmonize the regional, zonal and national outbreak preparedness frameworks. The presentation will discuss on challenges and opportunities in the in management of highly contagious diseases in resource poor setting of Sub-Saharan Africa.

BMR 47: Genetic diversity of *Glossina fuscipes fuscipes* and its implication in the control in the Lake Victoria Basin, Tanzania

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The genetic diversity of *Glossina fuscipes fuscipes* has been studied extensively in Uganda and Kenya. Results indicated the species had a high level of genetic diversity in these countries. Very little is known on the genetic diversity of *G. f. fuscipes* along the shores of Lake Victoria on Tanzania side. Therefore, a genetic diversity study on *G. f. fuscipes* was carried out along the shores of Lake Victoria (Rorya, Ukerewe and Bukoba) to provide genetic data that would be invaluable, in association with ecological data, in planning an appropriate control programme in the region. Both microsatellite and mitochondrial analysis results showed that, the populations of *G. f. fuscipes* in the studied locations were highly structured except in Rorya sites. The *G. f. fuscipes* populations in Rorya sites was the least genetically differentiated indicating that the district could be at high risk of reinvasion if control efforts were to be implemented. Based on these results, regional area wide control approaches such as SIT are recommended for this species in the study area but effective barriers will need to be installed between and around Rorya sites to determine the risk of re-invasion.

BMR 48: Clinical, cellular and parasitological aspects of onchocerciasis after community directed treatment with ivermectin in Ruvuma, south western Tanzania

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Onchocerciasis is a chronic disease among the neglected tropical diseases (NTDs) persisting in the environment due to the interaction between filarial worm and black flies (Simulium). Enormous dermatitis and visual impairment affects around 37 millions individuals in the world. In Tanzania, 15 districts are endemic with an estimated four million individuals at risk. Despite the community directed treatment with ivermectin (CDTI) strategies in place for over a decade, the current magnitude and severity of the disease in this focus is not clearly known. The aim of this study was to determine the current infection rate and clinical disease in the focus. In this descriptive study, physical examination and skin snipping were carried out to diagnose onchocerciasis. Quantitative PCR was used to confirm diagnosis and determine Onchocerca volvulus (OV) genome present in the skin specimen. A total of 106 individuals were studied. Over half (59.4%) were males with median age of 49.5 years and IOR was 36 to 62 years. The prevalence of microfilaridermia in hyper- and hypo/non endemic communities was 51 (48.1%) and 2 (1.0%) respectively with geometric mean intensity (GMI) of 2.8 mff/mg skin (95% CI= 2.5-3.1). The prevalence of troublesome itching was 49 (46.2%) and 1 (0.9%) in the hyper and hypo/non endemic communities, respectively. The prevalence of nodules among the adult’s individuals was 5.0% and 0.0% in the hypo/non endemic communities, respectively. The prevalence of CPOD in the hyper-endemic communities was 26 (24.5%). There was a weak association between CPOD and microfilaridermia (r= -0.27; p=0.047). OV DNA genome was available in 49 (45%) out of 106 participants. The amounts of OV DNA detected in the specimen varied greatly. 12 participants had OV DNA which present higher levels (r2 = 0.25). The presence of cryptic infection by PCR in communities where infections and clinical disease were negative by microscopy is a sign of uninterrupted transmission in the Ruvuma focus. Hence more intensive close supervision on CDTI strategy is warranted.

BMR 49: Population abundance and disease transmission potential of snail intermediate hosts of human schistosomiasis in fishing communities of Mwanza Region, north-western, Tanzania

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Schistosomiasis remains a major public health problem with estimated 240 million cases worldwide whereby more than 90% of these occur in Sub-Saharan Africa. Tanzania is ranked second after Nigeria in terms of disease burden with prevalence of infection as higher as 100% in some communities. We conducted a cross-sectional malacological survey to examine for abundance, identity and disease transmission potential of snails in fishing communities of Mwanza region, Tanzania. Snails were collected from selected sites with high human water contact using standard methods. The most abundant snails species were Biomphalaria sudanica which accounted for 81.25% (n=1470) of snails collected. Bulinus nasutus was the second abundant snail accounting for 13.87% (n=251) while Bulinus globosus was the least abundant snail accounting for 4.86% (n=88). Only 0.57% (n=11) of collected Biomphalaria snails were shedding S. mansoni cercariae while none of the Bulinus snail species were shedding cercariae. Vegetation cover was significantly associated with snail abundance (P<0.001). A positive correlation between water temperature and snail abundance was observed. No correlation was found between pH and snail abundance. The low numbers of snails shedding schistosome cercariae could be as a result of many factors including timing of the study in relation to transmission season.
BMR 50: Assessment of anthelminthic drug efficacy of single-dose Praziquantel against schistosomiasis in the Lake zone of Tanzania

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Praziquantel (PZQ) is the mainstay of schistosomiasis control and has significantly contributed toward a considerable progress that has been made towards the control of schistosomiasis. Although PZQ efficacy was found to be still effective against schistosomab species for many years, however, continual monitoring of PZQ efficacy using standardized approaches is important. The objective was to evaluate the efficacy of a single dose PZQ (40 mg/kg) against Schistosoma species in reducing egg counts in different countries. Tanzania was among of the multinational study partner of multi-centre/country study carried in six countries to evaluate the efficacy of a single dose PZQ against Schistosoma species based on a similar approach. During the baseline, 255 infected eligible children with S.mansoni in Ukerewe district and 252 infected eligible children with S.haematobium in Bariadi district were enrolled after treatment with PZQ standard dosage (40mg/kg). Patients were then followed up between 14–21 days (for cure rate & intensity). Compliance rate during the follow up survey was 90.2% in Ukerewe district as S. mansoni site and 88.9% in Bariadi district as S.hematobium site. Remarkably percentage egg reduction against both species (99.3% for S.mansoni and 98.8% for S. haematobium) was found. Similarly high as for cure rate for both species; 94.6% (CI 91.8 - 97.4) for S.mansoni and 88.5% (CI 84.6 –92.4) for S.hematobium was also noted. PZQ is still highly effective against both species (S.mansoni & S.haematobium). Continual regular monitoring of PZQ against S.mansoni & S.haematobium in our setting is recommended.

BMR 51: Impact of integrated control of schistosomiasis and Soil Transmitted Helminthes over five years in Kome Island, Sengerema district, Tanzania

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Integrated control strategies are important for sustainable control of schistosomiasis and soil transmitted helminthes (STHs), despite their challenges for their effective implementation. With the support of Good Neighbor International(GNI) in collaboration with NIMR, integrated control applying mass drug administration (MDA), health education using Participatory hygiene and sanitation transformation (PHAST) and improved safe water supply has been implemented in Kome island over 5 years for controlling schistosomiasis and STHs. Baseline survey for schistosomiasis and STHs was conducted before implementation any integrated control strategies, followed by four cross sectional follow up surveys conducted among randomly selected sample of school children and adults in all 10 primary schools and 8 villages, respectively, in Kome islands. Those follow up surveys were conducted for impact evaluation after introduction of control strategies interventions in the study area. Five rounds of MDA have been implemented from 2009 along with PHAST and improved water supply with pumped wells in Kome Island as other control strategies for complementing MDA. A remarkable steady decline of schistosomiasis and STHs infection was observed from 2009 to 2012 with significant trend in their prevalence decline, and thereafter infection rate has remained low at sustainable control. By third follow up survey in 2012, S.mansoni infection prevalence was reduced by 90.5% and hookworm by 93.3% among school children while in adults, the corresponding reduction was 83.2 % and 56.9%. Integrated control strategies have successfully reduced S.mansoni and STHs infection status to a low sustainable control. This study further suggests that monitoring and evaluation is a crucial component of any large-scale STHs and schistosomiasis intervention.
BMR 52: Effectiveness of mass de-worming as a control measure against urinary schistosomiasis in school children in Tanga district, north-eastern Tanzania
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Schistosomiasis is a disease caused by Schistosoma species and transmitted by snails. It is the second most prevalent tropical parasitic disease after malaria. Global estimates show that, over 700 million people are at risk due to their socio-economic activities. It is a public health problem of concern in Africa since 85% of the world’s cases estimate are found in Africa. The entire of Tanzania is almost affected by the disease with varying magnitudes. School children are the group mostly affected by the disease and is now targeted for mass drug administration (MDA) using praziquantel. Despite MDA, there has been limited information on the therapeutic efficacy of this strategy in controlling the disease in many areas of Tanzania including Tanga region. The objective was to evaluate the effectiveness of mass drug administration in school children within Tanga district. A cross sectional survey was conducted in Tanga district to assess the effectiveness of MDA in school children. A total of 199 students were enrolled in the study. Demographic data and risk behaviors that could subject children to infection were collected in semi-structured questionnaires. Urine samples were also collected for microscopic examination. A total of 199 students were enrolled, both males and females with a mean age of 10 and 9.7 respectively. Only 27 (%) of the participants were reported to have knowledge of schistosomiasis, whereas 85.4% were not aware of how an individual gets infected. Only (13.6%) received the drug in the previous campaign. Interestingly, less than 50% of those who had heard about schistosomiasis could explain the symptoms. Only 18/199 (9.0%) had schistosomiasis. This study showed that, schistosomiasis has decreased by 70% between 2009 and 2011. However, efforts are needed such as including many stakeholders to support this task for the purpose of eliminating the remaining infection.

BMR 53: An Investigation on the status of schistosomiasis and geo-helminth infections in Milola Ward in Lindi Rural District Tanzania
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Schistosomiasis and soil-transmitted helminths cause anaemia and stunted growth among children in Tanzania and thus constitute a major public health problem in the country. However, the current distribution and risk factors for these infections is lacking for areas in southern Tanzania particularly Milola Ward in Lindi District. This study was initiated to establish the current infection prevalence and intensity of Schistosoma mansoni, S. haematobium and other helminth infections in Milola Ward, Lindi District and assess how the infections vary with locality, age and sex. From September to October 2014, stool and urine samples were obtained from consenting adults and supervised children (> 5 years old) residing in Milola Ward. Stool was examined for S. mansoni and soil-transmitted helminths using the Kato-Katz technique while urine was examined for S. haematobium using haemastix and filtration techniques. Participants’ age and sex were correlated with parasite infection. A total of 246 individuals were enrolled for the study, 107 of which were males while 139 were females. Schistosoma haematobium occurred at 17.89% prevalence followed by hookworms (4.88%) and Trichuris trichiura (2.44%). More females were infected with S. haematobium (19.42%) than males (15.89%). Further, more children had S. haematobium (33.96%) than adults (16.77%). Milola West village was the most infected with S. haematobium (21.67%), followed by Milola A (19.44%) and Mkanga Ulani (16.92%). The least
infected village in this case was Milola B (11.32%). Mkanga Ulani residents had the highest S. haematobium intensity followed by far by residents from other villages. These findings suggest that parasite transmission in Milola Ward may be influenced by both environmental (locality) and demographic correlates (age and sex). Thus control measures for the infections should take these factors into considerations. The usefulness of these results in guiding future control efforts for the diseases in this area is considered.

BMR 54: A comparison of methods for detecting Schistosoma mansoni and soil transmitted helminthes infections among children, North West, Tanzania
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Multivariate techniques, characterized by high sensitivity, specificity, accuracy, precision and reproducibility are essential in building capabilities for a rapid detection and monitoring of infections that pose human and public health problems. The objective was to make a cross-sectional comparison of schistosoma mansoni and soil transmitted helminths (STH) detection methods for their relative sensitivity and predictivity effectiveness. A sample of 454 children’s stool was used for the study. Data were collected from the villages of Kayenze and Sangabuye – Ilemela district. The collected specimens were subjected to Formol ether concentration, Real Time-PCR, Flotac tests for the diagnosis of helminthic ova. A Kappa Cohen Coefficient was thereafter computed for each technique by comparing its results with the gold standard Kato Katz. Finally, the Kappa Cohen coefficients were used for a cross-sectional comparison of the methods sensitivities. Polymerase chain reaction (PCR), Ether concentration, FLOTAC FS7 (ZnSO4) showed high response for S. mansoni in that order. Flotac FS2 (NaCl) was less sensitive. For the detection of hookworm, the sensitivity of FS2 was highest, followed by FS7 and ether concentration. For the PCR which detects species, two species of hookworm were detected, Nector americanus and Ancylostoma duodenale. Other parasites detected, by method in brackets, were: Strongyloides stercolaris and Ascaris lumbricoides (PCR) Enterobius spp ova, Ascaris spp ova, Strongyloides stercolaris larvae, and Taenia spp ova (FS2); Ascaris ova (FS7); and hookworm (ether concentration). Kato Katz provided the highest egg count for s.mansoni at a rate of 350 mean EPG. The findings of this study revealed that PCR is a very sensitive technique for the detection of S. mansoni and hookworm by their species. Though its cost is high but suitable for the epidemiological survey to control Schistosomiasis and STHs at all levels of infections. The sensitivity of FLOTAC FS7 and ether concentration techniques both hold promise for the diagnosis of S. mansoni.
HIV AND TUBERCULOSIS

BMR 55: HIV prevalence and incidence trends in an open rural cohort in northern Tanzania: results after 16 years of follow-up
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With no treatment of HIV available to date, understanding the occurrence of HIV infection remain as one of the important strategies for combating HIV epidemic. This study estimates prevalence and incidence trends using data from an open demographic surveillance cohort in Northern Tanzania. The Kisesa open cohort study conducted 26 rounds of household based demographic surveillance and 6 rounds of individually linked HIV serological surveys between 1994 and 2010. HIV testing was anonymous, based on informed consent without result disclosure. The effect of selective participation in sero-surveys on prevalence and incidence estimates is investigated, using longitudinal knowledge of individuals' testing histories. In addition, incidence estimates make allowance for interval censoring using a multiple imputation procedure for sero-conversion dates. A total of 20,913 adults were interviewed and donated blood specimens for HIV testing in at least one of six serological surveys. HIV prevalence increased steadily from 6.1% in 1994/95 to 8.4% in 1999/2001, then declined to 5.4% in 2003/2004 and started to rise again to 7.0% in the last survey. HIV incidence increased sharply between the first and second intervals, (from 0.9% in 1994-97 1.3% per thousand in 1997-2001) slowly falling down to 0.6% in last interval 2007-2010. In roadside areas incidence fell in the last inter-survey interval, especially among women, contributing to a decline in roadside prevalence, but in remote rural areas incidence (and thus prevalence) rose slightly. HIV spread is continuing in the rural part of the population suggesting a need for more intensive HIV prevention efforts and ART interventions. The leveling off in prevalence is due to a combination of high mortality among HIV infected, and a slight decrease in incidence in roadside villages.

BMR 56: Prevalence and risk factors of metabolic syndrome among individuals living with HIV and receiving antiretroviral treatment in Tanzania
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In Tanzania, fewer studies have investigated the association between MetS and HIV infection among patients on ART using a comprehensive set of risk factors. The objective of the study was to estimate the prevalence and risk factors for MetS among HIV positive patients on antiretroviral therapy (ART) in Tanzania. A cross sectional study was conducted among adults aged ≥18 years living with HIV-infection and receiving ART. The study participants were recruited from 12 care and treatment clinics in Dar es Salaam (urban) and Mbeya (rural) regions between October 2011 and February 2012. The prevalence of MetS was assessed using International Diabetes Federation's criteria. Biochemical assays, anthropometric measurements, demographic characteristics and lifestyle behavioural data were collected. Study response rate was 351/377 (93.1%) and 177 (50.4%) recruited participants were from urban settings and 238 (67.8%) were females. The prevalence of MetS was 25.6% and was higher among participants from urban than those from rural areas (35.6% vs 15.5%, p <.001). The components of MetS including raised triglyceride (43.5% vs 21.3%, p <.001), low high density lipoprotein (85.9% vs 28.2%, p <.001) and raised blood fasting glucose (10.2% vs 5.2%, p =.04) were more common among participants from urban than those from rural settings. MetS Risk factors including; consumption of
fruits/vegetables <5 days/week (77.0% vs 59.3%, p<.001), not participating on vigorous intensity activities (65.5% vs 29.4% p<.001) and consuming mixed cooking oil (animal/vegetable) (15.5% vs 8.5%, p=.03) were higher among participants from rural than those from urban areas. In rural, only consumption of vegetables/fruits <5 days/week (AOR=5.50, 95%CI 1.21-24.95, p=.005) predicted the prevalence of MetS. In urban; sex (female) (AOR=3.01, 95%CI 1.31-6.85, p=.002), having primary/no formal education (AOR=0.32, 95% CI 0.12-0.89, p=.04) and ex- or current alcohol drinker (AOR=2.43, 95%CI 1.17-5.06, p=.02) were significant predictors of MetS. Prevalence, components and predictors of MetS prevailed more in urban than in rural settings. Interventions targeting prevention of MetS to reduce diabetes and cardiovascular diseases should consider settings diversification.

BMR 57: Efficacy and safety of Tashack used singly or concurrently by HIV patients on antiretrovirals in Tanga municipality in Tanzania

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The plethora of diets advocated for HIV-related disease symptoms and herbal mixtures have also not been well scientifically evaluated and documented in Tanzania. This study was carried out to evaluate the impact of using food supplements together with Tashack herbal remedy commonly used in Tanga municipality. This was a clinical observational study conducted in Tanga, north-eastern Tanzania. Enrolled patients were evaluated for HIV-1 antibody status through laboratory testing, monitored and followed-up for their immunological status, quality of life and incidence of opportunistic infections. HIV infected patients taking Tashack and food supplements (AFS-Group) and those taking ARVs in combination with Tashack (TM-Group) revealed significant improvement in haemoglobin levels as compared to patients on ARVs alone (AT-Group). In comparison with ARVs, Tashack alone and in combination of ARVs showed to significantly reduce the viral load below the undetectable limit of 400 copies/ml as well as in improving CD+ counts in the 18 months period. During the 18-month follow up, there was no significant difference in the serum chemistry profile and indeed, the values revealed very slight variation but within the range of the baseline normal values. Most of the patients with sub-therapeutic ARVs plasma concentration were those taking ARVs alone 61.5% (8/13) as compared to those taking ARVs with Tashack 38.5% (5/13). Notwithstanding, the achievement of Tashack alone and in combination with ARVs, the health improvement within 18 months indicates that this herbal medicine has a very high potential as either supplementary or alternative treatment for HIV/AIDS patients and therefore warrants further research with a larger sample size and rigorous study over a longer period of time.

BMR 58: Impact of Pima™ point-of-care analyser on initiation of antiretroviral therapy in Arusha, Tanzania-2013

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CD4 T cell count testing is an indicator of immunological status and is used as a criterion for initiation of anti-retroviral therapy (ART) among HIV-positive patients. According to World Health Organization (WHO), one in five HIV positive patients lack access to CD4 T cell count testing in Tanzania. Limited access and delayed turnaround time in obtaining CD4 T cell count results in late initiation of ART. We assessed the impact of Pima™ point of care analyzer on initiation of ART among HIV-positive patients in Arusha, Tanzania. We conducted a cross-sectional study in
December 2013 in which HIV-positive patients attending the care and treatment center were enrolled from five health centres with Pima™ analysers and five without the analysers. Data were collected using structured questionnaires. Chi-square test and 95% confidence intervals were used to compare outcomes between the two groups. Of 294 enrolled HIV patients, 166 (56.5%) were females. Mean age (SD) years was 35.7 (12.3), and 95 (32.3%) were newly diagnosed. Of the newly diagnosed, 74 (77.8%) were eligible for ART initiation and 40 (54.1%) were from Pima™ sites while 34 (45.9%) were from non-Pima™ sites. Pima™ sites initiated patients earlier (within 3 days) (40, 100%) compared to non-Pima™ sites (4, 11.8%) (p<0.001). Median (IQR) days between first CD4 T cell count to ART initiation in Pima sites was 1 day (1-3) compared to 21 days (16-26) in non-Pima™ sites (p<0.001). Conclusion: Pima™ Point of care CD4 cell counting analysers significantly reduce time from diagnosis to ART initiation of eligible patients. It should be considered as a potential intervention to reduce pre-ART loss-to-follow-up in remote settings.

BMR 59: Virological response following anti-retroviral therapy employing once-a-day 30mg of stavudine in HIV-infected patients: a 24-week randomized controlled study in Dar es Salaam, Tanzania

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Stavudine 30mg has been in use for more than a decade, its toxicity remains a challenge and phase out has picked up. However, the information about viral load suppression (VLS) at a once-a-day dosing is lacking. This is being explored in a prospective open-label randomized controlled study. Naïve HIV infected patients were equally randomized either to receive stavudine 30mg once-daily or zidovudine containing standard dose regimens. Viral load (at six months only), at baseline and six months were determined. Changes at baseline and six months were compared within-and between-groups. Our outcome was proportions of patients who attained VLS < 400 copies/mL at six months and CD4+ T-cell counts recovery. Four hundred and eighty three patients aged ≥ 18 years were analyzed. The overall mean (SD) age was 39 (9) years, being 41 (9) and 38 (9) for males and females respectively. The two groups were similar in demographic, clinical and other clinical laboratory indices at baseline. The median (range) viral load was 55 (15, 1242026) copies/mL and 100 (15, 1347093) copies/mL in the stavudine and zidovudine groups respectively, p=0.7282 Mean (SD) CD4 counts at baseline were 185 (141) cells/ul and 210 (147) cells/ul for the stavudine and zidovudine groups respectively. At twenty four weeks the proportion of patients with VLS < 400 copies/mL was 73.9% (95% CI being 70%, 77.9%) in both groups, there was no statistically significant differences been groups. Compared to baseline and six months values, there was a statistically significant recovery of CD4+ T-cell counts, (p<0.0001), but there was no statistical differences between the groups, p= 0.921. An antiretroviral standard regimen containing stavudine 30mg once-a-day was as effective as zidovudine containing regimen in viral load suppression as well as CD4+ T-cell recovery.

BMR 60: The African cohort study (AFRICOS): Baseline cohort characteristics from the Tanzania site

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Since initiation of US President's Plan for AIDS Relief (PEPFAR) support in the management of HIV/AIDS in 2004, data on the program outcomes especially in African context is limited. The African cohort study (AFRICOS) aims to assess HIV infection, disease progression, comorbidities,
treatment and prevention at multiple African sites. The objective was to describe early enrollment, socio-demographic and clinical characteristics of HIV infected AFRICOS enrollees at the Mbeya, Tanzania site. This was an open-ended cohort study with retrospective data collection at enrollment and subsequent prospective serial data collection, routine phlebotomy and sputum collection. Study visits were one every 6 months. From November 2013 to February 2015, Mbeya site had enrolled 164 HIV infected volunteers, 55.5% females with an age range from 18.9 to 73.1 years (median = 38.4 years). Time since HIV diagnosis was 5.2 years (range: 0 – 29.1 years) and the median duration of ART use was 5.2 years (range: 0 – 28.1 years). At enrollment to the facility, the median CD4 cell count was 139.5 cells/ul (range: 1 – 1084 cells/ul) while the median CD4 cell count at initiation of ART was 110.0 cells/ul (range: 1 – 576 cells/ul). At study enrollment, the median CD4 cell count was 322 cells/ul (range: 2 – 972 cells/ul). Seventy nine (130/164) were taking ART, and among those on ART with viral load results, 36.9% (48/130) had achieved viral suppression <50 copies per mL. HIV co-infection was not infrequent with common infections being Syphilis (7%), Hepatitis B (7.1%), and active pulmonary tuberculosis (2.1%). Serum cryptococcal antigen test was reactive in 3 out of 32 volunteers with CD4 cell count < 200 cells/mL. Early enrollment data show that HIV-infected clients seek care at advanced stages of disease as evidenced by their CD4 counts at clinic enrollment. This demonstrates the need for public health education on the importance of seeking early care and treatment of HIV/AIDS.

**BMR 61: Using the HIV infant tracking system to improve health outcomes for HIV-exposed infants in southern Tanzania**

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Gaps within the early infant diagnosis (EID) of HIV continuum of care contribute to poor retention rates and management of HIV-exposed infants (HEI's) in low-resource settings. The HIV Infant Tracking System (HIT System) online intervention was designed to overcome these barriers by utilizing electronic, algorithm-based alerts to improve prospective follow-up of infants by prompt communication between health facilities, testing laboratories, mothers and caregivers via text messaging, online alerts and physical tracing for caregivers and mothers without phones. The objective was to evaluate the impact of the utilization of the HIT System in improving the quality of EID services at 10 health facilities in the southern Highlands of Tanzania. We collected HIT System intervention data from 10 health facilities where the HIT System was implemented for more than 12 months and compared this to 12 months of pre-intervention data. We compared the time at initial EID testing; initiation on cotrimoxazole (CTX) prophylaxis; mother notification and time to antiretroviral therapy initiation and loss to follow up (LTFU) for pre and post-intervention so as to determine the impact of the HIT System in improving health outcomes for HIV-exposed infants. The study findings showed that the HIT System intervention had an impact on early initiation of CTX (86% at <7 weeks); it improved age at testing (41% at < 7 weeks and 39% at 7-12 weeks); more than 91% of the test results were returned to the health facilities and >91% of the mothers were notified of their infants HIV status. Additionally more than 70% of the positive infants were initiated on ART on time. In general there was a more than 50% improvement in outcomes, post-intervention. In conclusion, the HIT System significantly improved uptake of EID services and by extension, health outcomes of HIV-exposed infants in the facilities where it was piloted. Utilization of the HIT System provides an opportunity for continuous improvement of EID services, towards the elimination of mother-to-child transmission of HIV.

**BMR 62: Seroprevalence of HBV, HCV and associated factors among blood donors at EZBTS Dar es Salaam, Tanzania 2014**

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Transfusion transmissible infectious agents are among the greatest threats with high mortality, morbidity and financial burden to blood safety for the recipient. This retrospective study was conducted to investigate the seroprevalence of Hepatitis B and C infections and associated factors among blood donors. The retrospective study was conducted for analysis of 559 consecutive blood donors who attended national blood services center in Tanzania from March 2013 to March 2014. Logistic regression analysis was used to determine risk factors associated with HBV, HCV infections. The study involved a total population of 559 blood donors whereby the prevalence were 119 (21.3%) for HBV, 46 (8.2%) for HCV and 15 (2.6%) co-infected with HBV/HIV. The prevalence of HBV infection among male blood donors was 17% and in females 4.3%. Donors who were HIV positive were at a high risk of being HBsAg positive (OR = 15.55; 95% CI 2.93 - 172.66). There was a negative association between HCV and HBsAg (OR = 0.05; 95% CI 0.01 - 0.21). Likewise females were at a lower risk compared to their male counterparts though this was not statistically significant (P = 0.009). There was entirely no association whatever between marital status and HBsAg (P = 0.431). We observed that donors in the age category 15-24 years were more likely at higher risk for HBV infection (OR = 2.15; 95%CI 1.25 - 3.71) and this was statistically significant (P = 0.006). From the data we can conclude that the risk factors for HBsAg are HIV status, HCV, sex, age in ranges and weakest association for occupation. Lastly blood and blood products safety remains as crucial consideration in transfusion medicine in order to prevent TTI’s to recipients.

BMR 63: The link between Diabetes Mellitus and Tuberculosis: Evidence from published literature
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Tuberculosis (TB) is a chronic infectious disease and remains as one of the major global public health problems. Every year, over 9 million people fall ill with TB, and about 2 million die from it. Diabetes is a chronic metabolic disease that is increasing globally, including in settings with high burden of TB; it is associated with higher risks of TB and adverse TB treatment outcomes. The increase in number of people with diabetes may complicate care and control of TB, especially in areas with high burden of both diseases. The objective was to provide some evidence on the link between TB and diabetes based on studies conducted. Methodology: Literature review of published articles on diabetes and TB. Findings/results: Worldwide, 350 million people have diabetes. Over 80% of diabetes deaths occur in low- and middle income countries. By 2030, global diabetes prevalence will increase by 50%. People with a weak immune system, as a result of chronic diseases including diabetes are at higher risk of progressing from latent to active TB. Diabetic people have a 2-3 times higher risk of TB compared to people without. Globally about 10% of TB cases are linked to diabetes. Diabetic people diagnosed with TB have a higher risk of death during TB treatment and of TB relapse after treatment. Large proportion of people with diabetes and TB is not diagnosed, or is diagnosed too late. The global epidemic of diabetes has implications for control and treatment of TB. Prevention and care of diabetes should be a priority to both stakeholders involved in care and control of non-communicable diseases, and those working on TB control. Prospective studies are needed to improve prevention, early detection and treatment of diabetes and TB.

BMR 64: Risk stratification for diabetes screening at a tuberculosis referral hospital in Tanzania
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World Health Organization recommendations to study strategies of bidirectional screening for tuberculosis (TB) and diabetes have been met with varying levels of uptake by national TB
programs in resource-limited settings. In Tanzania, the National TB and Leprosy Program does not provide specific guidance on how to screen for diabetes among TB patients. Kibong’oto Infectious Diseases Hospital (KIDH) is a specialized referral hospital for TB cases from Northern Tanzania, and the national referral hospital for multidrug-resistant (MDR)-TB. We therefore performed glycated hemoglobin (HgbA1c) testing among all patients admitted to KIDH to determine the point prevalence of diabetes (HgbA1c ≥6.5%) and prediabetes (HgbA1c 5.7-6.4%). All patients hospitalized at KIDH over a single week (starting on World TB Day 2014) were enrolled. Of 148 patients, 107 (72%) were male. Fifty-nine (38%) cases had no prior TB treatment, 22 (15%) were retreatment and 69 (47%) were MDR-TB. Only 3 (2%) had a known history of diabetes. 144 (97%) had successful screening, of which 110 (77%) had a Hgb A1c≤5.6, 28 (19%) had ≥5.7<6.5, and 6 (4%) were ≥6.5. Comparing subjects with prediabetes or diabetes compared to those with normal A1c levels, retreatment patients were significantly more likely have a A1c≥5.7% [odds ratio 3.2 (95% CI 1.2-9.0) and p=0.02] compared to those without prior TB treatment, which was not the case for multidrug-resistant TB patients [odds ratio 0.67 (95% CI 0.27-1.7) and p=0.39]. No retreatment case was a known diabetic, thus the number needed to screen to diagnosis one new case of diabetes among retreatment cases was 11. Diabetes prevalence by HgbA1c was less common than expected, but higher HgA1c values were significantly more frequent among retreatment cases, allowing for a rational resource-conscious screening approach.

**BMR 65: Prevalence of tuberculosis and associated risk factors in central prisons population in Tanzania: a cross sectional survey**

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Delayed diagnosis and difficulties in completing treatment lead to prolonged transmission and increased risk to develop multidrug resistant tuberculosis (TB). Proved new approaches and case detected methodologies are needed to address the problem and clear this reservoir. In this study, all prisoners held in the 5 central prisons 3 in western, northeastern and southern highlands in Tanzania both inmates and new admissions from July 2013 were screened for TB using Xpert MTB/RIF®. Additionally, a brief questionnaire was administered to collect information on TB risk factors in prison. Logistic regression with robust standard errors was used in the analysis for univariate and multivariate analyses. Overall TB prevalence was 1.42% (CI=1.17-1.71). Among the TB cases, 59 (56.7%) were inmates and 45 (43.3%) were new admissions which correlates to being in prison for <6 months, while 34 (32.7%) had been in prison for more than 5 years. Moreover 59 (56.7%) TB cases had no TB symptoms. Male gender was found to be associated with high risk of TB in prison (OR=2.68; CI=1.21-5.89), age above 55 years (OR=1.94, CI=1.0-3.41) and 4th or higher imprisonment (OR=5.95; CI=3.57-11.09). Other independent risk factors were history of previous TB treatment (OR=1.43 CI=1.08-1.89) and having a known TB contact from fellow prisoner (OR=2.78; CI=0.88-8.80). There was no evidence of association of TB in prison with HIV infection. Although it is commonly acknowledged that prisons are a reservoir for TB, screening activities are mostly limited to inhabitants of the facilities. Our study has shown that new entries to penitentiary institutions significantly contribute to the overall TB notification rate within the system.

**BMR 66: Molecular methods and DST on validation procedure for H37RV Mycobacteria tuberculosis viability testing, using propidium monoazide**

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Progresses made in latest years to improve laboratory capacity for tuberculosis diagnosis led to the development of molecular assays that are now replacing conventional microscopy and culture-based methods. However, molecular techniques are currently unsuitable to monitor the response to tuberculosis treatment because they detect both live and dead bacteria, and a positive result does not imply that the pathogen is still viable. Propidium monoazide (PMA) is a compound which intercalates into DNA of both extracellular and non-viable (or membrane-damaged) organisms while it is excluded from viable bacteria. The objective was to develop a new diagnostic method that can detect only viable Mycobacterium tuberculosis complex in sputum sample using a highly affinity photo reactive DNA binding dye. H37Rv were suspended in 0.85% of NaCl, 0.5 Mac Farland was set for DST using Rif, Inh, Emb and Pza, afterwards one part of the susceptible samples were PMA treated before Gen-expert and DNA-Real Time PCR assays the other part were used for Mycobacterial Load Assay and culturing into MGIT. Samples treated with PMA had a higher ct value compared to untreated ones, this demonstrated that PMA was able to penetrate into killed cells and bound to DNA that inhibited PCR polymerization, which resulted into amplification of only fewer DNA from viable MTB. MGIT TTD were days; hours (3,17) control, (21;19) Rif, (4;6) Inh, (15;3) Emb and (5;3) Pza. MBLA ct values were (14.45) control, (25.48) Rif, (15.08) Inh, (26.08) Emb and (18.12) Pza. PMA method could be used as a potential in monitoring bacterial load in sputum specimens and may have a role as a biomarker of cure in TB treatment. TTD and MBLA demonstrated the number of viable MTBC to each drug after DST procedure. The preliminary performance of PMA method should be further evaluated in larger studies.

BMR 67: Bacteriologically confirmed pulmonary tuberculosis by induced sputum among children at Bugando Medical Centre, Mwanza, Tanzania
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Pediatric tuberculosis (TB) diagnosis remains difficult in resource-poor settings. We evaluated sputum induction implementation for the diagnosis of pulmonary TB in a Tanzanian hospital, hypothesizing that sputum induction could detect cases of pulmonary TB that would be missed by clinical scoring tools. We conducted a cross-sectional study from October 2013 to April 2014 at our hospital in North-western Tanzania. Children suspected to have TB were assessed by using TB score charts and underwent sputum induction. Sputum samples were examined by fluorescent microscopy, solid culture and Xpert MTB/RIF assay. The number of cases confirmed by sputum induction was compared to the number of TB cases suspected by four different pediatric TB score charts. A total of 192 patients were enrolled. Sputum specimens were successfully obtained in 187 (97.4%) patients without any major complications. Ten (5.2%) children were confirmed to have pulmonary TB by sputum induction. More than half (50-90%) of these confirmed TB cases would not have been detected by score charts alone. Sputum induction is both safe and feasible in a severely resource-limited hospital and can detect cases of pulmonary TB that would not be detected by clinical score charts alone.

BMR 68: Randomized trial of the bactericidal activity of 8-weeks treatment with moxifloxacin, PA-824, and pyrazinamide in drug-sensitive and multi-drug resistant tuberculosis
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New anti-tuberculosis regimens are urgently needed to shorten tuberculosis (TB) treatment. Following on from favourable assessment in a 2-week study, we investigated a novel regimen for efficacy and safety in drug-susceptible (DS) and multidrug-resistant (MDR) tuberculosis during the first 8-weeks of treatment. We did this phase 2b study of bactericidal activity among smear-positive pulmonary-TB patients at 8 sites in South Africa and Tanzania from March 2012-July 2013. We enrolled treatment-naïve patients with DS-TB, randomized to receive either 8-weeks of moxifloxacin (M), 100mg pretomanid(Pa), and pyrazinamide(MPa100Z regimen); moxifloxacin, 200mg pretomanid, and pyrazinamide (MPa200Z regimen); or the current standard care for DS-TB, isoniazid, rifampicin, pyrazinamide, and ethambutol(HRZE regimen). A group of patients with MDR-TB received MPa200Z (DRMPa200Z group). The primary outcome was bactericidal activity measured by the rate of reduction in M tuberculosis colony forming units over 8-weeks. We also assessed safety and tolerability by monitoring adverse events. We enrolled 207 patients and randomly assigned them to treatment groups; 60 patients to the MPa100Z regimen, 62 to the MPa200Z regimen, and 59 to the HRZE regimen. We non-randomly assigned 26 patients with drug-resistant TB to the DRMPa200Z regimen. In patients with DS-TB, the bactericidal activity of MPa200Z (n=54) on days 0–56 (0•155, 95% Bayesian credibility interval 0•133–0•178) was significantly greater than for HRZE (n=54, 0•037–0•131). DRMPa200Z (n=9) had bactericidal activity of 0•117 (0•070–0•174). The bactericidal activity on days 7–14 was strongly associated with bactericidal activity on days 7–56. Frequencies of adverse events were similar to standard treatment in all groups. The M-Pa-Z combination was safe, well tolerated, and showed superior bactericidal activity in DS-TB during 8-weeks of treatment. Results were consistent between drug-susceptible and MDR-TB. This new regimen has now entered into phase 3 trials in patients with DS and MDR-TB for shortening and simplifying treatment.

BMR 69: Four-month moxifloxacin-based regimens for drug-sensitive tuberculosis
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Early-phase and preclinical studies suggest that moxifloxacin-containing regimen could allow for effective 4-month treatment of uncomplicated, smear-positive pulmonary tuberculosis. We conducted a randomized, double-blind, placebo-controlled, phase III trial to test the non-inferiority of two moxifloxacin-containing regimens as compared with a control regimen. One group of patients received standard TB drugs for 8-weeks, followed by 18-weeks of isoniazid and rifampin (control-group). Secondly, we replaced ethambutol with moxifloxacin for 17-weeks, followed by 9-weeks of placebo (INH-group), and in the third group, we replaced isoniazid with...
moxifloxacin for 17-weeks, followed by 9-weeks of placebo (ETH-group). The primary end-point was treatment failure or relapse within 18-months after randomization. Of the 1,931 patients who underwent randomization, in the per-protocol analysis, a favorable outcome was reported in fewer patients in the INH-group (85%) and the ETH-group (80%) than in the control group (92%), for a difference favoring the control group of 6.1% (97.5% confidence interval [CI], 1.7-10.5) versus the INH-group and 11.4% (97.5% CI, 6.7-16.1) versus the ETH-group. Results were consistent in the modified intention-to-treat analysis and all sensitivity analyses. The hazard ratios for the time to culture-negativity in both solid and liquid mediums for the isoniazid and ethambutol groups, as compared with the control group, ranged from 1.17-1.25, indicating a shorter duration, with the lower bounds of the 95% CI exceeding 1.00 in all cases. There was no significant difference in the incidence of grade 3/4 adverse events, with events reported in 127 patients (19%) in the INH-group, 111 (17%) in the ETH-group, and 123 (19%) in the control group. The two moxifloxacin-containing regimens produced a more rapid initial decline in bacterial load, as compared with the control group. However, noninferiority for these regimens was not shown, which indicates that shortening treatment to 4 months was not effective in this setting.

BMR 70: Implementation of molecular bacterial load assay for measuring tuberculosis treatment response: challenges and benefits
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Tuberculosis (TB) treatment is usually difficult and associated with long treatment duration. Monitoring TB treatment response is challenging despite the recent development in TB diagnostics and treatment regimens. Currently, assessment of treatment response relies on less sensitive microscopic methods and the contamination prone culture. The Molecular bacterial load assay (MBLA) which quantifies bacterial load (BL) by amplifying the 16S-rRNA specific to tuberculosis complex during treatment has been established and recently validated in Mbeya as part of a multi-site study including Moshi, Maputo in Mozambique and Blantyre, Malawi. The objective was to assess the challenges and benefits of implementation of the MBLA. A total of 650 sputum samples were collected from 50 patients enrolled in the Multi Arm Multi Stage (MAMS) anti-tuberculosis trial. Samples processed for gold standard liquid culture (MGIT) and MBLA. Challenges, experiences and benefits associated with assay implementation were noted. Information regarding logistics of consumables, training, test timelines, costs and result quality were collected and analyzed to establish baseline data for guiding future users of MBLA in resource constrained settings like Tanzania. MBLA showed excellent correlation with MGIT, \( r^2 = 0.84 \), an indication of the assay’s efficiency in measuring viable bacilli. Logistical challenges for procuring consumables were very minimal and took only two weeks for training and assay competency. Competency was confirmed by consistent results comparable to other study sites. Assay reagent cost per sample was 10-20 USD dollars and results obtained within 24hrs. Unlike MGIT culture where 38% of data excluded in analysis due to contamination, MBLA was robust and reproducible as indicated by consistent retrieval of the assay internal and negative controls. In conclusion, MBLA successfully implemented in Mbeya with no major challenges. With high reproducibility and adaptability, MBLA is favorable future test to replace the standard sputum smear microscopy and culture for measuring TB treatment response.

BMR 71: Diagnostic comparison of the Xpert MTB/RIF assay and fluorescence microscopy for detection of Mycobacterium tuberculosis in pre-screenings sputum samples
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Accurate diagnosis of tuberculosis (TB) is still a problem due to the paucibacillary nature of the disease. The current TB standard diagnostic methods are insensitive and not specific to tuberculosis complex. In the population of patients with low bacterial load such as those with TB-HIV co-infection and childhood tuberculosis, the diagnosis is more compromised. Despite the recent development in TB diagnostics like the use of nucleic acid amplification tests (NAATs), validation of the tests in resource constrained settings is challenging and the use of sensitive microscopic techniques remain favorable tests in such settings. The objective as to compare the GeneXpert assay based on detection of MTB DNA and Fluorescence Microscopy (FM) for diagnosis of TB in pre-screening sputum samples collected at NIMR-Mbeya, Tanzania. In a prospective study from January 2013 - April 2015, 275 pre-screening sputum samples were collected from 275 TB suspected patients and processed with the GeneXpert assay and FM. Sensitivity values for the two assays were calculated and compared. Fifty of the 275 (19.5 %) samples were MTB positive by GeneXpert assay and 22/275 (8%) positive by FM. Sixty percent (30/50) of positive samples by GeneXpert was negative on FM while 2/225 (0.9%) of the FM positive samples were detected negative with the GeneXpert Assay. Rifampicin (RIF) resistance detected in only one sample 1/50 (0.02%) and 81.1% (223/275) of the samples was negative by the two assays. The performance of GeneXpert assay was superior to FM with low prevalence of RIF resistance. Testing multiple specimens using FM can increase the assay performance and make the FM as useful TB diagnostic tool in resource constrained setting especially in areas where implementation of the GeneXpert Assay is not possible.
SYMPOSIUM 2: ANTIMICROBIAL AND INSECTICIDE RESISTANCE

AMR 01: HIV-1 drug resistance among treatment naive female bar and hotel workers, a high-risk population of HIV-1 infection in Tanzania: challenges in managing HIV-1 infection
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A national ART program was launched in Tanzania in October 2004. Due to the existence of multiple HIV-1 subtypes and recombinant viruses co-circulating in Tanzania, it is important to monitor rates of drug resistance. The present study determined the prevalence of HIV-1 drug resistance mutations among ART-naive female bar and hotel workers, a high-risk population for HIV-1 infection in Moshi, Tanzania. A partial HIV-1 pol gene was analyzed by single-genome amplification and sequencing in 45 subjects (622 pol sequences total; median number of sequences per subject, 13; IQR 5–20) in samples collected in 2005. The prevalence of HIV-1 subtypes A1, C, and D, and inter-subtype recombinant viruses, was 36%, 29%, 9% and 27%, respectively. Thirteen different recombination patterns included D/A1/D, C/A1, A1/C/A1, A1/U/A1, C/U/A1, C/A1, U/D/U, D/A1/D, A1/C, A1/C, A2/C/A2, CRF10_CD/C/CRF10_CD and CRF35_AD/A1/CRF35_AD. CRF35_AD was identified in Tanzania for the first time. All recombinant viruses in this study were unique, suggesting ongoing recombination processes among circulating HIV-1 variants. The prevalence of multiple infections in this population was 16% (n=7). Primary HIV-1 drug resistance mutations to RT inhibitors were identified in three (7%) subjects (K65R plus Y181C; N60D; and V106M). In some subjects, polymorphisms were observed at the RT positions 41, 69, 75, 98, 101, 179, 190, and 215. Secondary mutations associated with NNRTIs were observed at the RT positions 90 (7%) and 138 (6%). In the protease gene, three subjects (7%) had M46I/L mutations. All subjects in this study had HIV-1 subtype-specific natural polymorphisms at positions 36, 69, 89 and 93 that are associated with drug resistance in HIV-1 subtype B. The results suggested that HIV-1 drug resistance mutations and natural polymorphisms existed in this population before the initiation of the national ART program. With increasing use of ARV, these results highlight the importance of drug resistance monitoring in Tanzania.

AMR 02: Resistance to antiretroviral therapy in paediatrics in northern Tanzania
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The dramatic scaling up of antiretroviral therapy (ART) prophylaxis in Low and Middle Income Countries (LMIC) among pregnant and breastfeeding women has reduced transmissions among infants born to mothers infected with human immunodeficiency virus (HIV). The use of prophylactic antiretroviral drugs by pregnant women infected by the virus for prevention of mother to child transmission (PMTCT) of HIV-1, may lead to the virus to acquire resistance to antiretroviral drugs. HIV acquired resistance may be transmitted to the children, compromising the future regimens. Limited information is available on the transmitted HIV-1 subtypes and prevalence of mutations associated with antiretroviral drugs among infected children in Tanzania. We characterized transmitted HIV-1 subtypes and investigated the prevalence of mutations associated with antiretroviral drugs resistance among children born to seropositive mothers in northern Tanzania. The aim of the study was to determine transmitted HIV-1 subtypes and prevalence of mutations associated with antiretroviral drug resistance among children born to mothers enrolled in PMTCT in Northern Tanzania. Patients and methods: KCMC Clinical laboratory is the zonal center for Early Infants Diagnosis (EID) using Dried Blood Spots (DBS) in Northern Tanzania. DBS were collected from January 2011 to December 2012. Genotypic resistance was determined in those with viral load of >400 copies/mL. Genotypic resistance
Mutations were detected in 13 of 46 children (28%). HIV-1 genotypes were A1 (n=27), C (n=10), A/D (n=4), D (n=3) and CRF10_CD (n=2). Median age was 12 weeks (IQR 6-28) weeks. The mean log10 viral load was 3.87 copies/mL (SD 0.995). All major mutations were detected in the reverse transcriptase gene, none from the protease region. The most frequent mutations were Y181C (n=8), K103N (n=4) and G190A (n=2), conferring resistance to non-nucleoside reverse transcriptase inhibitors (NNRTIs), and M184V (n=1), conferring resistance to lamivudine and emtricitabine. A large proportion of infants newly diagnosed with HIV in Northern Tanzania harbored clinically significant drug resistance. Surveillance of drug resistance among this population in resource limited settings is warranted.

**AMR 03: Treatment failure and patterns of HIV-1 genotypic drug resistance mutations among HAART experienced patients in Tanzania**

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Universal access to antiretroviral (ARV) therapy for HIV-1 infected patients has significantly increased in Tanzania since the last quarter of 2004. A total of 335,292 (76.2%) eligible clients are on ART. HAART regimens may vary in its ability to suppress viral load and to increase CD4+ Lymphocyte cell count in people infected with different HIV-1 subtypes, possibly due to genetic diversity, virulence and different pathways to suppress HIV replication. In order to better understand reasons for HAART response variability, HIV-1 infected patients who were on HAART for a year or more were recruited to participate in this study. A structure questionnaire was administered; demographic data, physical examination and blood collection were done. Review of previous clinical records was done to record past medical information including but not limited to immunological and virological data, side effects and ART regimen used before. Laboratory analysis was done during recruitments: CD4+ Lymphocytes, Complete blood count, HIV-1 subtypes, Viral load sequencing to determine genotypic drug resistance mutations. The study population consisted of 129 HIV-1 infected patients with a median age of 45 years (IQR 20-72) of which 53 (41%) were males and 76 (59%) were females. There was 22% and 11% immunological and virological failure using WHO criteria among study participants, respectively. Female more often had immunological failure than males. Of the 18 successful amplification, twelve (56%) were HIV-1 subtype C, 17% were subtype A and CRF01-AE each, while a unique combination of C and D, C and A accounted for 3% each. Seventy five percent had resistance to non-nucleoside reverse transcriptase inhibitors (NNRTI), 19% had resistance to nucleoside reverse transcriptase inhibitors (NRTI) while only 1 (6%) had resistance to protease inhibitors (PI). Twenty two percent were detected to harbor multidrug resistance mutations such as M184V, K103N and T215C. Prevalence of immunological failure is relatively high in Tanzania with little correction between virological failure and immunological failure. No distinct factors have been identified to predict immunological and virological failure. HIV genotypic drug resistance mutation is increasing in population. It is important to introduce routine viral load testing to monitor success of ART treatment in Tanzania. This will reduce the number of patients misclassified as treatment failure using immunological failure criteria. In order to reduce the prevalence of treatment failure there is a need to promote early HIV testing by strengthening provider initiated testing and cancelling (PITC) for health care seekers and conduct regular stainable routine screening for viral load and CD4 T cells so that patients can be put on ART on time and on potent regimen. There is also a need for routine surveillance of resistance to antiretroviral therapy in Tanzania.
AMR 04: Detecting virological failure in Tanzanian HIV-infected children

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The performance of clinical and immunological criteria to predict virological failure in HIV-infected children receiving antiretroviral therapy (ART) is not well documented. The objective was to determine the validity of clinical and immunological monitoring in detecting virological failure in children on ART. A total of 218 children were included in the study. All were from care and treatment clinics in Dar es Salaam, Tanzania. Their mean age was 10.6 years, 122 (56.0%) were males, and the mean time on ART was 40.9 months. The study was conducted from August 2011 to March 2012. Data on sociodemographic and clinical characteristics and immunological and virological failure were based on World Health Organization definitions. Blood samples were collected for CD4+ T-cell count and viral load tests. Of 217 children with available viral load results, 124 (57.1%) had virological failure (>400 copies/mL), 25.0% immunological failure and 11.5% clinical failure. The sensitivity, specificity, positive predictive value and negative predictive value of clinical criteria were 12.9%, 90.3%, 64.0% and 43.8%, respectively, those for immunological criteria 22.6%, 73.1%, 53.3% and 41.4%, and those for the combination of clinical and immunological monitoring 25.8%, 69.9%, 53.3% and 41.4%. Children who received nevirapine (NVP)-based regimens were two times more likely (odds ratio 2.0; 95% confidence interval 1.20 - 3.64) to have virological failure than those on efavirenz and protease inhibitor-based regimens. The study demonstrated poor performance of currently recommended clinical and immunological criteria for monitoring HIV-infected children on ART. Moreover, children on NVP-based regimens had a higher risk of developing virological failure than those on other regimens.

AMR 05: Virological failure outcome among second line patients in Mbeya, Tanzania

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The implementation of the national program in Tanzania since 2004 has resulted in a large scale up of people accessing treatment in the Southern Highlands, and increasingly, needs and conditions of treatment experienced patients become of concern, as patients fail first line regimen and proceed to second line. The objective was to generate evidence upon which policies may be based, the ALISA study was initiated in 2013 as single center observational cohort to systematically evaluate treatment outcome in HIV infected patients receiving 2nd line (and 3rd line) regimen at the Mbeya Referral Hospital Counseling and Testing Centre (CTC). To describe patient characteristics of participants in the ALISA cohort. The ALISA study prospectively follows up patients on second line at the Mbeya Referral Hospital coming from two entrypoints: 1) patients on 2nd line from the routine program 2) patients on first line therapy with the following inclusion criteria: 1) above 18 years, 2) willing to give informed consent 3) clinical or immunological failure 4) more than two years on ART. In any patients with viræmia >1000 copies, an intensive driven one- to-one adherence counseling is initiated followed by a re-test after one month. If patients remain above 1000 copies, they are switched to second line and enrolled into the study. Up to September 2014, a total of 252 patients were screened, of which 90 patients from secondline. From all patients already on second line, 13 (14%) showed viraemia above 1000 copies at inclusion. Nine were suppressed on second line following intensified adherence counseling, 4 showed sustained viraemia and resistance tests were performed in 3, resistance against NRTI backbone of their current regimen was found, 2 showed full susceptibility
to their regimen indicating adherence challenges and 1 of these had a possibility of using first line regime after resistance test result. 3 patients died during follow up 2 of them died due HIV end stage disease and 1 died due to complication of diabetes. 162 patients were screened from first line. Of these, 104 (64%) had undetectable virus at the first screening and 25 (15%) showed viremia above 1000 copies at screening. 13 re-suppressed following after adherence counseling, 12 showed true virological failure, and were switched to second line. Preliminary data show a high rate of suppression in patients receiving second line regimen at the Mbeya Referral Hospital. Early switch of treatment is desirable.

**AMR 06: Virological response following anti-retroviral therapy employing once-a-day 30mg of stavudine in HIV-infected patients: a 24-week randomized controlled study in Dar es Salaam, Tanzania**

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Stavudine 30mg has been in use for more than a decade, its toxicity remains a challenge and phase out has picked up. However, the information about viral load suppression (VLS) at a once-a-day dosing is lacking. This is being explored in a prospective open-label randomized controlled study.

Naïve HIV infected patients were equally randomized either to receive stavudine 30mg once-daily or zidovudine containing standard dose regimens. Viral load (at six months only), at baseline and six months were determined. Changes at baseline and six months were compared within-and between-groups. Our outcome was proportions of patients who attained VLS < 400 copies/mL at six months and CD4+ T-cell counts recovery. Four hundred and eighty three patients aged ≥ 18 years were analyzed. The overall mean (SD) age was 39 (9) years, being 41 (9) and 38 (9) for males and females respectively. The two groups were similar in demographic, clinical and other clinical laboratory indices at baseline. The median (range) viral load was 55 (15, 1,242,026) copies/ml and 100 (15, 134,009) copies/ml in the stavudine and zidovudine groups respectively, p=0.7282. Mean (SD) CD4 counts at baseline were 185 (141) cells/ul and 210 (147) cells/ul for the stavudine and zidovudine groups respectively. At twenty four weeks the proportion of patients with VLS < 400 copies/mL was 73.9% (95% CI being 70%, 77.9%) in both groups, there was no statistically significant differences between groups. Compared to baseline and six months values, there was a statistically significant recovery of CD4+ T-cell counts, (p<0.0001), but there was no statistical differences between the groups, p= 0.921.

An antiretroviral standard regimen containing stavudine 30mg once-a-day was as effective as zidovudine containing regimen in viral load suppression as well as CD4+ T-cell recovery.

**AMR 07: Multidrug-resistant tuberculosis in Tanzania: the current status on diagnosis and treatment**

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Tuberculosis (TB), an old infectious disease is still one of the public health problems in resource-limited settings. Human immunodeficiency virus (HIV) complicated TB including multi/extensively drug resistant tuberculosis (M/XDR-TB) especially in sub-Saharan Africa. This review presents an overview of MDR-TB diagnosis and treatment in Tanzania. Studies on MDR-TB conducted in Tanzania are reviewed. PubMed and Google Scholar were searched with the key words: drug-resistant tuberculosis; Human immunodeficiency virus; HIV; multidrug-resistant tuberculosis; MDR-TB; linking to Tanzania. Information extraction focused on the diagnosis and treatment approaches. MDR-TB poses a significant challenge in Tanzania. Prospects exist to improve diagnosis and treatment of MDR-TB cases. Rapid molecular tests can decrease the time to
initiation of appropriate MDR-TB treatment. New drugs or drug regimens may shorten treatment duration while limiting default and treatment related morbidity. Current diagnostics have the potential to decrease turnaround time from MDR-TB suspicion to start of treatment. New drugs or regimens may shorten treatment duration. Existing opportunities with proper implementation strategies can combat drug resistant TB.

**AMR 08: Multi-drug resistance tuberculosis: magnitude in unsuspected cases in Northern Tanzania**

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Multidrug-resistant tuberculosis (MDR-TB) is a form of TB caused by Mycobacterium tuberculosis species that do not respond to, at least, Isoniazid and Rifampicin, the two most powerful, first-line (or standard) anti-TB drugs. This is a global treat in TB control, as the cure rate for MDR strains is low and the treatment takes a long time about eighteen to twenty four months, also diagnosis of MDR is expensive and not available in most of developing countries and there is a threat that they may spread rapidly around the world. A cross sectional laboratory based study was conducted in Northern Tanzania to determine the magnitude of MDR-TB in unsuspected cases. Two hundred and sixty two TB –clinical isolates of patients who were diagnosed with pulmonary tuberculosis and treated with empirical first line anti-TB drugs; achieved at the KCRI-biotechnology laboratory from 2009 to 2013 were subjected to first line anti-TB drugs Streptomycin (STR), Ionized (INH), Rifampicin (RIF) and Ethambutol (EMB) using the MGIT 960 system. Among the 262 TB clinical isolates, 202 (77.1%) were susceptible to all the four drugs tested, while 60 (22.9%) were resistant to at least one anti-TB drug. Thirty two (12.2%) of the total isolates were mono resistant strains: 10 (3.8%), 11(4.2%), 2(0.8%), 9(3.4%) to STR, INH, RIF and EMB respectively. When each drug was considered separately (single or in combinations) the observed resistance rates were 35(13.35%), 30(11.45%), 23 (8.8%), 19 (7.25%) INH, EMB, RIF and STR respectively. Polyresistance was observed for 8 (3.1%) of all the clinical isolates. Where only, 1(0.4%) was resistant to STR/EMB and 2 (0.8%) to RIF/EMB. MDR-TB was 20 (7.6%) where, 6(2.3%) isolates were resistant to INH/RIF, 6(2.3%) to INH/RIF/EMB and 8(3.1%) of the clinical isolates were resistant to all the four drugs that they were tested for. Ionized resistance is the highest among anti-TB drugs and denotes the high potential for developing MDR-TB in the future. A proportional of patients on empirical first line anti-TB treatment are in fact MDR-TB patients. The rate of resistance to EMB is alarming as this drug is used for treatment of MDR-TB.

**AMR 09: Risk factors associated with multidrug resistance in patients attending Kibong’oto Hospital, Tanzania in 2013**

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Global control of tuberculosis (TB) has been jeopardized by two major threats: HIV/AIDS and multidrug-resistant TB (MDR TB). Drug resistance has reached alarming levels with the emergence of strains that are virtually untreatable with existing drugs. According to a national anti-TB drug resistance study conducted 2010, the prevalence of MDR TB has been found to be 20.6% and 3.9% among retreatment and new cases respectively in Tanzania. However, the risk factors for MDR TB have not been fully investigated. We identify risk factors for MDR TB among patients attending Kibong’oto Hospital in northen Tanzania. An unmatched case control study was conducted in 2013 at Kibong’oto Referral Hospital. Cases and controls were confirmed through smear microscopy, sputum culture and Cepheid’s GeneXpert MTB/rifampicin assay. Cases and controls were interviewed using a questionnaire and patients’ files were reviewed.
Data was entered, cleaned and analyzed using Epi Info. A total of 102 cases and 102 controls were enrolled in the study. The mean age of cases and controls was 37.8 (12.8SD) and 39.9(12.9 SD) respectively. In both cases 71(69.6%) and controls 72(70.6%) more males participated. We found that a history of smoking (AOR 1.9, 95% CI 1.0-3.5), history of contact with TB (AOR 2.7, 95% CI 1.4-5.1), history of previous treatment of MDR TB (AOR 8.1, 95% CI 4.3-15.2), size of family more than 5 members (AOR 1.7, 95% CI 1.6-2.80) positive HIV status (AOR 1.7, 95% CI 1.5-6.4), were associated with MDR TB. TB patients with the risk factors that were found to be associated with MDR-TB should promptly be screened for the presence of resistant strains. The TB control programme should consider closer monitoring of transmission trends of drug resistant strains as a priority.

AMR 10: Low rate of fluoroquinolone resistance in Mycobacterium tuberculosis isolates from northern Tanzania

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Fluoroquinolones are used in second-line treatment of tuberculosis (TB) and have a potential role in shortening TB treatment duration. The wide use of fluoroquinolones in the treatment of other infections including respiratory tract infections in patients with (undiagnosed) active TB, could result in fluoroquinolone resistant Mycobacterium tuberculosis. We determined the rate of fluoroquinolone resistance in isolates obtained from Tanzanian patients and linked this to previous fluoroquinolone exposure and mycobacterial resistance to rifampicin and isoniazid. A total of 291 M. tuberculosis isolates were obtained between April 2009 and June 2010 from patients with smear-positive pulmonary TB and tested for susceptibility to ciprofloxacin, moxifloxacin, rifampicin and isoniazid. Information on previous fluoroquinolone use was obtained by interviewing patients and checking their medical files. Only two (0.7%) of the 291 M. tuberculosis isolates were resistant to ciprofloxacin; one of which was intermediately resistant to moxifloxacin as well. These two isolates were susceptible to rifampicin and isoniazid. Twenty-two (8%) of the 291 patients had a history of fluoroquinolone use (median: 7 days, interquartile range: 5-10). The patients from whom the fluoroquinolone resistant M. tuberculosis isolates were obtained had no known history of previous fluoroquinolone. Our findings indicate that the rate of fluoroquinolone resistant M. tuberculosis in Tanzanian patients with TB is low and not related to previous, brief episodes of exposure to fluoroquinolones. The findings favour future application of fluoroquinolones in TB treatment regimens of shorter duration.

AMR 11: Prevalence, aetiological agents and antimicrobial sensitivity pattern of bacterial meningitis among children receiving care at Kilimanjaro Christian Medical Centre, Tanzania

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Bacterial meningitis in children causes a significant number of morbidity and mortality worldwide. Its diagnosis combines a high index of clinical suspicion and laboratory confirmation through cerebrospinal fluid (CSF) analysis. Despite following the recommended management of treatment, still many patients end up with serious neurological sequelae and death hinting on the possibility that the causative microbes have developed resistance to the antimicrobial agents that we are using. The aim of this study was to determine the prevalence, aetiological agents and antimicrobial sensitivity pattern among children with bacterial meningitis at Kilimanjaro Christian Medical Centre (KCMC), Moshi, Tanzania. This was a hospital based cross sectional study carried
out in children presenting to KCMC Paediatric ward from December 2013 to May 2014. All children less than 13 years of age who met the eligibility criteria were consecutively recruited. Lumber puncture for CSF collection was done for 80 who met the eligibility criteria. Confirmation of acute bacterial meningitis was done by isolation of causative bacteria from CSF culture or positive Gram reaction while PCR was done in 48 randomly selected patients. Data was collected by structured questionnaires and laboratory data sheet. Data was entered and analysed using statistical package of social sciences version 20.0. Out of 80 patients studied; overall 19 children had acute bacterial Meningitis as identified using both confirmatory methods. Gram stain and Culture technique methods together identified 2 (2.5%) out of 80 patients, whereas PCR confirmed infection in 18 (37.5%) out of 48 patients. Two organisms were isolated with Escherichia coli (n=18) being the commonest organism followed by Streptococcus pneumonia (n=1). Both isolated organisms were sensitive to the common used antibiotics; Ampicillin, Chloramphenicol, Gentamycin and Cephalosporins. The commonest causative agent for Bacterial meningitis in our population was Escherichia coli which were mostly identified by PCR. Streptococcus pneumonia was rarely isolated, only one case. The isolated organisms were sensitive to the empirical used antibiotics treatment (Ampicillin, Gentamycin, and Chloramphenical). Therefore the empirical antibacterial treatment used for meningitis can still continue to be used for management of meningitis in our set up.

AMR 12: Bacterial etiological agents causing respiratory tract infection among ambulatory school children in Moshi municipality, Tanzania

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Respiratory tract infections are the leading cause of morbidity and mortality in children worldwide. Management to respiratory tract infections poses a challenge in developing countries particularly due to limited resources for bacterial identification and therefore administration of antibiotic is empirical. The objective was to describe bacterial etiological agents causing respiratory tract infections among ambulatory school children and their resistance patterns to a panel of five antimicrobial drugs. We conducted a cross sectional community based study from January to March, 2014. A total of 2,016 pupils who were presumed to be healthy were screened, and 170 children with respiratory symptoms were enrolled. Clinical assessment was conducted followed by collection of nasopharyngeal swabs. Isolates were tested for sensitivity against ampicillin, chloramphenicol, gentamicin, ceftriaxone and cotrimoxazole. Of 2,016 screened school children, 474 (23.5%) had respiratory tract symptoms. Respiratory tract bacterial pathogens were isolated from 123 (73.7%) of 167 children whose nasopharyngeal and throat swabs were collected. Staphylococcus aureus was the most prevalent isolate 68 (91.7%) followed by S. pneumoniae 43 (35.0%), and the least prevalent isolate was Klebsiella pneumoniae 7 (5.7%). Majority of isolated upper respiratory tract bacteria were resistant to ampicillin. S. pneumoniae exhibited the highest rate of the resistance where by 33 (91.7%) isolates were resistant to ampicillin. However, the resistance of isolates to cotrimoxazole was found to be low. Gentamicin and Ceftriaxone were effective against most isolates. Prevalence of respiratory tract symptoms was high among ambulatory school children who were presumed to be healthy. This may be due to the overcrowding of children in the class, and the fact that these symptoms are disregarded by the parents. The observed high resistance of isolates might be due empirical treatment of respiratory tract infections, unnecessary prescription of antibiotics, and counterfeit drugs. There is a need to strengthen school health programme, and cotrimoxazole should be used in the treatment of uncomplicated respiratory tract infections.
AMR 13: Spectrum and antibiogram of bacteria isolated from patients presenting with infected wounds at Kilimanjaro Christian Medical Centre, Tanzania
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Infections of diabetic wounds, surgical sites, trauma wounds and other wounds are among the causes of morbidity and mortality throughout the world. These infections are increasingly attributed to the rapidly emerging problem of antimicrobial drug resistances and emergency of nosocomial pathogens. Pus swabs collected from wounds were streaked on Blood Agar (BA) and MacConkey Agar (MCA) plates and incubated aerobically for 18-24 hours at 37°C. Standard techniques were used for identification of pathogenic bacteria isolated in pure cultures. Drug susceptibility tests were performed by using Kirby Bauer disk diffusion method as per Clinical Laboratory Standards Institute (CLSI). ESBL was screened and confirmed by using the double disc approximation method. A total of 93 wound swabs from 93 patients were cultured. Majority of wound swabs 85 (91.4%) were culture positive and 8 (8.6%) had no bacterial growth. Of these, 91 (62.3%) of isolates were gram negative rods and 53 (36.3%) were gram positive cocci. Staphylococcus aureus was the most common in 23 (16.0%) isolate followed by Coliforms 18 (12.5%), Enterococcus spp. 18 (12.5%), Pseudomonas aeruginosa 15 (10.4%), Escherichia coli 14 (9.7%) and Proteus mirabilis 13 (9.0%). In diabetic wounds, common bacteria isolated were Enterococcus spp. 8 (36.4%), Proteus mirabilis 6 (27.3%), Klebsiella pneumoniae 5 (22.7%) and E. coli 5 (22.7%). In surgical sites infections, the most common bacteria isolated were Staphylococcus aureus 7 (20.6%), Enterococcus spp. 6 (17.6%), Pseudomonas aeruginosa 3 (8.8%) and Klebsiella pneumoniae 3 (8.8%). Staphylococcus aureus 10 (40.0%), E. coli 5 (20.0%) and P. aeruginosa 4 (16.0%) were the most common isolates from patients with wounds due to trauma. Resistance rates to common treatment antibiotics used at KCMC were moderate to high and the prevalence of ESBL producing gram negative rods was 50%. Findings show high rates of wound infections at KCMC hospital and there are moderate to high resistance rates to common antibiotics used for treatment and high prevalence of ESBL producing gram negative rods.

AMR 14: Nasopharyngeal carriage and antimicrobial resistance to commonly prescribed antibiotics among children under five with pneumonia in Mwanza, Tanzania
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Acute respiratory tract infections (ARTI) are responsible for up to 20% of child mortality in low-income countries. Since available vaccines do not cover all causative organisms, case management remains a key strategy for preventing mortality in these children. However, data to guide proper use of antibiotics for ARTI are limited. We determined nasopharyngeal carriage and antimicrobial resistance to commonly prescribed antibiotics among children under five in Mwanza Tanzania. A total of 160 under five children admitted at Sekou-Toure Hospital between May 2013 and March 2014 were recruited in a case control study whereby, 88 (55%) children were cases and 72 (45%) were controls. Nasopharyngeal swabs was obtained and cultured on blood agar, MacConkey agar and chocolate agar. Isolates from positive cultures were identified using Gram staining and standard biochemical methods. Antimicrobial susceptibility testing to commonly prescribed antibiotics was performed using disc diffusion method. A descriptive statistical analysis was performed and, differences between categorical variables were tested using Fisher’s exact test, and P-value <0.05 indicated significant difference. The mean age for 88 children with pneumonia was 21.0 (±16.5) months, 68.2% (60) were aged below 24 months, and 40.9% (36) were females. Of 88 samples tested, 29(33%) had positive cultures, with Enterobacter...
spp 12(41.4%), Streptococcus pneumoniae 10(34.5%), Streptococcus pyogenes 3(10.3%), Klebsiella pneumoniae 2(6.9%), Staphylococcus aureus 1(3.4%), and Escherichia coli 1(3.4%). This pattern did not differ by gender but there were more children in 0-23 month age group with Enterobacter spp than in 24-59 months group (P=0.02). Enterobacter spp were 100% susceptible to gentamicin, chloramphenicol, ceftriaxone, and 83% susceptible to cefuroxime but the susceptibility was <80% for azithromycin, penicillin G, erythromycin and ampicillin. Similarly, susceptibility of Streptococcus pneumoniae was 100% to gentamicin, ceftriaxone and cefuroxime but was <80% for ampicillin, chloramphenicol, erythromycin, azithromycin, penicillin G. The susceptibility of Streptococcus pneumoniae, to commonly prescribed antibiotics in Tanzania was low. The frequency of isolation of Enterobacter spp was surprisingly high. These findings suggest the importance of improving antibiotic prescribing and stewardship in this setting.

AMR 15: Bacterial contamination and antimicrobial susceptibility pattern of isolates from stethoscopes at Kilimanjaro Christian Medical Centre, Moshi, Tanzania

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Nosocomial infection can be transmitted from patients to patients through health care workers and their daily clinical instruments or clothes which act like a vector. Stethoscope among others has been linked to transmission of pathogens; furthermore some of those pathogens are resistant to routine antibiotics. This study was conducted to determine “bacterial contamination and antimicrobial susceptibility pattern of isolates from stethoscopes at Kilimanjaro Christian Medical Centre Moshi Tanzania. This was cross sectional study of the bacterial contamination of stethoscopes used by medical doctors and students at KCMC Hospital a referral and teaching Hospital. Methods: About 40 medical doctors and 60 medical students were included in this study. All invited study participants were asked to read the questionnaire and a verbal consent was sought and obtained from them. The swabs which were used were plain, cotton-tipped and sterile swabs. Normal saline was used to moisten the swabs before collecting the sample by passing the swabs around surface on the diaphragm of each stethoscope and the swabs were sent immediately to the laboratory. The swabs were immediately streaked onto blood agar and McConkey’s agar plates and were then incubated overnight at 37°C. The colonies obtained were identified by using Gram staining, coagulase, catalase and optochin and cefoxitin sensitivity. Using Kirby Bauer’s methods according to standard operating procedures also did antibiotic sensitivity testing. The results in the study showed that 46 (46%) of stethoscopes had bacterial contamination while 54 (54%) had no contamination. Some of the isolated species from contaminated stethoscopes were other staphylococcus 26%, staphylococcus aureus 8% (MRSA) and 2% enterococci. Through analysis of the data most of the participant knew the stethoscope can cause nosocomial infection (93%) but only a few took precautions of storing them at the right place 18 (18%) most reported to store them in their living rooms 82(82%). More studies should be done on hospital instruments being a vector for nosocomial infections and healthcare workers should have an organized and disciplined way of disinfecting and sterilizing hospital equipment stethoscopes being one of them.

AMR 16: Evidence of carriage of antimicrobial resistant Salmonella species of public health and veterinary significance in the intestines of house crows (Corvus splendens) in Tanzania

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The Indian house crow, *Corvus splendens* (Vieillot) was introduced in Zanzibar, Tanzania by the British and immigrants from India in 1897 to help clean the town. The crow is responsible for polluting the environment, water sources and human surroundings by their droppings and the rubbish they carry. The crows may be responsible for the spread of certain pathogens including Salmonella and their persistence in the environment. Given the zoonotic potential of Salmonella, the objective of this study was to investigate the occurrence of antimicrobial resistant Salmonella infections in Indian house crows and to determine if the isolates were similar to those associated with disease in livestock or humans. Indian house crows were lured with meat and blood baits to land into the crow live-trap set at the Mabibo compound of the National Institute for Medical Research in Dar es Salaam, Tanzania. A total of 100 house crows were captured, humanely sacrificed, and their small and large intestines were obtained by using aseptic techniques for microbiological investigations. Eight isolates were identified by standard microbiological techniques as *Salmonella* spp. (6 suggestive of *Salmonella gallinarum* and 2 suggestive of *S. typhi*). All isolates were found to be susceptible to ciprofloxacin but resistant to amoxicillin. Lower levels of susceptibility were noted for chloramphenicol and ceftriaxone. Our results demonstrate the presence of antimicrobial resistant Salmonella spp. in the Indian house crows’ population and provide an indication of potential public and poultry health risks associated with these birds in the coastal area. The occurrence of antibiotic resistant *S. typhi* and *S. gallinarum* among Indian house crows has both veterinary and public health consequences as they may be transmitted to poultry and humans. This therefore provides further rationale for the public action on eradicating the house crows.

**AMR 17: Surveillance of antimalarial resistance in Tanzania: current status and implication for policy change**

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Emergence and spread of *Plasmodium falciparum* resistant to chloroquine (CQ) and Sulphadoxine-pyrimethamine (SP) forced the adoption of artemisinin-based combination therapies (ACTs) as first-line antimalarial drug in most Sub-Saharan African countries (SSA) by 2007. Since the introduction of ACTs, SP remained a combinational drug for ACTs (SP-artesunate) used in few SSA countries or as a prophylactic drug in the intermittent preventive treatment of malaria during pregnancy (IPTp) where two or more treatment doses of SP are administered on monthly basis after the first trimester. Also SP as prophylaxis is used in infancy (IPTi) and in seasonal malaria chemoprevention (SMC). In Tanzania artemether-lumefantrine (ALu) is the country policy ACT for treatment of uncomplicated malaria while SP-IPTp continues as per WHO recommendation. Despite reports of high prevalence of molecular markers for SP resistance in East Africa particularly Tanzania, the WHO has continued to recommend SP-IPTp for regions where the biomarkers are relatively low. We hereby report on the current prevalence and trends of molecular markers of SP, CQ and ALu in Tanzania and their implications for policy changes. Cross-sectional survey of biomarkers in six representative regions of Tanzania mainland was done between June 2010 and August 2011. Genotyping for specific mutations that confer resistance to CQ, ALu and SP was done using PCR-RFLP techniques. Analysis for trends in biomarkers for CQ resistance was compared with previously published data. We observed a gradual increase in CQ susceptibility biomarker, Pfcrt-76K throughout the country ($\chi^2=2.38; p=0.795$). All regions had prevalence of pfcrt-76K of $>90\%$. For ALu associated resistance, there was a uniform distribution of Pfmdr-1 NFD (N86Y, Y184F and D1246Y) associated with reduce parasite clearance rate ($\chi^2=2.3, p=0.512$); whereas for SP a high prevalence of the quintuple mutation (IRNGE) varied from 37.5 to 90.2% ($\chi^2=11.1, p < 0.001$), with Pfdhps-540E approaching fixation in some of the regions. The Pfdhps-581G which has an increased predictive value for IPTp treatment failure was very high in
Tanga (56.6%) and Kagera (20.4%) regions and absent in Mtwara region. While there is increasing recovery of CQ susceptibility due to total withdrawal of CQ, SP has continued to increase due to its continued use in IPTp programme. This has led to continued emergence of super-resistance mutations such as Pfdhps-581 which threatens the future of SP-IPTp. There is an urgent need for alternative drugs for IPTp subsequent to strict monitoring of SP-IPTp. The levels of Alu-associated mutations indicate a uniform implementation of ACT policy in Tanzania. Continued monitoring of Alu performance for early detection of treatment failures is necessary.

**AMR 18: Molecular marker of *Plasmodium falciparum* resistance to chloroquine (Pfcrt) in an area with long history of antimalarial resistance**

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High levels *Plasmodium falciparum* resistance to Chloroquine (CQ) compelled Tanzania to replace CQ with sulfadoxine-pyrimethamine (SP) as first-line antimalarial in 2001 which was however replaced with Artemether Lumefantrine (AL) in 2006. Currently there emerging evidence in several settings that there is recovery of CQ-sensitivity after several years of its withdrawal from malaria treatment. Here, the aim was to assess the level of CQ resistance in an area with long history of antimalarial resistance in North eastern Tanzania. Samples were obtained from patients recruited in a clinical trial to assess in vivo efficacy of AL at Mkuzi health centre in Muheza district, north-eastern Tanzania. DNA was extracted from venous blood using Qiagen extraction midi kit. The samples were analyzed for single nucleotide polymorphisms (SNPs) in the P. falciparum CQ resistance transporter gene (Pfcrt; codons 72–76) using PCR and sequence-specific oligonucleotide probe (SSOP) ELISA. Prevalence of Pfcrt haplotypes before and after treatment samples was compared. Haplotype frequencies were calculated by excluding infections with mixed genotypes. A total of 104 microscopically positive samples were genotyped for the Pfcrt haplotypes. Of these, 78 (75%) samples contained wild-type (CVMNK) haplotype, 21 (20.2%) contained resistant (CVIET) haplotype while 5 (4.8%) samples had mixed (CVMNK/CVIET) infections. There were no SVMNT haplotype among the samples. The prevalence of the Pfcrt wild-type CVMNK haplotype was high in the study area reaching over 76%. No significant selection of the Pfcrt wild-type CVMNK haplotype after treatment with AL was observed (p > 0.05). The prevalence of CQ sensitive haplotypes has increased in the study area albeit at slow rate. Reintroduction of CQ preferably in combination with other drug should be considered in these settings where restoration has been observed for malaria control such as targeted chemoprevention interventions.

**AMR 19: In-vivo efficacy and safety of artemether-lumefantrine versus dihydroartemisinin-piperaquine for treatment of uncomplicated falciparum malaria**

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Antimalarial efficacy studies are recommended by the World Health Organisation to monitor the efficacy of artemisinin based combination therapy (ACT) and possibly detect evolution/emergency of tolerance/resistance to these drugs. This study assessed the efficacy and safety of artemether-lumefantrine (AL) and dihydroartemisinin-piperaquine (DP) for treatment of uncomplicated falciparum malaria. This was an open-label randomized inferiority trial which
recruited children aged 6 months to 10 years with uncomplicated falciparum malaria at Muheza District Hospital and Ujiji Health Centre in Tanga and Kigoma respectively. Patients were treated with either AL or DP and follow-up was done up to day 42 for AL and day 63 for DP. The primary outcome was parasitological cure on days 28 and 42 for AL, and day 42 and 63 for DP. Secondary outcomes included parasite and fever clearance in the first 72 hours post treatment. A total of 492 patients were enrolled (317 from Ujiji) and there was no early treatment failure at either site. The crude cure rates on day 28 were 69.9% and 74.0% in patients treated with AL and for DP, the cure rate on day 42 was 75.0% and 85.7% at Muheza and Ujiji, respectively. With extended follow-up to day 42 for AL and day 63 for DP, the cure rates were lower in the two groups and at both sites (AL = 56.0% and 46.2%; and DP = 52.5% and 42.7% at Muheza and Ujiji, respectively). All patients had cleared the parasites by day 3 at Ujiji while one patient treated with DP at Muheza (1.1%) had parasites on day 3. High parasite clearance was reported for both drugs indicating that there is no tolerance/resistance to artemisinins. The high rate of treatment failure among patients treated with both AL and DP could be due to re-infections which will be corrected after PCR analysis.

AMR 20: Plasmodium falciparum infections with highly resistant haplotypes against sulfadoxine pyrimethamine during pregnancy are associated with reduced birth weight

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Pregnancy-associated malaria (PAM) is a leading cause of maternal anaemia and low birthweight. Plasmodium falciparum widespread drug resistance has significantly affected the implementation of the intermittent preventive treatment during pregnancy (IPTp) strategy. The IPTp strategy is likely to protect pregnant women where Plasmodium falciparum is fully sensitive. Sulfadoxine pyrimethamine (SP) is the recommended drug for IPTp. However, despite being recommended for IPTp, the drug has been abandoned for management of paediatric malaria due to declining efficacy as a consequence of widespread drug resistance. Whether SP should be replaced or not is a subject for further discussions. Continued use of this failing drug not only compounds the resistance but also exacerbates further risks for adverse pregnancy outcomes. The aim of the study was to diagnosing PAM, infecting Plasmodium falciparum haplotypes and their effect on birth outcomes. A cohort of 924 pregnant women was followed from the first attendance at the antenatal clinic through delivery from September 2008–October 2010 in Korogwe, northeastern Tanzania. Markers for SP resistance such as dihydrofolate reductase (Pfdhfr) and dihydropteroate synthetase (Pfdhps) genes were genotyped. The relationship between infecting Plasmodium falciparum haplotypes (quadruple, quintuple and sextuple) with birth weight were analysed by multiple linear regression. We showed that the parasite population had accumulated many mutations in the Pfdhfr and Pfdhps genes and newborns from women with sextuple mutant haplotype infections had a significantly reduced birthweight (mean reduction 359 g; 95% CI, -601 to -117) compared with newborns of women with quintuple or less haplotype infections (p = 0.005). This study demonstrates that sextuple Pfdhfr/Pfdhps mutated haplotypes are prevalent in the study area and that these highly SP-resistant parasites are associated with a significant reduction in birthweight. Continued use of the suboptimal IPTp-SP regimen should urgently be reevaluated.
AMR 21: Genetic basis of pyrethroid resistance in a population of Anopheles arabiensis, the primary malaria vector in Lower Moshi, north-eastern Tanzania
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Pyrethroid resistance has been slower to emerge in Anopheles arabiensis than in An. gambiae s.s. and An. funestus and, consequently, studies are only just beginning to unravel the genes involved. Permethrin resistance in An. arabiensis in Lower Moshi, Tanzania has been linked to elevated levels of both P450 monooxygenases and β-esterases. We have conducted a gene expression study to identify specific genes linked with metabolic resistance in the Lower Moshi An. arabiensis population. Microarray experiments employing an An. gambiae whole genome expression chip were performed on An. arabiensis, using interwoven loop designs. Permethrin-exposed survivors were compared to three separate unexposed mosquitoes from the same or a nearby population. A subsection n of detoxification genes were chosen for subsequent quantitative real-time PCR (qRT-PCR). Microarray analysis revealed significant over expression of 87 probes and under expression of 85 probes (in pairwise comparisons between permethrin survivors and unexposed sympatric and allopatric samples from Dar es Salaam (controls). For qRT-PCR we targeted over expressed ABC transporter genes (ABC ‘2060’), a glutathione-S-transferase, P450s and esterases. Design of efficient, specific primers was successful for ABC ‘2060’and two P450s (CYP6P3, CYP6M2). For the CYP4G16 gene, we used the primers that were previously used in a microarray study of An. arabiensis from Zanzibar islands. Over expression of CYP4G16 and ABC ‘2060’was detected though with contrasting patterns in pairwise comparisons between survivors and controls. CYP4G16 was only up regulated in survivors, whereas ABC ‘2060’was similar in survivors and controls but over expressed in Lower Moshi samples compared to the Dar es Salaam samples. Increased transcription of CYP4G16 and ABC ‘2060’are linked directly and indirectly respectively, with permethrin resistance in Lower Moshi An. arabiensis. Increased transcription of a P450 (CYP4G16) and an ABC transporter (ABC 2060) are linked directly and indirectly respectively, with permethrin resistance in Lower Moshi An. arabiensis. Our study provides replication of CYP4G16 as a candidate gene for pyrethroids resistance in An.arabiensis, though its role may not be in detoxification, and requires further investigation.

AMR 22: Trends in the selection of insecticide resistance in Anopheles gambiae s.l. in north-western Tanzania during a community randomised trial of long lasting insecticidal nets and indoor residual spraying
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Anopheles gambiae s.l. in Muleba, Tanzania has developed high levels of resistance to most insecticides currently advocated for malaria control. The kdr mutation has almost reached fixation in Muleba An. gambiae s.s. This change has potential to jeopardize malaria control interventions carried out in the region. Trends in insecticide resistance were monitored in two intervention villages using WHO susceptibility test kits. Additional mechanisms contributing to observed phenotypic resistance were also investigated using CDC bottle bioassays with PBO and DEF synergists. Synergists are enzyme inhibitors of insecticide detoxification enzymes. Resistance genotyping for kdr and Ace-1 alleles was conducted using qPCR. High phenotypic resistance was observed in both study villages to several pyrethroids and DDT, with 12-23% mortality. There was a sharp decrease in mortality in An.gambiae s.l exposed to bendiocarb (carbamate) from 84% in November 2011 to 31% in December 2012 after two rounds of bendiocarb-based IRS. An. gambiae s.l. remained susceptible to pirimiphos-methyl (organophosphate).
Bendiocarb-based IRS did not lead to reversion of pyrethroid resistance. There was no evidence for selection for Ace-1 resistance alleles. There is an urgent need to investigate operational impact of observed selection of resistance on the use and effectiveness of LLINs and IRS for malaria control.

AMR 23: Increased expression of metabolic resistance candidates in the malaria vector *Anopheles gambiae* sensu stricto from Dar es Salaam, Tanzania

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One of the challenges facing malaria control is the development of insecticide resistance in mosquitoes that vector the disease parasite. *Anopheles gambiae*, which is a major vector of the malaria parasite *Plasmodium falciparum* in Africa, has over the years developed resistance to insecticides including dieldrin, 1,1-bis(p-chlorophenyl)-2,2,2-trichloroethane (DDT), and pyrethroids. The objective of this study was therefore to determine the mechanisms contributing to DDT resistance in *Anopheles gambiae* s.s. from Dar es Salaam, Tanzania. Female mosquitoes of standard age, reared from larvae sampled across varieties of natural breeding sites, were used in the study. Members of the An. gambiae complex were PCR-identified and screened for target-site mutations (Vgsc-L1014S and Vgsc-L1014F). A DDT-resistant population of An. gambiae s.s. and controls (sympatric and allopatric controls) were screened for GSTe2 and P450 genes-expression profiles using real-time quantitative polymerase chain reaction (qPCR). We found significantly higher allelic frequencies of the Vgsc-L1014S mutation in DDT-resistant An. gambiae s.s. than in the controls (p<0.001). Cytochrome P450 genes: Cyp6m2, Cyp6p3, Cyp623 and Cyp621 were significantly over-expressed in DDT-resistant An. gambiae s.s. compared with the control populations. We report the increased expression of multiple DDT-associated resistance mechanisms in the primary African malaria vector, An. gambiae s.s. from Dar es Salaam. The presence of multiple resistance mechanisms in An. gambiae that are common in both DDT and pyrethroids may have confounding effect in resistance-management strategies. However, the geographical extent of the insecticide resistance mechanisms observed in this study need to be investigated.

AMR 24: Susceptibility status of lymphatic filariasis vectors to Permethrin and Pirimiphos-methyl insecticides at rural Muheza, Tanzania

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Lymphatic filariasis (LF) is a parasitic disease transmitted by mosquito vectors. The disease affects over 120 million people in 73 countries globally. In Tanzania, the main vectors are *Culex quinquefasciatus*, *Anopheles gambiae* complex and Mansonia mosquitoes. Vector control interventions and mass drug administration have been employed in Tanzania. Chemical insecticides to control vectors remain the sole interventions, but challenged by the rapid increase in insecticides resistance, whereby, scarce information is available on the Permethrin insecticide susceptibility status of *Mansonisa uniformis* and Pirimiphos-methyl susceptibility status of these mosquito vectors. Therefore, the present study will assessed the susceptibility status of lymphatic filariasis vectors to Permethrin and Pirimiphos-methyl insecticides at rural Muheza, Tanzania. Mosquito larvae will be collected from breeding sites and reared in the insectary to
obtain F1 of a harmonized age for conducting insecticides susceptibility tests as per WHO guidelines (WHO 1998). Knockdown rates and mortality % after 24hours were recorded per insecticide. The results of knock down assessment of female *Anopheles gambiae* complex, *Culex quinquefasciatus* and Mansonia mosquitoes exposed to two classes of insecticide impregnated papers; pyrethroids and Organophosphate. The results indicates that Pirimiphos-methyl has the low (knockdown time of 50% and 90% of mosquitoes) KDT50 and KDT90 for *Anopheles gambiae* complex and *Culex quinquefasciatus*. Permethrin showed high of KDT50 and KDT90 to all exposed mosquitoes. The results of the 24 hours post-exposure mortality indicated that all mosquitoes were susceptible to Pirimiphos-methyl with 100%. *An. gambiae* complex, *Cx quinquefasciatus* were highly resistant to Permethrin. The present study has documented the susceptibility status of lymphatic filariasis vectors to Permethrin and Pirimiphos-methyl insecticides at rural Muheza whereby the main LF vectors being highly resistant to Permethrin and susceptible to Pirimiphos-methyl. This adds up to the body of knowledge especially to LF vectors control and insecticides resistance management.

**AMR 25: Reduced efficacy of long-lasting insecticidal nets in area with pyrethroid-resistance populations of *Anopheles 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. The extent to which insecticide resistance and underlying mechanisms impact the malaria vector insecticidal control is not clearly known. This study comparatively assessed the bio-efficacy of washed and unwashed PermaNet 2.0 long-lasting insecticidal nets (LLINs) against wild free flying pyrethroid-resistant *Anopheles gambiae* s.l. field populations in North Eastern Tanzania before and after development of insecticide resistance by the local vectors. Evaluation of the efficacy of PermaNet 2.0 LLINs was conducted in laboratory and in semi field (Experimental huts) following the standard WHOPES Protocol (WHO/CDS/NTD/WHOPE/GCDPP/2006.3). The evaluation criteria were percentage mortality, blood feeding inhibition, exophily and deterrence effects. WHO method was used to detect resistance in wild anopheles mosquitoes exposed to 0.05% deltamethrin. PCR based molecular diagnostics were used to identify mosquitoes to species and to detect kdr alleles. Anopheles mosquitoes were resistance to deltamethrin with mortality rate of 81.2% [95% CI: 76.8-84.9%]. Mortality rates induced by unwashed PermaNet 2.0 and PermaNet 2.0 washed 20x in this trial against *An. gambiae* was 31%, 30% and 27% respectively. By contrast the mortality induced by unwashed and 20 washed PermaNet 2.0 nets against *An. gambiae* in a trial conducted in this same area employing same huts when the vectors were fully susceptible to pyrethroids was 96% and 95% respectively. The reduced LLINs efficacy reported in this study indicates that resistance in Tanzania is capable of undermining the bio-efficacy of pyrethroid insecticide-based vector control interventions, especially LLINs. This emphasizes the need to identify alternative insecticides to replace or supplement pyrethroids also emphasizes the need for the development and implementation of effective and sustainable resistance management strategies.

**AMR 26: Monitoring efficacy and safety of artemisinin based antimalarials for the treatment of uncomplicated malaria in Tanzania: a systematic review**

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Prompt diagnosis and effective treatment are considered the cornerstones of malaria control and artemisinin based combination therapy (ACT) is currently the cornerstone of malaria case management. After deployment of ACT due to wide spread parasite resistance to the cheap and widely used antimalarial drugs, chloroquine and sulphadoxine/pyrimethamine; the World Health Organization (WHO) recommended regular surveillance to monitor the efficacy of the new drugs. The present paper assessed the implementation of efficacy testing for monitoring of the therapeutic efficacy of ACT for the treatment of uncomplicated malaria in Tanzania before and after policy changes in 2006. A systematic literature search of the published clinical trials conducted in Tanzania from 2001 to 2014 involving at least one form of ACT and reported efficacy against uncomplicated P. falciparum malaria in children less than five years was performed. References were imported into the Endnote library and duplicates removed. An electronic matrix was developed in Microsoft Excel followed by full text review with predetermined criteria. Studies were independently assessed and information related to ACT efficacy and safety extracted. Nine papers were selected from 125 papers screened. Efficacy of both AL and AS+AQ against uncomplicated P. falciparum infections in Tanzania were high with average PCR corrected cure rates on day 28 of 97.3% and 91.2% respectively. The highest day 3 parasite positivity rate was 1.4%. Adverse events ranged from mild to serious but were not directly attributed to the drugs. ACT is efficacious and safe for the treatment of uncomplicated malaria in Tanzania. However, only few trials have been conducted in Tanzania as recommended by WHO and thus more surveillance should be urgently undertaken to detect future changes in parasite sensitivity to ACT.
MNC 01: Cost effectiveness of universal pneumococcal vaccination in Tanzania: pharmacoeconomic evaluation of 10 valent and 13 valent vaccines
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Globally, Streptococcus pneumoniae is the leading cause of pneumonia, bacterial meningitis, bacteremia and acute otitis media. Pneumococcal diseases cause about 800,000 deaths annually in children younger than five years in the world. Tanzania is among the countries with a large burden of pneumococcal infections. In 2012, the GAVI alliance supported the introduction of the 13 valent (PCV13) conjugate vaccine in Tanzania. Our study aims to estimate the health benefits, costs and cost effectiveness of introducing PCV13 compared to 10 valent (PCV10) vaccine or no vaccination in Tanzania. We used a Markov model, developed in Microsoft Excel, in which we incorporated the direct and indirect costs of providing pneumococcal immunisation, outpatient and in-patient treatment of pneumonia, meningitis, bacteremia and AOM. Epidemiological and vaccine efficacy data relevant for Tanzania were included. The model evaluates the impact of the PCV10 and PCV13 pneumococcal vaccines on the disease process caused by pneumococcal pneumonia and nontypeable Haemophilus influenzae (NTHi), invasive pneumococcal disease (IPD), pneumonia and acute otitis media (AOM) for one Tanzanian birth cohort over their lifetime. The base-case cost-effectiveness results indicate that PCV13 has a 60% probability of being cost-effective when the willingness to pay for a QALY is equal to the per capita GDP of 609 US$, with ICERs of US$ 245 per LY gained and 258 per QALY gained. PCV13 is slightly more cost-effective than PCV10, but the differences were not robust with scenario analyses. Varying key model parameters may switch the results in favour of either of the pneumococcal vaccines. Both vaccine candidates are cost-effective in a Tanzanian setting. In the base case scenario, PCV13 is more cost-effective than PCV10, but this conclusion is sensitive to variations in key input parameters. When our results are extrapolated for policy decisions, a trade-off arises between PCV13-related prevention of invasive disease and the additional benefit of preventing NTHi disease by using PCV10. Policy decisions should be guided by information on the local prevalence of these diseases.

MNC 02: Outcome of the Southern Highlands Cervical Carcinoma Screening programme
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Cervical cancer remains the leading cause of mortality and morbidity among women between 15 and 44 years in Tanzania. In 2011, the National Cervical Carcinoma Screening Program (NCCP) was initiated in the Southern Highlands at Meta Hospital and Mbeya Referral Hospital. In 2013, the regional Hospitals in Mbeya, Kyepa, Rungwe and Mbozi, and the Mobile Diagnostic Treatment Center (MDTC) started screening. At the same time, the 2H study was integrated, making Cytology available for study participants. The objective was to combine available data from routine and research settings to describe outcomes of the regional NCCP. NCCP routine data collected between October 2012 and September 2014 that included women also enrolled in 2H was assessed for constancy, cleaned and compared with results generated 2H. A total of 9059 women were screened between September 2012 and 2014 in the NCCP 33% (n=2981) at Meta, 25% (n=2285) at MRH, and 38.5% at the Regional Hospitals (Keyla 16.4% [n=1489], Mbozi 11% [n=1030], Rungwe 7% [n=624], Mbeya Regional 4% [n=342]). Three percent (n=308) were screened at the
MDTC. The overall incidence of positive VIA and clinical presentation suspicious for cancer was 3.5%, and 1.9% respectively, which as mirrored by site specific proportions CTC (3.5%), Meta (3.4%), Rungwe Regional Hospital (3%) and MDTC (0.29%). Nevertheless, with 1.4% Keyla reported lower, Mbozi (4.5% VIA pos., 2.2% CA ) and Mbeya Regional (9.3%) higher VIA pos incidences. Next to META with 3% cancer suspicious cases, Keyla (0.04%) and Mbeya Regional also showed discrepancies compared to the regional average. In the context of 2H, 1048 women were recruited at CTC and Meta, representing 29.5% and 12.6% of the population screened in the national program. The proportion of via positive cases of 5% was higher than in the routine program, while the cancer suspicious population was comparable (2%). Sensitivity and specificity of VIA screening compared to Cytology was 78% and 94% respectively, with a Positive Predictive Value of 29% and a Negative Predictive Values of 99%. Despite limitations of comparisons between routine and research populations, our analysis contributes evidence that the current NCCP in the Southern Highlands is effective on population level. Nevertheless a focus on quality of service especially in newly rolled out sites is crucial, and additional diagnostics could reduce over treatment and identify VIA negative lesions.

MNC 03: Utilization and quality of care in provision of malaria interventions among women of reproductive age in Kilosa, Tanzania

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Universal access to and utilization of malaria prevention measures states that every person at malaria risk sleeping under an insecticide-treated mosquito net (ITN) and every pregnant woman at risk receiving at least two doses of sulfadoxine-pyrimethamine (SP). This study assessed utilisation and quality of care in provision of malaria interventions among women of reproductive age in Kilosa, Tanzania. A total of 297 women of reproductive age with children <5 years old were included in the study. The knowledge indicator on malaria in pregnancy was established based on the response of women on the timing to care, reasons, effect and preventive measures used. Health facility readiness, quality of care and client satisfaction were also assessed. About a quarter of women had two children while over 58% had ≥3 children. Seventy percent of the women had primary school education. Only 8% of women had good knowledge on malaria in pregnancy while most had low or medium knowledge. Knowledge significantly associated with education. A significant proportion of women were not aware of the reasons for taking SP during pregnancy (35%), timing for SP (18%), and the effect of malaria on pregnancy (45.8%). Timing for first dose of SP for intermittent preventive treatment in pregnancy (IPTp) was 1-3 months (28.4%) and 4-6 months (36.8%). Over 75% were provided with SP under supervision of the health provider. All women attended the ANC during their last pregnancy, however, visits decreased with increasing parity. The coverage of IPTp1 was 53.5% and IPTp2 was 41.1%. This study showed that the knowledge of the pregnant women on malaria in pregnancy and IPTp was average and is likely to have an impact on the low IPTp coverage. Educational massages on the risk of malaria during pregnancy and the usefulness of IPTp need to be emphasised.

MNC 04: Exploring the effectiveness of an education intervention delivered through local groceries to improve child feeding practices in rural communities

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Malnutrition is one of the most life-threatening conditions in early childhood. It causes about 35% of all deaths in children below 5 years and 50% of child mortality in sub-Saharan Africa. The condition can be effectively addressed by local solutions such as using local food grocers who on daily basis make contacts with child caregivers. Using case-control design in 5 villages in rural south eastern Tanzania, we evaluated an intervention involving training local grocers to select and provide appropriate meals to caregivers with children below two years. The trained grocers also trained their client caregivers on appropriate feeding of children. Ten local food grocers (2 per village) were recruited and each grocer was assigned to 5 randomly selected households with children <2 years. The grocers were retrained monthly, and were asked to help select appropriate foods for and advice their clients on appropriate feeding practices. Monitoring was done monthly. Primary outcome was performance of caregivers on key feeding indicators: breastfeeding, calorie density, nutrients density and food safety and feeding style. Main secondary outcome was growth, measured by length and weight and Z-scores for weight-for-age and length-for-age. We enrolled children 30 from intervention and 49 from control groups and all caregivers in intervention group received recommended training from the assigned grocers. Children in intervention group had higher breastfeeding scores than controls (25 [93%] vs 20 [74%], p = 0.068), higher caloric density scores (22 [81%] vs 21 [78%], p=0.735), higher scores on nutrient density/diversity (22 [67%] vs 14 [52%], p = 0.268) and higher scores on recommended food safety & feeding style targets than control (23 [85%] vs 12 [44%], p = 0.002). Overall, intervention group performed better in all indicators of good feeding practices than controls (19 [70%] vs 8 [29%], p=0.003). Local food groceries in rural areas, if empowered with knowledge on proper feeding practices and malnutrition can improve child feeding practices and nutritional status of children. Since mothers and caregivers make more contact with food grocers in their communities than they do to health facilities, this approach could significantly improve coverage with appropriate nutritional education.

MNC 05: Cryptosporidium burden and risk factors among mothers and infants 0-6 months in rural northwest Tanzania: a prospective cohort study
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Diarrhoea is a leading killer of children worldwide, with Cryptosporidium spp. contributing to this burden. In Tanzania, the burden and risk factors are poorly understood. We aimed to quantify the burden of Cryptosporidium spp. in young infants and their mothers and evaluate risk factors for infection. In our prospective cohort study, we enrolled pregnant women from a semi-rural health clinic in northwestern Tanzania and followed these women and their infants from delivery through six months. We collected anthropometric and survey data, as well as faecal samples from both. Exclusive breastfeeding (EBF) was determined using detailed questionnaires and Cryptosporidium spp. infection was determined using modified Ziehl-Neelsen staining. Risk factors for infection were assessed using uni- and multi-variate logistic regression models. HIV testing was done using Determine (screening) and Uni-gold (confirmatory). The prevalence of maternal Cryptosporidium spp. ranged from 44 to 63% and did not differ across time points. There was no difference in maternal Cryptosporidium spp. prevalence based on HIV-sero-status with the exception of Month 1. No evidence of infant Cryptosporidium spp. infection was detected until Month 2 and remained uncommon until Month 6 when 33% of infants were infected. As EBF declined from Month 1 to Month 6 (32 to 4%), the proportion of infant infection rose (0 to 33%). In univariate analyses, only maternal Cryptosporidium spp. infection at Month 1 (OR = 3.18, p = 0.047) was a statistically significant predictor of infant infection. HIV-exposure and predominant breastfeeding (PBF) or EBF at month 6 were protective factors for infant infection. Infants living in rural/semi-rural Tanzania are susceptible to Cryptosporidium spp.
infection and the timing of infection coincides with changes in breastfeeding practices. The post-partum burden is high with the majority of women experiencing infection at least once.

**MNC 06: Protecting maternal and newborn health: an analysis of mHealth strategies across the world with special deliveries in Africa**

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In poor rural communities of Africa, 51% of births occur without the assistance of a skilled birth attendant. National data also shows 61% of under-five deaths are linked to avoidable factors related to healthcare system and its management. Thus, delivering high quality healthcare services to the pregnant mothers and newborn is a priority. Different mHealth technology driven approaches have been deployed and hold potential for effective coverage of health interventions by resolving specific health system constraints. The objective of the review was to analyze mHealth strategies supporting maternal and newborn health across the world and to generate knowledge base with special emphasis on Africa. Four electronic databases (Google, Google Scholar, PubMed and ProQuest) were searched using specific search terms. Retrieved articles were then categorized according to themes identified in previous studies and descriptive coding scheme. In all, a total of 45 articles and reports were reviewed out of which, 19 mHealth programs focusing on Africa were then classified into five themes. The mHealth program analysis themes were, maternal and child health promotion and awareness (n=2), community based data collection and reporting (n=4), point-of-care support and decision support system (n=4), capacity building for healthcare staff (n=6) and general mHealth projects (n=3). An overview of the program strategies to improve maternal and newborn health outcomes and challenges was included under this review. A special emphasis was also given on the sustainability and scalability of the programs from the time of implementation. Overall, mHealth program in Africa is an effective solution to tackle maternal and newborn health challenges and have positive impact to improve healthcare services. However, mHealth serves as multi-dimension application which requires researcher’s stress on its policy framework and sustainability in low cost and resource settings.

**MNC 07: Experiences and motivating factors among community health workers participating in a mobile health project in Singida, Tanzania**

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Community Health Workers have the potential to help improve maternal, newborn and child health (MNCH) in Tanzania, however their performance can be limited by weak delivery of appropriate training, unsupportive supervision and ineffective job aids. The emerging field of mHealth offers innovative and potentially powerful approaches to strengthen health system support for CHW and increase their effectiveness in achieving key MNCH outcomes. Few studies have evaluated the impacts of mHealth tools on CHW motivation and job satisfaction; we aimed to help fill this important knowledge gap. A cluster-randomized, controlled, mixed methods trial design was used to evaluate the process and impact of a smart phone-based application (SP). The application was designed to assist CHW with data collection and management, delivery of education, gestational danger sign identification, and clinical referrals within a MNCH program run by World Vision in Singida, Tanzania. Pairs of CHW in 32 randomly selected villages were cluster-randomized to training on either SP or national paper-based protocols for use during household visits with pregnant women and children. We used thematic analysis to identify and compare factors affecting CHW motivation, job satisfaction and perceived challenges to MNCH protocol implementation using content from 60 in-depth qualitative interviews. Most CHW in
both groups were satisfied and proud of their work. Religion, duty and morality were common motivating factors; others included witnessing changes in health knowledge and behaviour, recognition and respect, and training opportunities. CHW were demotivated by lack of financial incentives and village-level government support, poor transport, and difficulties balancing volunteer duties with income-generating activities. Mobile phones incentivized CHW initially and simplified their work; however difficulties with charging, airtime, and security were common. Factors affecting CHW motivation and job satisfaction were similar in both groups. Strengthening CHW activities with mHealth technology may improve MNCH if programs address logistical challenges and CHW motivators.

MNC 08: A cross-sectional analysis of maternal food insecurity in urban setting
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Food insecurity to pregnant women seriously impedes efforts to reduce maternal mortality in resource poor countries. This study was carried out to assess determinants food insecurity among pregnant women in urban areas. A cross sectional study design was used to collect data for the period of two weeks. A structured questionnaire with both closed and open ended questions was used to interview a total of 225 randomly selected pregnant women who attend the three randomly selected antenatal care clinics in Temeke Municipal council. The food insecurity was measured using a modified version of the USDA’s core food security module which consists of 15 questions. Logistic regression analysis was used to obtain strength of association between dependent and independent variables. Among 225 pregnant women attending antenatal care (ANC) interviewed 55.1% were food insecure. Food insecurity declined with increasing household wealth, it was also significantly low among those with less than three children compared with having more. Low level of food insecurity was associated with having Secondary education (Adjusted OR = 0.24; 95%CI, 0.12–0.48), College Education (OR = 0.156; 95%CI, 0.05–0.46), paid employment (OR = 0.322; 95%CI, 0.11–0.96) and high income (OR = 0.031; 95%CI, 0.01–0.07). Also, having head of the household with secondary education (OR = 0.51; 95%CI, 0.07–0.32) college education (OR = 0.04; 95%CI, 0.01–0.13) and paid employment (OR = 0.225; 95%CI, 0.12–0.42). Food insecurity is a significant problem among pregnant women in Temeke Municipal which might significantly affect health of the pregnant woman and foetus due to higher maternal malnutrition which increases risk of miscarriage, maternal and infant mortality, and poor pregnancy outcomes. The study suggests a multi-sectoral approach in order to address this problem.

MNC 09: Characteristics of sickle patients enrolled in Muhimbili sickle cell cohort in Tanzania: A ten years’ experience
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Tanzania ranks the fourth among African countries with high burden of sickle cell anemia (SCA). SCA is associated with high mortality and could reach 90% in the first few years of life if untreated. This study aimed to describe the socio-demographic, clinical and laboratory characteristics of individuals recruited into Muhimbili sickle cell clinic. This is longitudinal follow-
up of SCD patients at Muhimbili National Hospital (MNH) clinic between 2004 and 2013. Individuals suspected to have SCD at MNH were invited to the clinic. Socio-demographic information including age, place of birth, ethnicity and clinical information was collected. Blood sample for screening of sickle cell and laboratory analysis was collected. Sickle status was determined using hemoglobin electrophoresis and confirmed by High Performance Liquid Chromatography. A total of 6,762 individuals were screened for SCD [3,762 (58.1%) HbSS, 1,481 (23.1%) HbAS and 1,165 (18.2%) HbAA]. 49.3% of the SCD were aged 2-9 years while 10.9% were over 20 years. Children aged 0-1 years contributed to 15.2% of all SCD patients. The rate of recruitment of HbSS over years was increasing, with significant number in age group 0-9. Majority of SCD patients, 2,368 (63.0%) were born in Dar-es-Salaam, of which the main ethnic groups came from coastal regions and around Lake Victoria. The rate of recruitment decreased with distance from MNH clinic. SCD patients had higher prevalence of jaundice, pulse rate and splenomegaly but lower rate of blood pressure and peripheral oxygen saturation compared to non-SCD. SCD patients had higher WBC, reticulocyte count, RDW and MCV but lower Hb concentration. They also had higher levels of bilirubin, AST, ALP, LDH and creatinine. Individuals aged below 10 years were the majority in MNH SCD cohort. High spatial variability in frequency of SCD was observed, where coastal and Lake Zone areas were the most affected. Variation in laboratory parameters can be used to characterize patients with SCD.

**MNC 10: Determinants of iron deficiency anemia in children below 2 years: A qualitative study in Kisarawe district, Tanzania**

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Iron deficiency anemia (IDA) is a public health issue which is more pronounced in children below 2 years due to high demand of iron for rapid growth and brain development. Thus, IDA results to irreversible effect on cognitive development of the child and future learning capacity. According to TDHS 2010, IDA was found in 75% of children below 2 years. The objective of this study was to assess the risk factors for IDA in children below 2 years. A cross-sectional baseline study that involved eight focus group discussions was conducted as a part of community based control trial for reducing micronutrient deficient in children below 2 years in the district. Social-cultural feeding norms determine early weaning from the first week of life and affects exclusive breastfeeding. Starting from the first day warm water reported to be given to the newborn and cassava porridge was initiated within the first week of life. Complementary food given to the baby is mainly dominated by cassava flour and main source of iron is from plants, which are also introduced very late. Decline in cassava production, which is the main food and cash crop in the district, has affected household purchasing power to buy adequate food for the family. Thus, food insecurity is dominant in the community. Provision of nutrition education should consider addressing specific local cultural beliefs and norms. Early assessment for detection of serious IDA cases and iron supplementation in children below two years needs to be a part of routine postnatal clinics in high-risk communities. Strengthening collaboration between health sector and agriculture sectors is needed to improve agricultural diversification and introducing high nutrient rich crops.

**MNC 11: Efficacy of standardized Roselle juice in improving iron status of adults in malaria endemic area: a randomized controlled trial**

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Hibiscus sabdariffa juice (Roselle), has been widely taken by many people for its nutritional benefits particularly in improving iron deficiency anaemia. However, no scientific evaluation of its
safety and efficacy to underscore such claimed benefits. The objective was to establish efficacy and safety of standardized Roselle juice among anemic adults. We conducted a randomized parallel dose-response, open label trial with 18-50 years anemic adults in malaria endemic rural area (n=131). Those meeting inclusion criteria were randomly assigned to four intervention groups. The first three groups received Roselle juice in increasing doses while control group received a daily dose of 60mg iron. The juice and tablets were taken daily for 30 days. During the study individuals completed 5 visits. In each visit we examined their physical, clinical, biochemical and psychological aspects. We assessed study endpoints, adverse events and adherence to interventions. Daily use of Roselle juice resulted in significant increase in serum iron store. Control group had highest increase followed by a group received 1500ml. However, other haematological parameters did not change significantly. Gastrointestinal disturbances and raised liver enzymes were side effects associated with both control and intervention groups. The incidence of raised liver enzymes increased with increase in of the intervention. The results showed that, standardized Roselle juice could be a potential source of safe natural remedy for iron deficiency anaemia when used at a dose of 1500ml daily.

MNC 12: Individual birth preparedness, complications readiness and its association with health facility delivery among recently delivered women in Chamwino District, Tanzania

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Developing countries accounted for 85% of the global burden (245 000 maternal deaths) including Tanzania. Individual Birth Preparedness and Complications Readiness (IBPACR) is the process of planning for normal birth and anticipating the actions needed in case of an emergency. It helps to increase use of skilled providers at birth which is the key intervention to decreasing maternal mortality. This study assessed prevalence of IBPACR and its association with place of delivery among recently delivered women in Chamwino district, Dodoma region. It was a cross sectional study (two years prior to survey) of women who delivered in November 2013 at Chamwino district. Women were asked whether they followed the five basic steps of IBPACR during pregnancy. Those who took three or more steps were regarded as having IBPACR. Data were analyzed by STATA. We interviewed 428 women. Median age (IQR) was 26.5 (22-33) years. About 249 (58.2%) of the respondents had IBPACR. After controlling for confounding and clustering effect, significant determinants of IBPCR were found to be maternal education (AOR = 2.26, 95% CI; 1.39, 3.67), spouse employment (AOR = 2.18, 95% CI; 1.46, 3.25), booking at ANC (AOR = 2.03, 95% CI; 1.11, 3.72), No. of ANC visits, (AOR = 1.94, 95% CI; 1.17, 3.21) and knowledge of key danger signs (AOR = 4.16, 95% CI; 2.32, 7.45). Also IBPACR was found to be significantly predictor of health facility deliveries (AOR = 2.45, 95% CI; 1.12, 5.34). Proportion of women who prepared for birth and its complications were found to be unsatisfactory despite majority being counseled on IBPACR during ANC. Those who were prepared for birth were more likely to have institutional delivery. It is recommended that each pregnant woman should provide documentation on what she has prepared so far during ANC visit in order to ensure practices of IBPACR.

MNC 13: Men approve partners’ use of modern contraceptive methods: findings from Kibaha district, Tanzania

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Men as decision makers in most of African cultures play an important role in the adoption of family planning (FP), either themselves as users or supporters of their partners. Notwithstanding the universal knowledge on the methods, their acceptance and use has been low among men in
Tanzania. Objective: This study sought to determine health delivery factors that influence men to approve their partners to use modern FP methods. A cross sectional, community-based study was conducted in Kibaha, Pwani region, involving 365 married men aged 18 to 60 years who were living with their spouses and had at least a child below the age of five years. To complement the quantitative data, health workers involved in reproductive health services and community dispensers of FP commodities were interviewed. Quantitative data was entered and analysed using Epidata and STATA computer software respectively whereas thematic analysis was done for the qualitative data. Results: A total of 365 men interviewed, their mean age was 35 years and 65.5% had completed primary education. Sixty percent of men reported to approve their spouses to use FP methods. Men were less likely to approve their partners to use FP methods if they did not find provider at the facility (OR=0.08; 95% CI 0.01-0.54, p=0.00), not counselled as couples (OR=0.10; 95% CI 0.01-1.38, p=0.03) and missed preferred FP (OR=0.12; 95% CI 0.01-1.54, p=0.05). This study has shown that considerable proportion of men approve their partners to use modern FP methods; however the magnitude reported does not reflect the current contraceptive prevalence rate among married women. Moreover delivery factors had influence on the male approval of FP methods. Further study is recommended to more understand underlying factors of male acceptance to the use of family planning methods.

MNC 14: Local quality improvement strategies can increase health facility deliveries: experience from the EQUIP project in rural Southern Tanzania

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In Tanzania, maternal and newborn mortality remains high. A low proportion of health facility deliveries and poor quality of emergency obstetric care contribute to these statistics. The EQUIP project (Expanded Quality Management Using Information Power), which was implemented in a district in southern Tanzania in 2011 to 2014, aimed to address both supply and demand side determinants of these problems by engaging local communities and health professionals, organized into quality improvement teams (QITs), in identifying local solutions to local problems. Progress was measured using run-charts and local data as well as by a district-wide continuous household survey and repeat health facility census implemented by EQUIP. No additional funds for equipment, supplies or human resources were added by the project. The objective was to explore which quality improvement strategies implemented by QITs in health facilities resulted in increased health facility deliveries. A mixed method’s case study, nested within the EQUIP project. Strategies that were perceived to work included: (1) emphasising male involvement (2) Assisting village and ward level leaders to sensitise and educate community on the importance of facility delivery; (3) educating and encouraging Traditional Birth Attendants to accompany mothers to a health facility. The proportion of mothers delivering in health facilities increased from around 55% as assessed in early 2012 to around 85% as assessed in early 2014, in the intervention district. Facility delivery also increased in the comparison area. The difference in difference was 7% (95% CI -7% to 21%) and indicated improvements, although not statistically significant. Applying local solution to local problems is imperative to achieve improvements in resource limited health systems. Remaining challenges include how to sustain the improvements made and finding paths for scaling up.

MNC 15: Optimization of an Enzyme Linked Immunosorbent Assay for quantification of Insulin Growth Factor-1 in Korogwe, Northeastern Tanzania

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Anaemia in pregnancy affects more than 56 million women worldwide, with Sub Saharan Africa carrying one of the highest burdens. Anaemia reduces the availability of oxygen, which may decrease the concentrations of circulating insulin-like growth factors (IGFs) in the blood. IGF1 is important in foetal growth throughout gestation and affects cellular differentiation in fetal tissues and the placenta. There is limited information on how different Haemoglobin (Hb) levels affect the IGF1 assay. Long term storage of blood samples at -80°C and repeated freeze-thaw cycles might affect the measurement of the IGF1 peptide. Measurement of IGF1 close to the site of sample collection is therefore pivotal. Sandwich Enzyme Linked Immunosorbent Assays (ELISA) can be used to determine IGF-1 levels from both fresh and cryopreserved plasma or serum samples. Optimization of a premanufactured ELISA kit is performed to facilitate accurate quantification of IGF1 in blood samples from 480 women at five different time points during pregnancy, in an African setting. As part of a main study involving pregnant women with different Hb levels, venous blood samples will be collected from volunteers with differing Hb levels. The concentration of IGF-1 will be measured from plasma/sera while taking into account different concentration gradients and Hb levels. The effect of freeze-thaw cycles on the stability of the IGF-1 peptides will be investigated by analyzing fresh plasma/sera against cryopreserved samples at -80°C and then thaw after one and four weeks intervals. Results from the optimization will be presented. An IGF-1 ELISA assay capable of identifying and compensating the freeze-thaw effect will be developed. The optimization will provide an assay for measuring IGF1 levels in blood while assessing the effect of anemia on IGF-1 concentration from fresh and cryopreserved samples. This method can subsequently be adopted by laboratories in Africa and beyond.

**MNC 16: Clinical presentation and outcome of children managed by the different branches of a new electronic algorithm for the management of childhood illness in Tanzania**

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Improving clinicians’ compliance to clinical algorithms and quality of care for children needs assessing the usefulness, safety and relevance of the entire algorithm used. Studies examining the distribution of children according to clinical presentation and outcome across the different branches of the algorithm are limited. Between December 2010 and June 2011 acutely ill children aged 2-59 months attending primary care facilities in urban and rural Tanzania were consecutively included. Children were managed strictly following a new ALgorithm for the MANAgement of CHildhood illness (ALMANACH). Outcomes were i) proportions of children with danger signs, main symptoms and signs, ii) point-of-care test results, iii) antimicrobials prescribed and iv) clinical outcome at day 7. Of 842 patients, 0.1% had general danger signs. 67.7% entered the fever, 59.2% the cough, 21.9% the diarrhoea and 14.5% the skin problem branches. 28.2% (100/351) of children with fever and cough (only one had chest indrawing) had a final classification of pneumonia (respiratory rate ≥50/min). 4.8% (6/124) patients for whom a urine dipstick was indicated had a positive result. None of the 39 patients in whom abdominal tenderness (a strong predictor of typhoid fever) was searched for presented this sign. At day 0, antibiotics were prescribed to 15.4% of all children; 2.3% received an antibiotic secondarily, mostly because of fever without focus. At day 7, 2.7% of all children were not cured, mostly due to skin infections. A vast majority of children had mild illnesses and most of them did not require antibiotics to be cured.
We could analyse the diagnostic relevance of each branch of the algorithm in this particular population, so that it can be rapidly adapted. The latter can be done by using electronic decision support systems that also allow to quickly implementing and evaluating these updated algorithms in the field.

**MNC 17: Uptake of services for prevention of mother-to-child transmission of HIV in a community cohort in rural Tanzania from 2005 to 2012**

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Estimates of population-level coverage with prevention of mother-to-child transmission (PMTCT) services are vital for monitoring programmes but are rarely undertaken. This study describes uptake of PMTCT services among HIV-positive pregnant women in a community cohort in rural Tanzania before the implementation of Option B+. Kisesa cohort incorporates demographic and HIV sero-surveillance rounds since 1994. Cohort data were linked retrospectively to records from four government-run clinics in Kisesa with PMTCT services from 2009 (HIV care and treatment clinic (CTC) available in one facility from 2008; referrals to city hospitals for PMTCT and antiretroviral treatment (ART) from 2005). The proportion of HIV-positive pregnant women residing in Kisesa in 2005-2012 who accessed PMTCT service components (based on linkage to facility records) was calculated overall (per HIV-positive pregnancy) and by year. Out of 1497 HIV-positive pregnancies (849 women), 26% did not access any services during pregnancy, 35% registered for ANC but not HIV services (29% were not tested at ANC or diagnosed previously), 8% enrolled in PMTCT but not CTC services (6% received antiretroviral prophylaxis), and 32% registered for CTC (14% received ART or prophylaxis). In 2012, coverage with HIV care during pregnancy reached 68% (upper estimate >90%); 44% coverage with antiretroviral drugs (62% upper estimate). Population-level coverage with PMTCT services was low overall, with weaknesses throughout the service cascade, but trended upwards over time. Option B+ should improve coverage with antiretrovirals for pregnant women through simplified decisions for initiating ART, but will rely on strengthening access to CTC services.

**MCH 18: Accessibility of early infant diagnosis of human immunodeficiencin sub Saharan Africa countries: a review**

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Globally, HIV is one of the most important infectious diseases in children. Early infant diagnosis (EID) services have been integrated in prevention of mother to child transmission (PMTCT) facilities in sub Saharan Africa. However, the coverage is still low. The objective was to assess factors associated with accessibility of early infant HIV diagnosis in sub Saharan African countries. Extensive literature review was conducted to provide information regarding HIV infection in infants and factors associated with accessibility to HIV diagnosis. The World Health Organization recommendation is for at least 80% of all HIV exposed infants to receive test within the first two months of life. In 2009, only 3%, 6%, 13%, 52%, 53% of HIV exposed infants in Nigeria, Uganda, Tanzania, Rwanda and Zambia, respectively received a virological test within the first 2 months of life. In Tanzania, only 27% and 30% of HIV exposed infants received a virological test within 2 months of life in 2010 and 2012, respectively. In Tanga, Tanzania, review of hospital records from 2009-2011 showed that about 67% of registered infants received the first HIV test, but it was not documented of when this first test was received. In Mozambique, independent maternal source of income (OR=10.8; 95% CI, 3.42-34.0), larger household size (OR=1.30; 95% CI, 1.09-1.53) and
greater distance from the hospital (OR=2.14; 95% CI, 1.01-4.51) have been described as among the predictors for mothers to bring their infants for EID services. Despite establishment of EID services in PMTCT facilities, the number of infants receiving early HIV testing is extremely low. More studies are highly recommended in order to explore factors associated with poor accessibility of EID services in countries with high HIV burden.

MNC 19: Burden of Salmonella among children admitted in Korogwe District Hospital, Tanzania
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Children admitted in paediatric ward in Korogwe District Hospital have been mostly presenting with febrile episodes that are commonly being diagnosed as malaria. However, as malaria is declining other causes of fever should be assessed. The study was conducted to determine bacterial causes of fever in children admitted in the hospital from 2013 to 2014. Blood was drawn into blood culture bottles by peripheral vein puncture from children with fever who medically required hospitalization for close observations. Drawn blood was then cultured in automated BACTEC 9050™ machine for detection of bacteria. Standard culture methods were used to identify bacteria. API testing system was used for confirmation of Salmonella typhi and other non-Salmonella typhi species. Serological tests and antibiotics susceptibility testing were also done. Total of 832 blood cultures were collected, cultured and analyzed from January 2013 to October 2014. Positive blood cultures were 79 (18.9%) of all blood cultures. 37.9% of positive blood cultures were Salmonella typhi, 16.4% were other pathogens such Streptococci pneumoniae, Staphylococcus aureus and Escherichia coli whereas 45.7% of isolates were determined as normal flora of the skin. The contamination rate for the whole period was maintained below the cut off of 10%. S. typhi isolates were sensitive to cefriaxone, gentamicin and ciprofloxacin and resistant to chloramphenicol and cotrimoxazole. S. typhi is a common cause of fever in children admitted in Korogwe District Hospital. The findings call upon further studies to establish the cause of S. typhi in Korogwe.

MNC 20: Families Matter! Program increases parent-preadolescent communication about sex in Tanzania: an outcome evaluation in Mtwara and Ruvuma
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Tanzania HIV and Malaria Indicator Survey statistics indicate that Tanzanian youth (15-24 years) are at high risk of acquiring HIV through sex. Studies show that when parents communicate about sexual issues with their children, children are less likely to engage in risky sexual behavior. T-MARC Tanzania piloted the Families Matter! Program (FMP), a five-session course for parents aimed at enhancing communication about sex between parents and pre-adolescent children, in Mtwara and Ruvuma. We aimed to evaluate whether FMP increases parent-preadolescent communication about sex. We conducted a pre- and post-intervention evaluation of FMP participants and their 9-12 year-old preadolescent children in Mtwara and Ruvuma regions. Data were collected separately from parents and preadolescents before and 3 months after FMP using a structured questionnaire. We measured the difference in sexual education communication (heterosexual friendships, puberty, menstruation, sex, reproduction, and maturity required for sex) and sexual risk reduction communication (abstinence, peer pressure, condoms, family planning, HIV/AIDS, and other sexually-transmitted infections) using six-item scales. The possible score range was 0-12 for each domain. Differences between pre- and post-intervention scores were evaluated using the Wilcoxon signed rank test. A total of 658 FMP participants (72% female,
28% male) and their preadolescent children completed the pre- and post-intervention questionnaires. There was a significant increase sexual education communication and sexual risk reduction communication scores among parents and preadolescents. 58% of parents and 54% of the preadolescents reported having communicated about more sexual education topics after the intervention. The mean score differences were 4.6 and 2.9, respectively (p<0.0001 for each). 81% of parents and 56% of the preadolescents reported having communicated about more sexual risk reduction topics. The mean score differences were 5.2 and 3.2, respectively (p<0.0001 for each). FMP increases parent-child communication about sex and how to avoid risky sexual behaviors in Mtwara and Ruvuma. FMP should be expanded as part of HIV prevention efforts in Tanzania.

**MNC 21: The need of involving teenagers in addressing maternal deaths**

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The Millennium Development goals (MDGs) number five, aim to reduce maternal mortality by 75% in 2015 through establishment of maternal death surveillance and responses that aim to improve accountability at every level of care where women of reproductive age went for services during pregnancy. This study analysed the maternal deaths to characterise maternal deaths according to social, demographic, and clinical characteristics detailing both intra-partum and post-partum complications with their corresponding cause of deaths. Descriptive cross-sectional study done through secondary data analysis of maternal deaths reported in 2010-2014. The independent (socio-demographic and clinical characteristics) and dependent variable (causes of death both direct and indirect and delivery complication) was created to establish the association through determining crudess odd ratio and 95% confidence intervals. Two hundred seventy one maternal deaths were included in the study with mean age of 27.83 years and SD of 6.78 years. Teens (age 15-24) were highly associated with getting sepsis during post-partum periods OR=2.31, 95% CI (1.23, 4.32) with high risk of dying due to sepsis (OR=1.9, 95% CI 1.07, 3.38) and Malaria (OR=3.22, 95% CI 1.56, 6.65). But those cases delivered in Health facilities were protected from getting sepsis OR=0.32, 95% CI (0.12, 0.83) and dying due to Malaria OR=0.31, 95% CI (0.12, 0.85). Married women had higher risk of dying due to anaemia OR=3.36, 95% CI (1.53, 7.4) but teens were less likely to die due to haemorrhage OR=0.55, 95% CI (0.32, 0.93). Variations between delivery complications and causes of maternal mortality among different socio demographic and clinical characteristics were observed. Teens found to be vulnerable to sepsis during post-partum period and die due to both sepsis and malaria. Interventions to combat the high maternal mortality ratio in Tanzania should be both cause specific as well as target specific.

**MNC 22: Sexual reproductive health and rights for youth heard: a case in Mtwara District in Tanzania**

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With almost half the world’s population < 25, young people’s sexual and reproductive health and rights (SRHR) are of the utmost priority. In Tanzania 1/3 of the population are young people 10-24 years and about 23% of women (15-19 years) have started childbearing. Youth-friendly sexual (YFS) are scarce, mostly inaccessible and not adequately integrated into sustainable health plans. Mtwara is among the regions in Tanzania with the highest percentage of teenagers who begin childbearing (25.5%). MMR being 238/100,000 live births and teenage pregnancy rate of 11%. This study describes the impact of the SRHR intervention implemented by AMREF Health Africa.
through the 3 years (2011-2013) Voices of Youth project funded by the Department for International Development. During interventions the main approaches applied were capacity building, community mobilization, health system strengthening and advocacy. A cross sectional study was done using quantitative method. Sample size used was 107 youth (10–18 years) and 10 health providers and 3 District Council partners. In addition to this document review was done. YFS were integrated in 26 health facilities; 46 schools integrated the life skill subject into the extra curriculum and established life skill clubs. Majority of respondents (93%) were satisfied with provision of youth friendly services; 90.7% reported health service providers maintained confidentiality; demand for condoms doubled, family planning methods have increased from 50% to over 76%, and utilization of voluntary counseling and testing services increased from 36% to 83%. Generally number of youth utilizing YFS increased by 8 times. Reduction in teenage pregnancy rate from 11% -8.5%, and school dropout from 18% -10%. Sexual reproductive health education and information is essential for the sustainability of the uptake of SRHS. There is still a need for scaling up the YFS knowledge among health providers, youth and community members.

MCH 23: Young people's access and utilization of sexual and reproductive health and rights information and services in Tanzania: are they youth-friendly?
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In 2002, the World Health Organization set out an agenda for establishing ‘Adolescent-Friendly Health Services’ (AFHS). Despite existence of supportive policy environment, young people in Tanzania still face serious barriers to the effective use of health services. The main objective of the study was to determine the status of the sexual and reproductive health and rights (SRHR) information and services of young people in Kilindi, Iringa municipality and Iramba districts in Tanzania. Fifteen focus group discussions (FGDs) and 3 group interviews (GIs) were held with a total of 130 participants drawn from categories of young people (in both primary and secondary schools); and out of school youth aged between 10 and 24 years from the three study sites. The FGDs and GIs mainly focused on availability, awareness and uptake of youth friendly SRHR information and services. There was low uptake of SRHR information and services because many young people were not aware that such services exist. Lack of confidentiality on the part of health care providers made young people fear the leakage of personal information to their parents. Lack of privacy at health facilities made young people avoid these places for fear of being stigmatized. As a result, they opted for other sources of these services and sometimes for example they opted for dangerous methods such as the use of detergents, herbs, ashes for abortion. Sexuality issues were regarded as taboo and could not be discussed in public. Other key findings are presented and discussed. Post-2015, there is an urgent need for national and international coordination to invest in sustainable and scalable strategies to improve adolescent healthcare, that are firmly embedded in national health systems programming and are responsive and accountable to adolescents’ needs.

MNC 24: Predictors of preconception anaemia in Korogwe, northeastern Tanzania
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Anaemia during pregnancy is associated with preterm delivery and intrauterine growth reduction. Women’s anaemia just before conception and/or during early pregnancy, when women are typically unaware of their pregnancy status, may influence pregnancy outcomes by affecting early critical developmental Preventing anemia before conception might therefore have substantial health benefits. However, the burden of preconception anaemia is not well established in Tanzania. We present the preliminary results of haemoglobin concentration and factors associated with anaemia among non-pregnant women in northeastern Tanzania. A cross-sectional survey was conducted from July to October 2014 on 563 non pregnant women aged 18-40 years. Sociodemographic and anthropometric data were collected using a pre-tested questionnaire. Anthropometric indicators were measured using standard procedures. Portable HemoCue 301, Medsorb Dominicana SA, Angelholm, Sweden, was used to determine hemoglobin concentration from a capillary blood. Data analysis was done using STATA Version 10. 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 563 women were enrolled. The mean age was 32.8 (SD ± 1.89) years. The mean Hb level was 12.3 (SD ± 1.7 g/dL). Anaemia (Hb<12g/dl) was detected in 202(37%) women out of which 109(19.4%) had mild anaemia (Hb=11-11.9g/dL), 88 (15.6%) had moderate anaemia (Hb 8-10.9g/dL),and 10(1.8%), 600had severe anaemia (Hb<8g/dl). Womens body mass index, family size, high parity were significantly associated with anaemia. Anaemia before conception is a moderate public health problem in Korogwe. The implications of these findings are important, particularly in light of recommendations to improve preconception care in Tanzania.
SOCIAL DETERMINANTS AND HEALTH SYSTEMS

HSP 01: Toward Universal Health Coverage: Japan’s strategy on Global Health Diplomacy
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Universal Health Coverage (UHC) will be an important agenda in the post-MDG (Millennium Developmental Goals to be achieved by 2015). Japan prioritizes global health in its foreign policy and expressed the Strategy on Global Health Diplomacy in June 2013, when the 5th Tokyo International Conference on African Development (TICAD) was held. TICAD has been held every five years since 1993, and from the 4th conference in 2008, the Noguchi Africa Medical Prize was started. Dr. Noguchi is a doctor who sacrificed his life during his activities in Africa in 1928. He is so highly respected that his face appears in the 1000 yen bill. The award was established to commemorate him by awarding health professionals and researchers who worked for Africa. From now on, UHC will be one of the priorities of Japan’s strategies. Japan’s commitment reflects its long history and tradition of its national health insurance system and its knowledge and experiences will be shared internationally to help achieve UHC. The presenter has been involved in the Japan’s UHC strategies by serving as a coordinator of a two-week training course for governmental officers responsible for UHC in Asian countries. It is held jointly by National Institute of Public Health (NIPH) and Japan International Collaborating Agency (JICA) and was started in 2013. The participants were chosen from mainly Asian countries but a discussion is going on to expand the countries to include African nations. From the 2nd course held in November this year, a total of eleven participants graduated. They are expected to serve as leaders in achieving UHC in their respective countries. In the presentation, the presenter will discuss Japan’s international health diplomacy as well as the knowledge and experiences from its history to achieve UHC.

HSP 02: Routine data for new cases of tuberculosis at the Central Tuberculosis and Leprosy Reference Laboratory in Tanzania
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Tuberculosis (TB) remains a major cause of morbidity and mortality worldwide. The World Health Organization (WHO) estimates that one-third of the population of the world is infected with Mycobacterium tuberculosis and that more than 8 million new cases of active TB occur annually. The estimated global annual mortality from TB is close to 2 million people. Tanzania is classified as one of 22 high burden countries for tuberculosis (TB) Worldwide. The HIV/AIDS epidemic is associated with a 60% increase in TB cases in Tanzania, and the prevalence of HIV among TB cases is estimated to be 43%. Therefore, since the onset of the HIV epidemic, TB has increasingly become a public health issue in Tanzania and in many other developing countries. Data was obtained from Central Tuberculosis and Leprosy Reference Laboratory from January to December, 2013. Descriptive epidemiology was conducted on all positively identified TB cases. Data were analysed based on time, place, and person. A total of 2014 new TB cases were identified, 1269 (63%) were males. Among all the cases, 1298 (64.5%) were tested for HIV and received their results whereas those who their HIV status was not known were 712 (35.4%) and four (0.2%) had missing results for HIV status. Distribution of the new TB cases (2014) were unevenly distributed in the regions as follows Mwanza (21%); Arusha (12.8%); Pwani (12.4%); Kilimanjaro (10.7%); Dar es Salaam (9.4%); Tanga (8.9%); Morogoro (7%); Iringa (5%); Shinyanga (3.2%); Ruvuma (1.8%); Kagera (1.6%); Kigoma (1.6%); Manyara (1.3%); Rukwa (1.1%); Mara (0.5%); Tabora (0.5%); Dodoma (0.2%); Mtwa (0.2%). Majority of the cases came from Mwanza followed by Arusha, Pwani, Kilimanjaro, Dar es Salaam and Tanga. Tuberculosis infection is more common in males than in females; however the burden of the disease is also high among women.
HSP 03: Evaluation of tuberculosis component of the Human Immunodeficiency Virus patient monitoring system in Tanzania
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Tuberculosis (TB) is a major cause of death among people living with Human Immunodeficiency Virus (PLHIV) even if on Antiretroviral Therapy. The Ministry of Health and Social Welfare designed a monitoring mechanism for TB activities in the HIV Patient Monitoring System in 2010. This study evaluated the usefulness and simplicity of the TB component of the HIV patient monitoring system. We reviewed TB screening and TB treatment indicators from the National AIDS Control Program data for 2013. At six health facilities in Ilala district, a total of 229 Care and Treatment Cards (CTC-2) were reviewed for completeness. Ten stakeholders from national, district and health facility levels were interviewed using a structured questionnaire. MS Excel was used for data analysis. The proportion of PLHIV screened for TB was 92.4% in the first quarter and 94.2% in the third quarter and 1.6% and 1.7% for TB treatment in the first quarter and third quarter respectively in 2013. Out of 10 stakeholders, 8 said the system is simple, had knowledge on the system and felt comfortable working with the system. Of 117 health facilities in Dar es Salaam, 41 (35%) submitted all three quarterly reports while 15 (12%) never reported any quarterly forms for Jan to September 2013. Data completeness for six health facilities for both TB screening and treatment/IPT were found to be 99.6% and 100% respectively. Tuberculosis component of HIV PMS is useful and able to achieve its objective (intensify TB case finding). However, it reported low number of HIV patients who were treated for TB. The system is simple and the information on both two TB indicators is completely filled by health care providers in Dar es Salaam.

HSP 04: Timelines to registration at HIV care unit after testing HIV positive from mobile/outreach testing versus facility based testing in rural settings of Mbeya region, Tanzania
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Mobile and outreach HIV testing services in Tanzania has been instituted to increase access and uptake of HIV testing, particularly in hard to reach areas, however entering into HIV care remains a challenge. The objective was to describe and compare time to linkage to care of HIV positive individuals tested at mobile/outreach versus facility based services over the first six months after diagnosis in rural settings of Mbeya region. A total of 776 adults who tested HIV positive from 16 randomly selected HIV testing sites were enrolled into a cohort study and followed for six months to gather information on linkage to care (from diagnosis to HIV care). Participants were enrolled in two arms of study: 1) those tested at fixed or facility based facilities and 2) those tested at mobile, stand alone Voluntary Counselling and Testing (VCT) or any other outreach services. A total of 147 (19%) HIV positive individuals who were enrolled into the study registered at HIV Care and Treatment Centre (CTC) on the same day as the day of HIV testing. A higher proportion of participants 525 (68%) registered between 2 -7 days. 71 (9%) clients registered between 14 and 30 days and 33 (4%) registered beyond 30 days from the day of testing HIV positive. Individuals testing at the mobile/outreach services took longer to enter into HIV care compared to those tested in the facility based services. In addition long distances and transport costs to centers offering HIV care and treatment services were some of the factors contributing to delay in entering into HIV care unit. Entering into HIV care after testing HIV positive remain a
big challenge in rural setting of Mbeya region, there is a need to improve health care system and linkage of HIV positive clients into HIV care.

**HSP 05: Evaluation of passive pharmacovigilance surveillance system in Tanzania – a review of secondary data**

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Tanzania Food and Drugs Authority (TFDA) routinely collects adverse drug reactions (ADRs) data to detect, prevent ADRs, protect public health, and reduce avoidable costs to the health care system through passive pharmacovigilance surveillance. Under – reporting is a challenge and limited epidemiological evaluations of the system have been conducted. This study evaluated the system to determine performance of the system in meeting its objectives and its attributes and provide recommendations. CDC guidance (MMWR) for evaluation of public health surveillance system was used. Review of secondary data for the period 2006 – 2013, and key informant interviews were conducted. Between 2006 and 2013, 630 ADRs cases were reported, 108 (1.4%) cases reported in 2013 compared to 8000 expected cases annually. All interviewed health care providers (HCPs), know ADRs case definitions, three trained on ADRs surveillance, two send reports to TFDA. Among 36 sampled reported forms, 27 (75%) were incompletely filled, 7(19.4%) correctly filled, 9(25%) received at TFDA timely. From January – December 2013, 108 cases were located in the data base while 80 cases found in reported forms. Among seven visited health facilities, five had only yellow forms and two reported ADRs cases to TFDA. Data management and analysis is done at TFDA headquarters. The system met some of its objectives: it is flexible, stable and representative but not simple, acceptable, and has poor data quality and timeliness. HCPs and public awareness on ADRs reporting should be increased. The system should be integrated into government health administrative levels, including follow ups. Supportive supervision and data transmission mechanisms should be improved.

**HSP 06: Exploring the use of automated cellphone systems for addressing the double burden of disease in Kenya**

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Sub-Saharan Africa bears 24% of the global disease burden but only 3% of world’s health professionals. Messaging-micro financing systems that are personalized to the individuals could be an effective and efficient way to intervene on health behaviors and establish a feasible Community-Based Health Insurance Scheme (CBHI). Priori hypothesis is that the use of mobile technology services has a significant relationship with patients' health financing and status. The objective was to assess whether the use of mobile technology services by microfinance institutions has a relationship with patients' health financing and status in Kenya. M-Afya was a randomized 8-week experiment conducted on individuals of formal, informal and rural sectors in level II, III, V health clinics in Kenya. 538 participants were randomly assigned to the M-Afya app intervention (n=273) or to standard care (n=273). Participants were taken through a two-week training period including health workers at designated locations. M-Afya app installed on participant’s cellphones and a minimum starting fee of KShs 20 was paid by patients and directed into their new accounts. The experimental group showed strong and positive relationship between M-Afya use and participants' health financing (Cronbach’s alpha=0.85) and health status (Cronbach’s alpha=0.72). Improvement of frequency of seeking treatment was reported in 168 of 273 participants in the test group compared with 132 of 273 in the control group (relative risk (RR) for non-users 0.81, 95%CI, p=0.0006). The number needed to achieve greater success was nine.
In conclusion, patients who used the M-Afya app had significantly improved their health status and showed significant willingness to seek medical attention.

**HSP 07: Analysis of tuberculosis dataset in Zanzibar**

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Tuberculosis remains a major global health problem. Approximately 6.8 million people developed the disease in 2012, and 1.3 million died. Although mortality has been reduced by 47% since 1990 and the WHO target of reducing mortality to 50% has been achieved, the disease is still a major challenge. In Zanzibar, the prevalence of the disease in 2013 was 52.3 per 100000 people. As the programme collect data for reporting, Analysis of these data was very important to see its weakness and areas of improvement so that its performance can be improved. This was analysis of the TB dataset-Electronic Tuberculosis Registers (ETR) for three districts in Unguja Island. Data were analysed using Epi Info 7. A total of 439 TB patients’ records for the year 2012 were retrieved from the ETR. Data were obtained from 57 health facilities that provide TB services, including diagnosis and treatment. Out of 57 health facilities, 47 (82.5%) are government, 5 (8.8%) military, 3 (5.3%) faith-based facilities and 2 (3.5%) are private hospitals. The mean age of patients was 36.08 years (±15.5SD) with a range of 1-80 years. Among the age groups, the group ages 25-34, contributed the most with 126 (28.7%), while the group ages 0-4 contributed the least (6 cases or 1.37%). About 63% of cases were smear positive, and 44% were diagnosed as severely infected with the disease and hence they were notified very late. Half of patients notified and registered for treatment are of unknown outcome. The programme needs to improve its case notification strategies to able to identify cases early. HIV status needs to be captured in the database. Follow-up of patients registered for treatment should be strengthened.

**HSP 08: Evaluation of the tuberculosis surveillance system in Zanzibar**

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In 2013, WHO estimated TB prevalence in Zanzibar at 124 per 100,000 population. This evaluation was done to see usefulness of the system and whether if it meets its objectives. CDC guidelines for the evaluation of the surveillance systems (MMWR 2001/vol. 50/No. RR-13) was used. One health facility was selected from each of four regions as well as reference hospital and reference TB laboratory as data collection sites. Interviews were conducted to clinicians, laboratory personnel, District TB and Leprosy Coordinators (DTLCs), Regional TB and Leprosy Coordinators (RTLCS) and data officers. Direct observation of laboratory assays, request forms and EQA documents was done. Analysis was done using Epi info version 3.5.1. The system meets its objectives and adequately captures sex and age distribution of cases and shows general trend of the disease in the population. In 2013, the system notified 684 cases, equivalent to rate of 52.5/100,000 population. Unfortunately, 96.3% of the notification was new cases and hence transmission rate is very high. Although case notification has increased from 537 to 684 cases in 2012-2013, making case increase by 27.3%, it was still very low compared to the WHO estimates. Zanzibar TB Reference laboratory picked 12 (1.42%) culture positive out of smear negative samples. All positive isolates have been sent to Central TB Reference Laboratory (CTRL) for drug sensitivity testing. Sensitivity and positive predictive value was found to be 42.18% and 11.02% respectively. Flexibility, representativeness and acceptability of the data are very good, while simplicity, data quality and timeliness of the system need to be improved. The system is useful as
it meets its objectives and captures the distribution of cases in age and sex over time, and the general trend of the disease in Zanzibar. However, it does not explain well geographic case distribution of certain area.

HSP 09: Evaluation of facility based maternal mortality notification and review surveillance system January February 2014
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Of all Millennium development goals, reduction of maternal mortality is furthest from achieving the target with only one year remaining. According to Tanzania Demographic and Health survey 2010, the maternal mortality ratio (MMR) was 454 deaths/100000 live births, and Tanzania has been included among ten countries accounting for 61% of the Global maternal deaths. Maternal deaths surveillance and response systems that include maternal deaths identifications, reporting, review and response can provide the essential information to stimulate and guide action to prevent future maternal deaths and improves the measurement of maternal mortality. The study was conducted between January and February 2014. Interviews with key stakeholders at the level of MOHSW and CHMT members were conducted. Questionnaires were administered, guidelines and forms that were available at the MOHSW (RCHs). The system attributes were assessed using CDC updated guideline (MMWR) and Routine Data Quality Assessment Tools. Eighteen health care workers were interviewed and 124 forms were reviewed in the year ending 2013. Of those interviewed, 12/18 (66.7%) health care workers reported the system is not simple in its structure as well as its operation, and a majority (what percent?) of them reported data collection was troublesome exercise with 16/18 had not undergone any formal training regarding the system. Among 124 forms reviewed, 37 (30%) was incompletely filled and 31 (25%) was inconsistently filled on a key variables. No standard tools available for collecting maternal deaths information as many versions of the forms were observed to be used in various facility for reporting. The acceptability, stability, data quality and timeliness need to be improved since the system does not meet its objectives with the data it contains. Formal training coupled with supportive supervision and the presence of standardised tools for data collection will improve the system.

HSP 10: Tanzania National HIV Research database: a tool for monitoring research, evaluation and a guide for prioritization HIV/AIDS research funding
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Among the PEPFAR commitments to Tanzania is building capacity for a country led response to the HIV/AIDS crisis and laying foundation for sustainable programs. Within this context, the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR) supported Tanzania to develop the National AIDS Control Program (NACP) National Health Sector Research and Evaluation Agenda (NHAREA) and the TACAIDS National HIV and AIDS Research and Evaluation Agenda 2010-2015 to make smart investments and prioritize research for HIV/AIDS issues of public health impact. Initially HIV/AIDS research was not streamlined and could neglect important areas for priority policies and programming. Furthermore, there is limited access to previous and ongoing HIV/AIDS research reports because of lack of a unified public repository. Thus, it is difficult to know which interventions or programs have been effectively implemented and evaluated. The purpose of the
National HIV Database is to create a public domain for tracking and storage of synthesized reports and ensure visibility, accessibility to reports and harmonization within the research and evaluation agendas. The HIV Database was conceived through consultations with NACP, NIMR, TACAIDS, and the U.S. Centers for Disease Control and Prevention (CDC). Stakeholder meetings were held to provide direction to the design and purpose of the database. NIMR Mwanza was tasked with the development of the database. The database was developed using international standards compliant to DDI and NADA requirements. The database has functional capability to link all HIV/AIDS research institution in Tanzania. The HIV Database contains priority thematic areas in research and evaluation including prevention, care and treatment, counselling and social support, health system strengthening, impact mitigation, stigma and discrimination, policy and legal issues, biomedical, social and behavior studies. The Database is available at http://41.59.3.72/index.php/home. The National HIV Database is a tool developed from collaboration of national stakeholders that offers the ability to transparently monitor HIV research conducted in Tanzania. Continued development and growth requires strong commitment from collaborating institutions and investigators.

HSP 11: Piloting of malaria reporting through electronic Integrated Diseases Surveillance and Response in four Districts of Tanzania

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Malaria surveillance is an important component of malaria control programmes. Currently, malaria and other disease data are collected through a paper based system that faces challenges of delayed reporting and poor data quality. We describe the pilot of electronic reporting of health facility based malaria surveillance data through electronic Integrated Disease Surveillance and Response (eIDSR). The Tanzania Ministry of Health and Social Welfare (MoHSW) and the Department of Computer Science of the University of Dar es Salaam (UDSM) designed a system of health data collection and transfer through the use of mobile phone technology. Following a pilot in one urban district (Temeke), training of Health facility (HF) representatives was conducted in 3 districts (Muleba, Misungwi and Bunda) located in high malaria prevalence areas of Northern Tanzania. In Temeke District representatives from 67 (65% of 103 eligible) Health facilities were trained in November 2013. In January 2014; a total of 40, 43, and 45 health facility representatives were trained in Muleba, Misungwi and Bunda districts; respectively. Majority of health facilities participating in the training were government owned: Temeke (57%); Muleba (73%); Misungwi (93%) and Bunda (88%). In the first 4 weeks of program pilot in Temeke (week 47 to 50 of 2013): over 50% of these reports were submitted on time (by Monday 3pm); a total of 38,321 suspected malaria cases were reported of whom 33,852 (88.3%) were tested for malaria while 4,469 (11.7%) were treated presumptively for malaria (clinical cases); and malaria positivity among those tested was 30.4%. Even at the very early stages of the system pilot, electronic disease surveillance has proven advantageous over the former paper based system. This data has shown an improvement in accuracy, completeness and timeliness of reporting malaria, allowing the NMCP to better tailor its programmatic activities, and to detect and respond to outbreaks timely.
HSP 12: Situation analysis of malaria data quality and use assessment in routine health information system

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Malaria data is an important aspect for monitoring malaria burden and intervention coverage to inform evidence-based programmatic decisions. Surveys have shown that the quality of malaria data from routine health information system (RHIS) is poor which made it difficult to analyze, interpret and ultimately the use of these data is limited. A situation analysis was conducted to identify weaknesses and gaps, appropriate solutions for system improvements. Desk reviews and field-based data collection was conducted to gather information that describes current practice, barriers and needs for malaria data quality improvement. A stakeholder’s workshop was convened to discuss the gaps identified, propose solutions, prioritize activities and develop a work plan to improve data quality and use. The findings suggest that malaria data quality in Tanzania is poor. The main issues reported at the facility level were data inconsistencies (in the registers, tally sheets and summary forms), data collection tools not being available and not being filled out. The findings show that most health facilities do not complete the tally sheets. At the district and regional levels, the main challenge encountered was unreliable internet connectivity that hindered timely processing of data into the DHIS2 system. The stakeholders proposed priorities for improving data quality and use, including: 1) data quality and use of data to be introduced as permanent agenda item in Health Management teams at district and regional level; 2) develop guidelines on data quality and use for health facilities and districts; and 3) supporting CHMTs to conduct regular, comprehensive and effective supportive supervision and, including data quality assessments. RHIS that produce complete, timely, reliable, and valid data are needed by national malaria control programs to monitor malaria burden and intervention coverage at national and sub-national levels to inform evidence-based programmatic decisions. The challenges appear to be behavioral and organizational, relating to how staff value and use data in their everyday work.


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The Integrated Disease Surveillance and Response (IDSR) system, a paper based system that reports public health surveillance and response data from the health facility level in Tanzania was implemented nationwide in 2002. A mobile phone based electronic system (eIDSR) was created in 2012 to replace the paper based system (paper-IDSR) to increase efficiency and completeness of reporting. A four-week pilot of the eIDSR system took place in Temeke District in Dar es
Salaam in November 2013. This study aimed to explore the change in reporting and completeness of surveillance data reporting following the change from the paper-IDSR to the eIDSR system. A total of 67 (64% out of 104 eligible) health facilities participated in the eIDSR pilot following training. For the duration of the pilot, the paper-IDSR and eIDSR system worked concurrently. Data were collected at the district level for the paper-IDSR and through an internet-based database for eIDSR. A data quality assessment was conducted in January 2014 to compare timeliness and quality of data between the two systems. Preliminary findings indicate that 70% of weekly reports were submitted on time through the eIDSR compared to 78% of timely reports via the paper-IDSR system; this is due to a discrepancy in how the paper-IDSR and eIDSR define timeliness (defined by paper-IDSR as Wednesday and eIDSR as Monday 3 pm for the previous week data). Initial analysis indicates that when the same cut off time (Monday) is used for both systems, timeliness in eIDSR is substantially faster than paper-IDSR. All health facilities reported complete data through the eIDSR system while 84% reported complete data through the paper-IDSR system. The paper-IDSR system required dedicated staff to travel from the health facility to the district medical officer to deliver weekly reports. The cost of travel and person hours lost to deliver reports is completely eliminated in the eIDSR system. This pilot shows that eIDSR improved timeliness of weekly reporting and data completeness. Implementation of eIDSR should be considered in all regions in the Mainland Tanzania to improve surveillance of infectious diseases.

HSP 14: Use of mobile phone based-technology for real-time reporting of fever cases and malaria treatment failure in areas of declining malaria transmission, north-eastern Tanzania

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Early detection of febrile illnesses at community level is essential for improved malaria management and control. Currently, mobile phone based-technology is common in developing world and the technology has been deployed in collecting and transferring health information and services in different settings. This study assessed the applicability of mobile phone based-technology in real-time reporting of fever cases and management of malaria by village health workers (VHWs) in an area with progressively declining malaria burden in north-eastern Tanzania. This was a longitudinal study covering three villages and one dispensary in Muheza district from November 2013 to October 2014. A baseline census was conducted in May 2013, the data were uploaded on a web-based database and updated during follow-up visits by VHWs. Active (ACD) and passive case detection (PCD) of febrile cases was done by VHWs and cases found positive by malaria rapid diagnostic tests (mRDTs) were given first dose of artemether-lumefantrine at the dispensary. Each patient was visited at home by VHWs to supervise intake of antimalarials and to monitor the recovery process. The data were transmitted to the database using mobile phones. The baseline population in the three villages was 2,934 in 678 households. A total of 1963 febrile cases were detected during ACD and PCD; 1832(93.3%) were captured using mobile phone. At the dispensary, 1836(93.5%) febrile cases were registered and 84.2% of these were through PCD. Positivity rates were 50.2% and 40.2% by mRDT and microscopy, respectively. No case had early treatment failure within seven days and adherence to treatment was 98%. One patient with severe febrile illness was referred to Muheza district hospital. The study showed that mobile phone based-technology can be used successfully by VHWs in surveillance and timely reporting of fever episodes and monitoring of treatment failure in remote areas. Further optimization and scaling-up will be required to utilize the tools for malaria cases and drug resistance surveillance.
HSP 15: The feasibility and acceptability of screening for hypertension in private drug outlets in Tanzania
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Hypertension is an increasing major contributor to ill health and premature mortality in Sub Saharan Africa (SSA) including Tanzania. Rates of detection, treatment and control are very low. This study aimed to determine whether pharmacies and drug outlets can be used as a venue to screen for hypertension in two districts of Mwanza region, Tanzania. A feasibility study was conducted in 8-selected drug shops from August 2013-February 2014. Drug shop customers were screened for hypertension, completed a simple questionnaire and referred to a nearby hospital if hypertensive. Follow up phone calls were made to hypertensive customers to document their referral attendance. Community perceptions and service acceptability were investigated by using quantitative and qualitative methods. Prevalence and risk factors for hypertension and referral attendance were assessed by multivariate analysis. The prevalence of hypertension (blood pressure greater than 140/90mmHg or self-reported use of antihypertensive medication) amongst the 970 participants (mean age 35 years), was 11.2 %. Age and female gender were associated with hypertension (50+ versus 18-29: OR 15.63, 95% CI: 7.33–33.32, P-value <0.001) and (female versus male: OR 1.29, 95% CI 1.05–1.58, P value <0.001). Only 19 out 109(25%) adults with a raised blood pressure readings attended a referral within 2 weeks of their referral. Older participants, males and those with higher education level were more likely to attend their referrals although the difference was not statistically significant. The prevalence of hypertension was high and unmet need for public screening for hypertension was evident among the study participants. There is an opportunity to implement intervention to improve detection by using private drug shops. Drug shops are close to people, acceptable and easily accessible.

HSP 16: Bacterial contamination of medical doctors’ and students’ clinical coats at a referral hospital in Tanzania
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Microbial transmission from patient to patient has been linked to transient colonization of health care workers attires. Bacteria such as Staphylococcus aureus, Escherichia coli, and Pseudomonas aeruginosa among others can be transmitted through direct contact or through fomites. The aim of the study was to determine type of bacterial contamination on clinical coats of medical doctors and students and factors associated with contamination in the tropics. A cross sectional study recruiting medical doctors and students were undertaken in a tertiary and teaching hospital in Moshi, Tanzania. A purposive sampling was used to enroll participants. Self-administered structured questionnaires were used to capture demographic data and information on white coat usage and handling. Sterile moisturized swabs were rubbed on specific pre-identified sites of the coat to collect samples for culture in the laboratory. A total of 180 participants were involved in the study and 118 (65.6%) were males. Sixty (33.3%) were medical doctors and 120 (66.7%) were medical students. The majority (55.6%) of participants were from non-surgical departments. One hundred and fifty study participants (83.8%) were stationed at in-patient departments while the rest were located at outpatient departments. In total 132 (73.3%) clinical coats were found to be contaminated with bacteria. Isolated bacteria included: Staphylococcus aureus 70 (38.9%), coagulase negative staphylococci 61 (33.9%), Pseudomonas aeruginosa 5 (2.8%) and Escherichia coli 2(1.5%). Clinical coats of participants from surgical departments were less likely to be contaminated (OR 0.1; CI 0.1 – 0.5; p<0.01). Nearly three quarters of doctors’ and students’ coats
were colonized with bacteria. This may play a substantial role in the transmission of bacterial infections in health care settings in sub-Saharan Africa.

**HSP 17: Modelling cost-effectiveness of HIV counselling and testing modalities in Tanzania**

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HIV counselling and testing (HCT) is a key HIV/AIDS control intervention. In fact, new modalities have been developed for expanding HCT coverage in developing countries. Thus the objective of the study was to compare to per client cost and outcomes of four modalities which exist in Tanzania’s HCT services. A cross-section study was conducted in four districts and 16,561 records were extracted from four HCT modalities in the 2012 calendar year. The modalities assessed were Co-located or Integrated Client-Initiated HCT (CICT/VCT), Mobile or Outreach HCT (Mobile CICT), Facility-based Provider-Initiated HCT (PITC), Home-based HCT (door-to-door and client index approaches). We collected data on client demographics and costs incurred during a period of 12 months. Client characteristics were extracted from NACP monitoring systems register. Costing data was abstracted from site specific programme accounts, supply and inventories. Moreover, Out of pocket expenditure were captured through exit interviews with clients accessed the HCT services during data collection. Cost and effectiveness was measured and compared across HCT modalities. HIV prevalence across HTC modalities and sites visited is at 7.52%. VCT was found to be a leading modality in detecting HIV positive clients with a HIV prevalence of 759(9.1%) and the least was Door-to-door reported 53(2.7). PITC modality reached the largest proportion of previously untested individuals [3779(92.90)]. Costs per client (for 2012 in USD) were $17.45 for PITC HCT, $19.92 for VCT-HCT, $25.88 for mobile-HCT and $21.59 for door-to-door-HCT. When compared to mobile HTC, incremental cost of PITC increased by 78% compared to the baseline cost Door-to-door was found to have the least cost compared to the mobile modality. Therefore the study data conclude that there is a significant different on unit cost across HCT modalities but multiple HCT modalities is an important components for HCT coverage expansion.

**HSP 18: Assessment of stool adequacy rate and non polio rate indicators of acute flaccid paralysis surveillance system in Tanzania, 2013**

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Acute Flaccid Paralysis surveillance was adopted globally as a key strategy for monitoring the progress of the polio eradication initiative by the World Health Organization. Tanzania began AFP surveillance in 1995 and last polio case was detected in 1996. The study used stool adequacy and Non polio AFP rates indicators to identify proportion of districts with stool adequacy rate below 80% and Non polio AFP rate below 1/100,000 children below 15 years. A retrospective descriptive analysis was conducted on secondary AFP surveillance data for all districts that reported AFP cases in 2013, consisting of all children below 15 years. Between January and December 2013, a total of 702 AFP-cases were reported, no wild polio virus was recorded. Fifty six percent of the AFP-cases were males and 64.5% were < 5 years old. Out of 123 districts that reported 23.6% had non-polio AFP rate below 1/100,000 and 8.9% had stool adequacy rate below 80%. Forty six percent (322/702) of AFP-cases had three polio vaccine doses. Majority of districts had stool adequacy rate above 80% and Non polio AFP rate greater than 1/100,000 Fifty six percent of the AFP-cases were males and 64.5% were < 5 years old. Fifty six percent of the AFP-cases were males and 64.5% were < 5 years old. The surveillance programme needs to address problems of delayed specimens collection and AFP cases reporting to reduce the number of compatibles cases in future.
HSP 19: The challenges of improving health workforce performance in Tanzania
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The single biggest barrier to scaling up the necessary health services in Sub-Saharan Africa is the lack of adequate and well-performing health workforce. The presentation aims at contributing knowledge on how workforce performance problems in the health sector could be addressed by integrating human resource (HR) and health system (HS) strategies. The PERFORM project tested this new approach in addressing health workforce performance in three district in Iringa region. The PERFORM project used Action Research approach engaging the Council Health Management Teams (CHMTs) in Iringa region to identify and analyse health workforce performance problems. The project used problem tree analysis approach to identify and analyse key health work force performance problems. The PERFORM project engaged the CHMTs to design and implement integrated HR/HS strategies to address health workforce performance without additional financial support from the project. The findings indicate that the CHMTs acquired skills particularly in problem identification and analysis and have started using the skills in improving health workforce performance. The use of HR/HS approach strengthened team work among the CHMT members particularly in decision making and implementation of activities. Furthermore, the bundles approach enabled the CHMTs to use different strategies in addressing health workforce problems. However, delay in disbursement of funds from the central government affected the implementation of bundles. Similarly, ad hoc activities such as meetings, workshops, seminars also delay implementation process.

HSP 20: Challenges to development and promotion of traditional medicine in Tanzania
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Traditional medicine in Tanzania has survived through generations and has remained a primary place for many who seek help of their problems in day to day lives. The government of Tanzania has regularly been the regulator of the conduct of traditional medicine in the country. Its control over the field is under a section in the Ministry of health and Social welfare (MoHSW). To date healers are formally recognized through registration under the council of traditional and alternative medicine. This then legalize and recognize the practice of traditional and alternative medicine and therefore set freedom to healers to practice without fear provided they keep observing the law, guidelines and regulation. We conducted a questionnaire based survey in two districts of Tanzania to investigate among others, on what hinders the development and promotion of traditional medicine in Tanzania. Three major challenges that faced the development of TM were found to be Religious beliefs, the community and the Regulatory bodies. The healers said the major obstacle in the development of TM is seen to be the influence of some priests who oppose them as superstitious. With the community, some members have taken the law into their own hands by killing the healers believing that these healers are the reasons of the mishaps and misfortunes that are happening in their communities. They accuse them for witchcraft. Finally, the regulatory bodies also have their roles in slowing down the development of TM in the country by putting some regulations which cannot be met by local traditional practitioner. Much is to be done to avert all these drawbacks so as TM to move forward with reasonable pace. More education is needed to those sorts of individuals on benefits of traditional medicine.
HSP 21: Traditional healers' knowledge transfer: a challenge to scientific investigations
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There have been efforts to re-discover, recognize, formalize, control and promote traditional medicine in Tanzania and elsewhere. The efforts include formulations of policy, law, regulations and guides on the conduct of traditional medicine by the Ministry of Health and Social Welfare; and the conducting scientific research by reputable research institutions. Traditional medicine was thought to be handled over from one generation to another mainly through oral traditions and apprenticeship. Concerns were there that without documentation of the knowledge itself, there is a danger of loss of much of the valued knowledge in the field of traditional medicine. We conducted a survey in Rombo district of Kilimanjaro region and Meru district of Arusha region to investigate on the ways of acquiring, sharing, keeping and passing traditional medicine knowledge and carrier within and between generations. This is a questionnaire based survey. A strong commonality was observed to the ways the healers acquire their skills. 95% of them became healers through spiritual divination from their distant ancestors whom they never physically came in contact with. The same healers never bothered to teach any individual for the purpose of preparing a successor, neither did they bother to document their knowledge about herbs or medicinal plants. The main reason on that was their trust in the traditional way of knowledge transfer through divination which they claim will come automatically to the ones meant to be their successors. The process of knowledge transfer through divination is paranormal and therefore outside the scope of investigations through scientific methods. It deters validation through scientific research. We therefore propose the use of logic analysis that goes beyond the traditional ways of scientifically testing hypotheses when investigating, handling and validating traditional knowledge transfer between successors of carriers of traditional medicine.

HSP 22: Mentoring for performance excellence: the Tanzania experience
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The National Blood Transfusion Service of Tanzania (NBTS) is a PEPFAR funded project. The key NBTS Quality Management System (QMS) objective for PEPFAR II is to achieve the African Society of Blood Transfusion (AfSBT) Level 1 Stepwise Accreditation. Mentorship was identified as an effective transfer of skills and knowledge for implementing the roadmap to accreditation. The objectives were to impart skills and knowledge on adherence to the QMS as a way of achieving GMP and to prepare the NBTS to achieve AfSBT Level 1 accreditation. Once the selection criteria were established, suitable mentors were identified. Mentors were trained by the AABB, NBTS's Technical Assistance provider. A three-phase approach was used to ensure the mentors achieved the skills they needed to mentor their peers. The mentors were deployed into the zones, resulting in reported compliance of approximately 70% to the charts of compliance requirements. The actual level of implementation will be measured through internal assessment of Level 1 accreditation requirements, scheduled for next quarter. Plans are under way to extend this program to all zones. The staff members were highly motivated by the program and the program has been well accepted in the zones where it was implemented. Mentoring for performance excellence is a successful strategy for facilitating the learning and implementation of skills to all stakeholders when implementing an important strategic objective of an organization.
HSP 23: Risk factors for service use and trends in coverage of different HIV testing and counselling models in northwest Tanzania between 2003 and 2010
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Little is known regarding the relative effectiveness of different HIV testing and counselling (HTC) strategies in increasing the uptake of services and improving HIV diagnosis rates in African settings. Information on HIV status, socio-demographic and behavioural characteristics were available from a serological survey (sero-survey) carried out as part of an ongoing community cohort study in northwest Tanzania in 2010. Participants using HTC in three places: community outreach during the sero-survey (CO-HTC), walk-in HTC at the health centre (WI-HTC) or antenatal HIV testing (ANC-HTC) were linked to the population cohort data. Characteristics of linked cases were compared to those of sero-survey participants who were not linked using logistic regression. Data from two earlier sero-surveys in 2003/4 (sero4) and 2006/7 (sero5) were used to assess trends in the proportion of persons testing at different services. Community links were available for 811 men and 1,229 women attending CO-HTC, 75 men and 112 women attending WI-HTC, and 153 women attending ANC-HTC. There were 5,968 unlinked controls for the CO-HTC analysis (2,320 men, 3,648 women), 815 for WI-HTC (425 men, 390 women), and 76 for ANC-HTC. The odds ratios for HIV-positive individuals using HTC compared to HIV-negative individuals were highest at WI-HTC. Uptake of CO-HTC and ANC-HTC was more equitable by serological, demographic and behavioural characteristics. Of those who participated in sero-surveys, CO-HTC attracted the greatest proportion of users overall and also diagnosed the largest number of HIV-positives. WI-HTC attracted HIV-positive individuals, younger men and women, and more educated women, possibly as it required a conscious decision to test. CO-HTC and ANC-HTC were more equitable in their coverage as they were linked to other health services. While different types of services help to attract different types of users, it will also be important to understand which services are most effective at linking HIV-positive people to treatment and care.

HSP 24: The first Mbeya HIV treatment failure workshop: addressing the needs of health care workers and patients on second line
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Since the start of the Antiretroviral Therapy (ART) National Treatment Program in 2004, treatment experienced patients pose new challenges to management. The most crucial of this challenge is to correctly identify and address treatment failure and develop further treatment options. To equip HCW with knowledge and skills in diagnosis and management of treatment failure, the 1st Mbeya HIV treatment failure workshop was conducted in April 2014. Facilitators addressed treatment failure in context of Tanzania’s new National Guidelines and provided information on contributing factors such as adherence and drug resistance that were illustrated by case studies of patients managed in clinical trials for whom viral load and resistance tests were available. Future perspective for 2nd line and screening approaches for early failure identification were discussed. The objective was to evaluate quality and relevance of the 1st Mbeya HIV treatment failure workshop. Participants voluntarily and anonymously completed a questionnaire with 22 given statements to be judged on a 7-point-Likert-like scale (1 = totally agree; 7 = totally disagree), answer six open-ended questions and gave recommendations for
improvement. The questionnaire addressed the following topics: organization, learning, and adequacy of timing, didactics and interaction, overall impression. A total of 34 participants (13 doctors, 1 laboratory technician, 5 pharmacists, 9 nurses and 6 without cadre information) attended the workshop and completed the written evaluation (response rate: 100%). Most participants found the course well organized. Except for one, participants agreed that they had enough opportunities and time to train skills. Didactics and interaction was rated very positive. Information and discussion was adequate for understanding and participants felt taken seriously concerning their needs, questions, expectations, opinions and explanations. Visual presentation, case studies and language supported the understanding of participants who suggested to repetition of this workshop on a regular basis. HCW felt prepared for challenges of management of treatment experienced patients. The practical approach with case studies utilized additional diagnostics available through studies for training of routine services. This is an often underestimated impact of research on improvement of routine services.

HSP 25: Assessment of knowledge among postnatal mothers before and after health education on cord care: an intervention study
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Umbilical cord care is one among the important postnatal practices for good newborn development. Poor cord-care practices by caregivers, especially postnatal mothers, contribute to newborns’ infection. Evidence from several studies indicates that poor knowledge about newborn care among postnatal mothers significantly contributes to poor cord care practice. The objective of this study was to assess the level of knowledge acquisition after health education among postnatal mothers at Amana Hospital in Dar es Salaam, Tanzania. A quasi-experimental pre-test post-test study design was used. Postnatal mothers were given a structured questionnaire with demographic variables and questions to assess mothers’ knowledge about cord care. Collection of data involved two phases of filling questionnaires with the same information by the participants, one before and one after the health educational intervention on cord care. The education intervention took place in the postnatal ward while mothers were waiting for care before discharge. Data were transferred into SPSS computer program for analysis to compute frequencies, means, standard deviations, cross-tabulations, p-value and chi-square. A total of 128 postnatal mothers were included in the study. Overall results showed that during pre-test, 58.5% of mothers had satisfactory knowledge about good cord care practices. The post-test results showed that, 71.2% had satisfactory knowledge regarding good cord care practice. A calculated p-value of 0.018 revealed significant gains in knowledge of postnatal mothers after one health education session. The study concluded that a health education session on cord care significantly increased knowledge of postnatal mothers regarding good cord care practices. It showed that health education conducted within the usual hospital routine can lead to knowledge changes among postnatal mothers which can improve newborn outcomes.

HSP 26: Factors influencing health information-seeking behavior among health care providers in Tanga region, Tanzania: a case study of MUHEF project
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Health information-seeking behavior among health care providers is not yet fascinating enough to provide high quality health services. Little is known about problems that preemt health care providers to look for information, and how they integrate what they find into their actions. The aim of the study was to determine factors influencing health information-seeking behavior and utilization of ICT resources among health care providers in Tanga region, Tanzania. A cross
A sectional study was conducted in July 2008 among 202 health care providers. Questionnaires were administered to find out what types of health information are searched by health care providers and their sources. Of the 202 health care providers, 52 percent reported that they knew how to use a computer and 48 percent had access to a computer. Providers who knew how to use a computer were more likely to have access to health information (OR = 43.3, 95 percent CI: 17.3, 111.6). Barriers to seeking health information included lack of skills to search health information (17 percent) and lack of reading culture (15 percent). Urban location of the health facility was found to be strongly associated with information-seeking behavior (OR = 14.18; 95 percent CI: 1.96, 288.6). Health care providers located in urban areas were more likely to search health information and use it than those in rural areas. Health care providers at the district hospitals were found to have less knowledge, access, and skills to search and use health information resources than urban health care providers. Providers in both urban and rural health facilities should continuously be trained on how to search and use health information.

HSP 27: Careseeking behavior and supply side constraints for treatment of pneumonia and diarrhoea among children under five

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Pneumonia and diarrhoea treatment using amoxicillin, and Oral Rehydration Solution and zinc respectively can effectively prevent unnecessary deaths in children under five. However, making these treatments available and properly utilized remains a challenge. This study aimed at identifying influencers and enhancers to careseeking behavior and supply side constraints. The study applied descriptive, qualitative design involving 63 caretakers and 26 service providers from 6 districts in Mbeya, Njombe and Iringa regions, Tanzania. Participatory rapid appraisal methods including community mapping, social network analysis and focus group discussion were used in data collection. The data were thematically analysed based on salient and recurring themes. With regard to diarrhoea and pneumonia treatment and prevention, dispensaries and drug stores were found to be the most sought facilities, while Community Health Workers (CHWs) were the least sought and their roles were not clear. Staff competence, a range of services offered, affinity and drug and service affordability and accessibility were found to influence care-seeking behavior. Supply-side constraints included drug stock out, inaccessibility and inadequate manpower and equipment. Information was mostly sought from health facilities and conveyed to families and neighbors. This study provided crucial information for strategic design and policy recommendations. Identified influencers, constraints and social network suggest where to invest resources for better influence and multiplier effect. Service providers should know and be able to offer what caretakers are looking for. The roles of CHWs need to be clarified and strengthened in order to enhance their credibility. Future studies should consider further examining the roles played by influencers and constraints identified in this study.

HSP 28: Caretaker-adolescent communication on sexuality and reproductive health in Unguja-Zanzibar

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Educating teenagers about sexuality and reproductive health involves not only the sending of accurate information by parents but also the requiring receptivity on the part of the listener and mutual regulation of information flow, as understandings change. Therefore, as much as caretaker-adolescent communication about sexual and reproductive health is important, it is also important how such communication is managed and perceived by the young persons. The
objective was to explore adolescents’ perceptions on the idea of communicating with caretakers on sexuality and reproductive health in Unguja-Zanzibar. This was an exploratory study, which utilized qualitative methods. All the three regions and six districts of Unguja-Zanzibar was involved. Purposive sampling was used to select 30 males and 42 female adolescents. Twelve focus group discussions were held in Kiswahili and were audio-recorded, transcribed and coded. With the use of content analysis, searches were carried out which involved thoroughly reading the individual codes for emerging patterns. The participants found it important for caretakers to communicate with adolescents about sexuality to avoid sexual and related health risks. Caretakers were the most preferred communicators. Information about the use of condoms was the most unpopular topic while the use of contraceptives seemed to be more interesting. The barriers to communication on the caretakers’ side, include, the belief that such information might encourage promiscuity; some caretakers do not find it easy to discuss matters related to sexuality with their children; and others feel that some adolescents know more about sexuality than themselves. Barriers on adolescents’ side include, “fear” of the caretakers, some of whom seem harsh, unfriendly, and sometimes unapproachable. Following the findings, it is suggested that intervention strategies that would help to alleviate communication barriers would consequently facilitate caretaker-adolescent discussions about sexuality and reproductive health.

HSP 29: The effects of using community social networks in identification of HIV positive children and adolescents in Dar es Salaam, Tanzania: evaluation of PASADA intervention on intensive paediatric case finding
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Identification of HIV infected children is essential to provide comprehensive care and treatment. However, only an estimated 15 percent of HIV exposed infants globally receive HIV testing in the first two months of life. This study aimed at evaluating the effects of a program for identification of HIV positive children and adolescents through community networks. A prospective, cross-sectional descriptive study was conducted between January and April 2011 and a total of 227 participants were recruited from PASADA clinics. The IPCF intervention involved initiating the process of HIV testing by identifying children through community social network. Unspoken social clues were also used to identify children who are at higher risk of being exposed to HIV. We administered structured questionnaire in addition to a retrospective review of PASADA health records on the number of children enrolled seven months before and after IPCF and the two groups were compared. New enrolment increased at the beginning of the IPCF programme in January 2010 and showed sustained increases through July 2010 by 42% (p=0.001). The study revealed that participants in the IPCF group were more likely to have visited more providers prior to being diagnosed with HIV than VCT participants (46% vs. 31%, respectively; p=0.001). IPCF provides a model for leveraging existing community structures to identify HIV-infected children who have previously been undiagnosed in the formal health sector. This model could be expanded in other settings to increase HIV testing and strengthen linkages to care for children. Efforts to expand IPCF to identify more children, especially those at earlier stages of disease progression, should be developed.

HSP 30: Assessment of the influence of label information on the purchase decision of packed food items in supermarkets: a case study of the Nyamagana District, Mwanza
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The Tanzania Food and Drug Authority (TFDA) provision requires the use of Label Information as a vital tool for informed purchase decisions. However, little is known on the influence of Label Information on purchase decision particularly from supermarkets. This Study examined the relationship between Label Information provided on Packed Food Items and the purchase decision of consumers. A total of 300 questionnaires were processed, 50 interviews conducted and three focus group discussions each with 15 participants were organized. The study was conducted in Nyamagana district. Respondents were found to be conversant with Kiswahili (99%) and English (78%). Most of the respondents (79%) do not read LI in the course of selecting and purchasing PFIs. Volume and expiry date were ranked as the most important information by 99% of respondents while Net Content and Instruction for Use was 3%. Some PFIs were found not to observe the PFIs Labeling Regulations, for instance, most bread did not bear expiry dates on their packages while other PFIs had their expiry dates outdated yet were found in the shelves of supermarkets. Strategic promotion of the TFDA Food, Food Labeling Regulations should be emphasized as the public has less awareness. The government should reconsider the LI legal framework and compel manufacturers to have dual versions of LI providing compulsorily in Kiswahili and any other language(s), which may include English. The policy should include repackaging of imported PFIs to incorporate Kiswahili LI, which will also increase employment and business opportunities at the same time promote Tanzanian values and identity even beyond borders. The LI exerts minimal influence to most users, hence, more research is required on this area.

HSP 31: Paediatric burn prevention: a pre-post test education intervention at pediatric outpatient clinic at Temeke Hospital, Tanzania

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Burn injury to flesh or skin is caused by heat, electricity, chemicals, friction, or radiation. Children under five are most susceptible to burn injury. Burns cause much pain, disability and even death. Many surveys have been conducted to assess cause, magnitude, management of burns and even knowledge rather than evaluating education intervention. The objective was to assess the changing knowledge of children's mothers in preventing home-related burn injuries among children under 5 years, after receiving an education intervention. Quasi-experimental pre-post-test study design was used. Data were collected from 114 children’s mothers by quota and simple random method. Subjects were interviewed and given an educational intervention and then interviewed again. The intervention was conducted at Temeke Hospital pediatric outpatient clinic during the time that nurses routinely give teaching sessions. Data have been transferred into SPSS computer programme where analysis was done to determine frequencies, means, cross tabulations, p-value, and chi-square. Before intervention, some mothers correctly reported that the commonest ways that a child gets burned was through hot liquids and cooking fire (39.5% and 44.7%); the least well understood cause was hot food (7.0%). On the pre test intervention, only 40.4% of the study sample had knowledge about appropriate treatment applied after a child is burned; after the communication intervention, the population who were found to have correct knowledge about proper post-burn management was increased to 70.2%. Education training sessions significantly increased knowledge about burn prevention among mothers of under five children. Such training sessions should be encouraged in already well-established clinic routines to increase the effectiveness of home safety among mothers/caregivers in society and reduce the incidence of burns injury and disability among children.
WATER AND FOOD SECURITY

WFS 01: Microbiological effectiveness of household water treatment and safe storage methods promoted in a pilot evaluation program in rural Tanzania
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Household water treatment and safe storage (HWTS) has been proposed as an interim solution for improving water quality in settings with unreliable water supplies. In a pilot program to assess the acceptability of various HWTS methods, we undertook this study to assess their microbiological effectiveness. We collected and analysed 1202 paired samples (source and reportedly treated) of drinking water from 390 households in rural Tanzania. Participating households received hardware and instructions for practicing four of six HWTS methods on a rotating five-week basis. Samples were analysed for thermotolerant (TTC) coliforms, an indicator of faecal contamination. All HWTS methods improved microbial water quality, with reductions in TTC ranging from 92.6% for boiling, 94.6% for a ceramic pot filter and Waterguard™ brand sodium hypochlorite, 95.3% for PUR® flocculant/disinfectant sachets, 96.3% for Aquatab® NaDCC tablets, and 96.9% for a ceramic siphon filter. Differences were not statistically significant. While none of the HWTS methods yielded water that was consistently TTC-free in accordance with WHO standards, they nevertheless contribute to water safety. However, as their microbiological performance is similar, decisions on scaling up these methods should be based on other factors such as correct and consistent use, cost, and sustainability.

WFS 02: 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 20 nephelometric turbidity units (NTU), using a double dose of Aquatabs up to 100 NTU, but neither were effective at turbidities greater than 100 NTU.

WFS 03: Traditional knowledge and practices used by farmers in storage of maize grains against insect pest infestation at Arumeru district, Tanzania
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Insect pest damage to field and stored maize grains results in major economic losses in Tanzania where by subsistence grain production supports the livelihoods of the majority of the population. Infestation of maize by insect pests commences in the field, but most of damage occurs during storage leading to negative implication in food security. The objective of this study was to document traditional knowledge and practices in the storage of maize grains against infestation by *Sitophilus zeamais* and *Prostephanus truncatus*. This was a cross-sectional study, conducted at Ngongongare village where by qualitative method was employed. Four Focus Group Discussions and 20 in-depth interviews were conducted using guided questions. Obtained data were transcribed and translated into English language and manually analysed to meet the objective. Farmers reported to practice both traditional and modern maize storage methods. Majority of respondents revealed that, pests that destroy stored maize was a major problem in their village. Also a significant number of participants (90%) knew the common types of insect pests. The present study revealed the existence of indigenous knowledge on pesticidal plants and products commonly used by farmers in the community. Respondents identified common group of products frequently used namely, pesticidal plants, animal by-products and minerals. It was also reported that, prolonged health problems resulted from using synthetic pesticides have made people to think on alternative traditional pesticides. Despite differences in storage methods among farmers, both were familiar with pesticidal plants, most frequently used in their community. Interestingly, majority of farmers used pesticidal plants and expressed their interest about the traditional methods as they are harmless and cheaper, they last longer compared to synthetic one. Basing on these findings, further research is needed to unveil the active compounds, optimal treatment and application rate of traditionally made pesticides.

**WFS 04: The effects of food storage facilities on improving food security in substance farming in Southern Tanzania**

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Food insecurity can lower food intake and result in poor health and nutrition. It is approximated that 60% of all childhood deaths in developing world are associated with chronic hunger and malnutrition. Also, 85% of the foods consumed in rural setting are obtained from seasonally cultivated farms, thus the risk of food insecurity is very high. Many of rural families in developing countries experience high levels of micro-nutrient deficiencies and poverty but also poor food storage. We are piloting low-cost innovative food storage facilities, to improve food security in subsistence farming households in southern Tanzania. The study design is case-control involving two groups of families, each consisting of 39 households. The treatment group is provided with dry food banking facilities, while the control group is offered none. Anthropometric measures of nutrition, frequency of illness and child feeding practices are then assessed in the two groups to determine if improved food availability is associated with improved child feeding outcomes. We expect that intervention will improve household food security by increasing the number of meals per day, dietary diversity since families will have an option of buying other foods types. Such a food-banking scheme can be used in low-and-middle income communities to ensure that there will be adequate food throughout the year. Effective grain storage will enhance household food security and improve feeding practices hence the risk young children to be malnourished will be reduced.
WFS 05: Chemical profile and insecticidal activity of essential oils from Chenopodium ambrosioides and Tagetes minuta growing in Tanzania

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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 pesticide, necessitates the search for alternative pesticides. Essential oils of Chenopodium ambrosioides and Tagetes minuta are potential insecticidal agents. The objective of this study 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; 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. 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.
SYMPOSIUM 3: NON–MALARIAL FEBRILE ILLNESS

NMF 01: The burden and future priority area of febrile illness in Tanzania
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In low resource settings there are few accessible diagnostic tools to guide the management of severe febrile illnesses. Making matters worse, very little epidemiological data underpins clinicians’ assessment of prior probability in vast areas of Africa including Tanzania. Different types of infections have been found to be major causes of febrile syndromes in tropical settings, such as relapsing fever, leptospirosis, rickettsial infection, dengue or typhoid fever. Such infections can be severe and most are treatable with specific therapy, but often clinically indistinguishable without confirmatory tests. Based on the successful contribution of RDTs to malaria and HIV diagnosis, several point-of-care assays and RDTs designed for peripheral health facilities have been or are being developed for other tropical infections to improve patient care and epidemiological surveillance. The aim of the symposium is to address the following issues: (i) Etiological causes of febrile illness in Tanzania, and (if available), different demographic and agro-ecological settings - which pathogens are most prevalent, and to identify communities that are most at risk from different pathogens to help inform treatment/management guidelines; (ii) Availability of diagnostic tests - which tests are available for which pathogens, and where in Tanzania the focus should be on efforts in establishing diagnostic test capacity?; (iii) Syndromic management algorithms - what evidence is there for the effectiveness of different empiric antimicrobial therapy recommendations for treatment of undifferentiated fevers?; (iv) Preventive measures - Can we identify preventive health measures for communities and human and animal health professionals to reduce disease risks in different communities? What are the constraints to uptake of these measures?; (v) Identify priorities for future research - e.g. trials to evaluate effectiveness of syndromic management algorithms, development and validation of diagnostic tests, evaluation of education and preventive measures, animal intervention studies to reduce human disease risk?

NMF 02: Diagnosis of febrile illnesses in Tanzania in the era of declining malaria: challenges and way forward
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Malaria and other febrile illnesses are very common especially in children in developing countries. Due to reliance on clinical algorithms for diagnosis in resource-poor settings, most febrile episodes have always been attributed to malaria. However, continuous malaria monitoring and recent improvements in malaria diagnosis have revealed a progressive decline in malaria and significant involvement of non-malarial etiologies in most febrile cases. In studies conducted in Tanzania, the prevalence of non-malarial febrile illnesses (NMFIs) has been found to be as high as 90%, more than 60% being due to respiratory infections, with malaria being responsible for less than 12% of fever cases. Other causes were found to be gastroenteritis, bacteremia, urinary tract infections and others. This creates a challenge to clinicians considering the fact that alternative diagnostics for non-malarial fevers are still unexploited. The combination of submicroscopic malaria parasitemia, diminishing naturally acquired immunity (NAI) to malaria, and knowledge, attitudes and practices of the community and health workers regarding non-malaria fevers have greatly contributed to the increase in magnitude of febrile illnesses diagnostic challenges. This paper highlights the situation of malarial and non-malarial fevers, challenges facing the health sector in diagnosis and consequently, management of febrile illnesses, and the need to: (i) Create
community awareness on the existence of non-malarial febrile etiologies (ii) Strengthen diagnostic systems for malaria and create options for diagnosis of other causes of fever (iii) Develop multiplex rapid diagnostic tests for alternative causes of fever (iv) Develop multiplex rapid diagnostic tests for alternative causes of febrile illness; as possible approaches to addressing these challenges for better diagnosis and consequently, management of non-malarial febrile illnesses in Tanzania.

NMF 03: Reducing malaria overdiagnosis: challenges and opportunities

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About 3.2 billion People living in malaria transmission area are at risk of being infected with malaria and develop malaria disease of which 1.2 billion are considered at high risk. In 2013, there were estimated 198 million cases globally which led to 584,000 deaths. It is estimated that 90% of these death occurs in Africa and children under the age of 5 year accounting for 78% of all deaths. Malaria is still prevalence among the poor and socioeconomically marginalized communities primarily from low- and lower-middle income countries. In Tanzania, malaria is considered a leading cause of morbidity and mortality among the outpatient and inpatients admission accounting for 40% of all the outpatients countrywide. However, evidences indicating over diagnosis of malaria in Tanzania are adequate. In the first scenario, malaria disease is presumed in a febrile or none febrile patient and therefore treated as so without any attempt to test the individual's blood. In the second scenario malaria test is negative (i.e. malaria parasites are not seen in blood) but the clinicians suspect the possibility of undetected malaria that can be fatal if untreated. Difficulties in differentiating malaria from other febrile diseases such as those caused by viral (e.g. Chikungunya, Dengue, Ebola, Flu e.t.c) and bacteria (e.g. E.Coli UTI, PID e.t.c.), suspected low sensitivity of malaria diagnosis, short duration to make treatment decisions in severe febrile cases pose a challenge in accurate diagnosis of malaria. However, thorough history taking among patients with fever accompanied by clinical investigation is crucial in reducing malaria over diagnosis. Furthermore, clinicians are urged to use high suspicion index for other febrile causing diseases to reduce malarial over diagnosis. New diagnostic tests that have a capacity of detecting viral pathogens acutely causing fever among febrile patients are now available. Such tests are a breakthrough towards diagnosing and accurately describe the epidemiology of non-malaria febrile illness in our population. Reducing malaria over diagnosis will have positive impact on individual’s economic as well as pill burden in non-malaria cases.

NMF 04 Rapid diagnostic tests for non-malarial febrile illness in the tropics

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In many African countries, febrile children are still believed to suffer from malaria. Fortunately, rapid and reliable diagnostic tools make malaria relatively easy to diagnose today. This is less true for other febrile illnesses that are potentially severe and for which a specific treatment is required. Valerie d’Acremont et al. conducted a comprehensive etiologic screening of 1005 Tanzanian children diagnosed with fever. The team analyzed clinical field-data, and the results of over 25’000 laboratory tests, including rapid tests performed on site, using a complex algorithm. The results show that in half of the cases children suffered from acute respiratory infections mostly due to viruses, in particular influenza. For the children presenting fever without source, malaria and bacterial infections were rare and most of them viral infections such as the fifth disease (erythema infectiosum due to parvovirus B19), sixth disease (roseola infantum due to HHV6) or mononucleosis (caused by the Epstein-Barr virus or the Cytomegalovirus). This study provided an important framework for improving management of febrile illnesses in the outpatient setting in Tanzania. Improved, novel diagnostic point of care tests are attractive and potentially useful tools in managing children with infections. However, such tools have to be carefully selected and integrated into evidence-based clinical management guidelines. Accuracy of such point of care tests varies and detecting microorganisms may not always inform
management since distinction between colonization/incidental infection and a disease that is really at the origin of the febrile episode. In addition, these tests are neither able to distinguish between mild disease that can be managed at home and severe disease requiring hospitalization.

NMF 05: Evidence and innovative tools to improvement management of non-malarial fevers in Tanzanian children
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New triage tools able to predict which children need to be referred and which children should be treated with antibiotics are highly needed. To address this challenge, a new tool called e-POCT was developed based on the findings from the Tanzanian Fever Study and a review of current evidence of fever management in children under five. e-POCT is an algorithm to guide management of febrile children that includes: i) few clinical parameters simple to assess, and ii) Point-of-Care test results based on specific host (rather than pathogen) markers that can discriminate between mild and severe disease, between pneumonia and upper respiratory tract infections, and between unspecified fevers of bacterial and of viral origin. This algorithm combining clinical symptoms and signs (oximeter) and bedside laboratory tests was built on an electronic support (android tablet). The e-POCT tool is currently being evaluated in terms of safety in health centers in Kinondoni district. We hope that this new tool will improve referral of severe children to hospital and clinical outcome of all patients, while keeping the antibiotic use at a low rate to avoid further development of resistance, which is a major public health threat.

NMF 06: An examination of exposure and risk factors for emerging infectious diseases causing non malaria fevers at the animal-human interface: Cross sectional study in Kilombero, Tanzania
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Approximately two thirds of all emerging infectious diseases affecting human populations are of zoonotic origin, with the majority of these diseases originating from wildlife and domesticated animals. We conducted a study to investigate causes of febrile illness at Illovo Sugar Limited Estate in Morogoro, Tanzania. The urbanization and agro-industrial land use of this study area provide a perfect animal-human interface with high risk of zoonotic infection transmission. The study aims to determine the etiology of undifferentiated acute febrile illness and associated risk factors among people living and working in environments that lie at the animal-human interface.

This hospital-based cross-sectional study was conducted at Illovo Sugar Estate Hospital in Kilombero, Morogoro. From June – July, 2014 a total of 205 patients were enrolled among febrile patients > 1 year of age with acute onset of fever of <5 days with an axillary temperature of 37.5 °C. A comprehensive case report form and epidemiological survey was administered to the patients and blood samples were collected. Over the course of 5 weeks, 205 febrile patients (≥37.5°C, ≥ 1 year of age, with symptomatic onset of ≤ 5 days) were enrolled, including 70 children (between 1 and 15 years of age; 34%) and 135 adults (≥15 years of age; 66%). Study activities yielded 205 malaria rapid diagnostic tests (RDT), 197 blood draws, and 115 nasopharyngeal/oropharyngeal swabs. Of the adult participants, 75 (56%) work in sugarcane fields, while 18 (13%) work in a factory setting. Among all febrile participants, 115 (56%) are members of families that own livestock, 155 (76%) and 119 (58%) have recently observed rodents and bats in their homes, respectively, and 121 (59%) observed primates near their homes. Of all enrolled fever cases, 119 (58%) were malaria positive as determined by RDT. Biological specimens are being analyzed using AFI TaqMan Array Cards (TAC)—a multi-pathogen detection assay used for targeted syndromic surveillance. The preliminary findings indicate that almost half of the febrile cases were caused by non-malaria fevers, and a high degree of animal-human interaction...
with known reservoirs of emerging pathogens, and therefore further testing of samples others etiological agents is justified.

**NMF 07: Community knowledge and attitudes and health workers’ practices regarding non-malaria febrile illnesses in Eastern Tanzania**

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Although malaria has been the leading cause of fever for many years, with improved control regimes malaria transmission, morbidity and mortality have decreased. Recent studies have increasingly demonstrated the importance of non-malaria fevers, which have significantly improved our understanding of etiologies of febrile illnesses. A number of non-malaria febrile illnesses including Rift Valley Fever, dengue fever, Chikungunya virus infection, leptospirosis, tick-borne relapsing fever and Q-fever have been reported in Tanzania. This study aimed at assessing the awareness of communities and practices of health workers on non-malaria febrile illnesses. Twelve focus group discussions with members of communities and 14 in-depth interviews with health workers were conducted in Kilosa district, Tanzania. Transcripts were coded into different groups using MaxQDA software and analyzed through thematic content analysis. The study revealed that the awareness of the study participants on non-malaria febrile illnesses was low and many community members believed that most instances of fever are due to malaria. In addition, the majority had inappropriate beliefs about the possible causes of fever. In most cases, non-malaria febrile illnesses were considered following a negative Malaria Rapid Diagnostic Test (mRDT) result or persistent fevers after completion of anti-malaria dosage. Therefore, in the absence of mRDTs, there is over diagnosis of malaria and under diagnosis of non-malaria illnesses. Shortages of diagnostic facilities for febrile illnesses including mRDTs were repeatedly reported as a major barrier to proper diagnosis and treatment of febrile patients. Our results emphasize the need for creating community awareness on other causes of fever apart from malaria. Based on our study, appropriate treatment of febrile patients will require inputs geared towards strengthening of diagnostic facilities, drugs availability and optimal staffing of health facilities.

**NMF 08: Bacterial causes of febrile illnesses in children in Kilosa District, Tanzania**

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Understanding the bacterial causes of fever particularly in the era of reported decline of malaria is very important. Despite their importance, there are few reports on the epidemiology of these diseases in Tanzania and the true burden of such illnesses remains unknown. These infections cannot be recognized clinically and thus lack of diagnostic tools in most of health facilities leads to misdiagnosis and mistreatment of febrile patients. This cross-sectional study was carried out in children at Kilosa district hospital in Tanzania. Among 370 enrolled patients, 85 (23.0%) had malaria parasites, 43 (11.6%) had presumptive acute leptospirosis and 26/200 (13%) had confirmed
leptospirosis. Presumptive acute brucellosis was identified in 26 (7.0%) while B. abortus was detected in 26 (7.0%) and B. melitensis in 57 (15.4%) of the enrolled patients. Thirty eight (10.3%) of the participants had typhoid fever due to S. Typhi and 69 (18.6%) had urinary tract infections. Co-infections between bacterial diseases with malaria were evident i.e. 146 (39.5%) of patients had dual or triple infections, thus indicates the necessity of considering multiple infections in patients with malaria. These findings are of relevance to clinicians and confirm importance of bacterial zoonotic diseases in the routine diagnosis of febrile patients. Also, the findings provide evidence to policy makers and national disease control programs.

NMF 09: Epidemiology and impact of zoonotic causes of human febrile illness
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Recent and ongoing studies of human febrile illness in northern Tanzania indicate that zoonotic infections are the cause of a substantial proportion of hospital admissions for fever in northern Tanzania, causing far more cases than malaria. Included among these zoonotic infections are leptospirosis, brucellosis, and Q-fever, all infections that can be transmitted from livestock, and which contribute to poverty through impacts on livestock production and reproduction. Current studies aim to tackle these problems through integration of data from human febrile surveillance platforms, community studies of infection patterns and risk factors in linked human and livestock populations, and social science approaches to investigate perceptions, understandings and practices in relation to zoonotic disease risk and disease control. Given the challenges posed by laboratory diagnosis of these infections for clinical management of human patients, we suggest that knowledge of the epidemiology of these infections in animal populations can make an important contribution to human clinical management. Empiric management of febrile illness, for example, could be guided by an appropriate index of suspicion based on knowledge of the local prevalence of different zoonotic infections and risk factors. Furthermore, intervention strategies that include control measures targeted at animal populations or zoonotic transmission pathways may have considerable benefits, both in terms of equity and effectiveness, over approaches that focus only on clinical management of patients. For example, with effective livestock vaccines currently available for each of these pathogens, appropriate ‘One Health’ strategies might involve implementation of livestock vaccination campaigns to control these diseases at their source, reduce inequalities associated with variable access to high quality diagnostic tests and health service provision, and reduce the combined impacts of zoonoses on human health, animal health and livelihoods.

NMF 10: Cryptococcosis: an unrecognized and preventable cause of febrile illness and early mortality among people living with HIV in Tanzania
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Cryptococcosis is a leading cause of death in people living with HIV/AIDS. Meningitis and meningoencephalitis are the most common manifestations of cryptococcosis, being the most common symptoms subacute or chronic headache and altered mental status. Patients may present with a mildly elevated temperature and are often misdiagnosed as malaria cases on clinical grounds. WHO recommends pre-antiretroviral (ART) cryptococcal antigen (CRAG) screening in persons with CD4 below 100 cells/μL. We assessed the prevalence and outcome of
cryptococcal antigenemia in rural southern Tanzania. Retrospective study including all ART-naïve adults with CD4<150 cells/μL prospectively enrolled in the Kilombero and Ulanga Antiretroviral Cohort (KIULARCO) between 2008 and 2012. CRAG was assessed in cryopreserved pre-ART plasma. Cox regression estimated the composite outcome of death or loss-to-follow-up (LFU) by CRAG status and fluconazole use. Of 750 ART-naïve adults, 28 (3.7%) were CRAG-positive, corresponding to a prevalence of 4.4% (23/520) in CD4 <100, and 2.2% (5/230) in CD4 100-150 cells/μL. Within 1-year, 75% (21/28) of CRAG-positive and 42% (302/722) of CRAG-negative patients were dead/LFU (p<0.001), with no differences across CD4 strata. CRAG-positivity was an independent predictor of death/LFU after adjusting for relevant confounders (Hazard ratio (HR) 2.50, 95%CI 1.29-4.83, p=0.006). Cryptococcal meningitis occurred in 39% (11/28) of CRAG-positives, with similar retention-in-care regardless of meningitis diagnosis (p=0.8). CRAG titre >1:160 was associated with meningitis development (Odds Ratio 4.83; 95%CI, 1.24–8.41, p=0.008). Fluconazole receipt decreased death/LFU in CRAG-positive (HR 0.18, 95% CI 0.04-0.78, p=0.022). In conclusion, cryptococcal antigenemia predicted mortality/LFU among ART-naïve HIV-infected persons with CD4<150 cells/μL and fluconazole increased survival/retention-in-care, suggesting that targeted pre-ART CRAG screening may decrease early mortality/LFU. A CRAG screening threshold of CD4<100 cells/μL missed 18% of CRAG-positive patients suggesting guidelines should consider a higher threshold.

NMF 11: Dengue and Chikungunya fever among viral diseases in outpatient febrile children in Kilosa district hospital, Tanzania
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Viral etiologies of fever such as dengue, Chikungunya, influenza and rota- and adeno- viruses contribute to substantial morbidity and mortality particularly in children in the tropical and subtropical countries. Despite their importance, the true burden of viral etiologies of fever in Tanzania is not known and in most cases these diseases are unrecognized and treated as malaria. This study aimed to identify viral etiologies as a cause of fever in children and co-infections among viral diseases and malaria. A total of 364 febrile children were enrolled, of these 83 (22.8%) had malaria, 76 (20.9%) had presumptive acute dengue, among those 29 (38.2%) were confirmed cases. Dengue was more likely to occur in children aged ≥ 5 years than in < 5years (OR 2.28, 95% CI: 1.35-3.86). Presumptive acute Chikungunya infection was found in 17 (4.7%) of patients. Co-infections between malaria and Chikungunya, malaria and dengue as well as Chikungunya and dengue were observed in 39 (10.7%) of patients. Furthermore, 5/97 (5.2%) of patients had influenza virus, 5/39 (12.8%) had rotavirus and 2/39 (5.1%) had adenovirus. Knowledge on occurrence of viral etiologies of febrile illnesses will alert clinicians to be more responsive towards viral infectious agents as potential causes of febrile illnesses in the routine diagnosis and management of febrile patients.

NMF 12: Epidemiology of leptospira infection in Katavi, Rukwa ecosystem, Tanzania
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Leptospirosis is a worldwide zoonotic disease and important cause of acute febrile illness. It is a serious under-reported public health problem particularly in rural settings of Tanzania. In Katavi
humans, livestock and wildlife and live in close proximity which exposes them to the risk of a number of zoonotic infections. A cross sectional epidemiological study was carried out in Katavi region, South-west Tanzania to determine the prevalence of *Leptospira* spp in humans, domestic ruminants and wildlife. Blood samples were collected from humans (n=340); cattle (n=1,103); goats (n=248); buffaloes (n=38); zebra (n=2); lions (n=2); rodents (n=207) and shrews (n=11). Sera were tested using Microscopic Agglutination Test (MAT) to antibodies against six live serogroups belonging to *Leptospira* spp with a cut-off point of ≥ 1:160. The prevalence of leptospiral antibodies were 29.96% humans, 30.37% cattle, 8.47% goats, 28.95% buffaloes, 20.29% rodents and 9.09% shrews and one of the two samples in lions was seropositive. A significant difference in prevalence *P*<0.05 was observed between cattle and goats. No significant difference in prevalence was observed between age and sex in humans or any of the sampled animal species. Five serogroups of *Leptospira* spp including Sejroe, Hebdomadis, Grippotyphosa, Icterohaemorrhagie and Australis were detected in humans, cattle, goats and buffaloes. Serogroups Sejroe and Grippotyphosa were detected in lions. Serogroups Australis, Icterohaemorrhagie and Grippotyphosa were detected in rodents and in shrews only serogroup Australis was detected. Serogroup Ballum was only detected in humans. The results of the present study demonstrated that leptospiral antibodies are widely prevalent in humans, livestock and wildlife in Katavi-Rukwa ecosystem. The disease poses a serious economic and public health threat in the study area. This study provides information on circulating serogroups which will is essential in designing intervention which will help minimize the risk of disease transmission. This therefore highlights the urgent need to increase awareness among potential stake holders so as to be able to reduce the number of current infections and also prevent further spread.