NATIONAL HEALTH RESEARCH AUTHORITY

2018 ABSTRACT BOOK

ZAMBIA'S 8TH HEALTH RESEARCH CONFERENCE

"Breaking New Ground in Health Research: Moving from Results to Implementation—Without Leaving Anyone Behind"

Ministry of Health

ZAMBIANS AND AMERICANS IN PARTNERSHIP TO FIGHT HIV/AIDS

PEPFAR

2018

8th Zambia Health Research & 12th Annual HIV Technical Conference

National Health Research Authority ZAMBIA

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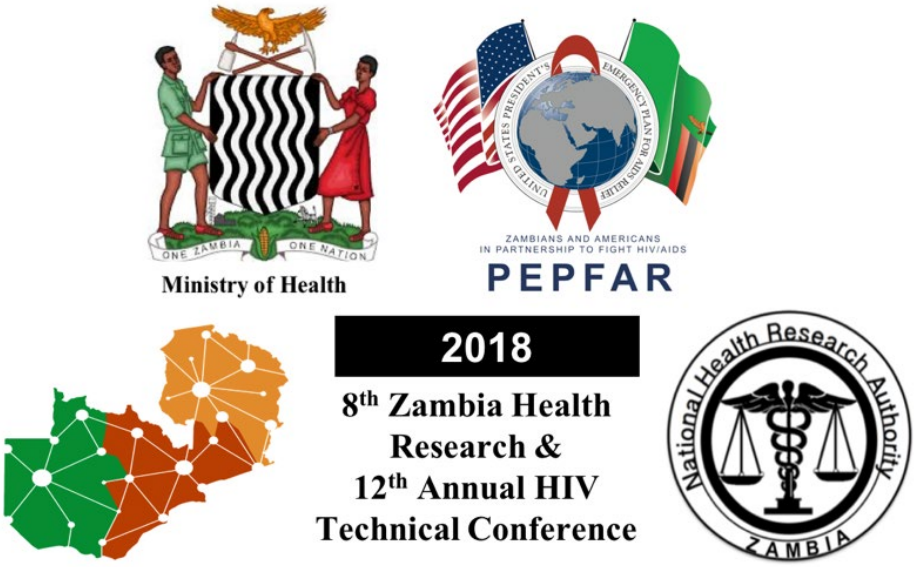
SYMPOSIUM ABSTRACTS



15th – 17th October 2018

Government Complex

Lusaka, Zambia

Clinton Health Access Initiative (CHAI)

Title: Bridging the gap between research and policy: Evidence generation and use on safe childbirth, road safety, and retention in HIV care

Conveners: Dr A. Silumesii[1], Dr F.D. Mwansa[1], Dr A. Mwiche[1], Dr T. Chisenga[1], Dr G. Munthali[1], Mr C. Kanchele[2], S. Mudhune[3], P. Haimbe[3], H. Shakwelele[3]

1. Ministry of Health, 2. Road Transport & Safety Agency, 3. Clinton Health Access Initiative

Introduction: In order to support evidence-based decision-making, new approaches and targeted efforts are needed to bridge the gap between research and practical applications of evidence in programs and policy. The Demand Driven Evaluations for Decisions (3DE) program aims to bridge this gap by bringing researchers and policy makers together to collaboratively generate reliable evaluation evidence that meets policy and program decision needs of the Ministry of Health (MOH). The 3DE model engages governments to define the key public health questions that need to be answered and to implementing partners with existing programs to collaborate with 3DE evaluators. The evidence generated is directly used to catalyze implementation of cost-effective health interventions. 3DE is funded by the United Kingdom Department for International Development (DFID) and implemented by the Clinton Health Access Initiative (CHAI) in Zambia, Rwanda and Zimbabwe. In Zambia, 3DE was funded to answer three policy questions with rigorous evidence, and this symposium will share the results from the three studies conducted by the 3DE program in collaboration with various stakeholders in Zambia.

Methodology: After a brief presentation on the 3DE model, three content experts will make presentations on each of the 3DE studies which were designed to answer the following questions:

- What is the impact of a mother-infant pair clinics on 12-month retention in care and treatment of HIV-exposed infants?
- What is the feasibility of introducing the Safe Childbirth Checklist (SCC) and systems mentorship to health facilities in Zambia and what is the observed change of the intervention on health worker behavior?
- What is the impact of stickers in public service vehicles motivating passengers to speak out against reckless driving on insurance claims from road traffic crashes involving minibuses?

Each panelist will be given 15 minutes to give an overview of the study, results and policy implications.

These 3 presentations will be followed by a final 15-minute presentation that will specifically focus on challenges and successes in conducting demand driven evaluations and using evidence for policy influencing.

The audience will then be invited to pose questions for further discussion.

Expected outcome: This symposium aims to inform the audience on an approach to support the Ministry of Health and other stakeholders, with evidence-based decision making by using rigorous impact evaluations in a demand-driven, rapid, and efficient way. It will also serve as an opportunity to deliberate on the evidence generated; as well serve as channel to disseminate and catalyze these health interventions.

Centre for Infectious Disease Research in Zambia (CIDRZ)

Title: The status of cholera and WASH in Zambia- perils, pitfalls and progress.

Conveners: Roma Chilengi, Jenala Chipungu & Anjali Sharma.

Introduction: Cholera has been recurrent in Zambia since 1978 and the most recent outbreak of 2017-2018, affected 5,421 people, claimed 109 lives and disrupted people's lives both socially and economically. In order to contain the outbreak, short term strategies were implemented including market clean ups, provision of clean water via water tanks, travel bans and burying of shallow wells and pit latrines. While we have seen a significant decline in the number of cholera cases, the measures put in place are not sustainable. The ultimate solution to eradicate cholera is the provision of piped water and sewer connection for every household; yet this is a lofty target that is unachievable in the short to medium term. As the Zambia Government is gearing towards eliminating cholera by 2025, intermediate impactful interventions are required to prevent future cholera outbreaks. This symposium plans to table this very issue by holding a discussion with leading global experts on cholera, behaviour change specialists and local scientists working in the sector.

Methodology: Key stakeholders including relevant line ministries, local authorities, multinational WASH partners, researchers and interested conference attendees will be convened to dialogue on the current state of cholera in Zambia, effective and applicable interventions and the best methods for implementation.
Up to three content experts will make short high-level presentations on the following key topics:

- Global knowledge on cholera: Professor David Sack Johns Hopkins University
- Behavioural interventions for cholera elimination: Professor Valerie Curtis- London school of hygiene and Tropical Medicine
- Cholera epidemiology in Zambia: Past present and future outlook: Dr Victor Mukonka.

Each presentation will be an overview of only 15 minutes, after which the three presenters will be joined by three other panellists from the Ministry of `Health, Ministry of Local Government and Housing, and the WHO Global Task force representative. Each panellist will be given 3 minutes to give a perspective on what we need to do to achieve cholera control and eventual elimination. Then the audience will be invited to make submissions and pose questions for discussion.

Expected outcome: This symposium aims to inform the Zambian health community on the current status of cholera locally and internationally, and progress being made towards cholera elimination in Zambia. The panel discussion will be guided to ensure active engagement and interaction between the audience and the panellists. A briefing report will be generated and shared with key stakeholders on cholera in Zambia, including but not limited to key line Ministries, DfID, WHO, UNICEF, World Bank etc. This document aims to contribute towards the national plan roadmap to cholera elimination by 2025 and will highlight key aspects requiring: 1) immediate, 2) short, 3) medium and 4) long-term actions for our country.

Title: Data to Policy Forum

Conveners: Dr. Dien Francis Mwansa, Dr. Sharon Kapambwe.

Introduction: As part of the Bloomberg Data for Health Initiative, the U.S. Centers for Disease Control and Prevention and Vital Strategies have partnered to develop and implement the Data to Policy (D2P) training course with the goal of using data for public health policymaking. This has now been handed over to the National Health Research Authority as part of their Knowledge Translation function. Staff are taught how to integrate epidemiology, economics, and modeling to develop informative policy briefs.

Methodology: Presentations made to policy makers and key stakeholders, below are the presentations:

1. **Hepatitis: Vaccinate, Save a Life!!** Addressing the Hepatitis B prevalence in the adult population in Zambia. Ms. Namundi Nshimbi
2. **Protecting Future Generations.** Addressing hepatitis B among pregnant women and newborn in Zambia. Ms. Nelia Langa Mulambya
3. **Care for the Carers:** Vaccinate health workers against Hepatitis B in Zambia. Dr. Daniel Makawa
4. **"Mind the Gap"** Improve Tuberculosis Care and Treatment in correctional facilities in Zambia. Fridah Ng'uni
5. **Save a Cervix, Save a Life!** Reinforcing Cervical Cancer Test and Treat for HIV positive women. Ms. Kutha Banda

Expected outcome: This policy forum is an opportunity for the trained participants to disseminate their policy briefs to policy makers and program officers and obtain input into the policy brief. This forum provides an opportunity to give policy makers possible policy options in order to address some of the public health challenges in the Country

Indigenous Knowledge

Title: Harnessing Indigenous Knowledge Systems for Novel Drug Development in Zambia; The case of *Steganotaenia araliacea (SAE) hochst* in obstetrical care.

Conveners: Prof. Fastone M. Goma and Prof. Christian Ezeala

Introduction: The use of plants for Medicinal purposes originated from the beginning of civilization as evidenced by the records found in Babylon (1770 BC) and in ancient Egypt (1550 BC) where plants had been used for the treatment of different diseases and complaints. In certain African countries, up to 90% of the population is said to still rely exclusively on plants as a source of medicine. The efficacy of a medicinal plant depends on the preparation of the plant material for consumption and/or remedy for various diseases. These are taken raw, cooked, roasted, and/or applied as topical, while some have to go through a process of extract preparation before use. All the various methods and mode of intake is to enhance the bioavailability and hence, the efficacy of the active plant material. However, if the method of preparation and intake of the plant material is wrongly applied, the desired result may not be achieved. With time the tribes have added the medicinal power of herbs in their area to their knowledge base. This is the indigenous knowledge system (IKS) that we intend to exploit.

It is reported that about 25 % of prescription drugs dispensed in the USA contain at least one active ingredient derived from plant material, or made from plant extracts, while others are synthesized to mimic a natural plant compound. The attention currently given by governments to widespread health care application has given a new momentum to research, investment and design of programmes in this field in several developing countries in Africa and elsewhere. IKS based medicines provide an alternative to conventional medicines due to their local availability and cheaper cost.

In this session, the process of investigating and extracting a uterotonic product from the bark of the root of SAE, a traditionally known parturient, is used as an example of an effective collaborative approach that is attainable in Zambia to produce an efficacious pharmaceutical product.

Methodology: The extract from the root of *Steganotaenia Araliacea Hochst (SAE)* has shown efficacious uterotonic activity on rat uterine muscle. The following presentations will detail the approach and processes necessary for the use of this product in conventional medicine.
1. **David Chuba, PhD**: Botanical identification, specimen collection and herbarium curation of indigenous knowledge system derived plants.
2. **James Nyirenda, PhD**; Extraction, phytochemical analysis and chemical characterization of the root extract of *S.araliacea*.
3. **Lukubi Lwiindi MSc** Demonstration of uterotonic activity and elucidation of possible mechanism of action of extract of *S.araliacea* roots on rat uterus.
4. **Christian C. Ezeala, PhD** Pre-clinical toxicology and biochemical evaluation of crude *S. araliacea* root extract in Wister rats.
5.**Fastone M. Goma, PhD** Drugability of the root extract of *S. araliacea* for use in obstetric care.

Expected outcome: This session is meant to disseminate the process for evaluating IKS based products in terms of efficacy and in-vitro characteristics, and to elucidate a mechanism for extracting a therapeutic product close to capsulation. This is a significant activity in disseminating the process of development of an oral "oxytocic" drug. Furthermore, in obstetrical care, circumstances requiring induction and/or acceleration of labour are many and conventional therapies are relatively few and expensive thus necessitating the need for discovering new, cost sensitive drugs with probably fewer side effects.

PATH-MACEPA Symposium
Title: Accelerating evidence-based Interventions for malaria elimination | Zambia's Journey: From SUFI to Elimination

Conveners:

1. ***Enesia Chaponda-Ngulube et al. (UNZA):*** *Current National Malaria in Pregnancy (MIP) Disease Burden - Focus on Nchelenge.*
2. ***Felix Masiye, et al. (UNZA):*** *Contribution of Malaria Interventions to the decline of Under-five, Infant and Maternal Mortality Rate.*
3. ***Bill Moss, PhD (Macha Research Trust):*** *Reactive case detection, secondary vectors and challenges to malaria elimination in Southern Province, Zambia*
4. ***Dr. Modest Mulenga (TDRC):*** *Impact of Indoor residual spraying and barriers to malaria control in Nchelenge District, Zambia*
5. ***Busiku Haminza, PhD (NMEC):*** *From Scale up for Impact to Malaria Elimination-How we did we get here?*

Abstract:
The substantial and measurable progress in recent years towards addressing malaria in Zambia, the impact of current interventions at scale, the commitment from the government, a keen interest among partners, and the momentum of scientific advances all converge to create an environment of urgency to eliminate malaria in Zambia. This Symposium continues that theme and presents some of the research work done here in Zambia in support of the goal of eliminating malaria.

TB Symposium

Title: Finding the Missing TB Patients

Conveners: Patrick Lungu, Alwyn Mwinga, and Joseph Nikisi

Chair persons: Prof. Njelesani, Dr. Laston Chitembo, Dr. Mwendaweli Maboshe, Dr. Alwyn Mwinga, and Dr. Joseph Nikisi

Introduction - There are many undetected TB cases in the community that are missed by routine passive case finding. In 2016, Zambia was only able to detect 62% (40,153) of the 64,374 new and relapse TB cases which the World Health Organization (WHO) estimated for the same year. The 2013/14 Zambian TB prevalence survey also showed that more than 90% of TB patients identified through active case finding, had not been diagnosed with TB through passive case finding prior to the survey. Innovative active case finding (ACF) strategies are required to close the gap between estimated TB incidence and actual case notification. This symposium will discuss and share results from ACF strategies that the National TB Program (NTP) and its partners have implemented in the past year.

Methodology: Key stakeholders including relevant line ministries, Non-governmental organizations (NGOs), researchers, and interested public health professionals will be convened to discuss the current state of the TB program in Zambia. They will also discuss effective and applicable interventions required to close the gap between estimated TB incidence and actual case notification.

TB experts, researchers, and program managers will make 5 – 10 minute, high-level presentations. These presentations will be grouped into 5 broad categories. At the end of each category, the audience will be invited to pose questions for discussion. Presentations will be on the following key topics:

1. Burden of TB in Zambia and active case finding
   - Burden of TB in Zambia – Dr. Patrick Lungu, NTP Manager
   - Role of Community in TB – Dr. Alwyn Mwinga, CEO, Zambart
   - Community-based active TB case finding in Kanyama community– Dr. Rhehab Chimzizi, TB Technical Advisor, USAID
   - Household TB Screening in PopART – Dr. Helen Ayles, Director of Research Zambart
   - Community vs Facility-based active case finding: Lessons from TB REACH project, Dr Monde Muyoyeta Monde, Director, TB Department CIDRZ
   - TB in ovaries – Dr. Vwalika, Obstetrician, University Teaching Hospital
2. TB in Vulnerable populations:
   - Active TB case finding and prevention therapy in vulnerable populations: Prisoners and PLHIV – Ms Sisa Hatwiinda, Cordinator Correctional Facilities, CIDRZ

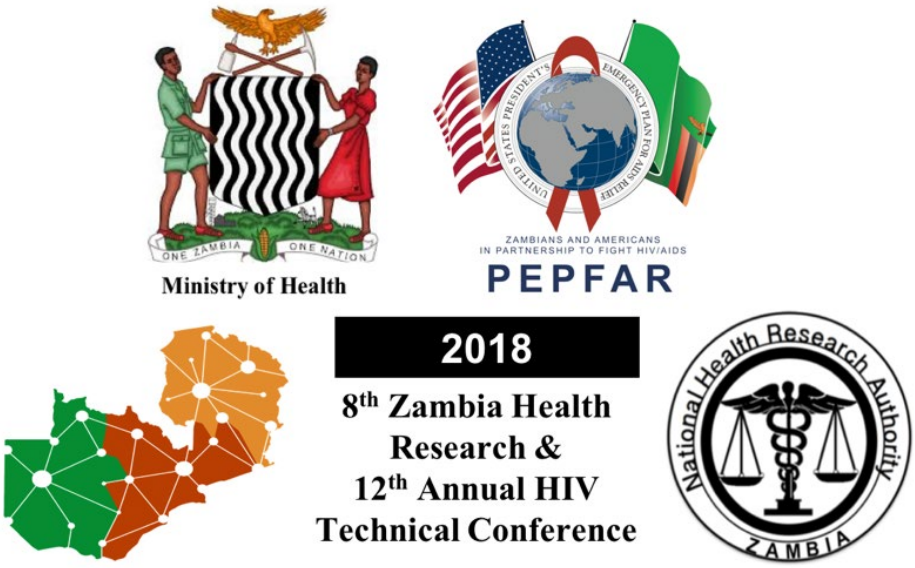
- TB in Children – Dr Chishala Chabala, Pediatrician UTH

3. TB Screening during special events:
   - World TB Day and Child Health Week – Dr. Joseph Nikisi, Chief of Party, Eradicate TB Project
   - World TB Day – Dr. Mwendaweli Maboshe, Chief of Party, Challenge TB Project
   - National Health week – Dr. Patrick Lungu, NTP manager

4. TB Diagnostics:
   - Diagnosis of TB - Dr. Duncan Chanda, Infectious Diseases Specialist, University of Zambia, School of Medicine
   - Gene Xpert Connectivity – Dr. Maboshe, Chief of Party, Challenge TB Project
5. Other TB related presentations
   - Sequalae of TB – Dr Mateyo
   - Isoniazid Presumptive Treatment (IPT) - – Dr. Patrick Lungu, National TB Program Manager
   - From Data to policy – Dr. George Sinyangwe, TB and HIV Division Chief, USAID
   - Focus for research in TB – Dr. Patrick Lungu, National TB Program Manager

Expected outcomes: This symposium will inform public health professionals, locally and internationally, on the status of the TB Program in Zambia, as well as the progress that has been made towards ending the TB epidemic. A briefing report will be generated and shared with key stakeholders on TB in Zambia, including but not limited to key line Ministries, WHO, Global Funds, USAID, CDC, World Bank, and public health NGOs. This document will contribute towards the "National Roadmap to End TB by 2035."

PLENARY PRESENTATION ABSTRACTS



15th – 17th October 2018

Government Complex

Lusaka, Zambia

Title: Prevalence and Correlates of Active Syphilis and HIV Co-Infection among persons aged 15-59 in Zambia: Results from the Zambia Population-based HIV Impact Assessment (ZAMPHIA) 2016

Authors: Hiwote Solomon [1,2], Albertina Ngomah Moraes [1,3], Daniel B. Willams [4], Arlette Simo Fotso [5,6], Clement B. Ndongmo [7], HetalPatel [4], Kathryn Lupoli [4], Lloyd Mulenga [1, 8,9]
1. Ministry of Health Zambia, Ndeke House, Lusaka, Zambia, 2. National Health Research Authority, Lusaka, Zambia, 3. Zambia National Health Public Health Institute, Lusaka, Zambia, 4. Centers for Disease Control and Prevention, Center for Global Health, Division of Global HIV & TB, Atlanta, Georgia, United States of America, 5. DPS University of the Witwatersrand, Johannesburg, South Africa, 6. ICAP at Columbia University, Mailman School of Public Health, New York, New York, United States of America, 7. United States Agency for International Development, USAID Global Health Supply Chain Program, Arlington, Virginia, United States of America, 8. University Teaching Hospital, Lusaka, Zambia, 9. University of Zambia, School of Medicine, Lusaka, Zambia

Background: Prior studies have suggested sexually transmitted infections, such as syphilis, are associated with an increased risk of transmission of the HIV virus. However, no study has measured the population-level prevalence and predictors of co-infection in Zambia.

Methods: We use data from the 2016 ZAMPHIA, a national household survey that included the DPP® Syphilis Screen & Confirm Assay (Chembio) for active syphilis and Alere Determine™ and Uni-Gold™ rapid HIV tests, per national algorithm. Bivariate and multivariate logistic regression models were developed to assess associations between co-infection and selected socio-demographic and sexual behavior variables. For the multivariate analysis, those infected with both active syphilis and HIV were classified as co-infected, and the comparison group is those who had no infection. Due to the complex survey design, all reported figures account for the survey designed and are weighted.

Results: A total of 19,114 individuals aged 15-59 responded to the individual interview and had a valid syphilis and HIV test. Among this sample were 10,972 females and 8,142 males. The national prevalence of active syphilis was 3.0%. Prevalence of active syphilis was highest among females (3.4%), those 25 years of age (3.9%), and respondents who reported 2 sexual partners in the last 12 months (5.3%). Sexually active HIV-positive persons had a higher prevalence of active syphilis compared to those who were HIV-negative (9.6% vs. 2.1%). The national prevalence of HIV/syphilis co-infection was 1.3% (95% CI 1.1, 1.5). Co-infection was higher among females living in urban areas (aOR =3.1, 95% CI=1.9, 5.0) and females who had an early sexual debut (before age 15 years) (aOR =1.7, 95% CI=1.0, 3.0). Co-infection was also high among both men and women who engaged in transactional sex in the past 12 months (aOR=2.3 (95% CI= 1.1, 5.2) and 4.1 (95% CI= 1.7, 9.8), respectively).

Conclusion: These findings show high prevalence of HIV/syphilis co-infection in Zambia and the need for the scale up of syphilis screening and treatment, particularly among HIV-infected adults. Additionally, these results can be used by syphilis and HIV prevention programs to target populations most at risk for co-infection, specifically those engaging in transactional sex.

Title: Artemisinin–based combination treatment during pregnancy, outcome of pregnancy and infant mortality: a cohort study

Authors: Michael Nambozi[1], J. Bertin Kabuya[1], Sebastian Hachizovu[1], Joyce Mulenga[1], Modest[1]

1. Tropical Disease Research Centre

Background: WHO recommends the use of artemisinin-combination therapy (ACT) for uncomplicated malaria in pregnancy in second and third trimesters. Most sub-Saharan African countries have already adopted and implemented this guideline. However, there is limited knowledge on ACT use and pregnancy outcomes and on new-born and infant's safety.

Methods: African pregnant women with malaria were recruited in four countries (Burkina Faso, Ghana, Malawi and Zambia) and treated with either artemether-lumefantrine (AL), amodiaquine-artesunate (ASAQ), mefloquine-artesunate (MQAS), or dihydroartemisinin-piperaquine (DHA-PQ); 3,127 live new-borns (822 in the AL, 793 in the ASAQ, 789 in the MQAS and 786 in the DHAPQ arms) were followed-up until 12 months of age.

Results: Prevalence of acute and chronic placental malaria was 28.0% (738/2646). Prevalence of low birth weight was 16.0% (480/2999), with no significant differences between treatment arms. There were no significant differences between treatment arms in terms of congenital malformations (p=0.35), perinatal (p=0.77), neonatal mortality (p=0.21), and infant mortality (p=0.96).

Conclusion: there was no significant difference between the four treatments arms (AL, ASAQ, MQAS and DHAPQ) in terms of perinatal, neonatal and infant mortality, nor on the occurrence of the SAEs in babies. Therefore, the four ACTs can safely be used to treat pregnant women

Title: Sepsis Prevention in Neonates in Zambia Study: Microbiology and Outcomes Associated with Bloodstream Infections

Authors: Chileshe Lukwesa-Musyani[1], Angela Nyondo[1], Carter Cowden[2], Lawrence Mwananyanda[3], Cassandra Pierre[4], Monica Kapasa[5], Sylvia Machona[5], Moses Chilufya[3], Gertrude Munanjala[3], Matthew Bates[6], Russell Localio[7], Susan E. Coffin[2], Davidson H. Hamer[8], James Mwansa[9]

1. Department of Microbiology, University Teaching Hospital (UTH), 2. Division of Infectious Diseases, Children's Hospital of Philadelphia, Philadelphia, PA 3. Right to Care/Zambia 4. Section of Infectious Diseases, Department of Medicine, Boston Medical Center 5. Neonatal Intensive Care Unit, UTH f. School of Life Sciences, University of Lincoln, Lincoln, United Kingdom 6. HerpeZ (www.herpez.org), University Teaching Hospital, Lusaka, Zambia 7. Division of Biostatistics, Department of Biostatistics, Epidemiology and Informatics, University of Pennsylvania Perelman School of Medicine 8. Department of Global Health, Boston University School of Public Health 9. Department of Microbiology, Lusaka Apex Medical University

Background. Neonatal sepsis is a major cause of mortality among neonates in low- and middle-income countries. Bloodstream infections (BSIs), the most common hospital-associated infections in neonates, occur more frequently in resource-limited countries than in high-income countries and contribute to many in-hospital neonatal deaths. In the context of the Sepsis Prevention in Neonates in Zambia Study (SPINZ), we prospectively evaluated the etiology of BSI and its association with mortality.

Methods. This prospective observational cohort study of neonates was conducted in the neonatal intensive care unit (NICU) at the University Teaching Hospital (UTH) in Lusaka, Zambia from September 2015 to April 2017. After obtaining informed consent from the newborn's guardian, blood cultures were performed if signs of sepsis were present (using a standardized definition). Standard microbiological techniques were used for blood cultures including automated Bactec for culture and Vitek for susceptibility testing of bacterial isolates. Standard definitions were used to differentiate confirmed pathogens from contaminants. Isolates were stratified into early onset (within 3 days of birth) and late onset (3 or more days of life) sepsis. Associations with mortality were analyzed.

Results. From September 2015 through March 2017, we enrolled 3323 neonates of whom approximately half had one or more episodes of sepsis, and 628 (19% of all neonates) had one or more positive blood cultures. Skin commensals were identified in 174 blood cultures. Confirmed pathogens were isolated from 66% (183/278) of all positive cultures obtained for early onset and 80% (313/390) for late onset sepsis ($p<0.001$). Of the 628 positive cultures, 13 were polymicrobial. K. pneumoniae was the most common pathogen, isolated from 52% of positive cultures (346/668). Other commonly isolated pathogens included: Enterococcus spp., Escherichia coli, yeast, other gram-negative bacilli and Staphylococcus aureus. Three BSI were caused by group B streptococci. K. pneumoniae was more prevalent in late- as compared to early-onset sepsis (56% [218/390)] vs. 46% [128/278)] of positive cultures ($p=0.012$). Enteroccocus spp.

were also more prevalent in late-onset compared to early-onset sepsis (17% vs 10% of all positive cultures, p=0.012), while similar rates of E. coli, yeast, and other gram-negative species were noted. Of all neonates with pathogen-confirmed BSI, 38% died (179/471) and mortality was the same for early- and late-onset sepsis with pathogen-confirmed BSI (38% for both groups). Mortality rates were higher in newborns with K. pneumoniae relative to those with other pathogens (42% vs. 29%, p<0.001) whereas mortality was lower for neonates who had only skin contaminants isolated (22%). Nearly all K. pneumoniae isolates (98%) demonstrated evidence of extended spectrum beta-lactamases (ESBL).

Conclusion. Multi-drug resistant gram-negative sepsis was common in neonates with suspected sepsis, especially in late-onset sepsis. K. pneumoniae, the most commonly isolated pathogen, was associated with mortality. Efforts to reduce acquisition of multi-drug resistant gram-negative bloodstream infections through infection prevention and control measures, and to optimize initial antimicrobial therapy are desperately needed.

Title: Prevalence and risk-factors for non-communicable diseases: Findings from the first national survey in Zambia

Authors: Roma Chilengi[1], Samuel Bosomprah[1], Paul Somwe[1], Namasiku Siyumbwa[2], Mulenga Mukanu[3], Perfect Shankalala[3], Kennedy Malama[3], Wilbroad Mutale[3]

1. Centre for Infectious Disease Research in Zambia (CIDRZ), 2. Ministry of Health, 3. The University of Zambia

Background: Non-communicable diseases (NCDs) are the leading global cause of death responsible for up to 57 million annual deaths. Low middle income countries (LMICs) including Zambia, are undergoing the so called epidemiological transition. The combined burden of NCDs has rapidly increased in LMICs reportedly contributing up to 48.0% of global NCD deaths; and the majority are considered premature. We present findings from the 2017 Zambia STEPwise approach to surveillance (STEPS)- the first nationally-representative survey on risk factors for NCDs, mental and oral health in adults aged 18 to 69 years.

Methods: This was a nationally-representative household survey conducted between July and October 2017 among adults aged 18-69 years using a multi-stage cluster sampling technique. We selected 5791 households sub-samples from the household listing of the 2016 Zambia Population-Based HIV Impact Assessment (ZAMPHIA)- which included 60,581 households drawn from 1,103 clusters nationwide. We adapted the generic WHO STEPS tools involving demographic data, physical measurements, and biochemical measurements. 41 field research assistants were recruited and trained in the STEPS methodology. Android tablets were used for direct electronic data capture onto a central server for the physical and biochemical results in the field. Urine samples were all shipped to the central laboratory at the University Teaching Hospital; results were linked to the main dataset using bar coded unique IDs. Data analysis was done in Epi Info 3.5.1, using pre-coded analysis commands developed by WHO and adapted for the Zambian survey.

Results: The response rate was 77.7% with 62.5% respondents being female. By age, 37.7% were aged 18-29; 35.2% aged 30-44; 18.2% aged 45-69 and 8.9% aged 60-69 years respectively. Up to 9.0% are daily tobacco smokers (males at 17.1 against females at 1.3%) with the mean age for starting to smoke being 15.7 years. 21.7% currently drink alcohol with 10.9% engaging in heavy episodic drinking of six or more standard drinks. Raised blood pressure was found in 19.1%, and 7.1% of these had severe hypertension (defined as having SBP ≥160 mmHg and/or DBP ≥100 mmHg or on medication). 6.2% had raised fasting blood glucose, and only 36.8% of these currently took medication; up to 90.8% had never been measured for raised blood sugar. Overall, 24.2% are either overweight or obese with BMI greater than 25kg/m2. On average, fruit is consumed on 2.1 days and vegetables on 6.3 days a week; however, up to 90.4% are consuming less than the recommended daily fruit and at least 5 servings of vegetables a day. More women (45.5%) than men (23.9%) reported no vigorous activity at all. The vast majority of Zambians (98.0%) have never been measured for cholesterol levels. The mean daily intake of sodium from spot urine testing was 9.5 grams (nearly double the recommended amounts). Approximately 16.4% of women aged 18 to 69 years reported ever undergoing cervical cancer screening.

Conclusion: This first ever STEPs survey for Zambia has revealed high prevalence of risk factors for NCDs, confirming the burden and distribution cross the country. These results require urgent multi-sectoral response, with consistent policy guidance if Zambia is to attain the 2030 global goals of reducing premature death from NCD by 25%.

Title: Effect of Results-Based Financing on the utilization and quality of maternal and child health services in Zambia: a three-arm cluster-randomized study

Authors: Collins Chansa[1], J. Friedman[1], M.C. Chama-Chiliba[2], J. Qamruddin[1]

1. World Bank, 2. UNZA

Background: The Zambia Results-Based Financing (RBF) pilot project was designed to strengthen the health system and improve the coverage and quality of maternal and child (MCH) health services. This study examines the effectiveness of the RBF project in improving utilisation, and quality of MCH services in Zambia.

Methods: The paper uses a cluster-randomised three arm design to show the effects of the RBF intervention group relative to an input financing (C1) and pure control (C2) arms. The data for the evaluation was collected at facility and household level covering 164 health facilities in the RBF intervention arm, 92 health facilities in the C1 arm, and 92 health facilities in the C2 arm. Baseline data was collected before commencement of the project in October and November 2011; and at endline from November 2014 to January 2015 after two and half years of project implementation. A difference-in-difference linear regression was used to estimate the effect of the RBF on key MCH quantity indicators; and quality of healthcare. The results are interpreted using Fisher-exact standard errors clustered at $p<0.12$.

Results: The results show that both the RBF and C1 arms performed better than the C2 arm but the C1 arm performed relatively better than the RBF with regards to impact on the quantity indicators. Specifically, the RBF performed better in focused antenatal care (i.e. pregnant women in the RBF arm attended their first ANC visits earlier), and provision of BCG and DPT vaccines. However, the C1 arm performed better than the RBF arm on institutional deliveries, deliveries by skilled provider, post-natal care, family planning outreach, and any vaccinations received. This suggests that inadequate funding to health facilities is one of the key bottlenecks to improved coverage of MCH services in Zambia. The results also show that the MCH indicators which were being incentivised were already relatively high when the RBF project was introduced. With regards to quality of healthcare, the RBF performed better than the two comparison groups in most of the aggregate and individual measures of quality.

Conclusion: The study concludes that input financing mechanisms can lead to improved utilisation of health services in health systems with inadequate financing. However, the RBF has an advantage of increasing both utilisation, and quality of MCH services. Furthermore, to enhance the effectiveness of RBF programs, it is pertinent to focus on under-utilized essential services; or use a target-based performance incentive framework if the indicators of interest are already high. Future studies evaluating the impact of RBF programmes need to include several arms to effectively examine the impact of such programmes.

Title: Challenges of identifying and following up social harms related to HIV self-testing in urban Zambia: Experience from the HPTN 071 (PopART) Study

Authors: Musonda Simwinga[1], Chiti Bwalya[1], Chepela Ngulube[1], Lwiindi Gwanu[1,] Chama Mulubwa[1], Bernadette Hensen[2], Mwelwa Phiri[1], Richard Hayes[2], Sarah Fidler[3], Helen Ayles[1,2], Virginia Bond[1,2]

1. ZAMBART, 2. London School of Hygiene & Tropical Medicine (LSHTM), 3. Imperial College

Background: HIV Self-Testing (HIVST) has the potential to improve access to HIV testing. HIVST is well accepted, convenient, and facilitates a degree of autonomy and privacy. However, concerns about potential social harms from use of HIVST also continue to be raised especially in settings with high levels of gender-based violence (GBV) that may predispose particularly women users to such harms. We used the opportunity of an HIVST study nested in four HPTN 071 (PopART) communities to document social harms. We share our experience and the challenges of identifying and reporting social harms in this cluster-randomised trial.

Methods: In communities randomised to the HIVST intervention, trained community health workers (CHWs) offered household members the option of HIVST or finger-prick HIV-testing for three months in 2017. Social harms identification, determination and reporting was done through several mechanisms. These included observations of home delivery of HIVST by social scientists (n=8), debriefing meetings of the CHWs with their supervisors, and Community Advisory Board (CAB) meetings. Following these, four group discussions with purposively selected CHWs (n=35) and two group discussions with CAB members (n=22) were conducted. Thematic data analysis using an inductive approach was used to analyse data. We read through all the field notes and transcribed group discussions to generate themes related to social harms.

Results: No extreme incidents of self-harm, such as suicide, were reported. However, other types of social harms occurred. These included attempted or actual forced testing (n=4), threatening harm/ divorce (n=1), emotional distress (n=3), marriage separation (n=2), gender-based violence (GBV) (n=1), blackmail (n=1) and invasion of privacy (n=1). Given the pre-existing conditions of poverty, gender inequalities and history of GBV in these communities we had anticipated more social harms to be reported. Community members were reluctant to talk about social harms openly to CHWs and CAB members in conformity with existing cultural norms, wider structural violence of GBV and male hegemony. Some women feared loss of support, divorce or persecution from their partners. None of the CHWs had prior experience delivering home based HIVST, and despite training, seemed to have difficulty relating to the term 'social harm'. Some CHWs felt responsible for the occurrence of social harms, having introduced the kit into households. Others thought that there was too much familiarity between CHWs and the participants for the former to solicit reports of social harms and for the latter to report them to CHWs.

Conclusion: It was challenging for both the participants of HIVST and the CHWs distributing the kits to report social harms. Therefore, we could not determine how big a problem social harms were in this HIVST study. Better approaches for reporting social harms that involve community members and systems are required.

Title: A Phase I single blind, randomized, placebo controlled, parallel group study to investigate the safety and tolerability of SF2000SD (an extract from a traditional remedy) in healthy male volunteers in Zambia

Authors: Ray Handema[1], Jean-Bertin Bukasa Kabuya[1], Alasford Ngwengwe[2], Shepherd Khondowe[1]

1. TDRC, 2. UNZA

Background: Despite a progressive implementation of a successful antiretroviral program over the first decade of free antiretroviral therapy in the Zambian public health sector, the use of traditional medicines is still prevalent for various reasons. Even though traditional medicines are used by HIV infected people, their safety has not been scientifically validated. Without scientific validation, traditional medicines will remain in rudimental stages even if they are safe and effective.

Methods: Between September and December 2016, the Tropical Diseases Research Centre (TDRC), Ndola, Zambia, conducted a Phase I, randomized, placebo controlled, parallel group study to investigate the safety and tolerability of SF2000SD an investigational product which is a spray dried extract from a traditional remedy used by a Zambian traditional healer to treat individuals suffering from HIV/AIDS. HIV negative healthy males aged 18 – 45 years were screened, enrolled and randomized into one of the three arms of the study: group A (SF2000SDnormal recommended dose for adult humans), group B (SF2000SD double dose) and group C (placebo). Participants were dosed for 6-weeks and followed up to two weeks post dosing period. Vital signs were recorded at all visits, physical examinations were performed and whole blood was collected and analyzed for plasma biochemistry, hematology at point of screening, weeks 1, 3, 6, 8 and at any unscheduled visits.

Results: There were 83 AEs observed during the study period. Most of these AEs were mild (94.40%), few moderate (5.33%) and very few severe (0.26%). When stratified by causality, 64.8% and 29.6% were mild related and not related respectively; 4.53% and 0.8% were moderate related and not related respectively; and not related and 0.26% and 0% severe related and related respectively. 30.4% occurred in study group A of which 16.8% and 12.0% were mild related and not related respectively and 1.06 and 0.53% moderate related and not related respectively. 35.46% occurred in study group B; 24.53% and 9.3% were mild related and not related and 1.6% moderate not related. 34.13% occurred in study group C; 22.46% and 8.8 were mild related and not related, 1.86% and 0.26% moderate related and not related and 0.26% severe related. Common AEs which were prevalent in study group A having shorter Medium Time (MT) to event onset or longer MT duration did not show any difference in their ranges when compared to study group C. The risks associated with the development of most common AEs after the administration of single dose of SF2000SD were not statistically significant even after doubling the dosage. Even though all participants experienced at least one AE, there was no cases of discontinuation, death or any other serious Adverse Event (SAE) observed in any of the study group.

Conclusion: SF2000SD showed a good safety profile as the placebo group and was therefore determined safe and tolerable in humans.

Title: Factors Associated with Unfavourable Tuberculosis Treatment Outcomes in Lusaka, Zambia, 2015; A Secondary Analysis of Routine Surveillance Data

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Background: Tuberculosis (TB) is a major public health challenge in low and middle income countries. Factors associated with unfavourable treatment outcomes have been known to affect treatment and control of the disease. However, analysis of routine data in Zambia does not show the factors associated. We determined the proportion of tuberculosis treatment outcomes and factors associated.

Methods: We defined unfavourable outcome as death, lost-to-follow-up, treatment-failure, or not-evaluated, and favourable outcome as a patient cured or completed-treatment. We abstracted data from treatment registers at a referral hospital, an urban-clinic and peri-urban (purposively selected) for all TB cases on treatment from 1st January to 31st December, 2015. We calculated proportions for treatment outcomes, and analysed associations between unfavourable outcome and factors including age, HIV status, health facility, and patient type, using univariate logistics regression. We used multivariable stepwise logistic regression to control for confounding, reported adjusted odds ratios (AOR), and 95% confidence intervals (CI).

Results: We included 1724 registered TB patients from the urban-clinic (40%), 1st Level Hospital (38%) and peri-urban-clinic (22%). Of the total patients overall unfavourable outcome was 43%. Total unfavourable outcome was treatment-failure (0.3%), lost-to-follow-up (5%), death (9%) and not-evaluated (29%). The odds of unfavourable outcome were higher among patients >59 years (AOR=2.9, 95%CI:1.44–5.79), among relapses (AOR=1.65, 95%CI:1.15–2.38), patients who sought treatment at the Urban clinic (AOR=1.76, 95%CI:1.27–2.42) and among TB/HIV co-infected patients (AOR=1.56, 95%CI:1.11–2.19).

Conclusion: Unfavourable treatment outcome was high in the selected facilities. We recommend special attention to patients of >59years old, relapse cases and HIV positive in the TB treatment and also close monitoring of health facilities in increasing efforts aimed at evaluating all the outcomes. Studies are required to identify and test interventions aimed at improving treatment outcomes.

Title: A view into the smoke; the current debates on medical marijuana.

Authors: Francis Mupeta[1], Abidan Chansa[2]
1. Secretary General of Zambia Medical Association and the ZMA Council, 2. President of the Zambia Medical Association.

In 2017**,** ZMA called for a national indaba on the medical use of marijuana. The following month saw the debate escalated to Parliament with the government confirming that it was legal to grow marijuana for medicinal purposes but under restrictions and that government was not interested in giving license for growing of marijuana. However, government loosened up the stance after it declared that it was pondering the legalisation of marijuana in 2018. Marijuana come from a naturally growing plant called *Cannabis sativa*. It contains over a 100 cannabinoids. This plant and its derivative are called by different names including; hemp, weed, ganja and hashish. Marijuana has been in use by the Chinese and Indians in the later millennia of BC. The link of marijuana to socioeconomic ills in the early 20th century to Mexican immigrants in the US led to its criminalisation and subsequent classification of the drugs as a category IV under the UN convention on narcotic drugs. The current interest in marijuana has been driven by the discovery of the endocannabinoid system in the human body. The system comprises naturally occurring cannabinol receptors CB1 and CB2 and their ligands- anandamine and 2-arachidonoyglycerol. There are two well-studied substances in marijuana; Tetrahydrocannabinol (THC) and Cannabidiol (CBD). THC is a well-known psycho-active substance which is attaches to CB1, whereas CBD tends to oppose those effects at CB2. CBD is usually utilised for medicinal purposes indicated and approved for treatment of nausea, vomiting, seizures and spasticity. Opponents have argued that the use of marijuana is associated to development of psychosis, amotivation and poor executive performance. However, different research have linked these effects to high THC content in marijuana. The illegality of marijuana is said to have impended much needed research to understand the full benefits of lack of, of this naturally occurring plant. This abstract highlights the ZMA council resolution on the legalisation of medical marijuana.

ORAL PRESENTATION ABSTRACTS

Ministry of Health

ZAMBIANS AND AMERICANS IN PARTNERSHIP TO FIGHT HIV/AIDS

PEPFAR

2018

8th Zambia Health Research & 12th Annual HIV Technical Conference

National Health Research Authority ZAMBIA

15th – 17th October 2018

Government Complex

Lusaka, Zambia

Title: Association of histo-blood group antigens with rotavirus vaccine response among Zambian children

Authors: Natasha Laban[1], Michelo Simuyandi[1], Caroline Chisenga[1], John Mwaba[1,2], Katayi Mwila-Kazimbaya[1,2], Samuel Bosomprah[1,3], Roma Chilengi[1]

1. Centre for Infectious Disease Research in Zambia (CIDRZ), 2. UNZA, 3. University of Ghana

Background: While rotavirus vaccines have demonstrated significant impact on reduction of rotavirus associated diarrhoea morbidity and mortality in low to middle income countries (LMIC), efficacies in these settings are lower than those in high income countries. Several hypotheses have been suggested to explain this observed phenomenon. In recent years, population differences in susceptibility to rotavirus infection conferred by genetically determined and polymorphic histo-blood group antigens (HBGA) has emerged as an important issue in the context of rotavirus vaccine response. We aimed to document Lewis, secretor and blood group ABO HBGA phenotypes among Zambian children vaccinated against rotavirus and investigate the association with rotavirus pre-vaccination seropositivity and vaccine seroconversion.

Methods: We used serum (202/420) and saliva (198/420) samples collected from a cohort of Zambian children who received rotavirus vaccination with known pre-vaccination rotavirus seropositivity and vaccine seroconversion status. Pre-vaccination seropositivity was defined as a rotavirus specific immunoglobulin A (RV-IgA) titre ≥ 40. Vaccine seroconversion was defined as ≥ four-fold increase in RV-IgA between pre-vaccination and post two-dose rotavirus vaccination. Lewis, secretor and blood group ABO HBGA phenotypes were detected using a saliva-based enzyme immunoassay. Blood group ABO HBGA phenotypes were also detected by reverse typing of sera. Fisher's exact test was used to assess association of each HBGA profile with seropositivity and vaccine seroconversion.

Results: Blood group AB by reverse typing was the most prevalent 82/202 (40.59%) and had the highest proportion of seropositive children 19/45 (42.2%, p=0.066) and vaccine seroconverters 45/127 (35.43%, p=0.14). Distribution of Lewis HBGA phenotypes was 7.18% Lea+b-, 42.05% Lea-b+, 17.95% Lea+b+ and 32.82% Lea-b- and majority of children were secretors 146/198 (73.74%). Among seroconverting children, a high proportion (76.7%, p=0.68) were secretors and had the Lewis b+ phenotype (54.9%, p=0.35).

Conclusion: Our results support the idea that children in the AB blood group, those of Lea-b+ phenotype and that are secretors could have higher susceptibility to rotavirus infection, and hence better vaccine uptake than the other groups. Improving the understanding of the influence of HBGAs on rotavirus vaccine response in the LMIC setting could inform design of next generation of rotavirus vaccines.

Title: Aetiology of diarrhoea and the effect of co-infection on risk of severe disease in under five children in Zambia

Authors: Caroline Cleopatra Chisenga[1], Samuel Bosomprah[1,2], Natasha Makabilo Laban[1], Katayi Mwila-Kazimbaya[1,2], John Mwaba[1,2], Michelo Simuyandi[1], Roma Chilengi[1]
1. Centre for Infectious Disease Research in Zambia (CIDRZ), 2. UNZA

Background: The historical presumption that rotavirus is the leading cause of severe gastroenteritis in infants and children now requires accurate evidence in the post vaccine introduction era. We aimed to document enteric pathogens among children presenting with moderate to severe diarrhoea at outpatient clinics in Lusaka province and investigated the effect of multiple enteric infections on risk of severe diarrhoea following introduction of rotavirus vaccination.

Methods: Clinical data and stool samples collected between July 2012 and October 2013 from children <5 years presenting to outpatient clinics in Lusaka with moderate-to-severe diarrhoea. The study was conducted during the early months post rotavirus vaccine introduction in 1300 infants and children. We used Luminex x-TAG® gastrointestinal pathogen panel to simultaneously detect enteric viruses, bacteria and protozoa from the stool samples in infants and children presenting with moderate to severe diarrhoea. Log-binomial regression was used to estimate the effect of co-infection on incidence of severe diarrhoea, adjusted for inadequate water sanitation and hygiene. P-values were calculated using likelihood ratio test.

Results: The top 5 leading enteric infections detected among children were rotavirus (67.6%), Adenovirus (42.2%), ETEC (41.7%), Salmonella (38.0%), and Giardia (37.5%). Among rotavirus infected children, 39% (368/933) were co-infected with Shigella, whereas among children infected with Adenovirus, 44% (255/582) were also co-infected with Shigella. The incidence of severe diarrhoea was estimated as 3.9% (54/1,380) (95%CI=3.0, 5.1). There was strong evidence that children who were infected with at least two enteric pathogens had about three times the risk of severe diarrhoea compared to those without any multiple infection (adjusted RR = 2.61; 95%CI = [0.37, 18.57]; p=0.008).

Conclusion: The observed higher risk of severe diarrhoea resulting from co-infecting enteric pathogens highlights the need to consider these infections in diarrhoea management and treatment strategies. Our study documents specific enteric pathogens with potential to emerge as important causes of diarrhoea in Zambia in the post rotavirus vaccine era. This information is essential for prioritisation of new enteric vaccines and strenghthening WASH.

Title: Rotavirus prevalence, co-infections and genetic diversity of vaccinated children in Zambia

Authors: Katayi Mwila-Kazimbaya[1], Roma Chilengi[1], Caroline C Chisenga[1], Natasha Laban[1], John Mwaba[1], Michelo Simuyandi[1]
1. Centre for Infectious Disease Research in Zambia (CIDRZ)

Background: Since the introduction of the rotavirus vaccine in the Zambian national immunization program there has been a reduction in rotavirus related diarrhea as well as all cause of diarrhea. However, some children vaccinated with Rotarix™ still present with rotavirus related diarrhea. This study aims to describe strains circulating post vaccination and co-infection with other enteric pathogens.

Methods: From a cohort of 420 infants, we passively collected 81 stool samples from 61 children who presented with diarrhoea at the health facility. Samples were screened for rotavirus using ELISA (Rotaclone®). Diversity of rotavirus strains were investigated by G and P genotyping using electrophore-typing and reverse transcription PCR amplification of the VP4 and VP7 genes. The samples were tested using the Luminex x-Tag gastrointestinal panel (GPP) for various enteric pathogens.

Results: Out of 81 diarrheal samples, 16% (13/81) were positive for rotavirus. Three samples had mixed genotypes. G1P8 was the most prevalent genotype detected followed by G2P6 and P6 while G1 was least. The mean vesikari score for rotavirus positive samples was 7.4, whilst for non-rotavirus positives was 6.4. ETEC accounted for the largest number of individual infections (30/81) as well as co-infection with rotavirus (4/81) as well as Giardia (4/81).

Conclusion: Our study provides evidence for non-vaccine rotavirus genotypes causing diarrheal in children vaccinated with Rotarix™ in Zambia. This description of our results will help in the design of both targeted and integrated next generation of rotavirus vaccine for the management of rotavirus associated diarrhoea in Zambia.

Title: Effect of innate antiviral glycoproteins in breast milk on seroconversion to rotavirus vaccine (Rotarix) in children in Lusaka, Zambia

Authors: Katayi Mwila-Kazimbaya[1], Roma Chilengi[1], Caroline C Chisenga[1], Natasha Laban[1], Michelo Simuyandi[1], Sody Munsaka2, Sallie Permar[3]
1. Centre for Infectious Disease Research in Zambia (CIDRZ), 2. UNZA, 3. Duke University

Background: Rotavirus vaccines have been introduced into national immunization programmes to mitigate morbidity and mortality associated rotavirus diarrhoea. Lower vaccine effectiveness has however been noted in low-middle income countries, but little is known about the role of components found in breast milk. This study assessed the effect of lactoferrin, lactadherin, and tenascin-c on rotavirus vaccine seroconversion.

Methods: This was a retrospective cohort study of 128 infants who had been fully immunized with Rotarix™. Serum samples were collected from the infant at baseline and one month after second rotavirus vaccine dose. Breast milk samples were collected from mothers at baseline. Standard ELISA was used to determine titres of rotavirus-specific immunologlobulin G and A in breast milk and serum as well as concentrations of lactoferrin, lactadherin, and tenascin-c. Poisson regression model with robust standard error was used to estimate the effect of breast milk components on seroconversion. The components were modelled on log base 2 so that the effect would be interpreted as a doubling of the concentration.

Results: In a multivariable analysis adjusting for maternal age, maternal HIV status, seropositivity at baseline, sex, age of child at vaccination as well as breast milk IgA and IgG, we found evidence of independent effect of LA (Adjusted IRR=0.95; 95% CI=0.91- 0.99; P=0.019) on seroconversion while there was no evidence for TNC (Adjusted IRR=1.00; 95% CI=0.85- 1.17; P=0.967) and LF (Adjusted RR=1.01; 95% CI=0.96- 1.05); P=0.802). We explored the joint effects of the three components but we found no evidence too (Adjusted RR=0.95; 95% CI=0.81; P=0.535).

Conclusion: High breast milk concentrations of lactadherin might play a role in infant's failure to seroconvert to rotavirus vaccines. Further research to understand this observed association is an important consideration.

Title: Impact of the Zambia Sanitation and Hygiene Program on Sanitation, Hygiene and Stunting in Rural Zambia

Authors: Davidson H. Hamer[1], William B. MacLeod[1], Godfrey Biemba[2], Alexandra Hoehne, Caitryn M. McCallum[1], Kojo Yeboah-Antwi[1]

1. Department of Global Health, Boston University School of Public Health (BUSPH), 2. National Health Research Authority

Background: In 2015, an estimated 8.4 million people in Zambia lacked access to improved sanitation including 2.1 million who practiced open defecation. Limited access to improved sanitation and safe water, and inadequate hand hygiene contribute to diarrhoea and stunting among children under five in Zambia. The Zambian government, with support from DFID, UNICEF and other partners have been implementing the Zambia Sanitation and Hygiene Program to address these public health challenges. A key component of this program is the community led total sanitation (CLTS) initiative, which aims to have an additional 3 million people consistently using improved sanitation facilities and adopting hand washing with soap or ash.

Methods: We conducted baseline and end-line cross-sectional surveys from June to July in 2013 and 2016 respectively, to measure relevant impact and outcome indicators. A two stage sampling procedure was used to identify households for participation. After provision of informed consent, the household head was interviewed and the toilet and handwashing facilities were inspected. Prevalence ratios were calculated and were adjusted for clustering by statistical enumeration area.

Results: At end-line, 83.0% of households reported using an improved toilet facility but 29.3% used improved sanitation facilities shared with other households. The use of improved not shared toilet facilities (defined as a facility that hygienically separates human excreta from human contact) improved from 36% (432/1204 households) to 51% (595/1170) and households having a specific place for handwashing improved from 21% (254/1204) to 33% (391/1170) between baseline and end-line. While there was no impact of the CLTS intervention on two-week prevalence of diarrhoea or acute respiratory infection, there was a significant reduction in stunting (height-for-age Z score <-2 standard deviations) from 46% (309/670) to 41% (617/1507) (adjusted prevalence ratio [aPR]1.18, 95%CI 1.06-1.31) and severe stunting (height-for-age Z score <-3 standard deviations) from 32% (217/670) to 18% (275/1507) (aPR1.86, 95%CI 1.59-2.18) among under-five children. Stunting and severe stunting were significantly lower in households with improved not shared facilities and those with water/soap for handwashing relative to those without these improvements (stunting: 34% [78/228] vs. 41%, [539/1279]; aPR 0.75, 95%CI 0.61-0.93 and severe stunting: 14% [31/228] vs. 19% [244/1279] aPR 0.65, 95%CI 0.65-0.97).

Conclusion: This impact evaluation demonstrated the importance of improved hygiene through development of facilities for handwashing coupled with improved sanitation for improving linear growth of children in Zambia.

Title: Rates, causes, and timing of maternal deaths, stillbirths and neonatal deaths in Southern Province, Zambia

Authors: Davidson H. Hamer[1], Julie M Herlihy[2], Fern Hamomba[3], Bowen Banda[3], Kojo Yeboah-Antwi[1], Kebby Musokotwane[4], Pilangana, Portipher[5], Chipo Mpamba[3], Jonathon L. Simon[6], Katherine EA Semrau[7]

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Background: Zambia continues to have an unacceptably high maternal mortality ratio (MMR) and neonatal mortality rate (NMR). Limited data are available for the country on the burden, timing and causes of neonatal and maternal deaths, and stillbirths. As part of the multi-country Alliance for Maternal and Newborn Health Improvement (AMANHI) study, we sought to address this evidence gap using a clinical trial infrastructure in Southern Province, Zambia.

Methods: In the context of the Zambia Chlorhexidine Application Trial (ZamCAT), pregnant women were recruited during antenatal care in 7 districts in Southern Province and followed until 6 weeks post-partum. Visits were made at 3 time points in the antenatal period and 5 time points after birth to assess vital status of the mother and her newborn. Verbal autopsies (VAs) were performed for deaths of pregnant and postpartum women, neonatal deaths and stillbirths (estimated gestational age ≥28 weeks). After intensive training and passing a qualifying examination, physicians used standardized methods for cause of death assignment. Agreement between two physicians was required for final cause of death determination.

Results: Among 25,750 pregnant women enrolled, there were 22 maternal deaths (13 VAs performed), 441 stillbirths (217 VAs performed), and 363 neonatal deaths (273 VAs performed) with outcomes ascertained. The MMR was 85.4 deaths per 100,000 births. The most common cause of maternal mortality was postpartum haemorrhage (55%), and the majority of deaths occurred during labour and shortly after delivery. The stillbirth rate was 17.3 per 1,000 births. Antepartum stillbirths (n = 118) were commonly due to maternal infections such as malaria and HIV (47%), other specific foetal causes (17%), hypertensive disorders (15%), complications of labour and delivery (13%), and antepartum haemorrhage (3%). Major causes of intrapartum stillbirths (n = 99) included complications of labour and delivery (70%), other specific foetal causes (14%), and maternal infections (7%). The NMR was 14.5 per 1,000 live births with common causes of mortality being severe neonatal infection (37%), prematurity (28%), perinatal asphyxia (27%), and congenital malformations (4%). More than half of neonatal deaths (55%) occurred in the first 24 hours, 26% between day 2-7, and the remaining 19% between days 8-28 of life.

Conclusion: This large study provides important insight into the causes of death of mothers and newborn babies in Zambia. The MMR and NMR were lower than recent Demographic Health Survey (2013-2014) data for Southern Province, possibly due to participant recruitment during the second trimester (thus missing early pregnancy mortality events) and benefits to the local population from the clinical trial infrastructure and associated interventions such as home visits in the early neonatal period. Postpartum haemorrhage remains the commonest cause of maternal

death, while antepartum stillbirths were often due to maternal infections such as malaria and HIV. Labour and delivery complications were major causes of intrapartum stillbirths and more than half of neonatal deaths occurred in the first 24 hours. These results imply that greater attention to improvements in access to and quality of emergency obstetrical and neonatal care are required if maternal mortality and perinatal mortalities are to be reduced in Southern Province and elsewhere in Zambia.

Title: Identification of immunity gaps to measles and rubella in southern Zambia: Added value of linking a serological survey with a post-campaign coverage evaluation survey

Authors: Kyla Hayford[1], **Simon Mutembo[2]**, Andrea Carcelén[1], Francis Mwansa[2], Angels Mwiche[2], Caroline Phiri[2], Kelly Searle[1], Jane Wanyiri[1], Philip E. Thuma[3], William J. Moss[1]
1. Johns Hopkins Bloomberg School of Public Health, 2. Ministry of Health, Zambia, 3. Macha Research Trust

Background: The goal of vaccination campaigns is to rapidly increase population immunity above a threshold to interrupt or prevent disease transmission. After the 2016 national measles and rubella (MR) vaccination campaign, a post-campaign coverage evaluation survey (PCES) was conducted to assess the impact of the campaign on vaccination coverage. Population immunity is not routinely assessed after vaccination campaigns but may provide valuable evidence to support immunization programs not captured by a PCES. We nested a serological survey in the PCES in Southern Province to estimate age-specific population immunity to measles and rubella viruses among all age groups.

Methods: In November and December 2016, we partnered with the Government of Zambia to conduct a concurrent serological survey with the PCES in Southern Province. Whereas the PCES enrolled children aged 9 months to <16 years, all household members age 9 months or older were eligible for the serosurvey. Four data collectors joined each PCES team and collected dried blood spots (DBS) by fingerprick. DBS were tested for measles- and rubella-specific IgG antibodies by enzyme immunoassay (Siemens Enzygnost, Germany). DBS results were adjusted for spot size and volume and categorized as seropositive, seronegative or equivocal according to the manufacturer's protocol. Seroprevalence was estimated with 95% Wald confidence intervals (CI). The PCES team collected data on routine and MR campaign vaccination history.

Results: Of the 731 individuals available at the time of the survey, 636 (87%) participated in the serosurvey and 81 (11%) refused. 590 DBS samples were successfully tested by EIA. Overall seroprevalence for rubella and measles IgG antibodies was 97% (95% CI: 96, 98) and 96% (95% CI: 94, 97), respectively. Rubella seroprevalence among children eligible for the campaign (98%, 95% CI: 96, 99) was significantly higher than for adults of reproductive age (ages 16-44 years, 94%, 95% CI: 88, 96. Fisher's exact test p=0.009). Women of reproductive age were significantly less likely to be seropositive for rubella than girls or older women (p=0.013). Importantly, rubella seroprevalence was only 84% (95% CI: 73, 93) for adolescent girls and women aged 16 - <30 years. Measles seroprevalence was not significantly different between children eligible for the campaign (96%, 95% CI: 94, 98) and individuals above the target age range (94%, 95% CI: 90, 96. Fisher's exact test: 0.215). Measles immunity gaps among young adults were observed but were less pronounced than rubella immunity gaps. 84% of eligible children received an MR vaccine during the campaign, 5% did not, and 11% had missing data on receipt of the campaign dose. 86% of children received at least dose of one measles-containing vaccine, 3% never received a measles vaccine, and 11% were missing data. Rubella and measles seroprevalence were significantly higher than expected by vaccination coverage, even after adjusting for expected primary vaccine failure (McNemar's test, p<0.0001 for both tests).

Conclusions: The MR vaccination campaign achieved high levels of population immunity in the target age range. Overall, immunity levels are sufficiently high to prevent measles and rubella

outbreaks. The nested serosurvey showed that population immunity was significantly higher than expected based on vaccination coverage estimates from the PCES. The serosurvey also revealed immunity gaps among older children and young adults not eligible for the campaign, gaps which would not have been identified through the PCES. Implications of these immunity gaps, particularly for rubella among women of reproductive age, need to be assessed. Sustaining high coverage with routine MR vaccination will be important to maintain high population immunity and prevent outbreaks.

Title: Acceptability and feasibility of implementing birth testing for early infant diagnosis of HIV infection in Zambia

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1. Livingstone Central Hospital, 2. Macha Research Trust, 3. Johns Hopkins Bloomberg School of Public Health

Background: Testing for HIV at birth is now recommended in many settings as it can lead to earlier diagnosis and treatment for HIV-infected infants and reduce morbidity and mortality. Testing at birth presents different challenges than later in infancy as it occurs in maternity wards shortly after delivery. This study was conducted to understand the acceptability and feasibility of implementing birth testing in different settings in Zambia.

Methods: A prospective study of early infant diagnosis was conducted at two urban facilities (one hospital and one clinic) and five rural facilities (one hospital and four clinics) in Southern Province, Zambia from February 2016 to May 2017. All HIV-exposed infants born at the health facilities were eligible to participate. Dried blood spot cards were collected and sent to a central laboratory for HIV DNA testing. Results were documented and provided to the mother.

Results: 864 HIV-exposed infants were identified as eligible and 754 infants (87%) were enrolled in the study. Only 19 (2%) infants did not participate because the mother did not want the child to be tested at birth. More mothers declined birth testing in the hospitals (urban: 1%; rural: 6%) than in the clinics (urban: 0.6%; rural: 0%). Only 1.7% and 0.9% of infants at the urban and rural facilities had detectable HIV DNA, respectively. The proportion of mothers who did not receive the results was high in the urban facilities (hospital: 63%; clinic: 23%) and rural hospital (13%) and low in the rural clinics (<1%). At the urban hospital, the primary reason was that the mother defaulted. At the urban clinic and rural hospital, the primary reason was that the mother had no phone and could not be reached.

Conclusions: Testing at birth was acceptable to the majority of mothers delivering in health facilities. However, returning test results to mothers was challenging, particularly in the urban areas and hospitals, as many women delivered far from home and lacked access to a phone, supporting the need for point-of-care tests for early infant diagnosis.

Title: Factors associated with PMTCT utilization among HIV-infected women in Zambia

Authors: Mutinta Hamahuwa[1], Yvonne Phiri[1], Pauline Manyepa[1], Nkumbula Moyo[1], Jane Mutanga[2], Phil Thuma[1], William J. Moss[3], Catherine G. Sutcliffe[3]
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Background: The dramatic scale-up of programs to prevent mother-to-child transmission (PMTCT) has led to significant decreases in the number of infants acquiring HIV infection. Targets have been set for coverage of PMTCT programs with a goal of eliminating pediatric HIV as a public health problem by 2020. For barriers to be addressed and PMTCT programs to reach their target, a better understanding of women not being reached and at high risk of transmitting HIV to their infants is needed in the era of option B+ and in diverse settings.

Methods: A prospective study was conducted of HIV-infected pregnant women delivering their infants at seven health facilities in Southern Province, Zambia from February 1, 2016 to January 31, 2018. The health facilities included Macha Hospital, Livingstone Central Hospital and associated health centers. Mothers were administered a questionnaire, a chart review was completed, and a dried blood sample (DBS) was collected from the infant and sent to the central laboratory for HIV DNA testing.

Results: Of the 802 mother-infant pairs enrolled in the study, 794 (318 and 476 from Macha and Livingstone sites respectively) had complete data and were included in the analysis. 92% of mothers received PMTCT. Infants born to mothers who did not receive PMTCT were more likely to have detectable HIV DNA at birth (3.0% vs. 1.0%; p = 0.17). Mothers who did not receive PMTCT were younger (28 vs. 30 years; p= 0.06), less likely to have received antenatal care (3.0% vs. 0.7%; p = 0.05), and more likely to report having been diagnosed with HIV infection during pregnancy (62.5% vs. 32.8%) or during labour (7.1% vs. 0.1%; p<0.0001). Among all mothers, 84.9% reported having been tested and knowing their status before the pregnancy. Among mothers diagnosed with HIV during pregnancy (n=275), 60.4% reported having been tested prior to the pregnancy. Among mothers diagnosed with HIV during labour (n=5), 80.0% and 20.0% reported having been tested prior to and during the pregnancy, respectively. Self-reported reasons for not receiving PMTCT among mothers diagnosed with HIV infection before or during the pregnancy included not wanting to initiate treatment (55%), issues of disclosure or consent by their partner (12%), the clinic failing to inform them about treatment options (7%), and the clinic not having drugs available (3%). For 22% of mothers, the reason was unknown.

Conclusions: These findings show that antenatal care and PMTCT programs were effective in identifying and treating HIV-infected pregnant women. Few women eligible for PMTCT were missed as most women who did not receive PMTCT were diagnosed during pregnancy or labour. Frequent HIV testing of women should be emphasized to facilitate early diagnosis and treatment and prevent HIV transmission to their infants.

Title: Early infant diagnosis of HIV infection and linkage to care in rural Zambia

Authors: Sylvia Maunga[1], Nkumbula Moyo[1], Simon Mutembo[2], Phil Thuma[1], William J. Moss[3], Catherine G. Sutcliffe[3]

1. Macha Research Trust, 2. Ministry of Health, 3. Johns Hopkins School of Public Health

Background: Early diagnosis and treatment of HIV-infected infants can reduce morbidity and mortality. For early infant diagnosis programs to be most effective, infants should be tested at recommended ages, results should be returned quickly, and infants diagnosed with HIV infection should be linked to care. This study was conducted to understand adherence to testing schedules, turnaround times for the return of results, and linkage to care in rural Zambia.

Methods: A prospective study was conducted at five health centers in Choma District of Southern Province, Zambia from February 2016 to December 2017. All HIV-exposed infants attending the health facilities for early infant diagnosis were eligible to participate and followed at the clinics for routine testing at 6 weeks, 6 months, 12 months, and 18 months/post-weaning. At 6 weeks and 6 months of age, dried blood spot cards were collected and sent to a central laboratory for HIV DNA testing. At 12 and 18 months/post-weaning, a rapid serological test was performed, with confirmatory HIV DNA testing if positive.

Results: Among 252 infants born between December 2015 and December 2016, only 30% were tested on schedule (6 weeks, 6 months and 12 months). Almost half (41%) missed one test and 18% missed two tests. The median time from sample collection to return of test results to the clinic was 14.3 weeks, with a median additional time to provide results to the mother of 5.6 weeks. 13% of the mothers did not receive their results, primarily (92%) due to the sample being lost. Delays in testing were noted for 24% of samples, primarily due to stock-outs of reagents at the lab (50%). 18 infants had detectable HIV DNA. Of these, only six infants were linked to care and initiated treatment 4 to 28 weeks after sample collection. Four infants died before the results were returned, and 3 infants were not linked to care due to relocation or refusal. For 5 infants, the test outcome is pending.

Conclusions: Despite efforts to improve early infant diagnosis, many infants missed testing at recommended ages, the turnaround time for results was long, and linkage to care remained challenging.

Title: Response to antiretroviral therapy among HIV-infected infants and young children

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1. Macha Research Trust, 2. Johns Hopkins School of Public Health

Background: Early initiation of antiretroviral therapy (ART) can reduce morbidity and mortality among HIV-infected children. Thus, guidelines have moved away from recommending treatment initiation based on clinical and immunologic thresholds to immediately after diagnosis. As infants have different immunologic, virologic and clinical characteristics compared to older children, it will be important to evaluate differences in treatment responses.

Methods: Since 2007, children younger than 16 years of age receiving care at Macha Hospital have been invited to participate in a prospective cohort study. After providing written informed consent, children are enrolled in the study and seen every three months. At each visit a questionnaire is administered, a physical exam is performed and a blood sample is collected to measure CD4% and viral load. This analysis was restricted to children younger than five years of age receiving ART from 2007-2016. Treatment responses in the first two years, including changes in CD4%, viral suppression (<400 copies/mL) and mortality, among children <12, 12-23, and 24-59 months of age were compared.

Results: During the study period, 89, 146, and 154 children <12, 12-23, and 24-59 months of age initiated treatment, respectively. Children <12 months of age were less likely to be severely malnourished (36% vs. 56% vs. 50%; p=0.02) at ART initiation compared to children 12-23 and 24-59 months of age, respectively. No significant difference was found between age groups for the proportion of children with severe immunosuppression (61% vs. 62% vs. 54%; p=0.40) or the median viral load at ART initiation (750,000 vs. 750,000 vs. 301,555 copies/mL; p=0.18). Children <12 months of age were less likely to achieve viral suppression after 3 (48% vs. 73% vs. 86%; p<0.001) and 6 (76% vs. 81% vs. 92%; p=0.06) months of ART compared to children 12-23 and 24-59 months of age, respectively. Beyond 6 months of ART, however, the proportion of children with viral suppression remained similar in each age group at approximately 85%. Gains in CD4% were similar across age groups, increasing from a median of 17-21% at ART initiation to 28-31% and 32-34% within 3 and 9 months, respectively. Median CD4% remained constant thereafter in each age group. Mortality was highest in the first 6 months after ART initiation across all age groups (cumulative mortality at 6 months: 12.2% vs. 11.0% vs. 5.1%; 24 months: 18.7% vs. 17.0% vs. 7.2%). Mortality was significantly higher among children <12 months (hazard ratio [HR]: 2.29; 95% confidence interval [CI]: 1.06, 4.94) and 12-23 months (HR: 2.26; 95% CI: 1.13, 4.50) compared to children 24-59 months of age. Differences remained after adjusting for levels of immunosuppression and malnutrition at ART initiation.

Conclusions: Children younger than 24 months of age initiating ART had good immunologic and virologic responses. However, infants younger than 12 months of age initiating ART took longer to achieve viral suppression. In addition, younger children initiating ART had higher mortality, particularly in the first 6 months of treatment. Providers caring for young children should be aware of these differences when evaluating treatment response.

Title: Nutritional Risk and Associated Factors of Adult Inpatients at Kitwe Teaching Hospital in Zambia: A Hospital-Based Cross-Sectional Study

Authors: Nixon Miyoba[1], Joseph Musowoya[2], Emily Mwanza[2], Angel Malama[2], Nyati Murambiwa[3], Irene Ogada[4], Macriveness Njobvu[2], Doris Liswaniso[5]
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Background: Nutritional risk and undernutrition are common problems among medical and surgical patients. In hospital, malnutrition is frequently under-diagnosed and untreated thereby contributing to morbidity and mortality. The purpose of this study was to determine the prevalence of nutritional risk among adult inpatients at Kitwe Teaching Hospital in Zambia. In addition, the study sought to establish factors associated with nutritional risk.

Methods: A hospital-based cross-sectional study comprising 186 consecutive inpatients aged 18 - 64 years admitted in medical and surgical wards was conducted at Kitwe Teaching Hospital. Out of one hundred and ninety eight (198) patients eligible to participate, data were collected from 186, representing a response rate of 93.9%. A structured questionnaire with elements of Malnutrition Universal Screening Tool was used to collect data over a six months period. Evaluated patients were dichotomized into no risk and nutritional risk. Binary logistic regression was performed to identify variables associated with nutritional risk.

Results: The mean age of adult inpatients was 40.72(14.4) years. Results indicate that 59.7% of hospitalized patients were at nutritional risk. Vomiting, weakness, appetite decrease, dysphagia and weight loss were significantly associated ($p=0.019$, $p=0.008$, $p<0.001$, $p=0.007$, and $p<0.001$ respectively) with nutritional risk. However, weight loss and appetite decrease were the most significant factors associated with nutritional risk (OR =50.16, 95% CI = 5.75 – 36.70, $p<0.001$ and OR=28.06, 95% CI =1.49 – 8.12, p=<0.001 respectively).

Conclusion: Findings of our study suggest that close to 60% of adult inpatients at Kitwe Teaching Hospital are at nutritional risk. Nutritional risk is an issue of major concern at Kitwe Teaching Hospital and is associated with a number of variables. Identification of nutritional risk using Malnutrition Universal Screening Tool among adult inpatients is feasible in resource-poor settings like ours.

Title: Procedure for Graduating Clients from a Nutrition Assessment, Counselling and Support Program

Authors: Beatrice Kawana[1], Venancio Sakala[1], Rick Henning[1], Charity Siame[2]
1. PATH, 2. Ministry of Finance

Background: Nutrition Assessment, Counselling and Support is an approach that applies a targeted nutrition intervention on patients or clients that meet a specific criterion to help them return to good health within the shortest duration of time. The purpose was to determine whether HIV+ malnourished clients, gained weight after being put on a food supplement for a defined period of time. The Thrive Project used this approach to assess malnourished clients and profiled those that improved their nutritional status and graduated them from the program. A graduating client was one whose nutritional status improved from being severely or moderately malnourished to a normal nutritional status.

Methods: HIV+ clients coming to the health facility for their routine check-up were nutritionally assessed using weight and height/length and MUAC. The clients were classified, counselled appropriately according to needs of their nutritional status. Those found to be malnourished were provided with home ration of a food supplement called High Energy Protein (HEPS) at each visit for a specified period of time. Clients were given follow-up appointments monthly and their weight monitored for improvements before.

Results: A total of 29,902 clients in 50 Thrive Project supported health facilities in four provinces were categorized as malnourished and received food supplements. Of these malnourished clients, 21,693 improved their nutritional status from severely or moderately malnourished to normal status of BMI greater or equal to 18.5kg/m2 and graduated. On average 89 percent for these clients were above 18 years of age and most of them were female.

Conclusion: NACS with food supplements contribute positively to the nutritional status of PLHIV over a defined period of time. With proper follow-up appointments in place, clients are able to be monitored effectively and get back to their normal weight within a specified period of time if there are no complications.

Title: Sexual and Reproductive Health Outcomes of Female Sex Workers in 4 Districts of Zambia

Authors: Mwelwa Chibuye[1], Maurice Musheke[1], Waimar Tun[1], Henry Fischer Raymond[1], Ryan Keating[1]
1. Population Council

Background: Sexual and reproductive health among sex workers is influenced by many factors including behavioral and social-demographic disposition. However, there is limited evidence on the sexual and reproductive health outcomes of female sex workers (FSWs) in Zambia. This is despite evidence indicating that FSWs are more vulnerable to poor sexual and reproductive health outcomes than other females. Such information is important for effective and efficient sexual and reproductive health programming.

Methods: A cross-sectional survey was conducted among FSWs in 4 districts of Zambia – Livingstone, Lusaka, Ndola, and Solwezi (n=1,986). Respondent-driven sampling (RDS) was used to recruit study participants starting with 6-15 seeds. FSWs responded to a bio-behavioural interviewer –administered questionnaire about contraceptive use, sexual violence and abortions. Data was analysed using RDS Analyst (RDSA) and STATA, and weighted to account for participant network sizes.

Results: A large proportion of FSWs (between 55.2 and 79.2%) reported using a family planning method, with injectables and male condoms being the most widely used. Inconsistent condom use with their five most recent sexual partners was reported in 84% or higher of the FSWs interviewed in all sites. Those reporting to have ever been pregnant ranged from about 40% in Ndola and Solwezi to as much as 90% in Livingston, with 4-6% being pregnant at the time of interview. Between 60-74% of those ever pregnant exchanged sex during their most recent pregnancy. Over 90% of FSWs sought antenatal care (ANC) for their most recent pregnancy with over 85% tested for HIV. Of those tested, around 10-19% tested HIV positive among those tested at Antenatal clinics. Abortions were reported in 14% -17% of the FSWs. 8.0 - 22.7% of FSWs interviewed reported having experienced sexual violence or rape in the last 12 months.

Conclusions: In as much as use of contraceptives among FSWs in Zambia is relatively high, more needs to be done in terms of accessibility of these commodities. Interventions need to be packaged to accommodate the various characteristics of FSWs including much younger FSWs at individual and community level. While a high proportion of FSWs accessed ANC services during their most recent pregnancies, it is of concern that a high proportion engaged in sex work during their most recent pregnancy. Due to the substantial risk of vertical HIV transmissions in cases where FSWs continue to work while pregnant, reproductive and maternal health content should be integrated into HIV prevention programming for FSWs. Given the high levels of violence experienced by FSWs, health programs for FSWs must also integrate violence screening and support services.

Title: Sepsis Prevention in Neonates in Zambia Study: Impact of an Infection Prevention Bundle on Neonatal Sepsis and Mortality

Authors: Lawrence Mwananyanda[1,2], Carter Cowden[3], Cassandra Pierre[4], James Mwansa[5], Chileshe Lukwesa-Musiyani[6], Angela Lyondo[1], Monica Kapasa[7], Sylvia Machona8, Moses Chilufya[1], Gertrude Munanjala[1], Matthew Bates[8], Russell Localio[9], Susan E. Coffin[3], Davidson H. Hamer[2]

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Background. Sepsis is a major cause of mortality in neonates in sub-Saharan Africa. Bloodstream infections (BSIs), the most common hospital-associated infections in neonates, occur more frequently in resource-limited countries than in industrialized countries and contribute to many in-hospital neonatal deaths. We assessed the efficacy of a novel bundle of low-cost infection prevention and control (IPC) measures targeted to known and suspected risk factors for neonatal hospital-associated BSI. We studied the impact of this intervention bundle on BSI and mortality in a neonatal intensive care unit (NICU) at the University Teaching Hospital (UTH) in Lusaka, Zambia.

Methods. This prospective observational cohort study of neonates who survived >3 days after NICU admission consisted of a six-month baseline period ("baseline"), two months during which interventions were introduced ("implementation"), and 10 months of intervention assessment ("intervention"). The intervention bundle consisted of IPC training, introduction of alcohol-based hand wash, weekly bathing of neonates >1.5 kg with 2% chlorhexidine, targeted environmental cleaning, and SMS reminders of IPC messages. The outcomes were all-cause neonatal mortality (primary) and suspected sepsis and laboratory-confirmed BSIs (secondary).

Results. From September 2015 through March 2017, we enrolled 2669 eligible neonates. Median maternal age, maternal HIV status, and newborn characteristics were similar in the baseline, implementation, and intervention periods (with the exception of birth weight). Half of neonates had one or more episodes of sepsis, including 549 (41%) who had a positive blood culture. Klebsiella pneumoniae, predominantly ESBL-producing, was most common (n=289, 70%); possible contaminants were isolated in most other positive cultures (n=140, 25.5%). All-cause neonatal mortality was lower during the intervention (18.0%) than the baseline period (23.6%), and similar reductions in mortality were seen in all birthweight categories. The incidence density rates for suspected sepsis and BSI with a pathogen were significantly lower in the intervention relative to baseline periods for all birth weight categories, except babies weighing <1 kg.

Conclusions. This bundle of infection prevention measures resulted in reductions in all-cause neonatal mortality, suspected sepsis, and BSI with pathogens. This combination of low-cost measures has potential to be applied in other contexts where hospital-associated sepsis is a major contributor to neonatal mortality.

Title: Association of Body composition (Unhealthy Fat Mass) with stunting in supposedly healthy children aged 3-5 years old in Ndola, Zambia

Authors: Justin Chileshe[1], Ng'andwe Kalungwana[1], Sydney Mwanza[1], David Mwakazanga[1], Grace Munthali[2], Ray Handema[1], Modest Mulenga[1]
1. Tropical Disease Research Centre, 2. NISIR

Background: The prevalence of stunting in children under five years in the world stands at 33% and in Zambia is at 40%. Prolonged undernutrition during gestation and extending into early childhood is common in developing countries and causes stunting. Consequences of impaired growth, cognitive delays, greater susceptibility to infections and high risk of mortality. Stunted children have different Body composition structure compared to normal children particularly lean mass. In Zambia there is scanty information on body composition and therefore this study was designed to assess body composition in stunted children compared to normal children without malaria and other infections in the preceding one week.

Methods: This was a cross-sectional study in which children aged 3-5 years were recruited at Nkwazi clinic in Ndola. Children's weight, height, Haemoglobin and Malaria were measured. Saliva collected was analysed for body composition to determine fat mass (FM) and fat-free mass (FFM) using deuterium dilution technique by Fourier transformed infrared (FTIR).

Results: A total of 116 children were recruited and 104 had analysable data. About 54.2% were males and the average age was 48 months. Stunting, underweight and wasting levels were found to be 36.6%, 23.8% and 4.9% respectively. Overall 40.4% of the children had healthy body fat (36.2% of girls and 43.8% of boys). Of the children with unhealthy body fat, 14.4% had lower than healthy and 45.2% had higher unhealthy body fat. Logistic regression was done with FM% as the dependant variable against Gender, Stunting and Underweight. Stunting was found to be statistically significant against FM% (P=0.011) and not others.

Discussion/Conclusion: Stunted children with unhealthy Fat Mass percentage were found to be significantly higher compared to the children who were not stunted (P=0.011). This should trigger further investigations in these children to counter future complications that can arise as a result of this amount of fat. The other variables such as malaria illness in the previous 1 month, age and gender were not statistically significant (P>0.05). The study was successfully implemented with use of deuterium water to assess body composition of children under the age of five years and that this can serve as baseline data for subsequent studies in this and other age groups.

Title: Performance of the GeneXpert for early infant diagnosis of HIV infection using whole blood and dried blood spot samples

Authors: Passwell Munachoonga1, Yvonne Phiri1, Sylvia Siphelele Maunga1, Mutinta Hamahuwa1, Mathias Muleka1, Hellen K. Matakala1, Nkumbula Moyo1, Philip E. Thuma1, William J. Moss2, Catherine G. Sutcliffe2

1. Macha Research Trust, 2. Johns Hopkins School of Public Health

Background: HIV DNA testing for early infant diagnosis presents different challenges in rural settings. Samples have to be transported to a central laboratory leading to long turnaround times for results, delaying linkage to care and treatment for HIV-infected infants. To reduce loss to follow-up, a near-patient, same-day test is critical to expand access for high risk infants. This study was conducted to compare the performance of GeneXpert when used with dried blood spots (DBS) and whole blood in rural Zambia.

Methods: A cross-sectional study was conducted at Macha Hospital and four rural health centers in Southern Province from November 2017 to March 2018. All HIV-exposed infants younger than 18 months of age and enrolled in an ongoing study of early infant diagnosis were eligible to participate. At the time of routine testing, an additional blood sample was collected for this study. Whole blood samples were collected from infants attending the Macha Hospital HIV clinic and maternity ward in EDTA tubes, and DBS collected from infants attending four rural health centers using Whatman 903 paper from a heel stick. The routine DBS was transported to the central laboratory for HIV DNA testing. The study DBS and whole blood samples were transported immediately to the Clinical Research Laboratory at Macha Research Trust and tested with GeneXpert (GX-IV). For whole blood samples, 100 □l was transferred into the GeneXpert sample chamber. For DBS samples, one spot was cut from each card, submerged in 1 mL of reagent, incubated at 56^{o}C at 500 rpm in a water bath for 15 minutes and then 1mL was pipetted into the sample chamber. The prepared samples were run by GeneXpert IV and the results were read within 90 minutes.

Results: One hundred and eighty-two samples were analyzed from HIV-exposed infants; 95 were DBS cards and 87 were whole blood. The assay was performed within 48 hours after blood collection. Out of 95 DBS; 83 samples (87.3%) were negative, 11 (11.5%) were invalid and 1 (1.1%) was positive. For the 87 whole blood samples; 79 (90.8%) were negative, 6 (6.89%) were invalid and 2 (2.29%) were positive.

A total of 81 (93.1%) whole blood samples had a valid result on first attempt compared to 84 (88.4%) for DBS samples (p=0.28). All invalid results were re-tested and the results were negative. Two (18.2%) DBS required re-testing twice to produce a valid result.

The three positive samples were confirmed positive by HIV DNA PCR testing at the central laboratory, giving 100% concordance for the GeneXpert IV.

Conclusion: The GeneXpert platform can be used as a near point-of-care test for early infant diagnosis of HIV in resource limited settings. The availability of test results the same day facilitates early linkage to care and treatment for infants diagnosed with HIV. Use of DBS samples for testing allows sampling off-site and potentially expands access to testing in affiliated rural health centers. However, use of DBS samples may result in a higher proportion of invalid results, which would need to be considered if implemented.

Title: Using Parasite DNA from Rapid Diagnostic Tests (RDTs) to Track Malaria in a Low Transmission Setting in Southern Zambia

Authors: Ben Katowa[1], Kelly Searle[2], Tamaki Kobayashi[2], Julia Pringle[2], Giovanna Carpi[2], Michael Musonda[1], Jennifer C. Stevenson[1,2], Philip E. Thuma[1], Douglas E. Norris[2], William J. Moss[2]

1. Macha Research Trust, 2. Johns Hopkins School of Public Health

Background: With the reduction in malaria cases and the Zambian government's commitment to eliminate malaria by 2021, tracking and understanding the changing transmission dynamics and parasite genetics are important to guide policy makers on the optimal interventions. Typically, DNA from blood spots collected on filter paper are used for such research. RDTs are the major tool for malaria diagnosis and are deployed throughout the country. Using RDTs for genetic studies provides an easily accessible source of parasite DNA that can provide data across large spatial and temporal scales. This study optimized DNA extraction methods from standard RDTs for genetic analyses of Plasmodium falciparum.

Methods: SD Bioline RDTs were spiked with standard laboratory strains of P. falciparum at 200 parasites/□L and 2000 parasites/□L concentrations. Field collected SD bioline RDTs were obtained by the Macha Research Trust field team during reactive case detection. DNA was extracted from the RDTs and parasite quantification was conducted using qPCR targeting the P. falciparum cytochrome b gene. A 24 single nucleotide polymorphism (SNP) assay was used to genotype parasites.

Results: DNA was successfully extracted from different parasite concentrations. RDTs spiked with 200 parasites/□L produced parasite concentration ranges from 20 to 73 parasites/□L while RDTs spiked with 2000 parasites/□L produced parasite concentrations ranging from 468 to 1462 parasites/□L. Using DNA extracted from RDTs, parasites from those spiked in the laboratory and those collected from the field were genotyped using the 24 SNP barcode. RDTs spiked with laboratory strains gave 100% concordance of their genotypes compared to the known standards. The genotypic similarities between the samples that were collected was between 79% to 90%, as would be expected with persistent low parasite carriage among asymptomatic individuals.

Conclusion: As malaria transmission declines, it will be important to detect and describe the genetic diversity of parasites and characterize sources of transmission. Sampling sufficient people through active case detection to obtain this information in low transmission settings will be logistically challenging. As RDTs are deployed on a large scale, using them to extract DNA for parasite genotyping may help address this problem. Genotyping DNA from RDTs will give a more comprehensive picture of the diversity of parasites and help develop maps of parasite sources and sinks. Using RDTs also allows recovery of parasite DNA before treatment. Our study demonstrated that RDTs provide quality DNA and offer an inexpensive, easily accessible source of parasite DNA.

Title: Effect of chlorhexidine bathing on neonatal bloodstream infections and mortality at a large neonatal intensive care unit in Lusaka, Zambia

Authors: Lawrence Mwananyanda[1,2], Carter Cowden[3], Russell Localio[4], James Mwansa[5], Cassandra Pierre[6], Matthew Bates[7], Chileshe Lukwesa-Musyani[8], Monica Kapasa[9], Sylvia Machona[9], Moses Chilufya[1], Gertrude Munanjala[1], Angela Lyondo[1], Davidson H. Hamer[2], Susan E. Coffin[3]

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Background: Sepsis is a leading cause of mortality among hospitalized neonates in resource-limited countries yet interventions aimed at reducing the incidence in these regions have not been well studied. Chlorhexidine gluconate (CHG) reduces neonatal mortality in some resource-limited countries when used for cord care and bloodstream infections (BSI) in US intensive care units (ICU) when used for patient bathing. We recently completed an observational study to assess the impact of an infection control bundle on neonatal mortality and BSI in tertiary care neonatal ICU (NICU) in Lusaka, Zambia. The bundle included CHG bathing, infection control training, locally produced alcohol hand rub, enhanced environmental cleaning, and daily SMS infection control reminders. The main objective was to determine the impact of CHG bathing on mortality and BSI in a NICU in sub-Saharan Africa.

Methods: We performed a secondary analysis using data from an 18-month prospective observational cohort study to assess the impact of CHG bathing on neonatal mortality and BSI. Babies ≥1.5 kg were eligible for bathing with a 2% aqueous CHG solution (at admission and weekly thereafter). Blood cultures were obtained for clinically suspected sepsis. Mortality and BSI data were compared from the 6-month baseline and 12-month intervention periods. To determine if confounding by indication contributed to the observed reduction in mortality, we constructed a standardized cohort using data from baseline patients. We compared mortality rates of babies in the standardized cohort to those in the intervention cohort.

Results: In the intervention period, 1038 of 1213 enrolled babies (86%) were bathed with CHG. Bathed babies had lower mortality than babies who were not bathed (11% vs. 23%, $p<0.01$). Bathed babies also had a lower rate of BSI with a pathogen than not bathed babies (7% vs. 17%, $p<0.01$). Klebsiella spp. comprised >50% of the pathogens in both bathed and non-bathed babies. We observed a 5% reduction when comparing mortality rates in the intervention as compared to the standardized baseline cohorts (11% vs. 16%).

Conclusions: Our study demonstrated CHG bathing was associated with reduced neonatal mortality and BSI in a NICU in a resource-limited setting. Our results were robust when we compared mortality in the intervention cohort to a standardized baseline cohort.

Title: Poor HIV testing rates among youth and adolescents in Zambia; will the self-testing strategy help? Results from EQUIP

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Background: HIV prevalence in Zambia is 13.3 % among the reproductive age. The age group 16-24 years constitutes 33% of people living with HIV. Data of 2014 indicated low testing rates among the 15-24 age group with only 46% and 37% females and males respectively aware of their status. EQUIP is implementing HIV self-testing (HIV-ST) in Ndola and Kabwe districts in Zambia to evaluate the contribution of HIV-ST to increased testing rates among youths and adolescents. A baseline survey was undertaken to assess HIV testing uptake, knowledge and use of HIV-ST among this age group.

Methods: A mixed-method cross sectional cluster randomized survey was conducted by trained research assistants. Youths and adolescents aged 16-24 years old were targeted in learning institutions and households. Data was collected using a Delvy dynamic survey tool programmed on handheld tablets for direct electronic data capture. Qualitative data was collected through key informant interviews and Focus Group Discussion (FGDs). Descriptive analysis was undertaken with mean/median for continuous data and proportions for categorical data.

Results: A total of 5232 (97.2%) individuals responded to the questionnaire. Thirty (30) key informant interviews and eighteen (18) focus group discussions were conducted. Mean age of respondents was 19.4 (SD 2.1), 48.6% were female. The majority of the key informants (87.3%) were single and 10.3% married. Up to 67% attained secondary school while 9.6% has tertiary education. The majority (62.8%) interviewed reported being aware of their HIV status. However, health facility records showed only 29.5% having tested in this age group. Females were 8 times more likely to have tested than males. Only 34% had heard about self-testing while 4.9% reported having done the self-test.

Conclusion: There was discrepancy between self-reported testing and testing rates found in the health center records. The low testing rates in health facility records reflect national testing rates in this age group. HIV-ST is the strategy that could increase access to HIV testing.

Title: Pulse pressure as a predictor of Erectile Dysfunction

Authors: Kasonde Bowa[1] & Geoffrey Chitambala[2]
1. Copperbelt University School of Medicine, 2. Mansa General Hospital

Background: There is an increasing prevalence of Erectile Dysfunction in developing countries including Zambia. This is related to the increase in communicable disease and the increase in life expectancy. The prevalence of ED in developed countries is estimated at 52% among men between 40 to 70 years. No work has been published in Zambia on the prevalence of ED. Ancedotal evidence suggests a rising incidence. ED reflects artherosclerotic disease in the sub Tunica intima spaces. Therefore, one of the early predictors of the deposition of lipid and cholesterol sub intimally is the change in pulse pressure. With the increase in the middle class in Zambia, metabolic syndrome is becoming increasingly common. This includes the triad of Diabetes Mellitus type 2, Hypertension and Obesity. The objective of the study was to determine the prevalence of ED among men aged 45 years and above in Ndola as well as the ability of pulse pressure to predict ED.

Methods: This was a cross sectional observational study using a convenient sample. The Erectile Function of participants was measured using the International Index of Erectile Function score (IIEF) as the outcome variable. The pulse pressure of the patients was used as the input or risk variable. The study computed prevalence rate as a ratio of this population seen, the sensitivity and specificity as well as the relative risk ratio.

Results: The study recruited 383 patients. The prevalence of ED in this population was 63%.The sensitivity of pulse pressure to detect ED was 58% and the specificity was 70%.The relative risk ratio was 1.62 and this was statistically significant at $p< 0.00001$.

Conclusion: This study which is the first of its kind in Zambia shows a very high prevalence of 63% of ED among men in an urban setting. This is well above 52% describe in similar populations in developing countries. The study also shows that pulse pressure is a sensitive indicator of vascular pathology likely to result in ED. With a RR of 1.63 and a sensitivity of 58%. This suggests that routine monitoring of pulse pressure in the population may help to reduce the risk of vascular pathology and its related morbidities, including CVA, PVD and ED.

Title: Cancer and Nutrition in Zambia

Authors: Kasonde Bowa[1] & Prof. Mohammed A. Labib[2] (late)
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Background: Zambia like many developing countries has experience the dual epidemic of communicable and non-communicable disease.in particular there has been a significant increase in the prevalence of Cancer in Zambia. There has also been an improvement in the reporting and treatment of Cancer. On the one hand the National Cancer Registry has been strengthened and on the other National Cancer Disease hospital has been established and expanded.

Methods: This study builds on our previous study which compared the epidemiology of Cancer in Zambia to the agro-ecological zones using the Zambia National Cancer Registry figures. This study which was published in 2002, showed a high prevalence on Cancer in the Zone 1 of the agro-ecological Zones. We repeated this study looking at cumulative figures up to 2009.

Results: The study found that the highest prevalence (21%) for Cancer was between 35 to 44years.The commonest cancer in female was Cancer of the Cervix(48%) and Cancer of the Breast (11%).While in male the most common cancers were Kaposi Sarcoma(22%) and Cancer of the Prostate(16%).Zone 1 the agro-ecological zone with the lowest rainfall had the highest prevalence of Cancer at 177 per 100,000.While Zone 2 had the second highest prevalence at 22 per 100,000 and Zone 3 had the lowest prevalence at 15 per 100,000.This is in keeping with previous studies which showed the same findings.

Conclusion: This suggest that nutrition may play a significant part in Cancer distribution in Zambia. The paper also suggests that in parts of Zambia with high levels of Cassava consumption, overall Cancer prevalence tends to be lower. Biological studies have shown that Cassava contains nutrients which are rich in anti-cancer oxidants. These included Vitamins A & C and Lamarin.

Title: A Descriptive Analysis of the Breast, Cervical and Prostate Cancer Patients from the Zambia National Cancer Registry, 2008 -2015

Authors: Francis Dien Mwansa[1], Nyambe Sinyange[1], Richard Nsakanya[2], Geoffrey Kwenda[3], Gershom Chongwe[4], Charles Michelo[4]

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Background: Cervical, breast and prostate cancers represent 51% of the cancer burden in mortality and morbidity in Zambia. The Zambia National Cancer Registry (ZNCR) is a population-based cancer registry that collects data countrywide providing long-term incidence and descriptive data. We aimed to show the breast, cervical and prostate cancer incidence trends and describe associated typical socio-demographic characteristics of these patients using ZNCR data collected between January 1st 2008 and December 31st 2015.

Methods: We analysed ZNCR provincial data for all primary cervical, breast and prostate cancer cases to calculate incidence and mortality. Data were cleaned using Excel and Epi Info version 7.2 and analysis was done in Stata 13. We determined annual incidence rates, from the mid-year (2011) onwards; and overall incidence using the mid-year population between 2008 and 2015. Socio-demographic and treatment variables that had data elements in the registry were analysed.

Results: From the total of 10,765 cervical, breast and prostate cancer records were analysed, notifications were lowest in 2008/09 and 2013/14 . Majority of breast cancer patients (56.9%) were aged between 30 and 54 years (40-64 years when adjusted for age), with majority of them (56%) married and nearly half (48.8%) born and majority (64.3%) lived in Lusaka, Eastern and Copperbelt provinces. Highest breast cancer case fatality rates and crude death rates per 100,000 population were in Lusaka (32.9% and 82) and Eastern (18.9% and 107) respectively. Surgery (32.2%) and chemotherapy (32.9%) were the commonest breast cancer treatment means.

Majority of cervical cancer patients (61.5%) were aged between 30 and 54 years (40-64 years age adjusted) with 53.1% married. Nearly half (43.9%) were born on the Copperbelt, in Eastern and Lusaka provinces and the 57.9% resident there. The highest case fatalities were in Lusaka (35.9%) and Eastern (14.3%) and lowest (2%) in Muchinga provinces, with a 248/100,000 people crude death rate. Surgery (29.6%) and chemotherapy (34.1%) were the commonest treatment means for cervical cancers

Majority of prostate cancer patients were aged between 60 and 84 years (older than 65 years age adjusted) and 54% were married. Lusaka (43%) and Eastern (13.1%) provinces had the highest prostate cancer case fatality rates and a crude death rate of 310/100,00 population. Chemotherapy (37.3%) and radiotherapy (31.8%) were the commonest prostate cancer treatment means.

Over 93% of HIV positive breast and cervical cancer patients and 81% of HIV positive prostate cancer patients were on antiretroviral treatment. All three cancers showed a general decrease in incidence and death rates between 2011 and 2015 but an increase in absolute numbers of patient notifications and diagnosis between 2008 and 2015.

Conclusion: There is need to reinforce guidelines for breast and cervical cancer screening in the third decade of life and from the fourth onwards for prostate cancer. With consistent and continuous monitoring of its representativeness, the ZNCR is a provisionally relevant way to evaluate cancer incidence trends in Zambia.

Title: Community Facility Framework Strategy to Achieve The UNAIDS 90-90-90 G0als In Rwenzori Region, Baylor Uganda

Authors: Emily Katamujuna[1]; Sandra, Joseph; Adeodata, Leticia, Davia
1. Baylor-Uganda

Background: While Uganda endeavours to achieve its 90-90-90 target, only 65% of people living with HIV knew their HIV status, 51% received ART in 2015. The challenge to achieving the sustainable development goals for health requires building a robust health system. Community structures, are key in delivery of health services with unique influence in advocacy and demand-creation. However, inadequate capacity and involvement in the formal health system weigh-down effective responses to TB, HIV and AIDS. Baylor, supported by CDC started Community Facility Framework, an innovation to strengthen linkages between communities and health facilities to achieve the 90 90 90 goals.

Methods: 25 CBOs and 49 PLHIV networks were identified based on agreed criteria and linked to 127 Baylor supported health facilities. Each CBO identified CHWs in proportion to client numbers within the catchment area to conduct linkages and referrals between health facilities and communities. CHWs work hand in hand with a focal person at the health facility referred to as the Linkage and referral Assistant to conduct referrals. Project officer, Linkage and Referral Supervisor and a Data Clerk coordinate activities for a successful linkage and referral process.

Results: Community facility collaboration is key in addressing the challenges of fighting HIV and AIDS. The community structures mobilising, sensitization, refer and follow up. Over 10,401 referrals have been made from community to facility and of these 8,340 were complete representing 80% success rate. While referrals from the facility to the community were 2557, of these 2032 were successful accounting for 80% success rate. By the end of 2017, in effort to achieve the 90:90:90 UNAIDS target by 2020, Rwenzori Region whose target is 87,626, has successfully enrolled 93% in care, 92% started on ART (80,749) and 91% of these (64,088) virally suppressed.

Conclusion: Community structures strengths in this linkage raises the need to better support their role in the community. CBOs, PLHIV networks, have led the way in creating complementary service delivery approaches and have contributed greatly to Health Systems Strengthening. Their involvement in the formal health sector should be strengthened to successfully achieve Uganda's 90-90-90 goal. Community-led and participatory governance is also important not just to achieve immediate health outcomes, but also in strengthening health systems and their accountability to the populations they serve.

Title: Financial sustainability of maternity waiting homes: evaluation of a four-pronged strategy in rural Zambia

Authors: Nancy A. Scott[1], Jeanette Kaiser[1], Misheck Bwalya[2], Viviane Sakanga[2], Parker Chastain[1], Melvin Mwansa[2], **Thandiwe Ngoma[2]**, Davidson H. Hamer[1], Peter C. Rockers[1], David Kalaba[1], Taryn Vian[1]
1. Boston University, 2. Right to Care- Zambia

Background: Maternity waiting homes (MWH) are designed to increase access to skilled delivery care and to improve maternal and neonatal health outcomes. Costs associated with MWH operations raise concerns about financial sustainability, particularly in resource-constrained environments. We implemented a four-pronged financial sustainability strategy at 10 MWHs in rural Zambia. Informed by community input and the Conceptual Framework for Sustainability of Public Health Programs, the strategy includes: 1) internal sources of revenue from government and traditional leadership; 2) external sources from revenue-generating social enterprises (goat rearing, hammer mill or shop); 3) in-kind community-donated labor and materials; and 4) financial literacy training of MWH staff on social enterprise business planning, bookkeeping, and cost projections. This study explores the effectiveness and contributions of each prong to financial sustainability.

Methods: We used a mixed-methods approach. We collected monthly expenditure and revenue data from internal, external and in-kind sources over 18 months. Quantitative pre-post training tests were administered to assess financial preparedness of MWH staff (n=83); monthly direct observation was used to monitor financial management skills retention. We conducted in-depth interviews (n=166) semi-annually with MWH, health facility, and government staff. The last round of interviews will occur mid-2018. Lastly, we triangulated data to understand the degree of integration of MWHs into the health system, contribution of each prong, and potential for financial sustainability. Preliminary results are presented.

Results: We found evidence of strong commitment to MWHs from government and traditional leadership. Health facilities provide cleaning materials and supplies to MWHs, and refer to MWHs as extensions of the facility, not a separate entity. Traditional leadership in all sites garnered community contributions (maize or money in varying quantities) and some have committed to future annual contributions. The social enterprises are generating sufficient revenue to cover MWH operating costs with mean monthly profits of K194 (sd K869), minimizing the burden on the government budget. All communities contributed mud bricks, sand, and labor toward the construction of the MWHs. Community contributions covered minimal construction costs but were important for morale and fostering a sense of responsibility and community-ownership of the MWH. Community-donated labor toward the cleaning and upkeep of the home has had mixed results. Financial literacy training improved knowledge, but intensive routine mentorship for MWH staff proved critical for skill retention.

Discussion/Conclusion: The multi-pronged strategy we tested appears to have contributed to the financially sustainability of MWHs in rural Zambia. Other similar health system interventions in low-resource settings may consider using the same strategy.

Funding: The activities discussed in this abstract were supported by funding from MSD for Mothers, MSD's 10-year, $500 million initiative to help create a world where no woman dies giving life. The development of this abstract was additionally supported in part by the Bill & Melinda Gates Foundation and The ELMA Foundation. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the abstract. The content is solely the responsibility of the authors and does not necessarily reflect positions or policies of Merck, the Bill & Melinda Gates Foundation, or The ELMA Foundation.

Title: Early Results of Universal Test and Treat Implementation in a Large Zambian Correctional Facility

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1. Centre for Infectious Disease Research in Zambia (CIDRZ), 2. James Cook University, Australia, 3. Zambia Correctional Service

Background: High HIV prevalence is an ongoing challenge in Zambian correctional facilities. To provide inmates with the benefits of treatment as prevention (TasP), generate evidence to tailor universal test and treat (UTT) to correctional settings, and coordinate tuberculosis (TB) screening among HIV-infected inmates, we launched a UTT study at Lusaka Central (LC), one of Zambia's largest correctional facilities. We present interim findings here.

Methods: We offered immediate ART to inmates with newly diagnosed HIV or previously diagnosed HIV not yet on ART, regardless of CD4 or WHO stage. To enable UTT, we strengthened the LC health system by: training corrections officers and health workers; hiring a study nurse and clinician; and supporting routine HIV testing services (HTS) and viral load (VL) testing. To evaluate impact, we strengthened routine data systems, and prospectively collected data along the HIV cascade for a cohort of HIV-positive inmates consenting to immediate ART.

Results: From June 2016 — February 2018, 4,872 inmates were offered and 4,608 (94.6%) accepted voluntary HTS; 805 (17.4%) were found HIV-positive. 735 (91.3%) were referred for immediate ART with 447 (60.8%) meeting study eligibility criteria for longitudinal follow-up. Of those, 28 (6.3%) refused enrolment. 419 (93.7%) enrolled and 419 (100%) started ART [372 men (88.8%), 47 women (11.2%)] within 1 day (IQR:1–5 days). Mean age was 33.2 years (sd:7.9 years). Median baseline CD4 was 288 cells/mm3 (IQ:22–832). Prior to ART, 413 (98.6%) of enrolled inmates underwent TB screening, 25 were diagnosed with TB by Xpert and 7 clinically; all 32 (100%) started anti-TB treatment. By the end of the study period, 318 (75.9%) enrolled inmates had been released or transferred. Of the 146 inmates with documented VL after ≥3 months on ART, 136 (93.2%) were suppressed at a VL≤1,000 copies/ml). Of these, 113 (77%) had VL<40, and 134 (91.8%) had <500. Only 10 (6.9%) inmates had uncontrolled viremia (VL>1,000 copies/ml).

Conclusions: Implementing UTT within a large correctional facility resulted in high uptake of HTS and immediate ART for inmates with advanced immunosuppression, and facilitated TB screening, diagnosis and treatment. Logistical complexities posed by the Zambian correctional setting, including frequent inmate transfer and release, threaten to interrupt the HIV care continuum for HIV-positive inmates.

Title: Predatory Journals: A Threat to Health Research Dissemination in Zambia

Authors: Japhet Matoba[1]
1. Macha Research Trust

Background: Journals have their origin in 1867 when the Royal Society of London began cataloging scientific literature as a way of keeping track of scientific contributions. Although the catalogue was aimed at keeping track of publications, it soon became a measure of a scientist's academic contribution and subject mastery. Over time, these catalogues also began to serve the purpose of public accountability and good scientific conduct. Publication matrices and indexes such as the science citation index and journal impact factors came in to help prioritise the journals.

With the expansion of the internet and emergence of open access publications the number of journals and publications increased greatly. The drive to publish promptly combined with easy access online, however, has also lead to the rapid emergence of publishing houses that have used this to their advantage. A large number of on-line publications prey on scientists for financial profit through article processing charges. They may claim they publish articles in a given field quickly and with online access, yet fail to meet scholarly publishing standards, including rigorous review.

Methods: Using the criteria proposed by Beall and others, we reviewed emails received by staff at Macha Research Trust to determine what proportion were from publishing houses that fail to meet international scholarly standards. Based on our findings, we developed guidance on how Zambian scientists can identify predatory journals and carefully select which publishing bodies are legitimate. We also identified potential methods that a Zambian researcher and their institute may employ to avoid this scam, and identified institutions that legitimate Zambian journals and publishers can be affiliated with to improve their practice and global merit. Additionally, we suggest measures that can be implemented by regulatory bodies in Zambia to avoid scientists and research bodies falling for these scams.

Results
A review of recent emails received from scientific publishers revealed that 15 % of emails received in the past day were from journals that do not adhere to the publication code of conduct. In some cases as many as five spam emails were received in a day, soliciting manuscript submission, promise of rapid publication at lower fees and exposure to a large audience. Other examples of non-adherence to publishing standards include failure to archive all published content, no management of conflict of interest issues in articles, lack of peer review, no methods to handle errata or ensure transparency. In addition, these "journals" predominantly target authors from low and medium income countries such as Zambia, where awareness of such predatory activities may be low.

Conclusion: There is a need to safeguard Zambian scientists from exploitation through predatory publications which are on the increase. Possible mechanisms of doing this include the National Health Regulatory Authority (NHRA) at both institutional and individual scientist level. There should also be a concerted effort to ensure that local journals be schooled on how to operate to avoid mistakenly being categorized as predatory journals.

Title: Vaccine-related perceptions influencing demand in three compounds in Lusaka, Zambia

Authors: Anjali Sharma1, Chanda P. Mwamba[1], Miguel Pugliese Garcia[1], Leonard Heyerdahl[2], Chanda Mwamba[1], Sharon Nkwemu[1], Roma Chilengi[1], Rachel Demolis[2], Elise Guillermet[2]

1. Centre for Infectious Disease Research in Zambia (CIDRZ), 2. Agence de Médecine Préventive

Background: Inequities in achieving full immunization in Zambia suggest the need for demand-creation rooted in prevailing attitudes, norms and access to vaccines. While a few studies explain uptake of specific vaccines in Zambia, none provide insight into the overarching perceptions that guide peoples' decisions regarding getting vaccinated.

Methods: Nested within an oral cholera vaccination uptake study, we sought to understand overarching perceptions on vaccines' acceptability, utility, accessibility and preferences in three informal settlements in Lusaka. We conducted 48 focus group discussions with laypersons and community-based health actors (lay healthcare workers, neighbourhood health committees and vaccinators).

Results: All discussants expressed high acceptance, associating vaccines with improved overall child health, life-long protection, and modernity. Some labelled vitamins and medications (e.g., antiretroviral drugs) as vaccines, perhaps due to synonymous local terms and dual-purpose therapeutic agents (e.g., herbs). Elders influenced parental choice citing natural immunity and conversely, vaccine-acquired immunity that has reduced childhood diseases. People sought alternatives when medicine symbolized lack of faith (Satanism) or had negative western connotations. Negative past experiences with vaccines including adverse events fueled hesitancy. Though perceived as fast-acting, some refused injections to avoid pain and risk of infection. Discussants preferred mobile campaigns covering weekends and delivered by lay healthcare workers for incapacitated and working people, but found routine provision by health professionals more informative.

Conclusions: Though receptive, misunderstandings regarding purpose, effectiveness and duration, preference for alternative therapeutic agents may be limiting vaccination coverage in our study population. Discussants suggested factual communication by professionals and mobile delivery through trusted community sources to address unrealistic expectations and distrust of vaccines and improve overall access respectively. Research on interventions addressing hesitancy while considering communities preferences may provide further insight into how to reach high, equitable coverage in Lusaka.

Title: Sero-epidemiology of rubella in Zambia in the pre-vaccination period (2005 – 2016) as baseline for future evaluation of the impact of introduction of rubella national immunization program

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Background: Rubella is highly under reported in Zambia as in most sub-Saharan countries despite being a disease of major public health concern especially among women of childbearing age. In September 2016, Zambia introduced a combined measles-rubella vaccine in children aged 0-14 years. In this study, we estimate the rubella sero-prevalence cases and its correlates before the introduction of the national paediatric rubella immunization program in Zambia to provide baseline reference data for the future evaluation of its impact.

Methods: A retrospective study was conducted among suspected measles cases between 2005 and September 2016. Rubella IgM was determined on fever and rash samples (suspected measles cases) that tested negative for measles IgM under the national measles cased based surveillance program. Data on age, sex, province, year and month of onset were extracted from the surveillance data. Logistics regression analysis was conducted to determine independent predictors of rubella sero-prevalence. The magnitude of association was estimated using odd ratio at 95% confidence interval.

Results: Overall, a sero-prevalence of 29.2% (1313/4497) was detected. Sero-prevalence among the females was 30.8% compared to 27.7% among males (p=0.022). Age, province and year were independently associated with rubella infection. Those in the age groups 5-9, 10-14 and 15-24 years (AOR=1.973; 95% CI [1.66 - 2.34]), (AOR=2.43; 95% CI [2.01 - 2.95]) and (AOR=1.336; 95% CI [1.06 - 1.69]) were more likely respectively and those aged <1 year (AOR=0.31; 95% CI [021 - 0.48]) were less likely to have rubella compared to those aged 25 years or older. The prevalence of rubella infection was highest in October in the hot dry season. The highest prevalence was recorded in North-Western province (37.3%) and the lowest in Luapula (22.8%). Persons in 2010 were less likely AOR=0.12; CI [0.05, 0.28] to have rubella infection compared to those in 2016. While rubella infections were more likely to occur between July and November compared to December, they were less likely to occur between February and May.

Conclusion: There is evidence of rubella virus circulation in Zambia between 2005 and 2016 affecting persons mostly in the 10-14 years followed by those in 5 - 9 years age group. It is recommended that nationwide immunisation campaigns be targeted in months of lower virus transmission between February and May and in a situation of limited resources to those aged 5-24 years.

Title: A Streamlined ART Initiation Algorithm of Care reduces Time to ART Initiation

Authors: Izukanji Sikazwe[1], Samuel Bosomprah[1], Jake Pry[1,2], Mpande Mwenechanya[1], Anjali Sharma[1], Paul Somwe[1], Nancy Padian[3], Monika Roy[4], Carolyn Bolton[1,5], Charles Holmes[1,6], Elvin Geng[4]

1. Centre for Infectious Disease Research in Zambia (CIDRZ), 2. University of California Davis, 3. University of California Berkeley, 4. University of California San Francisco, 5. University of Alabama Birmingham, 6. Georgetown University

Background

Over the last two decades combination antiretroviral therapy (ART) has markedly reduced HIV associated morbidity and mortality and the benefits of early ART initiation that include delayed HIV associated events has been shown. However, multi-step ART initiation algorithms that include pre-treatment counseling, clinical and laboratory assessment may result in loss of patients between eligibility and treatment, thus eroding gains towards achieving the 90-90-90 targets. Although individual randomized trials show improved outcomes with accelerated ART initiation, the success of accelerated ART practices in real world settings is less understood.

We evaluated a revised ART initiation approach based on same-day readiness assessment and point of care CD4 assessment, among public facilities in Zambia as compared to standard of care (SOC) procedures including three pre-treatment counseling sessions.

Methods

The rapid treatment approach was implemented between March and July 2016 in two rural and two urban health facilities and assessed against 5 comparator facilities practicing SOC among ART naïve, treatment eligible patients and followed up for 12 months. Date of ART initiation was identified at first pharmacy record of ARV dispensation. Individuals eligible for study participation were defined as ART eligible for the first time, ART naïve, age ≥ 14 years, not acutely ill, and not pregnant. Demographic and clinical data on all patients were abstracted from patient charts. We estimated the average treatment effect on time-to-ART initiation using survival-time inverse-probability-weighted regression adjustment models.

Results

A total of 1,812 patients were included in the analysis, of which 358 were exposed to the intervention and 1,454 to SOC (Tables 1 and 2). 1,089 (60%) were female, 803 (44%) had at least secondary education, and only 53 (3%) were adolescents aged 14-19 years (Table 2). The median age of patients who received SOC was 33 years (IQR=27, 41) compared to 36 years (IQR=29, 43) who received the intervention (p=0.003) (Table 1). 894 (61%) female received SOC compared to 195 (54%) who received the intervention (p=0.001) (Table 1). 617 (42%) of patients who received SOC had at least secondary education compared to 186 (52%) who received the intervention (p=0.023) (Table 1). About half (49%) of patients who received the intervention had initiated ART within same day of eligibility compared to about one-sixth (17%) who received SOC (p<0.0001) (Table 1). There were more frequent ART initiation within the first 30 days among those who received the intervention compared to those who received SOC (Figure 1). After day 60, the frequency with which patients initiate ART were similar in both groups (Figure 1). When everyone in the population of HIV patients aged 14+ years is exposed to the intervention, the average time-

to-ART initiation was estimated to be about 91 days less than when patients are exposed to SOC (ATE=-91 (95%CI: [-131, -51]; p<0.0001) (Table 3)

Conclusion

Rapid ART initiation as part of routine care in public sector facilities can increase both the rate of ART initiation as well as overall completeness of uptake among treatment eligible patients. Ongoing expansion of treatment guidelines to include all persons living with HIV may be able to achieve greatest gains when coupled with rapid ART initiation practices, which should include CD4 determination to identify patients with advanced disease and at risk of increased morbidity and mortality.

Title: A decade of malaria surveillance using SMS mobile phone technology in a low transmission setting in Southern Zambia

Authors: Mukumba Lubinda[1], Mukuma Lubinda[1], Ben Katowa[1], Japhet Matoba[1], Caison Sing'anga[1], Harry Hamapumbu[1], Jennifer C. Stevenson[1,2], Clive Shiff[2], Philip E. Thuma[1,2], William J. Moss[1,2]

1. Macha Research Trust, 2. Johns Hopkins Malaria Research Institute

Background: Accurate and real-time reporting of malaria cases is vital for monitoring the impact of interventions and early detection of outbreaks in low transmission settings. However, resource scarcity limits such monitoring programmes in resource poor settings. Macha Research Trust (MRT) in Choma District, Southern Province, Zambia, in collaboration with the Johns Hopkins Bloomberg School of Public Health, began using mobile phone short message service (SMS) in April 2008 to transmit weekly malaria rapid diagnostic test results (RDTs) from 14 rural health centres (RHCs) within the Macha Hospital catchment area.

Methods: SMS reports from 2008 to 2018 were analyzed for the number of RDTs used, positive RDTs, and test positivity rate (TPR) as well as RDT stock outs. Time series and maps of malaria cases by RHC were generated to monitor trends in near real-time. To validate the data, SMS reports were compared with the RDT registers at each RHC during quarterly data quality checks and accuracy estimated by malaria transmission season and facility. Reported total RDT positives and total RDTs used in high and low transmission seasons were used as variables for measuring data accuracy. The error rate was given as: 1) the difference between SMS reported RDT positives; and 2) SMS reported RDT usage as a proportion of actual figures contained within RDT registers. RHCs with highest percentage error for both variables were regarded as having lower quality data than those with lower error rates.

Results: Inter-annual and seasonal variations in cases and TPRs were evident, with peaks between April and May and few positives between July and October. Since 2012, four RHCs recorded stock outs for at least one week during the high and three RHCs during the low transmission seasons. Despite a reduction in malaria cases from 2008 to 2015, there was a marked increase in 2016. The highest RDT positives recorded at Macha Hospital were in 2016 (272, TPR 16.2%) while fewer cases were reported in 2017 (201, TPR 10.8%%). During the study period, 2011 recorded the lowest number of cases (22, TPR 4.6%). Fifteen percent of the weekly SMS reports required corrections across the 14 RHCs. The percentage error was higher during high transmission season from November to June, (range 0.01% to 7.36%), than in the low transmission season from July to October, (0% to 5.62%). More corrections were made at facilities where the SMS data were managed by a community health worker, while fewest corrections were required where the nurse in-charge reported, regardless of transmission level.

Conclusions: The SMS surveillance program has effectively been used to report malaria cases in near real-time at weekly intervals in Macha. Accuracy of reports was 85% across the RHCs. Facilities with highly trained, paid staff had fewer data errors. Improvements in malaria case reporting in terms of accuracy and rapidity are essential to monitor progress in reducing the burden of malaria especially in areas targeted for elimination. Highly trained and motivated staff improve data quality and accurate reporting.

Title: Is Housing (Roofing) Quality Associated with Malaria Incidence? The Findings in Nchelenge, Luapula Province

Authors: Jay Sikalima[1], V. M. Daka[1], J. Chileshe[1], O. Namafente[1], R. Handema[1]
1. Tropicla Disease Research Centre (TDRC)

Background: The malaria vectors (mosquitoes) predominantly enter houses via open eaves. There is an unprecedented opportunity to design homes that keep malaria vectors out, ultimately reducing individuals' exposure to malaria parasites thereby mitigating the disease. A growing body of research evidence shows that improved housing reduces malaria transmission. We conducted a study in the Nchelenge in the Northern region of Zambia to assess the association of locally used roofing materials, namely corrugated roofing sheets and straw-thatch, on malaria incidence.

Methods: Individuals seeking medical care were screened by clinicians at the point of care facilities where those that got suspected of malaria and consented were recruited. A total of 282 participants had their blood drawn for malaria testing and responded to a questionnaire capturing social demographic data which included IRS records in last six months, ITN ownership, and type of wall, roofing and floor material. A standard multiple regression was applied on IRS record, ITN ownership, sex and type of roofing material in order to determine the relation between 3 predictor values and the out outcome.

Results: Sixty-four percent of the participants slept under straw-thatched houses while 34.8% had slept under roof made of Corrugated Iron Sheets. Two respondents did not answer this section. Malaria positivity by Real Time PCR for those that slept under corrugated iron sheets and straw thatched roofs were 55.1% and 68.1% respectively. Of all the variables that were analyzed, there was a statistically significant association between roofing material and malaria positivity (R2=4.49, p= 0.034). Individuals sleeping in corrugated roofing sheets were less likely to have malaria than those that slept under a straw thatched roof (OR=0.579, 95% CI: 0.349-0.960).

Conclusion: Malaria control and elimination in sub Saharan Africa is currently focused mainly on Indoor Residual Spraying, use of Insecticide Treated Bed Nets and case treatment as they present. Unfortunately, not much attention has been given to environmental strategies to malaria control. The association of malaria cases with straw thatched houses underscores an urgent need for further studies on the housing structures and redesigning of houses particularly, in zones of high transmission including Nchelenge District to reduce vector densities as part of environmental control towards malaria elimination.

Title: Evaluation of Smear Conversion Rates, Predictors of Smear Non-Conversion and Challenges of Tb Treatment Monitoring in the Absence of Routine Culture

Authors: Winnie Mwanza[1], Deborah Milimo[1], Maureen Moyo[1], Nkatya Kasese[1], Helen Ayles[1,2], Monde Muyoyeta[1]
1. ZAMBART

Background: It has been suggested that TB patients can be considered as being non-infectious two weeks after commencement of treatment. Validity of this suggestion has not been evaluated in Zambia. We report on the observed trends of sputum non-conversion rates after month 1 of treatment and predictors of sputum conversion failure at two primary Health care facilities in Lusaka Zambia

Methods: We enrolled a consented cohort of consecutive Xpert MTB Positive and 10% Xpert MTB negative individuals for treatment monitoring and quality assurance purposes respectively. The first sample was collected at Month 0 before treatment initiation to establish baseline Fluorescence Microscopy (FM) smear and MGIT culture result. Follow up samples were collected at month 1, month 2 and month 5 for treatment monitoring using FM.

Results: A total of 183 participants who had a positive culture and an Xpert rifampicin sensitive at month zero and submitted a specimen at all follow up time points were included in the analysis. Of these, 150 (82%) were smear positive while 33 (18%) were smear negative at baseline. Smear non-conversion rate was 51%, 27% and 4% at month 1, Month 2 and Month 5 respectively. True smear non-conversion when FM was compared to culture was 43%, 17% and 1% at month 1, Month 2 and Month 5 respectively. False positive smear results rate was 17%, 38% and 67% at month 1, Month 2 and Month 5 respectively. Smear grade was the only observed independent predictor of failure to convert after one month of treatment, adjusted OR 2.68 (95% CI) for every increase in smear grade.

Conclusion: When compared to culture, 43% and 17% of smear positive TB drug sensitive patients did not convert after 1 and 2 months of treatment. This shows that significant proportions of patients remain infectious for longer than previously thought and this could be contributing to ongoing transmission. Infection control precautions should be given to close contacts and should continue for at least 2 months into TB treatment and longer for patients with high grade smear results. In the absence of routine culture for treatment monitoring, close evaluation of clinical parameters should be considered for patient management decision making as some patients may remain falsely smear positive after 5 months of treatment

Title: Consenting and Ethical Approval for Post Mortem Studies in Zambia

Authors: Angel Cirwa[1], Magdalene Mwale[2], Charles Chimoga[2], Gertrude Munanjala[2], Benard Ngoma[2], Victor Mudenda[2], Lawrence Mwananyanda[2,3]

1. The University of Zambia- School of Medicine, 2**.** Right to Care, 3. Boston University

Background: Post mortem biological tissue sampling can potentially increase the sensitivity of investigations to identify causative pathogens in pneumonia and can confirm or dispute ante mortem diagnosis. Despite Zambia recording the highest mortality on the recent large multi country Pneumonia Etiology Research for Child Health (PERCH), ethical approval to conduct fine lung tissue autopsies for the deceased children was denied.
The Zambia Pertussis/RSV Infant Mortality Estimation study (Z-PRIME) was then subsequently designed with the purpose of answering the research question: what proportion of deaths among infants <6months of age can be attributed to infection with either Bordetella pertussis or Respiratory Syncytial virus?

Methods: ZPRIME is a prospective, non-invasive post mortem study with a projected sample size of 4000 to be collected over 3.5 years. Experienced nurses and clinical officers, are engaged to provide grief counselling, obtain consent from the bereaved parents/guardians and collect nasopharyngeal swabs from the deceased infants.
Ethical approval was granted with a caveat to pause and review the study pilot after enrolling 50 participants because the assumption was that the consenting process would be traumatic to the grieving family.

Results: Pilot enrolment of the 50 infants from 4th August 2017 to 9th September 2017 had an 81% consent rate contrary to the 20 to 50% consent rate that was anticipated. The Ethics committee therefore gave approval for the study to continue. Earlier full post mortem studies in Zambia had a consent rate of 20%.
By 23rd March, 350 participants have been enrolled and the consent rate remains high at 82%. The main reasons for refusal included religion, time constraints and anger towards medical personnel. Muslims bury very quickly after death., Some people were in a hurry to bury to meet traditional demands and or to evade financial pressure. Other relatives were angry at medical personnel citing negligence as a cause of death and refused to consent on this basis.

Conclusions: The denial to grant permission to conduct post mortems on PERCH on the premise that that this would cause undue stress on grieving parents may not be correct., There are several reasons why the consenting on ZPRIME may have been successful. The counsellors are very experienced and received formal training in grief counselling prior to the study. The utilization of a secondary guardian as an option to consent may also have played a role as they may be less destressed when compared to the parents. The most comprehensive post-mortem study of the etiology of respiratory illnesses in children by Chintu et al led to informed policy and treatment guidelines at the World Health Organisation to include Septrin for prophylaxis of pneumocystis jirovecii pneumonia which was found in 27.5% of chest autopsies done. Given the advancement in laboratory molecular diagnostic techniques since the Chintu study and high consent rate demonstrated by the ZPRIME, we recommend that post-mortem studies that meet ethical standards be encouraged and approved.

Title: Is zero really zero? Molecular surveillance in areas approaching malaria elimination in Southern Province, Zambia

Authors: Mulenga Mwenda-Chimfwembe[1], Conceptor Mulube[1], Sandra Chishimba[1], Brenda Mambwe[1], Hawela Moonga[2], Busiku Hamainza[2], Kafula Silumbe1, Michael Hainsworth1, Ruben Conner1, Jeff Bernson[1], Gonzalo Domingo[1], Sampa Pal[1], Maria Kahn[1], Caterina Guinovert[1], Chris Drakeley[3], Rick Steketee[1], John M. Miller[1], Daniel J Bridges[1]

1. PATH-MACEPA, 2. Ministry of Health- Zambia, 3. London School of Hygiene & Tropical Medicine

Background: Malaria prevalence in children under the age of five has dramatically declined in Southern Province from 5.7 % in 2010 to 0.6 % in 2015. Encouraged by this, the Zambian Ministry of Health, in collaboration with its partners, is targeting malaria elimination. Within Southern Province, a number of health facility catchment areas (HFCA) have reported <10 local cases of malaria, i.e. those without a history of travel, in the last two years. To confirm that these limited cases reflect overall transmission intensity, rather than an issue with diagnostic or surveillance sensitivity, a study was conducted in five health facilities. This study aimed to (i) determine the prevalence of malaria using real time-based PCR technique, (ii) to estimate the sero-prevalence of malaria in areas that are approaching zero transmission and (iii) to determine the effect of the decline of malaria transmission on the parasite population genomics using the 24 SNP barcode.

Methods: A total of 1560 individuals from five HFCAs were enrolled in the study through either a random community population sample or a convenience sample of suspected malaria cases at the clinic. Each individual was tested with an RDT as well as a microscopy slide and dried blood spots (DBS) collected. DNA was extracted from the DBS using a QIAamp DNA mini kit and tested for the presence of Plasmodium DNA by PET-PCR. RDT or PET-PCR positive samples were pre-amplified and then genotyped using the 24 SNP barcode. Antibodies were eluted from DBS into a PBS solution and tested in duplicate for the presence of Pf AMA1 and MSP1 using a standard ELISA.

Results: A total of 9 individuals tested positive by RDT (0.57%), of which 2 were from the community sample and 7 from the HFCA sample. Only 1 HFCA sample was found positive by microscopy (0.06%). Three DBS (1 community, 2 HFCA) were found positive by PET-PCR (0.19%). Genotyping of the positive samples is underway. Genetic diversity and complexity of infection will be estimated and compared to historical samples from the same areas as well as other populations within Zambia that have markedly different incidence. Serological analysis is also underway for all samples. Results will be fitted to a reverse catalytic conversion model to look for age-related seroprevalence changes.

Conclusion: Microscopy, RDT and PCR results all strongly suggest that prevalence in the HFCAs studied concurs with the low incidence reported through the health surveillance system and is approaching elimination. It is expected that genotyping of the few infections identified will exhibit a low complexity of infection and low genetic diversity in comparison to higher incidence regions. Similarly, we expect the serology to demonstrate a marked decrease in seroconversion as a function of age, demonstrating the reduction in transmission intensity.

Title: High Insecticide Resistance and Parasite Infection Rates in Major Vectors of Malaria: Implications for Malaria Elimination Programme in Luapula Province of Zambia

Authors: Javan Chanda[1,2], Keith Mbata, Mulenga Musapa, Foustina Phiri, Mulenga Mweenda, Mulakwa Kamuliwo, Clive Shiff, Douglas E. Norris
1. PATH, 2. The University of Zambia

Background: The effectiveness of Indoor Residual Spraying (IRS) and Long-Lasting Insecticidal Nets (LLINs) in malaria control programmes depends largely on the susceptibility of Plasmodium vectors to chemical insecticides. However, the emergence of insecticide resistance is undermining the protective efficacy of these interventions. This study was conducted to monitor and update insecticide resistance status and sporozoite infection rates of Anopheles funestus sensu lato and Anopheles gambiae sensu lato in Luapula Province of Zambia.

Methods: Indoor resting blood-fed and gravid mosquitoes were collected from 20 houses per site using Centre for Disease Control (CDC) backpack aspirator between 04:00 to 06:00 hours in February and March 2014. The non-blood fed, 2-5-days F1 generations of An. funestus s.l. and An. gambiae s.l. were exposed to the pyrethroid; 0.05% deltamethrin, the carbamate; 0.1% bendiocarb, the organophosphate; 0.25% pirimiphos-methyl and the organochlorine; 4.0% dichloro-diphenyl-trichloroethane (DDT) according to the World Health Organization (WHO) standard protocol. A synergist; piperonyl butoxide (PBO) was used to identify metabolic resistance in An. funestus s.l. and An. gambiae s.l. populations. Enzyme-Linked Immunosorbent Assay (ELISA) was conducted to detect Plasmodium falciparum (P.f) sporozoite in mosquitoes while the species of An. funestus group and An. gambiae complex were determined by Polymerase Chain Reaction (PCR).

Results: The study revealed that populations of An. funestus s.s. were resistant to 0.05% deltamethrin and 0.1% bendiocarb but remained 100% susceptible to both 4.0% DDT and 0.25% pirimiphos-methyl. In addition, populations of An. gambiae s.s were resistant to three insecticide classes; 0.05% deltamethrin, 0.1% bendiocarb and 4.0% DDT but highly susceptible to 0.25% pirimiphos methyl in Luapula Province. The pre-exposure of An. funestus sensu stricto to PBO nullified high pyrethroid (deltamethrin) and carbamate (bendiocarb) resistance in all the study sites, indicating the involvement of P450s monooxygenases. Nonetheless, the use of PBO had limited or no effect on the resistance status of An. gambiae s.s. populations to DDT and suggesting probably the presence of target site mechanisms. Overall Plasmodium falciparum sporozoite rate in An. funestus s.s. population was 7.7% (n = 547) while An. gambiae s.s. had 8.5% (n=211) across the study areas of Luapula Province.

Conclusion: The detection of high sporozoite rates coupled with high resistance in An. funestus s.s. and An. gambiae s.s. populations may signify failure of LLINs in Luapula Province. To reduce malaria burden in Luapula Province, the use of new generation nets; PermaNet® 3.0 and Olyset® Plus are highly advocated for malaria control and elimination. The rotational use of DDT and pirimiphos-methyl for IRS remain the best options for sustained malaria vector control and elimination in Luapula Province of Zambia.

Title: Hepatitis B Virus (HBV) Functional Cure Among Art-Treated HIV-HBV Coinfected Zambian Adults

Authors: Belinda Varaidzo Chihota[1], Zude Zyambo[1], Roma Chilengi[1], Mutinta Natala[2], Llyod Mulenga[3], Gilles Wandeler[4] and Michael Vinikoor[1,2,5]

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Background: Co-infection with chronic Hepatitis B Virus (HBV) affects an estimated 2.7 million individuals living with HIV, and 71% (1.96 million) of HIV-HBV co-infected people are living in sub-Saharan Africa (SSA). In SSA, there is limited data on serologic and virologic outcomes during Tenofovir-based antiretroviral therapy (ART). We assessed HBV functional cure in a cohort of HIV-HBV co-infected adults in Zambia.

Methods: A prospective cohort of HIV-HBV co-infected adults was established at two public sector outpatient primary care facilities in Lusaka, Zambia. Any HIV-infected patient aged 18+ years, ART naïve, HBV co-infected defined as a single positive HBsAg test (either by Alere Determine HBsAg or serology) and eligible to initiate treatment under national guidelines, met the criteria to join the study. Baseline and routine HBV viral load, Hepatitis B surface antigen (HBsAg), CD4+ cell count and demographic data were collected at study visits. We used multivariate logistic regression models to assess baseline and on-treatment clinical correlates of HBV DNA suppression (HBV DNA <20 IU/ml) and HBsAg loss at > 2 years on treatment.

Results: From October 2013 – August 2017 we enrolled 358 HIV-HBV co-infected adults in our study, with median age 33 years (Interquartile range [IQR] 28-39 years). From our main analysis we excluded 37 patients who had less than 1 year follow-up and 25 (9.3%) who were missing critical clinical data. Among 242 patients, 94 (38.8%) were women, and median CD4+ count was 204 cells/mm3 (IQR 99-341). Out of 102 patients with quantifiable HBV DNA at baseline (i.e. >20 IU/ml), 122 (85.2%) achieved HBV viral suppression by 2 years on treatment. For every log10 IU/ml increase in baseline HBV DNA, patients were 29% less likely to suppress (OR: 0.71, 95%CI 0.56-0.90, P-0.00). Over an average of 2 years of observation we documented 32 (13.2%) episodes of HBsAg loss. Patients with a lower CD4+ count <200 cells/mm3 were nearly 2 times as likely to clear HBsAg compared to patients with higher CD4+ count (OR: 1.92, 95%CI 0.80-4.74, P-0.14).

Conclusion: The majority of patients achieved HBV viral suppression at 2 years and higher functional cure rate was observed than documented in HBV mono-infected groups. This supports the effectiveness of TDF-based ART. We conclude that further investigations are necessary to understand immunological factors driving higher HBsAg loss rates in certain groups, and that these results will have great clinical and public health implications.

Title: Profiling Bionomics of Malaria Vectors along Lake Kariba in Southern Province of Zambia: Implications for Malaria Control and Elimination Programme

Authors: Javan Chanda[1], Kochelani Saili[1], Mulenga Mweenda[1], Jimmy Sakala[1], Chishimba Kaputo[1], Conceptor Mulube[1], Brenda Mambwe[1], Sandra Chishimba[1], Busiku Hamainza[2], Elizabeth Kawesha-Chizema[2], Jennifer Stevenson[3,4], John. M. Miller[1]
1. PATH MACEPA, 2. MOH- National Malaria Elimination Centre, 3. Macha Research Trust, 4. Johns Hopkins University

Introduction: Malaria is a public health challenge in sub-Saharan Africa. In Zambia, the national malaria elimination programme (NMEP) has an ambitious goal of eliminating malaria by 2021. Long-lasting insecticidal nets (LLINs) and indoor residual spraying (IRS) are being scaled up countrywide to target the blood-sucking malaria transmitting mosquitoes. However, the effectiveness of LLINs and IRS requires thorough understanding of vector species composition, abundance, infection rate, insecticide resistance, biting and resting behaviour of local vectors of malaria. This study investigated the bionomics of malaria vectors in study areas targeted for malaria elimination along Lake Kariba of Southern Zambia.

Methods: Mosquito collections were conducted from 2014 to 2016 in 12 study sites using CDC light traps, pyrethrum spray catch, back pack aspirators and human landing catches in defined houses. Females unfed, 2-4 days old of An. gambiae s.l. and An. funestus were exposed to WHO insecticide treated papers; 0.05% deltamethrin, 0.1% bendiocarb, 4% DDT and 0.25% pirimiphos methyl. All mosquitoes collected were morphologically identified under a dissecting microscope. Parasite infection in Anopheles mosquitoes was detected by ELISA and sibling species of An. gambiae s.l. and An. funestus group were identified by PCR.

Results: The study revealed the presence of An. funestus and An. arabiensis are the main vectors of malaria along Lake Kariba. With increased IRS coverages in the study areas, the abundance of An. funestus reduced from 95.4% (n=6,011) in 2014 to 12.2% (n=445) in 2016 while populations of An. gambiae s.l increased from 2.4% (n=154) in 2014 to 81.7% (n=1907) in 2016. Both An. funestus (80%) and An. gambiae s.l. (68%) were found resting indoors. Biting profiles of An. funestus changed from endophagic (0.546) in 2015 to exophagic (0.633) in 2016. High exophagic rates were observed in An. arabiensis and secondary vectors during the study period. Populations of An. funestus and An. arabiensis were to deltamethrin and bendiocarb but remained 100% susceptible to DDT and pirimiphos methyl in 2015. In 2016, populations of An.arabiensis showed restoration of susceptibility to a bendiocarb.

Conclusion: The increase in outdoor biting of mosquitoes and high pyrethroid resistance will increase residual transmission of malaria. High coverages of IRS contributed to the restoration of carbamate susceptibility in An. arabiensis and the suppression of An. funestus abundance. Continuous monitoring of vector bionomics is critical towards planning and selection of vector control strategies.

Title: Monitoring Parasite Infection Rates in field Mosquitoes using Molecular Tools in Areas Targeted for Malaria Elimination, Southern Zambia

Authors: Conceptor Mulube[1], Brenda Mambwe[2], Kochelani Saili[2], Sandra Chishimba[2], Daniel Bridges[2], Busiku Hamainza[3], John Miller[2], Mulenga Mwenda[2] and Javan Chanda[2]
1. PATH, 2. PATH MACEPA, 3. MOH-National Malaria Elimination Centre

Background: Malaria remains a public health challenge in Zambia and about 98% of the infections are caused by Plasmodium falciparum. Three vector species; Anopheles gambiae s.s, An. arabiensis and An. funestus transmit malaria to humans in Zambia. To measure the degree of parasite infections in field mosquitoes, several protocols that have been developed; microscopic dissections, enzyme-linked immunosorbent assay (ELISA) and polymerase chain reaction (PCR). This study investigated the effects of implementing community-mass drug administration (cMDA) on Plasmodium falciparum infection rates in wild caught mosquitoes in Siavonga, Gwembe, Kalomo and Sinazongwe of Southern Zambia.

Methods: Indoor host seeking mosquitoes were collected in ten randomly selected houses using miniature CDC light traps (John. W. Hook co) from September 2014 to December 2016. A random sub-sample of 100 mosquito species were selected from two control (no cMDA) and two intervention (fMDA) and (cMDA) study areas arms in Southern Zambia. The wild caught mosquitoes were screened for the presence of P. falciparum Circum-sporozoite in the salivary glands using enzyme-linked immunosorbent assay (ELISA) and confirmed by polymerase chain reaction (PCR).

Results: Preliminary results of 2014 demonstrate that parasite prevalence rates in mosquito populations reduced in intervention sites (3/100) than control sites (5/100). In 2015, high parasite prevalence between two intervention study arms was observed in focalized MDA (4/100) than in community MDA (0/100) study areas. The overall species-specific infection prevalence was highest in An. funestus (12/400) than An. arabiensis (1/400) or other vectors species. However, so far no trace of positivity were recorded in the secondary vectors; An. coustani and An. rufipes. Sample analysis on other secondary vectors is ongoing.

Conclusion: The molecular results suggest that community MDA reduced parasite prevalence rates in Anopheles mosquitoes than in focalized MDA and control study areas. To eliminate malaria in the study areas, simultaneous deployment of community-MDA and IRS would provide additive impact on parasite suppression at the community level in Southern Province of Zambia.

Title: Evaluating the impact of Indoor Residual Spraying on malaria vector species Composition and Abundance along lake Kariba of Southern Zambia

Authors: Brenda Mamwbwe[1], John Miller[1], Daniel Bridges[1], Conceptor Mulube[1], Sandra Chishimba[1], Kochelani Saili[1], Busiku Hamainza[2], Mulenga Mwenda[1], and Javan Chanda[1]
1. PATH MACEPA, 2. MOH-National Malaria Elimination Centre

Background: In the last decade, Insecticide Treated Nets (ITNs) and Indoor Residual Spraying (IRS) have been scaled up for malaria Control and Elimination in Zambia. The household ownership of ITNs increased from 37.8% in 2006 to 77% in 2015 while IRS at district level rose from 5 districts in 2005 to 85 districts in 2015. Insecticide treated nets target indoor night biting mosquitoes while IRS is effective at indoor resting mosquitoes. Nonetheless, rapid scaling up of both ITNs and IRS for mosquito control and malaria elimination have facilitated changes in mosquito abundance, species composition, insecticide resistance, biting and resting behaviour of local mosquitoes. This study investigated changes on vector species composition and blood meal sources before and after IRS deployment in Siavonga, Gwembe, Sinazongwe and Kalomo districts of Southern Zambia.

Methods: Adult mosquitoes were collected from three to ten randomly selected houses using Pyrethrum Spray Catches (PSC), Centers for Disease Control and Prevention (CDC) light traps and human landing catches (HLCs) between 2014 and 2016. Mosquitoes were morphologically identified using taxonomic keys and classified based on abdominal stages. A random subset of 100 wild caught mosquitoes from 2014 to 2016 samples was selected before and after IRS for molecular species identification using multiplex and Second Internal Transcribed Spacer Region Polymerase Chain Reaction (PCR). Blood meal analysis was conducted using either Enzyme-Linked Immunosorbent Assay (ELISA) or blood meal PCR.

Results: As a percentage of captured malaria vector species, Anopheles funestus abundance decreased from 95.4% (n=6,011) in 2014 to 12.2% (n=445) while populations of An. gambiae s.s increased from 2.4% (n=154) to 81.7 (n=1907). In 2014, PCR results confirmed the presence of An. funestus s.s (98%) and An. rivolurum (2%) from the An. funestus group while An. arabiensis (94%), An. gambiae s.s (1%) and An. quadriannulatus (3%) as members of An. gambiae complex. In 2015, only An. arabiensis (98%) and An. quadriannulatus (2%) were detected in the study areas. In 2016, mosquito samples are currently being processed. These changes in vector abundance are largely thought due to changes in ITN and IRS coverage and the rotation to a novel insecticide, pirimiphos methyl 300 CS, for IRS.

Conclusion: Preliminary results of this study suggests that vector control activities, including fresh deployment of ITNs and IRS reduced endophilic An. funestus s.s and An. gambiae s.s than exophilic An. arabiensis and An. quadriannulatus. Monitoring and evaluation of vector species composition is critical for effective planning and selection of vector control strategies for improved malaria control.

Title: Increase in outdoor biting in primary and potential secondary vectors- possible implications on malaria elimination

Authors: Kochelani Saili[1], Javan Chanda[1], John M. Miller[1], Elizabeth Kawesha-Chizema[2], Busiku Hamainza[2]
1. PATH MACEPA, 2. National Malaria Elimination Centre

Background: Through the National Malaria Elimination Program (NMEP), the Zambian government has set the ambitious goal of eliminating malaria by the year 2021. To mitigate the malaria burden, Zambia's Ministry of Health has from the early 2000s, successfully scaled up malaria vector control interventions including mass distribution of long lasting insecticide-treated nets (LLINs) and targeted indoor residual spraying (IRS). The success of both methods depends on robust entomological surveillance. This study reports on implications of the increased outdoor biting in both primary and potential secondary vectors along areas earmarked for malaria elimination in Southern province.

Methods: This study was conducted in the rural areas of Sinazongwe and Siavonga districts southern Zambia. Indoor and outdoor mosquito foraging behavior was evaluated using Centers for Disease Control (CDC) light traps set in 20 houses per sentinel sites. Outdoor traps were set near outdoor kitchens or dining area where the household were known to spend most of their evening. Indoor resting densities were collected monthly using pyrethrum spray catches (PSC). To understand mosquito feeding behavior, paired indoor and outdoor human landing catch (HLC) collections were performed in three of the sentinel sites using three houses. Collections were made between February-April and September-November, 2017 in order to collect dry and wet season data.

Results: A total of 2,681 female Anopheles mosquitoes were caught primarily from indoor and outdoor light traps and from Pytherum Spray Catches. Of these, 61% (n=1629) were identified as species previously described as vectors of malaria in the study areas (An. gambiae s.l. and An. funestus s.l.) using the standard morphologic key for sub-Saharan species. The remaining 39% (n= 1,052) were composed of species not generally associated with malaria parasite transmission namely, An. rufipes, An. coustani s.l., An. pretoriensis and An. implexus. The majority of these were of the species An. pretoriensis (n=812; 30%). This is a slight increase from what has been observed in the two previous years of entomological monitoring.
A total of 1,073 mosquitoes, made up mainly of An. funestus s.l. (n= 859; 80.1%) and An. gambiae s.l. (n= 183, 17%) were captured by the Human Landing Catch method. Analysis of biting times for An. gambiae s.l. show that most biting took place outdoor (62%) during early evenings with human biting rates ranging from 0.139 to 0.5 bites/person/day. There was no significant difference in the outdoor verses indoor biting rates in An. gambiae s.l. ($t=0.1486$, $p>0.05$). Similarly, An. funestus s.l. was observed biting humans predominantly outdoors (65%) and mainly between 18:00 and 22:00hrs There was no significant difference in the outdoor verses indoor biting rates in An. funestus ($t=0.405$, $p>0.05$). In this study, human biting rates for An. funestus s.l. ranged from 0.377 to 0.411 bites/human/day.

Conclusion: The high biting rates seen in An. funestus and An. gambaie s.l. confirm these two species as the primary vectors of malaria in the study areas. This study also documents the presence and diversity of potential secondary vectors such as An. coustani, An. pretoriensis, An. rufipes and

An. squamosus which could be important in sustaining residual malaria transmission after eliminating the endophilic and endophagic vectors with indoor control measures (e.g. IRS and LLINs). Recent information from other studies within the country reveal that An. coustani, An. rufipes and An. pretoriensis have the ability to be infested with Pf sporozoites. The heterogeneity in the biting pattern of mosquitoes in the study area suggests that malaria transmission may be predominantly taking place outdoors and in the early evenings by both An. gambiae s.l. and An. funestus. The presence of the secondary vectors should serve as a red flag in malaria elimination programs as these may possess the latent ability to be epidemiological important malaria vectors whilst control efforts are set solely on the primary vectors. Evidenced outdoor biting should move malaria elimination programs to develop interventions that will target both indoor and outdoor vectors.

Title: Comparison of Indoor and Outdoor Collection of Anopheline Mosquitoes in Macha, Southern Zambia

Authors: Limonty Simubali[1], Twig Mudenda[1], Ben Katowa[1], Michael Musonda[1], Harry Hamapumbu[1], Phil Thuma[1,2], William Moss[1,2], Douglas Norris[2], Jennifer Stevenson[1,2]
1. Macha Research Trust, 2. Johns Hopkins Bloomberg School of Public Health

Background: Malaria prevalence by RDT has decreased to about 1% in the catchment area of Macha Hospital, in Southern Province, Zambia. The main malaria vector in the area is Anopheles arabiensis, with transmission likely also maintained by secondary vectors such as An. squamosus. Although cases are found in the dry season, malaria transmission is highly seasonal. An. arabiensis is present indoors from November to May mainly during the rainy season while other outdoor anopheline species are present all year round. This study aimed to compare the number and species composition of anopheline mosquitoes collected from indoor and outdoor traps in Macha and thus determine whether outdoor malaria transmission may contribute to maintaining malaria throughout the year.

Methods: This study was conducted in 141 households within a 40 km radius of Macha hospital from January to December 2016. Monthly collections were made from index case households and their neighbors that were identified from a reactive test and treat program (Step D) that is ongoing in Southern Province. CDC light traps were set both indoors next to occupied bed nets and outdoors next to animal enclosures from 18:00 to 06:00. Mosquitoes caught were identified at Macha Research Trust morphologically and confirmed by PCR. Circumsporozoite ELISAs and real time PCR were used to determine parasite infectivity. PCR for host DNA extracted from fed mosquitoes was used to determine host preferences.

Results: This study confirmed that the primary vector, An. arabiensis, was mostly found during the rainy season and was the predominant species from indoor collections comprising more than 80% of catches. Other anopheline species were found outdoors throughout the year in the Macha area. Outdoor collection numbers were almost two-fold that of indoor collections. Outdoors, An. squamosus and An. rufipes were the predominant species, with 35% and 21% of anophelines caught being of these two species, respectively. Infectious Plasmodium falciparum sporozoites were detected in An. arabiensis indoors and in An. squamosus and An. rufipes outdoors. Specimens from all three species showed some level of human blood feeding, ranging from 7 to 60%.

Conclusion: In the Macha area, the primary indoor vector, An. arabiensis, is still found predominantly in the rainy season and demonstrates the same endophagic and anthropophilic behaviors that have been documented for the area. Additional anopheline species are found outdoors next to animal shelters throughout the year. The finding of infectious human malaria parasites in these mainly exophagic species, not traditionally associated with malaria transmission in the area, and evidence of human blood feeding, suggests that these potential secondary vectors may be critical for maintaining transmission in this pre-elimination zone. More detailed studies are required to describe their behaviors and assess their relative roles in malaria transmission.

Title: Zambia National Malaria Indicator Survey 2018: monitoring progress toward strategic malaria elimination targets

Authors: Busiku Hamainza[1], Elizabeth Chizema Kawesha[1], Anthony Yeta[1], Hawela Moonga[1], Mercy Mwanza Ingwe[1], Freddie Masaninga[2], Maya Fraser[3], Daniel Bridges[3], Kafula Silumbe[3], John M. Miller[3]

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Background: The Ministry of Health with support from partners has developed an ambitious plan to eliminate malaria in Zambia. Monitoring progress toward national and international malaria indicators is necessary to benchmark progress and make course corrections during the period of implementation of the national malaria strategic plan. National Malaria Indicators Survey (MIS) have long been used by the malaria programme in Zambia to assess the coverage of key malaria interventions and malaria-related burden. The results from the 2018 Zambia MIS will be presented to benchmark progress for the malaria programme compared to previous national MISs and Demographic and Health Surveys (DHSs).

Methods: The Zambia MIS is a nationally representative, cross-sectional household survey designed to measure changes in malaria parasite prevalence based on microscopy and RDTs (SD Bioline)and key malaria intervention coverage indicators. Households are selected through a two-stage process, first through selection of standard enumeration areas (SEAs) from the latest census sampling frame based on survey design parameters, and second through re-listing and random selection of households at cluster level. A household and a women's questionnaire are used to assess standard questions on malaria indicators. Children under age 5 years are asked to take finger sticks to test for malaria by thick smear and rapid diagnostic test.

Results: The survey field work will be concluded by May 2018 and indicators related to coverage of malaria prevention and treatment will be presented. Key indicators include household availability and use of insecticidal treated mosquito nets, indoor residual spraying, antimalarial treatment for fever, access to care at facility and community level, knowledge and awareness of health and malaria communications and related issues. Malaria parasite and anemia prevalence for children under age five years will be presented. Results will be compared to previous MISs and DHSs conducted in Zambia.

Conclusion: Standardized households surveys such as the MIS provide a critical source of information to benchmark malaria intervention coverage and malaria-related burden progress in achieving national strategic targets for malaria elimination and evidenced-based guidance to planning.

Title: Prevalence of rheumatic heart disease in Zambian school children

Authors: John Musuku[1], Mark Engel[2,3], Patrick Musonda[4], Joyce Chipili Lungu[1], Elizabeth Machila[1], Sherri Schwaninger[5], Agnes Mtaja[1], Evans Mulendele[1], Dorothy Kavindele[1], Jonathan Spector[5], Brigitta Tadmor[5], Marcelo Gutierrez[5], Joris Van Dam[5], Laurence Colin[5], Aidan Long[6], Mark C. Fishman[7], Bongani M. Mayosi[2,3], and Liesl Zühlke[2,3]

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Introduction: The large global burden of rheumatic heart disease (RHD) has come to light in recent years following robust epidemiologic studies. As an operational research component of a broad program aimed at primary and secondary prevention of RHD, we sought to determine the current prevalence of RHD in the country's capital, Lusaka, using a modern imaging-based screening methodology. In addition, we wished to evaluate the practicality of training local radiographers in echocardiography screening methods.

Methods: Echocardiography was conducted on a random sample of students in 15 schools utilizing a previously validated, abbreviated screening protocol. Through a task-shifting scheme, and in the spirit of capacity-building to enhance local diagnostic and research skills, general radiographers based at Lusaka University Teaching Hospital (UTH) were newly trained to use portable echocardiography devices. Students deemed as screen-positive were referred for comprehensive echocardiography and clinical examination at UTH. Cardiac abnormalities were classified according to standard World Heart Federation criteria.

Results: Of 1,102 students that were consented and screened, 53 students were referred for confirmatory echocardiography. Of those, three students had definite RHD, ten had borderline RHD, and 29 were normal. Eleven students were lost to follow-up. The rates of definite, borderline, and total RHD were 2.7 per 1,000, 9.1 per 1,000, and 11.8 per 1,000, respectively. Anterior mitral valve leaflet thickening and chordal thickening were the most common morphological defects. The pairwise kappa test showed good agreement between the local radiographers and an echocardiographer quality assurance specialist.

Conclusion: The prevalence of asymptomatic RHD in urban communities in Zambia is on par with that reported in other sub-Saharan African countries. Task-shifting local radiographers to conduct echocardiography was feasible. The results of this study will be used to inform ongoing efforts in Zambia to control and eventually eliminate RHD.

Title: Facility Readiness for Emergency Obstetric and Newborn Care at Rural Health Centers in Zambia: A Time-Series Analysis

Authors: Elizabeth Henry[1], **Thandiwe Ngoma[2]**, Jeanette Kaiser[3], Kathleen McGlasson[3], Davidson H. Hamer[3], and Nancy Scott[3]
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Background: Health facility readiness to provide basic emergency obstetric and newborn care (BEmONC) is a critical supply-side factor to reduce maternal and neonatal morbidity and mortality in low resource settings. Over one year, we measured the monthly capacity of rural health centers in Zambia to perform the seven core BEmoNC signal functions to identify trends in performance and opportunities for improvement. This is the first known time-series assessment of signal function capacity in a rural context.

Methods: We conducted a monthly health facility survey between October 2016 and September 2017 at 20 health facilities in Southern and Eastern Provinces as part of an intervention trial testing the impact of maternity waiting homes. The survey elicited information on readiness to perform each signal function both when indicated and not during the previous month. We also identified the top reasons for lack of readiness.

Results: On average, 2.3 signal functions (range 1.3-3.5) were performed per month across all facilities. On average, facilities performed or were ready to perform 5.8 (range of 4.9-6.2) signal functions. There were no statistically significant time trends or shifts in the time-series data for total signal function capacity in this time period. The signal functions most often performed were administration of oxytocin, parenteral antibiotics, and newborn resuscitation. The signal functions that were routinely not able to be performed regardless of indication included assisted vaginal delivery, removal of retained products, and removal of the placenta. The primary reason for not performing a signal function was because it was not indicated. Other key reasons for not being able to perform functions included insufficient training or perceived preparedness, and supply or equipment challenges.

Conclusion: Rural health centers in Zambia routinely perform 2-3 BEmONC signal functions involving the administration of drugs intended to reduce bleeding and minimize infection, and newborn resuscitation. With the exceptions of assisted vaginal delivery and removal of products and placenta, facilities report readiness to perform the remaining signal functions, but do not often need to perform them. To ensure facility staff are sufficiently prepared to manage complications, training on functions they cannot perform is essential, as is refresher training or mentorship on those they report intending to perform but consistently do not.

Title: Artemisinin-based combination therapy in pregnant women in Zambia: efficacy, safety and risk of recurrent malaria

Authors: Michael Nambozi[1], J. Bertin Kabuya[1], Sebastian Hachizovu[1], David Mwakazanga[1], Joyce Mulenga[1], Webster Kasongo[1], Jozefien Buyze[2], Modest Mulenga[1], Jean-Pierre van Geertruyden[3], Umberto D'Alessandro[4]

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Background: In Zambia, malaria is one of the leading causes of morbidity and mortality, especially among under five children and pregnant women. For the latter, the World Health Organization recommends the use of artemisinin-based combination therapy (ACT) in the second and third trimester of pregnancy. In a context of limited information on ACT, the safety and efficacy of three combinations, namely artemether-lumefantrine (AL), mefloquine-artesunate (MQAS) and dihydroartemisinin-piperaquine (DHAPQ) were assessed in pregnant women with malaria.

Methods: The trial was carried out between July 2010 and August 2013 in Nchelenge district, Luapula Province, an area of high transmission, as part of a multi-centre trial. Women in the second or third trimester of pregnancy and with malaria were recruited and randomized to one of the three study arms. Women were actively followed up for 63 days, and then at delivery and 1 year post-delivery.

Results: Nine hundred pregnant women were included, 300 per arm. PCR-adjusted treatment failure was 4.7% (12/258) (95% CI 2.7-8.0) for AL, 1.3% (3/235) (95% CI 0.4-3.7) for MQAS and 0.8% (2/236) (95% CI 0.2-3.0) for DHAPQ, with significant risk difference between AL and DHAPQ ($p = 0.01$) and between AL and MQAS ($p = 0.03$) treatments. Re-infections during follow up were more frequent in the AL (HR: 4.71; 95% CI 3.10-7.2; $p < 0.01$) and MQAS (HR: 1.59; 95% CI 1.02-2.46; $p = 0.04$) arms compared to the DHAPQ arm. PCR-adjusted treatment failure was significantly associated with women under 20 years [Hazard Ratio (HR) 5.35 (95% CI 1.07-26.73; $p = 0.04$)] and higher malaria parasite density [3.23 (95% CI 1.03-10.10; $p = 0.04$)], and still women under 20 years [1.78, (95% CI 1.26-2.52; $p < 0.01$)] had a significantly higher risk of re-infection. The three treatments were generally well tolerated. Dizziness, nausea, vomiting, headache and asthenia as adverse events (AEs) were more common in MQAS than in AL or DHAPQ ($p < 0.001$). Birth outcomes were not significantly different between treatment arms.

Conclusion: As new infections can be prevented by a long acting partner drug to the artemisinins, DHAPQ should be preferred in places as Nchelenge district where transmission is intense while in areas of low transmission intensity AL or MQAS may be used

Title: Fertility Intentions among HIV-Positive Women in Zambia: Evidence from Demographic and Health Survey 2013-14

Authors: David Mulemena[1], Million Phiri[1], and Namuunda Mutombo[1]
1. University of Zambia

Background: HIV infection is a strong predictor of fertility as it might influence one's fertility desire. HIV-positive women may have fertility desires and may intend to have children but these vary by socio-economic, socio-cultural and demographic characteristics. Studies of fertility intentions among HIV-positive individuals report a strong desire to have children. However, with the advent of Antiretroviral Therapy (ART), the quality of life for people living with HIV has also been improved potentially impacting fertility intentions among HIV-infected individuals and yet little is known about their fertility intentions. This study attempts to examine the fertility intentions among HIV-positive women (15-49 years) in Zambia.

Methods: The analyses are based on women with linkable information on HIV testing, fertility preferences and contraceptive use from the nationally representative 2013-14 Zambia Demographic and Health Survey data. HIV data was merged with each woman's individual file which also contained household variables to create an analytical file. Analyses were carried out after merging the HIV test results and women's file, and survey specific weights were used to account for the degree of women's chance being in the sample. Cross-tabulations with Chi-square tests were conducted to ascertain the crude relationship and finally multiple logistic regressions were employed to identify the major independent predictors of fertility intention using STATA 14.0 with 5% level of significance.

Results: Findings reveal that, out of the total number of women (9,688) with linkable information on HIV testing and fertility preferences, 8,034 (82.9%) were HIV-negative while 1,654 (17.1%) were HIV-positive. Surprising results reveal that over half of HIV-infected women (55.7%) have intentions of having another child in future. This proportion of HIV-infected women with intentions of having another child is much lower than their HIV negative counterparts (80.5%). Similarly, the study shows that the majority (57.3%) of the HIV-infected women are not using any form of contraception. HIV-positive women who expect to have another child in future are younger, not married, have no education and have fewer children. Multivariate analyses indicate that HIV-positive women with some form of education (secondary or higher) and those who are working are significantly less likely to have intentions for having children in future. In general, multivariate analyses reveal that HIV-infected women have a lower odds of wanting more children when compared to their HIV-negative counterparts.

Conclusion: The study reveals that age, marital status, education, parity, occupation and ethnicity are the major predictors that influence the fertility intentions among HIV-positive women. Moreover, education level, fertility intention, parity and ethnicity were identified as the major predictors of contraceptive use among HIV-infected women. The fact that many HIV-infected women expect to have children has important implications for the prevention of vertical and horizontal transmission of HIV. Hence, the need for comprehensive and continuous expansion of family planning, voluntary counseling and prevention of mother-to-child transmission (PMTCT) and integration of HIV treatment care among HIV-positive mothers to meet diverse reproductive intentions.

Title: Impact of the HIV prevention tool "Join-In-Circuit on AIDS, Love & Sexuality" in Zambia

Authors: Esther Tatenda Zulu[1], A. Brudevold-Newman[1], A. Rink[2], P. Dias[1], H. Rink[1], G. Tembo[3], M. Mafwenko[1], M. Chipili[1]
1. American Institutes for Research, 2. Columbia University, 3. PALM

Background: The Zambian government through the Ministry of General Education (MoGE) has since 2012, been implementing Comprehensive Sexuality Education (CSE) in schools with the objective to increase sexual reproductive health knowledge and improve behaviour to reduce HIV incidence. MoGE adopted the Join-In-Circuit on AIDS, Love & Sexuality (JIC) as an interactive methodology to complement CSE delivery and promote adolescent youth friendly health services in Zambian schools. The JIC is a "booster" for the delivery of the national CSE curriculum. The JIC integrates health programming into the education sector by sensitizing youth in an interactive circuit utilizing pictorial aids and edutainment strategies. The program aims to improve sexual and reproductive health knowledge, and HIV testing uptake.

Methods: This paper reports results of a mixed-methods cluster randomized controlled trial conducted to evaluate the impact of the JIC on learners. Data was collected from a total of 8,028 students from 127 schools in Southern Province. The 127 schools were randomly assigned to either a control group or one of three different treatment arms designed to test the relative efficacy of different student targeting strategies. The three targeting strategies selected students who were centrally placed, those centrally placed plus a friend, or randomly selected individuals. We measure the impact of the program on participant knowledge and behaviour indicators, as well as the spill over effects of the program on non-treated students within treated schools.

Results: Our findings indicate that the JIC had broad positive impacts on learner sexual and reproductive health knowledge and behaviours: the JIC increased HIV testing rates, increased the likelihood that students visited a health facility for family planning advice over the past 6 months, and increased student's awareness of any family planning methods. The program was more impactful for girls increasing whether a girl had ever been tested for HIV by 12-percentage points (29%), visits to a health facility for family planning advice in the prior 6 months increased by 10-percentage points (39%), and awareness of family planning methods increased by 6-percentage points (9%). We also find important differences in the impacts of the program across the two different grades that received the intervention: our estimates suggest that the JIC improved the knowledge of the younger cohort and the behaviour of the older cohort. Our evaluation also allowed us to measure whether students that received the JIC passed that knowledge along to students that did not receive the program: we find no evidence that the JIC students had this knowledge or behaviour spill-overs on students that did not receive the JIC.

Conclusion: We conclude that the JIC had positive impacts on the outcome indicators which include increased HIV testing rates, increased visits to health facilities to seek family planning advise and increased awareness of family planning methods. We would therefore recommend uptake of the JIC as a method to boost CSE in schools.

Title: Women's empowerment and use of maternal health services in Zambia in 2010s

Author: **Ackson Tyson Mwale**[1]
1. The University of Zambia

Background: This study investigates the influence of women's empowerment measured via spousal educational difference and women's completed education level on the use of maternal health services (Antenatal care and skilled birth assistance), and whether it varies by ethnicity. A theoretical framework based on Kabeer's three dimension of empowerment combined with Zimmerman's approach and the rational choice theory informs the analyses.

Methods: Data from the 2013/2014 Zambia Demographic and Health survey are analysed focusing on women aged 15 -49 years who are married/ live with a partner and had a birth in the past five years. Multivariate logistic regression is the tool of analysis.

Results: The results indicate significant association between women's completed education level and use of maternal health services. Spousal educational differences show no significant association with the use of MH services. For both ANC and SBA use, a relatively weak relationship is seen with ethnicity. In addition, women's wealth level, the province they live in and region of residence type appear to be important with respect to the utilization of MH services.

Conclusion: The findings confirm that women's empowerment as seen especially in their ability to make choices and to act on them given their agency as well as the social and cultural environment supporting their independence are key aspects for women to realise the goal of using MHS.

Title: Effects of the Injectables, Pills, and Male Condom on total fertility rate in Zambia: Evidence from the 2013-14 Zambia Demographic and Health Survey

Authors: Mwewa Kasonde[1], and Chabila Mapoma[1]
1. The University of Zambia

Background: Generally, Total Fertility Rate (TFR) has declined over the past 20 years in Zambia, with urban fertility declining more than rural fertility. The contraceptive prevalence rate (CPR) has also increased; from 15 percent in 1992 to 49 percent in 2013-14. Common methods of contraception used by women of reproductive age include pills, injectables and the male condoms. The percentage of women using these methods has also significantly increased in recent times. However, no study so far has been designed to examine the extent to which these common methods of contraception (pills, injectables and male condom) have contributed to the reduction of TFR in Zambia. This study was captioned to investigate this phenomenon.

Methods: The study used the 2013-14 Zambia Demographic and Health Survey women's dataset; based on the indicators of interest (use of the three main common contraceptives) a sample of 3, 897 women was drawn. Binary logistic regression was conducted to determine odds ratios of having a birth in the 3 years prior to the survey; the odds ratios were adjusted for marital status, education level, residence, province, wealth index, age at birth of first child and method of contraception used. In addition, ***tfr2***, a Stata program to analyse total fertility was used to reconstruct the TFR of women given various demographic and socio-economic factors at a central date of 2012.39.

Results: Bivariate results show that women using injectables, pills and male condom were more likely to have had a birth in the 3 years prior to the survey. Adjusted Odds Ratio (AOR) results affirm bivariate results where women using pills, male condoms and injectables were more likely to have had a birth in the 3 years prior to the survey (AOR=1.031, CI: 0.940, 1.129; AOR=1.107, 1.034, 1.185 and AOR=1.061, CI: 0.934, 1.205 respectively). Women with secondary education were less likely to have had a birth in the 3 years prior to the survey (AOR=0.864, CI: 0.744, 0.965). Predicted TFR was higher among women who reported use of injectables (7.2) and lowest among women who have never used any contraceptive method (5.3). The TFR was lower among women with higher education and using any of the methods under study (3.4) but higher among those with no education even when they reported using any of the methods (7.4). Further, TFR was lower among women in the rich quintile (4.0) using these methods of contraception but highest among women from the poor wealth quintile (7.3) not using these methods of contraception.

Conclusion: Using the mentioned methods of contraception (pills, injectables and male condom) is not associated with the seen reduction in TFR among women in Zambia. However, secondary and/or tertiary education, wealth quintile (middle/rich) combined with the use of contraceptive methods was/is associated with seen reduction in TFR in Zambia. It is therefore imperative that continued provision and a supportive enabling environment for females to attain tertiary education will be extremely cardinal to reduce TFR, especially the rural TFR in Zambia.

Title: Case Report: LPV/r Intolerance Leading to LPV/r Resistance, Clinical Failure and Successful Viralload Suppression with DTG.

Authors: Rachel Thomas[1], M. Mwiya[1], R. Ginwalla[1], M. Tonga[1], and C. Kankasa[1]
1. University Teaching Hospital (UTH), Lusaka, Zambia

Background: Zambia is trying to achieve the UNAIDS 90-90-90 targets. The National Guidelines have been revised to achieve the targets and DTG has been included in the regime for first and third line in 2018, for the first time in Zambia. We report here the first case of DTG use in an adolescent with LPV/r in tolerance, resistance to LPV/r and with PTB co infection. The case report highlights the importance of having appropriate LPV/r substitute in case of intolerance and management of resistant HIV in the face of TB coinfection.

Method: File review of a female adolescent,17 years who had been on ARVS for 13years with second line combination of AZT,3TC, LPV/r for 7 years. The first line ARVS, most probably d4T,3TC,NVP as the ARVS were started in 2004.The adolescent was referred to our clinic with persistent G.E since the start of LPV/r based regime, weight loss, fever, chronic cough, oral thrush and dysphagia. The adherence was reported to be good. Genotypic resistance for NRTI,NNRTI and P.I was done. The patient was started on ATT with Rifabutin based regime, fluconazole, septrin and third line cART with DTG,DRV,RTV, ETR , based on resistance result. Review after two weeks showed dramatic clinical improvement.

Results: The viral load was 1,320,660 copies/ml. CD4 absolute count: 24 [3.63%]. Drug Resistance Testing: P.I Resistance Mutations: M46I, I54V, L76V, V82A.showing high level resistance to ATV/r ,LPV/r and low level resistance to DRV/r. NRTI resistance Mutations: M41ML, D67N, K70R, T215F,M184V,K219Q showing high level resistance to ABC, AZT, D4T,DDI, FTC,3TC and intermediate resistance to TDF. NNRTI resistance mutations: E138A, V179D, G190A showing high level resistance to NVP, EFV and intermediate resistance to ETR. Sputum Xpert MTB/RIF not detected. X ray: BL lower lobe cavitations. Stool MCS: normal.
VL: 2043 copies/ml after one month on DTG based regime,133 copies/ml after eleven weeks and well suppressed after seven months on third line drugs.CD4 increased form 24 to261cells/µl.

Conclusion: The above case shows the importance of DR testing in all patients failing on second line, having the right drugs to substitute in case of LPV/r intolerance to prevent resistance and to have rifabutin readily available with HIV/TB co infection to avoid drug interactions.

Title: Household saving during pregnancy and facility delivery in Zambia: a cross-sectional study

Authors: Aldina Mesic[1], Peter Rockers[2], and Calvin Chiu[3]
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Background: Financial barriers cause many women in low- and middle-income countries to deliver outside of a health facility, contributing to maternal and neonatal mortality. Personal savings accrued during pregnancy can increase access to safe delivery services.

Methods: We investigated the relationship between household savings accrued during pregnancy and facility delivery in rural Zambia. We analyzed cross-sectional data from women who had delivered a child in the previous 12 months. We fit a series of logistic regression models to estimate associations between household characteristics and savings accrued during pregnancy, comparing women who reported saving nothing to those who reported saving something but, by their own estimation, not enough to cover their delivery expenses, and to those who reported saving enough. We then estimated crude and adjusted associations between savings and facility delivery.

Results: Overall, 51% of women surveyed reported that they saved enough to cover delivery expenses; 32% reported saving but not enough; and 17% did not save at all. Greater household wealth (adjusted odds ratio [aOR] 1.37; 95% confidence interval [CI]: 1.23, 1.53) and being married (aOR 1.81; 95% CI: 1.33, 2.45) were positively associated with saving enough for delivery. Each month delay of attendance at first ANC was associated with a 14% reduction in the odds of saving enough (aOR 0.86; 95% CI: 0.80, 0.92). Compared to those who did not save, those who saved but not enough (aOR 1.63; 95% CI: 1.17, 2.25) and those who saved enough (aOR 2.86; 95% CI: 2.05, 3.99) were significantly more likely to have delivered at a health facility. Among women who delivered at a facility, those who saved enough were significantly less likely that those who did not save to report problems with service quality.

Conclusion: Our findings suggest that interventions that encourage saving early in pregnancy may improve access to facility-based safe delivery services.

Title: Facilitators and barriers to adherence to antiretroviral therapy and retention in care among adolescents living with HIV/AIDS in Zambia: A mixed methods study

Authors: Aldina Mesic[1,2], Nafisa Halim[3], William Macleod[3], Catharine Haker[3], Melvin Mwansa[4], Godfrey Biemba[4,5]

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Background: Adolescents account for nearly 30% of new HIV infections globally. In Zambia, only 42% of adolescents are aware of their HIV status, 72% of those are on HIV treatment, and 71% of those are virally suppressed. There has been an increasing focus on the need to improve access and retention in the HIV continuum of care (CoC), spanning from HIV testing through antiretroviral therapy (ART) initiation, ART adherence, and retention in care. Substantial losses occur during every stage of the HIV CoC, and specifically during the latter stages of ART initiation, adherence, and retention. Yet, little is known about the factors that contribute to the losses during these critical stages. The purpose of this study is to identify, understand, and describe gaps and areas of improvement in the community continuum of care for adolescents living with HIV/AIDS (ALHA) in Zambia.

Methods: We conducted a mixed-methods study: focus group discussions with 43 ALHA; in-depth interviews with four: and survey-based interviews with 330 ALHA. Using narrative analyses, we analyzed data, and identified themes on the barriers and facilitators of two stages of the continuum of care related to retention: ART initiation (i.e. when a patient meets national criteria for ART and begins treatment) and ART adherence/retention in care (i.e. uninterrupted ART treatment and routine HIV care) operating at the multiple levels of the social ecology. Further, we used survey data to summarize the prevalence of missed appointments and ART in ALHA, and logistic regression modeling to determine which factors were predictive of missing appointments.

Results: ALHA identified barriers at the individual/household level (i.e., poverty; nutrition, stigma and discrimination; fear of disclosure; scheduling conflicts), interpersonal level (i.e., negative attitudes about HIV from family, friends, and others), facility level (i.e., disrespectful treatment from clinicians; lack of adolescent specific services), and community (i.e., lack of collaboration; cultural beliefs and traditions). ALHA also identified facilitators such as educational resources and programs, and support from peers and providers. Further, we found that 46% of ALHA reported missing any HIV clinic appointments in the past three months, and about 12% reporting missing one dose of ART in the last week. Logistic regressions indicate that walking to the site of appointment and being currently employed were predictive of missed visits.

Discussion: The findings highlight the complexity of the multiple factors that are unique to ALHA, including the lack of adolescent-specific services, clinic scheduling conflicts (i.e., because of school), and disrespectful treatment by clinicians. By addressing the barriers and building on the facilitators, effective interventions to increase ALHA's engagement with HIV care can be developed.

Title: Potential of Ketofol to Provide Adequate Sedation and Analgesia in Women Undergoing Manual Vacuum Aspiration of Retained Products of Conception in Emergency Department at the University Teaching Hospitals, Lusaka, Zambia

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Background: Early pregnancy failure is one of the major public health problems worldwide. Approximately 15% of all pregnancies end in spontaneous miscarriage and estimated 22% induced abortions recorded annually. Currently, the treatment of choice in the first trimester is Manual Vacuum Aspiration (MVA), a short gynaecological procedure done in the emergency department characterised by anxiety and pain. Reducing the physical pain and anxiety experienced by women undergoing MVA is the ultimate goal of management while reducing medication-induced side effect. Several drugs have been used solely or in combination to try to alleviate the pain associated with the procedure with variable results. Therefore, this study was set out to explore the potential of ketofol for analgesia and sedation in women undergoing MVA.

Methods: A non-randomised study was undertaken at the University Teaching Hospital, Lusaka, Zambia in the gynaecology admission ward to assess whether ketofol (propofol and ketamine four: one ratio) is an effective sedative and analgesic drug in women undergoing MVA procedure. Women with retained products of conception were non-randomised, to receive standard care (morphine 30mg, ibuprofen 400mg, paracetamol 1g) or ketofol plus standard care. Pain scores were determined using the Face Pain Score at zero, 10 and 60 minutes. During the procedure, heart rate and oxygen saturation were measured as well as recovery time measured after the procedure.

Results: Out of 94 women who completed the study, 54 received standard care and 40 received ketofol plus standard care. Both the standard care and ketofol were well tolerated. The results showed that out of the 94 women that underwent MVA, 54 (57.4%) were on standard care and 40 (42.6%) were on standard care plus ketofol. For the women who were on the standard care alone, the median age was 31(28-35) while those who were on standard care plus ketofol was 33(29-36). There was no difference in gravidity and parity; p values 0.68 and 0.77 respectively. History of allergies, history of miscarriages and HIV status were also not significantly different between the two groups. Adverse events occurring in both groups were also assessed; dizziness, headache, apnea, hallucination, vomiting and agitation were all not statistically different between groups. Pain scores were compared at zero, 10 and 60 minutes of the procedure. Women on standard care had significantly higher pain score, median 10 (IQR, 8 - 10) compared to women on standard care plus ketofol 2(0 – 3.5); $p<0.001$ both at 0 and 10 minutes but there was no statistically difference at 60 minutes.

Conclusion: In conclusion, the data suggests that ketofol reduced intraoperative pain experienced during MVA of retained products of conception compared to standard care as well as effective sedation and rapid recovery.

Title: Closing the Epilepsy Treatment Gap: A Paediatric Epilepsy Education Initiative for Primary Care Providers in Zambia

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Background: Epilepsy is a highly treatable disease. While in higher-income countries, children with epilepsy generally receive care from neurologists, few neurologists are available in low- and middle-income countries (LMIC), and primary health providers – who often have limited training on these conditions – are responsible for neurological care. Primary health workers are therefore essential to closing the epilepsy treatment gap; however, these providers require the appropriate tools and education to provide adequate care.

Methods: We implemented a pilot educational program for clinical officers (primary health providers with three years of post-secondary general medical education) in Zambia, focusing on the diagnosis and management of pediatric epilepsy. We conducted a pre- and post-intervention analysis, including a knowledge assessment and an evaluation of provider comfort in caring for children with epilepsy.

Results: Ten clinical officers from three primary level health clinics participated. Following the 3-week course, there was improved overall knowledge about epilepsy (69% vs. 81% correct, $p<0.05$), including knowledge regarding medication management and recognition of focal seizures ($p<0.05$), as well as general comfort obtaining seizure history and adjusting antiepileptic medications ($p<0.05$). However, knowledge regarding acute seizures, appropriate use of diagnostic studies, and general etiologies of epilepsy remained limited.

Conclusion: Our paediatric epilepsy education course demonstrated that a short, directed training program for primary care providers may improve knowledge about the diagnosis and management of seizures in children. Through promoting health workers' capacity to provide high-quality care for children with epilepsy, future educational interventions – including clinical preceptorship – may help reduce the epilepsy treatment gap.

Title: Factors associated with of Obstetric Fistula Surgical Repair Failure at Monze & St. Francis Mission Hospitals from 2010 to 2016, Zambia

Authors: Fred Kapaya[1], Charles Michelo[2], Mumbi Chola[2], Ellen Yard[3], Idongesit[4], Essiet-Gibson[3], Nyambe Sinyange[5], Nathan Kapata[5], Steven Mupeta[6], Victor Mukonka[5]
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Background: Obstetric fistula is an abnormal opening between a woman's vagina and bladder and/or rectum through which urine and/or feces leak. It is estimated to affect more than 2 million women globally. Zambia's estimated prevalence is 0.53%. The condition causes significant maternal morbidity with associated high socio-economic burden. Surgery is the main treatment option but failure of repair remains a major challenge. The aim of the study was to determine factors associated with failure of repair of obstetric fistula at St. Francis and Monze Mission Hospitals in Zambia.

Methods: This was a retrospective cohort study using data extracted from hospital records of obstetric fistula repairs between January 2010 to December 2016 at St. Francis and Monze Mission Hospitals. The outcome was failure of fistula repair at hospital discharge confirmed by a dye test. A total of 453 records were identified using complete enumeration and used to identify predictor variables associated with failure of repair. STATA version 13 was used to analyze the data. Descriptive statistics including cross tabulations were used and presented in tables and graphs. Analytical statistics were done using bivariable logistic regression and to control for confounding, multiple logistic regression was used.

Results: A data set with a total of 453 obstetric fistula repairs was analyzed. Overall, 56 women out of 453(12.4%; 95%CI: 9.6—15.7) failure of fistula repair at hospital discharge. On average the age at fistula development was 23 years (IQR19, 30) while 27years (IQR 21, 35) at the time of repair with an average years with fistula of 1 year (IQR 0, 5). Those with urethral involvement (AOR 5.2, 95%CI: 2.34—11.60) were five (5) times more likely to have failure than those with an intact urethra. Women with other comorbidities (AOR 3.8, 95%CI: 1.19—12.01) were four (4) times more likely to experience failure than those who did not. Women with post-operative complications (AOR 25.2, 95%CI: 9.58—66.38) were twenty-five (25) times more likely than those who did not have. Women whose HIV status (AOR 0.34, 95%CI: 0.13—0.87) was unknown were 66% less likely to have obstetric fistula repair failure than those who were HIV negative. Women who were repaired at St. Francis (AOR 2.3, 95%CI: 0.95—5.61) were more likely to have failure of repair than those repaired at Monze Mission Hospital.

Conclusion: The results from the study demonstrated that women with vaginal scarring, urethral involvement, post-operative complications, comorbidities were more likely to have failure of repair. It is therefore recommended that quality of post-operative care be improved and caution be paid to the repair of women who present with urethral damage, vaginal scarring and comorbidities. The evidence generated would help to restructure our programs to improve fistula care in Zambia.

Title: Trends and determinants of under-weight children in Zambia –evidence from 2002, 2007 and 2014 Zambia Demographic Health Survey.

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Background: Over the past ten years, underweight levels in Zambia have remained static at 15% as compared to other indicators of under nutrition such as stunting and wasting (CSO, 2014). This is a source of concern in that despite the different nutrition interventions that have been introduced by the government and other organizations, underweight levels remain unchanged. According to UNICEF 2017, nearly half (about three million) of all deaths in children under five are attributable to under nutrition. High levels of underweight accelerate high levels of infant and child morbidity and mortality. Literature has shown that the mortality risk of children who are even mildly underweight is increased and this risk increases for those children who are severely underweight (WHO, 2010).

Methods: The study was a cross sectional study using data from the 2002, 2007 and 2014 Zambia Demographic and Health Survey's to assess the trends and determinants of underweight in under-five children. The analysis included a pooled estimate of about 26,735; 6877, 6401 and 13, 457 under-five children, in the 2002, 2007 and 2014 survey's respectively. We firstly conducted uni-variable and multi-variable analysis of each survey year. We then analyzed the pooled data.

Results: An analysis of the investigation of the trends of the unadjusted odds ratios showed children born in 2007 had a 56% reduced odds of being underweight ($p \leq 0.0001$), while in 2014 they had a 50% ($p \leq 0.0001$) reduced odds of being underweight when compared to children in 2002. Analysis of each separate survey year showed that the size of the child at birth was the only constant variable across the three survey years. The effects of age, sex and size of the child at birth, maternal residence, wealth index, education, age had statistically significant reduced odds of a child being underweight. A child having had a fever, diarrhea and the number of children under-five living with the mother showed statistically significant increased the odds of a child being underweight.

Conclusion: The analysis reveals that there was a substantial decrease in underweight in the first half of the last decade, significantly reducing the odds of a child being underweight, those odds however slightly increased in 2014 regardless of the prevalence being static. Underweight is still of public health concern and it is important to come up with practical and sustainable policies to help curb underweight in under-five children in Zambia.

Title: Coverage against the UNAIDS 90-90-90 targets among adolescents in the HPTN 071 (PopART) trial

Authors: Kwame Shanaube[1], Dave Macleod[2], Joseph Chaila Mwate[3], Constance Mackworth-Young[2], Graeme Hoddinott[3], Ab Schaap[1,2], Sian Floyd[2], Peter Bock[3], Richard Hayes[2], Sarah Fidler[4], Helen Ayles[1,2]

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Background: Attaining the ambitious UNAIDS 90-90-90 HIV control targets by 2020 will require profound investment into the health of young people as part of a comprehensive response to HIV. The PopART for Youth (P-ART-Y) study was nested within the HPTN 071 (PopART) trial, a 3-arm community-randomized study conducted in 21 communities in Zambia and South Africa. The P-ART-Y study measured the acceptability and uptake of a full combination HIV prevention package among adolescents and young adults aged 10-24 years in these communities. We review progress towards the UNAIDS targets among adolescents aged 10-19 years from four communities receiving the full prevention package (including immediate ART for all individuals with HIV) in Zambia.

Methods: In this trial, a combination HIV prevention package, including universal HIV testing and treatment, was provided door-to-door to the whole population. All enumerated adolescents aged 10-19 years were offered participation in this intervention and verbal consent was obtained. We estimated the proportion of HIV-infected adolescents who knew their status (first 90 target) and the proportion of these on ART (second 90 target), pre- and post-intervention. The data were collected from September 2016 to December 2017, covering the third round (R3) of the PopART intervention.

Results: We enumerated 46,363 adolescents (53.2% females) aged 10-19 years in Zambia. Consent to participate in the study, was provided by 34,853 (75.2%) adolescents, slightly lower in males compared to females (77.7% females versus 72.3% males). Uptake varied between age groups. Following the R3 intervention, the 'first 90' target was met or nearly met for males in all age groups. The 'first 90' was nearly achieved for girls in all age groups except for the 15-17 year olds where only 82% knew of their HIV infection (figure 1). The 'second 90' was achieved or nearly achieved in both males and females aged 10-14 years. However, in older adolescents the second 90 was not achieved, particularly in females, with only 77% of the 15-17 year olds and 70% of the 18-19 year old HIV-positive females being on ART.

Conclusion: The PopART intervention came close to achieving both the first and second UNAIDS 90-90-90 targets for all adolescent males. However, gaps still remain for older adolescents for the second 90, especially in adolescent girls. If the UNAIDS 90-90-90 targets are to be reached by 2020, youth and adolescents must be central in the planning, funding and implementation of HIV programming in sub-Sahara Africa.

Title: An Evaluation of Mental Health Status for Orphans and Vulnerable Children affected by HIV/AIDS in rural Zambia.

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Background: Zambia is among the top 10 countries worldwide ranked in terms of HIV prevalence. As of 2016, UNAIDS estimated Zambia to have ~94,000 children below the age of 18 years living with HIV/AIDS, and ~450,000 children orphaned by HIV/AIDS. Research has established that AIDS-orphaned youths are at high risk for psychological and emotional distress, but only a few studies have been conducted on these children in rural areas of Zambia. Previous studies in sub-Saharan Africa have shown that HIV-affected children demonstrate levels of mental health problems that may be significantly higher than HIV unaffected children, but are not statistically different from HIV-positive children, both using youth self-report and caregiver report. Therefore, we hypothesize that the children in our rural Zambian sample, both infected and affected by HIV/AIDS, are likely to exhibit some risk for mental health problems such as internalizing difficulties (anxiety/depression), but may not differ in their respective levels of risk.

Methods: The study uses cross-sectional data from an on-going longitudinal study being conducted in rural southern province Zambia. A representative sample of households were screened in villages within a 20Km radius of Macha Mission Hospital in Southern Province, Zambia. Orphans and vulnerable children affected by HIV/AIDS, aged 6 to 18 years, were identified using an adaptation of the Multiple Indicator Cluster Survey (MICS). The Pediatric Symptoms Checklist (PSC), which is a psychosocial screener, was used to evaluate risk for psychological problems in recruited children. The caregiver report form was used. Overall prevalence for mental health status is examined in a sample of N = 1,069 HIV affected children, ages 7-18. To examine the relative risk for children infected with HIV, we will employ a matched case-control design: HIV positive children were matched by age and gender with affected, non-diagnosed children to construct comparable samples.

Results: The median score for the full sample (N=1,069) was 5 (IQR; 2 to 9) implying a low overall risk of mental health disorders in these children. Only six HIV-OVCs were found to be at risk of mental health problems (score ≥28). Comparing HIV infected and affected children, there was no statistically significant difference in the internalizing mean scores between the two groups; t(146)= -8, p=0.42, CI=95%. Similarly, the overall median score for the two matched groups of HIV infected against HIV affected children (N=148) was zero (IQR; 0 to 1), also indicating a low risk of internalizing impairments.

Discussion: In general, the PSC showed a low risk of mental health problems both in general and in terms of internalizing in the study sample. Therefore, it is worth looking at the protective factors surrounding these children that may be supporting positive mental health.

Title: Field performance evaluation of dual rapid HIV & syphilis tests in three antenatal care clinics in Zambia

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Background: Mother-to-child transmission (MTCT) of HIV and syphilis remains a major global public health concern. In Zambia, HIV antenatal prevalence is 16.4%, syphilis prevalence is 9.0% and antenatal HIV and syphilis co-infection rate is estimated 24.2% (2010). Co-infection increases risk of MTCT of both diseases and adverse birth outcomes.
The need for improved POC diagnostic techniques to reduce barriers to testing and ensure receipt of results and prompt treatment cannot be overemphasized. Therefore, this is a field evaluation for performance, acceptability and feasibility of two POC dual tests, the SD BIOLINE HIV/Syphilis Duo Test (Standard Diagnostics, Korea) and the Chembio Dual Path Platform (DPP) HIV-Syphilis Assay (Medford, NY, USA) among pregnant women seeking antenatal care in Lusaka, Zambia.

Methods: This was a cross sectional study conducted in three ANC clinics at Kamwala, Chipata and Chawama primary health centres in the Lusaka urban district of Zambia from September 1, 2014 through June 30, 2015. We assessed the field performance, acceptability and feasibility of two dual HIV/syphilis RDTs, Chembio DPP HIV-syphilis Assay and the SD Bioline HIV/syphilis Duo. We enrolled 3212 pregnant women aged □18 years presenting for first ANC visit who were able to provide informed consent. All consenting participants were tested for HIV and Syphilis using the two RDTs and SOC testing. The participants completed an interviewer-administered questionnaire on socio-demographic characteristics, travel time to clinic, acceptability and preferences for the dual tests. ANC staff performing the tests were interviewed on the feasibility of the dual RDTs. The reference tests for HIV were Determine (Alere Medical Company Limited, Japan) confirmed by Uni-gold (Trinity Biotech, USA). The Western Blot (WB) (Biorad Laboratories) was to resolve discordant results. The reference test used for syphilis was Treponema pallidum particle agglutination assay (TPPA), positive TPPA was followed by RPR quantitative assays. Sensitivity and specificity for HIV and syphilis were calculated compared to their respective references. We also assessed performance for the syphilis component on both RDTs using reference for active syphilis RPR titers ≥1:4.
For acceptability, we used percentages to show preference for single versus dual RDT testing and willingness to wait for test results. For feasibility, we calculated the mean score for each attribute assessed.

Results: For Chembio, the HIV sensitivity was 90.6% [95%CI=87.4, 93.0] and specificity was 97.2% [95%CI=96.2, 97.8]; syphilis sensitivity was 68.6% [95%CI=61.9, 74.6] and specificity was 98.5% [95%CI=97.8, 98.9]. For SD Bioline, HIV sensitivity was 89.4% [95%CI=86.1, 92.0] and specificity was 96.3% [95%CI=95.3, 97.1]; syphilis sensitivity was 66.2% [95%CI=59.4, 72.4] and specificity was 97.2% [95%CI=96.4, 97.9]. Using the reference for active syphilis,

syphilis sensitivity was 84.7% [95%CI=76.1, 90.6] for Chembio and 81.6% [95%CI=72.7, 88.1] for SD Bioline. Both RDTs received high acceptability with 99.6% preference for dual RDTs and were assessed as highly feasible.

Conclusion: In a field setting, the performance of both RDTs was comparable to other published field evaluations and each was rated highly acceptable and feasible. These findings can be used to guide further research and proposed scale up in ANC settings.

Title: "It was a very easy test for him … in fact he loved it": Men's experiences and competencies with door-to-door secondary distribution of HIV self-test kits, in four HPTN 071 (PopART) study communities.

Authors: Chiti Bwalya[1], Chama Mulubwa[1], Musonda Simwinga[1], Bernadette Hensen[2], Lwiindi Gwanu[1], Melvin Simuyaba[1], Able Hang'andu[1], Kwame Shanaube[1], Sian Floyd[3], Alwyn Mwinga[1], Helen Ayles[1,2], and Virginia Bond[1,4]

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Background: Men's low uptake of HIV testing services (HTS) has been attributed in part to mobility linked to livelihood. Leaving oral HIV self-tests (HIVST) with other household members is an innovative strategy labelled "second distribution", which may have the potential and ability to reach mobile men. It is critical to understand if men receiving HIVST through secondary distribution can competently perform and interpret the test. We present an analysis of qualitative data to explore men's experiences and competence with using a secondary distributed HIVST kit.

Methods: This study was nested within the third intervention year of a community-randomised trial (HPTN 071 (PopART)) delivering a combination HIV prevention package including universal HIV test-and-treat, to every household within the participating communities. In communities randomised to the HIVST intervention, trained community health workers (CHWs) offered household members the option of HIVST or finger-prick HIV-testing for three months in 2017. Index participants, mostly women aged 18 years and older whose partners were absent during the visit, were offered an HIVST for secondary distribution to their partners. Qualitative data from intervention zones included: follow up observations in households where a test kit was left for secondary distribution (n=8), in-depth interviews with individuals accepting (n= 29) or rejecting HIVST (n=11), group discussions with purposively selected CHiPs (n=32) and men accepting HIVST either through secondary distribution or through CHiPs (n=19). Data were coded using Atlas.ti and analysed thematically.

Results: Men were expected to learn how to use HIVST through Instructions For Use (IFU) pamphlets, and index partners, having been trained by CHiPs, relaying instructions and giving demonstrations. Correct usage was facilitated by literacy, women partners enacting tips from CHiPs on how to offer and use HIVST and how to link partners testing HIV-positive to care, and by men's belief in their partner's ability to accurately relay information on use. Additionally, phoning CHiPs before and after use facilitated usage. Women tended to avoid any negative repercussions on relationships with their spouses by seeking prior permission from their partners before getting HIVST kits from CHiPs. Men valued secondary distribution as it enabled them to test as couples and aided disclosure. The test kit was considered novel and interesting by most men. HIVST was experienced as a confidential, painless, bloodless, convenient, and empowering test. Ownership of the result was also enhanced through HIVST. Men mentioned 'privacy' and 'confidentiality' as benefits of HIVST. Being able to test in one's bedroom and home was not only convenient; it also meant that no-one else saw the results unless the tester wished them to.

Conclusion: Secondary distribution of HIVST through partners can be an effective strategy to reach men who are absent from their homes because of livelihood activities. Men found HIVST less painful and more private than a finger prick test, and a useful aid for disclosing results to their spouses. Clear instructions and additional support though women partners and though trained community lay workers enhanced competence.

Title: Assessing capacity and readiness to manage NCDs in primary care setting: Gaps and opportunities based on adapted WHO PEN tool in Zambia

Authors: **Wibroad Mutale**[1], Samuel Bosomprah[2], Perfect Shankalala[1], Oliver Mweemba[1], Roma Chilengi[2], Sharon Kapambwe[3], Charles Chishimba[1], Mulenga Mukanu[1], Daniel Chibutu[1], Douglas Heimburger[4]

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Background: Sub-Saharan Africa is experiencing an epidemiological transition as the burden of NCDs overtake communicable diseases. However, it is unknown what capacity and gaps exist at primary care level to address the growing burden of NCDs. This study aimed to assess the Zambian health system's capacity to address in NCDs, using an adapted WHO Essential Non Communicable Disease Interventions (WHO PEN) tool.

Methods: This was a cross-sectional facility survey in the three districts conducted from September 2017 to October 2017. We defined facility readiness along five domains: basic equipment, essential services, diagnostic capacity, counseling services, and essential medicines. For each domain, we calculated an index as the mean score of items expressed as percentage. These indices were compared to an agreed cutoff at 70%, meaning that a facility index or district index below 70% off was considered as 'not ready' to manage NCDs at that level. All analysis were performed using Stata 15 MP.

Results: There appeared to be wide heterogeneity between facilities in respect of readiness to manage NCDs. Only 6 (including the three 1st level hospitals) out of the 46 facilities were deemed ready to manage NCDs. Only the first level hospitals scored a mean index higher than the 70% cut off; With regard to medications needed to manage NCDs, urban and rural health facilities were comparably equipped. However, there was evidence that calcium channel blockers (p=0.013) and insulin (p=0.022) were more likely to be available in urban and semi-urban health facilities compared to rural facilities.

Conclusion: Our study has revealed gaps in the primary health capacity to manage NCDs in Zambia, with almost all health facilities failing to reach the minimum threshold. These results should attract policy attention and potentially form the basis for review of the national approach to NCD care at the primary care level.

Title: Electroencephalogram Findings among Zambian Children: Clinical Correlation and Use of Antiepileptic drugs

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Background: Despite the heavy burden of epilepsy in Sub-Saharan Africa, there remains a relative paucity of neurophysiology services and limited published data on electroencephalographic features among African children. The aim of this study was to describe clinical characteristics, EEG findings, and antiepileptic drug (AED) treatment among children referred for EEG to the University Teaching Hospital in Lusaka.

Methods: EEG requests and reports from 2013-2015 were reviewed. Within the context of routine care, EEGs were interpreted by readers with advanced training in child neurology and clinical neurophysiology. Clinical data, seizure semiology and EEG findings were systematically extracted and analyzed.

Results: A total of 1,217 EEG reports were reviewed with 1,187 included in the analysis. Median age was 7 years (IQR 3 - 11) and 57% were males. Seventy-three percent (73%) of 554 had documented seizure onset before 5 years of age. Among the 23% with seizure etiology documented, 78% were associated with perinatal injuries and CNS infections. EEG abnormalities were found in 75% of the studies. Based upon clinical semiology, only 29% were reported to have focal seizures but EEG findings increased this proportion to 63% (p=0.004). Sixty-two percent (62%) were on AEDs with 85% on monotherapy. The most commonly used AED was carbamazepine (49%). There was no association between the choice of AED and clinical semiology (all p's >0.05).

Conclusion: This tertiary care center study identified over 60% of referred children to have localization-related epilepsies with at least 18% of epilepsies being from potentially preventable causes. These findings are consistent with multi-country, population-based data from elsewhere in Africa. Seizure semiology assessed in routine, non-specialist care does not appear to influence AED choice and frequently fails to identify focality evident on EEG. This highlights the need for further training to optimize clinical care and cost-effective use of AEDs in Africa.

Title: The Presence of Blood in Gastric Juice: A Sensitive Marker Of Gastric Cancer In Poor Resource Settings

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Background: Over 80% of patients diagnosed with gastric cancer at the University Teaching Hospital die within the first year of diagnosis. The stage of disease at initial diagnosis is a major determinant of outcome, and gastric cancer is often diagnosed late. Currently, there are no inexpensive, non-invasive and simple techniques that can be employed in poor resource settings for early gastric cancer detection. The aim of our study was to investigate the possibility of using a simple and cheap method of identifying individuals with gastric lesions needing endoscopic evaluation.

Methods: We hypothesed that testing gastric juice for the presence of blood could be used in primary care as a simple screening method to identify individuals requiring urgent referral to facilities with endoscopy. The study was conducted at the University Teaching Hospital's endoscopy unit in Lusaka, Zambia. During the endoscopy, gastric juice was aspirated immediately upon intubating the stomach and pH determined using pH paper test strips with 0.5 unit gradations. The presence of blood in gastric juice was tested using urinalysis strips. The samples were then re-analysed at 1:10 and 1:100 dilutions.

Results: We enrolled a total of 280 patients, of whom 147 (53%) were female and of median age 49 years (IQR 40-64 years). Of the patients enrolled, 116 (41%) had abnormalities seen during endoscopy: 43 (15%) benign gastric ulcers, 34 (12%) duodenal ulcers, 33 (12%) gastric cancers with the remaining abnormalities being polyps, non-specific inflammation or oesophageal lesions. Gastric pH was not significantly different between patients with abnormalities and those without (median pH 5.5 and 6 respectively; P=0.24). The presence of blood was associated with mucosal lesions, [OR 2.7; 95% CI 1.4-5.7, P=0.002]. It was also associated with gastric cancer, [OR 7.4; 95% CI 2.2-39, P=0.0001], even at 1:10 and 1:100 dilutions, [OR 7.1; 95% CI 2.9-18.4, P<0.0001] and [OR 10.2; 95% CI 3.6-29, P<0.0001] respectively. The sensitivity for gastric cancer detection using blood in gastric juice was 91% but the specificity was only 41%. The analysis yielded a negative predictive value of 98% and a positive predictive value of 23%. Analysis using the intensity of blood in gastric juice yielded an area under the receiver operating characteristic curve of 0.78; 95% CI 0.71-0.86 with a sensitivity of 79% and a specificity of 77%. Only 3 (9%) of the patients with gastric malignancy did not have detectable blood in gastric juice.

Conclusion: In poor resource centers without endoscopy or specialized medical personnel, determination of the presence of blood in gastric juice could be employed to identify individuals with a high risk of gastric cancer or other significant mucosal lesions. This strategy should be done in addition to the standard non-invasive clinical assessment for gastric cancer risk. However, the specificity of this technique remains is low.

Title: An Assessment of Gastric Cancer Risk Factors In Zambia

Authors: Violet Kayamba[1,2], Kanekwa Zyambo[2], Themba Banda[2,3], Joyce Sibwani[2,3], Aaron Shibemba[3], Douglas Heimburger[4], Marsharip Atadzhanov[1], Paul Kelly[2,5]
1. University of Zambia School of Medicine, 2. TROPGAN, 3. UTH, 4. VIGH, 5. QMUL

Background: The past 40 years have seen an increase in gastric cancer cases diagnosed in Zambia with evident lifestyle and dietary changes occurring during this period. Several investigators have reported associations between gastric cancer and various lifestyle factors but pooled analyses remain inconclusive and many of these studies were done outside sub-Saharan Africa.

Methods: The aim of the study was to investigate lifestyle risk factors associated with gastric cancer in Zambia. This was a case-control study conducted at the University Teaching Hospital. Questionnaires were used to collect lifestyle and dietary data. To estimate exposure to polycyclic aromatic hydrocarbons (one of the constituents of biomass smoke), we measured urinary 1-hydroxyprene (1-OHP) using HPLC. For dietary exposure to mycotoxins, we measured urine levels of aflatoxin metabolite M1 (AFM1) and ochratoxin A (OTA). The Tanaka formula was used to estimate 24hr urine sodium using spot measurements of sodium and creatinine.

Results: A total of 360 patients were enrolled from all ten provinces of Zambia, with 191(53%) females. Of these patients 74(21%) had confirmed gastric cancer, 40(11%) premalignant lesions (atrophy, intestinal metaplasia and dysplasia) and 246(68%) controls. The median age was 60, 61 and 58 years for gastric cancer, premalignancy and control groups respectively. The median BMI was significantly lower in the gastric cancer group (P=0.0001). Gastric cancer was associated with poor housing [OR 7.5; 95% CI 2.8-20, P<0.0001], lack of piped water [OR 5.2; 95% CI 1.7-6, P<0.0001], low education [OR 2.8; 95% CI 1.5-5.2, P=0.0003] and use of biomass fuels in the home [OR 3.3; 95% CI 1.8-6.2, P<0.0001]. Levels of urinary 1-OHP did not differ significantly between the three groups P=0.26. There was a positive correlation between 1-OHP levels and use of charcoal (P=0.04). Daily consumption of green vegetables was protective against gastric cancer [OR 0.2; 95% CI 0.1-0.5, P=0.001] and premalignant lesions [OR 0.3; 95% CI 0.09-0.9, P=0.03]. In contrast, consumption of processed meat was positively associated with gastric cancer [OR 7.3; 95% CI 1.7-31, P=0.008]. Estimated urinary sodium excretion was significantly lower among the gastric cancer patients [OR 3.3; 95% CI 1.8-6.2, P<0.0001]. 61% of the patients had AFM1 in urine, median 709 pg/mg creatinine (IQR 150-4546), and the median urinary OTA was 0.2ng/ml (IQR 0.07-0.16). However, none of these two mycotoxins was significantly associated with gastric cancer.

Conclusions: Exposure to biomass smoke, low socio-economic status, and regular consumption of processed meat are risk factors for gastric cancer in Zambia. Daily consumption of green vegetables is protective against gastric cancer and its premalignant lesions.

Title: Late Gastric Cancer Diagnosis in Zambia is Not Only Due to Delayed Patient Presentation

Authors: Violet Kayamba[1,2], Themba Banda[2,3], Joyce Sibwani[2,3], Marsharip Atadzhanov[1], Paul Kelly[2,5]

1. University of Zambia School of Medicine, 2. TROPGAN, 3. University Teaching Hospital, 4. VIGH, 5. QMUL

Background: Gastric cancer is one of the leading causes of cancer mortality in Zambia. We have previously reported that less than 15 % of these patients survive more than one-year after diagnosis. Many of these cases are detected at advanced stages and can therefore only be offered palliative treatment. Reasons for this late diagnosis are however not clear. We set out to investigate the time course of gastric cancer diagnosis in Zambia.

Methods: The study was conducted at the University Teaching Hospital, the national referral hospital in Lusaka, Zambia. Gastric cancer patients and normal controls were enrolled. An interviewer-administered questionnaire was used to collect information on health seeking behaviour.

Results: We enrolled 48 patients with gastric cancer and 96 dyspeptic patients without gastric mucosal lesions. For the patients with gastric tumours, the median age was 60 years (IQR 51-71 years; and 27(56%) were female). On subsequent follow-up 12 patients were unreachable, and 22/36 (61%) had died. 11/22(50%) of the mortalities died before commencement of therapy, with a median endoscopy to death time of 4 weeks (IQR 1-12 weeks), confirming the advanced stage of disease at presentation. The median time from noticing symptoms to first health care consultation was 3 weeks (IQR: 0-4 weeks). The median time from first consultation to endoscopy was 12 weeks (IQR 4-32 weeks), and in all cases endoscopy was done within two weeks of receiving the request. There was no significant difference in the health seeking behaviour of cases and controls. The main presenting symptoms for gastric cancer were abdominal pain 24(50%), vomiting 13(27%), dysphagia 5(10%) and 1(2%) patients reported a family history of gastric cancer. Among the controls, abdominal pain 74(78%) was most prominent, with vomiting 7(7%) and dysphagia 1(1%) being less common. Patients with tumours had significantly lower body mass index compared to the healthy controls at the time of diagnosis: median 19 kg/m2 (IQR 16-22 kg/m2) and 25 kg/m2 (IQR 21-29kg/m2) respectively, P=0.0001.

Conclusion: There is a delay by health care providers in identification of gastric cancer patients requiring endoscopy, and clinical presentation is usually with non-specific symptoms. This contributes to late diagnosis, poor nutritional status, and poor prognosis. There is therefore, an urgent need for affordable and non-invasive diagnostic tools that will aid clinicians identify early gastric cancer.

Title: Transcriptomic analysis of enteropathy in Zambian children with severe acute malnutrition

Authors: Paul Kelly[1], Mubanga Chama[2], Beatrice Amadi[3], Kanta Chandwe[2], Kanekwa Zyambo[2], Ellen Besa[2]

1. UNZA School of Medicine, 2. TROPGAN, 3. University Teaching Hospital

Background: Children with severe acute malnutrition (SAM) often have enteropathy, with or without diarrhoea. There are no molecular data to guide development of new therapies.

Methods: In order to identify new targets for treatment, we collected intestinal biopsies from 27 children with SAM and persistent diarrhoea undergoing investigation for the cause. mRNA was extracted from biopsies and sequenced, followed by three different analytical approaches: NOIseq, gene set enrichment analysis (GSEA), and correlative analysis.

Results: Transcriptomic profiling was carried out on biopsy sets from 27 children with SAM of both sexes, under 2 years of age, of whom one-third were HIV-infected. The NOIseq analysis revealed 66 differentially expressed genes (DEGs) out of 21,386 mapped to the reference genome. These DEGs include genes for mucins and mucus integrity, antimicrobial defence, nutrient absorption, C-X-C chemokines, proteases and anti-proteases. Both NOIseq and GSEA identified gene clusters common to paediatric Crohn's disease, despite the histological dissimilarity of these disorders. Correlative analysis identified 1,221 genes related to villus height which confirm that the enteropathy of malnutrition is hyperproliferative not atrophic. More severe enteropathy was associated with reduced xenobiotic metabolising enzymes but increased iron uptake molecules. Expression of antimicrobial peptides and macrophage markers were inversely correlated with microbial translocation.

Conclusions: Transcriptomic analysis, particularly using new correlative approaches, identified multiple novel elements of pathology including specific absorption defects. Despite greater histological similarity with coeliac pathology, there were minimal signatures typical of coeliac disease and unanticipated overlaps with Crohn's disease.

Title: Tryptophan, glutamine and leucine supplementation increases villus height but does not improve barrier dysfunction in Zambian adults with environmental enteropathy: a randomised controlled trial

Authors: Paul Kelly[1], John Louis-Auguste[2], Kanekwa Zyambo[2], Ellen Besa[2], Derick Munkombwe[1], Rosemary Banda[2]

1. University of Zambia- School of Medicine, 2. TROPGAN, 3. University Teaching Hospital

Background: Environmental enteropathy refers to blunting of villi, reduced absorption and microbial translocation observed in children and adults in the tropics or in deprived residential areas. Very few interventions have been shown to improve these disturbances, but in preliminary data we observed an effect of micronutrients on villus height.

Aims: We carried out a randomised controlled trial of 16 weeks of amino acid supplementation and micronutrient supplementation against placebo in a factorial design in Zambian adults, designed to evaluate responses of villus height, fluorescein leak during confocal laser endomicroscopy, mTOR activation in duodenal biopsies, and metabolomic analysis of urine samples.

Results: One hundred and two participants were recruited and randomised, and 85 (58 women, 27 men; median age 40 years) were included in the final analysis. Over 16 weeks amino acid, but not micronutrient, supplementation increased villus height by 34.5µm compared to placebo, a 16% increase (P=0.04). No effect was seen on fluorescein leak or mTOR activation, but post-treatment mTOR and VH were correlated (ρ=0.51; P=0.001). AA reduced TBET expression in lamina propria CD4 cells, suggesting reduced Th1 recruitment into the gut mucosa. β-Hydroxy-β-methylbutyrate (HMB), a leucine metabolite, was positively associated with mTOR activation and was increased only by MM supplementation. Treatment allocation had no effect on markers of microbial translocation or systemic inflammation.

Conclusions: In this phase II trial, amino acid supplementation increased villus height independently of barrier function. Future studies should consider that therapies may modify one aspect of enteropathy without impacting broadly on all domains of pathophysiology.

Title: Application of Multiple Imputation Techniques on Short-Term Clinical Outcomes of Patients with Traumatic Spinal Cord Injuries Who Presented at the University Teaching Hospital in Lusaka in the Period 2013-2017

Authors: Mwiche Musukuma[1], Patrick Musonda[1], Brian Sonkwe[2], Isaac Fwemba[1]
1. University of Zambia, 2. University Teaching Hospital

Background: Multiple imputation is one of the methods that provides a way to handle missing data. With the increase in the use of secondary data in epidemiological studies, the inquiry of how to manage missing data has become more relevant. Our study applied imputation techniques on traumatic spinal cord injuries data; a medical problem whose data is generally sporadic. This presented an opportunity to apply multiple imputation techniques to outline the clinical outcomes of these patients.

Methods: The aim of this study was to apply multiple imputation techniques to data that is generally sporadic and whose prospective collection would be prolonged. The study took on a retrospective case series design and conducted a complete enumeration of available medical records of patients who were admitted to the University Teaching Hospital with a diagnosis of traumatic spinal cord injuries between 1st January 2013 and 31st December 2017. The data was first analysed using complete case analysis, then multiple imputation techniques were applied, to account for the missing data. Thereafter, both descriptive and inferential analyses were performed on the imputed data.

Results: A total of 179 patients were identified as having suffered from spinal cord injuries during the time period of interest. Out of the 179 patients, 145 (82%) were male with a mean age of 35 years, while females were only 34 (18%). The most common cause of injury were road traffic accidents which accounted for 56% (101) of the injuries. Clinical complications suffered by these patients included paralysis, death, bowel and bladder dysfunction. Paralysis was the most common clinical complication and it affected 94 (53%) patients. Approximately 22% (40) of the patients died during admission. Performing inferential statistics using complete case analysis produced estimates with large confidence intervals and corresponding standard errors indicating lack of power and estimates not converging. After imputation, results showed that being paralysed increased the chances of a patient having a clinical complication (OR= 2.98, P<.0001). Length of hospital stay increased the chances of one having a clinical complication by only 3% (OR=1.029, P<.0001). On the other hand, as the severity of the spinal injury at presentation reduced (as measured by the Frankel scale), a patient was less likely to suffer a clinical complication by about 42% (OR=0.584, P<.0001).

Conclusion: Spinal cord injuries affect more males in their prime age than females. Paralysis increases the chance of complications such as pressure sores due to immobility. Further, a comparison of estimates obtained from complete case analysis and from multiple imputation revealed that when there are a lot of missing values, estimates obtained from complete case analysis are unreliable and lack power. Efforts should be made to use ideas to deal with missing values such as multiple imputation techniques.

Title: Spectrum of Primary Immune Deficiency among children seen at a Tertiary Care Hospital in a Resources-limited Developing Country with high HIV Prevalence

Authors: James Chipeta[1], Uzima Chirwa, Musonda, Muntanga K. Mapani, and Owen Ngalamika, Chipepo Kankasa
1. University of Zambia- School of Medicine

Background: The HIV pandemic has brought increased awareness and recognition of acquired immune deficient disorders world-wide. However, the rare Primary Immune Deficiencies (PIDs) may be under-diagnosed especially in the developing world with inadequate diagnostic capacity and high prevalence of infectious diseases. Here we review 22 cases of PIDs diagnosed at a tertiary Hospital in a poor resource restricted country highlighting the difficulties of managing PIDs in the developing world. The aim of this study was to report various challenges encountered in the diagnosis of primary immune deficiencies (PIDs) in a resource-limited country with high HIV infection prevalence.

Methods: Retrospective evaluation of case records of children diagnosed to have primary immunodeficiency disorders over a period of ten years (2006-2018) at a tertiary care hospital, in Lusaka, Zambia.

Results: A total of 22 children, aged between seven months and 12 years diagnosed to have primary immunodeficiencies (PIDs) have been reported in Zambia and mainly seen at Lusaka's University Teaching Hospital's (UTH) Department of Paediatrics and Child Health. The spectrum of PIDs seen show predominance of hyperimmunoglobin E syndrome (HIES) at 60% of all cases (n=12) followed by congenital neutropenia at 15% (n=3) while 10% of the cases were Ataxia telangiectasia (AT). Autoimmune Lymphoproliferative Syndrome (ALPS), Neutrophilic panniculitis (Sweet syndrome - SS), and Immune hyperesonophilic syndrome (Idiopathic Hyperesonophilic syndrome-IHES) contributed 5% each. The majority of the children diagnosed with HIES presented with classic triad clinical signs of Job's syndrome (recurrent abscesses, pneumonia and extremely high serum immunoglobulin E) with a few of them presenting with signs and symptoms consistent with probable autosomal recessive variant of HIES (pathological fractures, delayed wound healing and extremely high IgE.). The infant with idiopathic hyper-eosinophilic syndrome (IHES) presented with failure to thrive, delayed mile stones, recurrent respiratory infections, generalized lymphadenopathy, digital clubbing, hepatosplenomegaly and episodic eczema and joint effusions. Diagnosis was confirmed in this infant by finding of marked eosinophilia on peripheral smear, skin and liver biopsies with no traceable secondary causes. Meanwhile the infant with ALPS presented with massive generalized lyamphadenopathy, thrombocytopaenia, neutropaenia and recurrent anaemia. Histology in this infant was characteristic of ALPS with extensive follicular infiltrates of CD20+ B cells (plasmocytes) as shown by immunohistochemistry. Due to the local high endemicity of infectious diseases, among several other challenges, all these children have had tortuous diagnoses with repeated HIV, TB and parasitic infestation tests prior to definitive laboratory work-out and final definitive diagnoses.

Conclusion: Prevalence of PIDs is unknown in most of the developing world. The experience with the 20-case-series presented here suggests that a number of PIDs, in resource-limited countries, go undiagnosed or, indeed, misdiagnosed. There is, thus, need to enhance capacity for management of PIDs in the developing world."

Title: The Community Health Workers' Perception of Motivational Incentives

Authors: Martha Mwendafilumba[1], E. Mbewe[1], M. Green[1]
1. Centre for Infectious Disease Research in Zambia (CIDRZ)

Background: Community Health Volunteers (CHWs) have been recognized both internationally and locally as playing a pivotal role in executing primary health care services in the community. Volunteers offer free services to the general community who live far away from health facilities and their services range from health promotion to curatives activities. Over the years many volunteers have been trained in varied aspects of health by both government and other organizations supporting government efforts. The CHWs have assisted in bridging the gap of inadequate health personnel in health facilities country wide. This has come with another facet where health personnel have task shifted some of their roles to the community volunteers. The task shifting has increased the work load of the CHWs and number of hours they volunteer per day. These changes have not corresponded with actions taken to look at the impact on the volunteer and actions to cushion the impacts. As a result of increased responsibilities at community level, volunteers are not able to adequately manage both community and family obligations. This has led to some of them dropping out to attend to family life. This study explored, from point of view of volunteers, the motivational incentives that would sustain volunteerism for a longer time. The objective of the study was to explore the motivation incentive package that can sustain volunteerism as prescribed by the volunteers.

Methods: This was a descriptive qualitative study which looked at the in-depth views and opinions of volunteers on motivation and incentives. The study was conducted in Lusaka and Mumbwa which provided an urban and rural perspective of the motivation incentives. Data collection tools: Data were collected using focus group discussion (FGD) and in-depth interviews to collect the CHW perceptions. Three (3) FDGs and fifteen (15) in-depth interviews were conducted in each site this number was arrived at as the information saturation point.

Results: The volunteers suggested a package that included providing volunteers' with emotional and moral support, as well as socio-economic and work related needs. These incentives should be provided regularly to the volunteers. It was further suggested that the government should have a clear volunteer policy with guidelines on working conditions that all institutions would utilize in determining conditions of service for volunteers so that there would be uniformity in incentives and management of the volunteers.

Conclusion: The holistic package to sustain volunteerism for a long time as suggested by the volunteers is in line with Maslow's hierarchy of needs and Hertzberg's Two Factor theories. Past interventions to retain volunteers which looked at some aspects did not yield sustained positive results. It is therefore imperative that Ministry of Health with support from cooperating partners take a lead in putting officers to spearhead the process of setting up sustainable systems, policies and guidelines in place that will form a basis for partner support.

Title: The health system accountability impact of prison health committees in Zambia

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Background: From 2013, the Zambian Corrections Service (ZCS) worked with partners to strengthen prison health systems and services. Early formative work led to the establishment of facility-based Prison Health Committees (PrHCs) comprising of both inmates and officers. We present findings from a nested evaluation of the impact of eight PrHCs eighteen months after program initiation.

Methods: In-depth-interviews were conducted with 11 Ministry and Corrections officials and 6 facility managers. Twelve focus group discussions were convened separately with PrHC members and inmate non-members in 8 facilities. Memos were generated from participant observation in workshops and meetings preceding and after implementation. We sought evidence of PrHC impact, refined with reference to Joshi's three domains of impact for social accountability interventions – state (represented by facility-based prison officials), society (represented here by inmates), and state-society relations (represented by inmate-prison official relations). Further analysis considered how project outcomes influenced structural dimensions of power, ability and justice relating to accountability.

Results: Data point to a compelling series of short- and mid-term outcomes, with positive impact on access to, and provision of, health services across most facilities. Inmates (members and non-members) reported being empowered via a combination of improved health literacy and committee members' newly-given authority to seek official redress for complaints and concerns. Inmates and officers described committees as improving inmate-officer relations by providing a forum for information exchange and shared decision making. Contributing factors included more consistent inmate-officer communications through committee meetings, which in turn enhanced trust and co-production of solutions to health problems. Nonetheless, long-term sustainability of accountability impacts were undermined by permanently skewed power relations, high rates of inmate (and thus committee member) turnover, variable commitment from some officers in-charge, and the anticipated need for more oversight and resources to maintain members' skills and morale.

Conclusion: Our study shows that PrHCs do have potential to facilitate improved social accountability in both State and societal domains and at their intersection, for an extremely vulnerable population. However, sustained and meaningful change will depend on a longer-term strategy that integrates structural reform and is delivered through meaningful and cross-sectoral partnership.

Title: Hand Washing Compliance in Operating Theatres

Authors: Imraan Ahmed[1]
1. The University of Zambia

Background: Surgical site infections are the most common complication encountered following surgery in developing countries. One of the preventive strategies is minimizing cross infection between health care providers and patients in the operating theatres. Hand cleaning before interaction with a patient is a well-known practice that aims to reduce cross infection between patients, thus preventing development of surgical infections. This audit aimed to determine the hand cleaning trends among health personnel involved in patient care at the University Teaching Hospital (UTH), Lusaka and also availability of hand cleaning aids in the operating theatres.

Methods: This was a snap shot audit carried out at UTH between February and March 2017 in all the operating theatres during normal working hours (i.e. weekdays between 08.00 and 16.00). It involved observing whether or not theatre staff used any form of hand cleaning before interacting with patients, whether it was examining patients, examining or dressing the surgical site, intravenous cannulation, urethral catheterization or moving the patient. Usage of hand protective aids (sterile or non-sterile gloves) was also observed during the patient interaction. The availability of water, soap and alcohol-based hand rub was also observed during this period.

Results: A total of 66 observations were done. 47% of these observations were done on doctors, 29% on nurses, 15% on theatre porters and 9% on students. 91% of the time patients were interacted with, no form of hand cleaning was used, whereas only 3% of the time water was used and 6% of time both soap and water were used. More than half of the patient interactions (51%) were made with no gloves on. During surgical site examination and dressing, only 30% of these were done after using some form of hand cleaning. Water was available 82% of the time, but soap was available only 56% of the time.

Conclusion: Generally, it was observed that hand cleaning trends were rather poor among theatre staff at UTH. Even during surgical site examination and dressing, hand cleaning was generally not being done. This could be a contributing factor towards development of surgical infections. Contributing factors to this poor trend of hand cleaning could be due to erratic availability of water and soap in theatres or even lack of awareness among theatre staff. It is recommended that availability of water and soap be improved in theatres. It would also help to have alcohol-based hand rub available. Theatre staff at UTH needs to improve hand cleaning trends before interacting with patients. This could be improved by raising awareness amongst them about importance of hand washing.

Title: From Principles to Action: Stakeholder Engagement in a community- based cluster randomized trial, the HPTN 071 PopART trial.

Authors: Steve Belemu[1], Musonda Simwinga[1], Melvin Simuyaba[1], Tisankhe Ng'ombe[1], Nozizwe Makola[2], Rhonda White[3], Helen Ayles[1,4], Virginia Bond[1,4] on behalf of the HPTN 071 (PopART) Study team.
1. ZAMBART, 2. Desmond Tutu TB Centre, 3. FHI 360, 4. London School of Hygiene and Tropical Medicine

Background: Stakeholder involvement is critical to research. Therefore, several guidelines on how to engage stakeholders have been developed. The Good Participatory Practice (GPP) guidelines were developed by the Global Advocacy for HIV Prevention (AVAC) and UNAIDS to provide guidance on how different players in biomedical HIV prevention trials can effectively relate. The GPP principles are respect, mutual understanding, integrity, transparency, accountability and community stakeholder autonomy. Translating the principles into practice is not only unpredictable but can be complex too. We present our experiences of engaging stakeholders in the HPTN 071 (PopART) Study- a community-based trial in 21 study communities in Zambia and South Africa. The experiences presented here are based on 12 communities in Zambia.

Methods: Whilst developing the research idea and developing the protocol, initial consultations were held with different stakeholders. Baseline qualitative research in all the communities then helped to identify relevant stakeholders. Several representation structures were then formed. Community Advisory Boards (CABs) comprised of community representatives selected by the community. The Community Partners Platform (CPP) comprised civil society organisations of people living with HIV (PLWHA). Other platforms were also formed to cater for the PopART implementing partners and government departments. Ongoing stakeholder engagement was done through regular meetings, joint field monitoring visits and collaborating on design and content of study materials. CAB and CPP members were trained in research, ethics and other aspects of clinical trials. CABs also assisted researchers to resolve study related incidents. Towards the end of the study, CABs and the CPP have been actively involved in planning for study exit and dissemination of results.

Results: Regular updates on the performance of the study and feedback to stakeholders are provided through the different representative structures. Involvement of the representatives in the review and design of study materials, including messaging, ensures that feedback is timely and tailored to the different stakeholders, a demonstration of transparency. The early and subsequent regular engagement of stakeholders has helped to create trust and mutual respect between stakeholders and the study. Training stakeholders facilitated acceptance of some study decisions. Consequently, stakeholder engagement has helped maintain scientific and ethical integrity. Regular engagement has also enabled study staff to appreciate and consider different socio-cultural contexts and ultimately made the study more answerable to its stakeholders. However, maintaining the same stakeholders for the whole period of the study has proved difficult as some leave, lose interest or change their focus.

Conclusion: Translating GPP principles into practice requires constant work and can be challenging. However, having a clear stakeholder engagement agenda from the onset and creating appropriate engagement platforms enabled application of the principles.

Title: Effects of Performance-Based Financing on Facility Accountability and Autonomy: Evidence from Zambia

Authors: Chitalu Chama-Chiliba[1], P. Hangoma[1], C. Chansa[2], C. Mulenga[3]
1. The University of Zambia, 2. World Bank, 3. Mulungushi

Background: Several developing countries have introduced performance-based financing (PBF) mechanisms as a means to improve health providers' motivation and accountability to provide better health services. Due to its multi-faceted system's approach, PBF is envisaged to fetch larger implications on facility autonomy, accountability and management of health service delivery. This study investigates the causal effects of PBF on facility autonomy and accountability in Zambia.

Methods: The PBF in Zambia had three study arms consisting of a pure control arm, input financing arm and PBF, set up with the goal of understanding the extent to which the gains of PBF are driven by additional financing compared to input financing. Specifically, we seek to address the following questions: To what extent does the PBF increase facility autonomy and accountability? Are there differential effects between input financing and PBF financing mechanisms? The study used quantitative data collected prior to and after the implementation of PBF. The PBF in Zambia was implemented during the period April 2012 to October 2014. Data for the evaluation was collected from 201 health facilities at baseline (October-November 2011) and 176 health facilities at end line (November 2014-January 2015). Household survey data was collected from 3,064 households at baseline and 3,500 at end line with questions covering antenatal care, post-partum care, child health, delivery outcomes and family planning. We used a difference-in difference linear regression model to estimate the effect of PBF on accountability and autonomy and conduct robustness checks. We estimate three types of models to compare the treatment and control arms as follows: a) PBF vs enhancing financing group b) PBF vs pure control group 2 c) enhancing financing group Vs pure control group.

Results: Preliminary results show that the PBF intervention was effective in improving health facility accountability and community participation in facility management. The preliminary results also suggest that the PBF facilities report significantly higher autonomy on service provision, clarity on policies and procedures for doing things as well as the overall autonomy index.

Title: A prospective study to review the weight of important internal organs compared to that of text book values at Ndola Teaching Hospital: A case study of 100 specimens.

Authors: Lumamba Mubbunu[1], Kasonde Bowa[1], Volodymyer Petrenko[2]
1. Copperbelt University, 2. Ndola Teaching Hospital

Background: The standard organ nomogram are all based on European data. There have been no studies in Africa to show organ nomograms. These nomograms are important in radiology practice for radiation dosages as well as computation of medical dosing. The current work was a prospective study to review and create internal organ nomograms and compare them to standard medical literature. The main objective of the study was to compare the average weight of internal organs of subjects at Ndola Teaching Hospital to standard values from textbooks. This work is intended to be a pilot study to the development of standard weights of internal organs for the population of Zambia.

Methods: The weight of the subjects was measured using a body weighing scale 0.0 Kg-300 Kg with an accuracy of ±0.1Kg, and the height of the subject was measured using a height measuring tape 0.0cm-300cm with an accuracy of ±0.1cm from head to heel. The individual internal organ weights were measured using a digital scale 0.0g-5000g with accuracy of ±0.1g. The average weight of the internal organs was compared to standard textbook values. One sample t-test was used to determine the significance of the differences in weights, if $p<0.05$, then the difference in weight of the internal organs was significant.

Results: It was observed that the weight of the heart, liver, lungs, kidneys and brain were smaller compared to values in textbooks with a p-value of $p<0.001$, while the spleen was bigger than textbook values with a p-value of $p=0.004$. The differences in the weights of internal organs was attributed to the differences in body sizes between the European population and the subjects at NTH. Further, the larger spleen that was observed in the NTH subjects was attributed to parasitic infections like malaria which is endemic in Zambia.

Conclusion: The average weights of internal organs in the study subjects at Ndola Teaching Hospital were smaller when compared to textbook values, except for the spleen which was bigger.

Title: A disruptive cue improves handwashing in school children in Zambia

Authors: Anne Martin[1], Tabonga Naluonde[1], Christina Wakefield[2], Laurie Markle[3], Rim Abdullah[4], David A Larsen[4]

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Background: Behavioral economics hold great promise in changing patterns of behavior that influence human health. Handwashing with soap is one such behavior that is important in reducing exposure to pathogens, and in school-age children, handwashing helps reduce absenteeism through the prevention of respiratory and diarrheal diseases. However, the gap between knowledge on the importance of handwashing and actual handwashing practice, especially with soap, persists. Many traditional behavior change communication approaches have failed in achieving and sustaining improved handwashing practices. Cognitive psychology research on habits as well as nudge theory, a component of behavioral economics predicated on the idea of making a behavior as easy as possible to do, suggests that introducing a disruptive cue into the environment may be able to interrupt current habitual neurological patterns to effect and then sustain behavior change.

Methods: We used a participatory process to identify and introduce a locally appropriate disruptive cue to improve handwashing behavior in schools in Zambia. We then utilized a school-randomized controlled trial to test the soap-on-a-rope in 50 government schools in Namwala District of Southern Province. Two outcomes were considered among school children; washing hands with water and using soap while washing hands.

Results/ Conclusion: Following the intervention, soap use was more likely in intervention schools than control schools (Odds ratio = 7.23, 95% confidence interval = [1.76 – 29.71]), though both intervention and control schools saw an increase in handwashing without soap. This low-cost intervention could be scaled throughout Zambia and may work well in other countries of similar circumstances.

Title: Randomized Controlled Trial of a Multi-Pronged Intervention to Address Prevention of Violence in Zambia

Authors: Flor Melendez[1,2], Jeremy C. Kane[3], Stephanie Skavenski van Wyk[3], Saphira Munthali[2], Mwamba Mwenge[2], Laura K. Murray[3]
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Aim: To describe the common elements treatment approach (CETA) intervention and present study findings from a randomized controlled trial of CETA's effectiveness in reducing intimate partner violence (IPV) and associated hazardous alcohol use compared to treatment as usual (TAU).

Methods: JHU and Serenity Harm Reduction Programme Zambia (SHARPZ) implemented a trial of CETA across three different sites in Lusaka. Participants were adult women and their male partners (i.e., married couples or couples who were dating). To be eligible for the study, women had to report recent moderate-to-severe IPV perpetrated by their male partner (measured by scoring ≥11 on Severity of Violence Against Women Scale). Additionally the male partner had to have recent hazardous alcohol use (evidenced by scoring ≥ 8 on the AUDIT) as reported by either himself or by his female partner. Families were randomized to receive either: 1) CETA, a cognitive-behavioral therapy-based treatment, for approximately 6-12 weeks; or 2) TAU. CETA sessions were delivered separately to women and men. The primary outcomes were IPV and hazardous alcohol use. Participants were assessed for outcomes via audio computer assisted self-interviewing (ACASI) at baseline, post-CETA treatment (approximately 4-5 months after baseline), and 12 months post-baseline.

Results: A total of 248 families were enrolled into the study; 123 were randomized to CETA and 125 were randomized to TAU. At baseline, women reported high rates of experienced violence at the hands of their partner (51% reported being slapped, 59% pushed or shoved, 49% hit with a fist, 33% beaten, choked, kicked, burned, or dragged, 25% assaulted or threatened with a weapon, and 64% sexual assault. We also found very high rates of comorbidity: 90.3% of women, 92.3% of men experiencing two or more conditions (depression, trauma, alcohol use, substance use, HIV, and/or physical disability).

At 12-month post assessment women and their male partners who received CETA reported significantly greater reductions in experiencing and perpetrating violence. Among CETA participants, physical violence reduced from 80.3% at baseline to 37.9% 12 months post-baseline; sexual violence reduced from 81.9% at baseline to 35.7% 12 months post-baseline. Participants who received CETA also showed clinically and significantly greater reductions in alcohol use compared to participants who received TAU (effect size=0.43, $p<.05$).

Conclusion: The high prevalence of comorbidity underscores the need for treatments such as CETA, which are designed to be flexible and address a range of co-occurring problems. CETA is an effective intervention for reducing violence and alcohol abuse as well as mental health symptoms. Treatment of these problems can improve the physical health of individuals, increase economic productivity and decrease burden on the health care system at the community level. Scale up and sustainability of CETA are crucial and should be integrated into the National Health Policy and Planning.

Title: Molecular characterization of Cryptococcus species detected directly from cerebral spinal fluid samples in Zambia using PCR-sequencing method

Authors: John Mwaba[1,2], David Ojok[1], Innocent Mwape[1], Suwilanji Silwamba[1], Caroline Chisenga[1], Geoffrey Kwenda[3], Mox Kalumbi[4], Aaron Shibemba[4], Joseph Ngulube4, Hamakwa Mantina[4], Izukanji Sikazwe[1], Roma Chilengi[1]

1. Centre for Infectious Diseases Research in Zambia (CIDRZ), 2. Department of Biomedical Sciences, School of Health Sciences, University of Zambia, 3. UNZA School of Health Sciences, 4. University Teaching Hospital,

Background: Cryptococcosis is a clinically important yeast infection that remains a main source of morbidity and mortality, especially in individuals infected with HIV.
Laboratory diagnosis of cryptococcosis from cerebrospinal fluid (CSF) samples is traditionally based on microscopic examination of India ink preparations, detection of cryptococcal capsular polysaccharide antigen by a latex agglutination test as well as culture methods. These methods are either less sensitive or take a long time for results to be ready. This study aimed at detecting and genotyping Cryptococcus species directly from CSF samples submitted to the microbiology laboratory as part of routine hospital clinical care at the University Teaching Hospital (UTH) using PCR-sequencing methods.

Methods: A total of 196 stored CSF samples were accessed from UTH. Nucleic acid extraction was carried out using manual Zymo kits (Zymo Research, USA) and automated NucliSENS easyMAG platform (BioMerieux) following manufacturer's instructions. PCR was performed using two nested-primer pairs specific for internal transcribed spacer regions of ribosomal DNA of C. neoformans. Applied Biosystems 3130xL automated sequencer was used for Sequencing PCR products. DNA sequence analysis was performed using sequencher version 5.4.6 software. Sequence data to determine strain identity was generated by searching through the BLAST system at National Center for Biotechnology Information. Molecular Evolutionary Genetics Analysis (MEGA) version 6.0 software was used to construct a phylogenetic tree.

Results: Of the 196 CSF samples tested, 10% were positive for Cryptococcus species. All 20 (100%) samples were sequenced and identified as Cryptococcus neoformans var grubii with 99% similarity coefficient. Sixty two percent (122/196) samples were from male patients. Majority of samples (75%) had no clinical details indicated, 24% were requests for meningitis while 1% accounted for TB meningitis diagnosis.

Conclusion: This work demonstrates for the first time the use of molecular techniques in Zambia to detect Cryptococcus neoformans var grubii directly from CSF and may represent a promising method in the diagnosis of Cryptococcus meningitis.

Title: Continuous monitoring of sample acceptance rates and training of clinic personnel involved in sample collection reduced laboratory specimen rejection rates at a reference laboratory in Zambia annually over a 4-year period

Authors: David Ojok[1], Mabvuto Phiri, David L. Mwila, Mwila Mwanakatwe, Chileshe Mwashika, Namatama Simatele, Anna K. Bwalya, Bertha Chibwe, Jacinta Muyaba, Nandi Mwangilwa, Ranjit Warrier

1. Centre for Infectious Disease Research in Zambia (CIDRZ)

Background: The CIDRZ Central Laboratory (CCL) receives blood, plasma, and dried blood spot specimens from across Zambia for routine clinical testing. The sample collection and test ordering stage is critical in ensuring quality results, as errors there can lead to incorrect testing and incorrect reporting of results. Under the guidelines for ISO15189:2012 that govern clinical laboratories, samples that do not comply with the CCL acceptance criteria are rejected. The rejection criteria include mismatched demographics, incorrect collection vessels, insufficient volumes, and exceeding stability times for the ordered tests. The aim of this study was to improve the acceptance rates by continuous monitoring of reasons for rejection and immediate feedback followed by training of clinical staff who collected the rejected sample.

Methods: All samples and requests sent to CCL were reviewed and recorded during 48 months between January 2014 to December 2017. Rejected specimens and reasons for rejection were recorded daily on to an excel worksheet for analysis.

Results: Total number of samples received in the years; 2014, 2015 and 2016 were 120,000, 130,000 and 100,000 respectively. Cumulatively, 2% of specimen were rejected over the 4-year period. By documentation of rejected samples and periodic training of healthcare personnel, we were able to reduce the absolute sample rejection to 1% in 2015, down from 3% in 2014. There was also further improvement in 2016 with 99.2% of samples accepted, and only 0.8% rejected.

Discussion: Specimen management plays a key role in the quality of laboratory results. We reviewed in the steps in the pre- analytical phase, including appropriateness in test requests and request forms, patient and sample identification, and quality of specimen transportation. Our data indicate improvement over the two years as a result of continuous sharing of information with collection centers and training.

Title: Direct Biomarkers of Microbial Translocation Correlate with Immune Activation in Adult Zambians with Environmental Enteropathy and Hepatosplenic Schistosomiasis

Authors: Patrick Kaonga[1], Evans Kaimoyo[1], Ellen Besa[2], Kanekwa Zyambo[2], Edford Sinkala[1], Paul Kelly[2]
1. University of Zambia, 2. TROPGAN

Background: Microbial translocation is the movement of microbes or microbial products across the intestinal barrier into the blood stream and other sterile sites. It is a poorly understood consequence of several disorders such as environmental enteropathy (EE) and hepatosplenic schistosomiasis (HSS). Herein, we set out to compare biomarkers of microbial origin, host immune response to microbial translocation and immune activation in adults with these disorders and in healthy controls.

Methods: An unmatched case-control study was conducted in participants with EE (n=67) recruited from Misisi compound, Lusaka, Zambia, with two comparison groups, HSS participants (n=86) and healthy controls (n=41) from The University Teaching Hospital, Lusaka, Zambia. Plasma lipopolysaccharide (LPS) was measured by Limulus Amoebocyte Lysate Assay, plasma 16S rRNA gene copy number was quantified by quantitative real-time PCR, Toll-like receptor ligands (TLRLs) activity by QUANTI-Blue detection medium, plasma biomarkers of host response (C-reactive protein, soluble CD14, soluble CD163 and lipopolysaccharide-binding protein) to microbial translocation were measured by ELISA and cytokines (TNF-α, IL-6, IL-10, IL-4, IL-2, IFN-γ and IL-17) from cell culture supernatant by Cytometric Bead Array.

Results: The median for plasma lipopolysaccharide levels were elevated in EE group (378.9 [82.7 - 879.5 EU/ml]) compared to participants with HSS (213.1 [77.2 - 358.3 EU/ml]); p=0.03 or healthy controls (202.3 [43.2 - 251.1 EU/ml]); p=0.01. The 16S rRNA copy number were significantly elevated in the EE group (2651 [529 – 8779 copies/µl]) compared to the levels in participants with HSS (387 [165 - 1990 copies/µl]; p<0.001) or healthy controls (193 [132 – 455 copies/µl]; p<0.001). TLRLs activity was significantly higher in the EE group (0.49 [0.0 - 0.8 OD units]) than in participants with HSS (0.13 [0.0 - 0.8 OD units]; p=0.01) or the healthy controls (0.02 [0.0 - 0.12 OD units]; p=0.004). Host immune response to microbial translocation measured by soluble CD14 was higher in the EE group (1959 [1582 - 2669 ng/ml]) compared to participants with HSS (1712 [1389 - 1964 ng/ml]; p<0.001) or healthy controls (median 1170 [1045 - 1489 ng/ml]; p<0.001). Lipopolysaccharide-binding protein was elevated in the EE group (38.9 [34.3 – 45.1 ng/ml]) or participants with HSS (41.2 [24.3 – 51.3 ng/ml]) compared to healthy controls (23.9 [20.1 – 28.9 ng/ml]; p<0.001). Soluble CD163 was higher in the EE group (685.4 [497.2 – 941.9 ng/ml]) compared to healthy controls (421.6 [274.3 – 663.5 ng/ml]; p<0.001). In multivariate analysis after controlling for baseline characteristic, direct biomarkers of microbial translocation measured from cell culture supernatant were predictors of TNF-α, IL-6, and IL-10 from EE participants and HSS patients but not in healthy controls.

Conclusion: These data provide correlative and predictive evidence that microbial translocation contributes to systemic cytokines activation in two disorders common in the tropics and support the model that proposes that biomarkers of microbial origin in the gastrointestinal tract move across a compromised intestinal barrier leading to heightened immune activation in conditions with intestinal barrier dysfunction.

Title: Evaluation of the SD Bioline Cholera Rapid Diagnostic Test During the 2016 Cholera Outbreak in Lusaka, Zambia

Authors: John Mwaba[1,2,3], Eva Ferreras[4], Elizabeth Chizema-Kawesa[5], Daniel Mwimbe[6], Francis Tafirenyika[7], Jean Rauzier[8], Alexandre Blake[4], Ankur Rakesh[4], Geoffrey Kwenda[9], Anne-Laure Page[4]

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Background: Cholera is an important public health problem globally. More than 1.3 billion people are at risk, of whom 1.3 to 4.0 million contract cholera with an estimated 21,000 to 143,000 fatalities each year. Culture or Polymerase Chain Reaction (PCR) is considered the gold standard for the identification of the bacterium responsible of causing. However, both these methods require good laboratory infrastructure and highly skilled staff that are often not readily available in areas where outbreaks occur. The aim of this study was to assess the performance of the SD Bioline Cholera Ag O1/O139 rapid diagnostic test (RDT) compared to culture and PCR for the diagnosis of cholera cases during an outbreak.

Methods: The RDT and bacterial culture were performed on site using fresh stools collected from cholera suspected cases, and from stools enriched in alkaline peptone water. Dried stool samples on filter paper were tested for V. cholerae by PCR in Lusaka (as part of a laboratory technology transfer project) and at a reference laboratory in Paris, France. . A sample was considered positive for cholera by the reference standard if any of the culture or PCR tests was positive for V. cholerae O1 or O139.

Results: Among the 170 samples tested with SD Bioline and compared with the reference standard, the RDT showed a sensitivity of 90.9% (95% CI: 81.3-96.6) and specificity of 95.0% (95% CI: 89.1-98.4). After enrichment, the sensitivity was 95.5% (95% CI: 87.3-99.1) and specificity 100% (5% CI: 96.5-100).

Conclusion: The observed sensitivity and specificity were within recommendations set by the Global Task Force for Cholera Control on the use of cholera RDT (sensitivity=90%: specificity=85%). Although the study sample size was small, our findings suggest that the SD Bioline RDT could be used in the field to rapidly alert public health officials to the likely presence of cholera cases when an outbreak is suspected.

Title: Assessment of Environmental Factors Associated with Endemic Cholera in Lukanga Swamps of Kapiri Mposhi District in Central Province of Zambia from 2010 to 2016.

Authors: Simeon Sikwiiya[1,2], Prof. K. S. Baboo[3], Chisala Meki[3], Patricia Mubita[3], Roma Chilengi[2]

1. University of Zambia School of Public Health, 2. CIDRZ, 3. University of Zambia (UNZA)

Background: Cholera, an acute diarrheal disease, caused by the bacteria Vibrio cholerae is usually transmitted through water or food contaminated with faecal matter. The diarrhoea becomes very severe in about 10–20 % of these individuals and in untreated patients with severe dehydration, the case fatality (CFR) may exceed 50% within hours. The Lukanga swamps with a surface area of 13,520 km2, comprises a treeless lake and marsh ecosystem which is an intricate maze of reeds, pools, channels, and larger bodies of open water. In this wetland cholera has been recurring for a number of years now. Despite the recurrence of cholera outbreaks in the Lukanga swamps, little is known about the conditions of the environmental factors associated with endemic cholera within that aquatic environment. This study assessed the environmental factors (air temperature, precipitation) associated with endemic cholera in Lukanga Swamps from January, 2010 to December, 2016. The study also specifically sought to describe the sociological conditions (water quality and sanitation) and microhabitat conditions (water pH and water conductivity) and to isolate the Vibrio cholerae from 19 Lagoons of the Lukanga swamps.

Methods: This research was a Time Series correlational Study. Air temperature and precipitation data was collected from 19 lagoons using satellite remote sensing on weekly basis from 2010 to 2016 after geocoding each lagoon using a GPS. Weekly temperature and rainfall were then aggregated to achieve monthly average air temperatures and rainfall. Data was then entered into excel and imported into Stata version 14 (Stata Corp., College Station, TX, USA) for analysis. Considering the count outcome variable, a Poisson Regression Model controlling for seasonality and trend was built to estimate the association between the monthly number of cholera cases and average monthly air temperature and rainfall. 36 water samples were collected for quality monitoring and sent to Food and Drugs Laboratory for isolation of faecal coliforms.

Results: The study revealed that increased amount of rainfall was associated with decreased risk of cholera cases (IRR = 0.989, 95% CI: 0.9846 – 0.9936, p=0.001). The study also found out that one degree increase in temperature increased the risk of cholera cases by 65% and was statistically significant with (IRR = 1.647, 95% CI: 1.522 – 1.782, P-Value 0.000). Water quality monitoring tests revealed that 19 (50%) of water samples had faecal coliforms.

Conclusion: The results have shown that Lukanga Swamps are more prone to cholera outbreaks during the dry season, probably due to direct exposure to the natural reservoir of V. cholerae. Air temperature was found to be the best predictor associated with cholera outbreaks in the Lukanga Swamps and it shows promise in predicting these outbreaks with a lag time of two months prior to temperature rise. This study contributes to evidence generation in managing the disease and developing early warning systems of outbreaks for impactful interpolations in this epoch of climate change in that aquatic environment.

Title: A Review of Resistance Patterns among children and adolescents on First and Second Line Antiretroviral therapy at the University Teaching Children's Hospital, Lusaka, Zambia

Authors: R. Ginwalla[1], C Chileshe[1], M Mwiya[1], R Thomas[1], M Tonga[1], C Kankasa[1]
1. University Teaching Children's Hospital

Background: With an increasing number of adults and children on ART, reaching the last 90% target of viral suppression, especially in children remains a challenge. In this study we aimed to analyze the resistance patterns in pediatric and adolescent patients receiving HIV care and treatment at the University Teaching Children's Hospital in Lusaka, Zambia.

Methods: We conducted retrospective data collection on the pediatric and adolescent patients (aged 2 to 20 years on antiretroviral treatment (ART) with identified virologic failure (viral load >1000 copies/mL) and viral genotype resistance test results from May 2016 through December 2017. Descriptive statistics were used for data analysis.

Results: During the 20 month study period, a total of 175 patients were identified with virologic failure and resistance test results. Of those, 65 patients were on first line ART (47 on non-nucleoside reverse transcriptase inhibitor (NNRTI)-based and 18 on protease inhibitor (PI) based ART with nucleoside reverse transcriptase inhibitor (NRTI) backbone), and 102 were on second line protease inhibitor regimen with NRTI backbone; no ART data were available for eight patients. The patients on PI based regimen were younger (all <7 years, median age 5 years) and were all on the Lopinavir/ritonavir (LPV/r) syrup.
Resistance to any class of drugs was reported in 146 patients (83%). Of the 47 on NNRTI ART with Nevirapine (NVP) or Efavirenz EFV, 43 (91%) had developed resistance to NNRTIs (K103 in 55%). A single patient on NNRTI based ART had a PI primary PI resistance mutation with no prior exposure to PI treatment. Five of the 18 (28%) patients on the first line LPV/r based regimen had developed high level resistance Lopinavir and Atazanavir.
Of the 102 patients failing virologically on **second line** PI-based regimen, 14 (14%) had developed PI resistance. The most common PI mutations for 20 patients with PI mutations (as 1st part of or 2nd line) were I54V(75%), M46I/L (25%), L76V (25%) and V82A (20%). Fourteen out of 20 patients with PI-based ART failure had 3 or more major PI mutations. NRTI mutations were reported in 103 patients (59%), which majority having M184V (43%) mutation, followed by L74V/I (15%), Y115F (13%) and K65R (6%). Multiple TAMS of three or more were reported in 6% of all patients.

Conclusion: In our cohort of treatment-experienced children with virologic failure and viral resistance test results available, we observed high rates of the NRTI (59%) and NNRTI resistance (93%) and low rates of PI resistance. Resistance to PIs was twice higher among younger children (<7 years) on LPV/r syrup-based ART compared to older children on solid PI formulations. Ongoing analysis of the resistance patterns among pediatric and adolescent patients with treatment failure is needed to determine best treatment failure management strategies.

Title: Community Health Workers: Scalable Foot Soldiers for Case Management and Surveillance for Malaria Elimination in Zambia

Authors: Marie-Reine I. Rutagwera[1], Christopher Lungu[1], Ingwe, M. Mercy[2], Busiku Hamainza[2], John Miller[1]
1. PATH/MACEPA, 2. Zambia MOH/NMEC

Background: Zambia Ministry of Health has a goal of achieving malaria elimination by 2021. One of the strategies being employed since 2011 is to involve Community Health Workers (CHWs) to provide community malaria case management and surveillance through reactive case detection (RCD). Hence CHWs are counted as foot soldiers in the fight to eliminate malaria. To date about 3360 CHWs are actively working in the southern Zambia to track malaria burden trends (local and imported) and key malaria diagnostic and treatment commodities to guide intervention in a timely manner. Presented here is a review progress made by CHWs from 2014 to 2017 with RCD activities and lessons learned in southern province with 1650 CHWs for scaling up RCD throughout Zambia.

Method: RCD is triggered when a patient seeking care at a health facility or at a community health worker is confirmed to have malaria (an index case). The investigation tracks index cases back to their corresponding households and neighborhoods within 140m radius, where individuals in this area are tested and those confirmed to have malaria are treated. Then a data Community Health Worker collects all the reports from other CHWs in his area and submits individual reports java enable low cost mobile phones into the open-source District Health Information System (DHIS2). Data can then be viewed and analyzed by all stakeholders using already built in dashboards in DHIS2 and Tableau. 2014 to 2017 Southern province malaria incidence data was analyzed using Tableau.

Results: The data for the period under review shows that malaria incidence has dropped from 113.8 in 2014 the year in which 12 districts out 13 had fully implemented community malaria surveillance to 37.3 in 2017. In 2014, about 30.9% of confirmed malaria cases were identified by CHWs, this number increased to about 60.8% in 2017.

Conclusion: Zambia's malaria elimination goal can be achieved with prompt detection and effective treatment of malaria cases as this will help to reduce malaria severe cases and prevent onward malaria transmission. With the involvement of CHWs, distance patients would have otherwise travelled to the health facility has been shortened thereby reducing the time between the onset of the symptoms, diagnosis and treatment which is vital in an elimination setting. Timely acquisition of quality data in a more focalized manner help gain insight of the granularity of malaria transmission patterns to efficiently deploy supplies, plan interventions, and focus attention where most needed. The involvement of CHWs in community malaria case management, malaria elimination go can be achieved in Zambia.

Title: Marked variations in Pro-inflammatory and Regulatory cytokines and chemokines among children with cerebral malaria and bacterial meningitis in Zambia

Authors: James Chipeta[1], Daniel Mwimbe, Agnes Mtaja, Mable Mwale-Mutengo, Evans Mulendele, Monique Stins

1. University of Zambia School of Medicine

Background: Plasmodium falciparum is the most virulent malaria parasite species and is responsible for the majority of the global severe malaria disease burden. It is now evident that Plasmodium malaria disease pathology is a matter of balance between pro- and anti-inflammatory host immune response to the parasite. In our previous in vitro cerebral malaria (CM) pathogenesis blood-brain barrier (BBB) model studies, we have shown that Plasmodium falciparum–infected erythrocytes induce NF-_B regulated inflammatory pathways in human cerebral endothelium resulting into a 100-fold increase of pro-inflammatory cytokines/chemokines including CCL20, CXCL1, CXCL2, IL-6, and IL-8, suggesting a possible important role these immune moieties could be playing in CM pathogenesis at BBB- endothelium level. In the current study we sought to assess the serum and cerebral spinal fluid (CSF) in-vivo profiles of these cytokines and chemokines in children with CM compared to other common neurological infections.

Methods: A total of 12 children admitted to Lusaka University Teaching Children Hospital (LUTCH) in Zambia with CM were enrolled along with three sets of study patient controls of: bacterial meningitis (n=17), Encephalitis (n=2), and meningoencephalitis (n=2). Serum and CSF concentrations of selected pro- and anti-inflammatory cytokines as well as chemokines for all the study participants using LUMINEX Immune assay (Magpix) were determined. We used statistical analytical methods to ascertain whether particular sets of cytokines/chemokines were correlated to known clinical factors of CM disease severity or were prominent across the studied controls.

Results: Of the cytokines/chemokines investigated there was remarkable increased profiles of pro/anti-inflammatory cytokines (IL-6, IL-8, IL-23) and chemokines (IP-10, CCL20, sICAM-1, angiopontin-1, angiopontine-2, MCP1 and CXCL1) with statistical significant variations across the cases and controls. IL-6, IL-8, MCP1 levels were, both in sera and CSF, lower in CM patients compared to all study case controls. Levels of the chemokines were variable in sera and CFS across the study controls with ICAM-1, angio1, CCL20, and IP-10 being lower in CM cases compared to the study controls. CXCL1 was significantly higher in CM compared to study controls.

Conclusion: In conclusion these results show distinct variations in cytokine sera and CSF levels between CM and other CNS infections suggesting that cytokines and chemokines contribute variably to CM pathogenesis as compared to non- malaria CNS infections. This is probably via different regulatory mechanisms and may represent potential targets for future novel therapeutic intervention in CM.

Title: Prevalence of Glucose- 6-Phosphate Dihydrogenase Deficiency (G6PD) and Subclinical Gametocytaemia Among Adults and Children in High And Low Malaria Transmission Zones of Zambia.

Authors: Reggison Phiri[1], Nzooma M. Shimaponda-Mataa, Chisanga Chileshe, Kai Nachilima, Michael Musonda, Mable Mwale-Mutengo, and James Chipeta

1. University of Zambia School of Health Sciences

Background: Critical to malaria elimination activities is the breaking of malaria transmission which is currently achieved by vector control methods or by chemotherapeutical approaches utilising antimalarial drugs such as primaquine. However, in many malaria endemic countries in Africa, including Zambia, primaquine use may be contraindicated due to perceived high prevalence of Glucose 6 phosphate dehydrogenase deficiency (G6PDd). Literature on the prevalence of G6PDd in Sub-Saharan Africa, especially Zambia, is scanty. On the other hand, effective clearance of asymptomatic and subclinical parasitaemia is crucial for achievement of malaria elimination goals but clinical profiles of these are not well documented in Zambia. Thus, this study sought to determine the prevalence of G6PDd and subclinical gametocytaemia in low and high malaria transmission zones of Zambia.

Methods: The study was cross sectional involving a total of 384 participants (320 in high and 64 in low malaria transmission zones, respectively). A World Health Organisation certified G6PD Rapid Diagnostic Test (RDT) kit was used to detect G6PDd while determination of subclinical gametocytaemia was by PCR and conventional microscopy using thick film for Plasmodium detection and thin film for Plasmodium species identification.

Results: Gametocyteamia prevalence by microscopy in high transmission zones was 2.8% (9/320) and 0% in low transmission zone . G6PDd prevalence in high transmission zone was 2.5% (8/320) and 0% in low, of the 8 G6PDd individuals, 7 (87.5%) were male and 1 (12.5%) was a female. Malaria species prevalence by microscopy in high was 2.8% (9/320) and they were all Plasmodium falciparum species. In low transmission zone, malaria species prevalence by microscopy was 0% (0/64). However, RDT yielded a malaria prevalence of 33.1% (106/320) in high and zero percent in low. PCR has yielded subclinical Gametocyteamia (Pfs 25 gene) prevalence of 9.1% (29/320).

Conclusion: Though preliminary and notwithstanding the study limitations, the generated results on subclinical gametocytaemia and G6PDd profiles in high and low malaria transmission zones are important and will inform national policy in the ongoing current national malaria elimination activities.

Title: The morbidity and mortality pattern of malaria in children in a very low transmission setting: a cross sectional study

Authors: Patricia Mupeta Bobo[1], Chishala Chabala, Gershom Chongwe, Evans Mulendele, Mable-Mwale Mutengo, Daniel Mwimbe, Nirbhay Kumar, James Chipeta
1. Ministry of Health, Maternal and Child Health Unit

Background: Malaria remains endemic in Zambia with varying transmission intensities across the country despite several strides of national control interventions. Malaria morbidity and mortality data across varying transmission zones is necessary for informed national malaria control programs but such data is scanty in sub-Saharan Africa including Zambia. We thus, investigated the morbidity and mortality pattern of malaria at the University Teaching Hospital (UTH), Lusaka, Zambia, an area of very low transmission intensity.

Methods: Residents of Lusaka aged 0 - 15 years with Malaria Parasite Blood slide (MPS) or Malaria Rapid Diagnostic Test (RDT) confirmed malaria were enrolled between November 2014 and August 2015. Demographic characteristics, clinical presentation, laboratory and treatment outcomes of the respective enrolled participants were collected using a questionnaire and analysed using STATA statistical package version 12.

Results: A total of 109 children aged between 2 months to 15 years (median 5.6 years; inter quartile range [IQR] 3 – 8 years) were enrolled. The commonest symptom was fever at 94%. Proportions of uncomplicated and complicated malaria cases were 50.5% and 49.5%, respectively. History of travel was 54.6% among those with complicated and 45.4% with uncomplicated malaria. Infancy was not significantly associated with an increased risk of complicated malaria compared to ages 1-5years (OR 0.18, 95 CI: 0.02 – 1.67, p=0.13) and over 5 years (OR 0.18, 95 CI: 0.02 - 1.64, p=0.13). Children without history of travel were less likely to suffer from severe malarial anaemia compared to those who had (OR 1.65, 95 CI: 0.69 – 3.95, p=0.26). Infancy compared to ages 1-5 years (OR 0.64, 95 CI: 0.08 – 4.89, p=0.67) and above 5 years (OR 0.92, 95 CI: 0.13 –6.38, p=0.93) and history of travel (OR 0.38, 95 CI: 0.12 – 1.25, p=0.17) were not significantly associated with increased risk of cerebral malaria. Four (3.7%) deaths occurred all without history of travel and from cerebral malaria (CFR 21.1%).

Conclusion: Severe malarial anaemia was the commonest disease pattern. Mortality was unexpectedly low in this cohort of children. There is need for similar studies to be done periodically to monitor changes overtime and inform ongoing national malaria control and elimination activities.

Title: Evidence for optimal childhood TB diagnosis and treatment; The SHINE, SURE and TB-SPEED research studies

Authors: Chishala Chabala[1], Monica Kapasa[2], Kevin Zimba[3], Khozya Zyambo[4], Bwendo Nduna-Chansa[5], Chalilwe Chungu[6], Mwate Mwambazi[5], Joyce Lungu[2], Veronica Mulenga[2]

1. University Teaching Hospital-Children's Hospital, Lusaka, 2. University Teaching Hospital, Lusaka, 3. Matero Hospital, Lusaka, 4. Lusaka District Medical Office, 5. Arthur Davison Children's, Hospital, Ndola, 6. Chilenje Hospital, Lusaka

Background: Historically research in tuberculosis has prioritized adult with extrapolation of results to children. This often results in implementation of approaches that do not adequately address the unique challenges of diagnosis and treatment of tuberculosis in children. The SHINE, SURE and TB SPEED studies aim to address gaps in knowledge in the treatment of non-severe tuberculosis, tuberculous meningitis and diagnosis using innovative approaches respectively.

Methods: SHINE trial is an ongoing multi-centre, randomized controlled trial comparing a 4-month vs the standard 6-month regimen of TB using revised WHO paediatric anti-tuberculosis drug doses. The study will recruit 1,200 HIV-infected and HIV-uninfected children below 16 years with non-severe TB in Zambia, Uganda, South Africa and India. The primary efficacy and safety endpoints are TB disease-free survival 72 weeks post-randomisation and adverse events. Nested pharmacokinetic studies will evaluate anti-tuberculosis drug concentrations, providing predictions for optimal dosing, and measure antiretroviral exposures in order to describe the drug-drug interactions in a subset of HIV-infected children. Results are expected in 2020.
SURE trial is a multi-centre, factorial design, randomised controlled trial of HIV-infected and HIV-uninfected children with tuberculous meningitis(TBM) in Afica (Zambia, Zimbabwe, Uganda) and Asia (Vietnam). The study will compare the efficacy and toxicity of a short intensive 6-months anti-tuberculosis regimen vs standard WHO-recommended 12-month regimen. Additionally, the study will evaluate the effect of low dose aspirin compared to placebo in decreasing neurological disability in children with TBM. The primary efficay and safety end points are mortality or severe neurological sequelae and adverse events at 72-weeks post-randomisation. Nested PK studies will assess optimal dosing and drug-drug interaction of the interventions. The trial will commence in 2019.
TB SPEED is a multi-country study implemented in seven countries of Africa and Asia (Cambodia, Cameroon, Côte d'Ivoire, Mozambique, Sierra Leone, Uganda, and Zambia). The study will contribute to screen a total of approximately 77,000 children in the participating countries. The diagnostic approach will include; use of Xpert Ultra applied on nasopharyngeal aspirates and stool samples, use of digital chest radiography, as well as training and mentoring of clinicians to screen and diagnose paediatric TB. Systematic screening for tuberculosis of the most vulnerable children with HIV-infection, severe malnutrition and severe pneumonia will be undertaken. The main outcomes are case detection, mortality and cost-effectiveness of the intervention. Clinical activities will commence in 2019.

Discussion: The SHINE trial will inform whether treatment shortening of drug susceptible TB is efficacious and safe in children; it will also fill existing gaps in knowledge on dosing of new anti-TB formulations and commonly used HIV drugs. The SURE trial will address whether treatment shortening and use of aspirin will contribute to better outcomes in children with TBM. TB-SPEED will carry out research activities aimed at reducing childhood mortality from TB by evaluating innovative cost-effective approaches. All together these studies intend to contribute to better diagnostic and treatment approaches and to reduction in childhood mortality from tuberculosis.

Title: Mineworkers on the Move: Implications for TB control in Zambia

Authors: David Mwakazanga[1], Laura Podewils[2], Sydney Mwanza[1], Jonathan Smith[2], Elizabeth Long[2], Jim Tobias[2], Peter Chipimo[3], Namushi Mwananyambe[3], Webster Kasongo[1]

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Background: Zambia's mining sector has expanded in recent years, and persons are migrating across the country to pursue work in the mines. Mobile populations pose a challenge to TB control efforts by both fostering transmission to multiple communities and disrupting continuity of care. Thus, a better understanding of practices, perceptions, and understanding of TB is needed in this critical population.

Methods: Knowledge, attitudes and practices (KAPs) surveys were administered to mineworkers residing in the Copperbelt and North-Western Provinces in Zambia as part of the Zambia Assessment of TB and HIV in the Mines (ZATHIM) project. Population proportional to size was used to determine the study sample and convenience sampling was used to recruit participants in mining communities. KAP surveys were also conducted among healthcare workers (HCWs) at government and mining company facilities providing TB and HIV services. Proportions were calculated to summarize the findings.

Results: One thousand nine-hundred and fifty-six (N=1,956) current mineworkers and 94 HCWs completed KAP surveys. Mineworkers worked a median of 9 years in the mines (interquartile range [IQR]: 5-13); 31% of mineworkers with <10 years of experience had worked for >2 different mining companies, and 7% had worked at >3 different companies. Over one-third (34%) of mineworkers maintained both a mining residence and a family home elsewhere. Surveyed mineworkers visit their family residence a median of 6 (IQR: 3-12) times in a 3-month period. Only 30% of HCWs stated they had a formal referral system in place for transferring TB patients to another community; and most (94%) agreed that such a system would enhance national TB control.

Conclusion: Mineworkers in Zambia today often undergo transitions in employment and in residences. These data highlight the need to implement a comprehensive, national program with coordinated notifications and referrals in order to provide continuity of TB care for mineworkers.

Title: Zambia mineworkers' perceptions of self-efficacy, cues to action, and barriers to accessing TB services

Authors: Kelvin Kapungu[1], Tyler J. Fuller[2], Kathryn Curran[2], Elizabeth F. Long[2], Laura Jean Podewils[2], Jonathan Smith[2], David Mwakazanga[1], Webster Kasongo[1], Sydney Mwanza[1]
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Background: Zambian mineworkers are disproportionately affected by tuberculosis (TB) yet little is known about their perceptions and experiences accessing TB testing and treatment. We sought to understand mineworkers' perceived self-efficacy, barriers, and facilitators to accessing TB services.

Methods: From September–December 2017, we conducted 2,782 semi-structured surveys and 30 focus group discussions (FGDs). Convenience and purposive sampling methods were used to recruit mineworkers and ex-mineworkers on the Copperbelt and Northwestern provinces of Zambia. Survey response frequencies were generated and key themes were determined by applying inductive and deductive codes derived from the Health Belief Model.

Results: The majority of survey respondents displayed overall self-efficacy for accessing TB services, 95% (2577/2712) knew that TB could be cured; 96.2% (2659/1763) felt they could be diagnosed, if they had TB; and 98.6% (2742/2782) felt they could get TB treatment, if needed. However, FGD participants showed low self-efficacy in overcoming barriers to accessing TB services, such as: limited choice in where they were allowed to seek care, fear of potential loss of privacy of medical information, and limited transportation. To raise self-efficacy in overcoming barriers to TB services, FGD participants indicated social support was critical. For example, peer-mineworkers and family support were cited as facilitators of care for some miners and creating a barrier to seeking care for other FGD participants. Similarly, survey respondents expressed varying levels of willingness to disclose a hypothetical TB diagnosis to their spouse (2059/2792, 73.8%), their friend or workmate (1445/2792, 51.8%), and their supervisor (644/2792, 23.1%).

Conclusion: Self-efficacy was identified as common theme in our data with mineworkers reporting high overall self-efficacy, but describing low self-efficacy in overcoming barriers to services during FGDs. Family, friends, and coworkers were important sources of social support. Activities that build trust in mine company healthcare, promote community TB awareness, and strengthen social support networks among mineworkers may reduce barriers to TB services.

Title: Comparison of Antimicrobial Resistant Neisseria gonorrhea in Ceftriaxone vs Ciprofloxacin Using Multinomial/Proportional Odds Model, at the University Teaching Hospital in Lusaka, Zambia

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Background: The ability of Gonorrhea to develop resistance to antibiotics antagonizes measures that are put in place to control it. As a result, inexpensive treatment regimens of gonorrhea in those countries have been rendered ineffective while efficacious ones are often unaffordable. In Zambia, the lack of an active surveillance system as well as appropriate and structured data management and analysis tools further magnifies the problem because this makes it difficult to monitor trends. In gonorrhea, there is a close relationship between therapeutic outcome and in vitro susceptibility to antibiotics. Therefore, the aim of this study was to ascertain the effectiveness of Ciprofloxacin (Quinolone) in comparison with Ceftriaxone (Cephalosporin) in treatment of Gonorrhea using Antimicrobial Susceptibility testing.

Methods: Patients at the University Teaching Hospital from the Adult Hospital and from the Women and Newborn Hospital presenting with discharge and symptoms in line with Gonorrhea and gave consent, were recruited into the study. A Questionnaire was administered and genital swabs were collected. The Independent variables were: Sex, Marital Status, Education, Occupation, Monthly Income, More Than one Sexual Partner, Sexual Orientation, ever Slept with a Sex Worker, Residence, Hospital, Drug and Age-group. A hundred and four isolates were obtained and Antimicrobial Susceptibility Testing using Ceftriaxone and Ciprofloxacin was performed. Chi-squared test or Fishers Exact test for Associations were performed were necessary. The data was analyzed using Ordinal logistic regression as the Susceptibility is at 3 levels; Susceptible, Intermediate or Resistant with an assumed Ordinal nature. The Proportionality assumption was checked using Brant test and when violated Multinomial Logistic Regression was used to determine possible factors associated with Antibiotic Resistance.

Results: The overall proportion of patients who had Susceptible, Intermediate and Resistant results were: 47.1% (49), 52.9% (55) and 0 (0) respectively for Ceftriaxone and 68.0% (70), 9.7% (10) and 22.3% (22) for Ciprofloxacin. Ordinal logistic regression shows that in the final model, Males were 4.1 times more likely to have Intermediate or Susceptible results compared to Resistance than females. Ciprofloxacin was 70% less likely than Ceftriaxone of having susceptible or intermediate results compared to resistance and this could be as high as 90% and as high as 40%. Chance finding was ruled out (all p-values <0.05). The findings in the Multi-nomial logistic regression were consistent with that of the Ordinal logistic regression in that, the patients subjected to Ciprofloxacin are less likely to be Susceptible as compared to Resistant when their sex is taken into account. Also, patients were less likely to have intermediate results compared to Resistant however these results could have been to chance finding.

Conclusion: The level of Ciprofloxacin resistance detected in this study (22.3%) is greater than the level (5%) at which an alternative antibiotic regimen is recommended. The level of Ceftriaxone resistance detected (0%). University Teaching Hospital patients presenting with Gonorrhea, Ceftriaxone combined with azithromycin is a satisfactory option for first-line treatment of Gonorrhea.

Title: Prevalence of Tuberculosis in HIV Exposed Neonates Admitted to the University Teaching Hospitals Lusaka

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1. Lusaka Children's Hospital

Background: Tuberculosis is among the leading causes of mortality globally and represents a major health problem. Zambia is among the 30 high TB/HIV burden countries of the world with a national prevalence estimated at 455/100 000 for all age groups. A large proportion of people with TB are in the reproductive age group as such may either be pregnant or have young children. As at 2014 the prevalence of Tb among women attending antenatal care in Zambia was estimated at 1.5% in HIV infected women and 1.4% in uninfected women. There is a close association between maternal TB and HIV infection and postpartum infant mortality and morbidity. Although TB in neonates is rare, a tenfold increase in the risk of acquiring TB in infants born to HIV infected mothers has been documented in high burden settings. We aimed to determine the prevalence of TB in neonates born to HIV infected mothers or those with a history of TB infection.

Methods: A cross sectional study was conducted among neonates born to either HIV or TB infected mother or both. Neonates aged 28 days and below admitted to the University Teaching Hospital, Neonatal intensive care unit and nurseries in the Children's hospital general wards were included if they were exposed to HIV or maternal TB. At enrollment, one gastric lavage sample was collected before the first feed of the day and analysed using Xpert MTB-RIF test. Basic demographic details and clinical information on Tb diagnosis was collected. Descriptive statistical analysis were performed.

Results: One hundred forty nine neonates that met the inclusion criteria were enrolled.T he median age of the neonates was 5 days (IQR; x), mean birth weight was 2.50kg(SD; 0.85), 86 (58%)were full term delivery and 73(49%0) male infants. The mean age of the mothers was 29 years(SD;8.30)110 (74%) were multiparous vs 38(26%0 primiparous. All neonates enrolled in the study were HIV exposed. Only one neonate had a positive household contact of TB. Five cases(3%) of TB were diagnosed;2 out of 149 were bacteriologically confirmed using Xpert MTB RIF test with no rifampicin resistance. In the first bacteriologically confirmed case, TB was detected at age 3 days in a neonate admitted for neonatal sepsis while the second child with severe pneumonia was diagnosed at age 26 days. The first child had no verifiable history of maternal TB, while the other mother had died a few days before the child was hospitalised. The 3/149 neonates clinically diagnosed cases were negative on Xpert MTB-RIF but had abnormal chest radiograph findings and unresolving pneumonias, with poor response to antibiotic therapy.

Conclusion: The prevalence of TB in HIV and Tb exposed hospitalized neonates was 3%.Only 1% were bacteriologically confirmed using Xpert MTB-RIF test performed on gastric aspitares. Further prospective studies are required using more sensitive mycobacterial culture and Xpert ultra alongside a structured clinical approach targeting infants and mothers at risk of Tb to determine the true burden of perinatal disease.

Estimating the Period Prevalence of Non-Convulsive Status Epilepticus among Comatose Adults at the University Teaching Hospital in Lusaka, Zambia

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Objective: To estimate the prevalence of non-convulsive status epilepticus (NCSE) among comatose adults admitted to the adult medical-emergency unit (AMEU) of the University Teaching Hospital (UTH) in Lusaka, Zambia.

Background: Comatose patients with epileptiform discharges on a 30-minute EEG are found to have NCSE 40-60% of time on long-term EEG monitoring. NCSE is a treatable cause of coma but little is known about its epidemiology in sub-Saharan Africa due to limited EEG resources. Extrapolation from western epidemiological data may be inappropriate due to different NCSE etiologies and comorbid conditions.

Methodology: From 10/3/2017 - 4/13/2018, patients were screened daily for a Glasgow Coma Score (GCS) of ≤10. Enrolled patients underwent a 30-minute EEG. Demographic and clinical characteristics including duration of coma, past medical history, and coma etiology, if known, were extracted from charts. Structured neurological exam findings were captured. Patients were followed to discharge or death.

Results: EEGs were completed on 200/322 eligible patients with 122 EEGs being unavailable due to either death (67), recovery to GCS>10, (35), or lost to follow-up within the UTH system (20). Median GCS was 7 (IQR:5-9). Median age was 46 years (IQR:35-63). One hundred six patients (53%) were female. Median coma duration at the time of EEG was 4 days (IQR:2-7). The most common coma etiologies included infection (41%) and stroke (29%). Ten patients (5%) had a history of epilepsy. Fifty-six patients (28%) were found to have epileptiform discharges on routine EEG and 3% were in NCSE. No risk factors for having epileptiform discharges were identified. One hundred thirty-two patients (66%) died, twenty-one (10.5%) were discharged, twenty-one (10.5%) are still currently hospitalized, and twenty-six (13%) were transferred within UTH and lost to follow-up. The presence of epileptiform discharges was not associated with mortality (OR 1.59, 95%CI [0.81-3.15], p=0.18).

Conclusions: Data collection is ongoing. Interim analysis suggests epileptiform discharges are common in adult patients in the UTH AMEU with a GCS of ≤10 regardless of history of epilepsy. Routine EEG suggests 14-20% of comatose adults in this African setting may have NCSE. Mortality among comatose patients is high but not associated with epileptiform discharges. NCSE can be a reversible cause of coma and the potentially high prevalence of NCSE in this patient population underscores the need for further investment in EEG capacity in resource-limited settings.

Evaluating the Impacts of Home-Based Growth Charts and Community Monitoring on Stunting in Zambia

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Background: Despite the continued high prevalence of faltering growth, height monitoring remains limited in many low- and middle-income countries. A growing number of national governments have tried to change parental behavior through financial incentives and by educating parents on best practices for raising their children, including practices related to feeding and nutrition. In general, neither approach provides much information for parents, implicitly assuming that parents either do not need to know about their children's developmental status or that such knowledge would not change their behavior because of other constraints. The objective of this study was to test whether providing parents with information on their child's height can improve children's height and developmental outcomes.

Methods: 127 Villages in Chipata District, Zambia comprising of 547 children with a median age of 13 months at baseline were randomly assigned with equal probability to 1 of 3 groups: home- based growth monitoring (HBGM), community-based growth monitoring including nutritional supplementation for children with stunted growth (CBGM+NS), and control. Primary study outcomes were individual height-for-age z score (HAZ) and overall child development assessed with the International Fetal and Newborn Growth Consortium for the 21st Century Neurodevelopment Assessment tool.

Results: Villages that received growth charts (HBGM) experienced a 22-percentage point reduction in the prevalence of stunting among children malnourished at baseline; in the comparison group, 94 percent of children who had been stunted were still stunted one year later. Community-based growth monitoring with nutritional supplements (CBGM+NS), had positive but non-significant impacts on HAZ for children stunted at baseline and negative impacts for children not stunted at baseline.

Conclusion: The results from this trial suggest that growth monitoring has a limited effect on children's height and development, despite improvements in self-reported feeding practices. HBGM had modest positive effects on children with stunted growth. Given its relatively low cost, this intervention may be a cost-effective tool for increasing parental efforts toward reducing children's physical growth deficits.

Taenia solium in Zambia: time for control and/or elimination

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Background: Taenia solium taeniosis/cysticercosis is a neglected zoonotic parasitic disease complex with significant economic and public health impacts, occurring primarily in developing countries. Reports of the parasite in the developing world have shown the urgent need to control and possibly eliminate the parasite. Available control options target either the intermediate host or the final host. Although stand-alone options have the potential to reduce the occurrence of the parasite, long term or more integrated efforts seem to be required to reach an elimination status. Reports from Zambia indicate that, as in many parts of SSA, the country is endemic for T. solium. Studies have shown endemicity in both the intermediate host and the final host. A recent study also reported that the parasite contributes to more than 50% of the late onset epilepsy in an endemic area in the Eastern Province, highlighting the urgent need for implementation of control measures. The aim of this study was to determine the best control options for the control of T. solium in Zambia.

Methods: Available control options for T. solium were reviewed and current epidemiological data on the parasite in Zambia were used in an agent based disease transmission model, cystiSim, to evaluate selected intervention measures for their potential to achieve either control in the long term or elimination in the short term.

Results: According to the simulations, elimination can be achieved in a community by implementing four monthly interventions for six iterations. The interventions to be applied include human mass drug administration (MDA), and porcine MDA and vaccination. The model also suggested that a control strategy consisting of yearly porcine MDA during five years would lead to a substantial reduction of porcine cysticercosis and taeniosis.

Conclusion: The disease transmission model indicated that control or elimination is possible. However, socio-economic and political factors should be taken into account when designing control programmes. Obviously, the intervention strategies simulated by the model, require to be field tested.

Effects of the computer-based Taenia solium educational program 'The Vicious Worm' after one year: effective knowledge retention in rural primary school students in eastern Zambia

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Background: Taenia solium is a neglected zoonotic parasite endemic throughout many low-income countries worldwide, including Zambia, where it causes human and pig diseases with high health and socioeconomic burdens. Lack of knowledge is one of recognized risk factors, and consequently targeted health educational programs can decrease parasite transmission and disease occurrence in endemic areas.
Preliminary assessment of the computer-based education program, 'The Vicious Worm', indicated that it was effective in creating short-term awareness of T. solium in primary school students in rural areas of eastern Zambia. The aim of this study was to evaluate the long-term impact of 'The Vicious Worm' on knowledge retention by re-assessing the same primary school learners one year after participation in the education program.

Methods: Follow-up questionnaires were administered in three primary schools in Eastern Zambia in July 2017. In total, 87 students participated in the follow-up sessions, representing 88% of the initial workshop respondents.

Results: Knowledge of T. solium at 'follow-up' was significantly higher than at the initial 'pre Vicious Worm workshop' questionnaire round one year earlier, though generally not higher than at the 'post' questionnaire round that took place immediately after the educational component. While some specifics of the parasite's life cycle were not completely understood, the key messages for disease prevention, such as the importance of hand washing and properly cooking pork, remained well understood by the learners, even one year later.

Conclusion: Results in this study indicate that 'The Vicious Worm' as an education too is an effective tool for both short- and long-term T. solium education of rural primary school students in Zambia. Inclusion of educational workshops using 'The Vicious Worm' can be recommended for integrated cysticercosis control/elimination programs in sub-Saharan Africa, particularly if the sessions are simplified to focus on the key messages for prevention of T. solium transmission.

Pigs and Epilespy in Zambia

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Background: Neurocysticercosis, an infection caused by the larval stage of Taenia solium (the pork tapeworm), is a preventable and treatable disease and one of the main causes of epilepsy in low-income countries. Studies in Zambia have indicated high endemicity of T. solium in rural communities where a high prevalence of epilepsy has been reported. It was therefore important to analyze the role of neurocysticercosis as a cause of epilepsy. Diagnosis of the condition, however, relies on neuroimaging techniques, which are not routinely available in our study area.

Methods: In this single-centered, cross-sectional, community-based study, the role of neurocysticercosis (NCC) as a cause of epilepsy was examined. People with epilepsy (PWE) were identified using a screening questionnaire followed by an in depth interview and neurological examination to determine people with active epilepsy (PWAE). Blood and stool samples were obtained for serology and coproantigen ELISA, respectively.

Results: Fifty-six PWE were identified and 49 of these underwent CT scanning. Of the PWE, 39.3% and 23.2%were positive for cysticercal antibodies and antigens, respectively, and 14.8%for coproantigens (taeniosis). The CT scan findings were compared to a group of 40 CT scan controls. Lesions highly suggestive of NCC were detected in 24.5% and definite NCC lesions in 4.1% of CT scans of PWAE compared to 2.5% and 0%, respectively, in the control CT scans. Using the Del Brutto diagnostic criteria and adding serological results, 57.1% of the PWAE were diagnosed with probable or definitive NCC There was no statistically significant relationship between NCC, current age, age at first seizure and gender.

Conclusions: The findings of this study clearly show that that NCC is the single most important cause of epilepsy in the study area. However, large-scale studies are needed to estimate the true impact of neurocysticercosis in endemic regions and efforts should be instituted to the control of T. solium.

Effectiveness of index testing: Estimations from 4 years of data from the HPTN 071 (PopART) trial

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Background: HPTN 071 (PopART) is a community randomized trial to measure the impact of offering a combined HIV-prevention package on the incidence of HIV. The HIV-prevention package included HIV-testing and was offered door-to-door to all community members (universal testing or UT) from January 2014 to December 2017.
Index testing (IT) is encouraged by PEPFAR and the Zambian Ministry of Health to increase coverage of knowledge of HIV status. IT aims to test sexual partners of patients that are registered at the HIV-clinic. We used data collected during the UT approach to estimate the impact of IT on the knowledge of HIV-positive status.

Methods: UT was offered in 8 intervention communities in Zambia in 3 consecutive annual rounds. During one annual round, all households in the community were visited at least once, all household members were enumerated and HIV-testing was offered to everyone present in the household. Re-visits were planned to offer the intervention to household members that were absent at earlier visits. To estimate IT we defined an index case as a participant who self-reported being HIV-positive before testing was offered at the home. We then restricted our data to household members of an index case and report on their acceptance and results of HIV-testing and compared this with findings of UT (gold standard).

Results: In annual round 1, the HIV-positivity rate ([number of HIV-positives diagnosed] / [number of HIV-tests accepted]) is higher under IT (1,304 / 10,679, 12.2%) than under UT (9,196 / 126,208, 7.3%). The HIV-positivity rate for both IT and UT decreases with higher testing coverage's in annual round 2 and 3.
Compared to UT, IT would reduce the number of tests required by approximately 90%. However, over 80% of the HIV-positives diagnosed under UT, would remain undiagnosed under IT. IT only identifies 14.2% (1,304 / 9,196) of HIV-positives found under UT in annual round 1, increasing to 17%-18% over subsequent rounds.
Among participants of the intervention, IT would have resulted in 61.6% of the HIV-positives knowing their status (UNAIDS "first 90") increasing to 83.6% after 2 rounds of UT. After subsequent rounds of UT 96.7% of the HIV-positives know their status.

Conclusion: Index testing of household members alone is insufficient to reach UNAIDS "first 90" target. Additional testing initiatives need to be deployed to increase coverage of the knowledge of HIV-positive status. The PopART intensive UT approach is successful in meeting the "first 90" target.

Exploring the User and Provider Perspectives on the Quality of Antenatal and Postnatal Care in Rural Zambia

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Background: Zambia has a high maternal mortality ratio of 398 deaths/100 000 births, with about 1,800 women dying annually from complications related to child birth. More than half of these deaths (50-71%) occur during the postpartum period and 11-17% occur during childbirth itself. The majority of these deaths are due to direct and avoidable causes which are largely preventable when women have access to quality maternal healthcare before, during, and after childbirth. Nevertheless, the poor quality of services provided in healthcare facilities has been shown to be one of the main reasons for the high maternal mortality. This study, part of the Maternity Homes Access in Zambia (MAHMAZ) project, aimed to explore the user and provider perspectives on the quality of focused antenatal care (FANC) and postnatal care (PNC) services in four rural districts of Zambia.

Methods: We conducted 40 focus group discussions (FGDs) and 12 in-depth interviews (IDIs) between 2nd October, 2017 and 30th April 2018. FGD respondents comprised service users aged 18 years above, including pregnant and newly delivered women, fathers/husbands, community elders and safe motherhood action group (SMAG) members. IDI participants included health staff working in the maternal and child health units at the health facility, district and provincial health levels of the health system from Southern and Eastern Provinces (Nyimba, Pemba, Choma and Kalomo districts). One theme in the FGD and IDI guides explored perspectives on FANC and PNC service quality. Using content analysis, data were analysed against the world health organisation (WHO) quality of care framework.

Results: Both FGD and IDI respondents confirmed availability of functional FANC and PNC services in the health facilities and appreciated their benefits. Most service providers perceived FANC and PNC services to be of good quality due to the availability of national guidelines, skilled staff, essential emergency obstetric and newborn care (EmONC) equipment, medical supplies and commodities in the health facilities.
Nevertheless, most service users and some service providers, (especially from the health facility level), perceived FANC and PNC services to be of limited quality due to several logistical and administrative challenges. Service providers were concerned with inadequate dissemination of national FANC and PNC guidelines, low staffing levels, erratic supply of EmONC equipment, drugs and supplies, and lack of transport for referral of obstetric emergencies and complications. Service users complained of negative staff attitudes (such as being rude, not nice, and condescending), long distances, high transport costs, long waiting time, low quality of health education classes, insufficient availability of FANC and PNC rooms and lack of privacy and lack of medicines.

Conclusion: These findings suggest that both service users and providers perceive FANC and PNC services to be of limited quality in these rural areas of Zambia. They highlight important opportunities to target interventions for improving the quality of maternal healthcare services to ensure better maternal and newborn health outcomes.

Improving HIV Case-Finding using Partner Notification Services: A Snapshot from Zambia

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1. FHI30

Background: In Zambia, only about 75% of the estimated 1.06 million people living with HIV (PLHIV) receive lifesaving antiretroviral therapy (ART). This unmet need for treatment is attributable to various bottlenecks in the health system, including delayed diagnosis for HIV case identification, inadequate number and distribution of health care workers (HCWs), and poor linkage to ART services.

Method: To improve PLHIV case identification and scale up of ART initiation, the Zambia Prevention Care and Treatment Partnership, Bridge (ZPCT IIB) project, funded by the United States Agency for International Development (USAID) and managed by FHI 360, introduced partner notification services (PNS) in January 2018 in 10 select facilities in three provinces: Luapula, Northwestern, and Copperbelt. PNS is a voluntary process whereby a trained provider asks people newly diagnosed with HIV (index clients) to name their sexual partners. With the consent of the index client, the provider then contacts the named sexual partners, informs them that they have been potentially exposed to HIV, and offers voluntary HIV testing services (HTS). Consent to contact elicited partners is sought after assuring confidentiality and screening for the risk of intimate partner violence. Potential index clients for PNS were identified three ways:
1. PNS were integrated in every HTS point to enroll all patients newly testing HIV positive as index clients
2. HTS registers were also reviewed to identify newly tested HIV positive patients in the past six months for enrolment as index clients.
3. Viral load registers were reviewed to target patients with results greater than 1000 copies/mL for enrolment as index clients, to address ongoing risk of transmitting to their sexual partner(s).
To complement case identification, active follow up and escorted referral strategies were implemented simultaneously with PNS. Active follow up involved contacting the named partner(s) according to the index client's preferred method – phone or physical visit – within seven days. Those testing positive for HIV were then physically linked to an ART prescriber (escorted referral) by a counselor to initiate ART.

Results: Service data demonstrate that PNS was successful at identifying HIV-positive individuals in the 10 select facilities. When comparing the two months before PNS roll out (November to December 2017) and after (January to February 2018), the overall HIV-positivity yield increased from 3% to 5%.
Following the roll out of PNS (January to February 2018):
• 1,207 PLHIV were enrolled as index clients. Of those, 1,403 exposed partners were named, a ratio of 1.12 partners per index client.
• Of the elicited partners contacted, 975 (69%) consented to HTS and 261 (27%) tested positive.
• Out of all partners who tested positive, 94% were started on ART, a linkage rate higher than the linkage rate of 90% in December 2017.

Conclusion: Overall, introduction of PNS demonstrated that differentiated targeted testing using PNS improved case identification, with 27% of sexual partners that agreed to be tested having tested HIV positive. Further, facilitated linkages to treatment through escorted referrals used as part of a combined intervention contributed to higher ART initiation rates for newly identified HIV positive persons.

Taenia solium infections in Zambia: Towards a point of care (POC) test for endemic communities

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Background: Taenia solium taeniasis/ (neuro) cysticercosis is a communicable parasitic zoonosis whose economic and public health significance is neglected. Neurocysticercosis affects about 30% of people with acquired epilepsy in endemic areas. In Zambia, it is responsible for 57% of acquired epilepsy in Eastern province. Diagnosis and case management of neurocysticercosis/taeniasis in resource limited areas is challenging. Reliable, cheap and easy to use diagnostic tools with good performance are currently not available. The Centre for Disease Control (CDC), Atlanta, has developed a new point of care (POC) test based on recombinant rT24H and rES33 proteins which combines diagnosis of taeniasis and cysticercosis. However, its performance at community level is not known. The aim of this study is therefore, to evaluate the diagnostic performance of this test in Sinda district, Eastern Province of Zambia.

Methods: The diagnostic accuracy is being evaluated for taeniasis and (neuro) cysticercosis in 1200 randomly selected participants in a community based study. The performance characteristics (sensitivity and specificity) for neurocysticercosis will be computed by cross-tabulating of POC results with those of the 'Neurocysticercosis diagnosis' while a Bayesian approach will be used for cysticercosis and taeniasis to compare the performance of the index test with reference tests (EITB, B158/B60 Ag-ELISA, Ab-ELISA, Copro-Ag ELISA, PCR).

Preliminary results: Of the 722 participants tested so far, 0.96% were positive for taeniasis and 10.1% for cysticercosis on the POC test. Diagnostic performance of the POC; for taeniasis, Copro Ag ELISA and rES33-EITB reference tests have been done, Se 21% (CI, 50-51%) , Sp 97% (CI, 92-99%), PPV 43% (10%, 82%), NPV 91% (85%, 96%), LR+ 6.38 (1.59, 25.61), LR- 0.81 (0.62, 1.07). For cysticercosis, serum Ag-ELISA and rT24H-EITB tests have been done, Se 78 (CI, 56-93%) and Sp 69 (CI, 60-78%), PPV 35% (22%, 49%), NPV 94% (86%, 98%), LR+ 2.53 (1.78, 3.60), LR- 0.38 (0.14, 0.69). Copro PCR (T), LLGP-EITB and CT scan are yet to be conducted.

Conclusion: Results show the potential diagnostic value of the POC test and its applicability for use at community level in endemic areas. If successful, implementation of the tool will enable early detection of taeniasis and suspected neurocysticercosis cases and lead to improved patient management and treatment outcomes.

HIV prevalence and uptake of HIV care among female sex workers in 4 districts of Zambia: Implications for achieving the 90-90-90 HIV targets

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1. Population Council, 2. University of California, San Francisco, 3. National AIDS Council

Background: Prevalence of HIV infection among adults ages 15-59 in Zambia is 12.0%. However, the contribution of female sex workers (FSWs) to the HIV epidemic in Zambia is limited. Yet such evidence is essential for better HIV policy making and targeting of interventions especially that FSWs act as a bridging population for transmission of HIV into the general population.

Methods: A bio-behavioural survey was conducted among FSWs in 4 districts of Zambia – Livingstone, Lusaka, Ndola, and Solwezi (n=1,986). Respondent-driven sampling (RDS) was used to recruit study participants, starting with 3-15 seeds. RDS is a peer-driven, chain-referral, probability-based sampling method designed to reach hidden and hard to identify population groups. FSWs responded to a bio-behavioural interviewer–administered questionnaire on, inter alia, pre-survey knowledge of their HIV status and uptake of HIV testing and treatment services. FSWs who consented were tested for HIV using the national HIV testing algorithm. Data was analysed using RDS Analyst (RDSA) and STATA, and weighted to account for participant network sizes.

Results: The HIV prevalence was 45.9% (95% CI: 40.8–50.9) in Lusaka, 53.0% (95% CI: 48.2–57.8), in Livingstone 46.4% (95% CI: 41.6–51.3) in Ndola, and 50.0% (95% CI: 45.3–54.7) in Solwezi. These estimates are approximately three times higher than the HIV prevalence among women aged 15–49 years in the general population in Zambia (15.1%). Among FSWs who tested HIV positive in this study, a low proportion of FSWs in the districts knew their HIV status prior to the survey—51.3% in Lusaka, 53.1% in Livingstone, 32.3% in Ndola, and 43.1% in Solwezi. This is considerably lower than that of women in the general population, in whom 70% reported knowing their HIV status. Among those who self-reported being HIV positive, 75.0% (Lusaka), 77.9% (Livingstone), 61.2% (Ndola), and 65.0% (Solwezi) were currently on treatment. This is slightly lower than the proportion on treatment among women in the general population in Zambia (84.9%). Among those who self-reported being HIV positive, although the majority had accessed HIV-related medical care, only 60–70% accessed care within one month of diagnosis in Lusaka, Livingstone, and Solwezi. The percentage was lower in Ndola with only 41.3% seeking care within one month and 25.4% not seeking care for over a year after HIV diagnosis.

Conclusion: FSWs in Zambia remain an epidemiologically important population that must be targeted with HIV prevention, care, and treatment services. Despite many HIV-positive FSWs being on treatment, Zambia is far from being able to meet the 90–90–90 treatment targets because of the high level of undiagnosed HIV infection in this population group, and the low number of FSWs that re-test for HIV. Therefore, interventions targeting FSWs are warranted to ensure that FSWs re-test for HIV, given the high risk of HIV infection, and that HIV-positive FSWs get onto treatment to mitigate HIV-related morbidity and mortality, and help achieve viral suppression.

Title: Insulin Resistance is Associated with Higher Plasma Viral Load Among HIV-Positive Adults Receiving Longer-Term (1 Year) Combination Antiretroviral Therapy (ART)

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Background: As HIV-positive persons live longer due to the success of antiretroviral therapy (ART) in decreasing mortality, the burden of non-communicable diseases including diabetes mellitus (DM) is expected to rise. HIV is characterized by systemic inflammation, markers of which decrease quickly following ART initiation, but typically do not normalize. Inflammation may be accompanied by insulin resistance (IR), and both are implicated in the pathogenesis of DM in HIV-positive individuals. Sub-Saharan Africa accounts for almost two-thirds of the global HIV burden but there are few reports of IR, DM and HIV in this region. We assessed the relationship between IR and viral suppression among HIV-positive adults in the Zambian national ART program.

Methods: We conducted a cross-sectional survey evaluating HIV-positive adults that had received 1st line ART (usually TDF/FTC/EFV) for 12 months (± 3 months). Twenty clinics were sampled systematically based on the random starting-point, sampling interval and cumulative population size. Eligible patients had serum viral load (VL), fasting insulin, and glucose performed. IR was determined using Homeostatic model assessment. We determined proportions for each outcome using linearized standard error 95% confidence intervals and summary estimates. Viral suppression (VS) was defined according to the detection threshold of <20 copies/mL and treatment failure was defined as VL >1,000 copies/mL.

Results: Of 473 patients enrolled, 46.8% were male and 53.2% were female. 142 (30%) [95% CI: 0.26-0.34] had IR. Among those with IR, 55 (38.7%) were male whereas 87 (61.3%) were female (p-value=0.104). 19% of individuals with IR had treatment failure compared to 5.7% without IR (p-value <.0001). 427 (90.3%) participants had treatment success (VL<1000 copies/mL), and this was associated with a lower likelihood of IR (odds ratio (OR) = 0.26 [0.14, 0.48], p-value <0.0001). Among individuals with IR, 82 of 142 (58% [0.54-0.70]) had VS compared to 232 with VS among the 331 without IR (70%) [0.65-0.75]) (p-value=0.042).

Conclusions: In Zambian adults on ART for a year, IR was strongly associated with both viral non-suppression (VL>20) and treatment failure (VL>1000). Further investigations are warranted to determine if this positive association between IR and VL is causally related, and if so in which direction.

Assessment of impact of a cluster randomized girl's empowerment program on HSV-2 and HIV incidence among vulnerable adolescent girls in Zambia

Authors: Paul C. Hewett[1], Erica Soler-Hampejsek[1], Jere R. Behrman[1], Natalie Jackson[1], Karen Austrian[1]

1. Population Council

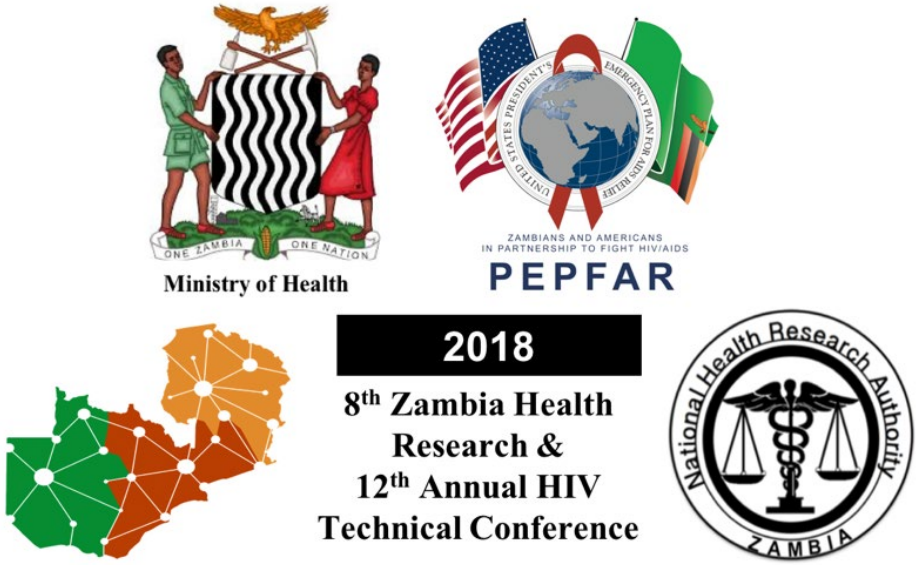
Background: Adolescent girls are at heightened risk of STI/HIV acquisition in high prevalence countries with generalized epidemics. To address the vulnerability of adolescent girls to STI/HIV risk, the Adolescent Girls Empowerment Program (AGEP) was designed to develop girls' social, health and economic assets through weekly, mentor-lead girl's group meetings conducted over two years. Girls participating in the program received sexual reproductive health and HIV prevention education via an interactive curriculum, which also covered issues of sexual and gender-based violence and HIV-based human rights. Improvement in knowledge, agency, and economic assets were consider the primary mechanisms of impact.

Methods: The AGEP evaluation was a cluster randomized trial, including a 4-year prospective cohort of a subset of adolescent girls. HIV and HSV-2 acquisition were the primary endpoints, secondary endpoints included sexual initiation and sexual risk behaviors. Baseline interviews with 4661 adolescent girls 10–19 were completed in 2013 and follow-up interviews were conducted annually through 2017. HIV and HSV-2 tests were conducted among those ≥15 in 2013, 2015 and 2017. HIV status was determined by Alere Determine™ and Uni-Gold™ Recombigen® rapid tests. HSV-2 status was assessed using Kalon™ HSV-2 gG2 ELISA on plasma samples. An intent-to-treat (ITT) analysis assessed program impact after four years, including two years post program.

Results: Of eligible girls at baseline, 96% were tested for HIV and 95% for HSV-2. Baseline prevalence was 3.1% (2.4%–3.9%) for HIV and 7.4% (6.4%–8.7%) for HSV-2. There were 1.0 incident HIV infections per 100 person-years (PYs) for AGEP enrollees and 0.9 incident infections per 100 PYs among control cases. The unadjusted HIV incidence rate ratio (IRR) comparing program to controls was 1.06 (0.68–1.72, P=0.40). For HSV-2, there were 4.7 incident cases per 100 PYs among AGEP cases and 3.7 incident cases per 100 PYs among controls; the HSV-2 IRR was 1.25 (1.00–1.58, P=0.02).

Conclusions: The ITT results based on biomarker data collected two-years after the intervention indicate AGEP was not effective in reducing the transmission of HIV over four years. The impact of AGEP on HSV-2 was counter to hypothesized, likely due to the early age at marriage observed among AGEP participations.

POSTER PRESENTATION ABSTRACTS



15th – 17th October 2018

Government Complex

Lusaka, Zambia

Title: The influence of intra-familial relationships on the utilization of maternity waiting homes in rural Zambia: a qualitative analysis

Authors: Jeanette Kaiser[1], Fong, Rachel M[1], **Ngoma, Thandiwe[2]**, Nam, HaYoung[1], Sakanga, Viviane[2], Bwalya, Misheck[2], Mwansa, Melvin[2], Vian, Taryn[1], Hamer, Davidson H[1], Scott, Nancy A[1]

1. Boston University School of Public Health, 2. Right to Care- Zambia

Background: Maternity waiting homes (MWHs) have been recommended by the World Health Organization as one method to increase access to skilled birth attendance. However, barriers persist to women utilizing MWHs. The social ecological model suggests the influence of individuals closest to a pregnant woman may be a contributing factor. In this study, we compare how intra-familial relationships influence a woman's utilization of a MWH in communities with high- and low-quality MWHs.

Methods: Within the scope of a large MWHs evaluation in rural Zambia, we conducted annual focus group discussions over three years for a total of 75 focus group discussions with (1) pregnant or recently delivered women, (2) men with a child under 1 year of age, and (3) mothers-in-law or community elders, at 5 newly-constructed MWHs and 5 control sites with existing MWHs. Using a merged content and inductive analysis, transcripts were coded against the Consolidated Framework for Implementation Research. Preliminary results are presented; data collection and analysis are ongoing.

Results: FGD respondents cited support from the family or husband as a facilitator to MWH utilization at approximately the same amount between intervention and control groups, with support from the family being more frequently discussed as a facilitator and lack of support from the husband more frequently discussed as a barrier to MWH use. The control sites more frequently discussed the challenge of finding a family member or friend to escort the woman to the MWH as a barrier to MWH use. Having someone to manage the woman's chores and household responsibilities was more frequently cited as a facilitator to MWH use, especially among intervention sites. Final results will explore these findings in more detail.

Discussion/Conclusion: Findings will inform discussion around challenges to accessing facilities for delivery that persist even with the availability of quality MWHs.

Funding: The activities discussed in this abstract were supported by funding from MSD for Mothers, MSD's 10-year, $500 million initiative to help create a world where no woman dies giving life. The development of this abstract was additionally supported in part by the Bill & Melinda Gates Foundation and The ELMA Foundation. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the abstract. The content is solely the responsibility of the authors and does not necessarily reflect positions or policies of Merck, the Bill & Melinda Gates Foundation, or The ELMA Foundation.

Title: Kangaroo Mother Care for Low Birth Weight Infants: A Descriptive Study from the University Teaching Hospital, Zambia

Authors: Nobutu, Muttau[1], M. Mwendafilumba[1], A. Mangangu[1], H. Kapesa[1], M. Kafusha[1], M. Phiri[1], A. Manasyan[1,2]

1. Centre for Infectious Disease Research in Zambia (CIDRZ), 2. University of Alabama at Birmingham (UAB)

Background: Low Birth Weight (LBW) infants are at increased risk of hypothermia, developmental delay and death. The World Health Organization (WHO) recommends Kangaroo Mother Care (KMC) as a low-cost intervention that provides thermal control, facilitates breastfeeding, weight gain, and reduces risk of neonatal mortality. This study aimed to evaluate the impact of KMC on health outcomes among LBW babies.

Methods: A prospective cohort study of 578 LBW (<2500g) neonates were enrolled and followed up on at the University Teaching Hospital (Lusaka, Zambia) KMC room between January 2016 - September 2017. Mothers were taught KMC techniques and care of the newborn. We monitored skin-to-skin and breastfeeding practices, weight at admission and discharge, length of admission and infant's vital signs.

Results: All infants demonstrated a mean weight gain of 250g (95%CI - 0.229, 0.253). Of the 571 neonates who had a recorded diagnosis at admission, 370 (64.8%) had one condition, 170 (29.8%) had two conditions and 31 (5.4%) had three conditions. Prematurity (82.3%), respiratory distress (4.4%) and sepsis (3.2%) were the most commonly diagnosed conditions while 10.1% accounted for varying conditions. The mean duration stay in the KMC room was 9 days. Twenty-five neonates (4.3%) returned to the NICU due to exacerbation of symptoms.

Conclusion: While high-tech equipment or specialist staff contribute significantly to the reduction of neonatal mortality, KMC has shown to be a feasible and low-cost intervention with the potential to improve health outcomes. Thus, we suggest that KMC services be rolled out especially in resource-limited health facilities providing neonatal care and/or NICU services.

Title: Process evaluation of integrating a nested serological survey within a post-vaccination coverage survey for measles and rubella in Southern Province, Zambia

Authors: Andrea Carcelen[1], Simon Mutembo[2,3], Francis Mwansa[2], Mutinta Hamahuwa[4], Philip E. Thuma[4], William J. Moss[1], Kyla Hayford[1]

1. Johns Hopkins School of Public Health, 2. Ministry of Health, Zambia, 3. University of Georgia College of Public Health, 4. Macha Research Trust

Background: Zambia's Ministry of Health conducted a measles-rubella vaccination campaign among all children younger than 15 years of age to introduce rubella-containing vaccine in August 2016. In November and December 2016, the Ministry conducted a post-campaign evaluation survey (PCES) to determine the level of vaccination coverage achieved among those eligible for the vaccination campaign. As part of this survey, a subset of districts was selected in Southern Province for blood specimen collection to measure population immunity among all household members included in the post-campaign survey. Vaccination coverage is often used as a proxy measure of population immunity, but serological testing is a more valid measure of immunity levels against measles and rubella. However, there are logistical and community acceptability concerns with collection of blood specimens. To critically evaluate survey implementation, qualitative data was collected from data collectors of both the PCES and serological survey.

Methods: In-depth interviews and focus group discussions were conducted among data collectors and their supervisors. Areas of interest included implementation of the post-campaign evaluation survey, biospecimen collection process, coordination of activities, and community acceptability. Data were transcribed and uploaded into Atlas TI for data management and indexing. Both inductive and deductive coding were used to analyze different aspects of the data. For the operationalization of the serological survey, deductive coding was used, and for community acceptability inductive coding were used. The programmatic qualitative research perspective was taken, to evaluate the serosurvey implementation with no further conceptual framework. Preliminary codes were developed from the debriefing conducted at the end of data collection, and updated as needed. Constant comparison was done throughout data analysis to evaluate the different experiences of each group. Data analysis is ongoing, and member checking will be done to improve credibility of findings.

Results: A total of 24 data collectors participated in this study, 13 in two separate focus groups and the rest through in-depth interviews. They represented all four teams that participated in the nested serological survey and corresponding post-campaign evaluation teams as well as their supervisors. There was considerable variation in terms of which teams experienced refusals in the community, but the questions arising from communities regardless of whether they accepted to participate or not were similar. One example is whether and when test results would be provided. Community sensitization was supposed to have occurred prior to survey implementation, and was mentioned by data collectors.

Conclusion: The findings from this study will inform future serological surveys in Zambia. Understanding the strengths and weaknesses of nesting a serological survey will facilitate implementation of future serological surveys. There are several key operational questions that may be answered by the findings of this study. For example, these findings highlight the desire of the community to receive their results, so a feedback loop should be created. This qualitative data collection also serves as a method of evaluation for this serological survey.

Title: HIV drug resistance among HIV-infected children receiving care in rural Zambia

Authors: Francis Hamangaba[1], Bornface Munsanje[1], Jeridy Munsanje[1], Nkumbula Moyo[1], Hellen K. Matakala[1], Passwell Munachoonga[1], Mutinta Hamahuwa[1], Philip E. Thuma[1], William J. Moss[2], Catherine G. Sutcliffe[2]

1. Macha Research Trust, 2. Johns Hopkins School of Public Health

Introduction: Understanding the challenges to effective treatment of HIV infection, including when to suspect virological failure due to drug resistance, is critical to providing optimal care to HIV-infected children. This knowledge impacts the effective use of second line therapy. HIV drug resistance can develop after exposure to antiretroviral drugs for prophylaxis or treatment and can jeopardize treatment responses. There are known genetic mutations of the HIV virus that correlate with resistance to certain classes of antiretroviral drugs, but there is scant evidence from children in rural southern Zambia.

Methods: This study was conducted within an ongoing cohort study of HIV-infected children receiving care at Macha Hospital ART clinic. Beginning in 2007, children younger than 16 years of age were eligible to enroll in the cohort and were followed every three months. Venous blood samples were spotted onto filter paper (Whatman 903 protein saver cards) at enrollment, at the visit when antiretroviral therapy (ART) was initiated, and every three months thereafter and stored at -20oC. For this study, samples were selected from two groups of children enrolled from 2007 to 2011: 1) Failure group: children with signs of treatment failure (detectable viral load after at least 6 months of treatment or a switch in regimen based on suspected failure), with samples selected before ART initiation and after treatment failure; and 2) PMTCT group: children who received ART as prophylaxis and later initiated treatment, with samples selected before ART initiation. Samples were sent to a laboratory at Johns Hopkins University for resistance testing under a Material Transfer Agreement (MTA E0031) in 2014.

Results: Of 30 samples from 20 children in the failure group, 11 (37%) had RNA successfully extracted and were sequenced to identify antiretroviral resistance mutations. Three samples from before ART initiation had RNA extracted and all had wild-type virus. Eight samples had RNA extracted after treatment failure and 7 (88%) had resistance mutations (one child was no longer receiving ART and had wild-type virus). Among the 7 children, 3 were receiving a regimen of Triomune Jr, 2 were receiving D4T/3TC/EFV, 1 was receiving AZT/3TC/NVP and 1 was receiving ABC/3TC/EFV. The most common resistance mutation was M184V (5/7 samples). Other mutations included Y181C (2/7), K103N (2/7), V179D (2/7), V106M (2/7), G190A (1/7), V108I (1/7), T69N (1/7), K103R (1/7). Twelve samples in the PMTCT group were selected and 8 (67%) had RNA successfully extracted and were sequenced. Wild-type virus was found in all 8 samples.

Conclusion: Children exposed to antiretroviral drugs for prophylaxis did not have drug resistance mutations. However, most children receiving ART with virologic failure had resistance mutations, likely as a result of poor adherence. Larger studies are needed to further evaluate drug resistance in these two groups of children in Zambia.

Title: Factors influencing HIV disclosure among HIV-infected children receiving care in rural Zambia

Authors: Mathias Muleka[1], Bornface Munsanje[1], Jeridy Munsanje[1], Cathy Sinywimaanzi[1], Francis Hamangaba[1], Nkumbula Moyo[1], Philip E. Thuma[1], William J. Moss[2] and Catherine G. Sutcliffe[2]

1. Macha Research Trust, 2. Johns Hopkins School of Public Health

Background: With the availability of effective treatment, HIV-infected children are living longer. As they age, these children need to be informed of their HIV status as it is an important aspect of their long-term disease management. There is little evidence on how and when this type of disclosure takes place in resource-limited settings and factors that influence disclosure. This study was conducted to understand the process of disclosure of HIV status among HIV-infected children receiving care in rural Zambia.

Methods: A prospective study of HIV-infected children younger than 16 years was conducted between September 2007 and December 2016 at Macha Hospital in Southern Province. Written informed consent was obtained from caregivers and assent was obtained from children 8 to 15 years of age. At enrollment, a questionnaire was administered to collect information on demographics, disclosure status and medical history. This analysis was restricted to children 8 to 15 years of age at baseline (n=176). HIV disclosure status was defined as 'fully aware' if the child knew they had HIV infection, 'partially aware' if they knew that they were sick but did not know they had HIV infection, and 'unaware' if they did not know they were sick or had HIV infection. Caregivers whose children were unaware of their HIV status were asked why they did not disclose to them. Logistic regression was used to evaluate factors associated with full disclosure.

Results: At enrollment, 52% and 32% of children were partially and fully aware of their status, respectively .Disclosure status was significantly associated with age: the proportion of children partially aware of their status decreased from 61% to 60% and 24% among children 8-9, 10-12 and13-15 years of age, respectively; and the proportion of children fully aware of their HIV status increased from 11% to 25% and 76% among children 8-9, 10-12, and 13-15 years of age, respectively ($p<0.0001$). When asked why they had not disclosed to their child, the primary reason given by caregivers was that their child was too young to know (80%). Other reasons included not knowing how to tell the child (28%), being afraid to tell their child (13%), and believing it was not good for their child to know (9%). After adjusting for age, the child's mother being alive was significantly associated with full disclosure (odds ratio: 2.44; 95% confidence interval: 1.01, 5.86). The child's father being alive and receiving antiretroviral therapy were not significantly associated with full disclosure.

Conclusion: Disclosure of HIV infection status to children is a process that occurs over time. Most children were partially aware of their status at 8-9 years of age and fully aware of their status at 13-15 years of age. Many caregivers reported delaying disclosure due to the child's young age, fear, or insufficient knowledge about the disclosure process. This supports the need for implementing programs to promote disclosure to HIV-infected children and adolescents and to support caregivers throughout the process.

Title: Puberty and sexual activity among perinatally HIV infected adolescents in rural Zambia

Authors: Francis Hamangaba[1], Bornface Munsanje[1], Jeridy Munsanje[1], Philip E. Thuma[1], William J. Moss[2], Catherine G. Sutcliffe[2]
1. Macha Research Trust, 2. Johns Hopkins School of Public Health

Background: With the availability of effective treatment, HIV-infected children are living longer. Many children are aging into adolescence and encountering puberty, sexual debut and sexual relationships in the context of HIV infection. Understanding these issues will be important for caregivers and healthcare workers so that adolescents can be provided appropriate support and services. The objective of this study was to evaluate the timing of puberty and sexual debut and the level of sexual activity and contraceptive use among HIV-infected adolescents in rural Zambia.

Methods: A cross-sectional study was conducted from March 2015 to February 2017 at Macha Hospital in Southern Province, Zambia. All adolescents 12-23 years of age who were enrolled in an ongoing cohort of perinatally infected children receiving care at the HIV clinic were eligible to participate. After obtaining written informed consent, adolescents were administered a questionnaire to collect information on self-reported Tanner pubertal staging, sexual activity and contraceptive use.

Results: 105 adolescents (59% female) were enrolled in the study. Among girls (median age: 14.9 years), 35% started menstruating and 29% were in Tanner stages 4 or 5 for both breast size and pubic hair. The median age of first menstruation was 15 years (IQR: 14, 16; range: 12, 19). 37% of girls were sexually active with a median age at first sex of 15 years (IQR: 14, 16). Among sexually active girls, 94% had sex for the first time with a boyfriend and 33% had disclosed their status to their first partner. While 61% had used a condom the first time they had sex, only 22% had used a condom the last time they had sex. 11% of sexually active girls had ever used any other form of contraceptives and 44% had ever been pregnant at a median age of 17.5 years (IQR: 15, 18; range: 15, 20). Among girls who were not yet sexually active, 97% intended to wait until marriage. Among boys (median age: 14.8 years), 11% were in Tanner stages 4 or 5 for both penis/scrotum size and pubic hair. 23% of boys were sexually active with a median age at first sex of 15 years (IQR: 14, 16). Among sexually active boys, 100% had sex for the first time with a girlfriend and 40% had disclosed their status to their first partner. 80% had used a condom the first time they had sex and 60% had used a condom the last time they had sex. No boys had a partner who became pregnant. Among boys who were not yet sexually active, all intended to wait until marriage.

Conclusions: In this rural area, perinatally infected adolescents were initiating sexual activity by the age of 15 years. While the majority of sexually active adolescents had experience with condoms, use was not consistent and fewer than half had disclosed their status to their partners. Perinatally infected adolescents have family planning and reproductive health needs that should be considered as they receive care.

Title: Lessons learned from nesting a measles and rubella serological survey within a post-campaign coverage evaluation survey

Authors: Simon Mutembo[1,2], Andrea Carcelen[3], Francis Mwansa[1], Angel Mwiche[1], Caroline Phiri1, Kelly Searle[3], Philip. E. Thuma[4], William. J. Moss[3], Kyla Hayford[3]
1. Ministry of Health, Zambia, 2. University of Georgia, 3. Johns Hopkins University, 4. Macha Research Trust

Background: Age-specific population immunity to vaccine-preventable diseases (VPDs) can be measured using serological surveys. However, serological surveys are infrequently conducted in low- and middle-income countries due to costs, operational challenges and potential high refusal rates for blood collection. Instead, age-specific population immunity is commonly inferred from vaccination coverage estimates, which are inaccurate and do not reflect the true population immunity because of primary and secondary vaccine failure in some individuals following vaccination and exposure to wild-type infection.
To effectively measure population immunity to VPDs serosurveys must be integrated in other routine household surveys. We assessed the feasibility of integrating a serosurvey within a measles and rubella vaccination post-campaign evaluation survey (PCES) by nesting a serosurvey within the PCES.

Methods: The serosurvey was nested in a PCES in Southern province and enrolled individuals above the age of 9 months while the PCES only enrolled children between the age of 9 months and 15 years. Sample size for the serosurvey was estimated using the PCES household sampling strategy with Measles and Rubella as antigens of interest. Finger prick sample was collected and kept at room temperature until transfer to the Laboratory. Enrolment rates in the serosurvey and PCES were calculated using proportions. Factors that enabled successful implementation were qualitatively described.

Results: The PCES was conducted in 26 clusters and enrolled 687 children from 237 households over twelve days. The serosurvey was conducted in 15 clusters randomly selected from the PCES clusters. Most PCES households (87%) agreed to take part in the serosurvey. In total, 156 households were eligible to participate in the serosurvey. Of the eligible households 143 (92%) were available at the time of the survey. Among available households, 124 (87%) took part in the serosurvey. Within the 124 households, 830 individuals were eligible, 675 (81%) were available at the time of the serosurvey and 581 (86%) participated in the serosurvey. For those who refused to participate the major reason for refusing was fear that blood can be used for satanic practices. Most of the challenges of implementing the serosurvey were because the serosurvey was conducted as a parallel project to the PCES and not completely integrated. Some of the strategies that enabled successful implementation of the serosurvey was the use of DBS, community sensitization in collaboration with the local health workers and the availability of a functional molecular lab in southern province.

Conclusion: The study demonstrates that serosurveys can be successfully integrated into a routine household surveys without adversely affecting community participation. However, this can only be attained if appropriate statistical adaptations are made to the design of the survey. Additionally, effectively strategies such as use DBS as opposed to venous blood and effective sensitization must be identified to reduce the cost and the risks of the community refusing to take part because of the myths surrounding blood collection.

Title: Demand side factors associated with quality antenatal care services in Zambia: A case study of Lusaka district.

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Background: The quality of antenatal care (ANC) that pregnant women receive in Zambia continues to be poor despite several interventions. Research has shown that only 29% of women in Zambia receive high quality antenatal care.

Methods: Using a cross sectional study design, the aim of this study was to determine factors associated with high quality ANC among pregnant women. Multi-stage sampling technique was used to select 380 study participants. Data analysis was done in STATA 13.1.

Results: It was established that only 47.1% of pregnant women received high-quality ANC, while 52.9% received low quality. Six key ANC interventions were considered, among which urine (36.7%) and blood (46.8%) testing were the least recived basic components of ANC. After adjusting for the effect of other factors, women with secondary education had higher odds of receiving high-quality ANC than women with primary level of education (OR= 1.98; 95% CI: 1.24- 3.14). Women staying with their huband/ partners had lesser odds of receiving high quality ANC compared to those that were not staying with their partners (OR= 0.47; 95% CI: 0.28-0.79).

Conclusion: Generally, the quality of ANC received by pregnant women is unacceptable. The following recommendations have been made: 1) MOH should come up with a tool to monitor and evaluate services provided from the end user perspective (patients); 2) health facilities should increase testing services (urine and blood testing and; 3) develop strategies to help educationally disadvantaged women to improve quality of ANC received.

Title: Performance characteristics of the LYNX p24 antigen point-of-care test for early infant diagnosis of HIV

Authors: Nkumbula Moyo[1], Sylvia Maunga[1], Jane Mutanga[2], Simon Mutembo[3], Philip E. Thuma[1], William J. Moss[4], Catherine G. Sutcliffe[4]

1. Macha Research Trust, 2. LCH, 3. Ministry of Health, 4. Johns Hopkins School of Public Health

Introduction: Early infant diagnosis of HIV infection (EID) is particularly challenging in rural areas because the currently used assays to detect HIV DNA require transportation of specimens to central laboratories. This leads to substantial delays in returning results to health workers and caregivers, resulting in loss to follow-up and delays in linkage of HIV-infected infants to care and treatment. Point-of-care (POC) diagnostics offer hope to minimize this challenge and several assays have been developed. This study was conducted to evaluate the performance characteristics of a POC test based on p24 antigen detection (LYNX) compared to HIV DNA testing for EID in rural and urban Zambia.

Methods: A prospective study was conducted at 3 hospitals (one rural and two urban) and 8 health centers (4 rural and 4 urban) in Southern Province, Zambia from February, 2016 to February, 2018. All infants born to HIV-infected mothers aged 0 hours to 18 months were eligible. At urban sites, infants were enrolled at birth and discharged from the study when the HIV DNA results were issued to caregivers, while at rural sites infants were followed throughout their scheduled clinic visits until 6 weeks after cessation of breastfeeding. Each time an enrolled child had a DBS sample collected for HIV DNA testing at the central laboratory, a LYNX POC test was also conducted immediately by trained staff (nurses, midwives or counselors) for comparison of results.

Results: 2181 LYNX POC tests were performed during the study period; 1407 tests (65%) had an HIV DNA test result available and were included in the analysis. Of the 1407 test results analyzed, 909 (65%) were conducted at birth while 498 (35%) were conducted during routine clinical visits at 6 weeks of age or older. At routine visits, 16 (3.2%) participants were HIV DNA positive. The LYNX test had a sensitivity of 81.3% (CI: 54.4%, 96.0%) and specificity of 99.0% (CI: 97.6%, 99.7%). The positive and negative predictive values were 72.2% and 99.4%, respectively. At birth, 12 (1.3%) participants were HIV DNA positive. The LYNX test had a sensitivity of 25.0% (95% CI: 5.5%, 57.2%) and specificity of 99.6% (95 % CI: 98.9%, 99.9%). The positive and negative predictive values were 42.9% and 99.0%, respectively. The median turnaround time for DNA test results was 3 months compared to 1 hour for LYNX test results

Conclusion: The LYNX test was easy to use and had many desirable characteristics for a POC test in a rural setting. However, the LYNX test had a lower sensitivity at 6 weeks of age or older compared to other available POC assays based on nucleic acid detection and a very low sensitivity at birth. Considering its high specificity, the LYNX POC test has the potential to be of great value as an EID screening test at routine clinic visits, particularly in rural areas. Its use could greatly improve linkage to care for HIV-infected infants in rural and urban settings where turnaround times for HIV DNA testing are often long and treatment initiation is delayed.

Title: Point-of-Care Urine Ethyl Glucuronide Testing to Detect Alcohol Use Among HIV-Hepatitis B Virus Coinfected Adults in Zambia.

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Background: Alcohol use is difficult to measure in HIV and hepatitis care settings. We compared point-of-care (POC) urine ethyl glucuronide (uEtG) testing with self-reported alcohol use measures in Zambia.

Methods: Using the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C) self-reported drinking was serially documented in a prospective HIV-HBV coinfection cohort taking antiretroviral therapy (ART) in Lusaka, Zambia. At cohort visits during August-2016 to May-2017, we also documented the date of last drink and tested participants' urine for EtG using a qualitative POC dipstick test (Rapid ETG, Premier Biotech, Cottage Grove, USA; cutoff 500 ng/ml). Unhealthy alcohol use was defined as AUDIT-C≥4 for women and ≥5 for men, abstinence was AUDIT-C=0, and other scores were moderate drinking. We assessed concordance between uEtG and alcohol use category and used multivariable logistic regression to identify epidemiological factors associated with underreporting (uEtG-positivity with last reported drink >7 days prior).

Results: Among 211 participants, median age was 35 years, 40.8% were women, median time on ART was 11.4 months, 76 (36.0%) reported current abstinence and 89 (42.2%) reported unhealthy drinking by AUDIT-C. Eighty-seven (41.2%) were uEtG-positive including 64 of 65 (98.5%) who drank ≤3 days prior and 17 of 117 (14.5%) who reported no drink in the past 7 days (i.e., underreported). uEtG was moderately concordant with AUDIT-C in comparing abstainers and drinkers but could not differentiate moderate and unhealthy drinkers. Prior drinking (versus lifetime abstainers) and longer time on ART (≥12 months) were associated with underreporting.

Conclusion: Unhealthy alcohol consumption was common among Zambian HIV-HBV patients. POC uEtG is an inexpensive tool that could be feasibly incorporated into HIV and hepatitis care for diagnosis and reduction of harmful alcohol use.

Title: Scoping review of research on non-communicable diseases in Zambia

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Background
One of the top priorities in developing countries as they begin addressing the burgeoning burden of non-communicable diseases is to generate local evidence on how to effectively deliver and implement the internationally recommended interventions. The pressure of the dual burden from non-communicable and communicable diseases requires a prioritized research agenda for generating evidence on the best ways to prudently use limited resources. We speculate that this study will provide evidence to inform the development of prioritized non-communicable disease research agenda in Zambia.

Methods
The scoping review methodology using the Arskey and O'Malley 5 stage framework was adopted for this study. This methodology was appropriate for our study because our aim was to map a broad research area and identify research gaps for which scoping reviews are appropriate and have been applied in similar studies.

Results
Overall (n=391), the majority of articles reviewed were on diet and nutrition (22.3%), with 19.2% and 15.3% on cancer and mental health respectively. Cardiovascular conditions including hypertension, and diabetes mellitus only accounted for a total of 10% of the studies reviewed. Over half of the studies were published in between 2012 and 2016 and over a third used a cross sectional study or survey methodology.

Conclusion
Our review showed the research studies have largely been focused on mental health, cancers and nutrition related topics with limited studies on chronic respiratory conditions and physical activity. Future research agenda should address the identified knowledge gap on burden non-communicable diseases and risk factors in adolescents, studies on male and childhood cancers and longitudinal designs to understand long-term outcomes of non-communicable diseases in the Zambian population.

Title: Challenges of implementing a point-of-care test for early infant diagnosis of HIV infection in rural Zambia

Authors: Happy Kamatha[1], Thando Maunga[1], Yvonnie Phiri[1], Nkumbula Moyo[1], Simon Mutembo[2], Philip E Thuma[1], William J Moss[3], Catherine G Sutcliffe[3]
1. Macha Research Trust, 2. Ministry of Health, 3. Johns Hopkins School of Public Health

Background: An affordable and simple point-of-care test would increase access to early infant diagnosis of HIV infection and improve the long-term health and well-being of HIV-infected infants. Point-of-care tests would also decrease inequities in early testing between urban and rural areas. This study was conducted to understand the challenges of implementing a point-of-care test for early infant diagnosis (EID) in rural Zambia.

Methods: A prospective study of early infant diagnosis was conducted at five health facilities in rural southern Zambia from February 2016 to February 2018, including a district-level referral hospital and four rural health centers (RHC). All healthcare workers involved in infant testing at the hospital and 2-3at each RHC were trained to use a point-of-care test (LYNX, Northwestern Global Health Foundation) based on p24 antigen detection, which was carried out at the same time as routine HIV DNA testing. LYNX tests were only carried out by those fully trained in its use.

Results: Thirteen healthcare workers were initially trained, including five psychosocial counselors at the hospital and one clinical officer, five nurses and two lay counselors at the RHCs. Due to staff turnover and shortages, an additional nurse and two lay counselors were trained during the study. At the hospital, an average of 4.9 infants (range: 0, 16) per week were evaluated for early infant diagnosis. As the counselors were designated to work on early infant diagnosis, they were able to incorporate testing into their daily activities and were available to test all infants. At the four RHCs, the average numbers of infants tested per week were 1.6 (range: 0, 7), 1.5 (range: 0, 7), 1.1 (range: 0, 5), and 0.4 (range: 0, 3), respectively, and implementing the point-of-care test was more challenging, especially at smaller clinics. The trained healthcare workers at the four RHCs, particularly the nurses, were frequently not available. The proportion of days when at least one trained healthcare worker was absent ranged from 36% to 67%. The proportion of days when at least two trained healthcare workers were absent ranged from 0% to 14%. Reasons for absenteeism were mainly vacation leave and attending a workshop. Shortages of staff at all of the RHCs were challenging, particularly at the smaller clinics. The frequent shortage of health workers was addressed by training and working with lay counsellors who required more intensive supervision and mentorship. At the larger RHC, 7% of infants receiving routine testing were not tested using the LYNX test, as more staff were involved in EID than were trained and a trained healthcare worker was not available that day.

Conclusions: Point-of-care testing was challenging to integrate into clinic activities, particularly at rural health centers. This was primarily due to staff turnover and shortages. When implementing a point-of-care test, the number and type of healthcare workers trained should be considered for each level of health facility. Strategies for ongoing supervision, training and quality control will be critical for successful implementation.

Title: Health Workers' Experiences with the use of SmartCare for decision-making in Mongu and Limulunga districts of Western Province of Zambia

Authors: Mutale, Mwango[1], Bornwell Sikateyo[2] & Joseph M. Zulu[2]
1. Ministry of Health, Western Provincial Health Office, 2. The University of Zambia

Background: The advancement of information technology in the health sector has given rise to demand for timely, reliable and accurate medical/health information to treat and manage patients. One of the ways to provide timely, reliable and accurate information is through the use of Electronic Health Records systems (EHRs). Zambia has adopted EHRs called SmartCare since 2005. However, in places where the roll out has taken place, only a few health facilities are using the system fully. The study objectives were; to explore health workers experiences and perceptions on the use of SmartCare system, to explore users' satisfaction on the benefits and challenges on using SmartCare compared to paper based record system and explore the usefulness of SmartCare system in decision making at health facility level.

Methods: A qualitative phenomological study design was used to collect data through in-depth interviews. A total of 16 respondents were interviewed on the use of SmartCare by health workers for decision making.

Results: Health workers perceptions and experiences on SmartCare system were good. They pointed out that it was a good system, easier, efficient and more convenient way to store and retrieve patient files/records than paper records. However, the study also showed that, the SmartCare was not being used for decision making in all the health facilities visited due to inadequate number of health staff to manage and enter data, work overload, duplication of work, lack electric power to run computers, lack of support and regular maintenance of the equipment.

Conclusion: To enhance utilisation of the SmartCare for planning and decision making, it is important to strengthen health system related factors such as training and deploying specialised staff to help manage the SmartCare. It is also important to develop supportive infrastructure and other support systems in the health facilities

Title: Enhancing bed net use by periodical bed net monitoring may help achieve the goal of malaria elimination by 2021

Authors: Harry Hamapumbu[1], Bruce Malembeka[2], Japhet Matoba[2], Jennifer C. Stevenson[2], Philip E. Thuma[2] and William J. Moss[1]

1. International Centre for Excellence for Malaria Research (ICEMR), 2. Macha Research Trust

Background: Malaria has been a major killer in most developing countries with large sums of money spent to try and find solutions to this endemic problem. Particularly in sub-Sahara African countries, malaria has claimed many lives with the most vulnerable being children under the age of five years and pregnant mothers. Endemic malaria threatens future human capital development for struggling economies. Many interventions and control measures have been utilized to help fight malaria, and one such intervention is the use of long lasting insecticide treated bed nets (LLINs). Despite many efforts to promote bed nets as a viable vector control method, their use within communities is not optimal. There are reports of misuse or repurposing, such as use of bed nets for fishing, fencing, curtains, wedding dresses, table cloths, or even ropes. They are also sometimes used in grain bins as a pest control measure. In addition, many people do not sleep under a bed net despite owning one, even if it is not repurposed. Finally, there may have been uneven net distribution patterns leading to under-utilization.

Methods: To determine if community members could realize the full benefit of bed nets by using them regularly and thus contribute to malaria control and elimination, we reviewed the data collected as part of a community-based survey project known as 'Enhanced Step D', a study where Macha Research Trust staff accompanied community health workers in a reactive treat and test campaign. The surveys were conducted in Choma district of Southern Province from 2015-2016 and involved following up reported malaria cases from nine health facilities: Kabanze RHC, Simaubi RHC, Mapanza RHC, Chilalantambo RHC, Mang'unza RHC , Nalube RHC , Mbabala RHC, Kamwanu RHC and Macha HAHC. Households were surveyed by administering a questionnaire to all adult participants on malaria knowledge, bed net ownership and use.

Results: Of the 296 households (HHs) surveyed, preliminary data indicate that 30 (10%) of the HHs had no bed net, while 266 (90%) HHs had bed nets. Residents of 42 (16%) of the 266 HHs with at least one bed net, did not use the bed nets. We will present data showing bed net ownership and changes in usage patterns among households that were revisited 30 and 90 days later. We will also present documented pictorial evidence of bed net repurposing.

Conclusion: We hypothesize that a system to regularly monitor bed net use at the community level combined with messages on their appropriate use and care would improve utilization of bed nets, and thus could be beneficial in the effort to eliminate malaria in Zambia.

Title: Assessment of Factors Affecting the Implementation of the Integrated Disease Surveillance and Response in Public Health Care Facilities – The Case of Rufunsa District, Zambia

Authors: Titus Haakonde[1], Godfrey Lingenda[2], Munsanje Foster[1] and Kennedy Chishimba[3]
1. Evelyn Hone College of Applied Arts and Commerce, 2. University of Lusaka, 3. Eden University

Background: Late reporting of disease out- breaks and other health related events of public health significance have been linked to poor implementation of the Integrated Disease Surveillance and Response (IDSR). As such, this study aimed at assessing factors affecting the implementation of the IDSR in public health care facilities in Rufunsa District, Zambia.

Methods: A cross-sectional facility based descriptive study design incorporating an observation was done in 9 Public health facilities in the district and 34 respondents were conveniently recruited into the study. Data collection was through pre-tested semi structured questionnaires and institutional- tailored observational checklist. Analyses were done using SPSS version18.

Results: The study revealed that Health Care workers in Rufunsa District had less knowledge about IDSR. Additionally, they portrayed negative attitudes towards the implementation of the IDSR and that they were receiving inadequate supervisory support and motivation. Lastly, all public health facilities had inadequate resources dedicated to IDSR Implementation.

Conclusion: The findings suggested that IDSR implementation in public health care facilities was not effective. Therefore, to ensure effective IDSR implementation, adequate funding directed to the strengthening of IDSR activities should be deliberately put in the budget's yellow book. Regular IDSR trainings are to be offered to health workers which should be followed by mentorship and supervisory support by the District and Provincial Health Offices.

Title: Using Data to Drive Decision-making and Strengthen Health System Responses to HIV/AIDS in Zambia

Authors: Emile Efronson[1], Jacob Sims[1], Samantha Custer[1], Bethany Larkin[2]
1. AidData, 2. Akros

Background: 1.2 million people are currently living with HIV in Zambia with an estimated 59,000 new infections occurring in 2016. Domestic policymakers and development partners have channeled resources into HIV/AIDS prevention and treatment programs, however, their efforts have been hindered by limited or no access to timely and disaggregated data on HIV/AIDS prevention, treatment and investments. Equipping decision-makers with access to an intuitive decision support tool (DST) in order to analyze and understand disaggregated data is critical to the HIV/AIDS response so that resources can be allocated effectively and customized solutions are created for districts and populations with the greatest need. Without access to timely, accurate, and digestible information for decision-makers, Zambia will fall short of both curbing new infections and reaching UNAIDS 90-90-90 targets.

Methods: Using a human-centered design process we aimed to understand what HIV/AIDS information was available to and used by decision-makers in Zambia. Through 47 key informant interviews across 22 organizations we asked stakeholders and decision-makers in the HIV response questions around (1) what decisions they make in their position (2) current state of data and (3) desires for future state of data in order to develop a DST for Zambia. Following this process, synthesized information informed the development of a DST for testing and use in the Zambian context.

Results: Key stakeholders identified 4 qualities in a future DST: 1) open-source/ web-based interactive visualizations 2) cross comparisons 3) GIS and location data and 4) shared data dictionaries. Additionally, stakeholders identified the following gaps in the current data landscape: there is little to no prevention and programmatic data available, not enough data disaggregation, and data collection efforts are often duplicative amongst partners. Overall, there was consensus that improving an existing data collection source would prove more beneficial than developing a new one. In response to stakeholder feedback, National AIDS Council (NAC) was identified as the in-country partner to support in upgrading their Health Management Information System, NACMIS, that focuses on prevention data. Through 12 technical working group meetings and 2 workshops with key stakeholders and decision-makers across all levels, NACMIS prevention indicators were refined and tested. In order to portray a holistic picture of HIV/AIDS prevention and treatment activities in Zambia, desired visualizations and systems for triangulating information with were identified by national, provincial, and district level decision-makers.

Conclusion: Responding to stakeholders' demand for optimizing an existing data collection system is one critical aspect to ensuring the long-term sustainability of effectively capturing prevention data and portraying an accurate picture of the HIV/AIDS response in Zambia. However, equally relevant to sustainability of the NACMIS will be ensuring sufficient capacity building and stakeholder buy-in so that decision-makers and end-users are equipped with the skills to both interpret and use data to drive decision-making in the national HIV/AIDS response. By doing so, NACMIS will address a gap in the current data landscape and improve the effectiveness in both the immediate and long-term response to HIV/AIDS in Zambia.

Title: "It depends how one understands it:" A qualitative study on differential uptake of oral cholera vaccine in three compounds in Lusaka, Zambia

Authors: Leonard Heyerdahl[1], Leonard W Heyerdahl[1,2], Miguel Pugliese[3], Sharon Nkwemu[3], Taniya Tembo[3], Chanda Mwamba[3], Rachel Demolis[2], Roma Chilengi[3], Bradford D Gessner[2], Elise Guillermet[2], Anjali Sharma[3]

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Background: The Zambian Ministry of Health implemented a reactive one-dose Oral Cholera Vaccine (OCV) campaign in April 2016 in three Lusaka compounds, followed by a pre-emptive second-round in December. Understanding uptake of this first-ever two-dose OCV campaign is critical to design effective OCV campaigns and for delivery of oral vaccines in the country and the region.

Methods: We conducted 12 Focus Group Discussions (FGDs) with men and women who took no OCV doses and six with those who took both doses. Simple descriptive analysis was conducted on socio-demographic and cholera-related data collected using a short questionnaire. We analyzed transcribed FGDs using the framework of dose, gender and geographic location.

Results: No differences were found by gender and location. All participants thought cholera to be severe and the reactive OCV campaign as efficacious. Most reported not receiving information on OCV side-effects and duration of protection. Those who took both doses listed more risk factors (including 'wind') and felt personally susceptible to cholera and protected by OCV. Some described OCV side-effects, mostly diarrhoea, vomiting and dizziness, as the expulsion of causative agents. Those who did not take OCV felt protected by their good personal hygiene practices or, thought of themselves and OCV as powerless against the multiple causes of cholera including poor living conditions, water, wind, and curse. Most of those who did not take OCV feared side-effects reported by others. Some interpreted side-effects as 'western' malevolence . Though >80% discussants reported not knowing duration of protection, some who did not vaccinate, suggested that rather than rely on OCV which could lose potency, collective action should be taken to change the physical and economic environment to prevent cholera.

Conclusion: Due to incomplete information, individual decision-making was complex, rooted in theories of disease causation, perceived susceptibility, circulating narratives, colonial past, and observable outcomes of vaccination. To increase coverage, future OCV campaigns may benefit from better communication on eligibility based on susceptibility, expected side effects, mechanism of action, and duration of protection. Governmental improvements in the physical and economic environment may increase confidence in OCV and other public health interventions among residents in Lusaka compounds.

Title: Genetic characterization of P. falciparum infections over time in the Community-led Responses for Elimination (CoRE) study, Southern Province, Zambia

Authors: Sandra Chishimba[1], Brenda Mambwe[1], Mulenga Mwenda[1], Conceptor Mulube[1], Kafula Silumbe[1], Hawela Moonga[2], Busiku Hamainza[2], Victor Chalwe[3], John M. Miller[1], David Larsen[4], Daniel Bridges[1]

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Background

Zambia aims to achieve malaria elimination by 2021 through a range of interventions. The Community-led Responses for Elimination (CoRE) study aims to inform intervention policy by comparing reactive focal drug administration against reactive focal test and treat in a pre-elimination area that is approaching elimination. By definition, measuring impact in these settings, where parasite prevalence is very low (e.g., <1% P. falciparum prevalence) is challenging. It is therefore critical, to expand on a basic binary outcome of presence or absence of parasite, to include genetic information that can assess the complexity of infection (COI) and parasite identity. Single nucleotide polymorphisms occur throughout the genome of every organism and can provide a means to compare different infections. Such a 'barcode' system has been developed for P. falciparum and allows inferences to be made about the relatedness of two infections as well as estimates related to complexity of infection (i.e., the number of haplotypes in an infection).

Methods

DNA was extracted from dried blood spots on filter paper, collected on 1, 30, and 90 days follow-ups from reactive case detection surveillance, using QIAmp DNA mini kits. Extracted DNA was then tested using a multiplex PET-PCR assay for P. falciparum and Plasmodium spp. PCR-positive samples were then pre-amplified and barcoded using a 24-SNP TaqMan or high resolution melt assay. Complexity of infection was calculated using COI by likelihood (COIL) software.

Results

To date, a total of 1,574 consenting individuals have been enrolled in the ongoing CoRE study, with 116 samples testing positive by PET-PCR. Positive samples have been successfully pre-amplified, while SNP barcoding and COIL analysis is ongoing. The association between complexity of infection and other measures of exposure (e.g., travel, age, sex) will be presented.

Conclusion

Tracking progress toward elimination using conventional tools is challenging when prevalence is very low. Molecular analyses like the 24-SNP barcode offer the possibility to extend our knowledge beyond the presence or absence of P. falciparum in a sample to include information on the genetic diversity / relatedness of the circulating parasite population, the complexity of infection.

Title: Entomological Evaluation of an Attractive Targeted Sugar Bait for Potential use in Malaria Prevention in Western Province, Zambia

Authors: Javan Chanda (PATH MACEPA)

Background: The Zambia National Malaria Elimination Strategic Plan 2017-2021 has an ambitious and attainable goal of eliminating malaria by 2021. Long-lasting insecticidal nets (LLINs) and indoor residual spraying (IRS) are the primary vector control methods currently in use, both of which targets indoor biting and resting mosquitoes to reduce malaria transmission. However, not all human–vector contacts occurs within households. Additional vector control methods for targeting outdoor-biting mosquitoes are urgently needed to complement existing indoor-based vector control strategies. The study will evaluate the effect of introducing a novel vector control product called an attractive targeted sugar bait (ATSB) developed by Westham Company on the densities and feeding rates of malaria-transmitting mosquitoes in Luampa District, Western Province, Zambia.

Methods: The study area was randomly divided into four areas to receive 0, 1, 2 and 3 ATSBs per sleeping structure with no active ingredient for re-capture of sugar-fed mosquitoes for assessing feeding rates. In each study area, mosquitoes were sampled by four different methods include indoor and outdoor CDC light traps, indoor and outdoor human landing catches (HLCs), indoor resting collections with battery powered Prokopack aspirators, outdoor resting mosquitoes with clay pots and malaise traps. Adult mosquitoes were identified morphologically to differentiate between An. funestus and An. gambiae s.l.. Feeding rates were assessed by dissecting captured mosquitoes immediately upon collection to record presence or absence of dye. Field work will be completed by June 2018 and differences in feeding rates will be compared among the varying levels of ATSB exposure. A 30% feeding rate has been modelled to provide a desired level for concomitant human epidemiological impact on malaria burden and if achieved will lead to a follow-on epidemiological field trial to quantitatively assess epidemiological impact.

Conclusion: Evidence generated from these studies will inform the Zambia National Malaria Elimination Programme's efforts to aid in controlling outdoor biting and malaria transmitting mosquitoes and to inform the World Health Organization's (WHO) Vector Control Advisory Group's (VCAG) review of this product for approval in the malaria vector control arsenal.

Title: Increasing uptake of Voluntary Medical Male Circumcision (VMMC) among 15-29yr old clients

Authors: Henry Sichinga[1], Chilochibi Chiziba[1], Lola Aladesanmi[1], Mary Namukoko[1], Chikusela Sikazwe[1], Joseph Banda[1], James Zulu[2]
1. Jhpiego, 2. Ministry of Health

Background: Evidence shows that VMMC programs can reduce heterosexual transmission of HIV by 60%. Jhpiego, with the Ministry of Health and CDC, are working to achieve 90% coverage of comprehensive male circumcision (VMMC) in prioritized districts in Zambia, focusing on increasing the proportion of males at higher sexual risk of acquiring HIV, primarily 15-29 year-olds as a way to contribute in preventing new HIV infections. Jhpiego continually monitors its demand creation interventions to understand which activities generate the greatest service uptake and contribute to achievement of performance targets of 75% of the focus age group.
The program has consistently recorded lower proportions of about 49% on average using miscellaneous mobilizing strategies.

Methods: Data reviewed from client intake forms collected on how clients heard of VMMC showed that clients who are 15 years-old and above respond positively to Interpersonal Communication (IPC) mobilization unlike the 10-14 year olds who respond to other mobilization strategies such as Public Address (PA) system. This resulted in the project resorting to restructuring demand creation strategies in November 2017. This included engagement and orientation of resident community mobilizers and facility environmental technician cadres in age-targeted demand creation interpersonal communication mobilization method.

Results: The analysis revealed a 23% increase in the proportion of 15-29year old males reached from the time IPC was introduced in November 2017. In addition, between April and October 2017 the project recorded an average of 49% (21,279) clients aged between 15-29 years old accessing VMMC services, while an average of 72% (17,785) was achieved between November 2017 and February 2018. This is higher than the highest proportion (65%, 465 in October 2017) of this group reached before IPC was introduced.
On the other hand, the project has since recorded a reduction (from 23,842 to 5,457) in the number of clients accessing VMMC between age group 10-14yrs who are easily attracted to come for services using media or PA system. The average 43% of this age group before the introduction of IPC reduced to an average of 20% after the implementation of IPC.

Conclusion: IPC approach lead to both an appreciable volume of older adolescents and adults and a greater proportion of the overall client age profile. This approach has been incorporated in routine service delivery for VMMC resulting in cost effectiveness, as mobilizers no longer spend time on 10-14 year-olds but rather the desired age group of 15 – 29 years of age. IPC is a promising approach to demand creation for priority age groups, and exploration of further innovation is warranted to reach both higher absolute numbers and proportion of adults.

Title: Results from the CoRE trial in Southern Province, Zambia, comparing two reactive responses in a quest to accelerate elimination of malaria

Authors: Daniel Bridges[1], John M. Miller[1], Victor Chalwe[2], Hawela Moonga[3], Busiku Hamainza[3], Richard W. Steketee[1], Brenda Mambwe[1], Conceptor Mulube[1], Chris Drakeley[4], Sandra Chishimba[1], Mulenga Mwenda[1], Kafula Silumbe[1], David Larsen[5]
1. PATH-MACEPA, 2. National Health Research Authority, 3. Ministry of Health, 4. London School of Hygiene & Tropical Medicine, 5. Syracuse University

Background: Zambia has seen impressive reductions in malaria transmission, such that the government has set ambitious targets of eliminating the disease by 2021. One key intervention in this success has been training community health workers to test and treat suspected cases, using rapid diagnostic tests and artemether-lumefantrine, as well as perform reactive focal test and treat (RFTAT) in the index case and neighbouring households.

Methods: To accelerate towards zero, the use of a more aggressive approach; reactive focal drug administration (RFDA) using the longer lasting dihydroartemisinin-piperaquine, was evaluated against RFTAT in the Community-led Responses for Elimination (CoRE) randomized controlled trial. Data from this two-year trial include: 1) a cross-sectional endline survey to measure seropositivity and P. falciparum prevalence in children under 15 years of age, to be performed in May 2018, 2) routine, aggregate health facility catchment area (HFCA) data, including community health worker health posts, and 3) longitudinal cohorts enrolled in reactive responses to measure clearance and re-infection rates for each arm.

Results: During the study, malaria incidence has dropped dramatically, with no significant difference in incidence between the two arms after the first year. However, in 2018, the control arm has reported 68 confirmed cases of malaria compared to only 27 in the intervention arm. PCR analysis of reactive responses identified >95% of all positives found in the index household.

Conclusion: While further analyses of this study will follow final data collection, it is clear that at least in areas of Southern Province, Zambia is continuing to proceed towards elimination, with transmission becoming increasingly focal. Optimizing the approach to malaria elimination through the use of community health worker responses to malaria cases is critical for rapidly achieving national strategic goals.

Title: PrePex™ Male Circumcision Active Adverse Event Surveillance Cascade in Zambia, Including Tetanus Vaccinations

Authors: Mary Namukoko[1], Joseph Banda[1], Lola Aladesanmi[1], Omega Chituwo[2], Henry Sichinga[1], Jimmy Siachobe[1], James Zulu[3], Kwame Asiedu[1]
1. Jhpiego, 2. Centers for Disease Control & Prevention (CDC), 3. Ministry of Health

Background: WHO prequalified the PrePex circumcision device in May 2013 for males 13 years and above. After a pilot in Zambia in 2014, active adverse event (AE) surveillance to further evaluate the device commenced in June 2016. However, it was halted in July based on WHO's recommendation of completed tetanus toxoid containing vaccine (TTCV) vaccination, at least 2 weeks prior to device placement. Active surveillance was restarted with TTCV in May 2017 by the Government of Zambia. Jhpiego is also supporting the Ministry of Health (MoH) to implement PrePex active AE surveillance.

Methodology: A review of surveillance records from 19th May 2017 to September 21st 2017 across all supported sites, focusing on clients who had received their first TTCV dose by July 31st, who should have completed the day 49/day 56 follow up at the time of the review.

Results: 415 clients received the 1st TTCV vaccination, 397/415 (96%) received the 2nd dose, 247/397 (62%) had the device placed, 233/247 (94%) had the device successfully removed. The major point where clients discontinued was after the 2nd TTCV vaccination. Among reasons cited for deciding to forego PrePex circumcision after completing TTCV vaccination included testing HIV-positive as part of device placement screening or no longer wishing to wait for circumcision by the PrePex device method. In this cohort of clients there were no AEs.

Conclusion: The completion rate of PrePex based circumcisions with TTCV is extremely low with only 56% (233/415) of clients remaining in the cascade from first TTCV vaccination to device removal and a large number clients lost to follow-up after the second TTCV dose. Demand generation activities are now being tailored with more TTCV specific communication to address these challenges, the project is also implementing additional follow up calls and visits after the second TTCV dose. In addition, the program has implemented a dual HIV testing process at first TTCV and just before placement.

Title: The epidemiology of Influenza in Ndola District of Zambia

Authors: Sydney Mwanza[1], Ray Handema[1], Bertha K. Chanshika[1], Samson Mwale[1], Jay Sikalima[1]

1. Tropical Disease Research Centre

Background: There is limited data on the burden of influenza in developing countries. In order to better understand the epidemiology of influenza virus infection in Ndola, Zambia, the Tropical Diseases Research Centre (TDRC) in Ndola conducted an influenza virus surveillance for patients who visited selected health centres between July 2013 and December 2015 in order to determine the viral etiology.

Methodology: Patients presenting with influenza-like illness (ILI) cases were obtained from 3 clinics while those with severe acute respiratory illness (SARI) where identified from the 2 major hospitals in Ndola. From consenting participants, nasopharyngeal and throat swabs specimens were collected and sent to the molecular biology laboratories at TDRC where they were extracted for viral nucleic acid and tested for influenza using real-time multiplex polymerase chain reaction. Samples meeting the exceeding the set minimum Critical threshold value were considered positive.

Results: A total of 292 samples were collected of which 89% were from patients with ILI and 11% from SARI sites. Of all 292 samples analyzed, 22.4 % yielded influenza A virus, and 6.3% were positive for influenza B virus. About 76% of influenza A virus was of the subtype H3, which circulated nearly every month of the study duration.

Conclusion: The study confirmed the existence of influenza viruses which were found circulating all year-round in the study population.

Title: Molecular Identification of Non-Tuberculous Mycobacteria Isolated from Clinical Specimens in Zambia

Authors: G. Mwikuma[1], BM Hang'ombe, E. Simulundu, G. Kwenda, T. Kaile, S. Nzala, Y. Suzuki

1. BMSZ

Introduction: The emergence of the Acquired Immunodeficiency Syndrome (AIDS) has rapidly increased the incidence of disease caused by Non-tuberculous Mycobacteria (NTM). Despite disease caused by Mycobacterium avium complex being common throughout the world, infections by other Non-tuberculous Mycobacterium species are increasing in both immunosuppressed and immunocompetent individuals and this has made it clinically important to quickly and accurately identify mycobacteria to species level. The diagnosis of a pathogenic versus a non-pathogenic species not only has epidemiological implications but is also relevant to the demands of patient management. Antibiotic treatment varies according to the species encountered and therefore species identification would reduce the burden of some of these emerging opportunistic pathogens. Use of conversional methods to identify mycobacteria is difficulty. The aim of the study was to determine the identity of Non-tuberculous Mycobacterial species isolated from clinical specimens in Zambia using molecular techniques.

Methodology: This was a retrospective study in which 91 isolates were identified by DNA sequencing of the 16S-23SrRNA intergenic transcribed spacer (ITS) sequence and 27 isolates were additionally identified by Polymerase Chain Reaction Restriction Enzyme Analysis of the heat shock protein65 (hsp65) gene.

Results: Sixty-eight (75%) out of the 91 isolates were identified as Non-tuberculous Mycobacteria. These comprised of M. Intracellulare (21%) which was the most prevalent species, followed by M. Lentiflavum (15%), M. avium(12%), M. fortuitum (9%), M. gordonae (6%), M. Kumamotonense (6%), M. Elephantis (4%), M. Indicuspranii (3%), M. arupense (3%), M. Flavescens (3%), M. Peregrinum (3%), M. Asiaticum (1%),M. Bouchedurhonense (1%), M. chimaera (1%), M. Europaeum (1%), M. Neourum (1%), M. Marinum (1%), M. Palustre (1%), M. Nonchromogenicum (1%), M. Rhodesiae (1%), M. Senegalense (1%)and M. Timonense (1%). Most of these species are potentially pathogenic.

Conclusion: These findings shows the importance of molecular techniques in accurate identification of acid-fast bacilli as this will prevent inappropriate treatment of patients with TB drugs based on positive Ziehl-Neelsen (ZN) smears. Our study has shown that DNA sequencing of the ITS region is definitive in species identification of Non-tuberculous Mycobacteria.

Title: When Locals Lead--Empowering Districts to set their own TB Operational Research Agenda: Lessons from the USAID Eradicate TB Project

Authors: Josphat Bwembya[1], Ramya Kumar[2], Mpundu Makasa[3], Joseph Simbaya[3], Philimon Ndubani, Ab Schaap[2,4], Gershom Chongwe[3], Musonda Simwinga[2], Alwyn Mwinga[2]
1. USAID Eradicate TB Project, 2. Zambia AIDS-Related Tuberculosis (Zambart), 3. The University of Zambia, 4. London School of Hygiene and Tropical Medicine

Background: In Zambia, there is inadequate local public health workforce capacity to design and implement operational research (OR). In 2017 the USAID-funded Eradicate TB Project launched an OR capacity building program for district-level Ministry of Health (MoH) staff. We describe the process used to set the TB OR priority agenda, select the trainees, anddevelop proposals. We will also share lessons learned for other high TB-burden countries that seek to implement similar training programs.

Methods: During a national meeting with key TB stakeholders in November 2017, ten OR priority areas were identified. We then selected four districts in three provinces based on three criteria: [1] high TB-burden evidenced by high TB notification rates from January 2016 – March 2017, [2] high-risk populations (ie: miners), and [3] motivated staff recommended by key stakeholders in the National TB Program (NTP). In December, TB focal persons, information officers, and laboratory specialists from each of the four districts, and one provincial-level TB focal person from each of the three provinces were invited to a meeting to learn about OR. District staff identified OR priority areas for each of their districts based on the national OR priority areas. In January 2018, a total of 19 trainees attended an intensive 10-day proposal development workshop. After key research proposal sections were summarized during interactive morning lectures, district teams would write their proposals in the afternoons, and present their proposals each evening. Participants were administered one pre and post-test, daily course evaluations, and a final course evaluation. Pre- and post-test scores were analyzed using a paired sample t-test.

Preliminary results: All four districts developed draft research proposals examining TB diagnostic and care cascades. The average pre- and post-test scores increased from 68 to 84 points ($p < 0.001$). Interactive teaching techniques, course evaluations, and active facilitator engagement allowed for tailor-made training and an iterative proposal design process. MoH stakeholder involvement throughout the agenda-setting, district-selection, and training ensured district-research topics were in line with national priority areas. Challenges included difficulty identifying a research topic that would be novel yet feasible, lack of access to literature in subscription journals, poor writing and literature referencing skills, and complicated inter-group dynamics due to varying education-levels and government ranks.

Conclusion: Training a group of individuals who have varied education levels as a district "team" was ineffective. Since operational research is meant to provide local solutions, training material should emphasize teaching concepts through real-word examples, instead of theory. Trainees with no basic knowledge of research will have difficulty writing an OR proposal within 10 days. For

future trainings, individuals will apply for the program through a competitive application. This will ensure that only motivated individuals with basic knowledge of research are selected.

Modelling Deaths Associated with Road Traffic Accidents and other Factors on Great North Road in Zambia between the years 2010 and 2016 Using Poisson Models.

Authors: Ronald Fisa[1], Chola Nakazwe[2], Charles Michelo[1], Patrick Musonda[1]

1. University of Zambia, School of Public Health, Department of Epidemiology and Biostatistics, 2. Central Statistical Office (Zambia), Demography Section.

Background: World Health Organization reports that about 1.24 million people die annually on the world's roads, with 20–50 million sustaining non-fatal injuries. More than 85% (1.05 million) of the global deaths due to injuries occur in the developing world.

Methods: In this study, data was collected from Zambia Police, Traffic Section on the Great North Road (GNR) highway between Lusaka and Kapiri-Mposhi in Zambia. The data collected was from January 1, 2010 to December 31, 2016. Results from standard Poisson regression were compared to those obtained using the Negative Binomial (NB), Zero-Truncated Negative Binomial (ZTNB) and Zero-Truncated Poisson (ZTP) regression. The Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) were used to determine the best fit model. The data was analysed using STATA version 14.0.

Results: A total of 1, 023 RTAs were analysed in which 1, 212 people died. Out of these 1, 212 deaths, 82 (7%) of the deaths were Juveniles and 1, 130 (93%) were adults. Faults such as pedestrians crossing the road accounted for 30% (310/1,023) of the accidents while 29% (295/1,023) of the accidents were as a result of driver's excessive speed. The mean age of the drivers was 37.1 years and standard deviation of 9.7. The minimum age of the driver was 15 years and maximum being 76 years.

In a multivariable regression analysis, the ZTNB was the best fit model (AIC=832.6 and BIC=869.1) as compared to the ZTP (AIC=1,287.2, BIC= 1,323.6). The results indicate that male drivers compared to female drivers had an increased incidence rate of death from RTAs (IRR=9.57, 95% CI= 0.96-95.46), with borderline evidence, p-value=0.054. Further, driving in the early hours of the day (from 24:00 hours to 06:00 hours) as compared to driving in the night (from 19:00-23:59) had a significant increase in the incidence rate of death from RTAs (IRR=2.1, 95% CI=1.01-4.41), p-value=0.048. Results also showed that public transport as compared to private transport increased the incidence of death from RTAs (IRR=5.65, 95% CI= 2.97-10.73) and this was statistically significant P-value<0.0001.

Conclusion: There is a reduced incidence of dying if one is using a private vehicle as compared to using a public vehicle. There is an increased incidence of death if one is driving between Landless corner and Zambia National Service (ZNS) as compared to driving between Lusaka and Katuba. This study suggests that when dealing with counts where there are a few zeros observed such as in fatal road traffic accidents, ZTNB fits the data well as compared to Poisson, NB and ZTP models.

Title: Why Babies are born before Arrival; A case of Chawama Community, Lusaka

Authors: Martha Mwendafilumba[1], Mulenga. T., Shabalu. P, Misinzo. M, Mangangu. A, Manasyan. A.

1. Centre for Infectious Disease Research in Zambia (CIDRZ)

Background: Every year around 48 million women worldwide - about 35% of deliveries - give birth without a physician, nurse, and/or midwife. Improving institutional delivery rates is a strategic priority of the Zambian Ministry of Health to reduce the number of maternal deaths and pregnancy related complications. Despite the vigorous community and facility health education, high number of women were delivering at home in Chawama catchment area.

Methodology: A barrier analysis using the twelve determinants of behaviour was conducted between October and December 2016 on 90 newly delivered women in Chawama catchment area (Lusaka Zambia) to find out the factors contributing to home deliveries in the zones with highest number of home deliveries. It compared those who delivered at home (doers) and those who didn't (non-doers) on the potential determinants for utilization of health facility for institutional deliveries.

Results: Both Non-doers and Doers had high knowledge on the danger signs of pregnancy, benefits of institutional deliveries, and potential complications during labour and delivery. However, despite this, mothers were not motivated to deliver at the health facility. But, attributes such as good patient care, staff attitudes and provision of medical commodities seemed to be the most preferred attribute to accessing skilled health care.

Conclusion: To increase access to health services for institutional deliveries it entails considering the quality of such services provided at government health facilities. Additionally, we suggest open dialogue between the service providers and end-users to identify the barriers and come up with solutions to increase institutional delivery.

Title: Assessment of Factors Influencing Antenatal Care Attendance in First Trimester of Pregnancy Among Women in Chibombo District, Zambia

Author: Joseph Chizimu[1]
1. The Ministry of Health

Background: Antenatal care (ANC) is one of the four pillars of the Initiative for Safe Motherhood. Early ANC attendance in the first trimester of pregnancy provides a platform where a health worker educates the mother and/or caregiver and assesses maternal and fetal well being so that complications are detected and managed early to have positive pregnancy experiences. Thus, this improves fetal and maternal outcomes. A number of factors have been alluded to as some of the hindrances to antenatal care attendance in the first trimester of pregnancy.
Aim: The aim of this study was to assess factors influencing antenatal care attendance in the first trimester of pregnancy among women in selected rural health centers in Chibombo District, Central Province, Zambia.

Methodology: It was a cross-sectional study, which was conducted in 10 selected rural health facilities in Chibombo District, Zambia. The study recruited 271 women. The data was collected through well-structured questionnaires and descriptive and inferential statistics were used to analyze the data using SPSS version 20.

Results: About 22.1% of the sampled women had their first ANC attendance in the first trimester of pregnancy while 29.9% in second and 48% in third trimester. Factors such as age, parity, household property, education and employment status had a statically significant association ($p< 0.05$) with ANC visit in the first trimester. While as, privacy, knowledge of cultural beliefs against ANC, been attended to by a skilled health worker, place where ANC was provided and marital status were not significantly associated with ANC visit in the first trimester of pregnancy. Besides, 43.5% had four or more ANC visits with majority (96.7%), had at least one ANC visit in their last pregnancy. There was a statically significant association between the number of ANC visits and its attendance in the first trimester of pregnancy.

Conclusion: The study revealed that in rural setting a significant number of pregnant women do not initiate ANC attendance in their first trimester of pregnancy and have less than four visits before delivery thus do not benefit fully from ANC services. Therefore, more sensitization has to be done on the significance of ANC attendance in the first trimester. Further, interventions on reducing distances to the nearest facility such as strengthening outreach activities have to be intensified.

Title: Experiences of Adolescent Learners with Sickle Cell Disease

Authors: Bernadette Moraes[1] & Ecloss Munsanka[1]
1. The University of Zambia

Background: Sickle Cell Disease (SCD) is an inherited chronic disease characterised by recurrent pain, low red blood cell count, and infection. SCD taxes the cardiovascular system and results in reduced exercise tolerance, delayed growth and sexual development. Adolescence is a developmental stage with numerous challenges, more so for adolescents with SCD. Adolescents who suffer from chronic pain due to the SCD are usually alienated from their peers and may also be victimised by them. As a result, adolescents with SCD commonly do not to disclose their condition, which may lead to further alienation and stigmatisation by their teachers as well as their peers. There is a dearth of literature on the experiences of adolescent learners with SCD; the literature search revealed that most research on SCD among adolescents has focused largely on the medical aspects. This study sought to explore the experiences of adolescent learners with SCD.

Methods: A phenomenological qualitative research design was used; the target population comprised adolescents with SCD, their caregivers and their teachers. The adolescents were randomly selected from among those who attend the Sickle Cell clinic every Friday at the University Teaching Hospital. Purposive sampling was used to identify caregivers and teachers who fit the required criteria. A reduced number of 5 adolescents, 5 parents and 5 teachers was used in order to capture quality experiences. Semi-structured interviews were used to collect the data. The data from the interviews was analysed, coded and grouped according to emerging themes. Interpretative Phenomenological Analysis (IPA) technique was used to interpret the experiences of adolescent learners with the SCD

Results: Among the adolescent learners the themes that emerged were: Being sick often; Grades are repeated; studies and extra lessons; Exemption from strenuous activities and Teachers do not understand the condition. Among the parents the themes that emerged were: Children with SCD miss school often; Children with SCD need more attention in class; Extra lessons and classes are repeated and Teachers do not understand sickle cell disease. Among the teachers, the themes that emerged were: Parents and learners not wanting the SCD condition to be known; Lack of knowledge by teachers about the SCD; Need for learners with SCD to have individualised attention during lessons; and Inadequate support given to learners with SCD in schools.

Conclusion: Both the adolescents with SCD and their parents prefer not to disclose the condition due to myths, misconceptions and stigma associated with the disease. Adolescents with SCD often miss school for extended periods of time, often falling behind and in some cases needing to repeat grades. Unfortunately, most teachers have a poor understanding of the SCD and there is inadequate support given to adolescent learners with SCD in schools. The physical and psychological burden that SCD has on school attendance may have a bearing on future employment and relationships, and may further lead to poor mental health and to the requirement of higher health care needs.

Title: Factors Associated with Early Childbearing among Adolescent Girls in the Research Initiative to Support the Empowerment (RISE) of Girls Trial at Baseline

Authors: Priscilla Nkonde[1], Patrick Musonda[1], & Cheelo Mweene[2]

1. The University of Zambia- School of Public Health, 2. The University of Zambia- BREC

Background: In Zambia, adolescent childbearing is a national problem that affects all the communities with a teenage childbearing rate of 146.8 per 1000 girls in the year 2010. (United Nations, 2010). WHO defines an Adolescent as any person between the ages of 10 to 19 years which is the focus age group for this study. This study is aimed at investigating factors that influence early childbearing among adolescent girls in some selected rural districts of Zambia at baseline of the RISE cluster randomized trial. These factors include; cultural beliefs, social economic factors, knowledge and access to reproductive health information and peer pressure.

Methods: This study is a nested quantitative cross-sectional design embedded in a Cluster Randomized Trial of the Research Initiative to Support the Empowerment (RISE) of girls. Participants are girls attending grade seven at various schools in 2016. Information on factors that could influence the participants' view on child bearing were collected at baseline. A complete enumeration of approximately 4900 girls recruited in 12 rural districts of Central and Southern provinces was analysed. Descriptive statistics are presented as frequencies and percentages in tables. To check for association with categorical variables, either Chi-squared or Fisher's exact test was done depending on whether the assumptions for Chi-squared test were satisfied or not. Univariate and Multiple Logistic regression analysis was used to test the association between independent factors and early childbearing. Clustering in the study was accounted for using robust standard error.

Results: The findings showed that more than two-thirds 3189 (73.7%) of the participants had little or no knowledge regarding adolescent sexual and reproductive health services while less than one-third 1137 (26%) had knowledge regarding Adolescent Sexual and Reproductive Health services. Adolescents with mobile phones were 2.5 more times likely to engage in early child bearing compared to adolescents without mobile phones. Regarding the age of adolescents, majority 227 (69%) who agreed to early childbearing were aged 10 to 15 years, whilst the least number of adolescents who agreed to early childbearing were 99(30.3%) in the age ranges of 16 to 20 years. In addition, results reviews that one-year increase in age of an adolescent girl increases early childbearing by 30% (OR=1.30, p- value=0.03). Overall, very few factors (mobile phone and age) at baseline were found to be associated with child bearing.

Conclusion: Only mobile phone use and age were associated with early childbearing at baseline. Given that this information was at baseline of the original cluster randomized trial, the information suggests that there was no evidence of a difference in factors that may affect early childbearing and hence, in the original study, it appears like randomization worked as there is no evidence of difference on a number of possible factors that may affect early childbearing.

Title: Time to Infant Death: A Study of Infant Mortality in Zambia

Authors: Rabecca Bwato[1] & Chabila Mapoma[1]
1. The University of Zambia

Background: Zambia is one of the countries that met the millennium development goal target number four of reducing under-five mortality by two thirds of the 1990 levels by the year 2015. Despite great strides in reducing under-five mortality, infant mortality contributes more than 50 percent to the under-five deaths in Zambia. A number of studies have been conduct to determine factors affecting infant and under-five mortality; however, none of these studies investigate time to the event (mortality). This study therefore aimed at analyzing the time to death of infants based on the 2013-14 Zambia Demographic and Health Survey.

Methods: Analysis was performed at three levels; Descriptive, Kaplan Meier and Cox-regression analysis. Descriptive analysis determined median survival while Kaplan Meier ascertained crude relationship; the Cox regression was done to identify major predictors of time to infant mortality using a significance level of 5 %.

Results: Of the total (564) number of infant deaths reported, more than half (320) occur before one month. Kaplan Meier analysis reveal that males had lower chances of surviving compared to females; infants born in rural areas and those born in homes with unsafe sources of water have lower chances of surviving compared to those in urban areas and with safe water source respectively. Cox regression results also show that infants born to women who live with their partners have 30 percent lower risk (HR=0.700, P-value=0.006) of dying compared to infants in homes where the mother does not live with a partner/husband. Infants born in homes that do not have improved toilet facility have a 15 percent lower risk (HR=0.853) of dying.

Conclusion: The study shows that median time to death is before one month and the main determinants of time to infant mortality in Zambia are: age of the mother, birth interval; place of delivery, type of place of residence, and mother living with partner. Hence the need for increased sensitization on dangers of early marriages, teen pregnancies as well as birth interval which may lead having births at tender age and short birth interval respectively. Most of deaths occur before one month, in future a study may be done to analyse survival time to death of infants before they reach the age of one month.

Title: Home deliveries in the capital: a qualitative exploration of barriers to institutional deliveries in peri-urban areas of Lusaka city, Zambia

Authors: Misinzo Moono[1], Mulenga, Tamara[1], Mwendafilumba, Martha1, Manasyan, Albert[1,2], Sharma, Anjali[1,3]

1. Centre for Infectious Disease Research in Zambia (CIDRZ), 2. University of Alabama at Birmingham, 3. University of Washington

Background: A shortage of skilled birth attendants along with unattended home deliveries and low quality of care in health facilities contribute to the high maternal and neonatal mortality in sub Saharan Africa. Identifying and addressing context-specific reasons for not delivering at health care facilities could increase births assisted by skilled attendants who, if required, can provide life-saving interventions.

Methods: We conducted 22 in-depth interviews (IDIs) with midwives at three health facilities in peri-urban communities and 24 semi-structured surveys with mothers in two areas served by health facilities with the highest number of reported home deliveries in Lusaka, Zambia. Both IDIs and surveys were audio-recorded, transcribed, and coded to identify themes around delivery and birthing experience.

Results: We found that most women preferred institutional deliveries to home deliveries, but were unable to utilize these healthcare services due to inability to recognize labour symptoms or lack of resources. Midwives speculated that women used herbal concoctions to reduce the duration of delivery with the result that women either did not present in time or endangered themselves and the baby with powerful contractions and precipitous labour. Respondents suggested that disrespectful and abusive maternity care dissuaded some women from delivering at health facilities. However, some midwives viewed such tactics as necessary to ensure women followed instructions and successfully delivered live babies.

Conclusion: Difference in beliefs and appropriate practice between midwives and mothers suggests the need for open dialogue to determine appropriate interventions between them to increase facility usage. Additionally, further examination of the pharmaceutical properties and safety of herbal concoctions being used to shorten labour are required, as well as measures that can be taken to reduce the economic burden of seeking care within this environment and improve the quality of care in the facilities.

Title: Reflections on a novel method of delivering teaching in the operating theatre in Lusaka, Zambia

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Introduction: Anaesthetists can find it difficult to attend organised teaching due to a heavy clinical workload. Cancelling or reducing theatre lists is problematic due to the number of patients awaiting surgery, and study leave for doctors is difficult to organise at a departmental level due to rota pressures. Clinicians often work alone without a break and often do not eat during working hours. We therefore introduced a new method of teaching in an accessible and flexible way without disrupting daily activities like theatre lists. There is no evidence that this method has previously been tried in a low resource setting. The objective of this study was to pilot the 'tea trolley' method as a way of increasing access to teaching at University Teaching Hospital, Lusaka, Zambia.

Methodology: We designed a twenty minute, interactive teaching package designed to explore attitudes around incident reporting, which we then took to all anaesthetists working at UTH during clinical working hours. Participants were asked to fill in a survey before and after teaching to explore attitudes and knowledge. The “tea trolley” trolley method of teaching was used; a simple two-tier trolley was set up with teaching material on one level and tea, coffee and biscuits on the other. Teaching took place in the operating theatre either in the anaesthetic room or nearby space. Two tutors were present at all times; one to deliver the teaching and another to look after the patient. After teaching, every clinician was offered a hot drink and a snack.

Results: It was found that none of the seventeen participants had been exposed to the 'tea trolley' style of teaching before and 88% said that they would want more teaching done in this style. 88% of participants found the teaching accessible or very accessible and 100% felt it was useful or very useful. There was good engagement from trainees and from Senior Registrars and Consultants. Challenges included finding a place to carry out teaching that was suitably close to theatre, having enough time to complete the teaching package during a list of quick operations and moving between different theatre areas because of hygiene rules.

Conclusion: We believe that this method of teaching could be used across hospitals in low resource settings, as a way of bringing teaching to the team members when formal teaching is difficult to access, and with the welcome addition of refreshments during a busy shift.

Title: Adaptation of the WHO PEN tool for assessing health system capacity to prevent and control Non-Communicable Diseases in Zambian primary care settings.

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Background: Sub-Saharan Africa is experiencing a rapid epidemiological transition with the growing burden of non-communicable diseases (NCDs), as a result of the rapid urbanization and westernization of lifestyles, decreasing physical activity, changing dietary habits and increasing longevity of the population. our objective was to assess the readiness of primary health care facility for the management of the common NCDs using the WHO PEN tool. However, in order to adequately capture the nuanced knowledge specific to the primary health setting in Zambia, there is need to contextualize this tool. In this paper, we detail the process of adapting the WHO PEN tool for the Zambian context and highlight the specific modification required to successfully collect high quality, useable knowledge for decision making.

Methods: A qualitative study was conducted looking at the process of adapting the WHO PEN tool for assessing capacity for primary health care facilities to manage and prevent NCDs. We conducted 15 in-depth interviews with key formants at national, provincial, district and health facility level. The stakeholders were drawn from three districts of Lusaka Province namely Kafue, Chongwe and Luangwa. The 48 health facilities in these 3 districts were part of the Better Health Outcomes through Mentorship and Assessment (BHOMA). Data was analyzed using NVivo version 11.

Results: The study showed that WHO Pen tool required major modification to correctly assess capacity for primary care facilities to manage and prevent major NCDs in Zambia. Major adaptions were required in the following domains: Human resources, essential medicines, health information, infrastructure and Community linkages.

Conclusion: In this study, we applied a qualitative approach to the adaptation process of the World Health Organization PEN tool through rigorous consultative meetings with NCD specialist at various level of the health system in Zambia. Generally, the study showed that WHO Pen tool required several modifications for it to correctly assess capacity for primary health care facilities to manage and prevent NCDs in Zambia. Future studies should evaluate the applicability of the adopted tool and suitability for assessing NCD service delivery capacity in low resource settings.

Title: Changes in selected electrolytes in adult intensive care patients at the University Teaching Hospital (UTH), Lusaka, Zambia

Authors: Ninza Sheyo[1] & B. Vwalika[1]
1. The University of Zambia

Background: The importance of regulating electrolyte levels is well recognized in most intensive care units. The extent of sodium and potassium imbalances in patients admitted to the Main Intensive Care Unit (MICU) at the University Teaching Hospital Lusaka Zambia is unknown. This study aimed to identify whether the abnormalities were associated with negative outcomes.

Methods: An observational cross-sectional study of patients admitted to MICU. Blood samples were collected at 0 hours and 24 hours post admission. Normal serum concentrations of sodium and potassium were considered as 135-145 and 3.5 - 4.5mmol/L, respectively. Values at o and 24 hours were compared with the Wilcoxon signed rank test. Logistic regression analysis was used to investigate the relationship between electrolytes and mortality. $P < 0.05$ was considered statistically significant.

Results: 100 patients were included in this study with a mean age of 36.8 years (SD = 12.1). The mean value of sodium level was 136.7 (SD = 8.9) mmol/L and 139.0 (SD = 11.6) mmol/L, on admission and 24 hours post admission respectively ($p = 0.0051$). Hypernatremia was shown to be associated with an increased risk of death ($p = 0.021$) in the MICU with an odds ratio of 4.0 (95% confidence interval of 1.2 to 12.9). Hyponatremia was the most prevalent electrolyte imbalance.

Conclusion: There is a significant change in serum sodium levels after 24 hours post admission. Hyponatremia being the most prevalent. Hypernatremia is significantly associated with mortality. Early correction of electrolyte imbalances in ICU can reduce mortality.

Title: Social Determinants of Human Anthrax Transmission among affected Communities in Zambia

Authors: Doreen Sitali[1], J.B Muma1, L.Ndonyo[1], C. Kabonesa[1], A. State[1], O. Mweemba[1]
1. The University of Zambia

Background: Zambia has experienced an unprecedented increase in the number of human anthrax outbreaks in the Western and Muchinga Provinces in the recent past. Epidemics are triggered by an interplay of environmental and human activity factors. However, there is insufficient information concerning the social factors that influence human behavior associated with anthrax transmission in Zambia. The study was set to explore the socio-economic, cultural and political determinants associated with human anthrax transmission in Zambia.

Methods: The study was conducted in the Western and Muchinga Provinces of Zambia. The University of Zambia Biomedical Research Ethics Committee gave ethical approval. A convergent parallel mixed methods design was used to collect both quantitative and qualitative data. A questionnaire survey involving 1,127 respondents, six focus group discussions, and eight key informant interviews were conducted to collect data. Descriptive statistics of quantitative data and thematic analysis of qualitative data were run concurrently but separately. The use of matrices facilitated interpretation of both quantitative and qualitative results.

Results: Most of the socio-demographic and socio-economic characteristics of respondents suggested that the majority were living below the poverty line. A larger proportion (85%) of respondents never attended school. The study also found that most of the respondents in both regions (76%) in Western and (51%) in Muchinga respectively had no access to safe drinking water and sanitation. The study had further established that, though the majority (88%) of respondents were knowledgeable about anthrax and knew that vaccination was an effective preventive measure for anthrax, they had negative attitudes towards most control measures due to low perceived efficacy of the vaccine and lack of trust of professional staff. Also, 78.1% of those interviewed either ate, sold or shared meat from dead animals. A large proportion (68%) of respondents participated in slaughtering moribund animals, and only 13% had their cattle incinerated or buried when they died of disease. Based on the study, it can be argued that poverty, cultural practices such as mafisa, gender roles, and responsibilities, and socio-economic factors are fundamental drivers influencing human anthrax transmission. Also, lack of community involvement, inadequate collaboration among disciplines and inadequate logistical support adversely affects the control of anthrax in the communities affected. Lastly, geographical remoteness of the two regions compromised the effective monitoring and control of the disease.

Conclusion: Based on the study's findings, government needs to provide funding for anthrax control and tackle poverty. Collaboration with other disciplines, within the One Health framework, is essential to effectively tackle the socio-cultural issues surrounding cattle rearing and meat consumption beliefs. There is need to conduct a comparative random sampling based study that will allow for generalization of findings and provide a comprehensive understanding of how different factors shape anthrax transmission.

Title: Anaemia In Pregnancy: A Public Health Problem in Zambia

Authors: Mwansa Ketty Lubeya[1] & Bellington Vwalika[1]
1. The University of Zambia- School of Medicine

Background: Anaemia is a global public health problem affecting people from different age groups, frequently, pregnant women and their children, especially in the developing world (World Health Organization (WHO) 2008). WHO (1996) defines anaemia in pregnancy (AIP) as haemoglobin (Hb) level below 11g/dl in the first half of the pregnancy and 10.5g/dl in the second half. Consequences of anaemia in pregnancy include increased risk of bad outcomes e.g. maternal mortality, reduced work capacity and in children-child mortality, impaired neural cognitive function and physical development of children. This study investigated the problem of anaemia in pregnancy and its associated factors.

Methods: This was a prospective cross-sectional study on pregnant women attending antenatal clinic at the following facilities in Lusaka, The University Teaching Hospital, Chelston, Kanyama, Kabwata and Kalingalinga clinics. The study involved 216 women booking for antenatal between September 2015 and January 2016. A structured questionnaire was administered to all eligible women to determine their socio demographic and economic status, reproductive factors, contraception use, health seeking behaviour and clinical state. Data was analysed using SPSS software. Inferential analyses were conducted using Chi square and T-test. For the historical independent variables with a known significant association with anaemia, a stepwise backward logistic regression was done.

Results: Out of 216 women enrolled in the study, seventy nine (36.6%) were found to be anaemic. The mean haemoglobin was 11.2g/dl. Thirty-six women (45.6%) had mild anaemia, forty-one (51.9%) had moderate anaemia while two (2.5%) had severe anaemia.
Associations between presence of anaemia and lower family income were statistically significant (P =0.020), with the non-anaemic women's mean family income being ZMK 2944.90 and ZMK 1926.90, for the anaemic women. The anaemic women had a statistically significant (P=0.023) lower intake of vegetables (mean 5.7days, SD 1.9) compared to the non-anaemic women (mean of 6.3days SD I.6). After adjusting for other factors such as, residence, frequency of consumption of meat and fruits, inter delivery time, HIV status, gestation age at booking, income and intake of vegetables were no longer significant associations. HIV infection remained significant in the regression model with the positive women beings 2.7 times more likely to have anaemia. The two groups were however statistically similar in terms of age, marital status, education level and residential area. All the reproductive characteristics such as parity, inter delivery time, family planning and gestation age at booking were comparable in the 2 groups.

Conclusion: Anaemia in pregnancy is still prevalent despite the results showing a reduction from 46.9% to 36.6% since the last study 10 years ago. Low intake of vegetables and low family income were significantly associated with anaemia HIV positive women were 2.6 times more likely to be anaemic. Women need continued education on importance of vegetable intake during pregnancy, involvement in legal income generating activities to boost family income. Women of reproductive age under HIV care should be aggressively managed and educated on anaemia prevention in pregnancy.

Title: Randomized Control Trial of ways to improve OVC HIV prevention and well being

Authors: Mwamba Mwenge[1] & Chombalelo Mukunta[1]
1. SHARPZ

Aim: To determine the effectiveness of Psychosocial Counselling (PC) and Trauma-Focused Cognitive Behavior Therapy (TF-CBT) at decreasing HIV risk behavior in adolescents (aged 13 – 17) in Lusaka City.

Methods: Participants were recruited by home based care workers (HBCW's) who read a recruitment script and asked community members who were interested to go to a parish in their community to meet with a study assessor. The assessor read them the consent form, and if they agreed to be part of the study, the assessor then administered a screener. The screener was scored immediately and adolescents could be eligible based on their screener, the caregiver's screener, or both. The study instruments were administered using an audio computer assisted self-interviewing (ACASI) system, which collected data on HIV risk behaviors (Peer HIV Risk Behavior Scale [PHRBS]) and substance use (ASSIST Scale).All study instruments displayed strong internal reliability (all Cronbach's Alphas <0.80). The ACASI allowed sensitive questions to be answered discreetly and it was programmed in English, Nyanja and Bemba. For clients that were eligible, a sequential study number was assigned to them (client ID) and they were asked to complete the ACASI interview (baseline interview). They were then randomized to either receive PC or TFCBT treatment. Clients were post-assessed using ACASI at three additional timepoints: within a month of completing treatment, as soon as they completed their treatment , 6 months post-treatment completion and finally 12 months post-treatment completion.

Results: 842 participants were screened: 232 were ineligible and 610 were eligible. 308 were randomized to TFCBT and 302 to PC. 271 (88%) TFCBT clients completed their sessions and 268 (89%) PC clients completed their sessions.
Data from the preliminary analysis shows that there were significant reductions in HIV risk behaviors as measured by the PHRBS among those who received TFCBT (48.0% reduction from baseline to 12 months post-treatment) and PC (48.3% reduction) interventions. There was no significant difference in change between the groups (p=.35). TFCBT was more effective than PC in reducing substance use. Adolescents who received TFCBT had an 81% reduction in substance use; adolescents who received PC had a 69% reduction. The difference in change was statistically significant (p<.05).

Conclusion: TFCBT and PC have similar effectiveness for HIV risk behavior. However, PC in the context of this study was enhanced in order to give it some structure for easier comparison with TFCBT. Furthermore, TFCBT was more effective than PC in dealing with comorbid HIV risk and substance use problems. This study has also shown that OVCs in Lusaka do experience high rates of stressors and trauma affecting HIV risk behavior, functioning, and substance use hence the need for similar evidence based interventions.

Title: Patients' satisfaction with HIV care providers in public health facilities in Lusaka Province – a study of patients who were lost-to-follow-up from HIV care and treatment

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Background: In North America and Europe, health systems routinely survey patient satisfaction in order to improve health services. Despite widespread problems with retention of HIV patients in Africa in HIV care, assessments of patient perspective as a basis for improvement activities remain rare. We assessed satisfaction among patients previously lost-to-follow up from HIV care in Zambia and its associations with re-engagement in care at a new health facility.

Methods: Lost patients (>90 days late for last visit) identified through electronic medical record review were randomly sampled and intensively sought in Lusaka province. We used a structured 9-item questionnaire to measure patients' satisfaction with their healthcare providers, adapted from Adult Primary Care Questionnaire, previously validated in the US. Internal consistency across all 9-items was assessed with Cronbach's alpha. Exploratory factor analysis was used to assess tool performance and develop a satisfaction score subsequently used in robust poisson logistic regression to model the association between patient satisfaction and re-engagement in care status, adjusting for patient characteristics (age, gender, education and facility type). The satisfaction score was calculated as a summation of responses to all 9 items on a 5-point Likert scale (range: 9-45) in which Strongly Agree=5 and Strongly Disagree=1. A score >31.5 indicated satisfaction while ≤31.5 indicated dissatisfaction.

Results: We traced 1,222 LTFU patients in Lusaka Province, out of which 568 (46.5%) were communicated with and care outcome obtained in person or via face-to-face (an additional 47 were directly contacted via telephone). Among the patients contacted in-person, 442 (77.8%) completed the satisfaction survey, while 126 (22.2%) refused to complete the satisfaction questionnaire. The Cronbach's coefficient alpha for patient satisfaction scale was 0.93. Results indicated a high overall satisfaction of 74% (n=298) with healthcare providers. However, there were higher levels of dissatisfaction with regard to time that healthcare providers spent with patients (37%), how providers take care of patients (29%) and how they listen carefully to them (28%). These health system reasons could potentially explain why some patients were lost from HIV care. After adjusting for age, gender and health facility type, patients who were satisfied with their HIV care providers were significantly more likely to re-engage in care than those who were not satisfied [adjusted prevalence ratio (PR): 1.58 [95% CI:1.19, 2.10], p<0.01].

Conclusion: All 9-items of a patient satisfaction scale previously validated in the US showed high internal consistency for measuring satisfaction in Zambia. Among lost patients, those expressing satisfaction are more likely to have re-engaged in care even in an environment where structural (e.g. transport costs) and psychosocial barriers (e.g. stigma) are common. HIV service providers should consider monitoring patient satisfaction to support better retention in care.

Title: Improving Prison Health Governance: The Zambian Prisons Health System Strengthening (ZAPHSS) Project

Authors: Clement Nchimunya Moonga[1], S. M. Topp[2], C. Chileshe[3], G. Magwende[3], G. Henostroza[4]

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Background: Prison health and health services in Zambia exist in a state of 'chronic emergency'. In 2013, the Zambian Correctional Service (ZCS) partnered with the Centre for Infectious Disease Research in Zambia on the ZaPHSS project, seeking to tackle structural, organisational and cultural weaknesses within the prison health system. Aim: We present findings from a nested evaluation that was guided by a modified realist framework, seeking 'context-mechanism-outcome' configurations.

Methods: Mixed methods were used including document review, in-depth interviews with Ministry (11) and prison facility (6) officials, focus group discussions (12) with male and female inmates in six prisons, and participant observation during project workshops and meetings. Ethical clearance and verbal informed consent were obtained for all activities. Analysis incorporated deductive and iterative inductive coding.

Results: Outcomes: Improved knowledge of the prison health system and service needs among key stakeholder groups was translated into stronger political and bureaucratic will. This found expression in a tripartite Memorandum-of-Understanding between Ministry of Home Affairs, Ministry of Health (MOH) and Ministry of Community Development, and in the appointment of a permanent liaison between MOH and ZCS. Capacity building workshops for members of ZCS Health Directorate and Command resulted in strengthened health planning and management outcomes including: more than doubling the ZCS health-professional workforce from 34 to 78 between 2014-16; introducing pre-service basic health training for all incoming ZCS officers, and formalisation of facility-based Prison Health Committees with a mandate for health promotion and protection (11 committees trained/appointed by 2016). Mechanisms: continuous and facilitated communication among major institutional stakeholders and the emergence of strong inter-organisational trust were critical to the project's iterative successes. Enabling contextual factors included a permissive political environment; a shift within ZCS from a 'punitive' to 'correctional' organisational culture; and prevailing political and public health concerns about the spread of HIV and TB in prisons.

Conclusion: Findings demonstrate how a "systems" approach to seemingly intractable problems of weak governance in the Zambian prison health system enabled both short-term 'tactical' and long-term 'strategic' progress. Many challenges remain but context-sensitive application of these principles to other settings may yield positive outcomes.

Title: Review of Data Strengthening Process for Malaria Surveillance System, Zambia

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1. PATH MACEPA, 2. Zambia MOH/ NMEC

Background: A robust, high quality surveillance system is crucial to inform action and monitor progress towards the Zambia's malaria elimination goal. Effective malaria control leading to elimination depends on timely acquisition of quality data to efficiently deploy supplies, plan interventions, and focus attention where most needed.
PATH/MACEPA supported the Zambia National Malaria Elimination Program to establish a scalable surveillance system at health facility and community levels in 2011. This system is currently active in 36 districts involving about 700 health facilities (HFs) and over 3360 Community Health Workers (CHWs) in Southern Zambia. It was designed to track malaria outpatient trends, key malaria diagnostic and treatment commodities at health facility and community levels using DHIS2 mobile reporting platform, and low cost mobile phones. Presented here is a data strengthening process for the malaria surveillance system in Zambia to ensure quality data is available for decision making.

Methods: Data quality standards to strengthen malaria surveillance are enforced at two levels. Within DHIS2, dashboard charts are used to identify outliers, data validation rules are checked to identify logical errors, and summary reports run to review completeness and timeliness. At facility/community level, routine data quality audits (RDQA) compare data in source documents with reported data on DHIS2 via mobile phones. The RDQA approach included monitoring and technical support (MTS) to discuss key findings, develop data quality improvement action plans, and provide necessary field-level support.

Results: Data accuracy was found to be of variable quality across facilities, districts, time, and malaria caseloads. Sources of most data quality errors included entering data incorrectly on mobile phones, entering correct data for the wrong period and incomplete or incorrect tallying of data from registers. Factors identified in 2015, 2016 and 2017 data Audit affecting reporting quality include staff turnover with poor hand-over procedures, poor network coverage, and damaged/lost phones. Feedback from district supervisors was positive and focused on the ease of use of the RDQA tool, the instant analysis, and the facilitation of providing feedback to facility staff.

Conclusion: The RDQA and MTS approach identifies data to be corrected, strengthen reporting procedures, provides feedback to community and health facility staff, promotes capacity building and collaboration across multiple levels of the health system. While, it is important to review weekly/monthly data accuracy to help identify issues, it is also important to review the overall accuracy for the period being assessed. Higher percentage error is more likely when the number of malaria cases is very low. Thus, in the context of malaria elimination, as malaria cases become rarer, reporting accuracy becomes more important.
Therefore, Integration of MTS with RDQA provides instant on-site capacity building and promote collaboration between health facility staff and the organisation.

Title: A study of Burnout Syndrome among Anaesthetists in Zambian hospitals

Authors: Mbangu Mumbwe[1]
1. The University of Zambia

Background: Burnout is a psychological syndrome that results from chronic exposure to job stress. Anaesthesia is internationally recognised as one of the most inherently stressful medical disciplines and this is often compounded by unique challenges within the anaesthetist's working environment. Patient safety, the physical and mental health of the anaesthetist and the efficient institutional running are all risked in the presence of burnout. The study aimed to determine the prevalence of burnout syndrome among anaesthetists working in Zambian hospitals and to determine which sociodemographic and occupational factors were more predictive of burnout.

Methods: A cross sectional study among 160 anaesthetists (out of an estimated total of 184) working in various public and private hospitals in Zambia was performed using the Maslach Burnout Inventory-Human Services Survey to assess the presence of burnout. Sociodemographic and occupational factors were assessed using a separate structured questionnaire.

Results: A high level of burnout was found in 51.3% of the 160 respondents. 66.3% had high scores in the emotional exhaustion dimension, 23.8% had low scores on the personal accomplishment dimension and 45% had high scores in the depersonalization dimension. Of the respondents, 26.9% were female, 73.1% male, 14.4% physician and 85.6% non-physician anaesthetists. Binary logistic regression analysis revealed that not having the right team (p=0.008, 95% C.I. 0.16-0.75) and being non-physician (p=0.019, 95% C.I. 1.25-12.34) are the strongest predictors of burnout among the sociodemographic and occupational variables.

Conclusion: The study showed that burnout levels among Zambian anaesthetists are high. Based on the findings, increasing the numbers of providers in general may reinforce the hospital anaesthetic team structure thereby reducing isolation. Furthermore, investing in training more physician anaesthetists may be protective.

Title: Non-Biological Determinants of Treatment Outcomes Among Pulmonary Tuberculosis Cases in Tumkur city, Karnataka

Authors: Sakshi Mohan[1] & Yellappa Vijayashree[2]
1. Ministry of Health Malawi, 2. IPH - Bangalore

Background: A significant number of tuberculosis (TB) cases in India receive treatment in the public sector but treatment success rates continue to be low. This study seeks to identify the non-biological determinants of favorable treatment outcomes among pulmonary tuberculosis (PTB) cases treated under the Revised National Tuberculosis Control Program (RNTCP) in order to demonstrate the potential of using predictive analytics to improve the performance of the DOTS program within resource constraints. The analysis also brings into question the effectiveness of current treatment strategies.

Methods: Case-level data was obtained from registers maintained under the RNTCP. A logistic regression model was employed to analyse the relationship between a binary variable representing successful treatment outcomes and various case-specific, programmatic and spatial factors. The strength of this study lies in the comprehensive approach adopted in dealing with a range of potential non-biological factors which could influence treatment outcome, through their influence on patient and provider behaviour and decision-making at different stages in the cycle of healthcare seeking, referral, detection, enrollment and treatment.

Results: On average male cases, cases with a previous history of default, and cases referred by private practitioners not enrolled in a RNTCP engagement program had a significantly lower probability of attaining a favourable treatment outcome. Certain demographics such as females, people in the working age group, and those residing outside spatial clusters of TB were found to be particularly adversely affected by distance from the healthcare provider.

Conclusion: The results of the study demonstrate that certain case-specific, programmatic and spatial characteristics of TB cases can provide an a priori indication of the likelihood that their treatment will be successful. This allows for the identification of high-risk cases, who can then be allotted a more rigorous treatment follow-up and counseling package. Certain demographic groups were found to be more susceptible to the distance from the healthcare provider. Females, for instance, are significantly adversely affected by distance from the referring party. A possible explanation for this is delayed diagnosis due to physical, financial or social barriers to accessing health care, to which women have been found to be more vulnerable. Older TB cases were more adversely affected by distance from the DOTS provider. This appears to be true not only for the elderly population but also for the population in the working age group, potentially because of the opportunity costs of not going to work or the fear of losing one's job. This provides for a case for Self-Administered Therapy (SAT). A significant contribution of this study is in analyzing spatial determinants of TB treatment outcomes, an area in which there is a dearth of previous research work in the context of India. By demonstrating that distance from the source of referral is particularly detrimental to the treatment success rate of cases residing outside TB clusters, the study shows that the application of spatial analysis extends beyond merely understanding disease transmission patterns and can be used in optimizing TB control measures.

Title: eLMIS in Zambia: Lessons in how to scale up information systems in low resource settings

Authors: Kalima Tembo[1], Jeremy Sikazwe[1], Wendy Nicodemus[1], and Chris Opit[1]
1. JSI AIDSFree Project

Background: The Zambian Ministry of Health (MOH) faced many challenges in managing procurement and distribution of medical products and supplies. Long lead times, stockouts, and general lack of efficiency throughout the national supply chain impeded Zambia's ability to meet client demands. To address this, the Ministry of Health (MOH) with support from the United States Agency for International Development (USAID) through the Strengthening High Impact Interventions for an AIDS-free Generation (AIDSFree) Project, decided to automate the supply chain to improve data visibility and reduce stock imbalances in facilities. This was done through the development of an electronic logistics management information system (eLMIS) which is one of only a few automated health information systems approaching nationwide implementation in Zambia.

Methodology: With limited internet connectivity in the country, eLMIS was developed to operate in both online and offline environments. The online edition was designed as an aggregate system that collects logistics data from all health facilities in Zambia. The offline edition was designed to automate health facility inventory transactions and seamless interfaces with the online edition using Representational State Transfer (REST) Application Programming Interface (APIs).

Results: The offline edition has been deployed to over 520 high-volume sites. The open-source eLMIS software facilitates data collection and inventory management in low-infrastructure environments, facilitating data review, aggregation, analysis, and commodity forecasting and quantification. This in turn enables data visibility from the point of origin to the point of delivery. The following are notable impact of the eLMIS:

- Improved reporting rates: Reporting rates across all four program areas have increased since eLMIS replaced the stand-alone desktop application Supply Chain Manager (SCMgr) three years ago. The midline evaluation report showed that the reporting rate has increased by 10 percent for laboratory commodities; 4 percent for antiretroviral drugs; 20 percent for HIV test kits; and 10 percent for essential medicines.
- Data Accuracy: Data validation in the electronic system has completely eliminated the arithmetic errors common in the manual logistics system. With the increased scale-up of eLMIS FE, facilities deployed with the application have seen improved quality in inventory management compared to those without the application.
- Increased supply chain visibility: Increased supply chain visibility: The system has drawn awareness to supply chain challenges and has prompted timely decision-making.
- Reduced stock out: Stockout rates of key HIV and AIDS tracer commodities have consistently declined. This reduction is especially seen in facilities that are deployed with eLMIS FE, which significantly improves inventory management over transcribing manual records from paper into eLMIS CE.
- Increased stock availability: In the past one year, availability of key HIV/AIDS tracer commodities at service delivery points has increased.

Conclusion: Electronic information systems require allocation of resources and time to achieve sustainability and attain the full change management maturity model. There is a need to continue cultivating reliance on data for decision-making. Data are widely used to guide procurement and routine operational decisions, but not yet for supervision and policy development. The technology and implementation experience from Zambia will benefit neighboring countries grappling with similar challenges.

Title: Current Trends of Childhood Blood Lead Levels and Exposure Patterns in Kabwe, Zambia

Authors: John Yabe[1], Shouta MM Nakayama[2], Yared B. Yohannes[2], Hokuto Nakata[2], Haruya Toyomaki[2], Kaampwe Muzandu[1], Andrew Kataba[1], Jack Caravanos[3], Mayumi Ishizuka[2]
1. The University of Zambia, 2. Hokkaido University, 3. PureEarth

Background: Childhood lead (Pb) poisoning is a serious public health concern. Children are vulnerable to Pb poisoning as the central nervous system is most sensitive to Pb toxicity during developmental stages. Neurodevelopmental impairment resulting in reduced intelligence and attention deficit hyperactivity disorder, etc. have been reported in exposed children. Since the current upper reference level for blood Pb (BLL) is 5 µg/dL, levels exceeding 10 µg/dL in children are considered elevated. At higher BLLs > 100 µg/dl, clinical symptoms of toxicity including encephalopathy, convulsions, coma and death become visible. In Kabwe, Zambia, lead-zinc mining has caused widespread Pb contamination of the environment, posing a serious human health risk. Because Pb exposure can result in irreversible harm in children, regular monitoring of BLLs is desirable. Therefore, the current study measured BLL in Kabwe communities to characterize the city's burden of disease and health risks. Moreover, trends of BLLs in children were assessed over a two year period and exposure patterns among children and adults were analysed.

Methods: Blood samples were collected in heparinized tubes from families (children and parents) at 13 health centres in October 2016 and July-August 2017. BLLs were analysed using a Lead Care® II analyser System.

Results: Of the 153 samples that were collected in 2016, BLLs ranged from <LOD - 64.3 µg/dl. These concentrations showed significant reduction compared to BLL records of 2014 in the same children. Off the 1250 samples that were collected in 2017, BLLs ranged from <LOD - 162 µg/dl, with significant site differences. Younger children (0 - 3 years) had higher BLL compared to older children and parents.

Conclusion: Results were consistent with findings using ICP-MS. Results show that there is a serious risk of childhood Pb poisoning in Kabwe. Therefore, urgent remedial measures and chelation therapy of the affected children are recommended.

Title: Field Evaluation of the Illumipro-10 Illumigene Malaria Diagnosis by Amplification of Plasmodium SPP DNA- A Viable Option to Accelerating Malaria Elimination?

Authors: Victor Daka[1], Ray Handema[1], Webster Kasongo[1], Justin Chileshe[1], Michael Nambozi[1]

1. Tropical Disease Research Centre

Background

Malaria is a life-threatening disease affecting approximately 3.2 billion people worldwide. Although malaria is preventable and curable, it has been difficult to eliminate in developing countries and remains a significant public health problem in Zambia. Zambia has set a goal of eliminating malaria by 2020. The national objective is to ensure that 100% of all suspected malaria cases receive parasitological diagnosis and 100% of parasitologically confirmed malaria cases receive prompt, effective antimalarial treatment. Although malaria microscopy and RDT have been rolled out there are still limitations that compromise their effectiveness. There is a need to identify newer, more sensitive and specific but cost effective methods for malaria diagnosis.

Methods

We evaluated the performance of Illumigene Malaria LAMP along with microscopy and RDT against Real-Time Polymerase Chain Reaction (RT-PCR) as the reference standard. Specific objectives included determining the sensitivity, specificity and positive and negative predictive values of the tests. A total of 282 study participants with signs and symptoms of Plasmodium infection were recruited from a high malaria prevalence area of Nchelenge, northern Zambia. Microscopy, RDT and Illumigene tests were done on site while RT-PCR was done at the Central laboratory at TDRC using dried blood spot specimens.

Results

Malaria positivity by RDT was 47.9%, microscopy 34%, Illumigene 66% and RT-PCR 64.5%. Sensitivity versus Specificity of RDT, microscopy and Illumigene compared with the gold standard RT-PCR for the diagnosis of Plasmodium species at 95% CI were 69.8% Vs 92%, 53.3%Vs 100% and 94.5% Vs 86% respectively. Performing tests for diagnostic accuracy, Illumigene showed the highest diagnostic sensitivity and strong agreement (k=0.812) with RT-PCR as the reference standard. Sensitivity for both RDT and microscopy were lower. Discordant results were observed across the four tests with low sensitivity and false negatives by RDT and microscopy. Overall, a total of 19.6 to 33.6% of the population in this study did not receive treatment based on RDT and microscopy diagnostic tests.

Conclusion

This could lead to the creation of a transmission reservoir thereby negating efforts towards malaria elimination. Though sensitivity of RDT is higher than microscopy, it is not comparable to molecular based methods. The field deployment of molecular testing should address sensitivity challenges observed with RDT and microscopic tests in this study. Revision of testing algorithm for malaria diagnosis should be considered if malaria elimination targets are to be achieved. A comparative study in a lowly malaria endemic region is warranted.

Title: A Study on Determinants of Preoperative Anxiety in Adult Patients Undergoing Elective Surgical Procedures at The University Teaching Hospitals, Lusaka, Zambia
Authors: Sompwe Mwansa (UNZA)

Background
Preoperative anxiety is a well-known and thoroughly studied phenomenon affecting patients undergoing both emergency and elective surgeries, across all age groups, economic brackets and educational backgrounds. Despite the well documented psychological and physiological effects of preoperative anxiety, its identification and management remain a challenge in many patient populations. In Zambia, there have been no studies conducted to determine the prevalence and determinants of preoperative anxiety in adults and, thus, no protocol governing its management. The aim of this study, therefore, was to establish the prevalence within the local population as well as to determine if any demographic factors could be used as predictors in future.

Methods
A prospective, cross-sectional study of adult patients scheduled to undergo major, elective surgical procedures at the University Teaching Hospitals was conducted over a six-month period to investigate the prevalence of preoperative anxiety in this population. A total of 205 questionnaires were completed during this period. The Visual Analogue Scale was used to answer 13 questions relating to preoperative anxiety. A score of 5cm or more on the scale was considered clinically significant anxiety. Data was analysed using Microsoft Excel.

Results
123 (60%) of the respondents were male, while 82 female patients participated in the study. Of the total number of respondents, 48 indicated feeling clinically significant preoperative anxiety, giving an overall prevalence of 23.41%. Of the 48 participants who experienced clinically significant anxiety, 24 were female, giving a slightly higher prevalence in females of 29.27%. There was no statistically significant relationship between age, educational status and ASA score, meaning that they cannot be used to predict preoperative anxiety in this population. When questioned about the possibility of experiencing negative effects postoperatively, 66.83% of respondents were anxious about experiencing postoperative pain, while 57.56% of respondents were anxious about experiencing postoperative nausea and vomiting. The low prevalence of anxiety in this population is countered by the prevalence rates in response to the possibility of experiencing pain and postoperative nausea and vomiting.

Conclusion
Based on these findings, further investigation can be conducted to determine why preoperative anxiety levels are particularly low as well as to study the effects of preoperative anxiety in the population. Protocol can be developed for the identification and management of postoperative pain, nausea and vomiting.

Title: An Investigation on Reported Increased Malaria Cases in Kalabo District, Zambia

Authors: Angela Gama Butale[1], Busiku Hamainza[2], Elizabeth Chizema Kawesha[2], Anthony Yeta[2], Ignatius Banda[2], Mercy Mwanza Ingwe[2], Japhet Chiwaula[2]
1. MOH, 2. NMEC

Background: Malaria is a major public health concern in Zambia, causing approximately 1430 deaths and over 6 million cases in 2017. On 6th February 2018, the Ministry of Health was alerted of an increase in malaria cases in a malaria endemic area, of Kalabo District. The purpose of our investigation was to verify the outbreak and conduct a situation analysis on malaria programming in Kalabo district.

Methods: Based on the WHO recommended malaria epidemic threshold estimation template, monthly malaria thresholds for Kalabo District were calculated. The threshold limits were stratified based on the monthly mean plus 2-standard deviations (SD), averaged from previous 5 years' data (2012-2016). Eight accessible health facilities were selected for data audit. A programmatic data verification tool was used to verify the accuracy of the malaria data reported based on the percentage of all malaria data elements reported accurately by health facilities into the Health Management Information System (HMIS). District reports on Indoor Residue Spraying (IRS) and Insecticide Treated bed nets (ITN) were used to estimate coverage of vector control. Attack rate was calculated per 1000 population for 2015-2017 fourth-quarter.

Results: Malaria cases were above the epidemic threshold limits recorded in Kalabo District from June 2017. In most facilities (7/8), the accuracy of the reported data on confirmed malaria cases was above 85%. Approximately, 29,912 (30%) of the population were protected by IRS in 2017. Of the 13 health facility catchment areas which recorded a high malaria incidence, 12 had no IRS and ITNs activities. The attack rate in the under-five (362/1000 population) and over-five (298/1000 population) years was double the attack rate recorded in 2016.

Conclusion: There was an increase in malaria cases in Kalabo District due to breakdown of control interventions specifically, lack of access to ITN and IRS. The district should increase the ITN and IRS coverage to 100% to protect the entire population. There is need to build capacity in analysis and interpretation of surveillance data both at provincial and district level to improve malaria surveillance.

Title: A foodborne disease outbreak investigation experience in a College in Lusaka, Zambia, 2017

Authors: Fred Kapaya[1], Francis Dien Mwansa[2], Patrick Sakubita[1], Angela Gama[2], Nelia Langa[1], Orbrie Chewe[1], Lwito Mutale[2], Francis Nanzaluka[2], Chongwe Gershom[3], Mumbi Chola[3], Nathan Kapata[1], Nyambe Sinyange[1], Sylvia Chibuye[2], Ellen Yard[4], Victor Mukonka[1]
1. Ministry of Health- Zambia National Public Health Institute, 2. Ministry of Health, 3. The University of Zambia, 4. Centers of Disease Control and Prevention (CDC)

Background: On 19 March 2017, an outbreak of unknown etiology was reported among students at a college in Lusaka, Zambia. We investigated to confirm the outbreak, identify exposures, determine the aetiological agent, and implement preventive measures.

Methods: we conducted an unmatched case-control study. Cases and controls were selected conveniently. A suspected case was diarrhea or abdominal pains in any student at College A and Controls were asymptomatic students at College A during 18-23 March. We interviewed cases and controls about exposures to suspected food and water and collected saved food samples and swabs from food-handlers' hands and kitchen surfaces for culture. We analyzed data using Epi-info v 7.2 (Atlanta, Georgia).

Results: we identified 59 suspected case-patients. Predominant symptoms were diarrhea (n = 51.83%) and abdominal pains (n = 44.75%). The outbreak started on 18 March, peaked on 19, and concluded on 20 March. We interviewed 30 case-patients and 71 controls. Exposures associated with increased odds of illness included eating food served at dinner on Saturday (18 March) in school cafeteria (OR = 5.8, 95% CI = 2.0-16.7); specifically, eating beans at Saturday dinner (OR = 21.6, 95% CI = 4.5-104) and drinking water supplied at school (OR = 8.8, 95% CI = 1.45-53.6). Samples from all food-handlers (n = 13) yielded Staphylococcus aureus and all food samples (n = 3) yielded Escherichia coli, Staphylococcus aureus and fecal coliforms.

Conclusion: the results suggest a foodborne outbreak caused by consumption of contaminated food served at dinner on 18 March at College A. We educated the food handlers and school management about the importance of disinfection of preparation surfaces, supervision of food handling and handwashing practices.

Title: Assessment of Prevalence and Risk Factors for Urinary Schistosomiasis Among Primary School Going Children in Mpongwe District, Zambia

Authors: Patrick Sakubita[1], Mpundu Makasa[2], Mumbi Chola[2], Margaret Riggs[2]
1. Zambia Field Epidemiology Training Program (ZFETP), 2. Department of Epidemiology and Biostatistics, School of Public Health, The University of Zambia

Introduction: Schistosomiasis, also known as bilharziasis or snail fever is a disease that results from infection with parasitic trematode worms of the genus *Schistosoma*. Schistosomiasis is acquired when free-swimming parasitic larvae known as cercariae penetrate the skin of people exposed to infested freshwater. The disease impedes school attendance and leads to absenteeism, ill-health and weak memory, poor performance and productivity, disability and death. In tropics and sub-tropics, human and water contacts can be potential risk factors of schistosomiasis. Domestic activities such as washing clothes and fetching water in infected water expose women and children to infection. In Zambia, urinary schistosomiasis caused by the trematode *Schistosoma haematobium* has been a major public health problem for many years. We conducted this study to investigate the prevalence of schistosomiasis among school going children and risk factors associated with contracting urinary schistosomiasis in Mpongwe district.

Method: We used a multi-stage cluster sampling method to select study participants. The first stage involved selection of clusters, at second stage selection of classrooms and the third stage consisted of simple random sampling for selection of respondents from the various classes with subjects of interest. Probability proportion sampling to size was applied in assigning appropriate numbers of pupils that constituted the sample size. Data was collected using structured questionnaires on electronic tablets. A questionnaire was administered to all selected pupils providing a urine sample to collect information on the sex, age, water contact activities, symptoms of urinary schistosomiasis, knowledge about the disease, and past praziquantel treatment. We collected urine samples to analyse for presence of schistosome eggs for determination of prevalence, intensity of infection and geographical distribution of the disease in the population. Schistosomiasis risk factors were assessed by multivariable logistic regression in STATA version 14.2. The level of significance was set at 95% and all p-values less than 0.05 were considered statistically significant.

Results: We interviewed a total of 390 (100%) pupils between the ages of 5-14years from 15 schools of which 206 (52.8%). The median age for the study participants was 12years (IQR 7, 14) and all the four positive cases were males accounting for 1.03% prevalence rate. Two (50%) of pupils who were found positive reported receiving preventive medication during the last mass drug administration exercise. The regression revealed that history of suffering from schistosomiasis (adjusted odds ratio (aOR) = 13.42, 95% confidence interval (CI) (AOR 13.42, CI 5.03-53.71; $p<0.001$) was significantly associated with increased odds of acquiring new infection. Taking preventive chemotherapy during the mass drug administration exercise was protective against urinary schistosomiasis by 21% amongst those who took the drug compared to those who did not (AOR 0.21, 0.07-0.58; $p=0.005$).

Conclusion: Our study found that urinary schistosomiasis prevalence may be currently lower than previously reported in some surveys. The study also found that previous history of schistosomiasis infection was a predictor for acquiring new infections. We recommend strengthened community health education programs to target the at-risk age group to continue in order to empower locals with knowledge on exposure states, prevention and control. School chemotherapy should be strengthened for universal coverage of the at-risk. We also recommend that there is need to explore alternative preventive and control measures beyond chemotherapy for comprehensive disease control in the district.

Title: Mpulungu and Mbala Cholera Outbreak Investigation in Northern Province, Zambia, 2017

Authors: Patrick Sakubita[1,2,3], Orbrie Chewe[1,2,3], Nancy Kasese[2], Kennedy Chishimba[4], Mwiche Siame[2], Nyambe Sinyange[1,2], Loveness Moonde[1]

1. Zambia Field Epidemiology Training Program (ZFETP), 2. Ministry of Health, 3. The University of Zambia-School of Public Health, 4. Lusaka City Council

Background: The first cholera outbreak in Mpulungu was reported in 1977/1978. Since 1993, cases were reported every year except for 1994 and 1995. Mpulungu is a rural town located close to Lake Tanganyika along the border with Tanzania and DR Congo. In March 2017, Mpulungu District Health Office reported an increase in suspected cholera cases. We conducted an investigation to isolate the causative agent and explore risk factors.

Methods: We conducted records and registers reviews in two health centres. A suspected case was any person with severe dehydration from acute watery diarrhea (≥3 stools in 24 hours) from 10-28 March, 2017 resident in Mpulungu and Chisanza-Mbala. A confirmed case was any suspected person in which *Vibrio cholerae* O1 or O139 was isolated in stool. We interviewed case-patients and controls using structured questionnaires matched 1:2 by 5-year age categories, residence and sex. Cholera risk factors were assessed by multivariable logistic regression. Additionally, water samples were collected for microbiological analysis from unprotected wells in villages recording case-patients.

Results: We identified 21 case-patients, one patient with *Vibrio cholera* O1 Ogawa isolated and no deaths. 19 case-patients and 38 controls were interviewed. Five water samples indicated contamination with *E.coli* and faecal coliforms. Our analysis revealed that contact with cholera patients prior to illness (adjusted odds ratio (aOR) = 0.04, 95% confidence interval [CI]: 0.004-0.330) was significantly associated with reduced odds of acquiring cholera. Additionally, self-reported hand washing practice was associated increased chances for cholera (aOR = 9.36, 95% CI: 1.121-78.157).

Conclusion: Our investigation and findings revealed that spread of the outbreak was due to cross contamination with case-patients and contacts. Improving community hygiene practices such as proper hand washing techniques will greatly contribute to minimizing spread of future cholera outbreaks. Intensified behavioral change communication for at-risk villages will raise knowledge on preventive and control measures.

Title: Trichomonas Vaginalis in Kasempa District North Western Province of Zambia

Authors: Justin Mulenga[1] & Kelvin Mwangala[1]
1. BMSZ

Background: The study is in retrospect to ascertain the impact of Trichomonas Vaginalis considering that Kasempa has 23 health facilities of which only 2 has laboratory services, which leads to mismanagement of patients, wastage of drugs, and increase in morbidity and consequently leading to drug resistance. The objective of this study was 1) to assess the impact of Trichomonas Vaginalis in Kasempa District, North western Province of Zambia, and 2) find sources of drug resistance in the treatment of STIs.

Methods: The focus is on data collected from Mukinge Mission Hospital and Kasempa Urban Clinic laboratories respectively. Data from the Registers was the focus for the study and the period 2015 to 2017 was the period of study. On average about 1,500 urine samples were examined in each year by both Mukinge and Kasempa Urban clinic laboratories, making a total of about 4,500 tests (Approximate).

Results: Findings reviewed that there was 3 men out of 121 cases found with Trichomonas Vaginalis in the period under study. The statistics of those found with Trichomonas Vaginalis increases during wet season and reduces during dry season. It was also mostly found in women of the reproductive age. Our assumption is Trichomoniasis in Kasempa has to do with personal hygiene as the study have unveiled.

Conclusion: The majority of men in Kasempa are circumcised, hence reducing the chances of being sexually infected with Trichomonas Vaginalis. Circumcised penis dries up hence, Trichomonas Vaginalis dies and drops off. It does not survive in dry environment. Therefore, the infection has to do with personal hygiene.

Title: Results from a comparison-control trial examining different targeting strategies for IRS, Zambia 2017

Authors: David A. Larsen[1], **Anne Martin[2]**, Derek Pollard[2], Carrie F. Nielsen[3], Busiku Hamainza[4], Jennifer Stevenson[5,6], Anna Winters[2,7]

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Background: Indoor residual spraying (IRS) is a powerful intervention in the fight against malaria, but high cost prohibits most national malaria control programs from achieving universal IRS coverage. Most countries rely primarily on universal coverage of insecticide-treated mosquito nets (ITN) for malaria control and target IRS campaigns to specific prioritized areas. However, there is limited information about how IRS should be delivered to maximize impact and prevent the most malaria cases and deaths with the limited resources available.

Methods: In collaboration with the National Malaria Elimination Centre in Zambia we conducted a comparison-control trial in 2017 and 2018 to evaluate different prioritization strategies for IRS. Six districts were divided into three groups (2 districts per group), with each receiving a different IRS targeting methodology for their IRS operations (pirimiphos-methyl) in 2017. Group A received a geographic concentration strategy wherein all structures within a geographic area were targeted for IRS. This method (blanket spraying) aims for heavy saturation of IRS without spatial gaps. Group B used health facility incidence data from the health management information system (HMIS) to estimate malaria burden in each area and prioritize houses according to incidence at the nearest facility. Group C used a strategy of ecological targeting to allocate IRS based on predicted probability of Anopheles funestus as developed by the Malaria Atlas Project. IRS was implemented in late 2017, and the final IRS coverage for the 2017 spray campaign reached 91% in the targeted areas in the six study districts.

Results: The primary outcome, the incidence of uncomplicated malaria as measured through the HMIS was analyzed using a difference-in-differences approach. The ecologically targeted arm of the trial saw the largest decrease in confirmed malaria incidence: 13% better than concentrating IRS geographically and 63% better than targeting IRS based on health facility incidence.

Conclusion: These results could have significant implications for how IRS is implemented. This presentation will discuss the results of this study and its implications for future targeting methodologies in Zambia and other countries using IRS.

Title: Children infected by HHV-6B with febrile seizures admitted to the hospital are more likely to develop febrile status epilepticus.

Authors: John Tembo[1,2]*, Kanta Chandwe[3]*, Mwila Kabwe[2,4], Moses Chilufya[2], Ornella Ciccone[3], Evans Mpabalwani[3], Dharam Ablashi[5], Alimuddin Zumla[6,7], Tie Chen[1*], Matthew Bates [2,8*]

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Background: Human herpesvirus 6 (HHV-6), the causative agent of roseola infantum has two variants HHV-6A and HHV-6B. They have both been shown to be neurotropic. It has been suggested that HHV-6A and/or B infections may be involved in the pathogenesis of febrile seizures in young children, a percentage of whom may go on to develop febrile status epilepticus (FSE), but existing data is conflicting and inconclusive. We describe a case control study to compare the frequency of HHV-6A and/or HHV-6B infections in children with febrile seizures (including febrile status epilepticus) and a control group of febrile children without seizures.

Methods: We recruited children aged 6-60 months admitted with a febrile illness with (cases) or without (controls) seizures presenting within 48 hours of commencement of fever. 3mls of whole blood was centrifuged and plasma stored at -80oC for pooled screening for HHV-6B and HHV-6A by Taqman Real Time PCR.

Results: The study recruited 102 cases and 95 controls. The prevalence of HHV-6B DNA detection did not differ significantly between cases (5.8% (6/102)) and controls (10.5% (10/95)) but HHV-6B infection was associated with febrile status epilepticus (OR 15; 95% CI, [1.99-120]; p=0.009). HHV-6A was not detected.

Conclusion: Prevalence of HHV-6B was similar among cases and controls. The age of the cases suggests most infections were probably reactivations, which might be less likely to cause febrile seizures. Within the febrile seizure group, HHV-6B infection was associated with febrile status epilepticus, suggesting HHV-6B infections could play an important role in pathogenesis of FSE.

Title: Fear of job loss as a barrier to TB care among mineworkers in Zambia: impact of TB-related policies

Authors: Shephard Khondowe[1], Laura Jean Podewils[2], David Mwakazanga[1], Kelvin Kapungu[1], Kathyrn Curran[2], Tyler Fuller[2], Elizabeth Long[2], Jonathan Smith[2], Webster Kasongo[1]
1. Tropical Disease Research Centre, 2. Centers for Disease Control and Prevention (CDC)

Background: The 1999 Compensation Act in Zambia prohibits persons with a history of tuberculosis (TB) from working in the mines. We aimed to understand the influence of this policy on perceptions and health-seeking behavior among mineworkers in Zambia.

Methods: We conducted semi-structured knowledge, attitudes and practice (KAP) surveys among current and former mineworkers and healthcare workers (HCWs) at mine-operated and public health facilities in mining communities in the Copperbelt and North-Western Provinces.

Results: A total of 2,782 current (n=1,956) and former mineworkers (n=836) and 94 HCWs completed the KAP surveys. While only 41% of mineworkers knew of the formal policy, 71% of mineworkers knew they are prohibited from mine work after a TB diagnosis. A large majority (77%) of mineworkers indicated they would not disclose their TB status to their supervisor; in contrast, 73% indicated they would discuss their diagnosis with their spouse. HCWs mentioned mineworkers' fear of losing employment as a key barrier to providing TB care and often cited that this leads to late disease presentation and failure to provide accurate contact information. Only half (53%) of current mineworkers underwent annual TB screening while almost all (97%) were annually screened for silicosis.

Conclusions: The 1999 Compensation Act in Zambia results in mineworkers withholding their TB status from their employer for fear of losing employment and is a key barrier to TB care among mineworkers. Revision of the policy is underway but is only the first step in facilitating early TB diagnosis and treatment. Annual occupational health screenings for silicosis is a missed opportunity to screen mineworkers for TB. A formal partnership between mining companies and the public health sector, including advocacy, education and continued provision of TB services without fear of job loss, may be an effective approach to controlling TB transmission among mineworkers, ex-mineworkers, and their communities.

Title: Tuberculosis Health Services for Mineworkers in Zambia: Policies versus Practices

Authors: Mathias Tembo[1], Shepherd Khondowe[1], Webster Kasongo[1], Kelvin Kapungu[1], Modest Mulenga[1], Peter Chipimo[2], Namushi Mwananyambe[2], Laura Jean Podewils[2]
1. Tropical Disease Research Centre, 2. Centers for Disease Control and Prevention (CDC)

Background: The Copperbelt Province in Zambia, where most mineworkers and ex-mineworkers reside, has the highest national rates of tuberculosis (TB) and HIV and the greatest gap between estimated TB burden and notifications. Mineworkers in both the Copperbelt and North-Western Provinces access both private mining and public health facilities for care. We assessed current practices in the TB cascade of care – from symptom screening through treatment initiation and completion – in these health facilities.

Methods: All mine-operated health facilities and public health facilities in mining communities on the Copperbelt and North-Western provinces of Zambia were targeted for inclusion. The TB cascade of care was assessed through key informant interviews and objective assessments of practices using standardized tools. We compared each step in the TB Cascade of Care to National Guidelines for TB Management. The proportion of facilities consistent with guidelines was calculated, and discrepancies were noted.

Results: Of the 21 facilities assessed, two were referral centers; we analyzed 19 facilities providing TB diagnostic and care services. Twelve (63%) health facilities were following guidelines for TB symptom screening; others used a limited number of symptoms (e.g., cough only) or included restrictions of duration to indicate presumptive TB. GeneXpert MTB/RIF was underutilized, with six facilities not sending any specimens for testing (32%) and three limiting Xpert use to HIV-positive persons. One facility was using Xpert according to guidelines. Deficient specimen courier systems and inconsistent turnaround times were noted. All facilities were following guidelines for treatment and treatment monitoring. The majority were using the national TB register (87%) and patient treatment card (100%).

Conclusion: Methods for TB screening and testing varied and were often inconsistent with national guidelines. These findings highlight the need to provide ongoing mentorship and supervisory support to health facilities to ensure standards for TB screening, testing and treatment in Zambia.

Title: Factors Associated with Mortality among Smear Positive Pulmonary TB HIV co infected Patients enrolled for Care in Eastern Province, Zambia.

Authors: Davie Simwaba[1] & Edwin Simukanga[1]
1. Ministry of Health

Background: Zambia has high burden of Tuberculosis and HIV with TB prevalence: 388/100,000 and HIV prevalence: 14.3% with TB/HIV mortality rate of 7.6%.TB mortality in Eastern Province remains high at 8-9% since 2006 to 2012 (WHO TB target < 5%).TB can be managed and HIV can be controlled with proven treatment regimens. The rationale of the study was to identify practical programmatic interventions for improving survival among Smear positive PTB patients receiving treatment for tuberculosis (TB) at Public Primary Health Care Facilities in limited resource setting.The objective was to determine the TB Cure and Death rate among S+PTB /HIV co infected clients in Eastern Province and to measure the effect of Highly Active Antiretroviral therapy and Direct Observed Treatment on death among smear positive Pulmonary Tuberculosis/ Human Immune Virus co infected patients on National Tuberculosis Program.

Methods: The study design was a retrospective cohort Study of 420 Sputum Positive Pulmonary Tuberculosis co infected with HIV aged 15 years and above. These were enrolled for treatment in the period 2009-2013 periods across 5 districts in Eastern province of Zambia. Soft copy data abstraction form developed, manual entries of observation from national TB registers and analysis on data collected by use of Epi info version 3.5.4

Results: A total of 420 observations were made and the majority was in reproductive age 25-44years comprising of 75%.Distribution by gender reported 194 observations to be female and 224 males. Mean age among females was 35.1 years and 37.1 among males. 380 (91.1%) clients were reported to be on direct observed therapy (DOT), A total of 405 clients were evaluated for HAART uptake with (289) 71.4% on treatment. A total of 407 clients were evaluated for CPT uptake with (348) 85.3%. Treatment outcome for 420 new sputum + PTB/HIV + clients for Periods (2009-2013) in Eastern province revealed that (242) 58% cured, (50) 12% had treatment success, (59) 14% died, (7) 2% had defaulted, (52) 12% were reported to be lost to follow up (LTFU) and (8) 2% were reported to have failed treatment. HAART and DOT are associated with reduced the risk of death among the study group. The S+PTB/HIV+ on HAART group was 0.4 less likely to die than the S+PTB/HIV+ Not on HAART showing effect to exposure from HAART (CI 95% P value 0.05) and The S+PTB/HIV+ on DOT group was 0.25 less likely to die than the S+PTB/HIV+ Not on DOT showing palpable protective effect to exposure from DOT (CI 95% P value 0.05).

Conclusion: Treatment outcome among new sputum PTB co-infected with HIV was lower than the Total sputum positive PTB clients on NTP in Eastern Province. HAART and DOT are associated with reduced risk of death.

Title: Validation of the NIH Toolbox, an iPad Based Test of Cognition, among Zambian children and adolescents

Authors: Kabundula Pelekelo[1], Mbewe Esau[1], Sylvia Mwanza Kabaghe[1,2], Heather Adams[3], & David R. Bearden[3]

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Background: Neuropsychological (NP) testing is conducted for different purposes including educational assessments, research, and intervention planning. It is essential to use an ecologically validated instrument in order to obtain valid assessment results, but there are few instruments validated for use in resource-limited settings. The National Institute of Health (NIH) Toolbox is an iPad-based battery of cognitive tests that was developed, normed and validated in the United States of America and has since been used to measure cognitive functioning of children adolescents aged 3-19 years. The NIH Toolbox has several advantages including capacity to measure the domains of cognitive, emotional, sensory and motor functions of people across a broad age spectrum from 3-85 years, minimal training requirements, customizability, easy scalability and low cost, but it has not previously been validated among Zambian population. Currently, the NIH Toolbox is being used to assess the cognitive functioning of children and adolescents at UTH-pediatric centre of excellence section. Therefore, it was imperative to determine the validity of the National Institute of Health (NIH) Toolbox in assessing the cognitive functioning among Zambia children and adolescents aged 8-17 years.

Method: A total sample of 92 children and adolescents aged 8-17 years were recruited and administered with the NIH Toolbox as well as a complete battery of standard neuropsychological tests. In order to determine the psychometric properties of the NIH Toolbox, face validity and construct validity were assessed using a qualitative assessment, and convergent validity was assessed using correlations with standard NP tests measuring the same construct, as well as parental ratings of intelligence and school performance.

Results: Qualitative interviews demonstrated that all subtests of the NIH Toolbox had appropriate face and construct validity, with the exception of the Picture Vocabulary Test which performed poorly due to requiring high levels of English language skills. Correlations with standard neuropsychological tests were moderate to excellent (all pairwise correlations >0.4, $p<0.05$). NIH Toolbox composite scores correlated well with parental ratings of intelligence (SCC 0.43, $p=0.001$) and with school performance (SCC 0.41, $p=0.001$)

Conclusion: The NIH Toolbox shows promise as a tool for the assessment of cognition in Zambian children and adolescents. Further studies are necessary to demonstrate reliability, criterion validity, factor structure, and responsiveness to change.

Title: Rifaximin Reduces Markers of Inflammation and Bacterial 16S rRNA in Zambian Adults with Hepatosplenic Schistosomiasis: A Randomised Control Trial

Authors: Edford Sinkala[1], Kanekwa Zyambo[2], Ellen Besa[2], Patrick Kaonga[2], Bright Nsokolo[2], Violet Kayamba[2], Michael Vinikoor[2], Rabson Zulu[3], Martin Bwalya[3], Graham R. Foster[4] and Paul Kelly[2]

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Background*:* Cirrhosis is the dominant cause of portal hypertension globally but may be overshadowed by hepatosplenic schistosomiasis (HSS) in the tropics. In Zambia, schistosomiasis seroprevalence can reach 88%. Bacterial translocation (BT) drives portal hypertension in cirrhosis contributing to mortality but remains unexplored in HSS. Rifaximin, a non-absorbable antibiotic may reduce BT. We aimed to explore the influence of rifaximin on BT, inflammation and fibrosis in HSS.

Methods*:* In this phase II open label trial (ISRCTN67590499), 186 patients with HSS seen at the University Teaching Hospital, Lusaka, Zambia were evaluated and 85 were randomised to standard care with or without rifaximin for 42 days. Changes in markers of inflammation, BT and fibrosis were the primary outcome. BT was measured using plasma 16S rRNA, lipopolysaccharide binding protein (LBP) and lipopolysaccharide (LPS), while hyaluronan (HA) measured fibrosis. Tumour necrosis factor receptor 1 (TNFR 1) and soluble cluster of differentiation 14 (sCD14) assessed inflammation.

Results*:* 16S rRNA reduced from baseline (median 146 copies/µl, IQR 9, 537) to day-42 in the rifaximin group (median 63 copies/µl, IQR 12, 196), P <0.01. Soluble CD14 rose less (P<0.01) in the rifaximin group (median rise 122 ng/ml, IQR-184, 783) than in the non-rifaximin group (median rise 832 ng/ml, IQR 530, 967). TNFR1 decreased (P<0.01) in the rifaximin group (median -39ng/ml IQR, -306, 563) but increased in the non-rifaximin group (median 166 ng/ml, IQR 3, 337). HA remained unchanged.

Conclusions*:* Rifaximin led to a reduction of inflammatory markers and bacterial 16S rRNA which may implicate BT in the inflammation in HSS.

Title: Profile of the uncircumcised Zambian Man

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Background: Zambia, a largely non-circumcising country, began implementing a voluntary medical male circumcision (VMMC) program in 2009, targeting 80% coverage of eligible males (15 – 49 years). Circumcision coverage among eligible males measured in Zambia Demographic and Health Surveys (ZDHSs) increased modestly from 11.4% in 2007 to 22% in 2013/14. A better understanding of demographic characteristics of uncircumcised males still uncircumcised would help address remaining gaps, but DHS analyses have not examined this profile before. Recent data from the 2016 Zambia Population-Based HIV Impact Assessment (ZAMPHIA) provides this opportunity.

Methods: The ZAMPHIA was conducted between March and August 2016. We analyzed self-reported responses from uncircumcised males 15-34 years, the primary relevant demographic group for the VMMC program, by provinces, for demographic traits, multiple risk behaviors, history of HIV testing and HIV status. Analyses adjusted for study design.

Results: Overall, 3,955 (68.9%; 95% confidence interval 67.1-70.6%) males reported being neither medically nor traditionally circumcised. In almost all provinces, the largest proportion of uncircumcised males are 19 years old or younger (range 28.9 - 37.8%); have primary education (1.4% - 53.7%); have never been married (51.3-67.6%); have not had an HIV test (34.9 - 59.7%), have had unprotected sex with a non-marital/ non-live-in partner in the past 12 months (60.7 - 86.2%), and are HIV-negative (89.0 - 98.9%). Uncircumcised populations on the Copperbelt and Lusaka provinces were predominantly urban, 90.0% and 84.0% respectively, with two of the four highest national HIV prevalence's at 6.6% and 6.8% respectively. In other provinces, the uncircumcised populations were predominantly rural (79.0 -91.5%) and the highest HIV prevalence's were in Western (11.0%) and Lusaka (6.8%).

Conclusion: The uncircumcised Zambian male is young, unmarried with some education, more likely to reside in rural areas in 8 provinces, and likely to have had recent unprotected sex with a non-marital partner. Approximately half have tested for HIV. This population is vulnerable to HIV infection as the majority are HIV-negative and would benefit from VMMC. Programs need to be tailored to increase uptake of VMMC services among young, single, mostly rural males with some education focusing on provinces with highest HIV rates.

Title: Profiling Chlorirquine Resistnace-Associated Pfcrt-76T and Pfmdr1-86Y Mutations in Plasmodium falciparum Isolates of Ndola, Zambia

Authors: Bertha Kasonde-Chanshika[1], Nzooma Mukwangu Shimaponda-Mataa[2]
1. Tropical Diseases Research Center, 2. The University of Zambia

Background: Zambia, like many malaria endemic countries, withdrew Chloroquine as a first line of treatment for falciparum malaria in October 2002 due to increased treatment failures and widespread Chloroquine resistance. Following the withdrawal of Chloroquine and further multiple changes in malaria first-line treatment, Zambia currently uses Artemether–Lumefantrine, an Artemisinin combination regime as first-line treatment. No systematic follow up to assess the current status of Chloroquine resistance after removal of the drug pressure is documented. This is important not only to inform policy makers of the future suitability of reintroduction of the drug but also as a way of documenting the parasite resistant patterns to Chloroquine in the Country. Therefore this study sought to determine the prevalence of the Chloroquine resistance-associated Pfcrt-76T and Pfmdr-86Y mutations in blood of 398 individuals as well as to establish day of parasite clearance after treatment with Artemether–Lumefantrine.

Methodology: Data was obtained during the rainy season in a cross-sectional study conducted between January and March in Ndola district in 2017. Dried blood spots (DBS) and blood slides were obtained from 406 patients attending Chipulukusu clinic during the period of the study. Rapid diagnostic tests (RDTs) and Microscopy was used to confirm Plasmodium falciparum infections and species by thick and thin films respectively as well as to confirm parasite clearance, while Polymerase Chain Reaction-Restriction Fragment Length Polymorphism was used to analyse for Pfcrt K76T and Pfmdr1 N86Y mutations. Stata version 11 was used to analyse the data.

Results: The prevalence of P. falciparum was 99% (397/398) with 1% co-infections with P. malariae. All the 397 (100%) P. falciparum specimens had the Chloroquine sensitive genotype of both markers and there was no treatment failure to Artemether–Lumefantrine experienced in the study participants.

Conclusion: Our study indicates a complete reversal to Chloroquine sensitivity while Artemether–Lumefantrine remains effective.In addition, Participants' demographics have no direct relationship with the markers, Pfcrt and Pfmdr.

Title: Severe Malarial Anemia and in-hospital mortality in Zambian Children with and without blood transfusion

Authors: Jay Sikalima[1], Matthew M. Ippolito[2,3], Manuela Hauser[4], James Lupiya[1], Emmanuel Mpundu[5], Jean-Bertin Kabuya[1], Luc K. Kamavu[5], Catherine Tente[5], Modest Mulenga[1], and William J. Moss[2,3] for the Southern and Central Africa International Centers of Excellence for Malaria Research

1. Tropical Diseases Research Center, 2. MRI, 3. Johns Hopkins Bloomberg School of Public Health, 4. UCHZ, 5. SPMH

Background: Severe malaria is the leading parasitic cause of death, and severe malarial anemia, defined as a hemoglobin (Hb) concentration ≤ 5 g/dl, is the most common clinical presentation. Prior studies offer varying thresholds of Hb concentration below which blood transfusion confers a survival benefit to children with severe malarial anemia. In resource-limited settings where blood stock outs present a challenge to clinical care, distinguishing patients who are most likely to benefit from transfusion can help inform allocation when inventories are scarce.

Methods: We present preliminary results of a cross-sectional study of hospitalized children (n=329) with severe malarial anemia in a high transmission area of northern Zambia to investigate associations among Hb concentration, blood transfusion, and mortality. Data are from January 2017 to January 2018, with collection ongoing

Results: The median age was 22 mos. (IQR: 12-31 mos.) and 49% were girls. The case fatality ratio was 14%. According to hospital protocol, blood transfusion was indicated for all children. However, due to blood product stock outs, 38 children (12%) did not undergo transfusion. To investigate the interaction between Hb concentration and the survival benefit of blood transfusion, we stratified children by level of anemia (severe: >3 to 5 g/dl, profound: ≤ 3 g/dl). In a preliminary effect-measure modification analysis, children in both strata had similarly increased odds of death if no transfusion was given relative to receiving at least one transfusion (OR: 2.84, 95% CI: 1.21-6.68, P=0.016).

Conclusion: Previous reports suggest that sub-stratification by degree of anemia might identify patients who are most likely to benefit from transfusion. In contrast, our preliminary analysis shows that children with profound (Hb ≤ 3 g/dl) and severe (Hb >3 to 5 g/dl) malarial anemia gained a similar survival benefit from blood transfusion. Our early results indicate that during periods of looming blood product stock outs, children with malarial anemia should be equally prioritized for blood transfusion regardless of the profundity of anemia.

Impact of the Regulatory Health Workforce Information System in Zambia

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1. Jhpiego Zambia, 2. HPCZ

Introduction: The shortage of health workers has been a growing concern in several African countries worldwide. Not only has HIV/AIDS been a major culprit in the deficit of health workers but also the skill imbalances, geographical and sectorial maldistribution and also the lack of information on the active health practitioners in a country. In order to reach the international health development targets, sub-Saharan countries i.e. Zambia inclusive, will have to scale up its workforce tremendously. It is for this reason that in 2014, Emory University funded a project in Zambia to build a regulatory Human Resource Information System (rHRIS) in which information (i.e. academic qualifications, special skills, license renewal status, workstation) on all health practitioners was stored. The objective of this paper was to ascertain the impact data in the rHRIS to strengthen human resource planning, policy and management.

Methods: A mixed method design was used in this study. Qualitative data was obtained from semi-structured interviews with two senior officials at the regulatory bodies. Quantitative data was extracted from the rHRIS database.

Results: Data from the rHRIS showed an increase of over 80% in practitioner registration and over 60% in license renewal of health professionals since the inception of the rHRIS in 2015. Due to the positive response in practitioner registration, practitioners with the right skills have been placed in the rightful locations which has in turn improved the uptake of quality health services. Furthermore, majority of the specialists have been identified and data on their skills, contact details and location is readily available in case of an epidemic. Additionally, there has also been an increase in the registration and accreditation of health facilities country wide resulting to quality health care. Interviews with senior officials cited the usefulness of the rHRIS data particularly in the tracking of license renewal by both health practitioners and health facilities which is one of the revenue streams for the regulatory body. It was also cited that data from the system led to a license renewal amnesty which all practioners where allowed to renewal their practicing licenses for the year 2017 without being charged penalties for arreas. This approach increased lincense renewals by over 50% as compared to the year 2016.

Conclusion: The attained advancements in health workforce planning and management as per the results of this paper might have not been achieved as quickly had there not been a rHRIS with readily available data on the health workforce for the Zambian Ministry of Health and regulatory bodies to utilize. This improvement shows that the Zambian government is determined to strengthen its health system in order to provide quality health care services for its citizens. In order for the rHRIS to be a constant success, regular improvements to the system are cardinal in order for it to adapt to organization and policy changes.

HIV Testing Uptake and Associated Factors Among Male Long Distance Truck Drivers in Zambia, 2015

Authors: Lwito Mutale[1], Choolwe Jacobs[1], Mumbi Chola[1], Gershom Chongwe[1], Webster Kasongo[1], David Mwakazanga[1]

1. The University of Zambia

Background: Globally, truckers have been reported to have an important role in the spread of sexually transmitted infections (STIs) and Human Immunodeficiency Virus (HIV). Evidence on uptake of HIV testing among this key population is not well established. We examined factors associated with HIV testing among male long distance truck drivers (LDTDs) since HIV testing has been found to be an integral part of the preventive strategies.

Methods: A cross sectional study was conducted among male LDTDs using secondary data from the 2015 Behavioral Surveillance Survey (BSS). The BSS was carried out in 5 of the 10 Corridors of Hope (COH) III project sites (Livingstone/Kazungula, Solwezi, KapiriMposhi, Chipata and Chirundu). The study recruited LDTDs from truck depots, border sites, Zambia Revenue Authority offices and those parked along the road. Face-to-face structured interviews were used to collect data on socio-demographic characteristics, HIV testing, HIV risk behaviors and knowledge towards HIV/AIDS. Multivariable logistic regression was done to improve predictive power and control for confounders.

Results: A total of 1,406 male LDTDs were included in the study, with age range 18-70 and mean age of 21. Over 80% reported being currently married and living with spouse while 94% reported having only one wife. Uptake for ever having tested for HIV among LDTDs was 83%, while 39% were circumcised. Positive predictors for HIV testing included the following: having reason for circumcision being health and hygiene (aOR 1.84, 95%CI 1.07-3.16), having reason for circumcision to prevent genital infections (aOR 2.98, 95%CI 1.28-6.94) and not having a relative or friend who was infected or died of HIV (aOR 1.57, 95%CI 1.11-2.22), while having more than two wives (aOR 0.41, 95%CI 0.25-0.67) was a negative risk factor for HIV testing uptake.

Conclusion: Personal reasons for circumcision such as hygiene and infection prevention were strong drivers for HIV testing. These findings suggest the need to implement more focused interventions and messages on health and hygiene and prevention of genital infections to increase circumcision and uptake of HIV testing among LDTDs. Additionally there is need to improve services targeting LDTDs, especially those who are less health-conscious.

Mental Health, Adaptive Functioning and Neurocognitive Functioning among school aged children living with HIV in Zambia

Authors: Lisa Kalungwana-Mambwe[1], Susan Malcolm-Smith[1], Leigh Schrieff-Elson[1]
1. University of Cape Town

Background: This study aimed to establish whether HIV affects mental health and neurocognitive functioning infected school aged children compared to HIV-uninfected in Zambia.

Methods: The study employed a cross sectional quasi-experimental design that compared two pre-existing groups, a HIV-infected group and a HIV-uninfected control group. The sample included 127 children aged 6-12 (M: 9.8; SD: 1.8) years, with 58(45.7%) HIV infected children and 69 (54.3%) HIV-uninfected children. 77 (55.9%) of the total sample was female. HIV-infected children were recruited from Anti-Retroviral Therapy (ART) centres in health facilities in Lusaka. HIV-uninfected children were recruited in the same health facilities. Mental health functioning was assessed using the Connors Parent Rating Scale Short Form. Neurocognitive functioning was assessed using various tests. Adaptive Functioning was assessed using the Vinelands Adaptive Behavioural Scales (VABS). Data was analysed using SPSS version 25. Mann-Whitney tests were used to establish whether there were significant differences between the HIV infected children and the HIV uninfected children

Results: Significant differences were found on tests of mental health with HIV-infected children experiencing more problems in the inhibition and executive functioning domains. On tests of neurocognitive functioning, significant differences were observed on test of attention and motor functioning with HIV-infected children reporting lower scores than HIV-uninfected children. HIV infected children also had poorer scores on the VABS with more internalising and externalising behaviour than HIV-uninfected children.

Conclusions: This is the first study that shows the effects of HIV across multiple domain and areas of functioning among school aged children in Africa. The study has indicated that HIV-infected children are prone to mental health, adaptive functioning as well as academic difficulties that may affect how they relate with peers and impact their social and academic functioning in a school environment.

An Ethical Analysis of Community Awareness of the Legal Status of Homosexuality in Zambia

Authors: John Shawa[1], Dr Anthony Musonda[1]
1. The University of Zambia

Background: The aim of this study was to ethically evaluate the Legal Status of Homosexuality in Zambia. The Zambian penal code criminalizes homosexuality. But this has not deterred people from practicing homosexuality in Zambia. Further, little is known about the problem of public health risk that the continued criminalization of the practice and victimization of homosexuals presents not only to homosexuals but also to heterosexuals through bisexuals. It is also not known about the impact of the illegal status of homosexuality on the prevention of HIV/AIDS infections. Thus the objectives of this study were: (i) to discuss the current global legal status on homosexuality; (ii) to establish the current Zambian legal status on homosexuality; (iii) to investigate the impact of the current legal status on homosexuality on homosexuals' access to heal care and on the prevention of HIV/AIDS infection; (iv) to ethically assess the Zambian legal status on homosexuality.

Methods: The study design was a descriptive survey. The methodology used was qualitative involving an ethical assessment. Based on a sample of 16 participants, primary data was collected through structured interviews with high court judges, subordinate court magistrates, private practicing lawyers, representatives from main church mother bodies and caregivers who were purposively sampled. Secondary data were collected from newspapers, documents, books and the internet. The data obtained was analyzed by coding and grouping it according to common themes. The theoretical framework was based on deontological perspectives which hold that an action was considered morally good because of some characteristic of the action itself, not because of the product of the action being good. I adopted the United Nations: first Gay Rights Declaration, the Yogyakarta Principles and John Rawls' "Theory of Justice" to guide the collection of data and to inform the ethical assessment.

Results: The findings revealed that 93.75 per cent the participants were aware of the legal status of homosexuality in Zambia. 25 per cent of the participants shared the opinion that the legal status should be maintained. The findings further revealed that despite the National Health Policy indicating that everyone has equal access to health; it was at the moment illegal for homosexuals to access health care. Health care givers that wanted to render health services to homosexuals were stigmatized. This legal situation had adverse effects on HIV/AIDS prevention because it left out homosexuals in the prevention and treatment of HIV infections.

Conclusions: The ethical assessment established that such a stance against homosexuality is concerning from ethical and human rights perspectives. It also poses serious risks from a public health perspective. This legal status was, therefore, morally unjustified. It was however recommended that this status needed to be discussed with the ethical and public health concerns that were raised in the findings.

Characterization of Non-tuberculous Mycobacterium from Humans and Water in an Agropastoral area in Zambia

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Background: The non-tuberculous mycobacteria include those mycobacterium species that are not members of the Mycobacterium tuberculosis complex, the causative agent of pulmonary tuberculosis and Mycobacterium leprae. In Zambia, Non tuberculous Mycobacteria are gaining recognition as pathogens of public health significance. However, there is scanty information on the isolation and speciation of these organisms for better patient management, consequently reducing the burden of these infections. Given the above information, the thrust of this study was to isolate and characterize NTM from humans and water in Namwala district of Zambia.

Methods: This was a cross-sectional study were 153 individuals with suspected TB were sampled from four health facilities in Namwala district, sputum samples were also collected. Additionally, 149 water samples were collected from different water drinking sources such as Tap water, Borehole water, rivers, wells and streams. Standard TB culture methods were employed to isolate Nontuberculous Mycobacteria and later 16S-23S internal transcribed spacer region Sequencing was employed to characterize NTM.

Results: Seven (7, 4.6%) NTM species were identified from humans with M. arupense (3, 42.9%) being the most common organism, while twenty three (23, 15.4%) NTM were identified from water with the common species being Mycobacterium gordonae (5, 21.7%). Mycobacterium avium and Mycobacterium fortuitum were both identified from human and water samples.

Conclusion: This study has shown the isolation of NTM species from humans and water with Mycobacterium arupense and Mycobacterium gordonae being the most prevalent. However, there is no evidence of human to human acquisition but rather a common environmental source, water. The isolation of NTM from drinking water sources could signify a public health risk to humans.

Title: Defining the intervention requirements for elimination in the Lake Kariba region using a spatial model of malaria transmission

Authors: Josh Suresh[1], Milen Nikolov[1], Amelia Bertozzi-Villa[1], John Miller[2], Busiku Hamainza[3], Edward A. Wenger[1], Jaline Gerardin[1], Caitlin A. Bever[1]

1. IDM, 2. PATH, 3. NMCC

Background: Elimination of malaria in Zambia will require the coordination of time-limited interventions, such as indoor residual spraying (IRS) and insecticide-treated bed net (ITN) distributions, with longer-term investments in surveillance and case management. However, it is costly and inefficient to try to apply the same intervention package everywhere; we expect that contexts with differences in historical transmission intensity, population clustering, importation rates, etc. may allow for minimal intervention packages in some areas, but specialized operational packages in others.

Methods: In order to offer guidance to this operational stratification of Zambia's elimination program, we carry out a highly detailed spatial simulation study of the Lake Kariba region in southern Zambia, which has benefited from IRS and ITN campaigns as well as multiple rounds of mass drug administration (MDA). While overall the region has experienced dramatic decreases in the incidence of malaria infections, transmission has not been completely interrupted everywhere. Drawing from data collected by the National Malaria Elimination Program and MACEPA during MDA activities, we implement the timing and coverage for MDA, ITN, and IRS on a 1 square kilometer grid cell basis. We also implement data-informed migration, treatment-seeking, and reactive case detection.
Relative abundances of An. arabiensis and An. funestus vectors are determined by calibrating to observed parasite prevalence and clinical incidence using climate data and resulting hydrology modes as a prior. We then run a set of counterfactual simulations, where we can tease apart the effect sizes of the various interventions, and provide insight on why elimination has or has not been achieved in each catchment.

Conclusion: This procedure allows us to shed light on what minimal intervention packages are most effective in various transmission strata, towards the ultimate goal of complete malaria elimination in Zambia.

Title: Compounded Household Stigma among Young People and Their Caregivers Living with HIV: Challenges and Opportunities to Reaching 90-90-90 in Zambia

Authors: Joseph Rosen[1], Namukonda, Edith S.[1]; Chibuye, Mwelwa[1]; Kayeyi, Nkomba[1]
1. Population Council

Background: Stigma profoundly disrupts the uptake of and sustained engagement in HIV treatment services, threatening progress to achieving the ambitious UNAIDS 90-90-90 targets. Less, however, is known about the impact of compounded stigma at the household level on HIV clinical outcomes. This study aims to document factors associated with and potential consequences of compounded household stigma among young people living with HIV (YPLHIV) and their HIV-positive primary caregivers in two Zambian provinces.

Methods: A prospective cohort study is being conducted to assess the impact of an integrated service-delivery program on HIV service utilization and household well-being. From July to October 2017, 528 households in Central and Eastern Provinces were identified and randomly selected for participation. Eligible households had a primary caregiver 18 years or older and a YPLHIV aged 5-9 or 10-17 years. After providing written informed consent, caregivers answered questions pertaining to the household, social and economic well-being indicators, and HIV-related factors. YPLHIV aged 10-17 were interviewed directly, and YPLHIV aged 5-9 were interviewed through caregiver proxy. The primary outcome variable, compounded stigma, was categorized using three separate scales capturing HIV-related stigma and mistreatment experiences among caregivers and YPLHIV, respectively. Households where both an HIV-positive caregiver and YPLHIV experienced stigma were classified as 'compounded', and households where only one respondent reported stigmatization were coded as 'discordant.' Households where neither the caregiver nor YPLHIV reported any experience with HIV-related stigma served as the reference group. After descriptive statistics were calculated, bivariate ordered logistic regression models were generated to identify factors associated with compounded stigma. Socio-demographic, household, and HIV-related covariates meeting a significance threshold of $p<0.1$ in bivariate analysis were introduced into continuous age-, sex-, and region-adjusted multivariable ordered logistic regression models, stratified by caregivers and YPLHIV.

Results: Among caregiver-YPLHIV pairs completing the baseline assessment, 310 (58.7%) had concordant HIV serostatus. Compounded stigma was documented in 22 (7.1%) households, and 66 (21.3%) caregiver-YPLHIV pairs reported discordant stigma experiences. Excluding YPLHIV continuous age, no statistically significant socio-demographic differences were observed between caregiver-YPLHIV pairs experiencing stigma and those who did not. Among YPLHIV, age (OR=1.11, 95% CI: 1.01-1.23) and non-adherence to antiretroviral therapy (dichotomized as stopping HIV medications for 30 continuous days in the past year) (OR=3.65, 95% CI: 1.07-12.38) were significantly associated with compounded stigma in multivariable analysis. Caregivers that were unmarried or lived alone had almost three times the odds of compounded stigma than those who were married or cohabitating, and this difference was statistically significant (OR=2.62, 95% CI: 1.11-6.16). Caregivers who spent a whole day and evening without eating at least once weekly in the past month had twice the odds of compounded stigma than those with enough to eat (OR=1.90, 95% CI: 1.05-3.43).

Conclusion: Compounded stigma affected food-insecure, socially vulnerable households and may result in suboptimal HIV treatment outcomes. In order to close gaps in the continuum of HIV prevention, care, and treatment and reach 90-90-90, novel stigma mitigation approaches addressing vulnerabilities experienced at the household level, not only among individuals, are urgently needed.

Title: Correlates of Comprehensive HIV Knowledge among Caregivers of Young People Living with HIV: Findings from a Baseline Assessment in Eastern and Central Provinces of Zambia

Authors: Edith Namukonda[1], Rosen, Joseph G.[1]; Chibuye, Mwela[1]; Kayeyi, Nkomba[1]
1. Population Council

Background: Comprehensive knowledge of HIV/AIDS influences attitudes towards sexual behaviors and is a great resource in the prevention of HIV and other sexually transmitted infections (STIs). While the relationship between comprehensive knowledge and HIV clinical outcomes is well-established, fewer attempts have been made to explore the influence of caregiver comprehensive knowledge on the health outcomes of other household members living with HIV. This study aimed to identify determinants of comprehensive HIV knowledge among primary caregivers of young people living with HIV (YPLHIV) aged 5-17 years in two Zambian provinces and explore associations between caregiver knowledge and key health/well-being indicators of their dependents.

Methods: A prospective cohort study was undertaken to measure the influence of the Zambia Family (ZAMFAM) project; an integrated service-delivery program for Orphans and Vulnerable children (OVCs) focused on HIV service utilization and household well-being. Data was obtained from 264 randomly selected ZAMFAM beneficiary households in Central Province, using a two-stage sampling method. An equal number of households was selected from Eastern Province, which served as a comparison group due to the non-existence ZAMFAM activities. Eligible households had a primary caregiver 18 years or older and a YPLHIV aged 5-17 years. Caregivers provided information on the household, social and economic well-being indicators, and HIV-related factors through a structured questionnaire. Comprehensive HIV knowledge was measured using a validated 5-item index containing questions gauging basic awareness of HIV transmission pathways and prevention strategies. Logistic regression models were used to identify associations between caregiver comprehensive knowledge and covariates of interest. Models were stratified by Province to account for confounding by demographic differences in the sample.

Results: Of the 528 caregiver-YPLHIV pairs enrolled, only 10.6% of caregivers demonstrated comprehensive HIV knowledge. Caregivers in Central Province were significantly more likely to possess comprehensive knowledge if women had decision-making power over household finances (OR 2.17, 95% CI 1.17-4.03) and 44% less likely to have comprehensive knowledge if they self-reported diminished capacity to satisfy their dependents' needs (OR 0.56, 95% CI 0.32-0.99). In Eastern Province, caregivers participating in support groups (OR 2.67, 99% CI 1.30-5.54) and receiving social support across four domains (OR 1.77, CI 1.06-2.95) were significantly more likely to have comprehensive knowledge. For YPLHIV outcomes, caregivers with comprehensive HIV knowledge were twice as likely to have dependents registered in HIV care (OR 2.43, 95% CI 1.07-5.51) and report a recent CD4+ count screening (OR 2.12, 95% CI 1.13-3.97).

Conclusion: Caregivers with comprehensive HIV tended to have improved psychosocial and economic outcomes. Findings also suggest caregiver knowledge may positively influence HIV treatment outcomes for other household members. Knowledge of HIV should be integrated in

counseling sessions for both caregivers and their HIV positive dependents. This study supplements the existing HIV education literature by emphasizing the potential role of HIV educational interventions at the household level to improve HIV outcomes.

Title: Geospatial mapping of current and former mineworkers in a high incidence TB setting - Zambia

Authors: Sydney Mwanza[1], Laura Podewils[2], James Tobias[2], J. Smith[3], David Mwakazanga[1], Webster Kasongo[1]

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Background: Mineworkers and ex-mineworkers in sub-Saharan Africa have been shown to have a profound impact on the spread of tuberculosis (TB). Despite several well-designed studies highlighting the association between mining and TB, little epidemiologic work has focused on the geographic distribution of current and former mineworkers' residences and their relation to mines and healthcare facilities; such work may facilitate targeted prevention and treatment programs. The aim of this study is to overlay survey data with geospatial mapping of current and former mineworkers in the Northwest and Copperbelt Province of Zambia.

Methods: All current and former (ex-) mineworkers in each region were eligible for this cross-sectional survey. Convenience sampling identified eligible participants in mining communities, in partnership with the mines, community leaders, and health facilities. Structured knowledge, attitudes, and practices (KAP) surveys were administered and GPS coordinates were collected at the residence of enrolled participants were captured.

Results: A total of 2792 mineworkers (1956 current and 836 ex-) were enrolled. Ex-mineworkers were more likely to have a history of TB (12% vs 3.0%; $p<0.001$). Among ex-mineworkers with a history of TB, one-fourth (25%) were diagnosed within the previous six months and one in five (22%) found it difficult to go to a clinic when sick. Striking differences exist in the geographic distribution of mineworkers and ex-mineworkers by province (Figure 1). In the Northwest province, while current mineworkers were relatively evenly distributed throughout three towns, almost all of former mineworkers (92%) in this study resided in one town. This is in contrast to the Copperbelt province, where similar proportions of mineworkers/ex-mineworkers were similarly distributed across 7 towns.

Conclusions: Mineworkers are a critical bridge population in TB transmission. Understanding differences in the geospatial distribution and perceptions of these populations provides insight into public health programs aiming to reduce TB transmission in Zambia.

Title: HIV Testing Optimization and Antiretroviral Therapy Initiation in a Tertiary Hospital: Case of Ndola Teaching Hospital, Zambia

Authors: Patrick Makelele[1], Gabriel Kibombwe[1], Jonatan Mukundu[1], Christian Nkama[1], Moses, Virginia Walubita[1], Rebecca Dirks[1], Moses Bateganya[1], Baz Dessalegn[1], Chiegil Robert[1]
1. FHI360

Background: Ndola Teaching Hospital (NTH), a tertiary-level hospital located in the Copperbelt Province of Zambia, is one of the 196 Ministry of Health (MoH) facilities supported by the Zambia Prevention Care and Treatment (ZPCT) IIB project, funded by United States Agency for International Development (USAID). The project supported the Government of Zambia towards reaching the 90-90-90 UNAIDS goal. Like many other health facilities, NTH has been slow in implementing provider-initiated testing and Counselling (PITC) and in rolling out Test and Treat, both of which are strategies recommended in the 2018 Zambia consolidated guidelines. However NTH was only offering Voluntary Counseling and Testing (VCT) -on client request- and Diagnostic Counseling and Testing (DCT) for patients with symptoms suggestive of HIV infection. These services were conducted in the Counseling and Testing (CT) room, located approximately 30 meters from the general outpatient department (OPD). Though important, the VCT and DCT strategies, leave many patients seeking care, unaware of their HIV status.

Methods: Before the ZPCT IIB-supported intervention, many clients attended to for general medical and specialist care were not offered HIV testing. In January 2018, to optimize testing, improve HIV case identification, and promote antiretroviral therapy (ART) initiation in line with Test and Treat approach, ZPCTIIB implemented the following strategies:
• Conducted meetings with senior and middle-level hospital management to obtain buy-in and establish PITC at all facility entry points and same day ART initiation through the Test and Treat MOH policy.
• Integrated seven additional CT corners into existing service delivery points
• Optimized lay counselor human resource by redistributing the available ones to various entry points
• Organized daily granular data review meetings with counsellors and other ART team members
• Engaged the laboratory services in-charge to
• Incentivized facility staff to enable extended hours for HTS and ART initiations
• Enhanced linkage of newly diagnosed positive patients using escorted referral from testing points to clinical assessment and ART initiation.

Results: Routine service data analyzed showed that before intervention (October 2017 and December 2017), NTH tested 705 people for HIV, out of which 136 tested positive (19% yield). Of those who tested positive, only 35 (26%) were initiated on ART. During the intervention period (January 2018 to March 2018), the NTH testing volume increased four-fold to 2,783. From these, 335 (12% yield) new HIV positive patients were identified. 234 (70%) of the new positives were initiated on ART during weekdays but also weekends and extended hours.

Conclusion: The global mandate for HIV epidemic control calls for new ways of doing business with strong leadership and management commitment. Obtaining NTH management approval and buy-in, made the difference in facilitating the intervention. Total quality leadership, including

human resource optimization through strategic resource deployment and accountability using daily granular level data review is key to achieving expected results. This approach can be easily adapted to other health facilities in poor resource settings to accelerate achievement towards 95/90/90 UNAIDS goals.

Title: Improving HIV Case-Finding among key populations; A Snapshot from 100 days of using Total Quality Leadership approach in USAID Open Doors Project Zambia

Authors: Florence Mulenga1, Lameck Nyirenda[1], Nellisiwe Chizuni[1], Flavia Mwape[1], Patrick Makelele[1], Gabriel Kibombwe[1], Clement Bwalya[1], Harry Massamba[1], Moses Bateganya[1], Joseph Kamanga[1], Chiegil Robert[1]
1. FHI360 /USAID ODP

Background: Key populations (KPs) such as female sex workers (FSWs), men who have sex with men (MSM), transgender (TGs); and people who inject drugs (PWID) are key to achieving epidemic control in Zambia. With HIV prevalence rates of 56% among FSW (IBBS, 2016), 24% among self-identified MSM and 14% among TGs (PANOS, 2016) Zambia's national response requires urgent efficient, effective and respectful HTS services for these groups. Institution and self-stigma are high among KP and limits access to health services (ODP/EPR, 2017) such as HIV testing. The USAID Open Doors Project (ODP), funded by PEPFAR/USAID through FHI 360, supports the access to and use of comprehensive HIV prevention, care and treatment services for KPs in eight districts of Zambia. We report on the changes in HIV test yield after 100 days of implementing TQL as a Quality Improvement strategy to accelerate HIV case-finding and antiretroviral therapy initiations in the project districts in Zambia.

Methods: Program data on HIV-testing and linkage to ART for FSW, MSM and TG was reviewed and analyzed from October 2017 to March 2018. The positivity yield for KP 10%, was lower than in the general population of around 12% for the same period. To improve the yield and linkage the project leadership implemented surge activities. The main activities, implemented as part of TQL QI strategy were:(1) identification and assignment of resources to 20% of sites accounting for 80% the results (2) making operational changes including setting up a "Situation Room" at USAID/ODP national office to, monitor performance in real-time using daily granular level data and prioritize activities, (3) orientation of outreach workers and community volunteers on program performance and new strategies such as social network (SN) and index testing to improve HTS uptake and micro mapping targeting places most likely to yield positive results (3) improving collaboration with respective District Health Offices and other PEPFAR/USAID funded treatment partners to enhance linkage to care

Results: When comparing the three months before intensive TQL implementation (January-March 2018) and after (100 days) of implementing the intervention, April 16-July24, 2018, the overall HIV-positivity yield increased from 10% to 36%. Similarly, linkage to ART increased from 83% before intervention to 91% 100 days of implementing TQL package of intervention.

Conclusion: Implementation of TQL strategy allowed the project to target new catchment areas with previously undiagnosed KP and thus high HIV positive yield. TQL strengthened with health facilities and other PEPFAR implementing partners, and contributed to improved case identification and linkage to ART. If implemented widely, TQL can help projects improve program targets to the to achieving the first and second of the UNAIDS 90-90-90 targets for KPs in Zambia.

Title: Prevalence, Intensity and Factors Associated with Soil Transmitted Helminths Infection among Children in Chililabombwe District, Copperbelt Province, Zambia-cross sectional study

Authors: Sibongile Tembo[1], Patricia Mubita[2], Jessy Zgambo[2], Lungowe Sitali[3]
1. The University of Zambia, 2. School of Public Health, University of Zambia, 3. School of Health Science, University of Zambia

Background: Soil transmitted helminthiases are a common type of parasitic infection in the world. STHs are among the neglected tropical diseases (NTDs) of poverty. Mainly caused by roundworms, whipworms and hookworms. The mode of transmission is different for each species. Some of the reported factors associated with STHs are eating unwashed vegetables, education levels of guardians, socio economic status, area of residence and sanitation. Re-infection is possible even after deworming. This study investigated the prevalence, intensity and factors associated with soil transmitted helminths among children.

Methods: This was a community based cross sectional study in Chililabombwe district, Zambia. Socio-demographic, environmental and service related characteristics of the study participants were collected using questionnaires. Stool samples were collected and examined for presence of parasites using formal-ether concentration and Kato Katz techniques. Geometric mean was used to report intensity of infection. Bivariate and multivariate logistic regressions were used to determine factors associated with worm infestations. An investigator led stepwise regression was used to select the best factors associated with developing STH.

Results: There were 411 guardian – child pairs in the study. Age distribution ranged from 1 to 15 years and 17 to 77 years in children and their guardians respectively. Prevalence of soil transmitted helminths was 14.36% and the most prevalent parasite was round worms (14.1%). The overall intensity of infection is light (<5000epg) with a few heavy infections (>50000epg). Factors independently associated with soil transmitted helminthes after adjusting for other variables were household income (AOR=2.49; 95% CI [1.01-6.12]) and overcrowding (AOR =1.33; 95% CI [1.09-1.62]).

Conclusion: Soil transmitted helminths particularly round worms were more prevalent in the study. Factors independently associated with worm infestation were household income and overcrowding. This indicates that reinfection is likely even after deworming.Hence policy makers should advocate for factors to improve the living conditions of communities.

Title: Evaluating the Impact of Antiretroviral and Antiepileptic Medication Interactions on ARV Effectiveness: An Exposure-Control Study

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Background: In 2012, the International League against Epilepsy endorsed evidence-based guidelines for antiepileptic drug (AED) selection in people with HIV. However, the recommendations were hindered by a lack of strong evidence. The decision to commence AEDs in a person with HIV is critical, due to interactions between enzyme-inducing AEDs (EI-AEDs) and antiretrovirals (ARV) that could lead to ARV resistance in people taking lifelong medications. Unfortunately, failure to commence an AED if needed places people at risk of seizure-related injuries and death. Given the absence of data to guide care, and potential public health impact of the development of ARV resistance due to concurrent EI-AEDs and ARVs, we conducted a dual exposure study to determine if the co-usage of ARVs and EI-AEDs is associated with ARV failure and ARV resistant HIV.

Methods: Participants were identified through the Epilepsy Care Team Registry and Muka Buumi ARV Clinics at Chikankata. Eligible "exposed" patients were over 18 years of age taking AEDs and ARVs. Matched controls were to be individuals on the same ARV regimen for similar duration of time but not taking an AED or any enzyme inducing medication. Participants answered a brief questionnaire on their medication and HIV history. CD4 and viral load were obtained in each participant, and HIV genotype obtained on anyone with a viral load greater than 1000 copies.

Results: Among the first 13 exposed participants, the mean age was 41 years (min=19, max=56), all were taking Carbamazepine for an average duration of 26 months (min=1, max=240). Previous AEDs include Phenobarbitone. All were receiving a first-line ARV regimen for an average duration of 26 months (min=3, max=40). Their mean CD4 nadir was 283 (min=25, max= 628) and had no evidence of clinical failure events. 2/13 met criteria for poor ARV adherence defined as being at least 1 week late for their ARV clinic visit and medication collection. Current mean CD4 was 508, and everyone had a CD4 greater than 200. Only 1/13 had a viral load greater than 1000copies/ml and their HIV genotype showed no specific ARV resistance pattern. Given these early findings, the study was halted due to futility with less than 10% of exposed participants having any measurable viral load.

Conclusion: This study sought to determine if adults dually exposed to AEDs and ARVs were at risk of drug interactions leading to ARV failure and resistance and was halted due to futility with the first 13 dually exposed individuals having no evidence of ARV failure. The preliminary data suggest that AED-ARV interactions may not represent a serious clinical problem at least among extremely adherent patients. These results are reassuring, but given the small sample size and the need to examine AED-ARV effects among less adherent populations, further studies are needed.

Title: What do Adolescent Girls and Young Women in Zambia tell us about their male partners and their relationship characteristics?

Authors: Maurice Musheke[1], Pilgrim, Nanlesta[1], Jani, Nrupa[1], Pulerwitz, Julie[1], Mathur, Sanyukta[1]
1. Population Council

Background: Adolescent girls and young women (AGYW) in Zambia are at high risk of HIV infection, in part because of their partner's behaviors and characteristics. Yet, less is known about male partners of AGYW – their characteristics and the dynamics of their relationships with AGYW. We examined characteristics of male partners of AGYW (ages 15–24) to better understand the HIV risk among AGYW.

Methods: We interviewed 1,915 AGYW, aged 15-24 years old, residing in urban districts of Lusaka and Ndola between November 2016 and April 2017, in locations where the DREAMS program is being implemented. The survey assessed characteristics of AGYW's recent male partners, their relationship characteristics and their partner's HIV risk characteristics. Descriptive analysis was conducted to assess attributes of current male partners among adolescent girls (AG) aged 15-19-years and young women (YW) aged 20-24-years.

Results: The majority of AG (82%) and YW (55%) had male partner boyfriends, while 16% and 43% respectively were married. The age range of male partners of AG was 16-40 years, with a mean difference of 5.0 ± 3.0 years, and 19-55 years for YW, with a mean difference of 5.4 ± 3.7 years. Nearly two-thirds of male partners for both AG and YW were circumcised (64% and 62% respectively), and approximately one-quarter of male partners had high risk jobs (27% and 25% respectively), defined as categories associated with greater risk of HIV acquisition and HIV prevalence.
Eighty six percent of both AG and YW had been in a partnership for one year or more. About 43% of AG and 33% of YW reported condom use at last sex, and 84% and 87% of AG and YW respectively reported a desire to have a/another child with their current partner. Twenty three percent of both AG and YW experienced partner violence in the last year; 22% of AG and 21% of YW experienced sexual violence in the last year; while 71% of AG and 76% of YW anticipated partner abuse or end of relationship if they tested positive for HIV. Over half of AG (53%) and nearly three-fourths of AG (71%) were aware of their partner having other partners in the last year, while 8% of AG and 7% of YW reported knowing their partner's HIV status.

Conclusion: To address the exceptionally high risk of HIV infection among AGYW in Zambia, interventions should focus on supporting AGYW in fulfilling their fertility desires while reducing their HIV risk, invest in strategies to prevent intimate partner violence and mitigate its impact on AGYW, and strengthen HIV counseling and testing for couples, including addressing potential abuse and relationship break-up.

Title: Developing a model to link Comprehensive Sexuality Education and adolescent health services to improve sexual and reproductive health outcomes among adolescents in Zambia

Authors: Mwelwa Chibuye[1], Kangale, Chabu[1], Namukonda, Edith[1], Rosen, Joseph[1]
1. Population Council

Background: Adolescents and young people in Zambia face many sexual and reproductive health (SRH) challenges including teenage pregnancy (28.5% of women 15-19 have begun child bearing), child marriage (31.4% of women got married before age 18), HIV and other STIs. They lack SRH knowledge and they often have inaccurate, misleading, and negative information about fertility and contraception. To combat this knowledge gap, the government introduced adolescent health services (AHS) in health facilities and in 2014 begun implementing comprehensive sexuality education (CSE) in schools for grades 5-12. However there is no linkage between CSE and health facilities. Increasing SRH knowledge and empowering adolescents to access SRH services in health facilities has significant potential to reduce negative outcomes among adolescents and ensure progression in school especially among adolescent girls.

Methods: The Population council is developing a model to link CSE in schools and AHS in health facilities. 23 schools in Mufumbwe and Solwezi districts have been randomized to three study arms; 1- with routine CSE and AHS only; 2- with school-based health services; and 3- health services provided at health facilities. A cross-sectional baseline study was carried out among school going boys and girls (grades 5 to 12) to determine their sexual and reproductive health knowledge and attitudes. Participants were randomly selected from randomly selected classrooms. Quantitative data was collected using a structured, interviewer-administered questionnaire. Questions asked included gender perceptions, sexual and reproductive health knowledge, gender-based violence and access and use of AHS.

Results: A total of 1,612 school going girls (49.6% -n=800) and boys (50.4%, n=812) age 12-24 from both Mufumbwe and Solwezi participated in the study. Only a third of adolescents interviewed had comprehensive knowledge of HIV. About a quarter (25.3%) of participants reported having had sex before. Among those 15-24 years old, 87.1% had their first sexual debut at 16 years. 27.2% reported having been sexually violated (raped) the first time they had sex. Among those sexually active, only 47% reported condom use during their last sexual intercourse despite over 75% knowing that condoms can prevent pregnancies and STIs. Around 16% of the girls and 6% of boys reported ever being pregnant or impregnating and around 70% from both groups experienced their first pregnancy between ages 15-19. 73% know of a method to prevent pregnancy with most mentioning the male condom. However, knowledge on non-barrier methods is very limited with only 25%% and 22.6% knowing about pills and injectables respectively. Very few reported using health facilities for SRH services.

Conclusion: Even with CSE in schools being the main source of knowledge for SRH among in-school adolescents, knowledge on SRH and access to and utilization of AHS still remains very low. For effective programming, CSE should be coupled with sexual behavior change interventions and increased access to AHS. The endline study will be carried out in 2019 to measure whether the CSE and AHS linkages will increase both knowledge and uptake of SRH services for adolescents and whether these will translate in reduced teen pregnancies and child marriages.

Title: Early Results from the UTH Children's Hospital Cohort of HIV-Associated Seizures and Epilepsy (CHASE) Study

Authors: Manoj Matthews[1], The CHASE Study Team for Lusaka including--Bearden, David[2], Birbeck, Gretchen[2, 3,4,]; Bositis, Christopher[5]; Ciccone, Ornella[1]; Dallah, Ifunanya[2]; Elafros, Melissa[6]; Gelbard, Harris[2]; Hammond, Colleen[7]; Johnson, Brent[2]; Kalungwana-Mambwe, Lisa[8]; Kampondeni, Sam[2]; Koralnik, Igor9; Mathews, Manoj[1]; Musukuma, Lisa[10]; Mwenechanya, Musaku[1]; Nachalwe, Mercy[11]; Namwiya, Musonda[8]; Navis, Allison[12]; Okulicz, Jason[13]; Phiri, Edward[1]; Potchen, Michael [2,14]; Siddiqi, Omar[10,15]; Sikazwe, Izukanji[16]; Theodore, William[17]

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Background: Seizure risks are high in people infected with HIV, but the risk of seizure recurrence, which determines the need for long term antiepileptic drugs (AEDs), is unknown in HIV positive children with new onset seizure. Given the possible drug interactions between AEDs and antiretrovirals (ARVs), research to assess the risk of future seizures and risk factors for epilepsy in this population is critical for national guideline development.

Methods: Since April 2016, children presenting to UTH Children's Hospital with new onset seizure have been assessed by local nursing staff for eligibility. Inclusion criteria are new onset seizure, HIV infection, parent/guardian to provide informed consent and willingness to receive HIV care through the Pediatric Centre of Excellence. Among enrolled children, clinical information regarding their seizure, the acute illness, and HIV disease and treatment history are gathered through parental interview and chart review. Relevant diagnostic data is also recorded with study resources supporting acquisition of neuroimaging, EEG, serum cryptococcal antigen, and if CSF is obtained, extensive cerebrospinal fluid (CSF) studies including investigations for common opportunistic viral infections, GeneXpert and culture for tuberculosis. Children are followed after discharge through their ARV clinic visits complemented by monthly phone calls to ascertain the child's well-being and seizure recurrence.

Results: To date, 47 children have been enrolled with 5 infants subsequently withdrawn due to negative HIV DNA studies. Among the remaining 42, mean age was 83 months (IQR= 27-132); 53% (n=22) were male. 19/42 (45%) were receiving ARVs at the time of the index seizure. WHO clinical stage classified 31/42 (74%) as stage 3 or 4; 11/42 (26%) as stage 1 or 2. CD4 counts proximate to the index seizure were available in 35 (83%) children. CD4% identified 54%, 15%, and 31%, as category 3 (most advanced), 2 or 1, respectively. Viral loads were available in 60% (25/42) and only 1/25 (4%) had viral suppression. Regarding seizure severity, 10% (4/42) presented in status epilepticus and 43% (18/42) had a single seizure in the 2 weeks prior to enrollment. Focality, an established risk factor for epilepsy in HIV uninfected individuals, was seen in 26/42 (61%) based upon seizure semiology, clinical assessment and

neuroimaging or EEG, where indicated. Diagnostic testing identified one case each of cryptococcal meningitis, TB meningitis, and varicella zoster virus encephalitis, two cases of cytomegalovirus encephalitis and 5 of EBV. No cases of HSV1, HSV2, HHV6A, HHV6B, or JC viruses were identified. To date, 19/42 (45%) children have died, 2 (5%) have been lost to follow-up and 21 (50%) remain in the study. Seizures have recurred in 6/42 (14%).

Conclusion: Similar to adults, children with HIV and new onset seizure have a high risk of early mortality and preliminary findings suggest seizure recurrence is common even relatively early. Ongoing enrollment and follow-up in the CHASE cohort is aimed at identifying risk factors for seizure recurrence and opportunities for optimizing care in children with HIV and new onset seizure.

Title: HIV Risk profiles among out-of-school adolescent girls and young women in two DREAMS sites in Zambia: Using Latent Class Analysis for differentiated prevention programming

Authors: Sanyukta Mathur[1], Pilgrim, Nanlesta[1], Patel, Sangram Kishor[1], Musheke, Maurice[1]
1. Population Council

Background: There is a critical need to reach out-of-school adolescent girls and young women (AGYW) with HIV prevention programs, including with oral pre-exposure prophylaxis (PrEP). Current programming needs better information to identify the most-at-risk AGYW. We used latent class analysis (LCA) to identify context-specific vulnerability profiles of out-of-school AGYW in Zambia to inform targeted outreach and programming.

Methods: We surveyed 846 AGYW (15-24 years) between November 2016 and April 2017 in two high HIV burden communities in Lusaka and Ndola, where DREAMS – a programme to reduce the vulnerability of AGYW to HIV - is being implemented. AGYW completed a survey capturing socio-demographics, sexual behaviors, HIV knowledge and attitudes, attitudes towards gender norms, experiences with violence and self-reported HIV status. LCA identified classes based on demographic, attitudinal, and behavioral indicators. We examined associations between class membership and HIV risk outcomes; we report adjusted odds ratios.

Results: We identified 2 latent classes – high and low vulnerability profiles - with good model fit statistics (entropy of 0.72). The high vulnerability profile, which comprised 40% of the sample, were characterized by low wealth, high mobility, sex below age 14, not being connected to adults at home, endorsing gender inequitable norms, and lacking comprehensive knowledge of both condoms and HIV.
Compared to AGYW with a low-vulnerability profile, AGYW with a high vulnerability profile had higher odds of engaging in transactional sex (AOR: 3.12; 95% CI: 1.44-6.75); experiencing sexual (AOR: 1.51; 95% CI: 1.03-2.21) and physical violence (AOR: 3.05; 95% CI: 2.12-4.39) from an intimate partner; and experiencing a pregnancy (AOR: 9.37; 95% CI: 6.66-13.18). AGYW with a high vulnerability profile also had high odds of reporting they were HIV positive (AOR: 6.32; 95% CI: 2.27-17.62).

Conclusion: We identified distinct vulnerability profiles among out-of-school AGYW in Zambia. Interventions should focus on reaching AGYW in the high-vulnerability profiles who were more likely to engage in risky sexual behaviors. LCA has the potential to enable more strategic, data-driven programming and evaluation.

Title: An Exploration of Needs Across the Faecal Sludge Management (FSM) Chain in Peri-Urban Areas in Lusaka

Author: Jenala Chipungu[1]
1. Centre for Infectious Disase Research in Zambia (CIDRZ)

Background: Sanitation remains a problem in high density areas of Lusaka, Zambia. According to the 2015 Joint Monitoring Programme (JMP) report, 44% of the population is served by 'unimproved' sanitation facilities. Unimproved sanitation facilities are inappropriate for use as they do not safely separate faecal matter from human contact, thereby contaminating the environment and placing a population at risk of disease.

Methods: Our study used a mixed method approach to explore the acceptability and consumer demand for solutions to key problems in FSM, namely; pit emptying, two sanitation pan technologies called a SATO stool (a pedestal-style toilet fitting) and SATO pan and a faecal sludge end use product, the faecal sludge briquette. We also investigated willingness to pay for each SATO pan component among household heads. We used actual products except in the case of faecal briquettes where we used charcoal as a substitute product, as briquettes were unobtainable.

Results: Demand for pit emptying is low with the majority preferring to build another pit in the event that their pits become full. The reasons for this were the fear of collapse following emptying (43%), emptying being too expensive (34%) and the unavailability of the service (22%). The SATO stool was preferred over the SATO pan largely because it allowed one to sit. Participants were willing to pay a break-even price of 100 ZMW and 70 ZMW for the stool and the pan respectively. 59% of participants said they would be comfortable using faecal sludge briquettes. Also, the SATO had a perceived advantage of preventing solid waste disposal. This is advantageous from the FSM perspective and also apparently valued by consumers. Participants equally valued the low water use for flushing. However, the pedestal was perceived as less hygienic for shared households and there were concerns that men may not keep it clean. With regards to willingness to pay, 79% of respondents expressed an interest in purchasing the SATO stool in the next 6 months. Less educated and less affluent women living in households with simple pit latrines that are not shared with many households may be more likely to purchase the Stool pan than other members of the population. In comparison, the Squat pan is more likely to be purchased by younger residents who have a dry pit latrine that is shared with many households

Conclusion: Faecal sludge briquettes may have a market if they are cheaper than charcoal. Attractiveness may be improved by referring to them only as biomass briquettes, explaining that they have been mechanically produced and heat treated and that their use helps conserve forest. Concerns around the briquettes were fear of contamination, smell and the burning capacity. However, if cheaper than charcoal, 74% of participants said they would be interested in using briquettes. Along with findings from the trial of the FSM chain in Lusaka, these findings provide important insights into various areas where the FSM chain could be improved. This report can be used as a basis future research around the FSM chain.

Title: Unravelling the Factors Affecting the Success of a Behavioural Intervention Targeted at Improving Peri-Urban Sanitation in Lusaka, Zambia

Authors: Jenala Chipungu[1], James B Tidwell[1], Robert Aunger[1] and Roma Chilengi[1]

1. Centre for Infectious Disase Research in Zambia (CIDRZ)

Background: The 'Indaba Yama Landlords' (IYL) intervention sought to motivate landlords in a peri-urban compound in Lusaka, Zambia to invest in sanitation status via presence of a cleaning rota; inside lock; outside lock; and water-sealed pan or hole cover. Landlords were invited to attend four meetings where they received the intervention. This study sought to identify the factors affecting the effectiveness of the IYL intervention among landlords in a randomised control trial.

Methods: In-depth interviews (n=23), focus group discussions (n=4), and surveys (n=928) were conducted. The Behaviour Centred Design (BCD) theory of change framework was used to identify themes on context, exposure, reception, behavioural outputs, action selection and long-term response around the study outcome.

Results: 61% of 543 invited landlords attended all four IYL meetings. Stated reasons for poor attendance included the lack of a monetary incentive, illness, or lack of time, interest in the topic or in the purpose in the meetings. 20% of landlords made all four toilet improvements while 60% made two or less. Conflict between tenants hindered the adoption of the rota in some cases, while the lack of water was reported as a barrier for toilet cleaning activities. The lack of money was a constraint for those that failed to put an inside lock, outside lock, and a water seal pan or hole cover. In the long term, the sustainability of physical improvements was affected by damage, loss, theft, rains and the collapse of latrines.

Conclusion: Given the varied factors affecting behavioural outcomes, understanding the process by which interventions reach their measured effect is necessary for the design and evaluation of future behavioural interventions.

Title: Understanding linkage to care with HIV self-test approach in Lusaka, Zambia - A mixed method approach

Author: Jenala Chipungu[1]
1. Centre for Infectious Disase Research in Zambia (CIDRZ)

Background: HIV self-testing (HIVST) is a novel approach designed to assist in achieving the goal of at least 90% of the population that learn their HIV status. A self-test user with a positive test is required to visit a clinic to link into HIV care, yet little is known about patient preferences for linkage strategies. We examined the intention to link to care amongst potential HIVST users and the suitability of three linkage to care strategies in Lusaka Province, Zambia.

Methods: We conducted a representative cross-sectional survey of 1,617 individuals aged 16–49 years old in Lusaka Province. Participants were shown a video of the HIVST. Data on intention to link to care and preferred linkage to care strategies—text message, phone call and home visits were collected. Eight focus group discussions were held concurrently with survey respondents to understand their preferences between the three linkage to care strategies.

Results: Of 1617 enrolled, 60% were women, 40% were men, with an average age of 27years (IQR = 22, 35). More men than women had at least secondary education (84% vs 77%) and were either employed or self-employed (67% vs. 41%). 85% (95%CI = 83 to 86) of participants said they would link to care within the first week of a positive self-test. Income >2,000 Kwacha (USD 200) per month versus income < 2,000 Kwacha (Adjusted odds ratio (AOR) = 0.59; 95%CI: 0.40 to 0.88; p = 0.009) and never versus prior HIV testers (AOR = 0.54; 95%CI: 0.32 to 0.91; p = 0.020) were associated with reduced odds of intention to link to care. 53% (95%CI = 50 to 55) preferred being prompted to link to care by home visits compared to phone call (30%) or SMS (17%).

Conclusion: We found almost nine out of ten potential HIVST users in the general population intend to link to care shortly after a positive test, and preferred home visits or phone calls to facilitate linkage, rather than SMS. Also, higher income earners and those who never tested for HIV were associated with reduced odds of intention to link to care. Policy guidelines and implementation strategies for HIVST should be responsive to patient preferences for linkage to care strategies to achieve the continuum of HIV care.

Title: Barriers to Respectful Care During Facility-Based Birth in Chipata District, Zambia

Authors: Rachel F Banay[1], Jana N Smith[1], Maurice Musheke[2], Emily Zimmerman[1], JD, Vivien Caetano[1]

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Background: Maternal and neonatal mortality in Zambia are high. As 67.4% of births in Zambia occur in health facilities,[1] improving the quality of facility-based birth has the potential to impact many lives, both of mothers and infants.
While adherence to clinical guidelines leaves room for improvement in Zambia,[2] respectful maternity care has additional far-reaching consequences. Quality of the delivery experience can influence subsequent care-seeking, including post-natal care,[3] routine immunization, sick child-care and facility delivery.[4] Evidence indicates a need for greater respectful care during facility-based birth in Zambia.[5]

Methodology: We contributed to the growing literature on provider behavior change by investigating how midwives make decisions about the provision of care and act in the moment, identifying contextual features which trigger adverse decisions and actions. In July 2018 we conducted qualitative research in Chipata District, Eastern Province. We interviewed 17 midwives, 3 midwife supervisors and mentors, 7 Safe Motherhood Action Group volunteers, 15 postpartum women, and 4 birth companions. We also conducted nine multi-hour observations of client-midwife interactions on labor wards at two urban health centers and a district hospital.

Results: Our research surfaced six behavioral barriers underlying midwives' disrespectful care, as well as the accompanying triggers in midwives' immediate environment: 1) providers do not explicitly consider the decision to provide respectful care because they believe they are doing what they are expected to; 2) harsh treatment is normalized in the care environment; 3) providers may decide that the costs of providing respectful care outweigh the gains; 4) providers believe they do not need to provide respectful care as it does not affect health outcomes; 5) providers may tunnel on other elements of care perceived as more important; and 6) providers may change their minds when they believe that disrespectful care will assist their clinical objectives.

Discussion: Midwives experience several behavioral barriers to providing respectful maternity care. Our presentation will elaborate on our findings, including contextual features which support respectful care. We will also describe how our findings inform the ongoing design of a behavioral intervention to improve respectful maternity care and outcomes for women and children in Zambia.

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[1] Central Statistical Office, Zambia, Ministry of Health.

[2] Owens et al., "The State of Routine and Emergency Obstetric and Neonatal Care in Southern Province, Zambia"; "Assessing the Impact of the Safe Childbirth Checklist and Systems Coaching on Health Worker Practices in Zambia."

[3] Chungu et al., "Place of Delivery Associated With Postnatal Care Utilization Among Childbearing Women in Zambia"; Worku, Yalew, and Afework, "Factors Affecting Utilization of Skilled Maternal Care in Northwest Ethiopia."

[4] Faye, Niane, and Ba, "Home Birth in Women Who Have given Birth at Least Once in a Health Facility."

[5] Sialubanje et al., "Reasons for Home Delivery and Use of Traditional Birth Attendants in Rural Zambia"; Topp and Chipukuma, "A Qualitative Study of the Role of Workplace and Interpersonal Trust in Shaping Service Quality and Responsiveness in Zambian Primary Health Centres"; Sacks and Kinney, "Respectful Maternal and Newborn Care."

Influences of Haemoglobin-as Genotype on Asymptomatic Plasmodium Infections in Children in Nchelenge District, Luapula Province Zambia

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Background: It is approximated that about 50% of malaria infections are asymptomatic in areas where malaria is endemic. In these areas, transmission is intense and consistent over time. As a result, most adults who live in these endemic areas possess partial immunity to malaria due to recurrent infections. Infants and children unfortunately, usually do not acquire this partial immunity early in life until they are exposed to malaria infection for a long time. These asymptomatic individuals continue transmitting the disease to others and provide a long-lasting reservoir for the malaria vector. It has been noted that there has been a higher prevalence of haemoglobin S in highly malaria endemic areas, especially in sub-Saharan Africa. And it has been reported that haemoglobin AS heterozygote [HbAS; sickle-cell trait] protects against severe disease & death due to Plasmodium falciparum. The aim of the study was to establish the effects of Sickle cell genotypes on asymptomatic malaria infection among children in Nchelenge district.

Methods: The samples were selected from the malaria transmission and impact of control efforts in Southern Africa study by a simple random sampling using Microsoft excel for children aged between 7 months to 9 years with no fever or previous illness. Malaria parasites were counted per 200 white blood cells [WBCs] on Giemsa-stained thick blood films, in determining parasitaemia & parasite density we calculated assuming a mean WBC count of 8000/µL. Malaria was defined as any parasitaemia plus fever. Samples from all participants with RDT positive, and blood smear negative and all positive blood smears [for parasite identification] were subjected to PCR. DNA was extracted from dried blood spots by Chelex DNA extraction, and submicroscopic infections were ascertained by nested PCR assays including commercial negative and positive controls. We extracted DNA using a QIAGEN kit and haemoglobin was typed by polymerase chain reaction-restriction fragment length polymorphism.

Results: Microscopically visible parasitaemia was present in 35.9% (83) of the children, at overall geometric mean parasite density (4435.4/µL; 95%CI, 3292.5-5975.1/ µL). By PCR, P. falciparum occurred in 89% (104/116) while 11% (12/116) were other species of malaria. The HbAS trait was present in 24.4% (56/230) of the children, while 71.7% (165/230) had a normal haemoglobin genotype (HbAA). HbSS occurred in 3.9% (9/230) of the children. Children with HbAS genotype were protected against uncomplicated malaria and had a lower geometric mean parasite density of 2548.7 parasites/µL [95% CI: 1617.8-4015.2], as compared to the wild-type with 6041.2 parasites/µL [95% CI 4161.2-8770.4].

Conclusion: In conclusion, our data showed that sickle cell trait (HbAS) protects against high parasitaemia, parasite density [P. falciparum] and anaemia in children, through the enhancement of the acquired and innate immunity, which inhibits parasite proliferation.