# Abstracts of Oral Presentations

## 001

### ADOLESCENT TUBERCULOSIS: THE MISSING MIDDLE

**Dodd P.J.[1], Kranzer K.[2]**
[1]School of Health and Related Research, University of Sheffield, Sheffield;
[2]Clinical Research Dept., London School of Hygiene and Tropical Medicine, London, UK

Adolescence is characterised by a dramatic increase in the risk of developing tuberculosis, a fact that has been appreciated since the early 20th century. The majority of the world's adolescents live in low and middle-income countries where tuberculosis remains common. It is increasingly apparent that adolescents lie at the heart of the global tuberculosis epidemic, but they have not yet been addressed as a distinct population in tuberculosis policy or within tuberculosis treatment services.

We will review the epidemiology of *Mycobacterum tuberculosis (M.tb)* infection among 10-24 year olds globally and in high tuberculosis burden countries. We will discuss the management of *M.tb* infection and disease, including HIV co-infection and multidrug resistant tuberculosis. In addition we will highlight special considerations regarding the tuberculosis continuum of care during adolescents.

## 002

### DISRUPTING POWER DIFFERENTIALS: LEARNINGS FROM THE YOUTH RESEARCHERS ACADEMY

**Mavodza C.V.[1,2], Dziva Chikwari C.[1,2], Tembo M.[1,2], McHugh G.[1,2], Dauya E.[2], Grundy C.[1], Dringus S.[1,2], Kranzer K.[1,2], Ferrand R.A.[1,2]**
[1]London School of Hygiene and Tropical Medicine, London, UK;
[2]Biomedical Research and Training Institute, Harare, Zimbabwe

Young people are often seen as subordinate to, and/or in the position where they are only 'learning from' adults. When thinking about how the full spectrum of youths' needs are considered in health care delivery, then engaging young people as partners in implementation, research and learning is necessary. As a way of addressing this necessity, we conducted a Youth Researchers Academy (YRA) to train and involve youth researchers in health research/projects. Moreover, funders and implementers of research and health projects that focus on youths are keen to see, know and understand the value (if any) of meaningfully engaging young people in research and projects about their own health.

We will describe and explore youth engagement activities- the Youth Researchers Academy, and Youth Advisory Groups that we work with. We will discuss power shifts, benefits, challenges and opportunities of meaningfully involving young people in research and projects. In addition, we will highlight the nuances and value add (reciprocity, bi-directional exchange of ideas) considerations for youth to youth and/or youth for youth engagement in research projects.

## 003

### PAIRING CHILDREN WITH HEALTH SERVICES: A NEW ROLE FOR SCHOOL HEALTH SERVICES IN THE 21ST CENTURY

**Baltag V.**
*Dept. of Maternal, Newborn, Child and Adolescent Health, World Health Organization, Geneva, Switzerland*

**Introduction:** Globally, over 90% of children in the primary school age, and over 80% of children in the lower secondary school age are enrolled in school where they spend 1/3 of their time. This makes schools a unique setting for preventive interventions, and school years an important period to establish healthy behaviours that will contribute to a lifetime of health promotion. This is probably why school health services constitute a common way of organizing services in educational institutions.
**Aim:** To understand better how school health services are organized, and what are the priority services and interventions, a global overview of school health services will be presented describing characteristics such as target group, providers, staffing level, services, settings, evidence-base and organizational challenges.
**Methods:** The literature in 6 databases as well as other sources were reviewed systematically. New global initiatives calling for a renewed attention to school health will be highlighted.
**Results:** School health services exist in some form in at least 102 countries and territories, and in the majority of cases they are part of routine service provision. Usually services are provided within school premises (97 countries), by dedicated school health personnel (59 countries). Services are provided in 16 areas; the top 5 interventions include vaccinations, sexual and reproductive health education, vision screening, nutrition screening, and nutrition health education. Routine screening practices exist in at least 65 countries, and at least 47 have systems for routine health reviews that include but are not limited to screenings. Good practices in conducting screenings are rarely reported. Implementation challenges include luck of adequate budget allocation, staff shortage and lack of professional development and training, inadequate coordination among multiple service providers, as well as insufficient evidence of effectiveness to enable advocacy.
**Conclusion:** School health services and regular medical check-ups are common in both LMIC and high- and upper middle- income countries. To strengthen their role in improving the health of school-age children, the evidence base needs to be strengthened, and priority health and development issues and the content of school health services better aligned. Recent global initiatives and investment cases provide new opportunities for school health.

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## 004

**CHEMICAL WATER QUALITY IN INPATIENT THERAPEUTIC FEEDING CENTRES: POTENTIAL RISKS TO PAEDIATRIC SEVERE ACUTE MALNUTRITION PATIENTS AND PROPOSED MANAGEMENT STRATEGIES**

**Ali S.I.[1], Turnbull J.[1,2], Arnold M.[1], Holt F.[1,3], Narang T.[1], Falade S.[1], Van Der Kam S.[4], Fesselet J.F.[4], Orbinski J.[1]**
[1]*Dahdaleh Institute for Global Health Research, York University, Toronto, Canada;*
[2]*Dept. of Pediatrics, McGill University, Montreal, Canada;*
[3]*The Hospital for Sick Children, Toronto, Canada,*
[4]*Public Health Dept., Médecins Sans Frontières, Amsterdam, The Netherlands*

**Introduction:** Paediatric patients with severe acute malnutrition (SAM) in intensive therapeutic feeding centres (ITFCs) are highly sensitive to electrolyte and mineral inputs they receive during treatment. Thus, the composition of therapeutic feeding (e.g., F75, F100) and other products (e.g., ReSoMal) used in ITFCs are carefully calibrated with respect to electrolyte and mineral content. These products, however, are usually reconstituted using locally available water, which can have widely varying electrolyte and mineral concentrations, referred to as its chemical water quality (CWQ). Concerns that elevated levels of electrolytes and minerals could adversely affect the treatment and recovery of paediatric SAM patients in ITFCs have existed since 2007 following experiences in Somalia, and were reignited in 2017 following an unusual mortality cluster among paediatric SAM patients in an ITFC in Ethiopia.
**Aim:** At present, we have no guidance on allowable CWQ in ITFC water supplies. We carried out a knowledge synthesis study in order to propose provisional CWQ guidelines for ITFCs.
**Methods:** We adopted the standard water quality risk assessment approach from public health for the unique context of paediatric SAM patients in ITFCs. We identified CWQ parameters of concern based on their metabolic and physiological roles, developed an exposure assessment tool to determine patient intakes under various clinical scenarios, carried out a systematic literature review to gather available data on upper intake limits for this sub-population, and convened a panel of medical, nutritional, and water experts to integrate findings and generate provisional recommendations.
**Results:** We identified a shortlist of CWQ parameters of greatest concern for this sub-population that included sodium, magnesium, sulphate, nitrate/nitrite, total dissolved solids, and osmolarity. Provisional CWQ guidelines for ITFC water supplies are proposed based on best-available data on upper intake limits for paediatric SAM patients.
**Conclusion:** Chemical water quality is an under-considered contributor to patient outcomes in ITFCs despite the importance of electrolyte and mineral intakes for paediatric SAM patients. The guidance generated by this project will improve how CWQ issues are managed in emergency feeding programs and contribute toward improving quality of patient care in ITFCs.

## 005

**METRONIDAZOLE-SENSITIVE ORGANISMS IN CHILDREN WITH SAM: AN EVALUATION OF THE INDICATION FOR EMPIRIC METRONIDAZOLE TREATMENT**

**Zangenberg M.[1,2], Abdissa A.[3], Johansen Ø.H.[4,5], Tesfaw G.[3], Girma T.[6], Friis H.[7], Kurtzhals J.A.L.[1,2]**

[1]*Centre for Medical Parasitology, Dept. of Immunology and Microbiology, University of Copenhagen, Denmark;*
[2]*Dept. of Clinical Microbiology, Copenhagen University Hospital (Rigshospitalet), Copenhagen, Denmark;*
[3]*Dept. of Medical Laboratory Sciences and Pathology, Jimma University, Ethiopia;*
[4]*Dept. of Clinical Science, University of Bergen, Bergen, Norway;*
[5]*Dept. of Microbiology, Vestfold Hospital Trust, Tønsberg, Norway;*
[6]*Dept. of Pediatrics and Child Health, Faculty of Medical Sciences, Jimma University, Ethiopia;*
[7]*Dept. of Nutrition, Exercise and Sports, University of Copenhagen, Denmark*

**Introduction:** Children with severe acute malnutrition (SAM) are at increased risk of death due to severe infections. All are given empiric antibiotic treatment; hospitalized cases with parenteral penicillin and gentamicin and outpatients with oral amoxicillin. Experts have suggested adding empiric metronidazole to cover for anaerobic bloodstream infections and diarrhoea caused by *Giardia duodenalis* or *Clostridioides difficile*. However, there is limited information on the prevalence and clinical impact of these infections.
**Aim:** The aim of this study was to assess the prevalence of metronidazole-sensitive organisms and their association with severity of disease in children with SAM.
**Methods:** Children from 0.5 to 15 years with SAM were enrolled in three sites in Ethiopia. Anaerobic and aerobic blood cultures were obtained, positive samples sub-cultured, isolates frozen at -80°C and shipped to Denmark followed by identification with MALDI-TOF. In addition, stool samples were collected, frozen and tested for *C. difficile* (toxin B gene), *G. duodenalis* and *Entamoeba histolytica* using PCR. Clinical outcome data were collected by study staff during admission and from medical records.
**Results:** A total of 334 children were enrolled, a stool sample was obtained from 218 (65%), aerobic blood culture from 273 (82%), and anaerobic blood culture from 153 (46%). Four percent of the children had bacteraemia, but none with strict anaerobic bacteria. *G. duodenalis* was detected in 57%, toxigenic *C. difficile* in 6%; no *E. histolytica* were detected. The children with *G. duodenalis* weighed less and more often had bilateral oedema. Detection of *C. difficile* in stool was associated with increased mortality (OR 43.34, 95%CI 3.89; 482.93). However, detection of *Giardia* and *C. difficile* was not associated with diarrhoea.
**Conclusion:** Our results do not provide support for a strategy of empirically treating with metronidazole to cover for anaerobic blood stream infection. The high prevalence of *G. duodenalis* and *C. difficile* suggests that trials evaluating the effect of empiric metronidazole should include an examination of stool samples to assess the effect on these organisms.

## 006

**COMMUNITY HEALTH WORKER LED ART DELIVERY (CLAD) IMPROVED SCHEDULED ANTIRETROVIRAL DRUG REFILL AMONG MEN WHO HAVE SEX WITH MEN (MSM) IN AN IDENTIFIED HIV CLINIC, LAGOS STATE, NIGERIA**

**Ibiloye O.[1], Osindero O.[2], Oyekanmi F.[2], Emerenini F.[1], Omole T.[1], Omoniyi D.[2], Obioha E.[2], Plang J.[1], Akande P.[1]**
[1]*APIN Public Health Initiatives, Clinical Services, Abuja;*
[2]*APIN Public Health Initiatives, Lagos, Nigeria*

**Introduction:** Men who have sex with men are underserved and have limited access to quality HIV services. To overcome barriers to care,

key populations (KP)-friendly community-based approaches have been proposed, which may be more accessible than facility-based HIV care.

**Aim:** Community Health Worker Led Antiretroviral (ART) Delivery (CLAD) model was implemented in a community setting to promote drug refill among MSM originally accessing care in a regular HIV clinic, Lagos, Nigeria.

**Methods:** We implemented CLAD model in a HIV clinic from July to December, 2018. This CLAD model involved devolvement of HIV positive MSM on ART to KP friendly community-based organization for their monthly drug refill. In the community, lay healthcare workers refilled antiretroviral for MSM and in addition, offered counselling, symptom check and condoms during drug refill visit.

Ninety-three (93) MSM were initiated on ART in the clinic prior to the intervention in July 2018. 24 (25%) of these patients were active in care (picked up drugs within the last 3 months) and 69 (75%) were inactive. Thirty-six (36) patients made up of 24 active patients and 12 patients traced back to care from the inactive group were enrolled into the CLAD model and monitored for 6 months during the intervention period. We assessed adherence to scheduled drug refill appointment pre and post-intervention. A paired T-test was performed to determine the difference between the frequency of scheduled drug refill before and after CLAD model intervention.

**Results:** The mean age of MSM recruited into the CLAD model was 25 years ± 4.4 SD. There was a significant difference in the mean number of months of drug refill by MSM between the 6 month period prior to the commencement of the CLAD model (M = 1.4 ± 0.7 SD) and after (M = 4.7 ± SD = 1.2); $t_{(35)}$ = 13.3, p < 0.001.

**Conclusion:** The CLAD model was found to be effective in improving drug refill appointment among KP attending a regular HIV clinic. We strongly recommend specialized client-centred approach to improve drug refill among MSM.

## 007

### HIV/AIDS-RELATED KNOWLEDGE AND STIGMA AMONG VILLAGE HEALTH WORKERS IN RURAL LESOTHO, SOUTHERN AFRICA: ANALYSIS OF DATA FROM GET ON RESEARCH PROJECT

Lejone I.T.[1], Lefu K.[1], Kopo M.[1], Kao M.[1], Muhairwe J.[1], Glass R.T.[2,3], Labhardt D.N.[2,3,4], Amstutz A.[2,3,4]

[1] SolidarMed, Swiss Organization for Health in Africa, Lesotho;
[2] Swiss Tropical and Public Health Institute;
[3] University of Basel, Basel;
[4] University Hospital Basel, Basel, Switzerland

**Introduction:** Lesotho has an adult HIV prevalence of 25.6% with the majority of the population living in rural areas where distances to health care facilities are often long. A lay health worker cadre, called village health workers (VHW), has been introduced in 1978 with more than 4000 VHWs currently operating in the country. In 2017 UNAIDS launched the 2 million African community health workers initiative to end AIDS and ensure sustainable health for all in Africa. Data about VHWs knowledge and stigma regarding HIV/AIDS are limited.

**Aim:** This study aimed to assess the level and determinants of HIV/AIDS-related knowledge and stigma among VHWs in Lesotho, as a basis of giving VHWs more responsibilities in the care of people living with HIV.

**Methods:** The study is a cross-sectional survey involving 469 VHWs from rural villages in two districts of Lesotho. The survey is part of the cluster-randomized GET ON (GETting tOwards Ninety, *NCT03598686*) research project. HIV/AIDS-related knowledge (10 items, 1 point each, the higher the better knowledge) and stigma (8 items, 1 point each, the higher the more stigma) were assessed using a validated questionnaire (Bowen et al. BMC Public Health (2016) 16:70). We conducted multivariable linear regression analyses to explore VHW characteristics potentially associated with HIV/AIDS-related knowledge or stigma.

**Results:** Median age of participating VHWs was 51 years (interquartile range 42-60) with 92% being females. Overall, participants obtained high scores on the HIV/AIDS-related knowledge scale (mean of 9.18 (standard deviation [SD] 1.24)) and low scores on the HIV/AIDS-related stigma scale with a mean of 0.97 (SD 1.54). A higher HIV/AIDS-related knowledge score was associated with lower HIV/AIDS-related stigma scores (P<0.001). In multivariable regression older age was associated with lower scores in HIV/AIDS-related knowledge (P<0.001) and higher score on HIV/AIDS-related stigma (P<0.05).

**Conclusion:** VHWs in northern Lesotho showed good knowledge about HIV/AIDS and low HIV/AIDS-related stigma. Younger VHWs and those with better knowledge showed less stigma towards people living with HIV. These findings encourage further involving VHWs in HIV programs and to potentially extend their competencies towards patient ART delivery.

**Table 1.** HW characteristics, knowledge and stigma, stratified by district

| Characteristics | BB (N=156) (33%) | MKG (N=313) (67%) | Total (N=469) |
|---|---|---|---|
| Age in years, median (IQR) | 50 (42-59) | 52 (42-61) | 51 (42-60) |
| Female Gender, n (%) | 144 (92) | 286 (91) | 429 (92) |
| HIV/AIDS-related knowledge, mean (SD) | 9.30 (1.10)[a] | 9.12 (1.29)[b] | 9.18 (1.24) |
| HIV/AIDS-related stigma, mean (SD) | 0.93 (1.48)[c] | 0.99 (1.57)[d] | 0.97 (1.54) |

Abbreviations: BB (Butha-Buthe), MKG (Mokhotlong)
[a] 13 missing data
[b] 22 missing data
[c] 5 missing data
[d] 7 missing data

**Table 2.** Factors associated with HIV/AIDS-related knowledge

| Variable | Multiple linear regression ($R^2$ =0.07, F=10.86, *P*<0.0001) | | | |
|---|---|---|---|---|
| | β coefficient | P value | 95% CI | |
| | | | lower | upper |
| Age (per year) | −0.029 | <0.001 | −0.039 | −0.018 |
| Female (vs Male) | 0.189 | 0.369 | −0.223 | 0.600 |
| MKG (vs BB) | −0.137 | 0.264 | −0.377 | 0.104 |

Complete-case regression analysis (N = 434); 35 missing data for HIV/AIDS-related knowledge
*Abbreviations: BB (Butha-Buthe), MKG (Mokhotlong), CI (Confidence Interval)*

*Table 3.* Factors associated with HIV/AIDS-related stigma

| Variable | Multiple linear regression ($R^2$ =0.21, F=27.57, $P<0.0001$) | | 95% CI | |
| | $\beta$ coefficient | $P$ value | lower | upper |
| --- | --- | --- | --- | --- |
| Age (per year) | 0.017 | 0.007 | 0.005 | 0.029 |
| Female (vs Male) | 0.287 | 0.243 | −0.195 | 0.769 |
| MKG (vs BB) | 0.017 | 0.905 | −0.265 | 0.299 |
| HIV/AIDS-related knowledge (per point) | −0.528 | <0.001 | −0.644 | −0.411 |

Complete-case regression analysis (N = 427); 30 missing data for HIV/AIDS-related knowledge, 7 missing data for HIV/AIDS-related stigma, 5 missing data both for HIV/AIDS-related knowledge and HIV/AIDS-related stigma

*Abbreviations: BB (Butha-Buthe), MKG (Mokhotlong), CI (Confidence Interval)*

## 008

## A NEW RAPID ACTING ANTI-WOLBACHIA DRUG FOR ONCHOCERCIASIS AND LYMPHATIC FILARIASIS

Hong W.D.[1,2], Johnston K.L.[2], Berry N.G.[1], Gusovsky F.[3], Hemingway J.[2], Turner J.D.[2], Taylor M.J.[2], Ward S.A.[2], O'Neill P.M.[1]
[1]*Dept. of Chemistry, University of Liverpool, Liverpool, UK;*
[2]*Liverpool School of Tropical Medicine, Liverpool, UK;*
[3]*Eisai AiM Institute, Eisai Inc., Andover, USA*

**Introduction:** Onchocerciasis and lymphatic filariasis are two neglected tropical diseases (NTDs) that together affect ~157 million people and inflict severe disability. Both diseases are caused by parasitic filarial nematodes with elimination efforts constrained by lack of a safe drug that can kill the adult filaria (macrofilaricide). Previous proof-of-concept human trials have demonstrated that depleting >90% of the essential nematode endosymbiont bacterium, *Wolbachia*, using doxycycline, can lead to permanent sterilisation of adult female parasites and a safe macrofilaricidal outcome. However, protracted treatment regimens and contraindications restrict the widespread implementation of doxycycline as the cure of these two NTDs.
**Aim:** To find a new anti-*Wolbachia* macrofilaricidal drug that can fulfil the profile of a short (ideally ≤7 days) oral treatment for onchocerciasis and lymphatic filariasis.
**Methods:** Starting from a phenotypic screen using a *Wolbachia* infected insect cell line, a selected hit series, thienopyrimidine was developed through a multi-parameter medicinal chemistry optimisation to improve the potency and drug metabolism/pharmacokinetic (DMPK). Leads identified through the optimisation campaign were evaluated extensively for efficacy, pharmacokinetics and safety to select a candidate molecule for onward development.
**Results:** After synthesising and testing of over 300 analogues in this series, we obtained compounds that had better potency than the 'gold-standard' anti-*Wolbachia* macrofilaricide doxycycline. Within all these analogues, AWZ1066S stands out as the best compound with the balance between efficacy, DMPK and safety. AWZ1066S shows superior efficacy to existing anti-*Wolbachia* therapies in validated preclinical models of infection and has DMPK characteristics that are compatible with a short therapeutic regimen of seven days or less. In addition to the ability to elicit efficacy after seven days of treatment, AWZ1066 also has a faster kill rate compared to other known antibiotics tested against *Wolbachia in vitro* which suggested a novel mode of action for AWZ1066S.

**Conclusion:** The programme has delivered the first novel synthetic candidate molecule, AWZ1066S. This candidate meets all Target Candidate Profile criteria for an anti-*Wolbachia* macrofilaricidal drug and has entered formal preclinical evaluation. AWZ1066S has the potential to significantly impact current global onchocerciasis and lymphatic filariasis elimination programmes and to reduce elimination time frames from decades to years.

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## 009

## THE HIDDEN HAND OF ASYMPTOMATIC INFECTION HINDERS CONTROL OF NEGLECTED TROPICAL DISEASES

Rock K.S.[1], Chapman L.A.C.[2], Dobson A.[3], Adams E.R.[4], Hollingsworth T.D.[5]
[1]*Zeeman Institute, University of Warwick, Coventry, UK;*
[2]*Global Health and Development, London School of Hygiene and Tropical Medicine, London, UK;*
[3]*Ecology and Evolutionary Biology, Princeton University, Princeton, USA;*
[4]*Tropical Disease Biology, Liverpool School of Tropical Medicine, Liverpool;* [5]*Big Data Institute, University of Oxford, Oxford, UK*

**Introduction:** Neglected tropical diseases are responsible for a large burden of chronic morbidity and mortality in low-income populations. A significant component of their impact stems from the high proportion of asymptomatically infected individuals who may transmit infection without developing symptoms that qualify them for treatment. Although large-scale international control efforts have reduced the burden of NTDs, their transmission persists and interventions rarely target the asymptomatic pool of individuals.
**Aim:** To estimate the contribution of asymptomatically infected individuals relative to symptomatic cases to the transmission of three major vector-borne NTDs – visceral leishmaniasis (VL), the Gambian form of human African trypanosomiasis (HAT), and Chagas disease – and assess the likely success of current and alternative control interventions, such as active screening, vector control and treating asymptomatic individuals.
**Methods:** A generic mathematical framework for analysing the transmission dynamics of vector-borne NTDs was developed and used to estimate the relative contribution of asymptomatic individuals for each disease based on data on their relative prevalence and infectiousness from the literature.
**Results:** Based on available data, asymptomatics contribute to a large proportion of transmissions for HAT and Chagas disease, but transmission of VL appears to be driven mainly by symptomatic individuals, though the relative asymptomatic contribution increases as VL incidence decreases. HAT appears to be the easiest of the three diseases to control using currently available screening and vector control interventions, which are predicted to be sufficient to interrupt transmission within 10-15 years. Treatment of asymptomatics in combination with vector control would greatly reduce Chagas transmission and potentially interrupt transmission, though over a much longer timescale (decades). Current VL case detection and vector control appear to be insufficient to stop transmission of VL.
**Conclusion:** Our results highlight that asymptomatics can act as a large reservoir of transmission for HAT, Chagas disease and VL and that

additional interventions targeted at these groups could lead to considerable progress in the control and elimination of these and other vector-borne NTDs.

## 010

### ARE WE THERE YET? ASSESSING WHO IS BEING LEFT BEHIND AND WHY IN PREVENTIVE CHEMOTHERAPY TREATMENT FOR NEGLECTED TROPICAL DISEASES

**Simpson S.J.[1], Muleta M.D.[2], Negussu N.[3], Zeleke Z.K.[4], Adekeye O.[5], Shu'aibu J.[6], Isiyaku S.[7], Dean L.[8], Koller T.S.[9], Mbabazi P.S.[10]**

[1]EquiACT, Lyon, France;
[2]Independent consultant, Addis Adaba, Ethiopia;
[3]Disease Prevention and Control Directorate, Federal Ministry of Health;
[4]WHO Country Office, Addis Adaba, Ethiopia;
[5]Dept. of Psychiatry, Ahmadu Bello University Teaching Hospital, Zaria, Kaduna State, Nigeria/Sightsavers Nigeria Country Office;
[6]Sightsavers Nigeria Country Office/Dept. of Family Medicine, Bingham University College of Medicine, Jos, Nigeria;
[7]Sightsavers, Kaduna State, Nigeria;
[8]Liverpool School of Tropical Medicine, Liverpool, UK;
[9]Gender Equity and Rights, WHO;
[10](NTD/PCT) Neglected Tropical Diseases, World Health Organization WHO, Geneva, Switzerland

**Introduction:** Preventive chemotherapy (PC) treatment for prevention and elimination of neglected tropical diseases (NTDs) is delivered as a targeted intervention. NTDs have been identified as the "litmus test" for universal health coverage. However, equity of coverage is affected by a range of social and structural factors meaning that some groups in the population are potentially being left behind.
**Aim:** To present findings about guidance designed to support NTD programme managers and partners to monitor and analyse differences in PC coverage between subpopulations within a country.
**Methods:** The guidance "Towards universal coverage for preventive chemotherapy for Neglected Tropical Diseases" encourages use of existing data and evidence, including analysis of the existing sex- and age-disaggregated data routinely collected at the community level as part of PC interventions. It also draws on additional quantitative data such as Demographic Household Surveys and encourages use of any existing qualitative studies. The analysis framework is designed to identify barriers and facilitators towards effective coverage by assessing the dimensions of availability, accessibility, acceptability, and quality of treatment.
**Results:** There are limited existing country studies that (a) make use of sex- and age-disaggregated data linked with social or structural factors and or (b) include a gender and or equity analysis. Pilots of the guidance are underway in Oromia and Amhara States, Ethiopia and Kwara State, Nigeria. Qualitative information is critical for understanding which groups in the population may not be reached (e.g. nomadic populations, marginalized groups, people with a disability, those who work or attend school outside of their communities) and why. Monitoring and evaluation have largely focused on quantitative data about PC and only more recently has use of disaggregated data been prioritised. Feedback on the guidance suggests that some aspects, e.g. gender and equity analysis, may pose a challenge to uptake without additional capacity-building and resources. This is being explored as part of the piloting process.
**Conclusion:** This presentation will discuss progress to date, focusing on how the guidance can be used to strengthen monitoring of not only 'who' is being left behind in PC but also 'why' to improve prevention and elimination of NTDs.

## 011

### REGIONAL NETWORKS FOR RESEARCH CAPACITY AND WHY THESE ARE NEEDED TO BE PREPARED FOR DISEASE OUTBREAKS

**Jamieson N.[1], Netongo P.M.[2], Dias A.G.[3], Ogunfowokan G.[4], Baker B.[1], Horby P.[5], Wilder-Smith A.[6], Lang T.[1]**

[1]The Global Health Network, University of Oxford, Oxford, UK;
[2]Biotechnology Centre, University of Yaounde I, Yaounde, Cameroon;
[3]Capanema, Para, Brazil;
[4]National Hospital, Abuja, Nigeria;
[5]ERGO, University of Oxford, Oxford, UK;
[6]Public Health and Clinical Medicine, Umea University, Umea, Sweden

**Introduction:** During the Ebola and Zika outbreaks research findings were needed in rapid response in order to determine how to best treat the disease and prevent their spread. This was acutely evident during the Zika outbreak where even less was known about this disease than Ebola. Here data was needed immediately on areas such as transmission, disease pathology and all types of studies where needed, from social science to vector biology through to observational clinical research. However, this outbreak occurred in regions where there was little research capacity. This grave situation showed why local research capacity and experience is important.
**Aim:** To build research capacity development networks that through skill and experience sharing could enable locally-led research that would be addressing everyday health challenges. Thereby creating lasting capacity that could respond to outbreaks.
**Methods:** Two networks were created, one in Africa and one in Latin America, which bring together experienced research organisations and connecting them through locally led research capacity activities to raise research awareness, skills and experience. These networks would be coordinated locally and have a vibrant presence online that would serve to connect the members and deliver ongoing access to tools, resources, training and each other.
**Results:** The REDe and ALERRT networks are vibrant communities of practice for knowledge sharing and research capacity development. Thousands of researchers are accessing online training, hundreds have registered onto the Professional Development Scheme. Over 15 workshops have delivered research skills training and networking opportunities to over 2,000 frontline health workers such as nurses, community health workers, laboratory staff and pharmacists. Regional activities are raising participant retention in studies, raising research standard and improving community engagement.
**Conclusion:** It is possible to deliver research capacity to areas where currently there was little research experience. However, this has to be done in a sustainable way with a long-term view. Therefore having the focus on gaining evidence to tackle the everyday health burdens is a viable approach to create lasting capacity that can then be taken up and used to deliver a locally-led research response in the event of an outbreak.

## 012

### HEALTH WORKFORCE DEVELOPMENT IN EMERGENCY PREPAREDNESS FOR VIRAL HAEMORRHAGIC FEVERS

**Okware S.[1], Okware B.[2], Walimbwa S.[1], Omuut W.[1], Nanyondo J.[1], Nabukenya I.[1], Walwema R.[1], van de Sande M.[3]**

[1]GHS Program, Infectious Diseases Institute;
[2]Case Western Reserve, Makerere University Collaboration, Kampala, Uganda;
[3]Public Health Dept., Institute of Tropical Medicine, Antwerp, Belgium

**Introduction:** Emergency preparedness is the ability of the governments or organisations to anticipate, respond to and recover from public health emergencies. Human resources for health (HRH) is vital in sustaining emergency preparedness efforts in Viral Haemorrhagic fever (VHF) outbreak-prone regions. [1] Substantial resources have been directed towards HRH in emergency preparedness.

**Aim:** We sought to evaluate the Uganda health workforce development for emergency preparedness for VHF.

**Methods:** We extracted data from Uganda National guideline for preparedness and response and clinical case reports from two actual outbreaks, National Task Force (NTF) Minutes, accountability fora, national level contingency plans for VHF. The data were analysed with an adopted human resource for health framework and pillars of Ebola Viral Disease control (coordination, case management, surveillance, laboratory, logistics and community engagement). Data was analysed in the broad categories of policy, leadership, partnerships, education, financing and HRH management systems. [3,4]

**Results:** Uganda has policies supporting recruitment of health workers and workforce capacity development. Oversight is provided by the NTF- a multisectoral, multidisciplinary management platform; mirrored at district level. Funding for capacity development is primarily through partner support. The development of training materials is centralised at national level ensuring harmony of training materials and criteria for participant selection. However, strategy of implementation varied among implementors from didactic to simulation exercise based. Participant selection was limited to public health facilities, village health teams and community leaders. Trainee database was limited to dataset maintained at central level, but custody of the database changed with each outbreak. Capacity building efforts are only activated during outbreaks and cover all supporting pillars of VHF control.

**Conclusion:** Leadership from the NTF in provision of both technical and political direction remains key in health workforce development. Efforts have been placed to build competencies in the health work force however, little has been done in planning on how to maintain these gains outside of outbreaks. [1] This may be enhanced by improving on the human resource management system and identification of local dedicated funding to develop clear strategies to ensure supply of fit-for-purpose public and private health sector health workers to meet demand.[2,3]

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## 013

### ASSESSING THE IMPACT OF A NEW EMERGENCY TRIAGE SYSTEM ON HEAD INJURY MORTALITY: TIKUR ANBESSA SPECIALIZED HOSPITAL EMERGENCY DEPARTMENT, ADDIS ABABA, ETHIOPIA

**Fantaye H.[1], Lomencho A.[2], De Vos P.[4], Azazh A.[3]**
[1]National Blood Bank Service Agency, FMOH;
[2]Internal Medicine and Public Health, AMC, Addis Ababa, Ethiopia;
[3]Institute of Global Health and Development Queen Margaret University, Edinburgh, UK;
[4]Emergency Medicine Dept., Addis Ababa University, Addis Ababa, Ethiopia

**Introduction:** One of the improvements in Ethiopia's emergency medical system was the introduction of a five level Emergency Triage System (ETS) in January 2015 that was piloted in selected Addis Ababa hospitals.

**Aim:** This study aims to assess the effect of this intervention on the head injury mortality in Tikur Anbessa Specialized Hospital (TASH) Emergency Department (ED).

**Methods:** Data were retrospectively collected from all medical records of head injury patients seen in Adult TASH- ED over two 6 months' periods, before and after the new Emergency Triage System implementation: 01/04/2014 – 30/09/2014 versus 01/04/2016 – 30/09/2016. An inclusion criterion was age above 13 for whom records could be retrieved. Exclusion criterion was 'patient declared dead on arrival'. Mortality and patterns of head injury were compared pre and post intervention. Chi square was used for the analysis using STATA 14.

**Results:** A total of 522 Head injury patients were analysed in the ED in both the pre- 258 and post-264 intervention study periods. Among head injury admission in the ED in both study periods, the highest number of patients were Road Traffic Accident /RTA/ victims, males and young age ($<30$). Mortality rate among head injury patients decreased from a pre-intervention 44(17.05%) to post-intervention 27(10.2 %) (OR=0.55, 95% CI (0.32, 0.95), p=0.02).The median age of death were 45 years in pre- and 40 years in post-intervention period with ages ranging from 13 to 85 and 13 to 96 years respectively. The proportion of deaths from moderate head injury decreased significantly from 14.0 % in pre-intervention to 6.3 % in post-intervention period respectively ($p<0.001$).

**Conclusion:** In Conclusion Emergency Triage System at TASH-ED has decreased mortality caused by head injury. This could increase life-years saved and productivity in a cost effective and easily achievable way in resource poor settings.

## 014

### FINDING THE MISSING CHILDREN WITH HIV: INDEX-LINKED TESTING IN CLINICS AND COMMUNITIES

**Dziva Chikwari C.[1,2], Bandason T.[2], Simms V.[1], Dringus S.[1], Sibanda E.[3], Chikodzore R.[4], Mutseta M.[5], Page-Mtongwiza S.[6], Weiss H.A.[1], Ferrand R.A[1,2]**
[1]London School of Hygiene and Tropical Medicine, London, UK;
[2]Biomedical Research and Training Institute, Harare, Zimbabwe;
[3]Health Services Dept., Bulawayo City Council, Bulawayo, Zimbabwe;
[4]Ministry of Health and Child Care;
[5]Population Services International, Harare, Zimbabwe;
[6]Organization for Public Health Interventions and Development, Harare, Zimbabwe

**Background:** HIV prevalence is much lower in children than in other age groups but the proportion undiagnosed is significantly higher. Innovative and targeted strategies are required to improve uptake and yield of HIV testing among children.

**Aim:** To evaluate the effectiveness of index-linked HIV testing for children aged 2-18 years living in the household of an HIV-infected individual in Zimbabwe.

**Methods:** Individuals attending for HIV care at 3 urban and 3 rural clinics in Zimbabwe who had children (2-18 years) of unknown HIV status living in their households were offered 3 options for their children to access HIV testing:
1) Clinic-based testing
2) Home-based testing by community health workers
3) Testing performed by caregivers using an oral mucosal test (caregiver testing)
Demographic data was collected from consenting caregivers who were followed up over 2 months to ascertain testing outcomes.

**Results:** We recruited 2813 people living with HIV (median age 38, IQR 32-46 years) who had 3431 children eligible for testing (median age 9, IQR 6-13 years). Testing was accepted for 2757 (80.4%) eligible children. Overall, 74.7% selected clinic-based testing, 19.2% opted for community-based testing and 6.1% for caregiver testing, with no difference in trend by setting. Among the 2757 children for whom testing was accepted, 1977 (71.7%) completed testing. Those who selected community-based testing were more likely to complete testing than those who selected clinic-based testing (OR=1.69 95%CI:1.3-2.2, p<0.001) or caregiver testing (OR=2.38 95%CI:1.0-2.3, p=0.04). Overall HIV prevalence was 1.4%, however, prevalence among 12-18-year olds was 2.5% and 81% of those diagnosed were >7 years. HIV yield was 0.8%. Previously undiagnosed HIV was strongly associated with older age (OR=3.54, 95%CI:1.1-11.1, p=0.03) comparing 13-18 years to 2-5year olds and with single or double orphanhood (OR=3.10, 95%CI:1.4-6.9, p=0.005). All 28 HIV positive children were linked to care within 2 weeks.

**Conclusion:** Index-linked testing is a feasible HIV testing strategy for children in Zimbabwe. Clinic-based testing had the highest uptake; however, children were more likely to be tested in community settings. Older children and orphans are at increased risk of undiagnosed HIV. Strengthening of testing strategies to target this age group are required.

Note: Only preliminary data is presented here. If accepted final data will be presented.

## 015

### SIMPLE INDIRECT MEASURES OF ADIPOSITY ARE DISCRIMINATORY OF ELEVATED BLOOD PRESSURE: A CROSS SECTIONAL ANALYSIS AMONG ADOLESCENTS IN A RESOURCE-POOR SETTING IN NORTHEAST NIGERIA

**Wariri O.[1], Jalo I.[2], Bode-Thomas F.[3]**
[1]MRC Unit The Gambia at The London School of Hygiene and Tropical Medicine, Banjul, The Gambia;
[2]Dept. of Paediatrics, Federal Teaching Hospital Gombe (FTHG), Gombe, Nigeria;
[3]Dept. of Paediatrics, Jos University Teaching Hospital (JUTH), Jos, Nigeria

**Introduction:** Sub-Saharan Africa accounts for a significant proportion of the number of undernourished children globally. However, the number of overweight and obese children in the continent increased steeply over the past three decades with associated increase in adiposity-related cardiovascular diseases. In resource-constrained health systems which grapples with treats from infectious diseases, there is limited availability of trained paediatric workforce and adoption of simple, non-invasive measures needed to monitor adiposity-related health risk.

**Aim:** We aimed to determine the discriminative ability of the Body Mass index (BMI), Waist Circumference (WC), and Waist-to-Height Ratio (WHtR) adiposity measures for elevated blood pressure (prehypertension and hypertension combined) among adolescents in Gombe, northeast Nigeria.

**Methods:** This cross-sectional study used a multi-stage sampling technique and involved 367 secondary school adolescents (10-18 years) in Gombe Local Government Area, Gombe State, northeast Nigeria from January to September 2015. We examined and compared the associations and discriminative ability of the BMI, WC and the WHtR for elevated blood pressure using multiple logistic regression and receiver operating characteristics (ROC) curves. Area under the curves (AUC), odds ratio (OR) and 95% confidence intervals (CI) are reported.

**Results:** All three measures of adiposity were strongly and positively associated with elevated blood pressure. The BMI obesity showed the strongest association with elevated blood pressure with odds that was double the odds of WC and triple that of WHtR [adjusted OR for BMI 15.3,

95% CI (4.8-27.9)]. The discriminative ability of adiposity measures for elevated blood pressure using AUC was comparable (0.786 for BMI, vs 0.780 for WC, vs 0.761 for WHtR).

**Conclusion:** We provide evidence, here on the BMI, WC and WHtR to support the use of simple indirect measures of adiposity in evaluating adiposity-related risk including prehypertension and hypertension among Nigerian adolescents.

## 016

### THE UK'S CURRENT AND FUTURE SUITABILITY FOR *AEDES ALBOPICTUS*

**Metelmann S.[1,2], Caminade C.[1,2], Hernandez-Colina A.[1], Sherlock K.[1], Blagrove M.S.C.[1,2], Jones A.E.[1], Medlock J.M.[2,3], Baylis M.[1,2], Morse A.P.[1,2]**
[1]University of Liverpool, Liverpool;
[2]NIHR Health Protection Research Unit for Emerging and Zoonotic Infections, Liverpool;
[3]Public Health England, UK

The Asian tiger mosquito *Aedes albopictus* is extending its northern range in Europe. In 2016 and 2017, its eggs and larvae have been found in the UK for the first time. As this mosquito is an important vector species, able to transmit various pathogens of animals and humans there is a major interest in whether this originally sub-tropical mosquito could become established in the temperate climate of the UK.

In order to analyse the UK's suitability for *Ae. albopictus*, we built a dynamical model for the mosquito's life cycle that takes into account its dependencies on temperature, precipitation, and human population density. To parametrise the model for European *Ae. albopictus,* we compared the development of a mosquito strain from Italy with a strain from the tropics in the laboratory. Monitoring larvae, pupae, and blood feeding behaviour at low temperatures did not show a suspected cold adaptation for the Italian strain though. In consequence, the whole data range derived from tropical strains could be used for parameter estimations.

Finally, we used current and future climate data sets to analyse the chances for a long-term establishment in the UK. For the moment, we find only a low suitability in the UK, except for some warmer and densely populated regions such as Greater London and parts of the south coast of England. Still, mosquito surveillance will be necessary for most of England, as we can show how the suitability will increase in the next 50 years.

## 017

### IMPACT OF CLIMATE CHANGE ON VECTOR-BORNE DISEASES, RECENT FINDINGS

**Caminade C.[1,2], Baylis M.[1,2], Blagrove M.[1,2], Metelmann S.[2,3], Morse A.P.M.[2,3], Medlock J.[2,4]**
[1]Dept. of Epidemiology and Population Health, Institute of Infection and Global Health, University of Liverpool, Liverpool;
[2]NIHR Health Protection Research Unit in Emerging and Zoonotic Infections, Liverpool;
[3]Dept. of Geography and Planning, University of Liverpool, Liverpool;
[4]Medical Entomology Group, Emergency Response Dept., Public Health England, Porton Down, Salisbury, UK

**Introduction:** Zika, dengue, chikungunya, yellow fever, malaria, Lyme disease, bluetongue, Shmallenberg are vector-borne diseases with large impacts on societies. These diseases are transmitted by exothermic arthropod vectors such as mosquitoes, midges and ticks which are

extremely sensitive to external environmental conditions. Rainfall is an important factor as it provides breeding sites for larvae. Temperature impacts a broad range of factors such as vector development, its survival, vector biting rates and the time required for the pathogen to develop inside the arthropod vector. Given anthropogenic climate change, the distribution and severity of vector-borne diseases might be severely modified in future.

**Aim:** This presentation will discuss climate change impact studies on animal and human vector-borne diseases, conducted primarily within the NIHR Health Protection Research Unit in Emerging and Zoonotic Infection.

**Methods:** Epidemiological mathematical models of various complexities (SEIR compartmental models, climate envelopes, Basic Reproduction number e.g. $R_0$, vectorial capacity models. . .) can be dynamically coupled with climate and population data to model historical VBD risk. Following validation with observed disease data, these models can then be driven by an ensembles of climate model scenarios, driven by different greenhouse gases emission scenarios to estimate future trends, and their related uncertainties, in VBD risk emergence or disappearance.

**Results:** Our work anticipated the northward spread of *Aedes albopictus*, the Asian tiger mosquito, in Europe and into southern UK. Recent findings further suggest that most of England might become suitable for this species by the 2070s, based on the extreme RCP8.5 emission scenario. A study using the Ross-MacDonald Ro model framework, showed that the climatic conditions related to the 2015 El Niño climate event favoured the Zika outbreak that had a devastating impact on Latin America that year. Our modelling work also confirmed the impact of the 2006 heatwave on the emergence of bluetongue, a midge-borne disease affecting ruminants, into northern Europe.

**Conclusion:** There is a wealth of evidence that climate variability and climate change has already impacted the distribution and severity of VBDs in temperate, highland, peri-arctic and arctic regions. Predictive risk models are valuable as they can inform vaccine deployment and disease control strategies in advance.

## 018

### CLIMATE INFORMATION FOR PUBLIC HEALTH ACTION IN ETHIOPIA

**Thomson M.C.[1,2], Woyessa A.[3], Mason S.J.[1], Dinku T.[1]**
[1]*International Research Institute for Climate and Society, Earth Institute, Columbia University, New York, USA;*
[2]*Mailman School of Public Health, Columbia University, New York, USA;*
[3]*Ethiopian Public Health Institute, Addis Ababa, Ethiopia*

**Introduction:** Urgent action to combat climate change and minimize its impacts (Goal 13) is integral to the successful implementation of the Sustainable Development Goals. As a result, the Ethiopian government has developed a Climate Resilient Green Economic plan to achieve middle-income status by 2025 in a climate-resilient green economy. In this context, the health sector must adapt to a changing climate and minimize its contribution to greenhouse gas production.

**Aim:** To ensure effective adaptation of the health sector in Ethiopia health policy-makers and practitioners are increasingly seeking to understand the climate, its primary drivers, its spatial and temporal structure, how it is measured, where, when and how it can be predicted. Of primary interest is how climate information can be used in policy and practice to improve current health outcomes while increasing the adaptive capacity of the public health sector to longer-term climate change.

**Methods:** Joint capacity building and co-production processes involving both health and climate communities have been undertaken that supports routine incorporation of climate information into epidemiological surveillance systems, early warning and risk assessment including hydro-meteorological disasters, infectious disease emergencies and nutrition

crises. The approach requires health experts to work alongside climate colleagues to produce new analyses of health-related risks while considering local context, the spatial and temporal structure of climate-related risk and the opportunities for interventions.

**Results:** Since 2011 the National Meteorological Agency of Ethiopia has implemented the Enhancing National Climate Services (ENACTS) initiative which is improving the availability, access and use of climate information for national decision-making, including health. ENACTS is now being implemented in 10 African countries supported by two regional climate centres (https://iri.columbia.edu/resources/enacts/). To ensure that health workers have the requisite knowledge and capacity to understand and use climate information to improve health decision-making ready access to authoritative resources, tailored to the specific needs of the health sector have been produced.

**Conclusion:** To enable climate-informed decision-making in the health sector new and innovative mechanisms for simultaneously strengthening climate services and uptake of climate information by health users is needed.

## 019

### THE RE-EMERGENT *BRUGIA* SPECIES IN SRI LANKA IDENTIFIED AS A NOVEL STRAIN OF *B. MALAYI* WITH A CLOSE NUCLEOTIDE HOMOLOGY TO *B. PAHANGI*

**Mallawarachchi C.H.[1], Chandrasena N.T.G.A.N.[2], Premaratna R.[3], Gunawardane N.Y.I.S.[4], Mallawarachchi S.M.N.S.M.[1], de Silva N.R.[2]**
[1]*Postgraduate Institute of Medicine, University of Colombo, Colombo;*
[2]*Dept. of Parasitology, Faculty of Medicine, University of Kelaniya, Kelaniya, Sri Lanka;*
[3]*Dept. of Medicine, Faculty of Medicine, University of Kelaniya, Kelaniya, Sri Lanka;*
[4]*Molecular Medicine Unit, Faculty of Medicine, University of Kelaniya, Kelaniya, Sri Lanka*

**Introduction:** Brugian filariasis has re-emerged in Sri Lanka, after a quiescent period of four decades. The re-emergent strain is a subperiodic strain of probable zoonotic origin. Cats and dogs are known to harbor sub-periodic *Brugia* species filariae. Ascertaining the species identity of the re-emergent *Brugia* filarial parasites required molecular analysis, since microscopy alone was inadequate.

**Aim:** Molecular speciation of the re-emergent *Brugia* species microfilariae in humans and those circulating among dogs and cats in the vicinity of human infections.

**Methodology:** A community-based night blood survey was carried out in selected areas of the Gampaha district for brugian filariasis using thick blood smears (TBS) to detect patent infections. Cats and dogs within the residential areas of human cases were surveyed for microfilariae using TBS. *Brugia* microfilariae positive samples (human and animal) were analysed by Polymerase Chain Reaction (PCR) and DNA sequencing. Microfilariae in 1ml of anticoagulated human blood were concentrated by Nuclepore® membrane filtration and genomic DNA was extracted from filter membranes. A representative sample of *Brugia* microfilariae positive animal blood spotted on filter paper was selected and DNA was extracted using ReliaPrep™ Blood DNA Miniprep System (modified). PCR was performed with pan-filarial primers specific for internal transcribed spacer region 2 (ITS2) of the ribosomal DNA. PCR products were analyzed by gel-electrophoresis on 2% agarose with positive and negative controls (*B. malayi* and distilled water respectively).

**Results:** PCR analysis of human (n=8), canine (n=53) and feline (n=24) samples elicited bands in the region of 615bp, which confirmed *B. malayi* infection. Nucleotide sequence analysis of the ITS-2 region of human,

canine and feline *B. malayi* microfilariae revealed a higher sequence homology with *B. pahangi* than *B. malayi* but phylogenetically, the sequences were closer to *B. malayi* than *B. pahangi*.

**Conclusion:** The re-emergent *Brugia* species is a strain of *B. malayi* that has closer nucleotide homology to *B. pahangi* than *B. malayi*, indicating the possibility of a novel or hybrid *B. malayi / B. pahangi* strain. The high prevalence of this novel strain of *B. malayi* among cats and dogs implicates them as reservoir hosts.

## 020

### A ONE-HEALTH PERSPECTIVE FOR SCHISTOSOMIASIS CONTROL IN AFRICA?

**Webster B.L., Rollinson D.**
*Dept. of Life Sciences, Natural History Museum, London, UK; London Centre for Neglected Tropical Disease Research (LCNTDR)*

Schistosomes are parasitic trematodes that cause Schistosomiasis, the most important water-borne Neglected Tropical Disease burdening and inflicting unnecessary suffering on many poor rural communities. Schistosomiasis is also a major disease of animals affecting large numbers of domestic livestock worldwide. Compared to Africa, Asian schistosomiasis is highly zoonotic, complicating control. Uniquely among trematodes schistosomes are dioecious. The sexually dimorphic adult worms form pairs providing opportunity for inter species mating. Inter-species crossing experiments have demonstrated that hybridisation readily occurs between closely related species resulting in hybrid vigour, expanded snail host ranges, increased fecundity/vectoral capacity and heightened animal heterosis / pathology.

In nature pre- and post-zygotic reproductive isolating barriers, such as host specificity, anatomical site of infection, distribution, mating preferences, competition and incompatibility are thought to prevent prolific inter-species admixture. However, reports of suspected natural hybridisation date back to the 1940's with possible implications for disease pathology, host switching/range, drug efficacy and transmission dynamics.

Recent advances in our ability to capture, preserve and genetically analyse schistosome larvae (eggs, miracidia, cercariae) have allowed us to identify natural inter species hybridisation between many schistosome species. Hybridisation may enable the genetic exchange of biomedically important traits between species. Moreover hybridisation between species that are reproductively isolated by their human and animals hosts, suggests a level of undetected zoonotic/zooanthroponotic transmission, complicating disease control.

Here we will bring together molecular data that shows the extent and dynamics of hybridisation between multiple schistosome species across Africa. We will particularly focus on the hybridisation between human and animal schistosome species possibly facilitated by or facilitating zoonotic transmission. We will show how more advanced genomic data is providing further insights into the genomic consequences of these hybridisation events and helping to distinguish active and ancient hybridisation. We will discuss how this is allowing us to assess the true impact that this hybridisation may be having on human and animal health and present future studies that will help determine if African schistosomiasis control needs to incorporate a one health perspective.

## 021

### PAST HUMAN-ANIMAL INTERACTIONS AND THE EVOLUTION OF ZOONOSES IN ETHIOPIA: A CONTRIBUTION FROM ARCHAEOLOGY AND ANCIENT GENETICS

**Lebrasseur O.[1,2], Woldekiros H.[3], Belay S.[2,4], Girdland-Flink L.[5], Hanotte O.[2,6], Mor S.[2,7], Dobney K.[1]**

[1]*Dept. of Archaeology, Classics and Egyptology, University of Liverpool, Liverpool, UK;*
[2]*International Livestock Research Institute, Addis Ababa, Ethiopia;*
[3]*Dept. of Anthropology, Washington University, St Louis, USA;*
[4]*Dept. of Microbial, Cellular and Molecular Biology, Addis Ababa University, Addis Ababa, Ethiopia;*
[5]*School of Natural Sciences and Psychology, Liverpool John Moores University, Liverpool, UK;*
[6]*School of Life Sciences, University of Nottingham, Nottingham, UK;* [7]*Institute of Infection and Global Health, University of Liverpool, Liverpool, UK*

**Introduction:** Since their introduction in Ethiopia, domesticated animals have adapted to the country's diverse, yet harsh, environment and its endemic diseases, leading them to display a unique genetic pool of resilient traits. However, crossbreeding with European stock and a lack of identification, characterisation and conservation of the indigenous gene pool is leading to the erosion and loss of that resilience.

**Aim:** Through genetic analysis of zooarchaeological remains, our research brings a temporal dimension to animal health and production in Ethiopia. We intend to begin mapping the evolution of authentic indigenous traits linked to environmental adaptation and disease resistance by characterising past genetic diversity of local cattle and goat populations. We also aim to recover ancient genomes of pathogens in order to trace their evolution and spread through time and in relation to specific lifestyles and environments.

**Material and Methods:** Once the DNA preservation is assessed, bone and teeth samples will be tested for pathogen DNA content. Well-preserved specimens will undergo high coverage sequencing for targeted Single Nucleotide Polymorphism analysis and whole genome recovery.

**Expected Outcomes:** Provided high quality genetic material is recovered, our findings will inform on emergence, selection pressures and loss of genes involved in adaptation and disease resistance among populations through time. It will also enrich our understanding of the biomolecular mechanisms of zoonoses, ultimately contributing key data for the development of countermeasures.

## 022

### ADDING PROACTIVE AND REACTIVE CASE DETECTION INTO THE INTEGRATED COMMUNITY CASE MANAGEMENT SYSTEM (ICCM+) TO OPTIMISE DIAGNOSIS AND TREATMENT OF MALARIA IN A HIGH TRANSMISSION SETTING OF CAMEROON

**Epie Bekolo C.E.[1], D'Arcy Williams T.[2]**
[1]*University of Dschang, Dschang, Cameroon*

**Objective:** Integrated community case management (iCCM) of childhood illness is a powerful intervention to reduce mortality. Yet, less than 20% of children with fever in sub-Saharan Africa have access to malaria testing. We conducted an action research to explore how iCCM+ based on incorporating proactive and reactive case detection of malaria into iCCM could help accelerate coverage.

**Design:** A community-led cross-sectional survey to measure the proportion of *Plasmodium* infection detected under iCCM+ compared with iCCM alone.

**Setting:** Four primary schools, 4 health facilities and 13 neighbourhoods of the rural community of Bare-Bakem in Cameroon.

**Participants:** Children and adults with fever between April and June 2018.

**Intervention:** A modified iCCM programme (iCCM+) comprised of a proactive screening of febrile children under five years old for malaria using rapid diagnostic testing to identify index cases and a reactive screening triggered by these index cases to detect secondary cases in the community.

**Primary and secondary outcome measures:** The proportion of index and secondary malaria cases detected by iCCM+ compared with iCCM alone.
**Results:** We screened a total of 501 febrile patients of whom *Plasmodium* infection was confirmed in 425 (84.8%) cases including 176 (83.4%) index cases and 249 (85.9%) secondary cases. Of these cases, 102 (24.0%) were index cases identified in the community during routine iCCM activity and 36 (8.5%) cases detected passively in health facilities; 38 (8.9%) were index cases identified proactively in schools; and 249 (58.6%) were additional cases detected in the homes of index cases by RACD – computing to a total of 287 (67.5%) additional cases found by iCCM+ showing the added value of iCCM+ over iCCM alone. The likelihood of finding additional cases increased with increasing family size [adjusted odd ratio (aOR) = 1.2, 95% CI: 1.1 – 1.3] and with increasing age ((aOR) = 1.7, 95% CI: 1.5 – 1.9).
**Conclusion:** Most symptomatic cases of malaria remain undetected in the community despite the introduction of community case management of malaria but most of these undiagnosed cases can be mopped-up by iCCM+. This approach should be targeted to schools, older children and large households.

## 023

## SILENT CIRCULATION OF ZIKA VIRUS IN THE STATE OF SERGIPE, NORTHEAST OF BRAZIL

La Corte R.[1,2], Jesus M.C.S.[2], Batista M.V.A. [2,3], Chagas R.D.O.[4], Storti-de-Melo L.M.[2,3]
[1]*Dept. de Morfologia;*
[2]*Programa de Pós-graduação em Biologia Parasitária;*
[3]*Dept. de Biologia;*
[4]*Dept. de Medicina, Universidade Federal de Sergipe, São Cristóvão, Brazil*

**Introduction:** The state of Sergipe showed the second highest prevalence (227.2 cases per 100,000 live births) of microcephaly associated with Zika virus (ZIKV) in the 2015 epidemic year in Brazil, although no cases of ZIKV infection were reported in Sergipe that year. This situation reveals problems in differential diagnosis and reporting of arboviruses faced by the State.
**Aim:** To investigate ZIKV infection in mosquitoes from cities located along one of the highways linking Sergipe to the State of Bahia.
**Methods:** Mosquitoes were collected using battery-powered aspirator in neighborhoods of high mosquito infestation in the counties of São Cristóvão, Laranjeiras, Itabaiana e Simão Dias. After collection, they were transferred to cups and brought alive to the laboratory, where they were frozen and quickly screened for species and sex. Females were sectioned at the waist and the heads and thorax were inserted into microtubes and macerated. Viral RNA was extracted using PureLink® Viral RNA / DNA Mini Kit and then a reaction was performed for the complementary DNA (cDNA) using the High-Capacity cDNA Reverse Transcription Kit (Thermo Fisher Scientific). The diagnosis for arboviruses was performed by PCR with Flavivirus-specific primers. Positive samples were submitted to PCR with the use of primers specific for ZIKV.
**Results:** From February to October 2018, 423 households were sampled, and 3,451 mosquitoes were collected, of which 184 were *Ae. aegypti* females. The highest density of females (female / house) was detected in Itabaiana (0.68), followed by Simão Dias (0.43), Laranjeiras (0.35) and São Cristóvão (0,24). *Flavivirus* infection was detected in 35 females, of which 10 were positive for ZIKV, all them from Itabaiana, showing an infection rate of 5.4% (10/75) for that city.
**Conclusion:** Our results showed that although three of the counties were negative, ZIKV is circulating in the state and may be causing asymptomatic or mild infections. In 2018 only 8 cases of Zika were reported across the state, which is inconsistent with the mosquito infection rate

we found and alert to the need for surveillance of neurological diseases, care for the pregnant woman and intensification of vector control and infrastructure improvement.

## 024

## FIEBRE (FEBRILE ILLNESS EVALUATION IN A BROAD RANGE OF ENDEMICITIES): A MULTI-SITE PROSPECTIVE OBSERVATIONAL STUDY OF CAUSES OF FEVER IN SUB-SAHARAN AFRICA AND SOUTHEAST ASIA

Hopkins H.[1], Bassat Q.[2], Chandler C.I.R.[3], Crump J.A.[4], Feasey N.A.[5], Ferrand R.A.[1,6], Lalloo D.G.[5], Mayxay M.[7], Newton P.N.[7,8], Mabey D.C.W.[1]
[1]*Faculty of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, London, UK;*
[2]*ISGlobal, Hospital Clínic, Universitat de Barcelona, Spain; Centro de Investigação em Saúde de Manhiça (CISM), Maputo, Mozambique; ICREA; Pediatrics Dept., Hospital Sant Joan de Déu (University of Barcelona), Barcelona, Spain;*
[3]*Dept. of Global Health and Development, London School of Hygiene and Tropical Medicine, London, UK;*
[4]*Centre for International Health, University of Otago, Dunedin, New Zealand;*
[5]*Dept. of Clinical Sciences, Liverpool School of Tropical Medicine, Liverpool, UK; Malawi-Liverpool-Wellcome Trust Clinical Research Programme, Blantyre, Malawi;*
[6]*Biomedical Research and Training Institute, Harare, Zimbabwe;*
[7]*Lao-Oxford-Mahosot Hospital-Wellcome Trust Research Unit (LOMWRU), Mahosot Hospital, Vientiane, Laos;*
[8]*Lao-Oxford-Mahosot Hospital-Wellcome Trust Research Unit (LOMWRU), Microbiology Laboratory, Mahosot Hospital, Vientiane, Laos; Centre for Tropical Medicine and Global Health, Nuffield Department of Medicine, University of Oxford, Oxford, England, UK*

**Introduction:** Fever is a common reason for health care seeking and hospital admission in sub-Saharan Africa and Asia, but little is known about its aetiology in many parts of the world. Many febrile illnesses present with non-specific symptoms and signs, presenting a case management challenge. Currently there is sparse evidence on which to base empirical treatment guidelines, burden of disease estimates, or control measures and resource allocation.
**Aim:** FIEBRE is a multi-site investigation, using consensus clinical, laboratory, and social science protocols, designed to identify infections that are treatable and/or preventable; to document antimicrobial susceptibility in micro-organisms that are isolated; to evaluate biomarkers that may distinguish bacterial from other causes of fever and/or prognosticate; and to inform new fever case management algorithms.
**Methods:** FIEBRE enrols febrile in- and outpatients aged ≥2 months presenting for care in Laos, PDR, Malawi, Mozambique, and Zimbabwe. Study staff take a targeted illness and exposure history; perform a physical examination; and collect pharyngeal swabs and venous blood samples from all participants, and urine samples where indicated. Bacterial culture and antimicrobial susceptibility testing are performed on site. Point-of-care tests are performed for malaria, and in subpopulations for HIV, cryptococcal antigen, and urinary lipoarabinomannan. At Day 28, clinical outcome is noted and patients provide a further blood sample for serology. Serology and other laboratory tests for arboviruses, *Leishmania* spp., *Leptospira* spp., rickettsiae, and respiratory viruses will be performed at reference laboratories. Community controls, matched to a proportion of outpatients, are recruited to estimate background prevalence of specific

infections in the study areas; and are surveyed to obtain representative data about treatment seeking and medicines use, and to estimate the incidence of common infections. In two sites, interviews and observations are used to understand antimicrobial use patterns among patients and prescribers.

**Results:** Recruitment lasting >12 months is on-going at each site to capture seasonal variation, targeting enrolment of 2,400 patients and >600 controls per site. Preliminary data will be presented on study populations and diagnostic results.

**Conclusion:** The FIEBRE study will provide harmonized data from representative sites to inform fever case management guidelines, and strategies to improve antimicrobial use.

## 025

## THE GUT MICROBIOTA AND IMMUNE STATE OF WILD RODENTS - CHALLENGES AND OPPORTUNITIES

### Viney M.

*Dept. of Evolution, Ecology and Behaviour, Institute of Integrative Biology, University of Liverpool, Liverpool, UK*

The vertebrate gut microbiota is a large, diverse assemblage of bacteria that can have profound effects on host individuals – for example, it is critical for the development of gut immune function and stimulates mucosal immune responses. While the microbiome is central to the healthy life of humans and other animals, we don't fully understand what comprises a normal healthy microbiome nor what shapes and controls its composition.

Most of what we know about the gut microbiome comes from studies of laboratory animals, mainly mice. Laboratory animal models are valuable when they capture relevant traits of another species (e.g. humans), or of the same species in a different environment (e.g. the wild). But, the microbiome of laboratory mice differs substantially among laboratories and suppliers, and is markedly less diverse than that of wild mice. There is evidence that the microbiome can have major impacts on immune function and resilience to infection. Therefore, arguably, laboratory mouse microbiomes and immune systems are artificial constructs and so do not represent the normal, healthy mouse microbiome.

Microbiomes, immune systems, and interactions between them, need to be studied in more natural systems, for three reasons: (i) to provide data that are more representative of free-ranging animals, rather than basing our understanding on phenomena specific to certain laboratory mouse strains, obtained from certain suppliers, studied in certain laboratories; (ii) laboratory-based systems show what patterns and processes <u>can</u> occur, but we need to know what patterns and processes actually <u>do</u> occur, and (iii) because we need to understand which aspects of microbiome biology and immunobiology are modelled well in laboratory animals, and which are not, thereby validating where laboratory models are – and are not – useful. Studying the gut microbiome of wild mice is complementary to laboratory-based microbiome studies, recognising that despite the advantages of wild animal systems, laboratory-based systems have advantages too.

## 026

## THE MODELLING OF THE PROCESS OF SOCIAL PROTECTION IN HEALTH

### Bossyns P.

*Enabel, Brussels, Belgium*

**Introduction:** Senegal in partnership with Enabel, the Belgian development agency, implemented a project between 2012 and 2017, concerning health insurance at large scale for the rural informal sector. An exten-

sive modelling exercise was conducted in order to match the intervention in the field with the latest findings in health insurance organisation and dynamics and in community-based health insurance in particular.

**Aim:** Modelling is an important part of all intervention research in order to conceptualise and to share with all stakeholders the vision and strategic options of the intervention. Models are constructed for different aspects of the object of intervention. The purpose of the intervention was to confirm (or adapt) the model and to make the model a living and evolving idea. This presentation wants to make clear the potential of the use of models in complex interventions and that they are even indispensable for success.

**Methods:** Descriptive study on the evolution of the models and how the vision evolved over time, justified by the progressive insights at each moment in the process, as an illustration of paving the pathway in complex human systems.

**Results:** Initial, rather general models and views evolved towards more robust -argued- and detailed models, that in their principles can be transferred to or applied in other settings.

**Conclusion:** Models are evolving mental maps to enable interventions in complex environments. Compared to the initial model, in the more final versions of the model, new dimensions were added such as patient's rights and the actuarial function and the anchorage of the operational unit evolved from district towards departmental level. Community participation needed complete revision.

### Reference:

1. Paul Bossyns, Fabienne Ladrière and Valéry Ridde: **Une assurance maladie à grande échelle pour le secteur informel en Afrique subsaharienne. Six ans d'expérience au Sénégal rural.** Studies in Health Services Organisation & Policy, 34, 2018

## 027

## HEALTH INSURANCE AND HEALTH CARE ORGANISATION IN RURAL SENEGAL

### Ndèye Bineta M.[1], Sow K.[2]

[1]*Director health insurance unit, Koungheul;*
[2]*Anthropology Dept., University Cheikh Anta Diop, Dakar, Senegal*

**Introduction:** Very few interventions in the area of health insurance actually address structures, procedures and problems from both the supply and demand side. This is astonishing because one can state that the 'Supply' is a condition of success for the 'Demand' side, but the contrary is true as well.

**Aim:** In order for a health insurance to be effective, many technical aspects need to be fulfilled and favorable conditions assured. They form the basis for replicability and sustainability. If certain marginal conditions are not met, health insurance cannot be properly implemented, even if the initiative is technically sound. Both the supply and demand side are tackled in a complementary way.

**Methods:** The political economy of the process is presented, aside the material and organisational conditions that determine the success of health insurance schemes for the informal sector. Political motivation, resource mobilisation and effective subsidies from the government, transparent (financial) management of the health facilities and regulation of the fee-paying system are some of the conditions that are analysed in this presentation.

**Results:** The results from the implementation of the organisation of a large scale health insurance for the rural informal sector in 2 regions of Senegal covering the demand and the supply side are presented: utilisation rates, penetration rate, portability, financial viability, degree of protection, the health care package.

**Conclusion:** The implementation pathway and monitoring of the process led to the conclusion that health insurance schemes should be evaluated

simultaneously for at least 7 different, semi-autonomous factors in order to really understand the dynamics of the insurance scheme and to be able to compare different schemes in terms of efficiency, effectiveness and coverage. On the other hand, a large-scale health insurance cannot succeed if the necessary systemic conditions are not fulfilled.

## 028

### AN INITIATIVE FOR SOCIAL PROTECTION IN HEALTH, AND BEYOND: THE EQUITY FUND IN MAURITANIA

**Van Belle E.**
*Memisa (medical NGO), Brussels, Belgium*

**Introduction:** A project in Mauritania of the Belgian Medical NGO Memisa in consortium with a local NGO APSDN has nearly 15 years' experience with a social assistance arrangement for health but which covers also other aspects, such as school fees. Being indigent has a repercussion on all events in life. Health is only part of it, and for instance the right to education is another aspect that should be addressed simultaneously in order to help people to get out of the poverty trap. Locally, this particular social assistance arrangement has been labelled 'equity fund'. The Senegalese experience addresses the question of equity and protection of the poorest only marginally.

**Aim**: To create a model of how social assistance could function and under which conditions, in an African (and Mauritanian) context.

**Methods:** Descriptive intervention study and monitoring of change over time.

**Results:** Although Senegalese authorities made a lot of (financial) efforts through the payment of health insurance premiums for indigent families (family allocation scheme), its effectiveness is probably low: no other accompanying measures are taken and the selection of the benefitting families is not very clear either. There is no individualized approach. In Mauritania, an equity fund was developed for the purpose of assuring access to quality health care for the poorest, but soon started addressing other social determinants of health. It is locally managed by a small professional team and involves the local community to a maximum. The identification of indigent people is done by a multi-stakeholder committee and the follow up is personalized based on home visits and reintegration measures.

**Conclusion**: Poverty is sometimes structural (e.g. handicapped people for instance) and therefore chronic, but sometimes it can very well be temporary and some financial support can then pull families out of the 'poverty trap'. Such dynamics can only be managed at a local level, while in many countries, national social assistance funds are run from central level, mainly because no peripheral structures exist. Health Insurance Units at district level can alter this situation and can become an opportunity to actually liaise with social assistance funds at the operational level.

## 029

### THE DEFENCE OF PATIENTS' RIGHTS THROUGH COMMUNITY ORGANISATION PLATFORMS

**Gyselinck K.**
*Enabel, Brussels, Belgium*

**Introduction:** Traditionally health committees with representatives of the population are supposed to deal with complaints from users. In practice one observes many obstacles, not the least the low level of training of those representatives and the 'asymmetric information' regarding technical health issues. The social power equilibrium between informal representatives of the population compared with nurses and doctors is very much pending towards the latter.

Enabel worked with local communities and local authorities in order to create a platform of patients' rights in Benin since 2012. Such platforms have more power than health committees because they are created independent from the health facilities and anchored at the level of the local authorities.

**Aim:** To organize users of health services to improve their autonomy towards their health and defend their rights. This implies access to quality information about health & health services, transparency from the supply side and participating in the quality control of health services.

**Methods:** An action-research approach was used with as initial hypothesis "By putting in place an independent platform of informed users of health services ('PUSS') engaging in a dialogue with the health providers, the quality of health care will improve.

**Results:** In 5 health districts health user-platforms were created. They influenced the relations between health providers and users by i) a more constructive atmosphere based on dialogue, with overall increase of user-satisfaction by 20% over 2,5 years, ii) the creation of a dialogue platform (related to RBF) between the users (PUSS), local authorities and health providers to discuss quality of services and to analyze complaints. About 500 complaints were registered over a period of 2,5 years of which 81% were treated in a satisfactory way.

**Conclusion:** The empowerment of the users of health services is an important component of any functional health assurance.

## 030

### PROGRESS IN THE CONTROL OF MALARIA IN GUINEA: ANALYSIS OF HEALTH FACILITY DATA FROM THE USAID GUINEA STOPPALU PROJECT, 2014–2018

**Bisanzio D.[1], Fofana A.[2], Regan E.[3], Preston A.[4], Guilavogui T.[5], Baldé M.A.[2], Taton J.L.[2], Condo P.[6], Reithinger R.[1]**
[1]*RTI International, Washington D.C., USA;*
[2]*RTI International, Conakry, Guinea;*
[3]*RTI International, RTP, NC, USA;*
[4]*RTI International, Fort Collins, CO, USA;*
[5]*National Directorate of Disease Control, Ministry of Health, Conakry, Guinea;*
[6]*President's Malaria Initiative, US Agency for International Development, Conakry, Guinea*

**Introduction:** Guinea has made tremendous progress in its fight against malaria. Most of this progress is due to Guinea's leadership and commitment to scale-up key malaria interventions, backed by substantial external financial support such as the Global Fund to Fight AIDS, Tuberculosis and Malaria and the President's Malaria Initiative (PMI). PMI's main platform from 2013 onwards has been the USAID Guinea StopPalu project, which has been operational in 19 of the country's 38 districts. The project supported Guinea's National Malaria Control Program in the distribution of long-lasting insecticidal nets, training of health care workers in malaria case management, strengthening community engagement at different levels, and the integration of malaria services between the public and private sector.

**Aim:** Evaluate spatio-temporal decline of malaria burden in Guinea from 2014 to 2018.

**Methods:** We analyzed temporal and spatial changes in the malaria rest positivity rate to assess changes in the malaria burden in the project's 19 districts from 2014–2017. Analyses were performed on routine monthly data from 141 public and private facilities and stored in a District Health Information System 2 (DHIS2) project database. Generalized additive mixed models were used to describe the temporal trend of the test positivity rate. Spatial analyses were applied to identify malarial fever hotspots every year; space-time Bayesian models were applied to produce

maps to estimate the spatial pattern of malarial fever fraction from 2014–2017.

**Results:** Trend analyses highlighted that the test positivity rate had a strong seasonality and was significantly reduced by 34.5% from 79.1% in 2014 to 52.3% in 2017. This reduction mostly affected children under 5 years of age but was also evident in other age groups. The analyses also showed that the test positivity rate had a marked spatial heterogeneity, with a rapid decrease in malaria fevers shown in northern Guinea. These findings corroborate prevalence data on children under 5 years of age from the country's 2016 Demographic and Health Survey.

**Conclusion:** Developed maps could be used by Guinea's national program to target interventions to those areas with continued high malaria transmission.

## 031

### OLOROFIM, AN INVESTIGATIONAL OROTOMIDE ANTIFUNGAL AGENT WITH *IN VITRO* ACTIVITY AGAINST *MADURELLA MYCETOMATIS*

Lim W.[1], Eadie K.[1], Konings M.[1], Fahal A.H.[2], Birch M.[3], Rijnders B.[1], Verbon A.[1], Van de Sande W.W.J.[1]
[1]Medical Microbiology and Infectious Diseases, ErasmusMC, Rotterdam, The Netherlands;
[2]Mycetoma Research Centre, Khartoum, Sudan;
[3]F2G Ltd, Manchester, UK

**Introduction:** *Madurella mycetomatis* is the main causative agent of eumycetoma, a chronic granulomatous infection of the subcutaneous tissue. Currently, the only antifungal agents with activity against *M. mycetomatis* are agents acting on ergosterol in the fungal cell membrane. Itraconazole is currently the drug of choice, but the duration of treatment is long and therapeutic failure is common. Therefore there is an urgent need to identify more potent antifungal agents with activity against *M.mycetomatis*. One of the novel classes of antifungal agents are the orotomides and olorofim is the first representative of this class. It inhibits fungal pyrimidine biosynthesis and it is currently being clinically evaluated in a global Phase II trial for invasive fungal infections in patients lacking treatment options.

**Aim:** To determine if olorofim also has *in vitro* activity against *M. mycetomatis.*

**Methods:** The *in vitro* activity of olorofim and itraconazole against 40 clinical isolates of *M. mycetomatis* was determined using our CLSI-based in vitro susceptibility testing with XTT endpoint reading.

**Results:** It was demonstrated that olorofim was highly active against all *M. mycetomatis* isolates. An MIC range of <0.004 – 0.125 μg/ml was found. This range was comparable to the MIC range obtained for itraconazole. To determine if olorofim would be superior to itraconoazole treatment, *in vivo* efficacy testing is needed.

**Conclusion:** This study for the first time demonstrated that *M. mycetomatis* can also be inhibited with antifungal agents with a different mode of action. Olorofim showed potent *in vitro* activity against *M. mycetomatis* isolates.

## 032

### FIELD PERFORMANCE OF THE HIGHLY-SENSITIVITY RAPID DIAGNOSTIC TEST IN A SETTING OF HIGHLY SEASONAL MALARIA TRANSMISSION

Mwesigwa J.[1,2], Slater H.[3,4], Bradley J.[5], Kandeh B.[6], Saidy B.[1], Ceesay F.[1], Whitiker C.[3], Bouseman T.[7], Van Geertruyden J.P.[2], Drakeley C.[8], Achan J.[1], D'Alessandro U.[1]

[1]Medical Research Council Unit The Gambia at London School of Hygiene and Tropical Medicine, Banjul, The Gambia;
[2]Faculty of Medicine and Health Sciences, University of Antwerp, Antwerp, Belgium;
[3]MRC Centre for Global Disease Analysis, Dept. of Infectious Disease Epidemiology, Imperial College London, London, UK;
[4]PATH, Seattle, USA;
[5]London School of Hygiene and Tropical Medicine, London, UK;
[6]National Malaria Control Program, Banjul, The Gambia;
[6]Radboud University Nijmegen, The Netherlands;
[7]Dept. of Microbiology, London School of Hygiene and Tropical Medicine, London, UK

**Introduction:** The Gambia has succeeded in reducing the burden of malaria. The human reservoir of infection could further decrease if malaria-infected individuals were identified by highly sensitive field-based diagnostic tools and then treated.

**Aim:** The objective of the study was to determine the performance of the highly sensitive Alere rapid diagnostic test (HS-RDT) was assessed and modelled for mass screening and treatment (MSAT) strategy.

**Methods:** A cross-sectional survey was done at the peak of the 2017 malaria transmission season in 47 Gambian villages. From each village, 100 residents were randomly selected for a finger prick blood sample to detect *P. falciparum* infections using HS-RDT and varATS qPCR. Results by HS-RDT were compared against varATS qPCR across varying transmission intensities, age groups, febrile and asymptomatic subjects. A deterministic model was used to predict HS-RDT performance for the MSAT strategy.

**Results:** Of the 4,060 participants screened; the median age (SD) was 13 years (6,31). Malaria prevalence by HS-RDT was 14.6% (592/4060, 95% CI:13.78-16.01). Compared to varAST qPCR, HS-RDT's sensitivity and specificity was 38.43% (191/497 95% 34.1-42.9) and 88.5% (2922/3301; 95%: 87.4-89.6), respectively. HS-RDT's sensitivity varied by malaria prevalence, and highest (50.89% (43.31-58.48%) in villages with prevalence 20-50%. In low transmission areas, three rounds of MSAT with the HS-RDT at 85% coverage would result in 80% reduction of malaria prevalence from 5% to 1% and reductions were maintained for 400 days. In moderate transmission areas, two MSAT rounds at 80% coverage or three rounds at 65% coverage resulted 60% reductions in malaria prevalence from 15% to 6%.

**Conclusion:** The performance of the HS-RDT varied, with sensitivity increasing with increasing *P.falciparum* prevalence and performing better where transmission was most intense. Multiple MSAT rounds implemented in low transmission to moderate areas using the HS-RDT for two or three years may be used as an additional strategy to achieve elimination.

## 033

### HIGH-INTERMEDIATE ENDEMIC PREVALENCE OF HEPATITIS B VIRUS AMONGST FEBRILE PATIENTS IN BANGLADESH, INCLUDING EVIDENCE OF OCCULT INFECTION

Chowdhury F.R.[1,2,3], McNaughton, A.L.[2], Amin M.R.[4], Barai L.[5], de Cesare M.[6], Bowden R.[6], Klenerman P.[2,7], Das B.C.[8], Dunachie S.J.[2,3], Matthews P.C.[2,7]

[1]Dept. of Internal Medicine, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh;
[2]Nuffield Dept. of Medicine, University of Oxford, Medawar Building for Pathogen Research, Oxford, UK;
[3]Mahidol-Oxford Tropical Medicine Research Unit, Bangkok, Thailand;
[4]Dept. of Medicine, Dhaka Medical College, Dhaka, Bangladesh;

[5]*Dept. of Microbiology, BIRDEM General Hospital, Dhaka, Bangladesh;*
[6]*Wellcome Centre for Human Genetics, Oxford, UK;*
[7]*Dept. of Infectious Diseases and Microbiology, Oxford University Hospitals NHS Foundation Trust, John Radcliffe Hospital, Oxford, UK;*
[8]*Food for the Hungry and Medical Team International, Cox's Bazar, Bangladesh*

**Introduction:** Bangladesh has recently been identified as one of the ten countries worldwide with the highest burden of viral hepatitis infection. Data on circulating genotypes remain limited, but both recombinant strains and occult infection have been previously reported in the region.
**Aim:** To assess the prevalence of HBV and occult HBV infection among febrile patients admitted to two medical facilities in Dhaka, including the Dhaka Medical College Hospital.
**Methods:** Any adult patients of $\geq$18 years with a history of fever >38°C for >48 hours admitted to the study sites between June-October 2017 were eligible to be enrolled. Blood samples were collected from patients and screened for HBV infection and previous HBV exposure, using HBsAg and total anti-HBc respectively. All anti-HBc-positive patients were screened for HBV DNA to identify occult HBV infection. HBV DNA positive patients with viral loads $\geq$3.0 $\log_{10}$ IU/ml underwent a target-enrichment approach for HBV whole genome sequencing (WGS) on an Illumina MiSeq platform in Oxford.
**Results:** A total of 201 patients were recruited into the study. Exposure to HBV was common in the cohort, with 74/201 (37%) anti-HBc positive. HBsAg was present in 14/201 (7%). Additionally, 3/201 (1.5%) of the cohort were anti-HBc-positive, HBsAg-negative and HBV DNA-positive, indicating occult infection. Viral loads in patients with occult infection were 1.1, 2.6 and 5.3$\log_{10}$ IU/ml.
WGS for HBV was performed on four patients, including one patient with occult infection. A median of 60,997 HBV reads per sample and median coverage of 869 reads/site was obtained after de-duplication. Genotypes A (n=1), C (n=1) and D (n=2) were observed, with the occult infection being a genotype C isolate. None of the sequences identified were recombinants.
**Conclusion:** Our findings indicate a high-intermediate endemic prevalence of HBV in this setting. Occult HBV infection is present in the region, accounting for 3/17 (18%) of HBV infections. This is of relevance to in clinicians assessing their patients and is also important in informing approaches to screening blood products for transfusion. A diverse range of HBV genotypes are present in Bangladesh, and the detection of a genotype A strain supports studies suggesting that this genotype is increasingly common in Bangladesh.

## 034

### DISK DIFFUSION AND E-TESTING TO DETERMINE THE IN VITRO SUSCEPTIBILITY OF *M. MYCETOMATIS* TOWARDS COMMONLY USED ANTIFUNGAL AGENTS

**Nyuykonge B.[1], Eadie K.[1], Fahal A.H.[2], Mouton J.W.[1], Van de Sande W.W.J.[1]**
[1]*Erasmus MC, Dept. of Medical Microbiology and Infectious Disease, Rotterdam, The Netherlands;*
[2]*Mycetoma Research Center, Khartoum, Sudan*

For many fungal infections, in vitro susceptibility testing is used to predict if an isolate is resistant or susceptible towards the antifungal agent used to treat the fungal infection. For Madurella mycetomatis, the main causative agent of mycetoma, *in vitro* susceptibility is currently not performed on a routine basis. This is because the currently used in vitro susceptibility testing method is labour intensive and expensive because the viability dye XTT is needed for endpoint visualisation. For bacterial agents, disk diffusion and E-testing methodologies are available and also for certain fungal species this is performed. Here we demonstrate that using a hyphal suspension, disc diffusion and E-testing can be used to determine the minimal inhibitory concentration of itraconazole, posaconazole, voriconazole and amphotericin B for *Madurella mycetomatis*. MICs found with the E-test were comparable to those obtained with our CLSI-based microtiter dilution in vitro susceptibility assay.

## 035

### SCHOOL BASED CLINICAL TRIALS IN LOW RESOURCE SETTINGS AND FACTORS ASSOCIATED WITH LOW INTERVENTION COVERAGE: LESSONS LEARNED FROM THE START–IPT TRIAL

**Khozoee B.[1], Rehman A.M.[1], Maiteki-Sebuguzi C.[2], Gonahasa S.[2], Kamya M.R.[3], Staedke S.G.[1]**
[1]*London School of Hygiene & Tropical Medicine (LSHTM), London, UK;*
[2]*Infectious Diseases Research Collaboration;*
[3]*School of Medicine, Makerere University College of Health Sciences, Kampala, Uganda*

**Introduction:** Intermittent preventive treatment (IPT) of malaria is recommended for specific vulnerable groups, and may also benefit school-aged children, who serve as an infectious reservoir of malaria parasites. START-IPT (School-based Treatment with ACTs to Reduce Transmission of malaria) was a cluster-randomised trial that investigated the community-level impact of IPT of primary schoolchildren with dihydroartemisinin-piperaquine (DP) in Jinja, Uganda. Students enrolled from intervention schools received monthly IPT with DP for up to 6 rounds of treatment. IPT with DP was found to have a positive impact on community-level malaria parasite prevalence (19.0% intervention vs 23.1% control, adjusted risk ratio 0.85, 95% CI 0.73–1.00, p=0.05), but intervention coverage was low (43.3%), which may have blunted the effect of IPT.
**Aim:** To better understand reasons for poor intervention coverage in the START-IPT study, a secondary analysis was conducted to evaluate the factors associated with intervention enrolment and treatment.
**Methods:** Data on students registered in the 42 intervention schools were analysed. Descriptive analysis was performed to explore characteristics of students screened, enrolled and treated, stratified by variables of interest. Logistic regression was used to perform univariate and multivariate analysis, adopting a causal modelling framework to investigate the association between student characteristics and treatment coverage.
**Results:** Of the 23,280 registered students, 7,997 (34.4%) were excluded because the parent/guardian could not be found, and 15,283 (65.6%) were screened. Of these, 5,204 (34.1%) were excluded, primarily because of inability to locate the student (31.4%) and menarche in females (25.9%). Overall, 10,079 (43.3%) students received at least one dose of DP; 3995 (39.6%) received > 3 rounds of IPT with DP. In an adjusted analysis, larger school size, school location, older age, male gender, lower bednet use, and history of fever at enrolment were all significantly associated with receiving $\leq$ 3 rounds of DP.
**Conclusion:** Low parental engagement, exclusion of females at menarche, and poor school attendance contributed to low enrolment in this school-based trial in a low-resource setting. Characteristics of schools and students at risk for low treatment coverage were identified, which could be targeted through community sensitisation and parental education in future research studies and programmes.

## 036

### FIELD EVALUATION OF AUTOMATED DIGITAL MALARIA MICROSCOPY: EASYSCAN GO

**Vongpromek R.[1], Proux S.[2], Ekawati L.[3], Archasuksan L.[2], Bachman C.[4], Bell D.[4], Sutanto I.[5], Dhorda M.[1,6]**
[1]*Infectious Diseases Data Observatory Asia Regional Centre, Mahidol-Oxford Tropical Medicine Research Unit, Faculty of Tropical Medicine, Mahidol University, Bangkok;*
[2]*Shoklo Malaria Research Unit, Mahidol-Oxford Tropical Medicine Research Unit, Faculty of Tropical Medicine, Mahidol University, Mae Sot, Thailand;*
[3]*Eijkman-Oxford Clinical Research unit, Jakarta, Indonesia;*
[4]*Global Good/Intellectual Ventures, Bellevue, WA, USA;*
[5]*Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia;*
[6]*Centre for Tropical Medicine and Global Health, Nuffield Dept. of Medicine, University of Oxford, Oxford, UK*

**Introduction:** Microscopy remains the gold standard for malaria diagnosis but its reliability depends heavily on the proficiency of human operators. Automated malaria microscopy could provide an alternative to standardize malaria parasite detection, speciation and quantification, thus aiding to the harmonization of microscopy performed in the context of drug, vaccine or diagnostic trials and research activities.
**Aim:** To evaluate the performance of the EASYSCAN GO automated malaria microscopy device, applying an artificial intelligence (AI) imaging software, using expert microscopy as a reference standard.
**Methods:** Febrile patients were recruited at SMRU clinics (Mae Sot, Thailand) and Hanura, Indonesia between November 2016 and July 2017. Giemsa-stained blood films were prepared and read by both expert microscopists and the automated microscope. The performance of device was evaluated for parasite detection, species identification and parasite density estimation.
**Results:** Of 793 patients enrolled in the study, 170 tested positive by expert microscopy (30 *Plasmodium falciparum*, 130 *Plasmodium vivax* and 10 mixed infections). Diagnostic sensitivity and specificity of the device were 89.4%(95%CI = 83.8%-93.6%) and 97.1%(95%CI = 95.4%-98.3%). Sensitivity was correlated to the parasite density, ranging from 7.7% in samples with low parasite density (1-50 p/μL) to 100% in samples with densities higher than 2000 p/μL. Sensitivity and specificity of the device were not significantly different when compared with nested PCR. Parasite species were correctly identified in 128 out of 152 samples (84.21%), yielding Cohen's kappa value of 0.64 (95%CI = 0.50-0.76). A total of 46 out of 152 (30.26%) of the parasite density estimates from the device were within ± 25% of the reference results. Interclass correlation coefficient (ICC) for parasite density estimates was 0.65 (95%CI = 0.56-0.73) indicating good agreement between the parasite density estimates.
**Conclusion:** These results represent unprecedented accuracy in field conditions for computer-based malaria parasite detection, identification and quantification on Giemsa-stained blood films. The current version of the device and software corresponded to WHO Competence Level 3 overall and Level 2 for diagnostic sensitivity & specificity. A multicentre trial is being conducted to test an updated AI version of the device in more diverse field and clinical trial settings.

## 037

## LIVER HEALTH IN HIV MONOINFECTED AND HIV/HBV COINFECTED INDIVIDUALS IN GHANA

**Villa G.[1], Phillips R.[2,3], Smith C.[4], Owusu D.[2], Abdullahi A.[1], Sayeed L.[5], Austin H.[1], Chadwick D.[5], Bhagani S.[6], Geretti A.M.[1]**
[1]*Institute of Infection & Global Health, University of Liverpool, Liverpool, UK;*
[2]*Kwame Nkrumah University of Science & Technology;*
[3]*Dept. of Medicine, Komfo Anokye Teaching Hospital, Kumasi, Ghana;*
[4]*Institute for Global Health, University College London, London;*
[5]*Centre for Clinical Infection, James Cook University Hospital, Middlesbrough;*
[6]*Royal Free Hospital NHS Foundation Trust, London, UK*

**Introduction:** The scale-up of ART in Africa has dramatically decreased HIV-related morbidity and mortality. Long-term impact of ART on liver health among HIV mono-infected and HIV/HBV co-infected subjects has been poorly investigated.
**Aim:** To assess liver status in HBsAg-positive and negative individuals on long-term ART in Kumasi, Ghana.
**Methods:** Consecutive patients who were established on ART and accessed routine HIV outpatient care over a 2-week period in February 2018 were screened for viral hepatitis co-infection (HBV, HCV, HDV) and assessed for liver fibrosis and steatosis by measures of transient elastography and controlled attenuated parameter (Fibroscan, Ecosens, France). Additional variables included demographics, anthropometric measures, behavioural factors and biochemistry data. Chi-squared test, Fisher's exact test and Mann Whitney's test were used as appropriate to compare participants' characteristics according to HBsAg status.
**Results:** The study population comprised 330 individuals: 91/330 (27.6%) were males, median age was 48 years (IQR 42-53) and 90/330 (27.3%) had positive HBsAg. Alcohol was consumed regularly by 6/330 (1.8%) subjects. Median time on ART was 8.9 years (IQR 5.7-11.3); 288/330 (87.3%) subjects were on a NNRTI, 35/330 (10.6%) on a PI and 7/330 (2.1%) not on ART. Median CD4 count was 620 cells/mm$^3$ (IQR 359-830). HIV-1 RNA was <40 copies/mL in 163/330 (49.4%) individuals; HBV DNA was >2000 IU/mL in 7/330 (2.1%) and between 40-2000 IU/mL in 9/330 (2.7%). HCV RNA was detected in 1/330 (0.3%) subject; 4/330 had positive anti-HDV antibodies. Fibrosis grade ≥F2 was found in 50/330 (15.2%) individuals; steatosis grade ≥S1 in 69/330 (20.9%). HBsAg-positive individuals presented higher prevalence of fibrosis than negative subjects (F2 23.3% vs 5.4%; F3 8.9% vs 1.3%; F4 4.4% vs 0.4%; p<0.01). Median plasmatic concentration of platelets, cholesterol and triglycerides were lower in HBsAg-positive individuals (238 vs 209 x10$^9$/L, p<0.01; 4.8 vs 4.4, p=0.01; 1.3 vs 1.1 mmol/L, p<0.01, respectively); conversely, AST and ALT concentrations were higher (27 vs 30 mmol/L, p<0.01; and 17 vs 21 mmol/L, p<0.01, respectively). No differences were observed on renal function, prevalence of metabolic syndrome or steatosis grade.
**Conclusion:** Liver fibrosis is more prevalent in HBV/HIV co-infected subjects, whereas no difference was observed in hepatic steatosis.

## 038

## USING COUNTRY-SPECIFIC MODELLING OF MALARIA INTERVENTIONS FOR NATIONAL STRATEGIC PLANNING

**Runge M.[1,2], Mohamed A.[3], Mandike R.[3], Molteni F.[1,2,3], Snow R.[5,6], Thawer S.[1,2], Lengeler C.[1,2], Smith T.[1,2], Pothin E.[1,2,6]**
[1]*Epidemiology and Public Health, Swiss Tropical and Public Health Institute;*
[2]*University of Basel, Basel, Switzerland;*
[3]*National Malaria Control Program, Dodoma, Tanzania;*
[4]*Centre for Tropical Medicine and Global Health, Nuffield Dept. of Clinical Medicine, University of Oxford, Oxford, UK;*
[5]*Population Health Unit, Kenya Medical Research Institute-Wellcome Trust Research Programme, Nairobi, Kenya;*
[6]*Clinton Health Access Initiative, Boston, USA*

**Introduction:** Malaria modelling has proven useful for comparing impact and costs of interventions and strategies at global level. However there has been little application of dynamic models by national programs to predict program impacts at the geographical resolution used for operational stratification in strategic planning by national programs.

**Aim:** A process was developed to provide analytical support to the National Malaria Control Program (NMCP) of Tanzania for the mid-term review and updating of the National Malaria Strategic Plan (NSP). This entailed use of the 'OpenMalaria' model of malaria dynamics to predict the impact of different geographical stratifications of intervention mixes at district level.

**Methods:** Workshops involving modellers, program managers (the NMCP), epidemiologists, and local experts agreed on the assumptions and data to use for model calibration and the strategies and scenarios to be simulated. Available data at district level included malaria indicator surveys, school parasitaemia surveys, entomological surveillance data, and vector control distribution. The district-specific outcomes of interest were chosen to be 2020 prevalence and the numbers of cases averted between 2017 and 2020. The predictions were evaluated against the national target (national prevalence less than one per cent by 2020) and used to suggest alternative intervention strategies.

**Results:** Shared understanding across of the relevance of the modelling required considerable engagement from the different groups of stake-holders. The key determinants of success were continual interaction and iterative revisions of the analyses following up feedbacks from the stakeholders. The modelling presented simulations of impact of strategies of interest and results showed that given the available data and the current plan, the objective of prevalence lower than 1% was not achievable by 2020. These conclusions led to an update of the NSP strategies and a revision of its objectives.

**Conclusion:** Research and policy planning are two worlds that do not interact as often as desirable. This project has helped to bridge this gap by providing a platform where policy makers and scientists can agree on what to put in the planning of the simulations. Beyond the immediate results, the process in itself has been useful to inform policy with evidence.

## 039

## IPAMU – A MADAGASCAR-GERMANY PARTNERSHIP PROJECT AIMING TO INVESTIGATE HEALTH CARE WORKER INFECTIONS DURING THE 2017 PNEUMONIC PLAGUE OUTBREAK

Kratz T.[1], Andrianasolo R.[2], Meurs L.[3,4], Markus I.[4], Kolie D.[5], Rajerison M.[6], Rakoto Andrianarivelo M.[7], Malvy D.[8], Grunow R.[9], Razafimbia V.[10]

[1]Federal Information Centre for Biological Threats and Special Pathogens, Robert Koch Institute, Berlin, Germany;

[2]Laboratoire d'Accueil et de Recherche en Santé Publique et en Technologies de l'Informatique Médicale et de la Communication, Antananarivo, Madagascar;

[3]European Centre of Disease Control and Prevention, Solna, Sweden;

[4]Dept. of Infectious Disease Epidemiology, Robert Koch Institute, Berlin, Germany;

[5]Faculté des Sciences et Techniques en Santé, Université Gamal Abdel Nasser de Conakry, Guinea;

[6]Unité de Peste, Institut Pasteur de Madagascar;

[7]Centre d'Infectiologie Charles Mérieux, Antananarivo, Madagascar;

[8]Université de Bordeaux, Faculté de Médecine, Bordeaux, France;

[9]Centre for Biological Threats and Special Pathogens, Robert Koch Institute, Germany;

[10]Direction de la Veille Sanitaire et Surveillance Epidemiologique, Ministère de la Santé Publique, Antananarivo, Madagascar

**Introduction:** A pneumonic plague (PP) outbreak occurred in Madagascar from August to November 2017. According to World Health Organization reporting, it lead to 2417 cases including 209 deaths, the majority of cases (77%) were clinically identified as PP and 81 Health care workers (HCWs) had symptoms compatible with plague. So far only anecdotal reports describe possible transmission and burden of PP within HCW. HCW PP infections can have a great impact as regular medical care is affected due to absent HCW and patients fear of contracting PP within a hospital setting.

**Aim:** In order to better understand HCW infections with PP, the Malagasy-German IPAMU partnership project was founded. The overall objective is to obtain the serological status, characteristics and knowledge, attitude and practices (KAP) of cases (HCW who had symptoms compatible with PP during the epidemic according to the Malagasy surveillance authority, DVSSE), compared with KAP of HCW who are non-cases.

**Methods:** This study was structured in three parts: serology, KAP survey and in-depth qualitative interviews. Serology of cases was obtained (June 2018) and data collection realized (September 2018). Quantitative data collection was guided by structured interviews using a KAP questionnaire. The KAP survey was conducted in two major cities; Antananarivo (four hospitals) and Toamasina (two hospitals and a mobile clinic). All available cases that underwent serology were included. HCW who were non-cases from the same departments were randomly selected and added to the KAP survey as a comparative group. Non-structured qualitative interviews were performed with cases and key informants (e.g. head of department). Using information from the KAP, we compared risk behavior, e.g. usage of personal protective equipment of cases and non-cases.

**Results:** Out of 81 HCW who had symptoms compatible with plague according to WHO, 36 cases were located in the two cities and recruited for serology. One participant (3%) was anti-*Yersinia pestis* – IgG positive. Sixteen symptomatic HCWs could be included in the KAP survey, as well as 53 non-symptomatic HCWs. Data analysis is ongoing. Upcoming results will be presented.

**Conclusion:** Transmission and infection patterns of PP among HCW remain a complex and understudied concern.

## 040

## BYPASSING OF HEALTHCARE FACILITIES AMONG NATIONAL HEALTH INSURANCE SCHEME (NHIS) ENROLLEES IN IBADAN, SOUTH-WEST NIGERIA

Oladimeji A.[1], Adeniji F.[2], Adewole D.[2]

[1]Health Strategy and Delivery Foundation, Minna;

[2]Dept. of Health Policy and Management, University of Ibadan, Ibadan, Nigeria

**Introduction:** Choosing a healthcare provider is an important decision that individuals and families make. Bypassing occurs when patients knowingly visit a health facility other than the one nearest to him/her. Bypassing can contribute to higher costs of access and poor outcomes. Among National Health Insurance (NHIS) enrollees who do not have to pay for healthcare services and whose choice of healthcare facilities is often made in the healthy state, the factors that determine the facility chosen are not well known.

**Aim:** This study assessed the choice of healthcare provider and perceived quality of care among NHIS enrollees within Ibadan, South-west Nigeria.

**Methods:** The study was a descriptive cross-sectional survey conducted among NHIS enrolees registered and accessing health care services in outpatient departments of 5 randomly selected NHIS-accredited health facilities in Ibadan. A total of 311 NHIS enrollees were consecutively recruited for the study and a semistructured, pre-tested, interviewer-administered questionnaire was used for data collection. Descriptive and inferential statistics were used to present results at 5% significance level. Distance travelled by patients from their residence to the facilities was estimated using Google maps.

**Results:** Mean age of respondents was 37.1±16.1 years. About half of the enrollees, 53.7%, were men and 72.3% were married. A third

(28.9%) of respondents were being treated for malaria and related febrile illnesses while 43% reported needing care for eye, heart, orthopedic and general surgical care. Overall, bypassing rate was 55.3%. About 41% chose their present hospitals on physician referral while 42% made the choice themselves. Respondents who by-passed travelled 27±34.1 more minutes to the farther hospital. The private hospitals providing secondary care [Alaafia hospital (77.8%), Toun Memorial (73.9%), The Vine medical centre (66.7%) and Victory Medical center (72.7%)] had greater proportion of respondents who perceived their hospital had good quality than the government-owned tertiary hospital University College Hospital (32.8%). There was positive association between poor perception of the quality of healthcare and by-passing ($X^2$ = 11.90, $p$< 0.001).

**Conclusion:** Evidence in this study show that by-passing occurs among NHIS enrollees in Ibadan, Southwest Nigeria and it is associated with patients' perception of quality.

## 041

### EFFECTS OF PERFORMANCE-BASED FINANCING ON HEALTH SYSTEMS OUTCOMES: CONCLUSIVE EVIDENCE OR UNDUE HYPE? A SYSTEMATIC REVIEW

**Brugnara L.[1] Marx M.[1,2]**
[1]*Heidelberg Institute of Global Health, University of Heidelberg, Heidelberg;*
[2]*evaplan at the University Hospital Heidelberg, Heidelberg, Germany*

**Introduction:** The WHO´s Health Systems Framework comprises four major Outcomes: 1) improved health (level and equity), 2) responsiveness, 3) social and financial risk protection, and 4) efficiency improvement. Performance-based financing (PBF), or pay-for-performance, are mechanisms to disburse funds according to pre-established criteria of service delivery or performance targets. It has been applied in different low- and middle-income countries as a strategy to improve quality of health services and to strengthen health systems in order to achieve better outcomes.

**Aim:** To investigate the effect of performance-based financing on health system outcomes in low- and middle-income countries.

**Methods:** We carried out a systematic literature review on PBF in primary health care in low- and middle-income countries and its effects on health systems outcomes. We searched in four scientific databases (Pubmed, Web of Science, SciELO and Google Scholar) considering more than 30 MeSH/key terms like performance-based financing, reimbursement incentive, or outcome assessment. We selected peer-reviewed publications that investigated health status (clinical/laboratorial) and equity (including equity in health services access), responsiveness, risk protection (including out-of-pocket/catastrophic expenditures), and efficiency (cost-effectiveness or resource use improvement).

**Results:** We identified 286 documents. We excluded 136 based on their title, 119 based on abstract, and three which we couldn't access the full text. Out of the 28 remaining publications, we could identify only ten referring to at least one of the health system outcomes. Two papers investigated health status improvement (no effect/slight effect), four equity between economic groups (one described positive effect, one no effect, two reverse effect), five responsiveness (four papers showed improved patient satisfaction, one no effect), two financial risk protection (one positive effect, one inconclusive), and one efficiency (inconclusive).

**Conclusion:** Most papers describing the effects of PBF focus on service performance (direct outputs), probably because in practice, such administrative data is easier to generate and easier to apply for performance pay. Yet, if PBF is to be used as a method for health systems strengthening, the effect on health systems outcomes should be considered. We claim that to better understand the effects of PBF more research at the health system and outcome level is needed.

## 042

### WHAT CAN BEHAVIOURAL CHANGE ANALYSIS BRING TO THE COMPREHENSIVE UNDERSTANDING OF PERFORMANCE-BASED FINANCING SUSTAINABILITY? EXPLORATION THROUGH THE APPLICATION OF THE I-CHANGE MODEL ON THE CASE OF BENIN

**Bodson O.[1], Paul E.[1,2]**
[1]*Faculty of Social Sciences, University of Liege, Liege;*
[2]*School of Public Health School, Université Libre de Bruxelles, Brussels, Belgium*

**Introduction:** Performance-based financing (PBF) is promoted as a way to improve health workers' performance. However, despite a growing interest in the issue of motivation and the use of several motivational theories to appraise it, little is still known about PBF internal mechanisms leading to behavioural change, even less on their sustainability. The recent termination of donor-funded PBF programmes in Benin represents a unique opportunity to analyse which motivational mechanisms are sustained when incentives cease.

**Aim:** This study aims to refine the understanding of PBF by using the I-change model[1] and to explore how PBF affects health workers behavioural change in Benin during implementation and after termination.

**Methods:** Our study rests on a qualitative design. We conducted semi-structured interviews with healthcare providers and managers from health centres (N=6) and hospitals (N=2) in two health districts supported by different donors), first during PBF implementation in 2017 and secondly, with some of the stakeholders previously interviewed (N=40), 6 and 9 months after the programmes stopped. Interviews were analysed thematically.

**Results:** PBF produced positive effects on some health workers' behaviours, like interpersonal communication and reporting, that are sustained after PBF termination. During implementation, the prospect of extra gain contributed to the motivation of health workers to adopt these behaviours, however that effect was reduced due to low level and perceived unfair distribution of financial incentives, and reversed with their cessation. Beyond financial incentives, other mechanisms also play an important role in health workers behaviours adoption, which persisted after PBF termination, notably awareness of inner duty, social pressure, and demonstration of the usefulness of some practices. However, some systemic constraints, design and implementation issues, and the absence of an exit strategy reduced their motivational effect.

**Conclusion:** Our behavioural change analysis using the I-change model helps refine the understanding of PBF and sheds light on its effects on health workers' behaviours that go beyond the effects of financial incentives, but can be reduced by systemic constraints, design, implementation and exit strategy issues.

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## 043

### A CROSS-SECTIONAL MIXED-METHODS STUDY OF SEXUAL AND REPRODUCTIVE HEALTH NEEDS, KNOWLEDGE AND ACCESS TO SERVICES AMONG REFUGEE ADOLESCENT GIRLS IN THE NAKIVALE REFUGEE SETTLEMENT, UGANDA

**Ivanova O.[1], Rai M.[1], Mlahagwa W.[2], Tumuhairwe J.[2], Bakuli A.[1], Nyakato V.N.[2], Kemigisha E.[2]**

*1Division of Infectious Diseases and Tropical Medicine, Medical Centre of the University of Munich (LMU), Munich, Germany; 2Faculty of Interdisciplinary Studies, Mbarara University of Science and Technology, Mbarara, Uganda*

**Introduction:** Humanitarian crises and migration make girls and women more vulnerable to poor sexual and reproductive health (SRH) outcomes. Nevertheless, there is still a dearth of information on SRH outcomes and access to SRH services among refugee girls and young women in Africa.

**Aim:** We aimed at assessing SRH needs, experiences and knowledge of refugee girls in the Nakivale settlement, Uganda.

**Methods:** A cross-sectional survey among 260 adolescent girls 13-19 years old was conducted between March and May 2018. Concurrently, in-depth interviews and focus group discussions were conducted among a subset of adolescents. For both methods, information was collected regarding SRH knowledge, experiences and access to services and commodities. The questionnaire was entered directly on the tablets using the Magpi® app. Descriptive statistical analysis was performed. Qualitative data was transcribed and analysed using thematic content analysis.

**Results:** A total of 260 participants were interviewed, with a median age of 15.9 years. The majority of girls were born in DR Congo and Burundi. Of the 93% of girls who had experienced menstruation, 43% had ever missed school due to menstruation. Regarding SRH knowledge, a total of 11.7% were not aware of how HIV is prevented, 15.7% did not know any STI and 13.8% were not familiar with any method to prevent pregnancy. A total of 30 girls from 260 were sexually active, of which 11 had experienced forced sexual intercourse. The latter occurred during conflict, in transit or within the camp. A total of 27 of 260 participants had undergone female genital mutilation (FGM). The most preferred sources for SRH information was parents or guardians, although participants expressed that they were afraid or shy to discuss other sexuality topics apart from menstruation with parents. A total of 30% of the female adolescents had ever visited a SRH service centre, mostly to test for HIV and to seek medical aid for menstrual problems.

**Conclusion:** Adolescent refugee girls lack adequate SRH information, experience poor SRH outcomes including school absence due to menstruation, sexual violence and FGM. Comprehensive SRH services including sexuality education, barrier-free access to SRH services and parental involvement are recommended.

## 044

### INCREASING TRENDS IN ADOLESCENT CHILDBEARING AMONG WOMEN IN ALL EDUCATIONAL GROUPS IN ZAMBIA, BUT OVERALL DECLINE

**Kampata L.[1,2,3], Sandøy I.[1,3]**
*1Center for International Health, University of Bergen, Bergen, Norway; 2School of Public Health, University of Zambia, Lusaka, Zambia; 3Centre for Intervention Science in Maternal and Child Health, University of Bergen, Bergen, Norway*

**Introduction:** Early age at childbirth poses risks to the health, social and economical wellbeing of women and their children. Studies have shown that higher educational attainment leads to higher age at first birth. In Zambia, access to education for women has increased since the 1990s, and this is expected to have affected trends in early childbearing.

**Aim:** To examine trends in childbearing before age 18 across education attainment levels among Zambian women aged 18-24 from 1992 to 2014.

**Methods:** We analysed data on age at first birth from the 1992, 1996, 2001/2, 2007 and 2013/14 Zambia Demographic and Health Surveys. The analyses were restricted to women aged 18-24 years (n=13,818). Mixed effects logistic regression was used to assess the trends.

**Results:** Overall, there was a significant negative trend in the proportion giving birth early from 33.8% in 1992 to 30.6% in 2013 ($p<0.001$). However, the odds of giving birth before age 18 tended to increase across all educational attainment levels. The proportion increased among women with middle educational attainment from 31.1 to 39% (OR=1.42, 95% CI, 1.17-1.72) and among those with high educational attainment from 5.9 to 15.9% (OR=3.04, 95% CI, 1.70-5.43). The difference in early childbirths between the low and high educational attainment groups was greater in 1992 (40.4 to 5.9%, OR=0.09, 95% CI, 0.05-0.17) than in 2013 (44.9 to 15.9%, OR=0.23, 95% CI, 0.19-0.29), and it was greater among urban ($OR_{1992}$=0.05, 95% CI, 0.02-0.14; $OR_{2013}$=0.13, 95% CI, 0.09-0.20) than rural women ($OR_{1992}$=0.16, 95% CI, 0.07-0.34; $OR_{2013}$=0.32, 95% CI, 0.24-0.42).

**Conclusion:** The odds of giving birth before age 18 increased at all educational levels since 1992 despite the overall slowly declining trend. The increased odds among higher educated women probably reflects that this group grew in size (from 10% to 44% of the sample) and was more heterogeneous in 2013, comprising a higher proportion of sexually active women, compared to the highly selected group of educated women in 1992. This may indicate that education in itself is not adequate in reducing adolescent childbearing and that other factors probably also must be tackled in order to reduce early childbearing.

## 045

### ASSESSING THE IMPACT OF CLIMATE CHANGE ON SLEEPING SICKNESS IN ZIMBABWE USING A GEOSPATIAL MODEL OF TSETSE POPULATION DYNAMICS

**Longbottom J.[1,2], Lord J.[1], Torr S.[1]**
*1Dept. of Vector Biology, Liverpool School of Tropical Medicine, Liverpool; 2Centre for Health Informatics, Computing and Statistics, Lancaster University, Lancaster, UK*

**Introduction:** Climate change influences the entomological and epidemiological components of vector-borne diseases. For Rhodesian human African trypanosomiasis (rHAT), recent increases in temperature have resulted in a decline in tsetse fly abundance at one field site in Northern Zimbabwe[1]. Researchers demonstrated this using a mechanistic model of tsetse population dynamics, incorporating the effects of temperature on tsetse mortality and development rates[1].

**Aim:** We aimed to produce a geospatial model of tsetse population dynamics to explore the effect of climate change on the abundance of the rHAT vector *Glossina pallidipes* throughout other sites within Northern Zimbabwe.

**Methods:** We compared remotely sensed MODIS temperature data to local weather station data previously used to fit the mechanistic model to longitudinal *G. pallidipes* abundance[1]. We then used the MODIS data to estimate mortality and development rates in the existing ordinary differential equation (ODE) model, running simulations for each 1 km × 1 km cell in Northern Zimbabwe, from 2000 to 2016. The projection of this model throughout Northern Zimbabwe produced estimates of changes in tsetse abundance for locations currently lacking longitudinal data.

**Results:** Our model predicts decreasing abundance of tsetse within several low elevation areas in relation to increasing temperature trends during 2000-2016. Conversely, we show that several high elevation areas, previously considered too cold to sustain tsetse, are now suitable climates, with viable population predictions.

**Conclusions:** The model produced here details, to the best of our knowledge, the first temperature-driven spatial projection of tsetse population dynamics within Zimbabwe. Both rHAT occurrence and tsetse abundance show decreasing trends across much of the Zambezi valley, with climate change likely to be one of several factors having an effect.

Future work including empirical studies to validate model predictions is planned.

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## 046

### MALARIA: BAD AIR - IS CLIMATE A RELIABLE PREDICTOR FOR MALARIA CASE DISTRIBUTIONS IN THE DOMINICAN REPUBLIC?

**Tapia L.[1,2], Arredondo-Abreu C.[2], Ruiz-Matuk C.B.[2], Paulino-Ramirez R.[1,2]**
[1]*Institute for Tropical Medicine & Global Health, Universidad Iberoamericana;*
[2]*Research Dept., Universidad Iberoamericana, Santo Domingo, Dominican Republic*

**Introduction:** Malaria, caused by the Plasmodium spp parasite, has established endemicity in the Dominican Republic. Malaria cases reports follow a seasonality pattern throughout the tropical regions. With the United Nations' goal to eradicate Malaria, understanding it's infectious dynamics has taken a front stage in the fight against this disease.

**Aim:** The aim of this study is to describe the relationship between climatologic factors and Malaria cases in Santo Domingo.

**Methods:** Weekly malaria reports from January 2013 to December 2017 were extracted from the Ministry of Health database. Meanwhile, Maximum, Minimum and Mean Temperature, Rainfall and Relative Humidity were obtained from to the National Meteorological Office. Correlation of individual factors was calculated using 1 week, 4 weeks, and 24 weeks lag time to establish a relationship between disease and climate. Regressions for these lags were conducted to explain the combined variance explained by the climatologic factors.

**Results:** At 1-week lag time, rain correlates with Malaria cases (tau = 0.10, $p < 0.05$). At a 4-week lag time, a negative correlation (tau= - 0.09, $p < 0.05$) exists between Humidity and Malaria cases reported. At 24 weeks lag, correlations between malaria cases and Mean Temperature (tau= -.10, $p < 0.05$), Minimum Temperature (tau= - 0.11, $p < 0.05$) and maximum temperature (tau= - 0.10, $p < 0.05$) were found. Regression models carried out with each lag were not significant.

**Conclusion:** Climatologic factors correlate with reported Malaria cases but fail to function as a predictive model for future disease. Strongest correlation occurs at a 24 week lag between malaria cases and temperature measures. Temperature proves to be a determining condition for Anopheles mosquito metabolic demand. Behavior factors related to malaria prevention is recommended to have a more comprehensive model.

## 047

### HUMAN RELEVANT TICKS AND TICK-BORNE PATHOGENS FROM MIGRATORY BIRDS IN SOUTHERN AND CENTRAL EUROPE

**Battisti E.[1], Urach K.[2], Cardinale M.[3], Felsberger G.[4], Ferroglio E.[1], Fusani L.[2], Hodžić A.[5], Hufnagl P.[4], Duscher G.G.[5]**
[1]*Università degli Studi di Torino, Turin, Italy;*
[2]*University of Vienna, Vienna, Austria;*
[3]*Swedish University of Agricultural Sciences, Lysekil, Sweden;*
[4]*Austrian Agency for Health and Food Safety;*
[5]*Institute of Parasitology, University of Veterinary Medicine, Vienna, Austria*

**Introduction:** Every year in spring time migratory birds carry larvae and nymphs of foreign tick species e.g. Hyalomma spp., along their way through Europe. During the bird´s journey the ticks drop off and in case of suitable prevailing weather conditions, those ticks are able to develop further to adult ticks and quest for new hosts in the new habitat. So happened in October last year in the north of Austria, where an adult male Hyalomma marginatum was found on a Haflinger horse. Additionally this tick was harbouring Rickettsia aeschlimannii, clearly pointing out the risk of importation of "exotic" diseases such as Crimean-Congo Hemorrhagic Fever virus (CCHFv), which can be transmitted by especially this tick species.

**Aim:** Therefor we investigated mirgratory birds on their spring travel towards northern Europe for the abundance of ticks and tick-borne pathogens and to give a risk assessment for the transfer of pathogens via migratory birds.

**Methods:** In 2016 and 2017 on the bird ringing station on the Island Ponza ticks were removed from mirgratory birds and those ticks were further analysed for the occurrence of zoonotic pathogens by the use of PCR.

**Results:** From 728 captured birds, 104 birds showed tick infestation and 231 ticks were derived from these. The vast majority of ticks were Hyalomma spp. Out of these 20.1 % were tested positive for "spotted-fever-group" Rickettsia comprising Rickettsia aeschlimannii, Rickettsia africae and Rickettsia raoultii. None of the ticks were found positive for CCHFv.

**Conclusion:** Migratory birds represent a constant possibility for exotic tick species to be introduced to northern areas. With these tick species new zoonotic pathogens such as R. aeschlimannii come along and there is a potential for CCHFv to be introduced as well. The public should be trained to notice "new and exotic" tick species.

## 048

### A NOVEL METHOD TO MONITOR USE OF INSECTICIDE TREATED CATTLE TO CONTROL HUMAN AND ANIMAL AFRICAN TRYPANOSOMIASIS IN TANZANIA

**Lea R.S.[1], Logan R.A.E.[1], Auty H.K.[2], Allan F.K.[3], Mbata G.H.[4], Lord J.S.[1], Morrison L.J.[3], Mramba F.[5], Hall D.R.[6], Torr S.J.[1]**
[1]*Dept. of Vector Biology, Liverpool School of Tropical Medicine, Liverpool, UK;*
[2]*Epidemiology Research Unit, SRUC, Inverness;*
[3]*Roslin Institute, University of Edinburgh, UK;*
[4]*Vector and Vector-Borne Diseases Research Institute, Tanga, Tanzania;*
[5]*Tanzania Veterinary Laboratory Agency, Dar es Salaam, Tanzania;*
[6]*Natural Resources Institute, University of Greenwich, Chatham, UK*

**Introduction:** National Parks in East and Southern Africa are hotspots for human and animal trypanosomiasis, caused by trypanosomes transmitted by tsetse flies. Our work in farming areas on the edge of the Serengeti National Park (SNP) in Tanzania suggests that unexpectedly low numbers of tsetse[1] may be due to widespread treatment of cattle with pyrethroids by livestock keepers.

**Aim:** To estimate the proportion of cattle treated with insecticide by livestock owners around the SNP and the amounts applied. Also, to develop a simple and cost-effective method for quantifying insecticide concentration on cattle hair to aid monitoring of large-scale interventions.

**Methods:** Hair samples were collected from 44 cattle herds located within 5 km of the SNP and surrounding game reserves, and a short questionnaire on insecticide use was administered. The concentration of pyrethroids from 180 cattle was assessed by gas chromatography-mass

spectrometry (GC-MS). Hair was also collected from experimental cattle treated with known concentrations of alphacypermethrin at 1-14 days post-treatment, bioassayed by exposing tsetse to the hair, and the insecticide concentration assessed using GC-MS and high-performance liquid chromatography (HPLC). Sub-samples from the farming area and experimental herd were also analysed using a modified simple colorimetric method (Insecticide Quantification Kit, IQK) suitable for quantifying cyano-pyrethroids[2].

**Results:** In the questionnaire, 67% of livestock owners reported using insecticide in the previous month to control tick- and tsetse-borne diseases in livestock. Chemical analyses of hair showed that pyrethroids were present in ~20% of herds. Bioassays showed that tsetse exposed to hair treated 1-4 days post treatment were killed but mortality declined to 2% by day 14; HPLC and GC-MS of the hair showed a similar decline in concentration of alphacypermethrin. The IQK was able to provide a semi-quantitative measure of pyrethroids present in cattle hair.

**Conclusion:** High levels of pyrethroid use in herds is a likely important cause of the low numbers of tsetse in areas bordering the SNP, providing an example of a One Health solution to the risk of sleeping sickness. The IQK shows potential as a simple and cost-effective method for assessing use of pyrethroids by livestock keepers.

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## 049

### CRIMEAN-CONGO HAEMORRHAGIC FEVER VIRUS SEROPREVA-LENCE IN TANZANIAN LIVESTOCK

**Hughes E.C.[1,2], Cleaveland S.[1], Allan K.J.[1], Kibona T.J.[3], Lankester F.[4], Davis A.[5], de Glanville W.A.[1], Willett B.J.[2]**
[1]Institute of Biodiversity, Animal Health and Comparative Medicine, University of Glasgow, UK;
[2]Centre for Virus Research, University of Glasgow, UK;
[3]Nelson Mandela African Institution of Science and Technology, Arusha, Tanzania;
[4]Paul G. Allen School for Global Animal Health, Washington State University, Pullman, USA;
[5]Institute of Health and Wellbeing, University of Glasgow, UK

**Introduction:** Crimean-Congo haemorrhagic fever virus (CCHFV) is a tick-borne zoonotic orthonairovirus which can cause fatal haemorrhagic disease in human patients and has a reservoir in domestic livestock species. The virus has a wide geographic range and is known to circulate in areas where no human cases have previously been reported. The virus has recently emerged in human populations in Uganda, leading to a number of fatalities, but the presence of CCHFV elsewhere in East Africa remains poorly understood. Northern Tanzania has been identified as an area of risk for human exposure but currently almost nothing is known about virus circulation in the country. Elsewhere, patterns of exposure in livestock have been shown to provide important insights into CCHFV exposure risk in humans so further investigation into animal reservoirs is required to better understand the potential threat to human health.

**Aim:** This study aims to investigate the seroprevalence, spatial distribution and risk factors associated with CCHFV exposure in Tanzanian livestock species.

**Methods:** Serum samples from approximately 8000 cattle, sheep and goats were collected as part of a cross-sectional survey in Arusha and Manyara regions, Tanzania during 2016. Samples were tested for CCHFV seropositivity using in-house and commercial N-protein based indirect and double-antigen sandwich ELISAs.

**Results:** Initial investigations indicate that approximately 40% cattle,

30% goats and 25% sheep were seropositive for CCHFV. Further testing and risk factor analysis is ongoing.

**Conclusion:** This is the first study to investigate CCHFV exposure in Tanzanian livestock. Initial results demonstrate that the virus is circulating in northern Tanzania and may present a hazard to human health. This One Health investigation, into the spatial patterns and risk factors associated with livestock exposure, is an important first step in characterising the potential threat CCHFV poses to human health in Tanzania.

## 050

### ANTIMICROBIAL RESISTANT BACTERIA IN ANIMALS, FOOD AND HUMANS - A STUDY WITH ONE HEALTH APPROACH

**Vinueza-Burgos C.[1], Ortega-Paredes D.[1], De Janon S.[1], Medina J.[1], Damian P.[1], Naranjo V.[1], Jaramillo K., Villavisencio F.[2], Villacis J.[2]**
[1]Unity of Research in Foodborne Diseases and Antimicrobial Resistance, Faculty of Veterinary Medicine, Central University of Ecuador;
[2]National Institute of Research in Public Health - Dr. Leopoldo Izquieta Pérez, Quito, Ecuador

**Introduction:** Antimicrobial resistance (AMR) is a worldwide concern and must be addressed with a One Health approach. The prevalence of indicator ESBL *Escherichia coli* and *Salmonella,* and its resistant characteristics in poultry production and humans are unknown in Ecuador.

**Aim:** To establish the prevalence and genetic determinants of AMR in ESBL *E. coli* and *Salmonella* isolated from poultry farms, chicken carcasses and humans in Ecuador.

**Methods:** We isolated ESBL *E. coli* (TBX agar + cefotaxime 3mg/l) and *Salmonella* (ISO 6579) from 13/11/2017 to 25/9/2018 in Quito city (Ecuador). Bacterial isolation was conducted in samples from 133 poultry flocks, 335 chicken carcasses at retail and 302 human gastroenteritis cases. AMR to 6 families of antibiotics was assessed by VITEK® system for ESBL *E. coli* and Kirby Bauer method for *Salmonella*. Serotypes of *Salmonella* isolates were obtained by PCR. Genes determining AMR to cephalosporins and colistin were tested by PCR and DNA sequencing.

**Results:** ESBL *E. coli* was present in 93.2% (n=124/133), 77.9 % (n=261/335) and 50.6% (n= 153/302) of farms, carcasses and humans respectively. *Salmonella* was present in 41.4% (n=55/133), 55.5% (n=186/335), and 1.9% (n=7/302) of farms, carcasses and humans respectively. Serotypes of *Salmonella* isolates (n=248) were Infantis (241), Tiphymurium (3), Enteritidis (2) and Dublin (1). One isolate could not be serotyped. Antimicrobial resistance rates >90% were found for $\beta$-lactams, quinolones and fosfomycin; resistance to nitrofurantoin was registered in 8% of isolates. Lower AMR rates (<5%) were found for amikacin and carbapenemes. 98% of ESBL *E. coli* and ESBL *Salmonella* presented multi-drug resistant phenotypes. Genes of the $bla_{CTX-M}$ group were found in 85% of ESBL isolates. The most frequent variant was $bla_{CTX-M-55}$ followed by $bla_{CTX-M-65}$, $bla_{CTX-M-3}$, $bla_{CTX-M-2}$, $bla_{CTX-M-123}$, $bla_{CTX-M-15}$ and $bla_{CTX-M-8}$. On the other hand, 1,5% of isolates presented the $bla_{CMY-2}$ variant. ESBL *E. coli* with the presence of *mcr*-1 gene were found in 18 isolates.

**Conclusion:** This research brings insights to the epidemiology of AMR foodborne bacteria. Specifically, the poultry sector appears to be a hotspot for antimicrobial resistance in Ecuador, but further research in other livestock is needed to have a broader epidemiological view.

## 051

### IDENTIFYING THE ROLE OF THE DIFFERENT RESERVOIR HOSTS OF ZOONOTIC SCHISTOSOMIASIS IN WEST AFRICA

**Léger E.**[1,2], **Catalano S.**[1,2], **Borlase A.**[1,2], **Fall C.B.**[3], **Diop S.D.**[4], **Webster B.L.**[5,2], **Rollinson D.**[5,2], **Diouf N.**[6], **Sène M.**[6], **Webster J.P.**[1,2]

[1]*Royal Veterinary College, University of London, London, UK;*
[2]*London Centre for Neglected Tropical Disease Research, London, UK;*
[3]*Université Cheikh Anta Diop, Dakar, Senegal;*
[4]*Université de Thiès, Bambey, Senegal;*
[5]*Natural History Museum, London, UK;*
[6]*Université Gaston Berger, Saint-Louis, Senegal*

**Introduction:** Schistosomiasis is a neglected tropical disease caused by Schistosoma parasitic worms, which inflicts a significant burden on human and animal populations, particularly across sub-Saharan Africa. Anthropogenic land-use changes affect the distribution and availability of suitable definitive and intermediate hosts, increasing opportunities for hybridization between human and animal schistosomes with subsequent zoonotic transmission. This can have a substantial impact on the dynamics and distribution of schistosomiasis, with further challenges and constraints for effective control.

**Aim:** Our aim was to elucidate the role of different definitive hosts as reservoirs of zoonotic Schistosoma single species and hybrids in a region of northern Senegal subject to important anthropogenic change.

**Methods:** Extensive and systematic parasite sampling from human, livestock, and rodent definitive hosts, combined with snail intermediate hosts, were performed over three years across key transmission sites in northern Senegal. Multi-locus molecular analyses of all Schistosoma isolates, followed by Maximum Likelihood (ML) and Bayesian Inference (BI), were used to infer phylogenetic and transmission dynamics between the circulating zoonotic Schistosoma species/hybrids and their hosts.

**Results:** Molecular analyses confirmed the presence of widespread viable hybridization within and between Schistosoma species of humans and animals. Phylogenetic analyses indicated shared transmission of zoonotic Schistosoma species and hybrids between humans and animals (both wild and domestic), providing unique insights into the role of different host species in maintaining transmission.

**Conclusion:** Our study emphasizes the need for a One Health multi-host framework for schistosomiasis control in both people and animals living in high zoonotic transmission zones of sub-Saharan Africa.

## 052

## TOWARDS A ONE-HEALTH COST-EFFECTIVENESS EVALUATION OF SCHISTOSOMAISIS CONTROL IN AFRICA

**Vince L.**[1,2], **Gower C.M.**[1,2], **Binetou-Fall C.**[3], **Leger E.**[1,2], **Borlase A.M.**[1,2], **Waldman L.**[4], **Sene-Wade C.M.**[5], **Diouf N.D.**[6], **Jackson E.**[7], **Webster J.P.**[1,2]

[1]*Dept. of Pathobiology and Population Sciences, The Royal Veterinary College, London;*
[2]*London Centre for Neglected Tropical Disease Research (LCNTDR), Imperial College, London, UK;*
[3]*Faculté de Médecine, de Pharmacie et d'Odontologie, Université Cheikh Anta Diop, Dakar, Senegal;*
[4]*Institute of Development Studies, University of Sussex, Falmer, Brighton, UK;*
[5]*Unité de Formation et de Recherche (UFR) des Sciences Agronomiques, d'Aquaculture et de Technologies Alimentaires (S2ATA), Université Gaston Berger, Saint-Louis;*
[6]*Institut Supérieur de Formation Agricole et Rurale (ISFAR), Université de Thiès, Bambey, Senegal;*
[7]*Curtin Business School, Curtin University, Perth, Australia*

**Introduction:** Schistosomiasis affects over 240 million people, predominantly in sub-Saharan Africa. Schistosomiasis in Africa was thought to be a largely human disease. Recent research identifies zoonotic transmission in sub-Saharan Africa as more significant than previously assumed, potentially reducing the efficacy and cost-effectiveness of preventative chemotherapy (PC) control programmes.

**Methods:** A review of economic evaluations of human and animal schistosomiasis control programmes was conducted, focusing on, economic interactions between human and animal disease. Systematic searches of eleven databases were carried out using structured methodology. Focus groups (n = 30) were carried out with farmers in four areas of Senegal (Barkadji, Richard Toll, Dakar and Koungheul). In-depth interviews (n = 32) were conducted with veterinarians, human health workers and policy makers to ascertain knowledge, attitudes and practices in relation to schistosomiasis. The rationale and availability of data for conducting a One Health economic evaluation to inform policy on schistosomiasis control in Africa we assessed.

**Results:** 53 studies were identified: 13 reported costs per child treated with PZQ or screened for schistosome infection; 39 reported cost-effectiveness or cost-benefit of schistosome control. Eleven studies in China considered zoonotic disease control, of which one reported costs reflecting a One Health perspective, but no studies on zoonotic control were reported from Africa. Farmers in endemic regions considered schistosomiasis to be in the top three severe livestock diseases. Human and animal formulae medications were used for animal treatment and participants felt a One-Health approach was needed in some regions.

**Conclusions**: A lack of data on the impact of livestock schistosomiasis was highlighted. A framework for a one-health cost–effectiveness evaluation was developed. In high knowledge regions, participants indicated that livestock treatment could benefit both animals and people. Further work is imperative to evaluate costs, disease impact and control options of schistosomiasis on animal health and production.

## 053

## PREVALENCE AND GENETIC DIVERSITY OF *T. GONDII* IN PIGS FROM YUCATAN, MEXICO

**Cubas-Atienzar A.I.**[1,2], **Hide G.**[2], **Ortega-Pacheco A.**[3], **Jiménez-Coello M.**[3], **Smith J.E.**[2]

[1]*Dept. of Clinical Sciences, Liverpool School of Tropical Medicine, Liverpool;*
[2]*Dept. of Parasitology, School of Environment and Life Sciences, University of Salford, Manchester, UK;*
[3]*Dept. of Biology, Faculty of Veterinary Sciences and Zoology, Autonomous University of Yucatan, Merida, Mexico*

**Introduction:** *T. gondii* is a zoonotic parasite of worldwide distribution. Seroprevalences of 70%-90% have been reported among the human population of Yucatan. Recent studies suggested that the pork produced in this area could have important public health implications but studies in pigs are limited in this locality. The parasite presents geographical patterns of strain variation with contrasting high levels of diversity across South America and restricted variation across North America, but little is known about the diversity of strains originated in Yucatan which lies in the transitional area between the two continents.

**Aim:** The aims of the present work were to investigate the prevalence of *T. gondii* in domestics pigs of Yucatan and genotyping of strains among pigs and sympatric animal species.

**Methods:** *T. gondii* prevalence and genotypes were investigated through a cross-sectional survey of commercial pig farms, together with post-mortem sampling at abattoirs. Nested-PCR amplification of the major surface antigen (SAG1) and the modified agglutination test (MAT) were used for diagnosis of the parasite and multi-locus sequence typing (MLST)

was used for genotyping of strains. The viability of the parasite was further investigated in tissue samples by mouse bioassay.

**Results:** The overall prevalence among 632 pigs was 1.4% (95%CI, 0.6%-2.7%) with the MAT (cut-off $\geq$ 1:25) and 19.8% (95%CI, 16.7%–23%) by PCR on blood. A total of 46 pig tongues were collected from 2 abattoirs of which 34.8% (95%CI, 21.4%–50.3%) were positive by PCR. Mouse bioassay was attempted in 40 of these tongues and 7.5% (95%CI, 1.5%–20.4%) were positive. Genotyping results revealed a high diversity among Yucatan strains with evidence of recombination and novel alleles. *T. gondii* strains from Yucatan possessed a mixture of genotypes found in both North and South America with a lack of a clear predominant genotype.

**Conclusion:** Prevalence and bioassay results indicate that pork could be a potential *T. gondii* infection risk to humans. Genetic population structure of the parasite in Yucatan resembles to other regions of Central America with significant levels of allelic variation and recombination which constitutes a reservoir for new strains.

## 054

### THE IMPACT OF SHORT-TERM RECONSTRUCTIVE SURGICAL MISSIONS: A SYSTEMATIC REVIEW

Hendriks T.C.C.[1], Botman M.[1], Rahmee, C.N.S.[2], Ket J.C.F.[2], Mullender M.G.[1], Gerretsen B.[3], Nuwas E.Q.[4], Marck K.W.[5], Winters H.A.H.[1]

[1]Dept. of Plastic, Reconstructive and Hand Surgery, VU medisch centrum, Amsterdam, The Netherlands;
[2]VU medisch centrum, Amsterdam, The Netherlands;
[3]KIT royal tropical institute, Amsterdam, The Netherlands;
[4]Surgery department and director, Haydom Hospital, Haydom, United Republic of Tanzania;
[5]Dept. of Plastic Surgery, Medisch Centrum Leeuwarden, Leeuwarden, The Netherlands

**Introduction:** Short-term missions providing patients in low-income countries with (specialized) reconstructive surgery are often criticized because evidence of their value is lacking.

**Aim:** This study aims to assess the effectiveness of short-term reconstructive surgical missions in low- and middle-income countries.

**Methods:** A systematic review was conducted according to PRISMA guidelines. We searched five medical databases from inception up to 2 July 2018. Original studies of short-term reconstructive surgical missions were included, which reported data on patient safety measurements, health gains of individual patients and sustainability. Data were combined to generate overall outcomes, including overall complication rates. PROSPERO registration: CRD42018099285.

**Results:** Of 1662 identified studies, 41 met full inclusion criteria, which included 48,546 patients. The overall study quality according to Oxford CEBM and GRADE was low. Ten studies reported a minimum of six months follow-up, showing a follow-up rate of 56.0% and a complication rate of 22.3%. Twelve studies that did not report on duration or follow-up rate, reported a complication rate of 1.2%. Fifteen out of 20 studies (75%) that reported on follow-up, also reported on sustainable characteristics.

**Conclusion:** Evidence on the patient outcomes of reconstructive surgical missions is scarce and of limited quality. Higher complication rates were reported in studies which explicitly mentioned the duration and rate of follow-up. Studies with a low follow-up quality might be underreporting complication rates and overestimating the positive impact of missions. This review indicates that missions should develop towards sustainable partnerships. These partnerships should provide quality aftercare, perform outcome research and build the surgical capacity of local healthcare systems. In line with this conclusion the author is currently conducting one such study on post-burn contractures in rural Tanzania. The study is conducted in a low-income country hospital with a long-standing sustainable partnership with high-income countries, which enables local capacity building. The study aims to provide quality clinical research outcome with a long-term follow-up.

## 055

### DISTRICT LEVEL MALARIA RISK IN MAINLAND TANZANIA: DEVELOPING A STRATIFICATION APPROACH FOR TARGETED MALARIA INTERVENTION STRATEGIES

Thawer S.[1], Mohamed A.[2], Chacky F.[2], Runge M.[3,4], Mandike R.[2], Mkude S.[1], Pothin E.[3,4], Snow R.W.[5,6], Molteni F.[1]

[1]Swiss Tropical and Public Health Institute, Dar-es-salaam;
[2]National Malaria Control Programme, Ministry of Health, Community Development, Gender, Elderly and Children, Dodoma, Tanzania;
[3]Swiss Tropical and Public Health Institute;
[4]University of Basel, Basel, Switzerland;
[5]Kenya Medical Research Institute, Wellcome Trust Research Programme, Nairobi, Kenya;
[6]Centre for Tropical Medicine and Global Health, Nuffield Dept. of Clinical Medicine, University of Oxford, Oxford, UK

**Introduction:** Recent efforts in malaria control in mainland Tanzania has led to progressive changes in the epidemiological profile of malaria with prevalence in children aged 6-59 months declining from 18.1% in 2008 to 7.3% in 2017. As heterogeneity in malaria transmission increases, a sub-regional stratification becomes crucial for optimised implementation of interventions. However to this aspect, malaria global strategy only provide generic guidance to countries.

**Aim:** Developing an approach for country specific stratification at district level according to malaria burden for identification of suitable intervention packages per strata.

**Methods:** The annual parasite incidence, test positivity rate, confirmed malaria incidence and malaria positivity in pregnant women obtained from routine District Health Information System (DHIS2), and parasite positivity rate in school children ($Pf$PR$_{5to16}$) obtained from the two latest biennial district representative School Malaria Parasitological Surveys (SMPS) were used as malaria burden indicators. The $Pf$PR$_{5to16}$ was taken as reference for the other indicators to determine appropriate thresholds. The maximum value of the past three years was used to allocate each district to one of four risk strata determined based on the identified thresholds. After stratification, modelling was used to predict the impact of intervention packages per strata.

**Results:** The identified thresholds defined four epidemiological strata: very low (<1% $Pf$PR$_{5to16}$), low (1-<5% $Pf$PR$_{5to16}$), moderate (5-<30% $Pf$PR$_{5to16}$) and high (>30% $Pf$PR$_{5to16}$). Out of 184 districts, 28 districts were in the very low strata (12% of the population), 34 in the low strata (28% of population), 49 in the moderate strata (23% of population) and 73 in the high strata (37% of population). Geographically, most of the districts in the low strata were situated in the central corridor running from north-east to south-west parts of the country, whilst the areas in the moderate to high strata were seen in the north-west and south-east regions.

**Conclusion:** A stratification approach based on routinely collected malaria burden estimates was developed. The resulting stratification allowed for setting effective targeted interventions towards malaria burden reduction or elimination according to the transmission intensity in mainland Tanzania.

## 056

### RECURRENCE BEHAVIOUR AND RELAPSE CHARACTERISTICS OF *PLASMODIUM OVALE* SPP. IN GABON

**Groger M.[1,2,3], Veletzky L.[1,2], Lalremruata A.[3], Meyer E.L.[4], Cattaneo C.[2], Mischlinger J.[1,2], Mombo-Ngoma G.[1,2], Blessborn D.[5,6], Führer H.P.[7], Ramharter M.[1,2,8]**

[1]*Dept. of Tropical Medicine, Bernhard Nocht Institute for Tropical Medicine & I. Dep. of Medicine, University Medical Center Hamburg-Eppendorf, Hamburg, Germany;*

[2]*Centre de Recherches Médicales de Lambaréné, Lambaréné, Gabon;*

[3]*Institut für Tropenmedizin, Eberhard Karls Universität Tübingen, Tuebingen, Germany;*

[4]*Center for Medical Statistics, Informatics and Intelligent Systems, Section for Medical Statistics, Medical University of Vienna, Vienna, Austria;*

[5]*Centre for Tropical Medicine and Global Health, Nuffield Dept. of Medicine, University of Oxford, UK;*

[6]*Mahidol-Oxford Tropical Medicine Research Unit, Faculty of Tropical Medicine, Mahidol University, Bangkok, Thailand;*

[7]*Institute of Parasitology, University of Veterinary Medicine Vienna, Vienna, Austria;*

[8]*German Center for Infection Research (DZIF), partner site Hamburg-Luebeck-Borstel, Hamburg, Germany*

**Introduction:** Tertian malaria has been long assumed to relapse. Yet, also other malaria parasites seem capable of evoking reappearing parasitaemia months to years after the primary infection. Recently, doubts about the currently accepted relapse theory of *Plasmodium ovale* (Po) spp. were raised by the scientific community as hypnozoites could so far not be demonstrated in the human host. Also, molecular methods have barely been used to support relapse reports.

**Aim:** The aim of this study was to describe *Po* spp. reappearance and relapse using molecular methods.

**Methods:** Baseline Po spp. mono or mixed infections were included and treated with artemether-lumefantrine. Participants were followed up biweekly for up to one year. In case of microscopic positivity, blood was drawn for further analyses. Blood samples were analysed by ultra-sensitive Pan-*Plasmodium* RT-PCR and *Plasmodium* species-specific nested singleplex quantitative real-time PCR. In case of reappearance of the same ovale species, 18S, potra, and porbp2 genes were partially sequenced and isolates were compared. Criteria for relapse were sameness of isolates in at least two genes, documented treatment of the preceding malaria episode, adequate D7 lumefantrine concentration and at least one negative PCR result between the two concerning episodes.

**Results:** 26 participants were eligible for analyses. The male/female ratio was 1, mean age was 8.2 years (range 2-81). At baseline, 17 participants had a real-time qPCR diagnosed *P. ovale curtisi* (Poc) infection, 13 were positive for *P. ovale wallikeri* (Pow). Twenty-four Poc reappearances and four Pow reappearances were detected in twelve participants, all before week 33. Ten reappearances fulfilled the criteria for Poc relapse. No Pow relapse could be discovered.

**Conclusion:** This is the first prospective analysis postulating ovale relapse in a patient cohort based on molecular methods. Genotyping shows homologous reappearance of the same Poc parasites following initial blood stage clearance which is in line with the current relapse theory. The results further prove that Poc and Pow circulate as sympatric species in Gabon. Interestingly, Poc was more prevalent than in this cohort than Pow. All observed relapses were caused by Poc, the absence of Pow relapses remains to be explained.

**057**

## ANOTHER WAY OF MAPPING MALARIA TRANSMISSION INTENSITY IN NIGERIA AND BEYOND

**Nakakana U.N.[1,2], Ahmed M.I.[3], Jiya N.M.[1], Jega R.M.[1], Onankpa B.O.[1]**

[1]*Dept. of Paediatrics, Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria;*

[2]*Medical Research Council The Gambia Unit at London School of Hygiene and Tropical Medicine, The Gambia;*

[3]*Dept. of Community Medicine, Usmanu Danfodiyo University Teaching Hospital, Sokoto, Nigeria*

**Introduction:** There have been several attempts at mapping malaria prevalence, particularly in areas where there is the highest burden of the disease, in Sub Saharan Africa. Unfortunately, there is the least availability of information in these areas. Most of these maps aim to bridge these gaps by estimating the prevalence, where this information is not available, based on mathematical models, utilising geographic information of the various locations. Some of these maps include the Malaria Atlas Project (MAPs) and Mapping Malaria Risk in Africa (MARA) in West Africa. We propose a new way of mapping Malaria transmission globally, particularly in areas where there is some information of malaria transmission.

**Aim:** To map malaria transmission intensity in Wamakko, Nigeria and propose a method for mapping malaria intensity globally.

**Methods:** We use Geographic Information Systems to make these maps. Using a base map of Nigeria, we geo-locate the sites of previous malaria surveys, particularly the Nigerian Malaria Indicator Survey of 2010. The prevalence in each of the sites is transformed to the estimated prevalence among children 2 to 10 years of age, as exists in the MAP database and extend the prevalence in each case to 10km of the index site, based on the average flight distance of the predominant vector in this region. It is also extended a further 5Km, based on the maximum flight distance of the vector. The product is a multi-pixel map.
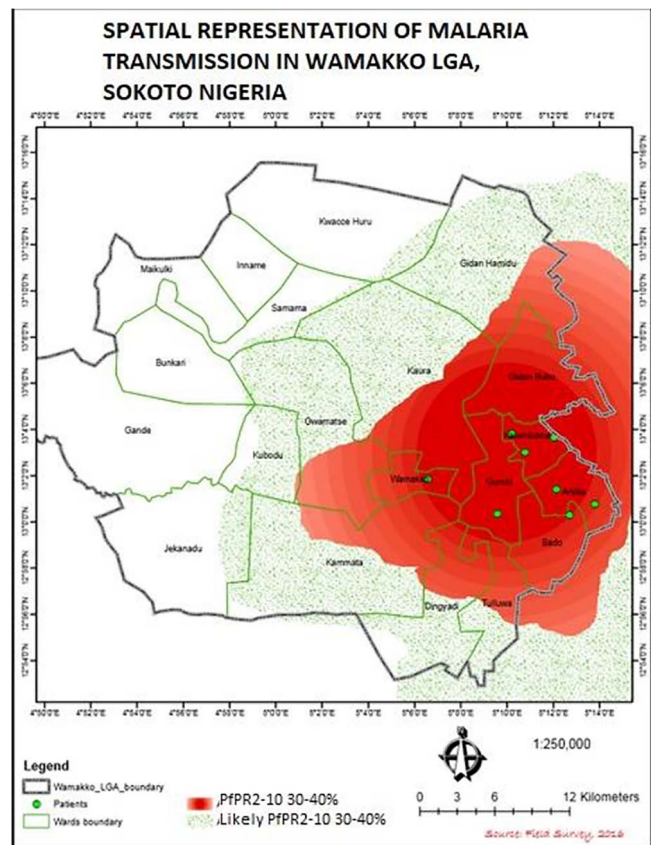
**Results:** The map shows a representation of the prevalence of malaria across the sites, using the same colours and identifiers as the MAPs representations. This is compared with the corresponding timepoint of MAP representation. It shows significant differences from MAPs. However this is more accurate than MAPs, where data is available, but it doesn't cover the entire landscape, leaving areas of limited information.

**Conclusion:** Using GIS, data on malaria transmission intensity can be extended beyond the actual sites of conduct of malariometric surveys, with a greater accuracy than mathematical models and can be the gold standard for mapping disease-transmission-intensity. The challenge lies in ensuring that these surveys are conducted uniformly and with universal spread.

## 058

### MALE INVOLVEMENT IN PREVENTION OF MOTHER-TO-CHILD TRANSMISSION OF HIV DURING THE OPTION B+ ERA IN NDOLA DISTRICT, ZAMBIA

**Chongwe E.[1], Inambao M.[2], Mkandawire R.[3], Zolfo M.[4]**
[1]Dept. of Public Health, Copperbelt University Ndola City;
[2]Dept. of Obstetrics and Gynaecology, Ndola Teaching Hospital;
[3]Dept. of District Medical Officer, Ndola District Health Office, Ndola City, Zambia;
[4]Dept. of Clinical Sciences, Institute of Tropical Medicine, Antwerp, Belgium

**Introduction:** The coverage of Prevention of Mother to Child Transmission (PMTCT) of HIV with anti-retroviral therapy (ART)reached 87% in 2015 in Zambia. However, risk of vertical transmission remains high (6%). Although the transition to Option B+ has brought a paradigm shift in the implementation of PMTCT, poor male involvement in PMTCT services has been identified as one of the factors contributing to reduced effectiveness of the programme.

**Aim:** To determine the extent and the role of male involvement in the PMTCT programme during the Option B+ roll out of PMTCT in Ndola district, Zambia and its impact on the uptake of PMTCT services.

**Methods:** We conducted a retrospective analysis of routine clinical data in the PMTCT programme in Ndola district from Jan 2015 to Dec 2017 using descriptive statistics and time trends to describe the levels of male involvement; that is any male partner accompanying and participating with the women in PMTCT/antenatal (ANC) clinics in Ndola. We conducted univariate and multivariate logistic regression to examine the association with uptake of PMTCT services.

**Results:** Among the 48,702 HIV+ and HIV- women who used ANC services in which PMTCT is integrated, 6,288 (14.3%) reported male involvement. Male involvement among HIV+ women increased significantly over time from 10.4% in 2015 to 20.6% in 2017. Male involvement among HIV+ women was found to be significantly associated with 3 or more ANC visits (aOR= 1.6, $p$-value 0.048), earlier gestational age at first ANC visit (first trimester aOR 2.4, $p<0.008$ compared to second/third trimester), and infant's ARV prophylaxis (aOR=8.0, $p<0.01$). PCR HIV positivity among infants aged 6 weeks was1%, no association with male involvement.

**Conclusion:** The extent of male involvement in PMTCT services in Ndola increased but remains suboptimal. HIV+ women with involvement of male partners were twice as likely to initiate ANC in the first trimester and were 8 times more likely to provide ART prophylaxis to their infants. Restructuring of PMTCT programmes during Option B+ era must be a priority. Enabling and encouraging male partners' involvement is a key factor for improving uptake, timeliness and effectiveness of services to HIV+ women and their infants.

## 059

### INTIMATE PARTNER VIOLENCE AND MATERNAL DEPRESSION DURING PREGNANCY: A COMMUNITY BASED CROSS-SECTIONAL STUDY IN ETHIOPIA

**Belay S.[1], Astatkie A.[1], Emmelin M.[2], Hinderaker S.G.[3]**
[1]School of Public Health, College of Medicine and Health Sciences, Hawassa University, Hawassa, Ethiopia;
[2]Dept. of Social Medicine and Global Health, Lund University, Lund, Sweden;
[3]Centre for International Health, University of Bergen, Bergen, Norway

**Introduction:** Intimate partner violence (IPV) is regarded as an important public health and human rights issue characterized by physical, sexual or emotional abuse. Globally more than one in three women report having experienced physical or sexual violence by their intimate partner. We found no studies from Ethiopia using standard tools in assessing both IPV and depression among pregnant women.

**Aim:** To measure the prevalence of IPV and depression during pregnancy and assess the association between IPV and depression and other determinants.

**Methods:** A community based cross-sectional study was conducted as part of a prospective cohort study which enrolled 589 pregnant women living in Wondo-Genet district. Exposure to IPV was assessed using a structured questionnaire of the WHO multi-country study of violence against women and maternal depression, was measured by the Edinburgh Postnatal Depression Scale (EPDS) at the time of enrollment. Data was collected by five female nurses, double entered and validated using Epi-data and analyzed using SPSS. Descriptive statistics was computed and multivariable logistic regression was carried out to estimate the risk and adjust for confounders, keeping in the model variables with associations p<0.25.

**Results:** A total of 589 women out of 606 were interviewed, making a response rate of 97%. The mean age of the participants was 25 years, ranging from 16 to 45 years. The overall prevalence of IPV was 21% (95%CI, 18.1-24.7). The prevalence of emotional, physical and sexual violence was 14.6%, 9.2% and 9.5% respectively. After adjusting for potential confounders, increased risk of IPV remained among rural participants (AOR=2.09; 95%CI=1.06-4.09), parental exposure to IPV (AOR=14.00; 95%CI=6.43-30.48), pregnancy not desired (AOR=9.64; 95%CI=3.44-27.03), alcohol use by husband (AOR=17.08; 95%CI=3.83-76.19) and low social support (AOR=13.93; 95%CI=6.98-27.77). The prevalence of antenatal depressive symptom (with EPDS score above 13) was 6.8% (95% CI 6.2-11.3). Exposure to IPV (AOR=17.60; 95%CI=6.18-50.10) and alcohol use by husband (AOR=3.31; 95%CI=1.33-8.24) were predictors of depression.

**Conclusion:** One in five pregnant women experienced domestic violence, confirming that pregnancy does not protect from IPV; and it was strongly associated with depression. Screening for IPV and depression at antenatal visits with referral to relevant care and service is recommended.

## 060

### EXPLORING THE GENDER-SPECIFIC IMPACT OF EDUCATIONAL FILM ON MATERNAL AND CHILD HEALTH KNOWLEDGE AND BEHAVIOUR: A QUALITATIVE STUDY IN SERENJE DISTRICT, ZAMBIA

**Mweemba O.[1], Smith H.[2], Coombe H.[3]**
[1]School of Public Health, University of Zambia, Lusaka, Zambia;
[2]Malaria Consortium;
[3]Medical Aid Films, London, UK

**Introduction:** Men's involvement in antenatal, childbirth and postnatal care is important for the health of mothers and new-borns. Yet many men do not consider they have a role to play, and evidence suggests they are discouraged by socio-cultural attitudes and lack of knowledge. Medical Aid Films creates educational films for communities and health workers in low resource settings. In Serenje district, Zambia, MAF and the Ministry of Health run a rural health outreach project, screening maternal and child health (MCH) films for women that also attracted male audiences.

**Aim:** We conducted a qualitative study to understand gender-specific responses to film content and the suitability of film for MCH education. Specific objectives explore effects on knowledge and behaviour and draw out recommendations for improved content and delivery.

**Methods:** We conducted in-depth interviews with women and male partners (n=8), six focus group discussions with men and women in catchment areas and key informant interviews with health workers (n= 3) in three purposefully selected health outposts with high numbers of film screenings. The research approach and thematic analysis were informed by communication-behaviour theory, which specifies inputs that may influence the extent of change after exposure to different communication media.

**Results:** Women and men reported increased knowledge and awareness of key MCH topics, the need to seek skilled care during pregnancy and birth and the importance of male involvement in supporting the care of women and children. Health workers also perceived that more men were accompanying women to antenatal, outpatient and under 5 clinics and that traditional care-seeking and treatment practices had changed. Whilst men perceive male involvement in tangible and patriarchal ways, in contrast women expressed a desire for more and different types of male support.

**Conclusions**: Results show the potential of educational film to improve community knowledge and awareness and encourage healthy practices and care-seeking, including male involvement. Further exploration of the needs, values and preferences of men and women and the integration and delivery of screenings is required to ensure that widespread implementation maximises participation of men and women in MCH but does not undermine women's rights, autonomy or safety.

## 061

### SPATIAL HETEROGENEITY ON THE REDUCTION OF VAGINAL FISTULA BURDEN IN ETHIOPIA IN 2005 AND 2016 USING NATIONAL HOUSEHOLD SURVEY DATA

**Deribe K.[1,2], Fronterre C.[3], Dejene T.[4], Biadgilign S.[5], Deribew A.[6,7], Abdullah M.[8], Cano J.[3]**

[1]Dept. of Global Health and Infection, Brighton and Sussex Medical School, Brighton, UK;
[2]School of Public Health, Collage of Health Sciences, Addis Ababa University, Addis Ababa, Ethiopia;
[3]Dept. of Disease Control, Faculty of Infectious and Tropical Diseases, London School of Hygiene & Tropical Medicine, London, UK;
[4]Center for Population Studies, Addis Ababa University;
[5]Research Consultant;
[6]St. Paul Millennium Medical College;
[7]Nutrition International (former Micronutrient Initiative), Addis Ababa, Ethiopia;
[8]United Nations Population Fund (UNFPA), East and Southern Africa Regional Office, Johannesburg, South Africa

**Introduction:** Vaginal fistula is a devastating maternal complication characterized by an abnormal opening between the bladder and/or rectum and vagina, which results in continuous leakage of urine or stool. Although it is one of the major public health problems of Ethiopia, its magnitude and distribution nationally is not well studied.

**Aim:** We aimed at estimating the number of cases, district-level geographical disparities and change over time of self-reported symptoms of vaginal fistula in Ethiopia.

**Methods:** We used data from 2005 and 2016 Ethiopia Demographic Health Surveys, which included self-reported signs of vaginal fistula for 14,070 and 15,683 women of childbearing age (15-49 years) respectively. We fitted mixed-effect linear models with site-level prevalence of lifetime and untreated vaginal fistula on a suite of potential risk factors. We included a random effect to account for unexplained variability between regions. Fitted models were then used over gridded maps of the selected covariates to produce continuous maps of predicted prevalence with corresponding 95% confidence intervals.

**Results:** The estimated number of women of reproductive age with lifetime vaginal fistula and untreated cases in 2016 were 72,533 (95% CI 38,235–124,103) and 31,961 (95% CI 11,596–70,309) respectively. These figures show reduction with regard to 2005 estimates: 98,098 (95% CI 49,819–170,737) life time fistula and 59,114 (95% CI 26,580–118,158) untreated cases. In 2016, district level lifetime and point (untreated) prevalence ranged from 2.3 to 6.7 and from 0.6 to 3.9 per 1,000 women of childbearing age respectively. By 2016 there was a 19 times difference between predicted point prevalence of vaginal fistula rates when comparing districts with the highest point prevalence vaginal fistula rates against those with the lowest point prevalence rates. Nonetheless, the number of districts having more than 200 untreated cases declined drastically from 54 in 2005 to 6 in 2016.

**Conclusions:** Ethiopia has made substantial progress in reducing the prevalence of vaginal fistula over the last 10 years. Novel evidence from our study can be used to understand and identify granular disparities for local level tracking, planning, spatial targeting of resources and implementation of interventions against vaginal fistula.

## 062

### OUTBREAK OF AN UNKNOWN PARALYTIC DISEASE IN NORTHERN MOZAMBIQUE – DISCOVERING THE EPIDEMIOLOGY OF KONZO

**Cliff J.**

Community Health Dept., Faculty of Medicine, Eduardo Mondlane University, Maputo, Mozambique

In August 1981, Hans Rosling was working as a district medical officer in northern Mozambique when he received the news of an outbreak of paralysis at a remote mission station, 100 km away. He went there immediately and found that the patients had a uniform history of sudden onset of spastic paraparesis. The number of cases was rapidly increasing, and reports began to come in from a wide area covering hundreds of kilometres, with a population of around half a million people. A classic epidemiological investigation followed, with Hans organizing community leaders to carry out active case finding. After six weeks, 1102 cases had been identified. The epidemic had begun in May, peaked in August and lasted until October. Children over two years of age and women of reproductive age predominated. The nearby coastal region and urban centres were spared. The area was suffering from a severe drought. The cause of the disease was not known, and laboratory results from patients showed no infectious agent. Suspicion fell on a toxin, but the grass pea, known to cause spastic paraparesis, was not consumed in this area. Hans turned to anthropology, staying with rural families and taking detailed histories of food consumption. He found that people were dependent on a diet of newly harvested bitter cassava, the only crop to have survived the drought. Bitter varieties of cassava contain high concentrations of cyanogenic glucosides that need to be removed by processing. People were hungry and taking short cuts in processing. The lab therefore tested

for serum thiocyanate and found extremely high concentrations (mean 298 µmol/l). We hypothesized that the cause was cyanide intoxication from a monotonous diet of bitter cassava. The epidemiology fitted – the peak of the epidemic coincided with the cassava harvest, children over two and women of reproductive age were more dependent on cassava and on the coast, people had access to fish. Although we had not found the disease in our textbooks a thorough grey literature search subsequently revealed that an identical disease, konzo, had been described by Trolli in the then Belgian Congo in 1938.

## 063

### A SECOND OUTBREAK OF KONZO IN TANZANIA – DEFINING THE CLINICAL PICTURE OF KONZO

**Howlett W.P.**

*Kilimanjaro Christian Medical Centre, Moshi, Kilimanjaro, Tanzania*

**Introduction:** Outbreaks of paraplegia are known historically to occur in the tropics and have been documented from the early part of the last century. Their aetiology has been mostly attributed to nutritional causes varying from lathyrism caused by consumption of large quantities of chic pea (lathyrus sativus) to B vitamin deficiency and more recently cassava consumption.
**Aim:** The aim of this presentation is to report the neurological findings from an outbreak of paraplegia occurring in a drought affected cassava growing rural area of northern Tanzania in 1985.
**Methods:** A detailed neurological examination was carried out on 39 affected persons.
**Results:** The clinical findings was similar in all cases: characterised by an abrupt onset of initial difficulty in walking progressing to paraparesis over 2-3 days. Typically a previous heathy child or young adult developed heaviness in the legs or inability to stand either during or after long walk or present on waking. Less than one third complained of transient lumbar pain, numbness in legs, difficulty speaking and difficulty seeing typically clearing in the first days or week. On examination, the physical findings were characterized by a symmetrical spastic paraparesis with hyperreflexia in the legs 100%, ankle clonus 90% and extensor plantar response 85%. Power was reduced in the legs in 82% varying from severe 54% to mild 23%. Arms were involved in 56% typically with isolated hyperreflexia or mild weakness except in 2 most severely affected cases with severe weakness. Optic pallor was noted in 6 cases 15% 5 (83%) of whom had had a previous episode of paraplegia. A selection of the affected patients were re-examined at 1, 2, 10 months and 3 years after the first examination and the neurological findings remained unaltered with the same degree of spastic paraparesis and a characteristic scissors gait.
**Conclusion:** The clinical findings were those of a unique form of epidemic spastic paraparesis, which resulted in almost identical upper motor findings in affected patients but differing only in degree.

**References:**
1. Howlett WP, Brubaker GR, Mlingi N, Rosling H. Konzo an epidemic upper motor neurone disease studied in Tanzania. Brain 1990 ;**113** :223-35.

## 064

### MOLECULAR ANTHROPOLOGY – WHAT WE CAN LEARN FROM HANS ROSLING'S INTERDISCIPLINARY WAY OF CONDUCTING RESEARCH IN AFRICA

**Tylleskär T.**

*Centre for International Health, University of Bergen, Bergen, Norway*

Hans Rosling had a bright research career in the 1980s and 1990s before his career as 'edutainer' and stand-up statistician from Karolinska Institute and the Gapminder foundation. It started during his time a district medical officer in Nacala in northern Mozambique in 1981 when he was confronted with this outbreak of konzo. This was the starting point for a series of field studies in several African countries. His research was characterized by an extreme interdisciplinary approach, which he called molecular anthropology. In the first outbreak in Mozambique, he noticed that the field staff he sent out in the rural villages where there was drought and famine came back with cassava for their own consumption – every day. In the then strictly socialist society, this required a lot of tact, sensitivity, patience and anthropologic methods to reveal the truth about how cassava was handled because of the stigma attached to it. No one had heard of cyanide or cyanogen compounds causing paralysis, so biochemical methods had to be developed and then brought out in the field for confirmatory use. The larger research community could not understand why people we so "stupid" to grow toxic food crops but Hans was convinced that poor people were not stupid, there was a good reason for why they did what they did. Again, this required tact, sensitivity, patience and anthropologic methods to understand the agricultural aspects of growing cassava. Hans was able to show that the mostly female cassava farmers had good food security reasons for growing bitter cassava containing high concentrations of cyanogen compounds, which requires processing before consumption. Today, some of his methodology would be called 'mixed-methods' but it rarely stretches so far as from anthropology via medicine and chemistry to agricultural research. In addition, Hans supervised a dozen PhD-candidates in clinical medicine, clinical chemistry, nutrition and agronomy.

## 065

### SUMMARY OF PRESENT-DAY KNOWLEDGE OF KONZO AND CASSAVA TOXICITY

**Tylleskär T.**

*Centre for International Health, University of Bergen, Bergen, Norway*

**Introduction:** Cassava toxicity is still a problem in many areas of Africa. Updated prevention methods may be needed.
**Aim:** In this presentation, recent studies of cassava, cassava toxicity, and clinical aspects of konzo and prevention efforts will be summarised.
**Methods:** Literature review.
**Results:** Studies in agronomy, food processing, clinical studies and prevention efforts show that 1) there are good reasons to grow bitter cassava, the idea of 'choosing sweet cassava instead' is not valid; 2) konzo may be affecting more than just the upper motor neurons; 3) cassava toxicity may also be associated to ataxic neuropathy in Nigeria; 4) proper processing of cassava is primordial in prevention.
**Conclusion:** Cassava toxicity is closely linked to extreme poverty, ecological degradation and extremely tough socio-economic conditions. In the worst-off societies, prevention must focus on cassava processing that is not too taxing on the available work force.

## 066

### TRANSMISSION NETWORKS OF *CRYPTOSPORIDIUM SPP.* IN RURAL SUB-SAHARAN AFRICA: A MULTI-COUNTRY STUDY

**Krumkamp R.**[1,2], **Caccio S.**[3], **Adegnika A.**[4], **Amuasi J.**[5], **Lusingu J.**[6], **Rakotozandrindrainy R.**[7], **May J.**[1,2], **Eibach D.**[1]
*[1]Bernhard Nocht Institute for Tropical Medicine (BNITM), Hamburg; [2]German Center for Infection Research (DZIF), partner site Hamburg-Borstel-Lübeck, Germany;*

[3]*Istituto Superiore di Sanità, Rome, Italy;*

[4]*Centre de Recherches Médicales de Lambaréné, Lambaréné, Gabon;*

[5]*Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR), Kumasi, Ghana;*

[6]*National Institute for Medical Research, Korogwe, Tanzania;*

[7]*Université d'Antananarivo, Antananarivo, Madagascar*

**Introduction:** High prevalence and mortality from Cryptosporidiosis among children in sub-Saharan Africa has been shown in recent years, however transmission dynamics and reservoirs are yet to be investigated.

**Aim:** This multicentre study traces back *Cryptosporidium* positive children to their close human and animal contacts in order to identify transmission networks and reservoirs.

**Methods:** Stool samples from children below 5 years with diarrhoea were collected at hospitals in Gabon, Ghana, Madagascar and Tanzania. *Cryptosporidium* positive and negative initial children were followed to the community, where stool samples from all household members, neighbouring children and animal contacts were obtained. Samples were screened for *Cryptosporidium spp.* by PCR-RFLP analysis of the small subunit rRNA gene and sequence analysis of the 60 kDa glycoprotein gene for *C. hominis* and *C. parvum*. Contact networks were identified and rate ratios (RR) calculated.

**Results:** Among 1,363 initial children 44 (20%), 47 (11%), 25 (11%) and 68 (14%) were diagnosed with *Cryptosporidium* spp. in Gabon, Ghana, Madagascar and Tanzania, respectively. The following species were diagnosed: 144 (79%) *C. hominis*, 26 (14%) *C. parvum*, 10 (5%) *C. meleagridis*, 2 (1%) *C. felis* and 1 (1%) *C. xiaoi/bovis*. Across the countries the proportion of infections ranged from 8% to 20% in household members, from 20% to 36% in neighbouring children and from 11% to 15% in animals. Among 108 contact networks *gp*60 subtyping established 37 clusters, which contained 49% and 54% of *Cryptosporidium* positive household members and neighbours, respectively, but only 18% of *Cryptosporidium* positive animals. In comparison to *Cryptosporidium* negative initial children, positive initial children had an increased risk of having positive household members (RR = 2.5; 95%-Confidence Interval (CI): 1.5–5.2) or positive neighbouring children (RR = 2.7; 95%-CI: 1.6–4.8), but no risk of having positive animals (RR = 1.3; 95%-CI: 0.8–2.1) in their contact network.

**Conclusion:** Cryptosporidiosis in rural sub-Saharan Africa is characterized by clusters among human contacts, to which zoonotic transmission, despite close human-livestock contacts, seems to contribute only marginally. Shared sanitation facilities or water sources may be responsible for anthroponotic neighbourhood transmission. Public health programmes need to focus hygiene and sanitation practices.

## 067

## A DYNAMIC MODEL OF BOVINE BRUCELLOSIS IN PUNJAB, INDIA

**Holt H.R.[1], Walker M.[1], Beauvais W.[2], Kaur P.[3], Bedi J.S.[4], McGiven. J.[5], Sharma N.S.[3], Gill J.P.S.[4], Mangtani P.[6], Guitian J.[1]**

[1]*Pathobiology and Population Sciences, Royal Veterinary College, Hertfordshire, UK;*

[2]*Population Medicine and Diagnostic Sciences, Cornell University College of Veterinary Medicine, Ithaca, USA;*

[3]*Veterinary Microbiology, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana;*

[4]*School of Public Health and Zoonosis, Ludhiana, India;*

[5]*FAO/WHO Collaborating Centre for Brucellosis, OIE Brucellosis Reference Laboratory, Dept. of Bacteriology, Animal & Plant Health Agency, Woodham Lane, Addlestone, Surrey, UK*

**Introduction:** Brucellosis is an economically important bacterial disease of livestock and a neglected zoonosis. The disease is endemic in Punjab, the Indian State with the highest milk production per capita Infected cows cannot be culled and vaccine coverage and availability is low. Information is needed to support the implementation of sustainable control programmes for the disease in this setting.

**Aim:** To develop and fit a disease transmission model to cross-sectional serosurvey data on brucellosis in dairy farms in Punjab and to simulate the impact of different vaccination strategies.

**Methods:** A cross-sectional serosurvey was conducted in 425 dairy farms to estimate the seroprevalence of brucellosis in rural Ludhiana district, Punjab using a multi-stage sampling strategy. In addition to sampling livestock, all persons present involved with livestock husbandry were offered brucellosis screening. Accompanying data were collected on herd structure and farm management. A stochastic, demographically-structured within- and between-herd brucellosis transmission model was developed and fitted to the seroprevalence data using Approximate Bayesian Computation methods to estimate the effective contact rate ('transmission' parameter) among animals. The fitted model was used to simulate the impact of vaccination campaigns at village level.

**Result:** Individual livestock seroprevalence was 15.1% (95% CI: 13.5 to 16.8) and farm-level seroprevalence was 32.9% (28.6% to 37.6%). Seroprevalence in 595 occupationally-exposed individuals was estimated to be 9.7% (95% CI: 7.4% to 12.3%). Persons assisting with calving and abortion and those in contact with seropositive cattle had increased odds of being seropositive. The model indicated that vaccination of calves only, which is more acceptable to farmers, could significantly reduce seroprevalence to less than 2% within 30years without the need to achieve perfect coverage.

**Conclusion:** Brucellosis is highly endemic in Punjab and occupationally-mediated zoonotic transmission to humans is common. Vaccination could significantly reduce the incidence of the disease in livestock and thus also the risk of human exposure. A new proposed control programme is being planned by Indian authorities, which aims to eliminate the disease in selected villages within 5 years. However, given the productive age of cattle in Punjab, this model indicates that a commitment for sustained vaccination beyond this period is needed.

## 068

## A ONE HEALTH APPROACH TO INVESTIGATING SOURCES OF INFECTION WITH CRYPTOSPORIDIUM AND GIARDIA IN RURAL AREAS OF TIGRAY, ETHIOPIA

**Tesama K.T.[1,2], Tysnes K.R.[1], Debenham J.J.[1], Nødtvedt Ane C.W.[1], Terefe G.[3], Robertson L.J.[1]**
[1]*Food Safety and Infection Biology, NMBU, Oslo, Norway;*
[2]*College of Veterinary Medicine, Mekelle University, Mekelle;*
[3]*Pathology and Parasitology, AAU, Addis Ababa, Ethiopia*

**Introduction:** Cryptosporidiosis and giardiasis are highly prevalent in Ethiopia and are major causes of diarrhoea in young children. *Cryptosporidium*, in particular, is well known to be associated with paediatric mortality in sub-Saharan Africa. Although we have progress on diagnosis of these infections in sub-Saharan Africa, our knowledge on sources and transmission routes remains poor due to lack of targeted studies, and the contribution of zoonotic infection to the burden of human disease is also poorly documented. Lack of awareness, sharing the same house with animals, unsafe water supplies, inadequate sanitation, and poor hygiene are all factors that may increase transmission, but the relative importance of these factors remains unknown.

**Aim:** In this study, we used a One Health approach to investigate the contribution of domestic animal infections and contaminated water and fresh produce to human infections with these parasites in Tigray region, Ethiopia.

**Methods:** A cross-sectional study design was used to collect samples from 209 calves, 269 lambs, 258 goat kids, 221 children and adults, 55 vegetables and 37 water samples that were analysed for occurrence of *Cryptosporidium* oocysts and *Giardia* cysts, with subsequent genotyping of positive samples. Questionnaires were also used to collect information on possible risk factors for infection from 221 animal owners and 41 non-animal owners.

**Results:** Laboratory analysis has started but not yet finalized. We would like to present preliminary data on the occurrence of infection with these two parasites among domestic animals and their owners, and also people who do not own animals, in this region.

**Conclusion:** Although diagnosis and treatment remain important touch-stones in intestinal parasitic infections, prevention is equally important. A One Health approach can be used to provide indicators of the most important sources and routes of infection.

## 069

### PATHOLOGIES ASSOCIATED WITH MALE GENITAL SCHISTO-SOMIASIS AND EFFICACY OF PRAZIQUANTEL TREATMENT IN MALAWIAN FISHERMEN

Kayuni S.A.[1,2], Makaula P.[3], Lampiao F.[4], Juziwelo L.[5], LaCourse E.J.[1], Stothard J.R.[1]
[1]*Dept. of Tropical Disease Biology, Liverpool School of Tropical Medicine, Liverpool, UK;*
[2]*MASM Medi Clinics Limited, Medical Society of Malawi (MASM), Blantyre, Malawi;*
[3]*Research for Health, Environment and Development (RHED), Mangochi, Malawi;*
[4]*Physiology Dept., College of Medicine, University of Malawi, Blantyre, Malawi;*
[5]*National Schistosomiasis and STH Control Programme, Community Health Sciences Unit, Ministry of Health, Lilongwe, Malawi*

**Introduction:** Urogenital schistosomiasis (UGS), an important disease caused by the blood fluke *Schistosoma haematobium*, is endemic along the shoreline of Lake Malawi. Male genital schistosomiasis (MGS), an under-reported manifestation of UGS, is defined by the presence of schistosome eggs within seminal fluids, genitalia and associated pathologies[1]. In a cohort study among fishermen along southern lakeshores of Malawi's Mangochi District, the baseline prevalence of UGS was 17.1% (eggs in urine) while for MGS (eggs in semen) was 10.7%. There is need to assess whether recommended praziquantel treatment for UGS also clears eggs in semen and averts MGS pathologies observable by ultrasonography.

**Aim:** To investigate the morbidity associated with MGS as observed by ultrasonography, and the efficacy of praziquantel treatment in clearing egg-patent infection in semen.

**Methods:** Participants (fishermen) recruited in the cohort MGS study and treated with praziquantel at baseline, were invited to follow-up studies after 1-, 3-, 6- and 12-months. Mid-morning urine and semen were examined for parasitological diagnosis of schistosome ova. Transabdominal and scrotal ultrasonography were conducted on the participants to investigate for genital pathologies. Praziquantel treatment at 40 mg / kg was offered to all the participants.

**Results:** At 1-month follow-up study, prevalence of UGS reduced to 11.1%, with mean egg count of 13.5 per 10 ml whilst that of MGS was 0% (no eggs seen in semen). At 3-months follow-up, UGS prevalence rose to 11.7%, with higher mean egg count of 15.6 per 10 ml and MGS prevalence was 8.9%, mean of 3.6 eggs per ml. Follow-up at 6-months, revealed UGS prevalence was reduced further to 4.3%, mean egg count of 0.4 per 10 ml and MGS was 4.8% and mean of 0.9 eggs per ml. MGS pathologies was detected in 20% of the participants, which were seen to reduce on follow-up studies.

**Conclusion:** MGS is prevalent among fishermen along Lake Malawi, known to be endemic for UGS, and is associated with pathologies observed by ultrasonography. The current treatment of choice, praziquantel, can clear the infection which raises the need for wider availability and accessibility to diagnostics and treatment for all people in endemic areas, together with other complementary control interventions.

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## 070

### EVALUATION OF NEXT GENERATION OF INSECTICIDE TREATED NETS: THE TANZANIAN EXPERIENCES

Mosha J.F.[1], Lukole E.[1], Mosha F.W.[2], Manjurano A.[1], Martin J.[2], Kulkarni M.[3], Mwalimu C.D.[4], Rowland M.[5], Protopopoff N.[5]
[1]*National Institute of Medical Research, Mwanza, Tanzania;*
[2]*Kilimanjaro Christian Medical University college, Moshi, Tanzania;*
[3]*University of Ottawa, Ottawa, Canada;*
[4]*Ministry of Health Community Development Gender Elderly and Children, National Malaria Control Program, Dar es Salaam, Tanzania;*
[5]*London School of Hygiene and Tropical Medicine, London, UK*

Insecticide Treated Nets (ITNs) are the primary method of malaria control in Sub-Sahara Africa. New types of mosquito nets, that combine a pyrethroid and either a second insecticide or a synergist, have been developed to respond to the expanding threat of insecticide resistance in malaria vectors. The Pan African Malaria Vector control research Consortium (PAMVERC), a research partnership between LSHTM, NIMR and KCMUCO, is supporting the development and evaluation of several of these new vector control products from laboratory assessment to large scale community trials. Recently we completed a cluster randomized controlled trial (RCT) comparing an ITN combining a pyrethroid and the synergist piperonyl butoxide (PBO) to a standard pyrethroid Long Lasting Insecticidal Net (LLIN), in an area of insecticide resistance in Tanzania, The study showed a reduction in malaria prevalence of 44%, 33% and 17% after one, two and three years of use in the intervention compared to the control arm. This finding led to a policy recommendation by WHO and the deployment of PBO-ITN in areas with pyrethroid resistance in Sub-Sahara African countries. Following WHO requirements on generating epidemiological evidence for novel vector control product class, we are conducting a new RCT to evaluate the efficacy of two dual ITNs combining pyrethroid with a second adulticide chlorfenapyr or with a hormone growth regulator; pyriproxyfen, conferring sterility to the mosquitoes.

## 071

### CRITICAL DECISION MAKING AND FIGHTING INSECTICIDE RESISTANCE IN MALARIA PREVENTION

Sherratt P.
*Against Malaria Foundation, UK*

Global malaria rates are no longer falling. Strong evidence has been building over the last 15 years of increasing resistance to the three primary pyrethroids used in nets.

This presentation looks at the decision making process behind the first use of next generation nets at scale, and draws conclusions for research and net programmes going forwards.

I will examine how the various pieces – views from leading academics, research publications, WHO guidance, net manufacturing and net purchase decisions - can be brought together to make innovative and optimal decisions. I will focus on the largest ever trial of nets, which began in 2017 and continues to date. This involves 6 million "PBO" next generation nets currently being deployed in Uganda alongside 6 million standard nets. The key research outcome is a randomised control trial, led by the Liverpool School of Tropical Medicine and funded by AMF. I will cover why AMF decided to fund research at this scale for the first time and what we are doing with the results.

This will lead me to cover the principal ways in which the academic community can directly and quickly influence malaria interventions. 4 organisations (Global Fund, PMI, AMF and UNICEF) purchase and deploy 91% of all bed nets provided in development. I will outline how AMF considers choice of net, how we look at options for monitoring net effectiveness and how the views and published research from academics can and should influence these decisions.

There is also a free market dynamic at play. Bed net manufacturers need to be incentivized to develop new products, but high prices exacerbate the overall large gaps in funding for malaria programmes. I will discuss how we weigh this balance and the importance of breaking the deadlock which can arise, and did arise in the context of PBO nets.

Finally I will discuss specific plans for the future, how we are planning and executing large net programmes in the light of insecticide resistance, including mass campaigns in countries such as DRC which present unique challenges for successful malaria outcomes.

## 072

### INDOOR RESIDUAL SPRAYING FOR MALARIA CONTROL: PAST, PRESENT AND . . .. DOES IT HAVE A FUTURE?

**Invest J., Lucas J.**
*Sumitomo Chemical Company*

The invention and deployment of long lasting bed nets (LLINs) on a massive scale in the last 15 years has resulted in dramatic falls in malaria across Africa and the rest of the world (Bhatt et. al. 2015). A predominant reliance on this tool containing a single class of chemistry has however resulted in widespread pyrethroid resistance. There is mounting evidence that nets have lost biological efficacy especially in Africa, leading to concerns that bed nets are now starting to lose their effectiveness and malaria rates could rise and challenge the WHO malaria elimination goals.

Pyrethroid +PBO LLINs have recently been shown to be more effective than pyrethroid only nets in reducing malaria transmission in areas of high resistance, and so offer some hope for the future. As a solution however, as these PBO containing nets still rely on pyrethroids, they are seen more as a temporary solution while LLINS treated with novel modes of action chemistry are developed. Olyset Plus® containing permethrin and PBO is the first 'PBO' LLIN to show epidemiological impact in reducing malaria compared to a standard permethrin only net in an area of pyrethroid resistance in Muleba, Tanzania.

Due to the complexity in the way bed nets function, providing both personal protection and a community effect, it is recognised that epidemiological data will be needed to support such products, with the result that it will take many years before LLINs treated with alternative modes of action chemistry to come to market.

However Indoor Residual Spray (IRS) products effectively kill mosquitoes but have to some extent fallen from favour in malaria control programmes and been replaced by LLINs. However there are already high levels of resistance reported in many malaria endemic countries to IRS products containing DDT, pyrethroids and carbamates with worrying signs that resistance is now growing to more recently introduced organophosphate product (WHO, 2015). New chemistry with different modes of action are desperately needed to allow rotation in IRS and help preserve insecticide susceptibility.

Thankfully SumiShield® 50WG, which is based on the neonicitinoid insecticide clothianidin has recently been reviewed under the new WHO Prequalification system, and has obtained a PQ listing. This is the first new mode of action IRS product for almost 40 years!

While we wait for new mode of action bed nets to come to market new IRS tools like SumiShield will become essential in areas where there is evidence that LLINs are failing as there are currently no other tools available that provide such good control. IRS also has the benefit over LLINs that the treatment requires no user compliance as nets do, and works during early evening and morning when people may not be under their LLIN but relaxing in their homes.

Sumitomo is one of several manufacturers working with the IVCC NGenIRS program that seeks to bring products like SumiShield into the market at scale and in a cost effective manner. This allows IRS to play a critical role in insecticide resistance management and the journey on the road to malaria elimination and ultimate eradication.

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3. www.thelancet.com published online April 11, 2018 http://dx.doi.org/10.1016/S0140-6736(18)30427-6
4. SumiShield and Olyset Plus are trademarks of Sumitomo Chemical Company Ltd.

## 073

### CONTRASTING HEALTH POLICY AND SYSTEMS RESEARCH (HPSR) IN DIFFERENT LOW AND MIDDLE INCOME COUNTRY CONTEXTS AND DISCUSSION ON PRIORITIES FOR FUTURE GLOBAL HPSR

**Bou-Orm I.R.[1], Yang J.[2], Merritt R.K.[3], Omigbodun A.[4], Whitty C.[5]**
[1]*Institute for Global Health and Development, Queen Margaret University, Edinburgh, UK;*
[2]*The School of Public Health, Fudan University, Key Laboratory of Public Health Safety, Ministry of Education, China;*
[3]*Centre for Health Services Studies, University of Kent, UK;*
[4]*Obstetrics and Gynaecology, University College Hospital, Ibadan, Nigeria;*
[5]*Dept. of Health and Social Care, London, UK*

**Introduction:** The National Institute for Health Research (NIHR) Global Health Research (GHR) Programme, funded by the UK Government aid budget as Official Development Assistance (ODA), supports high quality research primarily and directly relevant to people in low-middle income countries (LMICs). Through developing equitable partnerships between researchers in LMICs and the UK, NIHR is supporting research and capacity to improve the lives of the poorest and most vulnerable people through major initiatives including and a new health policy and systems research programme (www.nihr.ac.uk/globalhealth).

**Aim:** To compare the approaches, findings and challenges of undertaking health policy and systems research (HPSR) across different contexts within LMICs, with a panel discussion on future priorities for global HPSR and funding models to strengthen health systems in LMICs.

**Methods:** NIHR GHR Units and Groups work in health policy and systems research across different contexts, from health in situations

of fragility in Sierra Leone and Lebanon, to improving health in informal settlements in Africa, to exploring the evidence for policy pathways to immunisation in China. Panel members from these partnerships will present on their research and contextual challenges, with discussion to contrast and share learning. During 2018/19 NIHR, in partnership with Health Systems Research UK and Health Systems Global, has consulted to identify priorities for further research in global HPSR. Findings will be presented, and a discussion will focus on the priorities identified and partnership models to address this area in a global context.

**Results:**

● Panel members and the audience will share learning on context relevant approaches to improve health services, integrate systems and apply policy research to inform health service delivery in different contexts.

● A discussion on priorities emerging for health policy and systems research in LMICs and how best to address them.

**Conclusion:** There are shared and distinct challenges faced when working in different settings: informal settings, fragile states, low resourced compared to middle-income countries. Equitable partnerships between UK researchers and LMICs, and active early engagement of policy makers and communities in defining priorities and working collaboratively are key. Consultation findings to define priorities for global HPSR to inform NIHR funding will be presented.

## 074

### DEATHS OF MOTHERS, NEWBORNS AND CHILDREN IN KAMPALA CITY, UGANDA: CONTEXT, DRIVERS AND POTENTIAL MITIGATION STRATEGIES WITHIN A PUBLIC-PRIVATE MIXED HEALTH CARE SYSTEM

**Waiswa P.[1,2], Mugerwa Y.[3], Kananura R.M.[1], Wanduru P.[1], Kwesiga D.[1], Birabwa C.[1], Tetui M.[1], Daniel O.[4], Balaba D.[3]**
[1]Makerere University School of Public Health, Kampala, Uganda;
[2]Dept. of Global Health, Karolinska Institute, Solna, Sweden;
[3]Population Services International Uganda, Kampala, Uganda;
[4]Kampala City Council Authority, Kampala, Uganda

**Introduction:** Rural-urban migration to Kampala has resulted in a growing urban-poor population (1.5 million in 2018) without a corresponding improvement in health care infrastructure and quality. Poverty, illiteracy and a health system that is rural-centric and not responsive has led to a loss of the urban survival advantage. In Kampala, health care is dominated by private, unregulated and unaffordable providers, with few overcrowded public health facilities unable to provide good quality care. Little is known about health care among the urban poor or organisational models to serve the most vulnerable.

**Aim:** As part of formative research to inform the design of an intervention to develop a health care delivery model for socio-economically vulnerable mothers and babies (The Kampala MaNe project), we explored the status, context and actors in Kampala slums.

**Methods:** We triangulated descriptive analyses from three data sources. Firstly, we analysed maternal health services utilization in Kampala district in the representative 2016 Uganda Demographic and Health Survey (UDHS). We also analysed the District Health Information System data for Kampala facilities, with a focus on facility births and birth outcomes. We analyzed PSI data to determine general characteristics of the urban poor.

**Results:** While 98% of women attended antenatal care at least once, only 67% had 4+ visits, mainly due to initiation late in pregnancy. 94% gave birth in a health facility, 64% of these at private facilities. The maternal mortality rate in Kampala was 100/100,000 live births and perinatal mortality was high at 34/1000 live births, with the worst outcomes among the poorest. Women living in slums were young, with 91% aged

<30 years. Women had limited knowledge on birth preparedness. 90% preferred to give birth at public facilities due to affordability.

**Conclusion:** Maternal and perinatal outcomes in Kampala remain suboptimal despite proximity to health facilities and high utilization. The MaNe project will include demand generation through social behaviour change communication, improving private and public health facility (mixed health system) networking, accessibility and responsiveness for the poor, and emergency transportation. The model could be scaled up in similar large cities elsewhere.

## 075

### MAPPING THE SERVICE DELIVERY LANDSCAPE FOR BREAST-FEEDING: A CASE STUDY IN MANILA, PHILIPPINES

**Camiling-Alfonso R.[1], Escober A.E.[2], Calibo A.[2], Capili D.I.[3]**
[1]Alliance for Improving Health Outcomes, Manila;
[2]Dept. of Health, Family Health Office, Manila;
[3]Kalusugan ng Mag-Ina, Manila, Philippines

**Introduction**: Breastmilk is the ideal source of nutrition for newborns and young infants. While >90% of Filipino women initiate breastfeeding, only half of infants are exclusively breastfed by one month of age. Improving breastfeeding continuation requires a three-pronged approach of promotion, protection and support. Most efforts focus on promotion, and practical help to women and their families is neglected. Promotional activities increase women's intention to breastfeed, and the consequent lack of support from the public health system is being recognised. The issue is exacerbated in large cities where community-based support activities are more challenging to organise and sustain.

**Aim:** The aim of this scoping exercise is to identify gaps and opportunities in provision of breastfeeding support in metropolitan Manila (23 million inhabitants), and to facilitate enabling dialogues to allow for coherent systems strengthening action from a broad range of stakeholders.

**Methods**: We reviewed key national and local policy documents related to service delivery of breastfeeding promotion and support. We mapped and characterized providers through interviews with relevant actors (e.g. program managers, technical experts, leading advocates, mother support group leaders). Last, we conducted a mapping of support networks with key leaders and consultation with key informants.

**Results:** Various components of essential breastfeeding support have not been articulated in policy and service delivery documents, resulting in variable quality, availability and cost of care. We identified gaps between policies and service delivery; e.g. community health workers have a formal role in breastfeeding support, but no practical instructions are provided. No systematic referral network exists in Manila. The gap in provision of breastfeeding support has been addressed mainly by breastfeeding women themselves, through voluntary groups facilitated by social media (i.e. Facebook groups), augmenting public services to the extent that health workers are learning from them. However, issues with misinformation occur and challenges around the control of the dominant narrative are anticipated in the future.

**Conclusion:** We present a case study of Manila which can be replicated in other urban settings to assess whether breastfeeding support is appropriate. Evidence generated through such landscape exercise can inform future urban policy and practice dialogues to recommend solutions that are context-adapted.

## 076

### DEVELOPING HIGH-RESOLUTION AIR QUALITY AND ENVIRONMENTAL NOISE ESTIMATES IN SUB-SAHARAN AFRICAN CITIES: PATHWAYS TO EQUITABLE HEALTH CITIES STUDY PROTOCOL FOR ACCRA, GHANA

Clark S.[1], Alli S.[2], Arku R.[2] on behalf of the Pathways Measurement and Monitoring working group
[1]*Epidemiology and Biostatistics., Imperial College London, London, UK;*
[2]*School of Public Health and Health Sciences, University of Massachusetts-Amherst, Amherst, USA*

**Introduction**: As a result of rapid and largely unregulated growth in sub-Saharan African (SSA) cities, air and noise pollution are increasingly becoming a public health problem. There has been increasing local and global attention to pollution in African cities, and how to best reduce the current health harming levels, particularly in Accra, Ghana. However, long-term high-quality monitoring of pollution and its sources are lacking, which is a major barrier to strategic policy making.

**Aim:** We designed and piloted a transferable and scalable measurement campaign that in combination with state-of-the-art modelling will characterize air quality, noise pollution, and its sources, in high-resolution in the Greater Accra Metropolitan area.

**Methods:** We will capture the temporal and spatial variation in pollution and its sources through a combination of fixed (n=10 sites, 1 year of monitoring) and rotating monitoring sites (n=130 sites, 7-days of monitoring) that were piloted in April 2019 and will continue for 1 year. We will capture noise levels, audio, $PM_{2.5}$ air pollution, weather conditions, and time-lapse imagery, with affordable and rugged equipment that can deliver high-quality data. We will analyse noise levels and ambient $PM_{2.5}$ for spatial and temporal trends. We will further apply machine learning methods to the imagery and the audio to extract objects in the images that are

*Dept. of Clinical Sciences, Institute of Tropical Medicine, Antwerp, Belgium*

**Introduction:** Genital Schistosomiasis has a high disease burden in endemic countries. In travellers however, it is rarely described.
**Aim:** We describe a case of delayed diagnosis of genital and rectal schistosomiasis and give an overview of the literature of documented genital schistosomiasis in female travellers and migrants.
**Methods:** Search in PubMed and Google Scholar using search terms 'Genital', 'Schistosoma', 'Schistosomiasis', 'Bilharzia', 'Traveller', 'Female', 'After Travel'.
**Results:** A 28-year-old women had menorrhagia, dysmenorrhea, dyspareunia, hypogastric pain, fatigue and difficulties to conceive. Intermittent haematochezia was reported. The complaints started 8 years ago after a holiday where she accidently fell in the Niger River in Mali and the following days an 'abdominal eczema' was seen. During these 8 years the patients consulted several gynaecologists and had extensive investigations without diagnostic yield. On a cervical biopsy we found calcified Schistosoma eggs surrounded by granulomas. Cervical, vaginal and rectal skin snips showed calcified S. haematobium eggs in granulomata. 44 Cases of female genital schistosomiasis in travellers and migrants are described in the literature presenting with a wide range of gynaecological complaints.
**Conclusion:** Female genital schistosomiasis is a rare diagnosis in travellers but might be underdiagnosed in women with chronic gynaecological symptoms. Delay in diagnosis of this treatable disease can lead to important morbidity and unnecessary investigations.
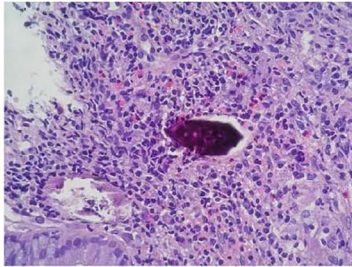
Cervical biopsy



Cervical snip



Rectal snip

potential sources of pollution and classify different types of urban sounds from the audio (e.g., biotic, road-traffic sounds) that may be health harming/ promoting beyond absolute decibel levels. Finally, spatiotemporal and physics-based dispersion models will be parametrized for the local context and used to generate the first ever high-resolution pollution surface maps in an SSA city.

**Results:** From the month-long pilot conducted in April 2019 (n=182 site-days of monitoring), average weekly $PM_{2.5}$ concentrations (range: 16-33.5 µg/m$^3$) and noise levels (range: 55-71 A-weighted decibels) exceeded international and national air quality and noise guidelines at the majority of monitoring locations.

**Conclusion:** The pilot proved that the measurement campaign can deliver high-quality and data rich measurements that can provide useful information for policy makers and practitioners in Accra and other SSA cities to design evidence-based policies for reducing pollution and improving health.

## 077

## DIAGNOSIS OF GENITO-RECTAL SCHISTOSOMIASIS IN A FEMALE TRAVELLER 8 YEARS AFTER EXPOSURE

**Van Den Broucke S., Bottieau E.**

## 078

## MULTI-MORBIDITY IN GHANAIAN MIGRANTS IN EUROPE AND RESIDENTS IN GHANA: THE RODAM STUDY

**Marza Florensa A.M.[1], Boateng D.[1], Agyemang C.[2], Levitt K.[3], Klipstein-Grobusch K.[1,4] on behalf of the RODAM consortium**
[1]*Julius Global Health, Julius Centre for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht;*
[2]*Dept. of Public Health, Amsterdam Public Health Research Institute, Amsterdam University Medical Center, University of Amsterdam, Amsterdam, The Netherlands;*
[3]*Diabetic Medicine and Endocrinology, Groote Schuur Hospital, University of Cape Town, Cape Town;*
[4]*Division of Epidemiology & Biostatistics, School of Public Health, University of the Witwatersrand, Witwatersrand, South Africa*

**Introduction:** Multi-morbidity (MM), or the presence of multiple chronic diseases, is an increasingly relevant public health problem due to the growing burden of non-communicable diseases (NCDs). This is particularly important in low- and middle-income countries (LMICs) undergoing a health transition with considerable socioeconomic and life-style changes. These changes happen rapidly for populations who

migrate from LMICs to high-income countries. In this context, the RODAM Study investigates NCDs in Ghana and among Ghanaian migrants in Europe.

**Aim:** To investigate the distribution and patterns of MM in Ghanaian migrants in Europe and residents in Ghana, and to elucidate the influence of site of residence on multi-morbidity.

**Methods:** 5695 individuals aged 25-70 years from Ghanaian origin living in Amsterdam, London, Berlin and urban and rural Ghana were included. Eight conditions were studied: hypertension, obesity, diabetes mellitus, hypercholesterolemia, cardiovascular disease, chronic kidney disease, rheumatic disorders and depression. Participants were categorized according to the number of diseases they presented: 0-1, 2-3, and 4 or more. Patterns of MM were determined from the most frequent combinations of diseases, and the effect of geographical site on MM was assessed with ordered logistic regression.

**Results:** The most prevalent condition was hypertension in Europe (prevalence ranged from 49.4% to 57.0%) and rheumatic disorders in Ghana (31.6% to 40.1%). MM affected 39.2% of men and 47.8% of women, and the overall MM prevalence was highest in urban Ghana and lowest in rural Ghana. The prevalence and composition of disease patterns differed by site and sex. With rural Ghana as reference, the odds of MM was higher for men in Europe and urban Ghana (OR, 95%CI): Amsterdam (2.1, 1.5-2.9); Berlin (2.1, 1.5-3.0), London (2.1, 1.4-3.1), urban Ghana (2.6, 1.9-3.7); and women in urban Ghana (1.7, 1.4-2.1).

**Conclusion:** The prevalence of diseases and disease patterns differed between Ghanaians residing in Europe and Ghana and also between those living in urban and rural Ghana. MM was most prevalent in urban Ghana and least in rural Ghana, and more common in women than men. In light of this, it is recommended that healthcare brings attention to multi-morbidity, particularly in contexts of migration and urbanization.

## 079

### MODELLING THE IMPACT OF PYRETHROID RESISTANCE ON THE MASS COMMUNITY EFFECT OF LONG-LASTING INSECTICIDE TREATED NETS

**Unwin H.J.T., Sherrard Smith E., Churcher T.S., Ghani A.C.**
*MRC Centre for Global Infectious Disease Analysis, Dept. of Infectious Disease Epidemiology, Faculty of Medicine, Imperial College, London, UK*

**Introduction:** Long-lasting insecticidal bed nets (LLIN) provide personal protection against malaria by reducing exposure to infectious bites, and community protection by reducing the local mosquito population and hence onward transmission of the parasite. Standard LLIN contain a pyrethroid insecticide, but resistance to this chemistry, which is widespread in mosquitoes, may diminish the community impact of LLIN. The relative effect of personal (direct) versus mass community (indirect) protection at different levels of pyrethroid resistance could influence decisions on LLIN product choice.

**Aim:** To quantify the direct versus indirect effects of existing LLIN, and how these change as pyrethroid insecticide resistance in mosquito populations increases.

**Methods:** A mathematical model of *Plasmodium falciparum* transmission is used to estimate the reduction in all-age clinical incidence that can be attributed to personal or community protection with LLIN. The LLIN intervention model is parameterised using data from a systematic review of hut studies which measure the killing and repellence effects of LLIN. LLIN efficacy wanes as pyrethroid resistance in local mosquitoes, measured using mosquito survival in discriminatory dose bioassays, increases[1]. We demonstrate how direct versus indirect effects vary with increasing net usage and increasing pyrethroid resistance.

**Results:** LLIN users are consistently predicted to have lower levels of malaria prevalence and incidence irrespective of the level of pyrethroid resistance. In the absence of resistance, in areas of high transmission (pre-intervention EIR of 100), we estimate 42% of the reduction in clinical incidence to be attributed to mass community effect when 50% of the community use LLINs. At 80% LLIN usage, this decreases to 18% because a much larger proportion of the population sleep under LLIN and so are directly protected. However, when simulating pyrethroid resistance at 80%, only 34% of the reduction in clinical incidence is attributed to community effects for 50% LLIN usage, and this drops to 14% if LLIN usage is at 80%.

**Conclusion:** Pyrethroid resistance may diminish the mass community effect gained from LLIN interventions, with the scale of this lost protection associated with the proportion of population using LLINs.

**Reference:**
1. Churcher T.S., Lissenden N., Griffin J.T., Worrall E., Ranson H. The impact of pyrethroid resistance on the efficacy and effectiveness of bednets for malaria control in Africa. *eLife* 2016; 5; e16090. DOI: 10.7554/eLife.16090.001

## 080

### THE EFFECTS OF INSECTICIDAL BED NETS ON INSECTICIDE RESISTANT MOSQUITO HOST SEEKING AND BLOOD FEEDING BEHAVIOUR

**Guy A.[1], Foster G.[1], Matope A.[1], Parker J.[1], Voloshin V.[2], Ranson H.[1], Towers D.[2], McCall P.J.[1]**
*[1]Dept. of Vector Biology, Liverpool School of Tropical Medicine, Liverpool;*
*[2]School of Engineering, University of Warwick, Coventry, UK*

Long lasting insecticidal nets (LLINs) are essential for malaria control in Africa, but their future is threatened by resistance to pyrethroid insecticides, the primary insecticide class used. A deeper understanding of how LLINs affect mosquitoes, particularly via sub lethal impacts on behaviour or longevity post-exposure is fundamental to design innovative nets.

Using a range of video techniques in free-flight assays, we are investigating the impact on insecticide resistant *An. gambiae s.l.,* of a range of current and next generation bed nets on host seeking, blood feeding and a range of impacts. During the test, bloodfeeding through the bednet was permitted or prevented, and detailed behavioural events ranging from pre-contact repellency/ contact-irritancy to duration of bloodfeeding were recorded for analysis.

With standard 'first generation' pyrethroid LLINs all four mosquito strains, responded rapidly, landing and bloodfeeding through nets with no clear evidence that pyrethroid treatments repel when a human host is present. Responses of resistant and susceptible strains were remarkably similar at the same net types. Exposure to pyrethroid did not affect mortality rates of resistant mosquitoes immediately after exposure, nor did it impact on longevity rates.

Results will be presented from current research investigating responses at bednets treated with piperonyl butoxide (PBO) and new chemistries such as chlorfenapyr, in comparison with first-generation pyrethroid-only nets. The value of these studies on mosquito behaviour in the domestic environment is measured by its contribution to the vector biology knowledge base and to the search for novel vector control tools. Importantly, this quantitative characterisation of the impacts of next-generation LLINs provides invaluable data for the development of reliable entomological endpoints to permit the likely impact of novel LLINs on transmission and incidence of malaria. Thus, accelerating the likelihood that the most effective new vector control tools are deployed at the earliest opportunity.

**081**

### RELATIONSHIPS BETWEEN ABUNDANCE OF EARLY INSTAR LARVAE IN AQUATIC HABITATS AND OVIPOSITION IN THE MALARIA VECTOR ANOPHELES ARABIENSIS USING GENOTYPIC RECONSTRUCTION OF SIBLING GROUPS

**Odero J.O.[1,2], Fillinger U.[1], Rippon E.J.[2], Masiga D.K.[1], Weetman D.[2]**
[1]*Human Health Theme, International Centre of Insect Physiology and Ecology, Nairobi, Kenya,*
[2]*Vector Biology Dept., Liverpool School of Tropical Medicine, Liverpool, UK*

**Background:** Strategies for controlling malaria vectors outdoors are gaining importance as we reach the limitations of the primary indoor interventions. One such strategy is to target oviposition site-seeking female or her offspring as all mosquitoes require aquatic habitats for immature development irrespective of their biting or resting preferences. Oviposition site selection by gravid females is frequently studied by counting early instar larvae in habitats. This approach is however only valid if the number of larvae correlates with the number of females laying eggs. We tested this hypothesis against the alternative, that a higher abundance of larvae results from improved survival of a similar or fewer number of families.

**Methods:** In a controlled experiment, 18 artificial ponds were left uncovered for 4 days to allow oviposition by wild mosquitoes, then covered with netting for a further 6 days to prevent further egg-laying. Early instar larvae were sampled daily from day 5. Additionally, natural *Anopheles* habitats of two different types were identified, and larvae sampled. The larvae were PCR-identified to species and most samples of the predominant species, *An. arabiensis*, genotyped using microsatellites. We used BAPS and COLONY softwares for sibling group reconstructions.

**Results:** In the ponds, the number of families predicted larval abundance (BAPS $R^2$=0.318, p=0.01; COLONY $R^2$=0.476, p= 0.001). BAPS estimated that 57%, 95% CI (39-75) of females had deposited larvae in multiple ponds, whilst COLONY estimated 45%, 95% CI (30-56). In natural habitats, the mean family size predicted the larval abundance using BAPS ($R^2$=0.829, p=0.017) but not in COLONY ($R^2$=0.218, p=0.68). BAPS estimated 73%, 95% CI (59, 87) of the females to have deposited larvae in multiple natural habitats and COLONY, 60%, 95% CI (53, 67).

**Conclusion:** Our study shows that, whether in closely-located artificial habitats or natural breeding sites, higher early instar larval densities result from more females laying eggs in these sites. These results provide empirical support for the approach of using early instar larvae abundance as a proxy indicator for oviposition site preference. Furthermore, the sharing of habitats by multiple females and the high skip-oviposition rate in *An. arabiensis* suggest that larviciding by auto-dissemination of insecticide may be successful.

**082**

### THE PLACE OF THE "PHARMACY" AND "DRUG SELLERS" IN LOW- AND MIDDLE-INCOME COUNTRIES: A SCOPING REVIEW

**Oleffe A., Mahieu C.**
*School of Public Health, Université Libre de Bruxelles, Brussels, Belgium*

**Introduction:** Faced with numerous barriers reducing access to formal health systems, many people in low- and middle-income countries (LMICs) turn themselves to "pharmacies" and other drug sellers. After having been neglected for a long time in health system policies, these stakeholders are progressively taken into account. This slow recognition is sustained by two main interconnected elements: an inability of public health systems to take charge efficiently of endemic and emerging non-communicable diseases; and the increasing importance of self-medication as first therapeutic resort of a large portion of people across the world, both in urban and rural settings. Thus "pharmacies" seem to have become unavoidable in the health-seeking behaviours of populations in LMICs, and now play an essential role in the health system.

**Aim:** This study aims to identify existing knowledge and clarify key concepts related to the "pharmacy" and its connected professional groups, so as to better understand their place and role in the broader context of changing health systems.

**Methods:** We use the scoping review method which has been structured around a three-step search strategy. The inclusion criteria were developed on the basis of the PCC model: Public – Concept – Context. Different types of sources have been searched (primary, secondary and others which includes grey literature). Among the primary sources, the following databases have been selected for the review: Medline (via PubMed), Sociological Abstracts, Psychinfo (via Proquest) and Scopus.

**Results:** After applying our extraction framework, the results will be presented in a search and selection decision flowchart, following the PRISMA mode. Results will be presented around following themes: professional groups' categories, articulation to health systems, role in care delivery, relations to other healthcare professionals.

**Conclusion:** By establishing a cartography of existing knowledge and key concepts underlying the topic, this scoping review aims to better understand the state of the art on the place of the "pharmacy" in a changing health system in LMICs. This will allow to clearly identify the areas that need to be further investigated by public health researchers in order to nurture the reflections around the reorganisation of care provision in those settings.

**083**

### SOCIAL, CULTURAL AND ECONOMIC FACTORS INFLUENCING BED NET USE IN THE PREVENTION OF MALARIA IN PREGNANCY IN GHANA

**Aberese-Ako M.[1], Magnussen P.[2], Ampofo G.[3], Tagbor H.[3]**
[1]*Institute of Health Research, University of Health and Allied Sciences, Ho, Ghana;*
[2]*Dept. of Veterinary Disease Biology, University of Copenhagen, Copenhagen, Denmark;*
[3]*School of Medicine, University of Health and Allied Sciences, Ho, Ghana*

**Introduction:** Improving maternal health remains a priority to the Ghanaian government. Consequently it has implemented the WHO recommendation of distributing free insecticide treated bed nets to pregnant women - one of the most effective strategies to combat malaria in pregnancy. However negative outcomes of malaria in pregnancy such as low birth weight and miscarriages still recur. Yet the socio-cultural and economic dynamics that influence bed net use is not well understood.

**Aim:** This ethnographic study sought to describe and understand community and health care dynamics in utilization of bed nets among pregnant women in two Ghanaian regions.

**Methods:** In depth interviews were conducted among pregnant women, health workers and opinion leaders. Observations were conducted in thirteen communities and eight health facilities. Ethical clearance was obtained and the study was conducted according to the principles of the Declaration of Helsinki and good clinical Practice. Nvivo 11 was used to support data coding. Data were triangulated and analyzed using grounded theory approach.

**Results:** Findings suggest personal, social, cultural, interpersonal and health system factors influenced use and non-use of nets. Women with a history of net use prior to becoming pregnant remained consistent users, but those who used nets for the first time during pregnancy were

not. Fear of sleeping under a bed net, experiencing irritating effects of chemicals used to treat nets and preference for traditional methods, to wade off mosquitoes at night, reduced net use. Pregnant women whose husbands and other family members used bed nets were influenced positively to use them. Sharing a room with a husband who did not support use of bed net denied pregnant women the right to use them. Poverty resulting in sharing of a room with others, staying out late for business purposes and to converse, exposed some pregnant women to mosquito bites. Receiving ample education from health providers and encouragement from public officials improved bed net use.

**Conclusion:** Bed net use is influenced by the socio-cultural and economic context of pregnant women. Thus giving out nets at facility level should be backed by mass community education to promote community acceptance and use of nets.

## 084

### EFFECT OF UPTAKE OF INTERMITTENT PREVENTIVE TREATMENT IN PREGNANCY (IPTP) ON BIRTHWEIGHT OF BABIES IN A RURAL GHANAIAN SETTING

**Awini E.[1], Gyapong M.[2], Darkwa E.[1], Odonkor G.[1], Williams J.[1]**
[1]Dodowa Health Research Centre, Accra;
[2]University of Health and Allied Sciences, Ho, Ghana

**Introduction:** Low birthweight (LBW) is a major cause of neonatal and infant mortality. A major cause of LBW is malarial infection during pregnancy. Knowing the effect of IPTp doses of pregnant mothers on LBW in rural settings will contribute to informed decision.
**Aim:** To determine the effect of IPTp intake on birthweight of babies born between 2012-2016 in a rural Ghanaian setting.
**Method:** Data on pregnancy, child birth, demographic and socioeconomic status of 11,744 mothers who delivered from 2012-2016 were extracted from the Dodowa Health and Demographic Surveillance System (HDSS) database. Information on their 12,929 babies was also extracted. The HDSS is a dynamic cohort that monitors events of individuals in the system. Effect of IPTp on birthweight was estimated adjusting for confounders such as maternal age, sex of baby, socioeconomic, marital status and number of previous livebirths. Logistic regression analysis was employed using STATA.
**Results:** About 12,929 livebirths by 11,744 mothers were recorded from 2012-2016. Mothers of 88.8% (11,485) of children received at least one dose of IPTp during pregnancy, but 48.7% received 3+ doses. The overall proportion of LBW was 7.0%. About 6.7% of children whose mothers received IPTp had LBW compared to 10.3% of those whose mothers never received IPTp. In the unadjusted analysis, the odds of LBW for children of mothers who received up to two and 3+ doses of IPTp were 71% (OR: 0.71, 95%CI: 0.54-0.95) and 55% (OR: 0.55, 95%CI: 0.42-0.73) of those whose mothers did not receive IPTp. The effect of IPTp on LBW decreased slightly after adjusting for other exposures. The odds of LBW were 73% (OR: 0.73, 95%CI: 0.55-0.97) and 59% (OR: 0.59, 95%CI: 0.45-o.79) of those who did not receive IPTp. Other variables such as maternal age, sex of baby, previous livebirths and socioeconomic status were associated with birthweight. Mothers aged below 20 years and those above 35 years were more likely to have LBW compared to mothers aged between 20 and 34 years.
**Conclusion:** Intake of IPTp during pregnancy was consistently associated with decrease LBW, thus IPTp intake is crucial to reducing LBW in malaria endemic countries.

## 085

### RISK FACTORS FOR GESTATIONAL DIABETES AND COMPARISON OF ASSOCIATED PREGNANCY OUTCOMES BY DIAGNOSTIC CRITERIA

**Agbozo F.[1,2], Abubakari A.[3], Jahn A.[2]**
[1]Dept. of Family and Community Health, School of Public Health, University of Health and Allied Health Sciences, Ho, Ghana;
[2]Institute of Global Health, Medical Faculty and University Hospital, Heidelberg University, Heidelberg, Germany;
[3]Dept. of Nutritional Science, School of Allied Health Sciences, University for Development Studies, Tamale, Ghana

**Introduction:** Gestational diabetes mellitus (GDM) has risen considerably in Africa. Studies have extensively investigated the risk factors but reported prevalence is often based on one diagnostic test and cut-off whilst pregnancy outcomes have been scarcely explored.
**Aim:** We assessed the prevalence of GDM using diverse cut-offs, identified maternal risk factors and compared the associated adverse pregnancy outcomes by diagnostic criteria.
**Methods:** This study was an unmatched case-control nested in a prospective cohort involving 807 women recruited consecutively from five antenatal clinics serving rural, semi-urban and urban communities in Ghana. Dietary and obstetric risks were assessed retrospectively while physiologic measurements were repeated throughout pregnancy. Non-diabetic, singleton pregnant women (n=490) were tested between 20-34 weeks using fasting venous plasma glucose (FVPG) and single-step 75-g 2-hour oral glucose tolerance test (OGTT). Diagnosis was based on 2-h OGTT $\geq$8.5 mmol/l and FVPG $\geq$5.6 mmol/l. At delivery, pregnancy outcomes of 403 women were traced. Adjusted odds ratio (OR) for GDM was estimated by unconditional logistic regression and Mantel-Haenszel statistic and the relative risk (RR) for adverse pregnancy outcomes estimated by multiple logistic regression.
**Results:** Prevalence per 2-h OGTT was 9.0% and FVPG was 10.8%; 14.9% had at least one abnormal value while 3.9% had both abnormal values. GDM was higher in primary (27.2%) facilities compared to secondary (13.6%) and tertiary facilities (6.3%) (p=0.009). Independent risk factors included excess intake of high glycemic index foods (aOR; 2.91 confidence interval [CI];1.05-8.06), obesity (aOR;2.13 CI;1.12-4.03), arm circumference >30cm (aOR;2.96 CI;1.31-10.58), previous cesarean delivery (aOR;4.01 CI;1.08-14.76), antenatal care in primary facilities (aOR;4.951 CI;1.87-3.76) and low partner education (aOR; 3.36 CI;1.27-8.89). GDM by OGTT was associated with large-for-gestational-age (aRR;5.56 CI;1.39-12.77) whilst GDM by FVPG was associated with neonatal resuscitation (aRR; 5.72 CI;1.37-23.85). No significant adverse maternal outcome was identified.
**Conclusion:** The higher GDM prevalence in primary facilities suggests social disparities in access to healthcare. Despite the diverse risks, pregnancy outcomes were not convincing. While weight control and dietary counselling are crucial, primary facilities need amenities for testing. Further studies would clarify the etiologic pathways of OGTT and FPG and the valid diagnostic cut-offs for African populations.

## 086

### OBSERVATIONAL STUDY OF VISCERAL LEISHMANIASIS IN PREGNANCY IN SOUTH SUDAN: MATERNAL AND PREGNANCY OUTCOMES

**Pekelharing J.E.[1], Gatluak F.[2], Harrison T.[1], Maldonado F.[3], Ritmeijer K.[1]**
[1]Médecins Sans Frontières, Amsterdam, The Netherlands;
[2]Médecins Sans Frontières, Lankien, South Sudan;
[3]Royal Tropical Institute, Amsterdam, The Netherlands

**Introduction:** South Sudan is one of the most endemic countries for visceral leishmaniasis (VL), and is frequently hit by large epidemics, which affect all age groups. Because of modulations in the function of

the immune system during pregnancy, pregnant women are considered particularly vulnerable for developing complications of VL disease and opportunistic infections. Small cohort studies in the literature indicate high mortality rates in pregnant women with VL. There is limited evidence available about clinical aspects and treatment outcomes of VL in pregnancy.

**Aim:** We aimed to describe characteristics, treatment outcomes and pregnancy outcomes for patients with VL in pregnancy, using data from a VL cohort.

**Methods:** A retrospective analysis was conducted of routine programme data from a MSF health facility in Lankien, Jonglei State, South Sudan, for the period 2015-2018. Patients with VL in pregnancy and a comparison group, a random selection of female non-pregnant VL patients in reproductive age, were identified from the database. Medical records of these patients were reviewed for medically relevant information.

**Results:** Data were obtained for 113 women with VL in pregnancy and 223 patients in the comparison group. Patients with VL in pregnancy presented with more severe anaemia and higher need for blood transfusions (OR 9.3; 95%CI 2.5-34.2), and antibiotics were prescribed more often (OR 6.0; 95%CI 3.4-10.6) compared to the comparison group. Adverse pregnancy outcomes (including miscarriage and premature delivery) were reported in 28% of cases. Postpartum haemorrhage was common. Patients with VL in pregnancy required more often extension of treatment to achieve cure (OR 10.0; 95%CI 4.8-20.9). Nevertheless, cure rates were high (96.5%) and mortality was low (1.8%) in this cohort of patients with VL in pregnancy.

**Conclusion:** This is the largest cohort in the literature of outcomes associated with VL in pregnancy. Our data suggest that good survival rates for women with VL in pregnancy are possible in resource-limited settings, despite the high incidence of complications. Limitations of the work include the lack of follow-up data for pregnancy or neonatal outcomes after discharge from treatment for VL.

## 087

### LESSONS LEARNED FROM THE IMPLEMENTATION OF A DIGITAL HEALTH INFORMATION SYSTEM IN A RESOURCE-CONSTRAINED URBAN ENVIRONMENT

**Berghman E.[1], De Caluwé P.[2], Benjamin Ndoole A.[3], Vaes L.[2]**
[1]ULB-Coopération;
[2]AEDES, Brussels, Belgium;
[3]MaisOrdi, Kinshasa, DRC

**Introduction:** Urban health context in the Democratic Republic of the Congo (DRC) is highly fragmented and suffers from technological constraints. Nonetheless, with carefully planned steps, it is possible to implement a flexible and resilient digital health information system. This digitalization presents multiple benefits: data is collected once, with improved quality, and aggregate data can be produced for the mandatory national health information system. Furthermore, additional local analysis can be made to ensure better healthcare and better facility management.

**Aim:** The aim is to improve the process of introducing electronic medical records in hospitals located in DRC.

**Methods:** Based on experiences collected in Kinshasa, several hypotheses on how to improve the implementation of a digital health system (CERHIS) in a hospital were formulated. They were then tested in another hospital in Goma, DRC.

**Results:** Results are of two types: (1) technical and (2) medical. (1) We confirmed the hypothesis that both external and internal technical supports are necessary. Logistic difficulties have caused delays and complications in the deployment of the system. We examine their nature

and propose solutions. (2) We studied the degree to which implementing a new system would allow the modification of procedures and practices in the health structure. The experience shows that even though the hospital management team is involved, it is difficult to create new health procedures leveraging digital technologies. However, the procedures already in place are easily integrated into the digital system. The health workers were trained to use the system to perform their routine duties. This approach was more efficient than the former one where all the users had to learn how to use the entire system. The importance of giving a global view of the system for its proper use is however acknowledged.

**Conclusion:** Some hypotheses have been confirmed or reformulated. Before any generalization, it is necessary to test the results obtained in other settings. However, these results can be used as preliminary guidelines for the implementation of a digital health system in a hospital.

## 088

### MAKING DATA SHARING EASY, FEASIBLE AND ACCESSIBLE

**Olesen O.F.[1], Hajduk G.K.[2], Jamieson N.E.[2], Baker B.L.[2], Pandya L.J.[1], Habarugira J.M.V.[1], Lang T.[2]**
[1]European & Developing Countries Clinical Trials Partnership (EDCTP), The Hague, The Netherlands;
[2]Centre for Tropical Medicine & Global Health, University of Oxford, NDM Research Building, Old Road Campus, Oxford, UK

**Introduction:** The sharing of clinical trial data is increasingly required by research publishers, regulatory agencies, ethics committees, and funding bodies. Despite these requirements, there are currently no clear standards, best practices or guidelines on how, where and when researchers should share their data.

**Aim:** Funders such as the European & Developing Countries Clinical Trials Partnership (EDCTP) aim to provide their grantees, and the wider global health scientific research community, with clear guidance and a range of tools and resources to aid the data sharing process.

**Methods:** In an effort to support and facilitate data sharing, EDCTP is collaborating with The Global Health Network to develop a cross-cutting knowledge hub for data sharing. This hub will help researchers find the optimal repository for their clinical trials data, and to collect and organise their data in an appropriate format that is ready for sharing. We carried out a gap analysis to assess researchers' needs, as well as the resources and training opportunities available to them. Our approach was three-fold: (1) we used specialist web browsing software to carry out a comprehensive audit of online training courses, learning materials and educational videos related to data sharing in health; (2) we conducted a workshop on data sharing and obtained feedback from the attendees regarding their training needs in the area; (3) we investigated the availability and characteristics of existing repositories in order to develop a tool that will guide researchers to the repositories most appropriate for their datasets.

**Results:** We have created an online platform, The Knowledge Hub (EDCTPKnowledgeHub.tghn.org), that will provide free and accessible resources, guidance and training on data sharing for clinical trials, plus access to a virtual research community. This includes resources relevant to all stages of data sharing, from data processing and management, through preparation of metadata and documentation, to guidance on choosing an appropriate repository for data deposition.

**Conclusion:** The aim of this Hub is to become a core resource for researchers that can guide and support the data sharing process. Ongoing feedback from the research community will be essential to refine and validate the usefulness of this resource.

**089**

## UNCOVERING THE HIDDEN: SURVEILLANCE OF THE EMERGENCE OF ANTHELMINTIC RESISTANCE IN HUMAN POPULATION WITH SOIL-TRANSMITTED HELMINTHS IN SOUTHERN MOZAMBIQUE

**Grau-Pujol B.[1,2,3], Martinez-Valladares M.[4], Gandasegui J.[1,4], Cano J.[5], Cossa A.[2], Sacoor C.[2], Muñoz J.[1,2]**
[1]*Barcelona Institute for Global Health, ISGlobal, Universitat de Barcelona, Spain;*
[2]*Centro de Investigação em Saúde de Manhiça, Mozambique;*
[3]*Fundación Mundo Sano, Buenos Aires, Argentina;*
[4]*Dept. of Animal Health, Instituto de Ganadería de Montaña (CSIC-Universidad de León), León, Spain;*
[5]*Faculty of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, London, UK*

**Introduction:** Over one billion people worldwide are infected with soil-transmitted helminths (STH). STH infections (*Ascaris lumbricoides*, *Trichuris trichiura*, hookworm and *Strongyloides stercoralis*) can contribute to anaemia, malnutrition, and delayed cognitive development among others. Currently, the cornerstone for controlling STH is mass drug administration (MDA) programs with benzimidazole drugs, albendazole or mebendazole. However, some studies start to suspect of benzimidazole-resistance, already observed in veterinary medicine in high rates.

**Aim:** The aim of this study was to design and implement a pilot surveillance platform to characterize treatment response and genotypic albendazole-resistance in Manhiça district, Mozambique.

**Methods:** We conducted a cross-sectional study with 800 participants older than 5 years of age in Manhiça district. A grid sampling methodology was used to obtain infection spatial representativeness in the district. Two stool samples were collected from each participant on two consecutive days. For participants with positive STH infection, a third stool sample was collected twenty-one days after treatment. Samples were analysed by Telemann concentration and Kato-Katz thick smear techniques. Genotypic albendazole-resistance is being evaluated by pyrosequencing to detect single nucleotide polymorphisms (SNP) related with anthelmintic resistance in the $\beta$-tubulin gene. The Kulldorff's scan statistic method was employed for identification of clustering of STH infection and albendazole-resistance. Bayesian Kriging was used to estimate general spatial trends in infection.

**Results:** A proportion of 21% of participants were infected with at least one STH, and 20% of participants older than 15 years were infected with hookworm. We detected a high rate cluster of STH infection in Calanga region, a sandy and watery area. The lowest cure rate and egg reduction rate were for *T. trichiura* (47.3% and 50.2%, respectively). The correlation of $\beta$-tubulin SNPs with treatment response will be presented.

**Conclusion:** We observed high rates of STH treatment failure, particularly for *T. trichiura*. The correlation of treatment failure and $\beta$-tubulin SNPs will be conferred. Periodical surveillance and better understanding of benzimidazole-resistance mechanisms are needed to predict treatment response and to monitor anthelmintic resistance appearance progression. This could contribute on STH infection control and interruption of its transmission.

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**090**

## A MAJOR HURDLE IN THE ELIMINATION OF UROGENITAL SCHISTOSOMIASIS REVEALED: IDENTIFYING COMMUNITIES AND HEALTH WORKERS' PERCEPTIONS AND EXPERIENCES OF FEMALE GENITAL SCHISTOSOMIASIS IN GHANA

**Kukula V.A.[1], MacPherson E.E.[2], Tsey H.I.[3], Stothard J.R.[4], Theobald S.[5] , Gyapong M.[6]**
[1]*Social Science Dept., Dodowa Health Research Centre, Ghana Health Service, Ghana;*
[2]*Malawi-Liverpool-Wellcome Trust, Blantyre, Malawi;*
[3]*Institutional Review Board, Dodowa Health Research Centre, GHS, Ghana;*
[4]*Dept. of Parasitology, Liverpool School of Tropical Medicine;*
[5]*Dept. of International Public Health, COUNTDOWN Consortium, Liverpool School of Tropical Medicine, Liverpool, UK;*
[6]*Institute for Health Research, University of Health and Allied Sciences, Ho, Ghana*

**Introduction:** Female Genital Schistosomiasis (FGS) is a serious chronic gynecological condition that affects about 56 million African women/girls. There is little known at the community level about how people interpret symptoms of FGS and how health workers respond to symptoms. In Ghana the national schistosomiasis control program's response has prioritized mass drug administration of praziquantel to in-school children and FGS has been largely overlooked.

**Aims:** We aimed to understand community and health worker's perceptions and experiences of FGS in a schistosomiasis endemic district of Ghana.

**Methods:** We used qualitative methods to explore experiences and practices relating to FGS with community members and health workers in schistosomiasis affected communities. This included 12 focus group discussions, 34 in-depth interviews and 6 vignettes with health workers, community members, teachers and school children. We purposively selected fifteen riverside communities in Shai-Osudoku district where urogenital schistosomiasis prevalence was between 54.8% and 60.0%. The analysis was guided by the framework approach.

**Results:** For both health workers and community members there was little understanding of schistosomiasis as a disease that could affect girls, or could cause general gynecological problems. When adolescent girls had reported blood in their urine and gynecological symptoms at primary health care clinics they had been misdiagnosed with an STI. During these interactions' girls reported being chastised by health workers for being sexual promiscuous.

**Conclusion:** It is imperative for the national control programme to better engage on FGS and implement interventions to meet girls'/women's needs. There is need to integrate FGS into sexual and reproductive health services with health worker training and support community awareness for appropriate management of FGS. More broadly, harmonizing the portfolio of all actions on FGS is essential in at-risk areas if we are to aspire to leave no women or girls behind.

**091**

## CHALLENGES IN ACHIEVING ELIMINATION OF LYMPHATIC FILARIASIS HOTSPOTS IN SIERRA LEONE

**Bah Y.M.[1], Sonnie M.[2], Conteh A.[1], Paye J.[2], Bah M.S.[2], Sawyerr V.[1], Veinoglou A.[3], Hodges M.[2], Koroma J.B.[4], Zhang Y.[5]**

[1]*Neglected Tropical Disease Program, Ministry of Health and Sanitation, Freetown, Sierra Leone;*
[2]*Helen Keller International, Freetown, Sierra Leone;*
[3]*Helen Keller International, Head Quarters, New York, USA;*
[4]*Family Health International 360, Accra, Ghana;*
[5]*Helen Keller International, Regional Office for Africa, Dakar, Senegal*

**Introduction:** Lymphatic filariasis (LF) was endemic in all 14 health districts (HDs) and mass drug administration (MDA) with ivermectin and albendazole started in 2008. Since 2009 annual epidemiologic coverage of ≥65% has been reported in 12 HDs. In 2013, a pre-transmission assessment survey (pre-TAS) using microfilaremia (mf) was conducted and 8HDs passed (mf prevalence <1%) and 4HDs (Bombali, Koinadugu, Kailahun and Kenema) with high baseline mf prevalence (6.9%, 5.7%, 2.6% and 0.6% respectively) failed. In 2017 these 8HDs also passed the TAS using Filariasis Test Strips (FTS) and stopped MDA. The 4 HDs repeated the pre-TAS in 2017 and the results presented.

**Methods:** One sentinel and one spot check site per HD (with 2 spot check sites in Bombali) were selected and 300-350 persons aged ≥5 years/site were tested. All positive results were confirmed by a second FTS test and a follow-up mf study was later conducted for positives only.

**Results:** A total of 3,394 persons were tested and 296 were FTS positive, Bombali: 17.2%, Koinadugu: 13.3%, Kailahun: 4.5% and Kenema: 1.8%. 236 positives were traced and retested for *Wucheria bancrofti* mf using midnight and 232 for *Mansonella perstans* mf using midday blood samples: 9 and 13 positives respectively.

**Conclusion:** These 4 HDs again failed the pre-TAS (antigen prevalence >2%). All share borders with Guinea and/or Liberia with difficult terrain and limited communications. The Guinean districts bordering the north had even higher baseline prevalence: 11%. Cross-border migration is common for farming, trading and is also observed for campaigns (not just LF-MDA). Guinea and Liberia only started LF-MDA in 2014 and 2016 respectively. Bombali and Koinadugu also have traditional healers attracting lymphedema patients which seem to have created secretive non-compliant foci. Sub-district-level data is essential to identify and resolve these challenges. Unreliable denominators and hence coverage appear to be no more significant in the HDs that are failing versus those that have already passed the pre-TAS. In this remote region people rely heavily on cattle rearing which may provide a natural reservoir for *W. bancrofti*. At least three more rounds of MDA will be conducted before a repeat pre-TAS is conducted.

## 092

### CRYPTOSPORIDIUM DIARRHOEA IN ADULT PATIENTS AT QUEEN ELIZABETH CENTRAL HOSPITAL, BLANTYRE, MALAWI

**Garg P.[1], Smith C.[1], Chirambo A.[1], Matola B.[2], Mallewa J.[2], Hinton J.[3], Gordon M.A.[1,3]**
[1]*Malawi-Liverpool-Wellcome Trust Clinical Research Programme;*
[2]*College of Medicine, Queen Elizabeth Central Hospital, Blantyre, Malawi;*
[3]*Institute of Infection and Global Health, University of Liverpool, Liverpool, UK*

**Introduction:** Diarrhoeal diseases are a major global cause of morbidity and mortality, with a significant burden in Sub-Saharan Africa. Diarrhoea accounts for >300 adult admissions/year at Queen Elizabeth Central Hospital (QECH), the majority of whom have HIV infection. The prevalence of cryptosporidium infection in this population is unknown.

**Aim:** The aim of this single-centre prospective pilot study was to determine the prevalence of infection with cryptosporidium and other enteric pathogens amongst adults admitted to QECH with a primary diagnosis of diarrhoea (≥3 loose stool/24hr).

**Methods:** Adults admitted to QECH with a primary diagnosis of diarrhoea were prospectively recruited July-September 2016. Demographics, clinical parameters, and HIV status were recorded. Stool specimens were obtained and analysed by multiplex-PCR to detect cryptosporidium and up to 42 other bacterial, viral, protozoan or helminthic pathogens.

**Results:** 100 patients (M=53) were recruited during the study period, of whom 80% were HIV seropositive. Median age was 35.5 years (IQR 29-43) with a median 7 days (IQR 4-21) duration of symptoms. From 99 stool specimens suitable for analysis by multiplex-PCR, 182 pathogens were detected (64% bacteria, 22% protozoa, 14% virus). Cryptosporidium was detected in 16/99 samples (14/16; 87.5% HIV positive). Co-infection with more than one organism was common (n=62), ranging from 2 (n=17) to 13 pathogens (n=1) detected. 13/16 cryptosporidium positive patients had at least one other organism detected by PCR (92% HIV positive), most frequently E. coli spp. (21.5%) and Shigella (8%). The frequency of co-infection and number of pathogens detected were not correlated with World Health Organisation (WHO) HIV disease stage.

**Conclusion:** This study highlights that Cryptosporidium infection remains an important factor in HIV seropositive patients admitted to QECH due to diarrhoea. Co-infection with more than one organism is common and leads to uncertainty in attributing pathogen causation with clinical disease. Future work aims to describe the frequency of asymptomatic carriage of enteric organisms. Furthermore, this study provides baseline epidemiological data for a planned randomised trial of a repurposed therapeutic (Clofazimine) in cryptosporidiosis.

## 093

### ANTIBIOTIC RESISTANCE PATTERN OF URINARY TRACT INFECTIONS IN A FACILITY IN ETHIOPIA: EXPERIENCE OF A CLINICIAN

**Lomencho A.**
*AMC, Addis Ababa, MEPI Junior Scholars, University of Gondar, Gondar, Ethiopia*

**Introduction:** Urinary tract infection is a common outpatient medical problem. A knowledge of the common causative agents and their resistance pattern is important to come up with local recommendations. At present there is lack of national data to support this and facility based studies are a good starting point.

**Aim:** To see the etiologic pattern and antimicrobial resistance profile of Urinary tract infections seen in a facility in Ethiopia.

**Methods:** This was a retrospective observational study of all urine cultures done for UTI over a 7 months period (January-July, 2018).

**Results:** There were a total of 75 urine cultures done over six months period of whch 65% was for female patients. The age range was from 18 to 90 with a mean age of 45. 85% of the urine cultures were done for outpatient cases. Common comorbidities seen among the participants included diabetes (4%) and HIV (2%). Among the cultures done, 60% were done for a consideration of recurrent UTI. 42% (32) of the culture results showed growth. E. coli accounted for 68.7% of the positive cultures while Enterococcus fecalis accounted for 10%. The rest were klebsiella pneumoniae (9%) S. Saprophyticus (4%), citrobacter (3%) and other organisms.

**Conclusion:** E.Coli accounted for a majority of urinary tract infections seen at our facility. The resistance pattern noted for E.Coli could be an indirect indication of widespread use of antibiotics including amoxicillin, ceftriaxone and Ciprofloxacin. The antibiotic resistance pattern noted in this study needs to be further investigated to come up with local recommendations for empiric antibiotic use for UTI.

## 094

### AUTODISSEMINATION OF PYRIPROXYFEN SUPPRESS A STABLE POPULATION OF *ANOPHELES ARABIENSIS* UNDER SEMI-CONTROLLED SETTINGS

**Lwetoijera D.[1], Kiware S.[1,2], Okumu F.[1,3,4], Devine G.J.[5], Majambere S.[6]**

[1]*Environmental Health and Ecological Sciences Dept., Ifakara Health Institute, Ifakara, Tanzania;*
[2]*Dept. of Mathematics, Statistics and Computer Science, Marquette University, Milwaukee, Wisconsin, USA;*
[3]*Institutes of Biodiversity, Animal Health and Comparative Medicine, University of Glasgow, Glasgow, UK;*
[4]*School of Public Health, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa;*
[5]*QIMR Berghofer Medical Research Institute, Brisbane, Queensland, Australia;*
[6]*Pan-African Mosquito Control Association, Nairobi, Kenya*

**Background:** Autodissemination of pyriproxyfen (PPF), i.e. co-opting adult female mosquitoes to transfer the insect growth regulator, pyriproxyfen (PPF) to their aquatic habitats has been demonstrated against *Aedes* and *Anopheles* mosquitoes. This approach, could potentially enable high coverage of aquatic mosquito habitats, including those hard to locate or reach via conventional larviciding. This study demonstrated impacts of autodissemination in crashing a stable and self-sustaining population of the malaria vector, *An. arabiensis* under semi-field conditions in Tanzania.

**Methodology:** Self-propagating populations of *An. arabiensis* were established inside large semi-field cages. Larvae fed on naturally occurring food in 20 aquatic habitats in two study chambers (9.6 × 9.6 m each), while emerging adults fed on tethered cattle. The mosquito population was monitored using emergence traps and human landing catches, each time returning captured adults into the chambers. Once the population was stable (after 23 filial generations), PPF dissemination devices (i.e. four clay pots each treated with 0.2- 0.3 g PPF) were introduced into one of the chambers (treatment) and their impact monitored in parallel with untreated chamber (control).

**Results:** Daily adult emergence was similar between control and treatment chambers, with average ($\pm$S.E) of $14.22 \pm 0.70$ and $12.62 \pm 0.74$ mosquitoes/trap respectively before treatment. Three months post-treatment, mean number of adult *An. arabiensis* emerging from the habitats was $5.22 \pm 0.42$ in control and $0.14 \pm 0.04$ in treatment chambers. This was equivalent to >97% suppression in treatment chamber without re-treatment of the clay pots. Similarly, the number of mosquitoes attempting to bite volunteers inside the treatment chamber decreased to zero, six months post-exposure (i.e. 100% suppression). In contrast, biting rates in control rose to $53.75 \pm 3.07$ per volunteer over the same period.

**Conclusion:** These findings demonstrate effective suppression of stable populations of malaria vectors using a small number of simple autodissemination devices, from which adult mosquitoes propagated pyriproxyfen to contaminate aquatic habitats in the system. This is the first proof that autodissemination can amplify treatment coverage and deplete vector populations. Field trials are necessary to validate these results, and assess impact of autodissemination as a complementary malaria intervention.

## 095

### HIGH LEVELS OF COPY NUMBER VARIATION IN METABOLIC INSECTICIDE RESISTANCE GENES IN MALARIA MOSQUITOES

**Lucas E.R.[1], Miles A.[2,3], Harding N.J.[2], Lawniczak M.K.N.[3], Weetman D.[1], Kwiatkowski D.P.[2,3], Donnelly M.J.D.[1,3], the Ag1000G consortium**

[1]*Dept. of Vector Biology, Liverpool School of Tropical Medicine, Liverpool;*
[2]*Big Data Institute, Li Ka Shing Centre for Health Information and Discovery, Oxford;*
[3]*Malaria Programme, Wellcome Trust Sanger Institute, Hinxton, UK*

The rise and spread of insecticide resistance in mosquitoes represents a worrying trend that threatens the progress made in controlling malaria. Duplication or amplification through copy number variation is a key mechanism by which expression of a gene can be increased, yet relatively little is known about the importance of copy number variation in the observed rise in insecticide resistance. Using the 1142 genomes of *Anopheles gambiae* and *An. coluzzii* from the Phase 2 release of the *Anopheles gambiae* 1000 Genomes project, we scanned the whole genome for copy number variants and found that gene duplications were enriched for metabolic gene families, which are commonly associated with insecticide resistance. Focusing on four gene regions with known associations to metabolic insecticide resistance (GSTU4-GSTE3, CYP9K1, CYP6M2-CYP6Z1 and CYP6AA1-CYP6P2), we produced detailed characterisations of all local duplications. All of these regions contained duplications, with the GSTU/GSTE, CYP9K1 and CYP6AA/CYP6P region showing multiple independent duplications of varying size, distribution and frequency. Several duplications show evidence of being under selection, indicating a likely role in insecticide resistance, and recent collections indicate that these duplications are increasing in frequency.

## 096

### MEASURING THE INTERACTION OF MOSQUITOES WITH BIOCIDE PRODUCTS USING 3D INFRARED VIDEO TRACKING

**Fatou M.[1,2], Fry S.N.[3], Müller P.[1,2]**

[1]*Dept. of Epidemiology and Public Health Dept., Swiss Tropical and Public Health Institute, Basel;*
[2]*University of Basel, Basel;*
[3]*SciTrackS GmbH, Bertschikon, Switzerland*

**Introduction:** Biocide products, such as topical repellents or insecticide-treated nets, are important tools for mosquito bite prevention and vector control. The efficacy of biocide products is measured in bioassays that typically record endpoints, such time to first bite, mortality rates or blood-feeding inhibition. These endpoints, however, provide no information as to how the mosquitoes interact with the repellent or the insecticide-treated net. A better understanding of how mosquitoes behave to these products would lead the way to improved formulations, modes of delivery or designs of more realistic biological assays. One promising approach to study how mosquitoes interact with biocide products is to record their flight trajectories in 3D. Recent advances in hardware and software provide the means to achieve this goal.

**Aim:** The objective of our work is to quantify the behaviour of host-seeking mosquitoes when they interact with topical repellents or insecticide-treated nets.

**Methods:** We measured the behaviour of host-seeking mosquitoes combining standard bioassays with Trackit 3D fly, which allows the 3D flight trajectories of several mosquitoes to be measured in real time using two arbitrarily positioned high resolution cameras. We have then compared the mosquito flight trajectories in the presence and absence of biocide products.

**Results:** Making use of Trackit 3D's customization and automated calibration features, we equipped various bioassay set-ups, including the arm-in-cage and the WHO tunnel test, with 3D video tracking, allowing

us to acquire 3D flight trajectories at 90 measurements per second in real time. The real time functionality allowed us to monitor the measurement and store the position data without the need to store large amounts of video data, and process these offline. Filming under near-infra-red lighting conditions allowed us to measure the natural behaviour of the night active mosquitoes under naturalistic lighting conditions.

**Conclusion:** We are able to measure the 3D flight trajectories of several mosquitoes in real time in the vicinity of topical repellents and insecticide-treated nets using an efficient approach. We will present our latest results on how mosquitoes interact with biocide products, and we will discuss the pros and cons of our set-up with other systems currently available.

## 097

### LYMNAEID SNAIL VECTOR CONTROL WITHIN ONE-HEALTH OR ECO-HEALTH INITIATIVES AGAINST HUMAN FASCIOLIASIS

**Bargues M.D., Mas-Coma S.**
*Dept. Parasitologia, Fac. Farmacia, Univ. Valencia, Valencia, Spain*

**Introduction:** Human fascioliasis is a vector-borne zoonotic trematodiasis transmitted by freshwater Lymnaeidae snails. This disease is caused by two liver flukes: *Fasciola hepatica* transmitted by *Galba/Fossaria* species in mild temperature areas and altitude zones throughout, and *F. gigantica* by *Radix* species in warm lowlands of wide parts of Africa and Asia, where fasciolid intermediate hybrid forms appear where lymnaeids of the two aforementioned groups locally overlap.

**Aim:** Ecology, behaviour and colonization capacity of lymnaeids are those of typical r-strategist organisms with a high multiplication rate, thus defining crucial aspects of the transmission patterns and epidemiological scenarios of the disease in humans and livestock reservoirs. They are therefore a key element to be considered within One-Health or Eco-Health initiatives against human fascioliasis.

**Methods:** A highly singular feature of lymnaeid snail vectors is their marked amphibious behaviour. This appears related to their high dependence on environmental factors and climate variables, and explain why these vectors and fascioliasis are so much influenced by climate and global changes, mainly anthropogenic environmental modifications such as artificial irrigation developments, domestic ruminant movements and livestok export/import. Methods to assess these characteristics should be applied according to different seasons, different environment types, and different livestock management traditions.

**Results:** The complexity of the control activities to undertake differ from endemic areas where only one lymnaeid vector species is present up to areas where more than one species of different ecological characteristics are involved. Within *Galba/Fossaria* there are species showing different capacities for disease transmission to humans, with *G. truncatula* as the most efficient. Similarly occurs within *Radix* group, with *R. viridis* as main vector for human infection.

**Conclusion:** Scenarios appear to be so different depending on regions and areas, that extrapolation of control measures becomes difficult. The One-Health initiative at present running in the Northern Bolivian Altiplano human hyperendemic area, where only one lymnaeid species is involved, is expected to be the first step in this way.

## 098

### DISTRICT HEALTH MANAGEMENT AND ITS ASSOCIATION WITH DISTRICT PERFORMANCE: A STUDY OF SIX DISTRICTS IN THE EASTERN REGION OF GHANA

**Heerdegen A.C.S.**[1,2]**, Aikins M.**[3]**, Amon S.**[3]**, Agyemang S.**[3]**, Gerold J.**[1,2]**, Prytherch H.**[1,2]**, Wyss K.**[1,2]
[1]*Swiss Centre for International Health, Swiss Tropical and Public Health Institute;*
[2]*University of Basel, Basel, Switzerland;*
[3]*School of Public Health, College of Health Sciences, University of Ghana, Accra, Ghana*

**Introduction:** Evidence suggests weak management and leadership (M&L) capacities being a major obstacle for responsive health service delivery, especially in low and middle-income countries. The district health system in Ghana, as in other countries, plays a pivotal role in the delivery of basic health services. District health managers are responsible for converting inputs and resources such as finance, staff, supplies, equipment and infrastructure into effective services that are responsive to population needs. Some districts perform better than others in terms of health outcomes and meeting service delivery targets. This may, in part, be associated with M&L competencies at district level as well as the availability of management support systems.

**Aim:** To examine district health managers' M&L competencies, as well as contextual characteristics, in high, average and poor performing districts.

**Methods:** The study took place as part of the EC-funded PERFORM2Scale project that is scaling-up a piloted district level management strengthening intervention. Sixty-nine health managers' in six districts completed a self-administered questionnaire in the Eastern Region of Ghana. Participants provided socio-demographic information; information on their previous management experience and training; and assessed their general and health-system related M&L competencies, work environment and the extent of functional support systems. The districts were grouped into high performing (n=2), average-performing (n=2) and low-performing (n=2) according to the Ghana Health Service League of District Performance that rank district performance.

**Results:** There were no major differences in socio-demographic characteristics and previous management experience between the different performing districts groups, yet exposure to management training differed with more exposure in poor performing districts. Nevertheless, District Health Managers' in high performing districts rated their overall M&L competencies significantly better than those is lower performing districts. Furthermore, study participants in the high performing districts reported a higher extent of functional support systems and significantly better communication within their teams, job satisfaction and organizational commitment.

**Conclusion:** The findings underline the importance of management development at district level. Efforts focusing on building managerial competence should also give emphasis to developing better support systems, collaboration and teamwork among district health managers.

## 099

### PERCEPTIONS OF CARE AND TREATMENT OF PEOPLE LIVING WITH HIV/AIDS IN BIHAR: A QUALITATIVE STUDY FROM INDIA

**Nair M.**[1]**, Kumar P.**[2]**, Pandey S.**[2]**, Harshana A.**[1]**, Kazmi S.**[1]**, Moreto-Planas L.**[3]**, Agarwal N.**[2]**, Singh C.M.**[2]**, Ranjan A.**[2]**, Burza S.**[1]
[1]*Medecins Sans Frontieres, New Delhi;*
[2]*Comunity and Family Medicine Dept., All India Institute of Medical Sciences, Patna, India;*
[3]*Medecins Sans Frontieres, Barcelona, Spain*

**Introduction:** Patients with advanced HIV face significant difficulties in accessing treatment in Bihar, India. However, routine stigma and discrimination is often implicit and anecdotally reported rather than formally documented. This study aimed to explore perceptions of care and treatment among people living with HIV and AIDS (PLHA) in two

districts of Bihar and uncover perceptions of PLHA among healthcare providers and community members.

**Methods:** Two districts of Bihar were purposively selected for the study, namely the capital Patna and another peripheral district located within 100 km of Patna. We conducted semi-structured, in-depth interviews with PLHA, healthcare personnel, as well as community members accessing care at health facilities across the two districts to triangulate findings. Audio-recordings were transcribed and translated into English and entered into NVIVO for in-depth coding and analysis. Researchers engaged in a grounded theory analysis and followed open, axial and selective coding processes to develop a core theory.

**Results:** 71 participants were interviewed, including 35 HIV positive patients, 10 community members, and 26 healthcare providers. HIV was conceptualized as a "dirty" or "immoral" illness even in healthcare settings: the majority of doctors engaged in mandatory testing of all patients rather than following universal precautions, and several refused to treat HIV positive patients. Intentional and non-consensual disclosure of HIV positive status by healthcare personnel was commonly reported by patients and doctors alike, with anticipated stigma limiting public disclosure of illness among patients. Among healthcare personnel, a pervasive fear of contracting HIV and poor knowledge of transmission were major drivers of stigmatizing behaviors such as refusing to touch or treat. Stigma played a crucial role in hampering access to care, particularly outside Patna and within private healthcare.

**Conclusion:** The Government of India's current approach to stigma reduction in health care is mostly punitive in nature, and assumes high level of provider awareness. We argue that there is a pressing need to implement universal precautions across all health facilities in the state, and implement evidence-based stigma reduction interventions. Given the gaps in knowledge however, impact will be dependent on educating healthcare providers on modes of transmission.

**Ethics Statement:** This study was approved by the MSF Ethical Review Board and the Ethics Committee of the All India Institute of Medical Sciences, Bihar, India.

## 100

### QUALITY IMPROVEMENT IN THE KENYAN COMMUNITY HEALTH SYSTEM: A MECHANISM TO DRIVE LOCAL INNOVATIONS TO OVERCOME LOCAL CHALLENGES

**Otiso L.[1], Kumar M.B.[2], Wingfield T.[2], Doyle V.[2,3], Okoth L.[1], Muturi N.[1], Karuga R.[1], Kimani M.[1], Ogwang E.[1], Regeru R.N.[1], Taegtmeyer M.[2]**
[1]LVCT Health, Nairobi, Kenya;
[2]Dept. of International Public Health, Liverpool School of Tropical Medicine, Liverpool;
[3]Capacity Development International, Liverpool, UK

**Introduction:** Community health worker (CHW) programs have been scaled up globally to response to primary health care challenges. Concerns about data quality, quality of care and limited effectiveness of CHWs in improving health outcomes have remained. Quality Improvement (QI) is a systematic approach to identify and improve on gaps in the delivery of health services. QI has been used in health facilities to address quality gaps through local data collection, analysis and use for problem solving. Few studies have applied or assessed QI approaches in CHW programs.

**Aim:** We tested the feasibility of implementing QI approaches in community health programs in Kenya as a means of solving local health problems.

**Methods:** We implemented a QI program in purposively-selected community health units (CHUs) in Kenya between October 2016 and December 2018. We established 27 QI teams made up of CHWs, their supervisors, and staff from the primary health care link facility. We carried out a three phased training in QI methods interspersed with periods of implementation and team coaching over nine months. We hosted 'learning events' where we used a wide range of active methods and competitive awards to exchange ideas and stimulate and promote innovation.

**Results:** We highlight two community-initiated and -led innovations to showcase the ways that teams designed solutions within their available resources founded on robust root cause analyses:

1. CHWs extended growth monitoring from facilities to informal day-care centres to reach more children under 5 years in Nairobi contributing to increased diagnosis of moderate acute malnutrition at community level from 1.2% to 44% cases.

2. Improving antenatal care through mother-to-mother support groups – Kitui

3. CHWs developed waiting cards for antenatal care to allow women who come early to be seen first in Nairobi. The average waiting time was reduced by 25 minutes per mother.

**Conclusion:** We demonstrate the value of guided, structured QI in community-led approaches, resulting in innovation and implementation of 'what works' in users' micro-context. Recognising that implementation challenges persist, here we highlight how QI capacity can lead to creativity of community teams to design and drive meaningful change in their priority health issues.

## 101

### A PRAGMATIC NCD PROJECT IN RURAL KENYA

**Van Den Broucke S.[1,2], Nzomukunda Y.[2], Scholtes C.[2], Prasai M.[2], Kizito W.[3], Muthinji E.[4], Njiru R.[4], Ellman T.[5]**
[1]Dept. of Clinical Sciences, Institute of Tropical Medicine, Antwerp;
[2]MSF-OCB, Brussels, Belgium;
[3]MSF-OCB, Nairobi,
[4]MoH, Embu, Kenya,
[5]MSF-OCB SAMU, Capetown, South-Africa

**Introduction:** Early 2017, Médecins Sans Frontière, Belgium (MSF-OCB) was invited by Ministry of Health (MoH) to start an integrated NCD-project dealing with hypertension, diabetes, asthma and epilepsy in Embu, a rural county in Kenya. After an initial assessment of the current NCD program strengths and challenges, 5-year goals where set.

**Project Aims:** To develop a model of care for NCDs that is easy to scale-up and duplicable by Ministry of Health (MoH). To develop specific advocacy messages on NCD's supported by outcome results through operational research.

**Assessment:** In the county reference hospital, 46% of hospitalizations in internal medicine are NCD related. NCD management is chaotic and lacks uniformity compared to HIV and TB care. National NCD guidelines are sometimes conflicting, not always adapted to the local context and on rare occasions utterly detrimental. Quality laboratory monitoring for NCDs is rarely available. Patients referred to higher level cannot be transferred back to PHC level. Supply of NCDs treatments is unreliable at all levels and 90% NCD drugs come from non-WHO pre-qualified manufacturers. National Health Insurance (NHI) is beneficial for NCD patients and 1/3 patients are insured but regular drug stock-outs undermine the NHI and cause patients double costs (still need to buy drugs in private pharmacies).

**Proposal:** An integrated mentoring and coaching project was launched focussing on capacity building in primary health care (PHC) with a referral and back-referral policy between central and peripheral health structures. Simple, pragmatic, locally adapted and innovative project guidelines were created, with SOPs adapted to PHC level. Point-of-Care HbA1c, cholesterol and creatinine are introduced. MSF provides WHO pre-qualified drugs.

CHWs will create disease awareness in the community to stimulate health-care seeking behaviour for patients most at risk. Operational research to document outcomes of the model of care and on the feasibility of the innovative guidelines is planned. First cohort outcomes are expected mid-2019.

## 102

### POST-UNIVERSITY SPECIALTY TRAINING (PUST) OF FAMILY DOCTORS IN TAJIKISTAN

**Bohle L.F.**[1,2]**, Kasymova Z.**[3]**, Davlyatova D.**[3]**, Ross G.**[3]**, Yarbaeva S.**[3]**, Galeazzi R.**[1,2]**, Wyss K.**[1,2]**, Prytherch H.**[1,2]
[1]*Swiss Centre for International Health (SCIH), Swiss Tropical and Public Health Institute (Swiss TPH);*
[2]*University of Basel, Basel, Switzerland;*
[3]*Swiss Agency for Development and Cooperation's Medical Education Reform Project, Dushanbe, Tajikistan*

**Introduction:** Medical education reform is a priority of the National Health Strategy 2010-2020 of the Government of Tajikistan. Swiss support has facilitated the establishment of a 2-year Post-University Specialization Training (PUST) for Family Doctors. The PUST has a stronger focus on clinical skills and on-site tutored practical learning than the conventional 1-year work experience period designated as 'Internatura' which also continues to be offered to graduates from medical university.
**Aim:** The clinical skills, attitudes, behaviour and theoretical knowledge of Family Doctors graduating from the 2-year programme were compared to Family Doctors completing the conventional 1-year internship ('Internatura'), as well as to those of newly graduated medical students entering the PUST programme.
**Methods:** An Objective Structured Clinical Examination (OSCE) and a 60-item Multiple Choice Questionnaire focusing on 20 tracer diseases were conducted. Three sub-samples participated: i) graduated medical students newly entering the PUST ("Ordinators-1st Year" N=20/20); doctors newly completing the 1-year 'Internatura' ("Interns" N= 6/8); and Family doctors newly graduated from the 2-year PUST ("Ordinators-FDs" (N=26/24). Results were tested for significance.
**Results:** In the OSCE the Ordinators-FD performed best, achieving on average (60%, equal to 84 out of 139 possible points), followed by the Ordinators-1st Year, with the Interns in fact performing poorest of all. The differences between the performance of the Ordinators-FD and both other groups were significant (F=8.64, P=0.01). For the MCQs the difference was less marked, with Ordinators-FD answering 44% correctly; Ordinators-1st Year" 42%, and Interns 38%.
**Conclusion:** The PUST programme is a successful and impactful programme for improving the clinical skills, attitudes and behaviour of Family Doctors in Tajikistan. However, there is still room to continuously and systematically further strengthen the theoretical and practical knowledge, skills and competencies of medical graduates entering family medicine, as well as their tutors. To further improve the knowledge and skills the programme should be enlarged to a total of three years to bring it closer to international standards. A strengthening of the programme and expansion would consequently result in an increase in the provision of health services of highest quality with a positive impact on reducing the morbidity and mortality of the Tajik population.

## 103

### PROMOTING GLOBAL RECOMMENDATIONS TO PREVENT MATERNAL MORTALITY AND MORBIDITY IN LOCALLY UNACCEPTABLE CIRCUMSTANCES - SAFE MOTHERHOOD PRIORITIES (1987-2017)

**Solnes Miltenburg A., Kvernflaten B.**
*Dept. of Community Medicine and Global Health, Institute of Health and Society, University of Oslo, Oslo, Norway*

**Introduction:** Worldwide too many women are unnecessarily dying in childbirth. However, thirty years of global attention for maternal mortality, sparked by the Safe Motherhood Initiative in 1987, has resulted in significant progress. Also in low resource settings, more women have access to essential services and seek care during pregnancy and birth. Nevertheless, by 2015, it has become clear that increased access to care, did not result in the expected reduction of mortality in every country, particularly in low resource settings. The crucial gap in the quality of care revealed a lack of focus on the implementation of global recommendations of interventions to prevent maternal mortality and morbidity.
**Aim:** We aim to illustrate how the recurrent local promotion of global standard models as a way to improve maternal health, have resulted in sometimes damaging consequences for women and health providers on the ground.
**Methods:** We performed a desktop review of Safe Motherhood priorities in the past thirty years, and rely on several years of fieldwork and research on maternal health in low-resource settings.
**Results:** Throughout the past 30 years, global focus has remained on interventions argued to be effective to achieve reduction of maternal mortality. Consequently, these have been framed in an increasingly medicalized service model, disseminated through a universal, 'one-size-fits-all' approach, while local contexts are divers and dynamic. Examples from several countries in sub-Saharan Africa, illustrate how the global standard models and related interventions (e.g. focussed antenatal care, birth with a skilled attendant, emergency obstetric care) over time have been negotiated, shaped and transformed influenced by the socio-economic and political context.
**Conclusion:** The Sustainable Development Goals era, the 4th Safe Motherhood decade, provides a new opportunity, to move beyond numerical indicators of progress on maternal mortality reduction, and to promote maternal well-being and dignity, prioritizing the values and needs of women and their families, in the contexts in which they live and seek care. In order to achieve this however, efforts should be made to assist policy makers and health providers to adapt global recommendations, fitting to their, often unacceptable, country realities, rather than to universal dreams and aspirations.

## 104

### JUDICIAL AND HEALTH RESPONSES TO CHILD SEXUAL ABUSE IN WESTERN KENYA: A CASE STUDY OF ADOLESCENT SURVIVORS OF SEXUAL ABUSE

**Wangamati C., Sundby J., Nyangor M., Prince R.**
[1]*Dept. of Community Medicine and Global Health, Institute of Health and Society, University of Oslo, Oslo, Norway;*
[2]*Plan International*

**Introduction:** Child sexual abuse (CSA) is a global, social and health challenge. Extant literature in Kenya indicates an increasing number of minors seeking health and legal services for sexual abuse. However, little is known about the experiences of CSA survivors when they seek health and legal services.
**Aim:** The aim of this study was to gain contextual insight in the experiences of CSA survivors in Kenya, and their access to justice.
**Methods**: We conducted in-depth interviews with 10 girls who had experienced sexual abuse and held informal conversations with their guardians and service providers, reviewed medical and court records, and observed interactions between the girls and the legal system.

**Results:** We report on experiences of two girls seeking justice through the Kenyan justice system as they are representative of the ten cases. We found that these minors' rights to justice were violated. They were subjected to long delays at the law courts before their cases could be heard. Sexual and reproductive health services offered to the minors were of poor quality. Moreover, guidelines on screening CSA and mandatory reporting were non-existent in health facilities.

**Conclusion:** There is need for the criminal justice system in Kenya to prioritize sexually violated minors in courts. Health providers should be trained and given guidelines on how to screen for CSA and cater to the needs of CSA survivors.

## 105

### EFFECTS OF REFRESHER TRAINING ON THE USE OF MANUAL VACCUM ASPIRATION IN THE TREATMENT OF INCOMPLETE ABORTIONS: A QUASI-EXPERIMENTAL STUDY IN MALAWI

**Odland M.L.[1,2]**
[1]*Dept. of Public Health and Nursing, Norwegian University of Science and Technology, Trondheim, Norway;*
[2]*Institute of Applied Health Sciences, University of Birmingham, Edgbaston, Birmingham, UK*

**Introduction:** The maternal mortality ratio is decreasing globally, although it remains high in Malawi. Unsafe abortion is a major cause and treatment of complications after abortion is a big burden on the health system. Even though manual vacuum aspiration (MVA) is the recommended surgical treatment of incomplete abortions in the first trimester, many hospitals in Malawi continue to use sharp curettage. It is known to have more complications and is more expensive in the long run.

**Aim:** The purpose of this study was to determine the effectiveness of a structured MVA training programme in the treatment of incomplete abortions in Malawi.

**Methods:** A quasi-experimental before-and-after study design was employed in an MVA training programme for health personnel at three hospitals in Southern Malawi. A total of 53 health personnel at the Queen Elizabeth Central Hospital and the district hospitals of Chikwawa and Chiradzulu (intervention hospitals) were trained in the use of MVA. Kamuzu Central Hospital in Lilongwe and the Thyolo District Hospital served as control institutions. Medical files for all women treated for an incomplete abortion at the study hospitals were reviewed before and after the intervention. Information on demographic and obstetric data and the type of treatment was collected.

**Results:** There was a significant increase in the use of MVA from 7.8% (95% CI 5.8 to 10.3) to 29.1% (95% CI 25.9 to 32.5) 1 year after the intervention. In comparison, we found a mere 3% increase in the control hospitals.

**Conclusions:** By providing a refresher training programme to health personnel who treat women with incomplete abortions, it was possible to increase the use of MVA as recommended in the Malawi national guidelines.

## 106

### INVESTING SCARCE RESOURCES WISELY – SYSTEMATICALLY ANALYSING RESEARCH FUNDING TO IMPROVE DECISION-MAKING IN HEALTH RESEARCH AND REDUCE FUTURE BURDENS OF DISEASE

**Head M.G., Brown R.J., Batchelor J.**
*University of Southampton, UK*

The aim of health research is to provide new tools, knowledge and approaches that can be applied to the healthcare sector and reduce the burden of disease. However, investors in global health research makes decisions on funding without a clear widespread picture of the overall cross-funder research landscape and the impact and benefits of these decisions.

The Research Investments in Global Health (ResIn) study (http://researchinvestments.org/) is a long-running project that analyses funding trends in health research. We have previously mapped and described investments in UK-funded global health research, and compared to the burden of disease to gain insight into level of funding compared with level of disease. In 2018 we published a report (Sizing Up Pneumonia Research) describing the worldwide underspend on pneumonia R&D, and also a Lancet Global Health paper quantifying the sites of malaria research hubs across sub-Saharan Africa (e.g. Kenya, Tanzania) along with the geographical gaps in dissemination of funds (e.g. Chad, Central African Republic).

Now, ResIn is producing an extensive, fully-categorised, global dataset that incorporates 80,000 separate infectious disease research investments, totally an estimated $100 billion, from 46 countries over the time period 2000-2017. Findings from this large analysis will cover type of science of the awards, disease in focus, geography of research, and be available in 2019 and be presented at ECTMIH.

Our results have, and will continue to, inform high-level global health policymakers e.g. we are cited in policy documents from the World Health Organisation and UK government, as well as funders, professional bodies and societies, and in-country stakeholders of low- and middle-income countries. We provided original data and expert comment to the 2018 World Bank 'Money and Microbes' report, which described how data on funding, research capacity, level of skills and evidence gaps are vital information to accurately describe if decreases in health burden are to be maximised. Our Methods and findings can underpin and support the moves from global health stakeholders to improve the quality of this evidence base.

## 107

### SOCIOECONOMIC INEQUALITIES IN ARBOVIRAL DISEASES IN LATIN AMERICA: ESTIMATING AND DECOMPOSING THE INDEX OF INEQUALITY FOR DENGUE, ZIKA AND CHIKUNGUNYA IN COLOMBIA AND BRAZIL

**Carabali M.[1], Harper S.[1], Lima-Neto A.[2,3], Caprara A.[4], Restrepo B.N.[5], Kaufman J.S.[1]**
[1]*Dept. of Epidemiology, Biostatistics and Occupational Health, McGill University, Montreal, Canada;*
[2]*Fortaleza Health Secretariat (SMS-Fortaleza);*
[3]*University of Fortaleza (UNIFOR;*
[4]*University State of Ceara (UECE), Fortaleza-CE, Brazil;*
[5]*Instituto de Medicina Tropical- Universidad CES, Medellin, Colombia*

**Introduction:** Dengue, chikungunya, and zika are arboviruses transmitted to humans by *Aedes sp.* mosquitoes. These endemic diseases in Latin America have similar symptomatology, no specific curative treatments, and no effective vaccines. Overall notified cases, dengue deaths and severe forms of zika and chikungunya are more common among people in low socioeconomic position, but no formal assessment of the inequality has been done yet.

**Aim:** To estimate the socioeconomic inequality of dengue, chikungunya and zika at the neighborhood level in Brazil and Colombia.

**Methods:** We used data on all notified cases from 2008 to 2017 in Medellin, Colombia and Fortaleza in Brazil, to estimate the magnitude of socioeconomic inequalities. We used Bayesian Hierarchical spatiotem-

poral analysis to estimate neighborhood-level monthly incidence rates and used income data to estimate the relative concentration index of inequality (RCI). To identify the main contributors to inequality, we decomposed the RCI and described its time trend. A priori covariates included in the RCI decomposition were age, sex, occupation, education, as well as neighborhood-level climate, entomological, and social variables. We fitted overall and disease-specific Poisson models, using random effects for time and spaces and semiparametric functions for climatic variables using Integrated Nested Laplace Approximation Methods (r-INLA).

**Results:** In Fortaleza there were 274,089 reported arboviral diseases (dengue=195,483; chikungunya=77,024; and zika=1582 cases). The overall RCI was -0.07 (95% CI= -0.08, -0.06) indicating a concentration of arboviruses among the poor, even after adjusting for the spatiotemporal trend, with a 7% reduction on the incidence rates per every $100 USD increase in the median income per neighborhood. The overall RCI using a fully adjusted model was -0.02 and the main contributor to inequality was waste management (21.6%). The lowest RCI (-0.11) was from 2010 while the highest were 2012 (-0.015), 2015 (-0.027), and 2017 (-0.014).

**Conclusion:** Our quantitative assessment of data from the last 10 years in two endemic Latin American cities highlights the contribution of social determinants to inequality in arboviral diseases. Results indicate the concentration of arboviruses among the poor, however, such concentration is more marked during interepidemic years and decreases during outbreaks.

## 108

### THE NEED TO IMPROVE ACCESS TO RABIES POST-EXPOSURE VACCINES: LESSONS FROM TANZANIA

Changalucha J.[1], Steenson R.[2], Grieve E.[3], Cleaveland S.[2], Lembo T.[2], Mtema Z.[1], Sambo M.[1,2], Govella N.[1], Dilip A.[1], Hampson K.[2]

[1]Environmental Health and Ecological Science, Ifakara Health Institute, Dar-es-salaam, Tanzania;
[2]Institute of Biodiversity, Animal Health and Comparative Medicine, University of Glasgow;
[3]Health Economics and Health Technology Assessment, Institute of Health and Wellbeing, University of Glasgow, Glasgow, UK

**Introduction:** Rabies is preventable through prompt administration of post-exposure prophylaxis (PEP) to exposed persons, but PEP access is limited in many rabies-endemic countries.

**Aim:** We investigated how access to PEP can be improved to better prevent human rabies.

**Methods:** Using data from different settings in Tanzania, including contact tracing (2,367 probable rabies exposures identified) and large-scale mobile phone-based surveillance (24,999 patient records), we estimated the incidence of rabies exposures and bite-injuries, and examined health seeking and health outcomes in relation to PEP access. We used surveys and qualitative interviews with stakeholders within the health system to further characterise PEP supply and triangulate these findings.

**Results:** Incidence of bite-injury patients was related to dog population sizes, with higher incidence in districts with lower human-dog ratios and urban centres. A substantial percentage (25%) of probable rabies exposures did not seek care due to costs and limited appreciation of risk. Upon seeking care a further 15% of probable rabies exposed persons did not obtain PEP due to shortages, cost barriers or misadvise. Of those that initiated PEP, 46% did not complete the course. If no PEP was administered, the risk of developing rabies following a probable rabies exposure was high (0.165), with bites to the head carrying most

risk. Decentralized and free PEP increased the probability that patients received PEP and reduced delays in initiating PEP. No major difficulties were encountered by health workers whilst switching to dose-sparing ID administration of PEP. Health infrastructure also includes sufficient cold chain capacity to support improved PEP provision. However, high costs to governments and patients currently limit the supply chain and PEP access. The cost barrier was exacerbated by decentralization of budgets, with priority given to purchase of cheaper medicines for other conditions. Reactive procurement resulted in limited and unresponsive PEP supply, increasing costs and risks to bite victims.

**Conclusion:** PEP access could be improved and rabies deaths reduced through ring-fenced procurement, switching to dose-sparing ID regimens and free provision of PEP.

## 109

### A PROOF-OF-PRINCIPLE INTEGRATED HEALTH DELIVERY PLATFORM, TARGETING SOIL-TRANSMITTED HELMINTHS (STH) AND CANINE MEDIATED HUMAN RABIES, RESULTS IN COST SAVINGS AND INCREASED BREADTH OF TREATMENT COVERAGE FOR STH IN REMOTE RURAL COMMUNITIES IN TANZANIA

Lankester F.[1,2], Davis A.[3], Kinung'hi S.[4], Yoder J.[5], Bunga C.[4], Alkara S.[2], Mzimbiri I.[2], Cleaveland S.[6], Palmer G.H.[1,2]

[1]Paul G. Allen School for Global Animal Health, Washington State University, Pullman, Washington, USA;
[2]Global Animal Health Tanzania, Arusha, Tanzania;
[3]School of Geographical and Earth Sciences, University of Glasgow, Glasgow, UK;
[4]National Institute of Medical Research, Mwanza, Tanzania;
[5]School of Economic Sciences, Washington State University, Pullman, Washington, USA;
[6]Boyd Orr Centre for Population and Ecosystem Health, Institute for Biodiversity, Animal Health and Comparative Medicine, College of Medical, Veterinary and Life Sciences, University of Glasgow, Glasgow, UK

**Introduction:** Achieving the London Declaration goal of a 90% reduction in neglected tropical diseases (NTDs) by 2030 requires innovative and cost-effective control strategies.

**Aim:** This proof-of-principle study examined the effectiveness of integrating control programs for two NTDs: soil-transmitted helminths (STH) in humans and dog rabies. Treatment integration required combining mass drug administration (MDA) for STH and mass dog rabies vaccination (MDRV).

**Methods:** The study was carried out in remote villages in the Ngorongoro District, Tanzania, where there is an existing national primary school-based deworming program. The first objective was to investigate the effectiveness, cost and time savings, and community perceptions of integrated delivery. The second objective was to quantify the impact of the study's MDA strategy on reaching primary school-aged children (whether or not enrolled in school) and other community members. To implement, we randomly selected villages for delivery of MDA and MDRV (Arm A), MDA only (Arm B), or MDRV only (Arm C).

**Results:** Cost per delivered dose was lower under integrated strategy by $0.12 (33%) and $0.82 (16%) for deworming and rabies, respectively. The percentage of households in Arms A and B that participated in the deworming event was 82% and 86%, respectively ($\chi^2 = 0.2$, $p = 0.66$). The percentage of households in Arms A and C that participated in the rabies vaccination event was 80% and 88%, respectively ($\chi^2 = 2$, $p = 0.16$). It took 33% less time for a single person and a dog to attend the integrated delivery than two separate events. Strong community support was expressed for integrated delivery.

**Conclusion:** This proof-of-principle study demonstrated integrated delivery platforms for health interventions are popular, cost and time saving. Further, integrating human and animal health interventions is feasible, locally acceptable and does not appear to result in a reduction of the proportion of people reached for deworming or constrain the ability to achieve a 70% target for dog rabies vaccination. Thus, indicating the utility of integrated One Health delivery platforms and suggesting a role in the global campaign to reduce NTDs, especially in remote communities.

## 110

### EVALUATION OF BARRIERS TO POST-EXPOSURE PROPHYLAXIS IN BLANTYRE, MALAWI USING A MIXED-METHODS APPROACH

Stokes S.[1,2], Gamble L.[2], Gibson A.D.[2,3], Lohr F.[2,3], Burdon Bailey J.[2,3], Mayer D.[2,3], Michembo J.[4], Maruwo G.[5], Mellanby R.J.[3], Mazeri S.[2,3]

[1]*London School of Hygiene and Tropical Medicine, London;*
[2]*Mission Rabies, Cranborne, Dorset;*
[3]*The Roslin Institute and The Royal (Dick) School of Veterinary Studies, The University of Edinburgh, Easter Bush Veterinary Centre, Roslin, Midlothian, UK;*
[4]*Mission Rabies;*
[5]*Blantyre Regional Veterinary Office, Blantyre, Malawi*

**Introduction:** Rabies is an important and under-reported infectious disease of the central nervous system which is endemic in many Sub-Saharan African countries. Bites from infected dogs are the main cause of human infections. The disease can be prevented if post-exposure-prophylaxis (PEP) is administered immediately post bite. However, many dog bite victims do not receive PEP.

**Aim:** The aim of this study was to examine the reasons why dog bite victims do not report to health services to obtain PEP in Blantyre, Malawi.

**Methods:** Between February and June 2018, people presenting to the Regional Veterinary Laboratory (RVL) in Blantyre, Malawi after exposure to a dog bite or scratch were randomly selected to participate in a questionnaire survey combining quantitative and qualitative data on the exposure and its management. Contact tracing of nearby households was also carried out to identify other people exposed to dog bites or scratches in the area in the preceding 3 months. A multivariable logistic regression model was developed to assess factors associated with RVL attendance.

**Results:** A primary cohort of 102 dog exposures reported to the RVL were investigated. Contact tracing of these exposures led to a subsequent 2410 household interviews which identified a secondary cohort of 97 further dog bite exposures. Of the secondary cohort, 72.2% of exposures had not been reported to the RVL. 46.4% did not present to either RVL or any other clinic for assessment after their exposure. Only 4.6% had washed their wound for the period of time recommended by WHO following exposure, and 16.3% had received PEP vaccine. Factors associated with attendance at the RVL included bite from a stray dog, more severe bite, and higher household income.

**Conclusions:** Passive surveillance of potentially rabid dog bites will significantly underestimate incidence of dog exposures. Barriers to rabies PEP vaccine uptake include knowledge, financial barriers and public perception that health services will be unable to supply vaccine.

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### MANAGEMENT AND CONTROL OF TICKS AND TICK-BORNE DISEASES AFFECTING CATTLE BY COMMUNAL FARMERS IN ZIMBABWE

Sungirai M.
*Dept. of Animal and Wildlife Science, Midlands State University, Gweru, Zimbabwe*

**Introduction:** Tick-borne diseases (TBDs) account for losses exceeding millions of United States Dollars (USD) annually in most African countries. In Zimbabwe, TBDs are responsible for at least 60% of cattle mortalities annually. The resource poor communal farmers are most affected since they own the majority of the cattle. There is need to investigate how these communal farmers are managing and controlling ticks and TBDs in their areas. This will help in coming up with enhanced strategies to reduce the losses encountered by farmers.

**Aim:** The aim of this study was to investigate how communal farmers were managing and controlling ticks and TBDs by assessing level of knowledge and perception on ticks and TBDs, knowledge, frequency and type of acaricide used and access to veterinary services.

**Methods:** A nationwide survey was conducted in 33 / 55 farming districts of the country. Six hundred farmers were personally interviewed using a semi-structured questionnaire in order to answer the study's objectives. The data was analysed using descriptive statistics for the dependant variables under investigation as well as cross tabulations to check for relationships between demographic and dependant variables.

**Results:** The results showed a deep awareness of ticks and TBDs with 70% of the sampled farmers being able to mention tick-borne diseases and relate to their clinical signs. This was however influenced ($p < 0.05$) by gender, participation in farmer training courses and age. The most common TBDs affecting cattle nationally were heartwater, anaplasmosis, babesiosis and theilerosis in that order. The acaricide amitraz was the most frequently used (68%) followed by organophosphates (25%) and synthetic pyrethroids (7%). It was observed that most farmers (79%) were participating in government co-ordinated communal dipping programmes and there was a strong reliance (85%) on veterinary personnel for assistance.

**Conclusion:** Ticks and TBDs continue to be a problem for resource poor communal farmers. The high level of knowledge by farmers on TBDs will ensure a cheap form of data collection in the absence of resources to carry out traditional epidemiological studies. With the high frequency of use of amitraz as an acaricide there might be need to investigate issues to do with resistance.

## 112

### POULTRY VALUE CHAINS SHAPING AVIAN INFLUENZA VIRAL TRANSMISSION IN BANGLADESH

Fournie G.[1], Hoque A.[2], Barnett T.[3], Biswas P.[2], Giasuddin M.[4], Henning J.[5], Mangtani P.[3], Flora M.[6], Debnath N.[7], Pfeiffer D.U.[1,8]

[1]*Royal Veterinary College, London, UK;*
[2]*Chittagong Veterinary and Animal Science University, Chittagong, Bangladesh;*
[3]*London School of Hygiene and Tropical Medicine, London, UK;*
[4]*Bangladesh Livestock Research Institute, Savar, Bangladesh;*
[5]*University of Queensland, Australia;*
[6]*Institute of Epidemiology, Disease Control and Research, Dhaka, Bangladesh;*
[7]*FAO, Dhaka, Bangladesh;*
[8]*City University, Hong Kong*

**Introduction:** Avian influenza virus is endemic in Bangladesh and maintained via a complex network of poultry value chains that covers the whole country.

**Aim:** This study aims to assess (1) the socio-economic factors shaping Bangladeshi poultry value chains and (2) the consequences for the transmission of avian influenza viruses (AIVs) to poultry and humans.

**Methods:** An inter-disciplinary approach was adopted, combining ethnography, epidemiology, virology and mathematical modelling. Overall, about 2500 poultry production stakeholders were interviewed to explore the value chains supplying Dhaka and Chittagong. This informed the design of cross-sectional and longitudinal virological and serological surveys of farmed and marketed poultry, as well as in-contact humans.

**Results:** Demand and availability of poultry greatly varied according to breeds and species. While this resulted in different poultry origin and market destination patterns, value chains intertwined in markets, promoting the mixing of poultry of all breeds, species and geographical origins, as well as of their viruses. Although infection of market workers by AIVs was rare, market air and environment were highly contaminated. AIV bird-level prevalence in marketed poultry was more than 10-times as high as in farms supplying those markets, and co-infection with multiple strains was common. Model Results suggested that this viral amplification from farms to markets resulted from transmission events mainly occurring during transportation, rather than at markets. Moreover, the value chains' topologies likely resulted in various viral strain mixing patterns depending on poultry types and market locations, with consequences for the design of surveillance and control programmes. These model outputs are currently being validated through phylodynamic analyses and field experiments. We also identified actors with key roles – such as credit providers – whose choices and transaction decisions shaped poultry trade, influencing AIV infection patterns.

**Conclusion:** Trading practices created conditions for the co-circulation of multiple AIV strains at high prevalence levels in the Bangladeshi poultry trading system, increasing the risk of viral reassortment. To mitigate this risk, it is essential to alter value chain structures by influencing transaction dynamics through economic incentives and promoting access to economic capital and information.

## 113

### ZOONOSES RESEARCH IN THE HORN OF AFRICA: A SCOPING REVIEW

**Cavalerie L.[1,2], McIntyre M.K.[1], Lebrasseur O.[2,3], Nanyingi M.[1,4], Christley R.M.[1], Pinchbeck G.L.[1], Baylis M.[1], Mor S.M.[1,2]**
[1]Institute of Infection and Global Health, University of Liverpool, Liverpool, UK;
[2]International Livestock Research Institute, Addis Ababa, Ethiopia;
[3]Dept. of Archaeology, Classics and Egyptology, University of Liverpool, Liverpool, UK;
[4]University of Nairobi, Nairobi, Kenya

**Introduction:** One Health is particularly relevant to the Horn of Africa where people livelihoods are highly dependent on livestock and their shared environment. In this context, zoonoses may have a dramatic impact on both human and animal health, but also on the ability of livestock owners to sustain themselves.

**Aim:** This scoping review aimed at characterizing and evaluating the nature of zoonotic disease research in the Horn of Africa (Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan, South Sudan and Uganda). Specifically, this review addressed the following questions: what specific zoonotic diseases have been prioritized for research in each country, what domains are reported (human, animal, environment), and what methods were applied?

**Methods:** We used a combination of keywords to search online databases for peer-reviewed papers and theses. Screening and data extraction (disease, country, domain and method) was performed using DistillerSR.

**Results:** A total of 9222 papers were retrieved through database searches. After duplicate removal, 3871 relevant studies were assessed for inclusion, resulting in more than 2000 relevant studies. Ethiopia had the largest number of papers followed by Kenya, Uganda and Sudan. Most frequently studied zoonoses were brucellosis and echinococcosis. A large majority of studies used epidemiology Methods (descriptive or cross-sectional) and focused on one domain only (animal or human).

**Conclusion:** Recommendations arising from this scoping review include: (1) reducing study duplication through better communication and collaboration; (2) aligning research with country priorities; (3) encouraging One Health approaches and reporting following COHERE guidelines; (4) adopting research Methods that support evidence-based zoonoses management.

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### THE ASSOCIATION OF BURULI ULCER DISEASE ENDEMICITY WITH MAJOR CLIMATIC, EPIDEMIOLOGICAL AND SOCIO-ENVIRONMENTAL FACTORS: A GEOSPATIAL ANALYSIS FROM SOUTHERN NIGERIA

**Puchner K.P.[1], Kreibich S.[1], Meka A.[2], Adebayo P.I.[3], Van der Schaaf H.[4], Watson K.[4]**
[1]German Leprosy and TB Relief Association, Würzburg, Germany;
[2]German Leprosy and TB Relief Association, Enugu;
[3]National Tuberculosis, Leprosy and Buruli Ulcer Control Programme, Federal Ministry of Health, Abuja, Nigeria;
[4]Dep. ILT, Fraunhofer Institute of Optronics, System Technologies and Image Exploitation IOSB, Karlsruhe, Germany

**Introduction:** Buruli ulcer (BU) endemicity is long-established in Nigeria; however the substantial increase of reported new cases in the last years, suggests that dimensions of BU endemicity might not be fully understood yet. BU epidemiology exhibits small, yet highly clustered incidence and transmission from contaminated environments to humans. Thus, identification of climatic, epidemiological and socio-environmental factors predictive of BU endemicity is of key importance.

**Aim:** To analyze the association of the 164 BU cases, reported between 2012 and 2015, in 4 Nigerian States with major climatic, socio-environmental and epidemiological factors at the level of the respective Local Government Areas (LGAs).

**Methods:** All BU cases were geocoded. Cumulative number of new cases per 100,000 at LGA level (CNNCs), served as our outcome variable. Data on relevant climatic, socio-environmental and epidemiological parameters, serving as independent variables, were obtained from remote Earth Observation data, OpenStreetMap, online mapping tools, literature review and geocoding of field data. Geospatial illustrations of reported BU and Spearman rank correlation between outcome and independent variables was performed. Linear regression analysis for assessing the most accurate predictive model for BU CNNCs was used.

**Results:** Proximity of BU cases towards different types of waterbodies was evident in the geospatial illustration. BU CNNCs correlated directly with topological wetness index and inversely with median land slope, average annual rainfall, as well as to distance to ponds, lakes and all kinds of waterbodies (composite variable comprising ponds, lakes, rice fields and rivers). Regarding prediction quality, the best performing model included two independent variables, i.e. distance to rivers and to all kinds of waterbodies, yielding a Root Mean Square Deviance of 3.85.

**Conclusion:** In line with prior evidence, we found an association of BU CNNCs with proximity to waterbodies and level landscapes. Models containing distance to waterbody related variables had the

best prediction quality for the presence of BU. In the face of the required systematic active case finding, geospatial analysis could serve as a prioritization tool in planning efficient BU-interventions at the subnational level. Future studies, encompassing regions with wider climatic, sociodemographic and epidemiological diversity and higher number of BU cases are urgently needed.

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### NETWORK ANALYSIS OF DAIRY CATTLE MOVEMENT AND ITS IMPLICATION ON BOVINE TUBERCULOSIS SPREAD AND CONTROL IN EMERGING DAIRY BELTS OF ETHIOPIA

**Mekonnen G.A.[1,2], Ameni G.[2], Wood J.L.N.[3], The ETHICOBOTS consortium, Berg S.[4], Conlan A.J.K.[3]**
[1]National Animal Health Diagnostic and Investigation Center, Sebeta;
[2]Aklilu Lemma Institute of Pathobiology, Addis Ababa University, Addis Ababa, Ethiopia;
[3]Disease Dynamics Unit, Dept. of Veterinary Medicine, University of Cambridge, Cambridge;
[4]Bacteriology Dept., Animal and Plant Health Agency, UK

**Introduction:** Dairy cattle movement is an important risk factor for the spread of bovine tuberculosis (BTB), particularly in endemic countries with poor or no restrictions on animal movements or trade. Understanding the frequency and patterns of dairy cattle movement is essential for predicting the risk of spread of BTB between farms and potentially important for targeting controls.
**Aim:** The study aimed to investigate the network structure of dairy cattle movement and its influence on the transmission and prevalence of BTB in three emerging dairy areas of Ethiopia, namely in the cities of Hawassa, Gondar, and Mekelle.
**Methods:** A questionnaire survey was conducted in 278 farms to collect data on the pattern of dairy cattle movements during the last five years (2014-2018). Visualization of the network structure and analysis of the relationship between network characteristics and BTB prevalence in these dairy farms was performed using social network analysis.
**Results:** The cattle movement network displayed both scale free and small world properties implying local clustering with fewer farms being highly connected, at higher risk of infection and with the potential to act as super spreaders of BTB if being infected. Farms having a history of cattle movements onto the herds were more likely to be affected by BTB (OR: 2.2) compared to farms not having such history. Euclidean distance between farms and the batch size of animals moved on were positively correlated with prevalence of BTB. Conversely, farms having outgoing cattle showed a decrease on the likelihood of BTB infection (OR=0.57) compared to farms which maintained their cattle. Targeted removal of farms in the network based on the eigenvector centrality measures showed a faster rate of change on the size of the giant connected component and largest community size compared to a random removal of farms implying that targeted intervention could be one control option.
**Conclusion:** This study describes the patterns of cattle movement in Ethiopia contributing to disease transmission between herds and could help to identify critical points along the path to impose control measures. It finally provides a starting point to build and estimate dynamic transmission models for BTB, and other infectious diseases.

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### PROLONGED AND PERSISTENT DIARRHOEA IN CHILDREN: A CASE-CONTROL STUDY IN ETHIOPIA

**Zangenberg M.[1,2], Johansen Ø.H.[3,4], Abdissa A.[5], Eshetu B.[6], Kurtzhals J.A.L.[1,2], Friis H.[7], Sommerfelt H.[8,9], Langeland N.[10], Hanevik K.[3,10]**
[1]Centre of Medical Parasitology, Dept. of Immunology and Microbiology, University of Copenhagen;
[2]Dept. of Clinical Microbiology, Rigshospitalet, Copenhagen, Denmark;
[3]Dept. of Clinical Science, University of Bergen, Bergen;
[4]Dept. of Microbiology, Vestfold Hospital Trust, Tønsberg, Norway;
[5]Dept. of Medical Laboratory Sciences and Pathology, Jimma University;
[6]Dept. of Paediatrics, Jimma University, Jimma, Ethiopia;
[7]Dept. of Nutrition, Exercise and Sports, University of Copenhagen, Denmark;
[8]Centre for Intervention Science in Maternal and Child Health (CISMAC), Dept. of Global Public Health and Primary Care, University of Bergen, Bergen;
[9]Norwegian Institute of Public Health, Oslo;
[10]Norwegian National Advisory Unit on Tropical Infectious Diseases, Haukeland University Hospital, Bergen, Norway

**Introduction:** Diarrhoea lasting less than 7 days is defined as acute (AD), 7-13 days as prolonged (ProD), and 14 days or longer as persistent (PD). Causes and risk factors of AD are well-described, but we lack good data on factors associated with ProD and PD (ProPD) in children. Acute malnutrition is assumed to be one of the main contributors to extended duration of a diarrhoea episode.
**Aim:** We aimed to assess the prevalence of, and variables associated with ProPD in a hospital and health centre in Ethiopia with special focus on associations with acute malnutrition.
**Methods:** We conducted a case-control study where cases were children aged under 5 years with diarrhoea and controls were frequency-matched weekly by age and district of residency. Controls for infants were recruited from vaccination rooms serving areas where the cases lived, those 12-59 months of age by house visits using a procedure based on random points in the catchment area of the respective study site. Data were collected on enrolment and on follow up 14 days after onset of diarrhoea and was later analysed in an unconditional mixed regression model.
**Results:** We enrolled 1084 cases and 933 controls. 921 (85%) of the cases had AD, 124 (12%) had ProD and 34 (3%) had PD. Of the 370 cases with follow-up data 78 (21%) had ProPD. Twenty-eight per cent of the cases with ProPD had acute malnutrition. Children with diarrhoea were more often moderately or severely wasted on enrolment or were born prematurely, when compared with controls. Children with ProPD were more often moderately or severely wasted or stunted, and more often reported having received zinc when compared with children with AD. A higher proportion of children with AD reported vomiting or had fever.
**Conclusion:** ProPD is common and not confined to children with acute malnutrition. ProPD was however associated with moderate or severe wasting and with having received zinc treatment. Other factors such as vomiting and fever differed between AD and ProPD; one of several possible explanations for this could be that these diarrhoeal syndromes have different aetiologies.

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### EPIDEMIOLOGICAL AND CLINICAL PROFILE OF IMMUNOSUPPRESSED PATIENTS WITH IMPORTED STRONGYLOIDIASIS: A SUBSTUDY FROM A LARGER COHORT OF THE +REDIVI SPANISH COLLABORATIVE NETWORK

Salvador F.[1], Treviño B.[2], Herrero-Martínez J.M.[3], Rodríguez-Guardado A.[4], Torrús D.[5], Goikoetxea J.[6], Zubero Z.[7], Velasco M.[8], Chamorro S.[9] ; on behalf the REDIVI Collaborative Network
[1]Dept. of Infectious Diseases, Vall d'Hebron University Hospital, PROSICS, Barcelona;

[2]Tropical Medicine and International Health Unit Vall d'Hebron-Drassanes, PROSICS, Barcelona;

[3]Infectious Diseases Unit, University Hospital 12 de Octubre, Madrid;

[4]Tropical Diseases Unit, Hospital Universitario Central de Asturias, Oviedo;

[5]Infectious Diseases Unit, Hospital General Universitario de Alicante, Alicante;

[6]Infectious Diseases Unit, Hospital Universitario de Cruces, Bilbao;

[7]Dept. of Internal Medicine, Hospital de Basurto, Bilbao;

[8]Infectious Diseases Section, Hospital Universitario Fundación Alcorcón, Madrid;

[9]Dept. of Infectious Diseases, Hospital Ramón y Cajal, Madrid, Spain

**Introduction:** *Strongyloides stercoralis* infection is asymptomatic most of the times. However, in immunosuppressed population severe clinical presentations may occur: *S. stercoralis* hyperinfection syndrome and disseminated strongyloidiasis, with high mortality rate.

**Aim:** The aim of this study was to describe the clinical and epidemiological profile of immunosuppressed patients with imported strongyloidiasis in a non-endemic setting, the yield of the different microbiological diagnostic techniques, and to compare these Results with a group of non-immunosuppressed patients.

**Methods:** This is a case-control substudy from a larger observational retrospective study that included all patients with strongyloidiasis registered in the +REDIVI Spanish Collaborative Network from January 2009 to February 2017. REDIVI is a Spanish collaborative network of 23 Tropical Medicine Units, with a national database to record all cases of immigrants and travellers visited. The following information was retrieved from the REDIVI database: demographic information (age, sex, country of origin), patient classification (immigrant, VFR, traveller), presence of immunosuppressant conditions, travel-related information (country, duration), main symptoms, and diagnosis. Extra information of these patients was requested to the participant centres: eosinophil cell count, microbiological techniques performed, treatment, and follow-up.

**Results:** During the study period, 1245 patients with imported strongyloidiasis were registered in the +REDIVI database. From these, 80 (6.4%) patients had some kind of immunosuppression: 56 (70%) patients with HIV infection, 19 (23.7%) patients receiving immunosuppressive therapies, and 5 (6.3%) patients with solid organ transplantation. The vast majority were immigrants (97.5%), 3 (3.8%) patients had a hyperinfection syndrome, and 34 (52.3%) patients had eosinophilia. The percentages of positive Results of the formalin-ether technique, the fecal culture and serology were 12.3%, 21.1% and 95.4% respectively. When comparing the main characteristics between immunosuppressed and non-immunosuppressed patients, immunosuppressed patients had higher proportion of severe clinical manifestations (3.8% vs 0%, p=0.036) and lower proportion of eosinophilia (52.3% vs 78.5%, p<0.001). No differences were found regarding yield of microbiological techniques and treatment response.

**Conclusions:** These results stress the importance of strongyloidiasis screening among immunosuppressed patients coming from endemic areas, and serological tests have an acceptable sensitivity to be used as a screening tool among this population.

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## TESTING NOVEL DIAGNOSTIC STRATEGIES TO OPTIMISE PUBLIC HEALTH INTERVENTIONS AGAINST HUMAN SCHISTOSOMIASIS: A STUDY PROTOCOL OF THE FREEBILY CLINICAL TRIAL IN MADAGASCAR

Fusco D.[1], Rakotoarivelo R.A.[2], Rakoto Andrianarivelo M.[3], Puradiredja D.I.[1], Klein P.[1], Stahlberg K.[1], Rakotozandrindrainy N.[4,5], Rakotozandrindrainy R.[4], Schwarz N.G.[1], the freeBILy consortium
[1]Dept. of Infectious Diseases Epidemiology, Bernhard Nocht Institute for Tropical Medicine (BNITM), Hamburg, Germany;

[2]Dept. of Infectious Diseases, University of Fianarantsoa Andrainjato, Fianarantsoa;

[3]Centre d'Infectiologie Charles Mérieux (CICM), University of Antananarivo;

[4]Dept. of Microbiology and Parasitology, University of Antananarivo;

[5]UPFR in Parasitology-Mycology of University Hospital Joseph Ravoahangy Andrianavalona Ampefiloha, Antananarivo, Madagascar

**Introduction:** Mass drug administration (MDA) of praziquantel is one of the main control measures against human schistosomiasis. Although pregnant women, infants and children under the age of 5 in high endemic areas should be considered for MDA, they are usually not treated without diagnosis. Diagnostic tools identifying infections at primary health care centre (PHCC) level could therefore help to integrate this vulnerable group into control programmes. freeBILy (Fast and reliable easy-to-use-diagnostics for eliminating Bilharzia in young children and mothers) is an international multi-centre consortium focused on improving schistosomiasis diagnostics.

**Aim:** In Madagascar, the study aims to determine the effectiveness of a Test-Based-Schistosomiasis-Treatment (TBST) strategy for pregnant women and their infants and children up until the age of 2.

**Methods:** A two-armed (intervention and control) cluster randomised controlled phase III trial including 5200 women and their offspring assesses the impact of TBST on child growth and maternal haemoglobin in areas of medium to high endemicity of *S. mansoni*. The participants will be tested with the Point of Care-Circulating Cathodic Antigen (POC-CCA) assay, a urine-based non-invasive rapid diagnostic test for schistosomiasis. In the intervention arm, a POC-CCA-TBST strategy will be offered to women during pregnancy, 9 months after delivery and for their infants at 9 months of age. In the control arm patient care will follow national schistosomiasis management guidelines rather than POC-CCA-TBST. All participants will be offered the POC-CCA-TBST at 24 months after delivery. This trial will be integrated into the routine maternal and child primary health care programmes at 40 different PHCC in Madagascar's highlands.

**Results:** freeBILy in Madagascar is in the implementation phase. Thus far, all sites have been selected and set up for the study. Fifty local staff including nurses, midwives, data managers and laboratory technicians have been trained in Good Clinical Practice and the study protocol. The recruitment phase will end in the last quarter of 2019.

**Conclusion:** This trial assesses a strategy to integrate pregnant women and their children under the age of 2 into schistosomiasis control programmes. It also represents an opportunity in Madagascar for local capacity-building in clinical trials and large-scale intervention research.

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## PREVALENCE AND INTENSITY OF *SCHISTOSOMA* INFECTION ON IJINGA ISLAND, MAGU DISTRICT, NORTH-WESTERN TANZANIA,

## AFTER AN INTENSIFIED TREATMENT PROTOCOL WITH PRAZIQUANTEL

**Mueller A.[1], Fuss A.[2], Mazigo H.D.[3]**
[1]Klinikum Wuerzburg Mitte gGmbH, Medical Mission Hospital, Dept. of Tropical Medicine;
[2]Medical Mission Institute, Wuerzburg, Germany;
[3]School of Medicine, Dept. of Medical Parasitology & Entomology, Catholic University of Health and Allied Sciences, Mwanza, Tanzania

**Introduction:** Annual rounds of praziquantel treatment for populations at risk are the mainstay of schistosomiasis control programs. In many endemic settings this has been successful but in areas of intense transmission more frequent interventions could ensure a greater impact on infection levels.

**Aim:** The main objective of this study was to investigate the effectiveness of intensified praziquantel treatment.

**Methods:** The study was carried out on Ijinga Island near the southern shoreline of Lake Victoria, located in Magu district, north-western Tanzania. An intensified treatment protocol of the entire population was carried out as follows: The first three treatments with praziquantel were administered at intervals of five to six weeks, the fourth and fifth treatment rounds half and one year after the first treatment, respectively. A sentinel group of 223 school-aged children (SAC) was examined 6 weeks after each treatment round by Kato-Katz and POC-CCA test.

**Results:** Before treatment, the prevalence of infection was 84% for SAC determined by Kato-Katz and 98% determined by POC-CCA test. The follow-up prevalences decreased after the first 3 rounds of treatment to 12.6% (POC-CCA) / 3.6% (KK). After the 4th round of treatment an increase in the prevalence to 53.4% (POC-CCA) / 28.7% (KK) was found. After the 5th round of treatment a decrease to 31.8% (POC-CCA) / 19.3% (KK) had to be noted. The intensity of infection was medium before treatment giving a mean egg count of 248 epg (of positives). After five rounds of treatment the intensity of infection was reduced to 44 epg.

**Conclusion:** The baseline data showed that the area had a major problem of schistosomiasis. A significant reduction in the prevalence of *S. mansoni*



**Figure 1.** Prevalence of *S. mansoni* infections of the sentinel group

infection was achieved after 3 rounds of chemotherapy in short intervals. But extending the intervals of re-treatment to 3 and 6 months lead to a significant increase in the prevalence again although the intensity remained low. These data demonstrate, that even an intensified praziquantel treatment regimen alone will not allow to interrupt transmission of schistosomiasis in a high transmission setting. Additional interventions focussing on WASH and a change in the defecation practices need to be implemented.

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## SEROPREVALENCE STUDY OF ANTI-EBOLAVIRUS (EBOV) IMMUNOGLOBULIN G (IGG) AT THE INDEX SITE OF 2013-2016 WEST AFRICAN EBOV OUTBREAK: INSIGHT INTO EARLY TRANSMISSION AND CASE FATALITY RATE

**Timothy J.[1], Hall Y.[2], Akoi-Boré J.[3], Diallo B.[4], Tipton T.[2], Bower H.[1], Glynn J.[1], Carroll M.[2]**
[1]London School of Hygiene & Tropical Medicine;
[2]Research & Development Institute, National Infection Service, Public Health England, UK;
[3]Public Health England/Tropical Medicine Institute Berlin Reference Laboratory, Guéckédou, Guinea;
[4]World Health Organisation, Regional Office for Africa, Brazzaville, Republic of Congo

**Introduction:** Despite extensive diagnostic, molecular and phylogenetic research into the transmission of EBOV during the 2013-2016 West African outbreak, no quantitative study or diagnostic Methods have been employed at the suspected index location; Meliandou village in Guéckédou prefecture, Guinea. Previous studies in this area, conducted during the outbreak, were necessarily limited and did not include serological investigation.

**Aim:** To understand the full details immediately following the spill over event that initiated the 2013-2016 EBOV outbreak. To identify risk factors for transmission and assess the true case fatality rate of the early phase of the outbreak.

**Methods:** Over 200 participants of the village of Meliandou agreed to provide oral fluid samples that were subsequently assessed for EBOV using a highly specific glycoprotein (GP) IgG ELISA. All participants were extensively interviewed regarding health status and contact with potentially infected villagers during the early phase of the outbreak.

**Results:** Analysis revealed 8 seropositive survivors and 2 other suspected deaths of EVD, including two which were sub-symptomatic. True case fatality rate was 55.6% (95% CI 30.8-78.5) compared to 100% as previously reported.

**Conclusion:** This thorough retrospective epidemiological study performed concomitantly among the resident adult population greatly expands our understanding of the initiating events including transmission dynamics, probable transmission chains, lower case fatality rates and the presence of both mild and asymptomatic cases.

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## TEST AND TREAT CAMPAIGN: ADULT INDIVIDUALS AS A SOURCE OF *SCHISTOSOMA MANSONI* INFECTION IN FISHING COMMUNITIES OF ILEMELA AND NYAMAGANA MUNICIPALITIES- NORTH-WESTERN TANZANIA

**Bakuba E.[1], Kaatano G.[1], Kreibich S.[2], Parisi S.[2], Müller M.[3,4], Kasang C.[2,3], Mazigo H.D.[5]**
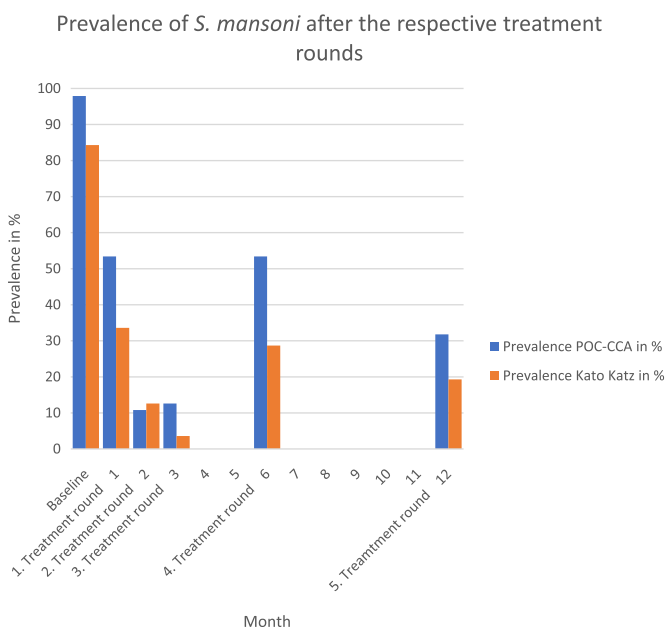[1]Tanzania National Institute of Medical Research, Mwanza, Tanzania;

[2]Medical and Social Projects Dept., DAHW - German Leprosy and Tuberculosis Relief Association;
[3]Medical Mission Institute; [4]Klinikum Wuerzburg Mitte gGmbH,
[4]Missioklinik, Dept. of Tropical Medicine, Wuerzburg, Germany;
[5]Dept. of Medical Parasitology, Catholic University of Health and Allied Sciences, Mwanza, Tanzania

**Introduction:** Tanzania has the second highest prevalence of schistosomiasis in sub-Saharan Africa. The national prevalence is estimated at 52.5%. Currently, control programmes in Tanzania against schistosomiasis target only school children using the Mass Drug Administration (MDA) approach with praziquantel. Leaving the adult population out of control programmes neglects their human right for treatment and leaves them as a potential source of infection and further transmission.

**Aim:** We report the prevalence of *Schistosoma mansoni* among adult individuals participating in test and treat campaigns in North-Western Tanzania.

**Methods:** In November 2017 and January 2019, test and treat campaigns for *Schistosoma mansoni* infection were conducted among fishing communities in Ilemela and Nyamagana municipality on the southern shoreline of Lake Victoria. The campaigns included individuals aged ≥15 years. Participant's age, sex and history of participating in MDA were recorded using a questionnaire. A single urine sample was collected from each participant and screened for *S. mansoni* infection using a point-of-care Circulating Cathodic Antigen (CCA) test. All infected participants were treated with praziquantel (40mg/Kgbwt).

**Results:** A total of 2,137 and 2,070 individuals participated in the campaigns in 2017 and 2019 respectively. The overall prevalence of *S. mansoni* based on the CCA urine test was 81.7% (95%CI: 79.9-83.2) and 70.9% (95%CI: 68.9-72.8) for the year 2017 and 2019 respectively. In both years, male individuals had a higher prevalence of *S. mansoni* than female individuals. Similarly, the youngest age group (15-25 years) had the highest prevalence compared to older age groups.

**Conclusion:** The findings demonstrate that *Schistosoma mansoni* infection is highly prevalent among adult individuals living in the study areas. Taking into account the availability of effective treatment, it is ethically unacceptable to leave this population without appropriate treatment. In addition an untreated population acts as a reservoir of infection, potential source of environmental contamination and finally a cause of re-infections to treated school children. Thus, there is a need to consider alternative treatment strategies that include the adult population. This will reduce their risk to develop severe complications associated with schistosomiasis and furthermore reduce the risk of perpetuation of transmission.

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### DIAGNOSTIC ACCURACY OF C-REACTIVE PROTEIN AND PROCALCITONIN DETERMINATION FOR THE IDENTIFICATION OF BACTERIAL INFECTIONS IN PATIENTS WITH PERSISTENT FEVER IN THE TROPICS

**Van Duffel L.[1,2], Jacobs J.[1,3], Van Esbroeck M.[1], Buyze J.[1], Tsoumanis A.[1], Yansouni C.P.[4], Boelaert M.[5], Verdonck K.[5], Chappuis F.[6], Bottieau E.[1]**
[1]Dept. of Clinical Sciences, Institute of Tropical Medicine, Antwerp;
[2]Dept. of Internal Medicine and Infectious Diseases, Antwerp University Hospital, Antwerp;
[3]Dept. of Microbiology and Immunology, KU Leuven, Leuven, Belgium;
[4]JD MacLean Centre for Tropical Diseases, McGill University Health Centre, Montreal, Canada;
[5]Dept. of Public Health, Institute of Tropical Medicine, Antwerp, Belgium;
[6]Division of Tropical and Humanitarian Medicine, Geneva University Hospitals and University of Geneva, Geneva, Switzerland

**Introduction:** Diagnostic uncertainty about the aetiology of febrile diseases in tropical settings often leads to overconsumption of antibiotics. In acute fever, the inflammatory biomarker C-reactive protein (CRP) has proven to reduce antibiotic use by helping to exclude bacterial disease in low risk patients. The usefulness of biomarkers has not been studied in the approach to persistent fever in the tropics.

**Aim:** To describe the diagnostic accuracy of CRP and PCT to identify bacterial disease in patients with persistent fever in the tropics, with special attention to severe bacterial illnesses.

**Methods:** CRP and PCT levels were determined in stored serum samples of a prospective observational study on the causes of persistent fever (defined as fever of one week or longer), conducted in Cambodia, Nepal, Sudan and the Democratic Republic of Congo. Receiving Operating Characteristics (ROC) curves were generated and sensitivity and specificity were calculated for identifying any bacterial cause of persistent fever, as well as a predefined group of severe bacterial infections for which antibiotic treatment cannot be delayed.

**Results:** Among 1838 febrile patients, serum concentrations were determined in 1777 (96.7%) and 1711 (93.1%) samples for CRP and PCT respectively. The Area Under the ROC curve (AUROC) for detecting all and severe bacterial infections was 0.574 and 0.734 for CRP and 0.545 and 0.679 for PCT, respectively. The sensitivity of CRP at a threshold of 10mg/L (normal value) was 66.9% and 88% for all and for severe bacterial infections, with a specificity of 42.4% and 42.7% respectively. For PCT at a threshold of 0.1μg/L, sensitivity was 55.4% and 74.9% for all and for severe bacterial infections, while the specificity was 52.0% and 52.6% respectively.

**Conclusion:** In patients with persistent fever, the diagnostic accuracy of CRP and PCT for identifying bacterial disease in general was low, suggesting a lower clinical utility than in acute fever. The sensitivity was higher in the predefined category of severe bacterial illnesses, which could help withholding (unnecessary) immediate antibiotic treatment when biomarker values are normal. However, randomised controlled studies are required to assess whether reduction in antibiotic use is safe in this group of patients.

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### COSTING OF AN INTEGRATED APPROACH FOR HUMAN AFRICAN TRYPANOSOMIASIS (HAT) CASE FINDING IN THE DEMOCRATIC REPUBLIC OF THE CONGO

**Snijders R.[1], Fukinsia A.[2], Mulenga P.[3,4], Claeys Y.[1], Hasker E.[1], Mpanya A.[2], Miaka E.[2], Meheus F.[5], Lutumba P.[6], Boelaert M.[1]**
[1]Public Health Dept., Institute of Tropical Medicine Antwerp, Belgium;
[2]Programme National de Lutte Contre la Trypanosomiase Humaine Africaine, Kinshasa;
[3]Ecole de Santé Publique, Lubumbashi University, Lubumbashi,
[4]Faculty of Medicine, Lubumbashi University, Lubumbashi, DRC,
[5]International Agency for Research on Cancer, Lyon, France,

[6]*Tropical Medicine Dept., Kinshasa University, Kinshasa, DRC*

**Introduction:** Gambiense HAT (g-HAT) used to be a major public health problem in Sub-Saharan Africa but massive control efforts resulted in a significant decline of cases and elimination is deemed feasible by 2020. Case management remains the main g-HAT control strategy. Currently case detection is mainly done by dedicated teams and specialized health centers but integration of these activities in the general health system is needed to ensure the sustainability of elimination.

**Aim:** To estimate the costs and identify challenges regarding the implementation of an integrated approach of g-HAT case detection and treatment.

**Methods:** An integrated case finding system was introduced in two health zones in the DRC. Initially 3 fixed health structures were able to perform serological screening and parasitological confirmation. In 2016, 33 health facilities were trained and equipped to perform g-HAT screening with Rapid Diagnostic Tests (RDTs). Additionally, the laboratory skills of 8 larger health centres were reinforced to increase the parasitological confirmation capacity. Further a referral system was introduced. Epidemiological and costing data was collected from a healthcare provider perspective to estimate the average cost per person screened and treated. To examine the robustness of the Results, sensitivity analyses were conducted on key parameters of the baseline scenario (epidemiological data and cost drivers).

**Results:** In 2018, 61,491 people visited the health structures out of which 62% was tested for malaria. All patients testing negative and/or presenting clinical HAT symptoms were screened for g-HAT. In total 7,668 people were tested with an RDT which led to the identification of 100 g-HAT suspects and 3 g-HAT cases. The estimated annual cost of the implementation of this system was 105,000$ or 14$ per person screened for g-HAT. 87% of this cost was financed through the national sleeping sickness program and the remaining part by the health centres and patients.

**Conclusion:** These results will contribute to rational decision making in g-HAT control and elimination programs. Furthermore, main costs drivers are identified which can support context-based adaptions of the approach to realize cost reductions if possible. Additionally, potential challenges for the integration process in the health care system are highlighted.

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### TSETSE CONTROL IN g-HAT FOCI: FOR HOW LONG AND HOW TO STOP?

Rayaisse J.B.[1], Tirados I.[2], Kaba D.[3], Mahamat H.M.[4], Kagbadouno M.[5], Mugenyi A.[6], Peka M.[7], Courtin F.[3,8], Camara M.[5], Solano P.[8]
[1]*Centre International de Recherche-Développement sur l'Elevage en zone Subhumide (CIRDES), Bobo-Dioulasso, Burkina Faso;*
[2]*Liverpool School of Tropical Medicine (LSTM), Liverpool, UK;*
[3]*Institut Pierre Richet (IPR), Bouaké, Côte d'Ivoire;*
[4]*Institut de Recherche en Elevage pour le Développement (IRED), N'Djaména, Chad;*
[5]*Programme National de Lutte contre la Trypanosomiase Humaine Africaine (PNLTHA), Conakry, Guinée;*
[6]*Co-ordinating Office for Control of Trypanosomiasis in Uganda (COCTU), Kampala, Uganda;*
[7]*Programme National de Lutte contre la Trypanosomiase Humaine Africaine (PNLTHA), Ndjaména, Chad,*
[8]*Institut de Recherche pour le Développement (IRD), UMR Intertryp, IRD, Cirad, Université Montpellier, France*

**Introduction:** With the development and the use of tiny targets, implementation of tsetse control in complement to the "screen and treat" strategy has significantly impacted gambiense Human African Trypanosomiasis (g-HAT) incidence in Guinea, Chad, Côte d'Ivoire and Uganda. This combination of Methods, in addition to saving lives and reducing/eliminating transmission, is easily accepted by populations that are not anymore disturbed by tsetse bites and that are more protected against g-HAT.

**Aim:** However, with the reduction of the tsetse densities together with decrease in disease incidence, and decrease in funding when the number of cases has gone down, the question of sustainability of vector control operations emerges. Tsetse eradication can be contemplated in potentially isolated areas (e.g. like the Mandoul in Chad), but in many HAT foci tsetse populations are not isolated, e.g. in areas like the mangrove in Guinea. In these areas, the question becomes: until when should the vector control be maintained, and by who? If it has to be stopped, what are the conditions to be fulfilled in before stopping?

**Results:** We propose here an algorithm aiming at helping decision on tsetse control in g-HAT foci according to the incidence of HAT cases in the focus, which consists in: 1) maintaining vector control as long as new cases are still found, 2) decreasing vector control when number of new cases reaches zero, but keeping a capacity of reaction to be able to implement vector control in the vicinity of new cases, should they be found (« reactive vector control »), and 3) stopping vector control when no cases have been found during 5 consecutive years with similar medical effort. Parallel to these decisions, other tools (xenomonitoring in tsetse, monitoring in animals and tsetse densities surveillance) should be used to help for early response if necessary, using prediction models.

**Conclusion:** Such an approach is useful and will give some common guidelines for decision making, depending on the context, provided stakeholders have the same understanding on the description/definition of the different situations.

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### NEW ADVANCES IN VECTOR CONTROL AGAINST HUMAN AFRICAN TRYPANOSOMIASIS: THE EXPERIENCE OF 'TINY TARGETS' TO CONTROL *GLOSSINA FUSCIPES*

Tirados I.[1], Selby R.[1], Hope A.[1], Rayaisse J.-B.[2], Vander Kelen C.[3], Kovacic V.[1,4], Mansinsa P.[5], Mahamat H.M.[6], Mugenyi A.[7], Solano P.[8]
[1]*Liverpool School of Tropical Medicine (LSTM), Liverpool, UK;*
[2]*Centre International de Recherche-Développement sur l'Elevage en zone Subhumide (CIRDES), Bobo-Dioulasso, Burkina Faso;*
[3]*Institute of Tropical Medicine (ITM), Antwerp, Belgium;*
[4]*Médecins Sans Frontières (MSF), Paris, France;*
[5]*Programme National de Lutte contre la Trypanosomiase Humaine Africaine, Kinshasa, Democratic Republic of the Congo;*
[6]*Institut de Recherche en Elevage pour le Développement (IRED), N'Djaména, Chad;*
[7]*Co-ordinating Office for Control of Trypanosomiansis in Uganda (COCTU), Kampala, Uganda;*
[8]*Institute de Recherche pour le Développement (IRD), Montpellier, France*

**Introduction:** Control of gambiense-Human African Trypanosomiasis (gHAT) has been largely based on the screening and treatment of cases. Vector control was considered too expensive and logistically demanding for widespread use. The development of small (25x50 cm) insecticide impregnated targets ('Tiny Targets') has offered a cost-effective method of vector control that can be combined with medical interventions.

**Aim:** We compared the entomological impact of Tiny Targets against

subspecies of *Glossina fuscipes*, the most important vector of gHAT, in three different countries (Chad, DRC, Uganda) with varying agro-ecological and epidemiological settings.

**Methods:** Vector control was carried out in different habitats: riparian vegetation in the West Nile focus of Uganda, swamp in the Mandoul focus (Chad) and degraded rainforest in Yasa Bonga Health Zone (DRC). Monitoring of the impact of Tiny Targets on tsetse was assessed using networks of monitoring traps (176 traps in DRC and 44 in Chad, both deployed quarterly; 96 traps deployed weekly in Uganda). Personnel from local communities deployed targets, largely on foot in Uganda ($6,000 km^2$) and Chad ($840 km^2$), and from dugout canoes in DRC ($3,000 km^2$). Targets were deployed biannually in Uganda (36,000 targets/year) and DRC (12,000 targets/year) and annually in Chad (2,700 targets/year). Planning, management and supervision of the operations were conducted by local entomologists with limited external support.

**Results:** In all settings, >90% reduction in the tsetse populations was achieved within three months of targets being deployed and the reduction was sustained thereafter. Higher levels of control (>99%) were achieved in more isolated foci (e.g., Mandoul). Targets were deployed more rapidly when local teams were recruited and paid for the deployment but greater acceptance of the intervention by local communities was achieved by community-based approaches. The economic cost of controlling tsetse in these settings was ~$100/km^2$, with lower costs being achieved in areas where tsetse were more spatially restricted.

**Conclusion:** Tiny Targets offer an important means of accelerating progress towards the elimination of gHAT. The effectiveness, low cost and limited external support required for Tiny Targets make this technology suitable for large-scale operations. Local communities are important partners in the successfully use of control operations.

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### THE LACK OF QUALITY-ASSURED SOURCES OF MEDICINES ON THE GLOBAL MARKET: A QUALITATIVE SURVEY TO EXPLORE THE NEEDS OF PURCHASERS IN THE BELGIAN HUMANITARIAN SECTOR

**Nebot Giralt A.[1], Ronse M.[2], Ravinetto R.[2]**
[1]*QUAMED, Bruxelles;*
[2]*Dept. of Public Health, Institute of Tropical Medicine, Antwerp, Belgium*

**Introduction:** Access to quality-assured medicines is crucial for universal health coverage, but the World Health Organization (WHO) estimates that 10% of medicines in low and middle-income countries (LMICs) are substandard/falsified. The WHO Pre-Qualification (PQ) Programme guides purchasers toward quality-assured medicines in selected therapeutic areas, but majority of essential medicines remain out of its scope.

**Aim:** We conducted a qualitative exploratory assessment of unmet needs of medical humanitarian/development organizations linked to Belgian consortia, that purchase medicines for programs in LMICs.

**Methods:** Respondents were sampled among representatives of all the 22 organizations, members of two well-established platforms, i.e. Be-cause Health and QUAMED. Data were collected via semi-structured interviews in September-October 2018. Interviews were manually coded and allowed to identify priority unmet needs, as well as patterns emerging by categories of respondents.

**Results:** 17 participants from 15 organizations were able to participate and interviewed. The reported challenges to purchasing quality-assured medicines were grouped into three interrelated categories: Availability (i.e. shortages; poor stock management; regulatory or administrative barriers); Quality Assurance (i.e. lack, or single sources, of pre-qualified sources; lack of interest of pre-qualified manufacturers in small purchasers; poor institutional awareness); and Price.

It appeared that the WHO PQ approach (based on pre-qualification of the couple product-manufacturer) is relevant for big purchasers, including major medical-humanitarian organizations, but is less fit to address needs of small and medium-sized organizations, and of programmes operating at primary health care or hospital level. These stakeholders purchase a panoply of essential medicines and would benefit from "pre-qualification" of distributors and procurement agencies.

It was also suggested that the scope of WHO PQ should be expanded, e.g. to include antibiotics; medicines for noncommunicable diseases (NCDs); and some products for tuberculosis, sexual reproductive health and neglected tropical diseases.

**Conclusions:** Only organizations with strong institutional awareness and significant investments in QA systems seem able to use the WHO PQ list adequately and consistently. However, most organizations in our sample would benefit from the WHO PQ expansion to new areas, in particular antibiotics and medicines for NCDs; and from public, reliable information on distributors/wholesalers that supply pre-qualified products at fair and transparent pricing policy.

## 127

### ILLNESS REPRESENTATIONS AND COPING PRACTICES FOR SELF-MANAGING HYPERTENSION AMONG SUB-SAHARAN AFRICANS: A COMPARATIVE STUDY AMONG GHANAIAN MIGRANTS AND NON-MIGRANTS

**Nyaaba G.N.[1], Agyemang C.[2], Masana L.[3], Aikins A.[4], Beune E.[5], Larrea-Killinger C.[6], Stronks K.[7]**
[1]*Dept. of Public Health, APH Research Institute;*
[2]*Dept of Public Health, APH Research Institute, University of Amsterdam, University Medical Centres, Amsterdam, The Netherlands;*
[3]*Barcelona Institute for Global Health (ISGlobal), University of Barcelona/Medical Anthropology Research Centre-URV, Tarragona, Spain;*
[4]*Regional Institute for Population Studies, University of Ghana, Legon, Ghana;*
[5]*Dept. of Public Health, APH Research Institute, University of Amsterdam, Amsterdam, University Medical Centres, Amsterdam, The Netherlands;*
[6]*Dept. of Social Anthropology, University of Barcelona, Barcelona, Spain;*
[7]*Dept. of Public Health, APH Research Institute, University of Amsterdam, University Medical Centres, Amsterdam, The Netherlands*

**Introduction:** Hypertension (HTN) control is a major obstacle among sub-Saharan African populations partly due to poor self-management.

**Aim:** We explore and compare how one's social and physical context shapes their illness representations regarding HTN and the coping strategies they develop and adapt to mitigate challenges in self-management.

**Methods:** A cross sectional multisite qualitative study using semi-structured interviews among 55 Ghanaians with HTN living in The Netherlands and urban and rural Ghana. A thematic approach was used in data analysis.

**Results:** Family HTN history, personal experiences with HTN and outcomes of using biomedical and traditional treatments shaped participants illness representations and coping strategies. Migrants and urban non-migrants modified medication schedules and integrated taking medication into daily routine activity to cope with the side

effects of taking antihypertensive medication. Rural non-migrants used traditional remedies and medicines to mitigate antihypertensive medication side effects and/or to cure HTN.

**Conclusion:** Contextual factors within person's social and physical environments shape their illness representations and coping strategies for HTN though interactive phrases. How patients understand the permanence of HTN, the risk implications of having HTN are for them and their use of alternative remedies in order to identify those for whom personalized educational and motivational efforts might improve antihypertensive medication acceptance and long-term adherence. Health professionals should also harness the relationships within peoples' social and physical environments, encourage implementation of family wide behavioural changes and involve family relatives in HTN treatment to enhance patients' self-management of HTN.

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### SOCIAL HEALTH INSURANCE AND PAYMENT FOR FAMILY PLANNING SERVICES: EVIDENCE FROM INDONESIA

**Wilopo S.A.[1,2], Pinandari A.W.[1], Wahdi A.E.[1], Hariastuti I.W.[3], Oesman H.[4], Magnani R.[1]**

[1]Centre for Reproductive Health, Faculty of Medicine, Universitas Gadjah Mada, Yogyakarta;
[2]Depts. of Biostatistics, Epidemiology and Population Health, Faculty of Medicine, Universitas Gadjah Mada, Yogyakarta;
[3]Population and Family Planning Bureau of East Java Province, Surabaya;
[4]National Population and Family Planning Bureau, Jakarta, Indonesia

**Background:** Per United Nations 2030 Sustainable Development Goal aspirations, Indonesia has since 2014 been implementing a Universal Health Coverage (UHC) scheme that covers family planning (FP) services. No prior studies examine the impact of health insurance on contraceptive use in low- and middle-income countries. This study sought to assess progress in providing insured women with access to free FP services and the correlates thereof.

**Method:** We analyse the experiences of 3,707 married women who used modern contraception at the time of the Indonesian 2015 Performance Monitoring and Accountability 2020 survey and had received FP services in the 12 months prior to the survey. We assessed type of payment (insurance vs. out-of-pocket) for FP services in relation to health insurance coverage, contraceptive method, type of health facility, and respondent background characteristics. Logistic regression was used to assess net effects of the factors considered.

**Results:** Although 51% of study subjects were covered by some form of health insurance, the member of BPJS and JAMKESMAS/DA were 19.2% and 21.4% of them received free FP services. While insured women were 2.5 times likely to have received free services than non-insured women, only about 20% of insured women avoided out-of-pocket payments. Receipt of free services was far more likely with public sector service providers and when long-acting contraceptive Methods were chosen. Other factors influencing receipt of free services included parity, level of informed choice, and residence (urban vs. rural; inner vs. outer islands).

**Conclusions:** The findings are indicative of the issues that many countries will have to address in trying to reach SDG goals with regard to UHC and reproductive health, especially countries with sizeable private sector participation in providing family planning services and countries with decentralized systems of government. If service delivery is dominated by the private sector and financed largely by out-of-pocket payments, then moving to free services under UHC will be challenging for FP programme.

Future research on how countries are choosing to address these issues and the relative success of alternative approaches will be important. This topic is virtually certain to be one of high interest in the post-FP2020 agenda.

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### BEYOND 2020 WITH NEGLECTED TROPICAL DISEASES: LEAVING NO ONE BEHIND IN THE JOURNEY TO 2030

**on behalf of and with Uniting to Combat NTDs Equity Working Group: Simpson S.J.[1,2], Ducker C.[3], Dean L.[4]**

[1]EquiACT, Lyon, France;
[2]University of NSW, Australia;
[3]Uniting to Combat NTDs, Haywards Heath, West Sussex;
[4]Liverpool School of Tropical Medicine, Liverpool, UK

Efforts to combat neglected tropical diseases (NTDs) reached a turning point in 2007, when the World Health Organization (WHO) convened the first meeting of global partners. That meeting produced a shared commitment to support WHO strategies and goals by working together in an innovative, flexible and cost-effective way leading to the WHO 2020 Roadmap on NTDs in 2012. The Roadmap in turn inspired the London Declaration which calls on all endemic countries and the international community to join in a commitment to provide the resources necessary across sectors to lift over one billion people from the heavy burden that NTDs continue to place on their lives. In January 2016, the 17 Sustainable Development Goals (SDGs) reaffirmed the commitment to the control and elimination of NTDs in relation to goals (1,3 and 6). In July 2016, a *Uniting to Combat NTDs: Women and Girls in Focus* meeting was held in London and from this a working group on Gender and Equity was established to ensure more attention to gender analysis in research, policy and programming. The group which is formed of members from researchers, donors and implementers, strives to strengthen collaboration and learning about how to strengthen equity and inclusiveness in NTD policy and programmes.

By 2030, with the SDGs that universally apply to all, countries are expected to have mobilized efforts to end all forms of poverty, fight inequalities and tackle climate change, while ensuring that *no one is left behind*. As part of efforts to ensure no one is left behind in the prevention and treatment of NTDs, a range of activities are taking place to support countries in monitoring and assessing who is being left behind and why. Using these data, we will have to creatively address gaps to achieve our goals in 2030.

This interactive session seeks to bring together implementers, donors, researchers and activists to review experiences on the relationship of GER to the implementation of NTD programs, the data required, and how utilizing a GER lens can contribute to more effective coverage and accessing harder to reach and vulnerable groups, both in preventive chemotherapy (PC) and innovative and intensified disease management (IDM) NTDs. We are keen however to learn from participants with experience in strengthening equity and inclusiveness in delivery of interventions and programmes for other conditions such as malaria or AMR.

## 130

### ELEARNING SOLUTION FOR CAPACITY STRENGTHENING OF HEALTH PROFESSIONALS: THE EXPERIENCE OF GUINEA

**Delvaux T.[1], Delamou A.[1,2], Millimouno M.[2], Kourouma K.[2], Kolié M.[2], Beavogui A.H.[2], Garcia M.[1], Kiyan C.[1], Roegiers S.[1], Van Damme W.[1]**

[1]*Institute of Tropical Medicine, Antwerp, Belgium;*
[2]*Centre National de Formation et Recherche en Santé Rurale de Maferinyah, Forécariah, Guinea*

**Introduction:** There is a need for capacity strengthening of health professionals in public health and sexual and reproductive health and rights (SRHR) in Guinea.

**Objective:** To describe and discuss an innovative training program in Guinea.

**Methods:** Two online courses namely on Primary Health care (eSSP) and Management of SRHR services (eSSR) were developed in French by the Research Centre in Rural Health (CNFRS) Maferinyah in Guinea with the support of the Institute of Tropical Medicine (ITM), Antwerp in 2017. Moodle Platform was used to deliver, manage the two courses and generate course statistics.

**Results:** eSSP and eSSR courses included 7 and 8 modules, running over a total of 10 and 11 weeks, respectively. Six cohorts of an average of 25 participants from all regions in Guinea were trained in 2018. Lessons learnt through the first cohort were used to refine both courses. Results from the six cohorts showed that of the 135 participants enrolled in the eSSP course, 22% (n = 30) were from other countries other than Guinea and women accounted for 21% (n = 29). Regarding the professional background, 75% were medical doctors, 7% nurses, 7% graduated medical students. The number of participants having completed the eSSP course was 92, of which 63 (68%) validated it and received a certificate. Of the 147 participants enrolled in the eSSR course, 21% (n = 31) were from countries outside Guinea and women made up 33% (n = 49). In terms of professional background, the majority were physicians (71%), 5% were nurses, 7% (n = 10) were midwives and 7% were medical graduates. The number of participants who completed the eSSR course was 100, of which 93 (93%) validated and got a certificate.

**Conclusion:** This innovative training program targeting health professionals showed that it is feasible to deliver online courses even in far to reach settings in Guinea. Involving women in elearning courses remains one of the challenges.

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### BREAKING TRANSMISSION FOR *SCHISTOSOMA MANSONI*: DETERMINING POST-TREATMENT SURVEILLANCE CRITERIA FOR DETECTING ELIMINATION

**Toor J.[1,2], Truscott J.E.[1,2,3], Werkman M.[1,2,3], Turner H.C.[4,5], Phillips A.E.[1,2], King C.H.[6], Medley G.F.[7], Anderson R.M.[1,2,3]**

[1]*London Centre for Neglected Tropical Disease Research, Dept. of Infectious Disease Epidemiology, St Mary's Campus, Imperial College London;*
[2]*MRC Centre for Global Infectious Disease Analysis, Dept. of Infectious Disease Epidemiology, School of Public Health, Faculty of Medicine, St Mary's Campus, Imperial College London;*
[3]*The DeWorm3 Project, The Natural History Museum of London, London, UK;*
[4]*Oxford University Clinical Research Unit, Wellcome Trust Major Overseas Programme, Ho Chi Minh City, Vietnam;*
[5]*Centre for Tropical Medicine and Global Health, Nuffield Dept. of Medicine, University of Oxford, Oxford, UK;*
[6]*Center for Global Health and Diseases and Dept. of Mathematics, Case Western Reserve University, Cleveland, USA;*
[7]*Centre for Mathematical Modelling of Infectious Disease, London School of Hygiene and Tropical Medicine, London, UK*

**Introduction:** The World Health Organization has set elimination (breaking transmission) as the end goal for schistosomiasis. However, there is currently a lack of guidance on what programmes should do once very low prevalence levels have been reached to determine whether elimination or recrudescence of the disease will occur after stopping treatment.

**Aim:** To determine the surveillance criteria for detecting whether elimination or recrudescence of *Schistosoma mansoni* will occur after stopping treatment.

**Methods:** We use a stochastic individual-based model of *Schistosoma mansoni* transmission and treatment impact to determine a prevalence threshold which can be used to determine whether elimination or recrudescence will occur. We use Kato-Katz as the diagnostic technique. We calculate positive predictive values (PPV) to determine reliable certainty measures for detecting elimination. We show when post-treatment surveillance should be carried out and how many individuals should be sampled.

**Results:** We find that a prevalence threshold of 1% by Kato-Katz is optimal for detecting elimination at two years (or later) after the last round of treatment using a sample size of 200 individuals across the entire community (where the community size is 500-1000 individuals).

**Conclusion:** A prevalence threshold of 0.5% is sufficient for surveillance 6 months after the last round of treatment. However, as such a low prevalence can be difficult to measure in the field, we recommend using 1% 2 years after the last round of treatment (with a sample size of 200 individuals). For treatment programmes where elimination is highly likely, higher prevalence thresholds can be used but require waiting longer for post-treatment surveillance.

## 132

### IMPACT OF POPULATION MOVEMENT BETWEEN VILLAGES ON THE LIKELIHOOD OF BREAKING TRANSMISSION OF SOIL-TRANSMITTED HELMINTHS

**Vegvari C.[1,2], Truscott J.[1,2], Kura K.[1,2], Hardwick R.[1,2], Anderson R.M.[1,2]**

[1]*London Centre for Neglected Tropical Disease Research (LCNTDR);*
[2]*Dept. of Infectious Disease Epidemiology, Imperial College London, UK*

Soil-transmitted helminth (STH) infections affect predominantly socio-economically disadvantaged populations in sub-Saharan Africa, East Asia and the Americas and are commonly treated by preventive chemotherapy. Once cleared individuals can become re-infected. In recent years, there has been increasing interest in whether it is feasible to break transmission of STHs by mass drug administration (MDA). Detailed mapping data from the TUMIKIA study and DeWorm3 trial suggest a high level of heterogeneity in infection prevalence and intensity within implementation units. Treatment coverage and individual compliance are also expected to vary in most endemic regions. Spatial heterogeneity in disease prevalence in combination with human population movement have been recognised as important drivers for ongoing transmission in malaria, dengue and neglected-tropical diseases, for example, trachoma and human African trypanosomiasis. Given the heterogeneity in the distribution of STH infections, human movement patterns are likely to play a role in the transmission of STHs between different spatial units. The impact of infected individuals moving between locations on disease prevalence is likely to become more important as local populations move towards STH elimination. Here we examine how human population movement affects the outcome of MDA programmes, using a stochastic individual-based metapopulation model. We show that the risk of re-introduction of infection depends on the age group of moving individuals and STH species. If a village is infection-free, an annual movement rate of 2-3% from an infected source village imposes a risk of re-introduction of STH of 75% or higher. Planning for STH elimination programmes should account for human mobility patterns. We recommend that individuals arriving from areas with ongoing STH transmission should receive pre-

ventive chemotherapy for STHs. This can most easily be implemented if migration is seasonal and overlaps with treatment rounds, e.g. seasonal migrant labour. In areas where there is substantial cross-border movement, STH programmes should be co-ordinated among countries. Transmission hotspots in or near treatment clusters should be eliminated, for example, by implementing appropriate WASH measures and targeting treatment to individuals living in hotspots.

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### HISTORICAL PERSPECTIVE ON HUMAN AFRICAN TRYPANOSO-MIASIS (HAT) IN THE DEMOCRATIC REPUBLIC OF THE CONGO

Miaka E.M.[1], Boelaert M.[2], Mpanya A.[1]
[1]PNLTHA, Kinshasa, DRC;
[2]Dept. of Public Health, ITM, Antwerp, Belgium

**Introduction:** The Democratic Republic of Congo (DRC) is currently the epicentre of HAT and reports more than 85% of all cases worldwide. To reach the global elimination goal, specific challenges in DRC need to be understood and addressed.
**Aim:** Provide overview on HAT and its control in DRC from colonial times to the present.
**Methods:** Review of literature and historic program records.
**Results:** In the 1960s, the disease was almost eliminated, but in the early years of independence of the former Belgian colony, HAT cases increased steadily leading to a major peak with more than 25,000 cases reported in 1998 alone. This evolution led to renewed Belgian support to the *Programme National de Lutte contre la Trypanosomiasis Humaine Africaine* (PNLTHA) of DRC, first through an emergency programme implemented by three NGOs, then for about 15 years via the Belgian Technical Cooperation (BTC) and recently through the Institute of Tropical Medicine Antwerp (ITM). Other agencies joined forces to introduce diagnostic and therapeutic innovation, and recently an investment in innovative vector control was made. The result was a sharp decline in the annual number of diagnosed cases.
**Conclusion:** Though the numbers of HAT cases detected in DRC has substantially declined, and the elimination threshold seems within reach, there are major challenges ahead. Adaptive management, improved surveillance and continued innovation seems to be the way forward.

## 134

### OUTCOMES OF THE HAT ELIMINATION EFFORTS IN DRC

Verlé P.[1], Mpanya A.[2], Hasker E.[1], Snijders R.[1], Inocencio da Luz R.[1], Boelaert M.[1], Miaka E.M.[2]
[1]Dept. of Public Health, ITM, Antwerp, Belgium;
[2]PNLTHA, Kinshasa, DRC

**Introduction:** Since 2016 a consortium of scientific institutes supports the national HAT control program of DRC in its elimination efforts. This consortium benefits of the generous support of the B&M Gates foundation and the Belgian government. A number of innovations have been introduced at scale in three endemic provinces, formerly known as Bandundu Province. A door-to-door screening approach, a digitized data capture, use of rapid diagnostic tests in health facilities, mapping and microplanning of activities and quality assurance system are part of the package. In addition, the potential of a sero-surveillance model is currently being assessed to timely detect a new outbreak and ensure sustained elimination of HAT.
**Aim:** To analyse the outputs and outcome of recent innovative HAT control efforts.

**Methods:** Compare results of improved active screening through mobile teams and Results of enhanced passive detection of HAT in health facilities over the last 3 years in the previous Bandundu Province.
**Results:** The combination of improved active detection and enhanced detection in health facilities resulted in increased decline of the number of HAT cases detected. However, the active screening approach through mobile teams, has its limitations and becomes harder to justify. On the other hand, with available tools, also the enhanced integration in the primary health care system is insufficient to reach elimination of transmission because of accessibility problems and low attendance rates. Sero-surveillance could provide a solution for continuous surveillance by screening a large amount of people in their village with minimal discomfort.
**Conclusion:** Available strategies proved to be effective but with dwindling case numbers, new challenges emerge and new strategies are required. Further integration in the primary health care system is essential, while the HAT control programme could serve as leverage to improve the system itself.

## 135

### DESCRIPTION OF A PUBLIC HEALTH PROJECT AIMED TO IMMIGRANT POPULATION: SALUD ENTRE CULTURAS (SEC) PROJECT

Chamorro S.
National Referral Unit for Tropical Diseases, Infectious Diseases Dept., Ramón y Cajal University Hospital, Madrid

**Introduction:** The growing flow of migration into Europe persists. Just in 2017, 171,635 immigrants and refugees arrived in Europe from North Africa via Mediterranean routes. Immigrants face many obstacles to access essential health-care services due to a number of factors, including their irregular status, language barriers and lack of health policies.
**Aim:** Description and evaluation of a public health project specifically aimed at and adapted to the immigrant population: the Salud Entre Culturas (SEC) project, linked to the Tropical Medicine Centre at Ramón y Cajal University Hospital in Madrid, Spain.
**Methods:** SEC is implemented through three main programs:
(1) New Citizens New Patients (since 2006) - Health education workshops on communicable diseases (HIV, STIs, TB, Chagas Disease (CD), Scabies), Spanish Health System and maternal and child health.
(2) Silent Disease Screening Campaigns (since 2014) - Screening test for CD and HIV.
(3) Building Bridges: Managing cultural diversity in health services (since 2006)- Accompaniment, interpretation and intercultural mediation in medical practice and training programs as professional mediators aimed at people of immigrant background.
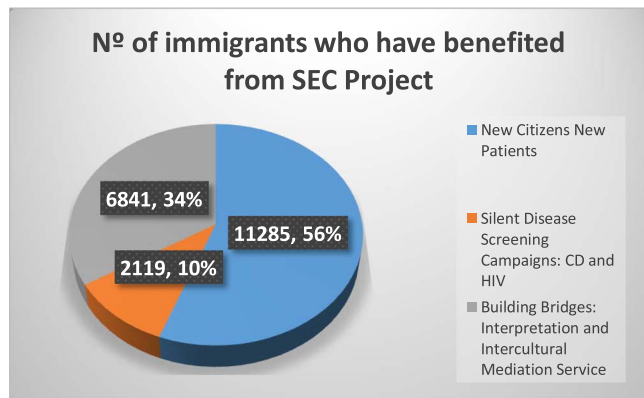**Results:** A total of N=20307 immigrants have been beneficiaries up to 2018:
(1) N=11285 immigrants attended NCNP workshops
(2) N=2119 were screened for CD with a prevalence of T cruzi infection of 19.15%. N=504 were tested for HIV (2017 campaign) with a prevalence of 0.8%.
(3) N=6841 immigrants have benefited from the interpretation and mediation service and N=22 have been trained as professional mediators.
**Conclusion:** SEC project represents an initiative and a driving force for health access, training and health education. Thus, the growing number of users participating in its three programmes support the fact that projects of this nature are more necessary than ever in a reality where social inequalities and access barriers to the health system have increased, especially in the immigrant community.

**Nº of immigrants who have benefited from SEC Project**



- New Citizens New Patients
- Silent Disease Screening Campaigns: CD and HIV
- Building Bridges: Interpretation and Intercultural Mediation Service

6841, 34%
11285, 56%
2119, 10%

## 136

### BARRIERS TO FACILITY-BASED DELIVERY IN POST-EBOLA SIERRA LEONE

**Theuring S.[1], Koroma A.P.[2], Harms G.[1]**
[1]Institute of Tropical Medicine and International Health, Charité-Universitätsmedizin, Berlin, Germany
[2]Dept. of Obstetrics and Gynecology, Princess Christian Maternity Hospital, Freetown, Sierra Leone

**Introduction:** Sierra Leone has one of the highest maternal mortality rates in the world. Encouraging the use of skilled birth attendance in health facilities is an important step in the endeavor to increase the number of safe deliveries. However, public trust in health facilities has greatly been damaged during the Ebola epidemic outbreak in Sierra Leone in 2014/2015, and little is known about specific barriers to facility-based delivery (FBD) in the country after recovering from Ebola.

**Aim:** Our aim was to analyze intrinsic and extrinsic barriers to FBD among women in Freetown, Sierra Leone, in order to develop strategies increasing the use of skilled birth attendance.

**Methods:** We conducted a qualitative study on FBD in Princess Christian Maternity Hospital, Freetown, which is the national referral maternity hospital in Sierra Leone. We performed six focus group discussions with a total of 35 providers, pregnant women and recent mothers, pertaining to experiences, attitudes and behaviors regarding FBD and potential barriers. Discussions were tape recorded, transcribed and evaluated through content analysis.

**Results:** Women in our study were overall technically aware of the higher safety linked with FBD, especially in medical emergencies during delivery. However, this awareness largely diverged from their individual desire to deliver in a supportive and trusted social and traditional environment, involving close family members. Relatives and community members seemed to be highly influential regarding birth practices. Many women associated FBD with negative staff attitudes and a fear of being left alone. Logistic issues regarding transportation problems or late referral from smaller health centers were identified as frequent structural barriers to FBD.

**Conclusions:** Improving general staff attitudes, and allowing a delivering woman to bring a trusted accompanying person to support her during labor could be promising approaches to increase women´s confidence in FBD. However, these approaches also imply revising health systems structures, like working conditions of overloaded hospital staff that are conducive for a friendly atmosphere, sufficient space in delivery wards allowing the women to bring a birth companionship, or like the establishment of a reliable peripheral ambulance system to ensure transportation and fast referral.

## 137

### EFFECT OF PREOPERATIVE BICARBONATE INFUSION ON MATERNAL AND PERINATAL OUTCOMES OF OBSTRUCTED LABOUR IN MBALE REGIONAL REFERRAL HOSPITAL - A STUDY PROTOCOL FOR A RANDOMISED CONTROLLED TRIAL

**Musaba W.M.[1], Barageine J.K.[2], Ndeezi G.[3], Wamono F.[4], Wandabwa J.N.[5], Weeks A.D.[6]**
[1]Dept. of Obstetrics &Gynaecology, Busitema University/Mbale Regional Referral Hospital, Mbale;
[2]Dept. of Obstetrics & Gynaecology, School of Medicine Makerere University College of Health Sciences, Kampala;
[3]Dept. of Paediatrics and Child Health, School of Medicine Makerere University College of Health Sciences, Kampala;
[4]School of Statistics & Planning Makerere University College of Business & Management Sciences, Kampala;
[5]Dept. of Obstetrics &Gynaecology, Busitema University Faculty of Health Sciences, Mbale, Uganda;
[6]Sanyu Research Unit, University of Liverpool/Liverpool Women's Hospital, Liverpool, UK

**Background:** To improve maternal and fetal outcomes among patients with obstructed labour (OL) in low resource settings, the associated electrolyte and metabolic derangements must be adequately corrected. Oral fluid intake during labour and preoperative intravenous fluid replacement following OL corrects the associated dehydration and electrolyte changes, but it does not completely reverse the metabolic acidosis that is a cause of intrapartum birth asphyxia and a risk factor for primary postpartum haemorrhage due to uterine atony.

Sodium bicarbonate is a safe, effective, cheap and readily available acid buffer that is widely used by sportspeople to improve performance. It also appears to improve fetal and maternal outcomes in abnormally progressing labour. However, its effects on maternal and fetal outcomes among patients with OL is unknown.

**Aim:** To establish the effect of a single dose preoperative infusion of sodium bicarbonate on maternal and fetal lactate levels and clinical outcomes among patients with OL.

**Methods:** This will be a double blind, randomised controlled clinical phase IIb trial. We will randomize 478 patients with OL to receive either 50 mls of placebo with standard preoperative infusion of Normal Saline (1.5 L) or 4.2 g of sodium bicarbonate solution (50 mls of 50 mmol/L) with the preoperative infusion of Normal Saline (1.5 L). The primary outcome will be mean lactate levels in maternal capillary blood at one hour after study drug administration and in the arterial cord blood at birth. We will use the intention to treat analysis approach. Secondary outcomes will include safety, maternal and fetal morbidity and mortality up to 14 days postpartum. Makerere University School of Medicine Research and Ethics Committee and Uganda National Council for Science and Technology have approved the protocol. Each participant will give informed consent at enrolment. The trial registration number is PACTR201805003364421.

**Discussion:** If it is safe and effective in reducing maternal and fetal lactatemia (acidosis) among patients with OL, then the data from this trial will inform the design of future trials that will facilitate the inclusion of sodium bicarbonate infusion in the standard preoperative care for patients with OL in low resource settings.

## 138

### "IT´S AN OBSOLETE PRACTICE": PERCEPTIONS OF SYMPHYSIOTOMY AMONG HEALTH WORKERS IN NORTH GONDAR ZONE, ETHIOPIA

**Halvåg R.[1], Blystad A.[1], Kiserud T.[2], Muleta M.[3], Moland K.M.[1]**
[1]*Research Group for Global Health Anthropology, Center for International Health, Dept. of Global Public Health and Primary Care;*
[2]*Dept. of Clinical Science, University of Bergen, Norway;*
[3]*Dept. of Gynecology and Obstetrics, Jimma University Hospital, Ethiopia*

**Introduction:** Eight percent of all maternal deaths are caused by obstructed labor. Cesarean section is the standard procedure for obstructed labor globally, but it is not widely accessible in low-income settings leaving mother and child at risk. Symphysiotomy is an alternative emergency obstetric intervention, but the procedure is not well known and is surrounded by negative connotations. There is insufficient evidence on how symphysiotomy may function as a lifesaving procedure in contexts where cesarean section is not accessible.
**Aim:** The aim of this study was to explore health workers perceptions on symphysiotomy, and the feasibility of carrying out further studies assessing symphysiotomy as an alternative emergency obstetric intervention in areas where cesarean section is inaccessible.
**Methods:** A formative qualitative study based on semi-structured in-depth interviews with 35 urban and rural health workers was carried out in the North Gondar Zone, Amhara region, northwest Ethiopia. University of Gondar Hospital was the main site of the study.
**Results:** Symphysiotomy was an unfamiliar medical procedure to most of the informants, and none of the informants had practical experience carrying out the procedure. Symphysiotomy was perceived as outdated by hospital health workers and had been presented as an obsolete and harmful practice during their medical training. Rural health workers were less skeptical, and also a few of the hospital staff commented on symphysiotomy as a potential alternative lifesaving procedure that could reduce unacceptable referral complications and maternal deaths. There was a general call for more research-based knowledge on the procedure.
**Conclusion:** The study revealed substantial ambivalence towards symphysiotomy, hospital staff being most skeptical. Although there was a stated interest in more evidence on the procedure, the substantial reluctance encountered among hospital staff makes it difficult to conduct further studies at the research site. The study brings to the forefront of attention ethical dilemmas related to a potential introduction of a medical procedure that may save mother and child but is presently viewed as a second-best option in global maternity care.

## 139

## ONCHOCERCIASIS-ASSOCIATED EPILEPSY: THE EPIDEMIOLOGICAL EVIDENCE

**Siewe Fodjo J.N.[1], Menon S.[1], Hotterbeekx A.[1], Basanez M.G.[2], Colebunders R.[1]**
[1]*Global Health Institute, University of Antwerp, Antwerp, Belgium;*
[2]*London Centre for Neglected Tropical Disease Research, Imperial College London, London, UK*

**Introduction:** The relationship between onchocerciasis and epilepsy has been subject to debate by the scientific community. There is a need to investigate a possible association between both conditions in the light of recent findings.
**Aim:** To provide up-to-date scientific evidence regarding onchocerciasis-associated epilepsy (OAE).
**Methods:** We analysed peer-reviewed papers, abstracts presented at international conferences, and grey literature including all study designs. The available evidence was reviewed against the Bradford Hill criteria.

**Results:** Cross-sectional studies as well as case-control studies and a meta-analysis demonstrated the strength of association between epilepsy status and the presence of *Onchocerca volvulus* microfilariae (mf) or antibodies. Furthermore, a biological gradient and temporality between mf load and the risk of developing epilepsy were demonstrated in a cohort study in Cameroon, with risk ratios of up 28.5 for children having >200 mf per skin snip to develop OAE later in life. There is additional evidence supporting the specificity, consistency, coherence and plausibility of this association; indeed, OAE was observed to be highly prevalent in onchocerciasis-endemic areas with sub-optimal control measures in Cameroon and South Sudan, starting between the ages of 3 and 18 years, with typical clinical aspects including nodding syndrome, and in the absence of other epileptogenic tropical diseases like neurocysticercosis. Conversely, epilepsy incidence drastically reduced after strengthening onchocerciasis elimination programs in Northern Uganda (Kitgum and Pader), and Nigeria (Imo river basin). Notwithstanding, a few case-control studies did not report such an association most likely due to the methodological approach used and increased ivermectin coverage which had probably depleted the mf load in most participants. A common mechanism of molecular mimicry was suggested for both onchocercal retinopathy and seizure-causing cerebral lesions in OAE, thus fulfilling the criteria for analogy. Experimental evidence was weakest; mf had been detected in human cerebrospinal fluid decades before the worldwide institution of mass treatment with ivermectin, but not in recent studies.
**Conclusion:** Overall, applying the Bradford Hill criteria suggests strong epidemiological evidence that infection with *O. volvulus* may cause epilepsy, including nodding syndrome. However, the pathophysiological mechanisms remain elusive.

## 140

## CARING FOR PATIENTS SUFFERING FROM FILARIAL INFECTIONS: LESSONS FROM LYMPHATIC FILARIASIS PROGRAMMES

**D Mackenzie C.D.[1], Mandara W.L.[2], Kristnastry S. [3], Malecela M.N.[4]**
[1]*NTDSC, Task Force for Global Health, Atlanta, USA;*
[2]*NIMR, Dar es Salaam, Tanzania;*
[3]*Govt. T D Medical College, Alappuzha, Kerala, India;*
[4]*NTD, WHO, Geneva, Switzerland*

**Introduction:** Patient care is a major component for defining success in the lymphatic filariasis (LF) elimination programme - this is not the case any of the other major filarial disease programme, the onchocerciasis elimination programme, despite the fact that there is still considerable morbidity associated with the latter infection.
**Aim:** To use the lessons learnt from the LF Programme to develop approaches for caring for those suffering from onchocerciasis.
**Methods:** Compare the underlying aetiologies, the different medical needs and treatments, as well as the differences and commonalities, and develop a field approach to providing care for those suffering from onchocerciasis and other filarial conditions.
**Results:** The different pathogeneses of filarial infections underscore the need for focused treatment protocols in many instances, nevertheless there are also many commonalties, and the experiences from the LF Programme can inform onchocerciasis and other programmes and create and improve the provision of care to the affected individuals. To do this it is important to consider the range of areas associated with providing patient care i.e. clinical presentations and needs, quality of life, supportive care, and rehabilitation.
**Conclusion:** Although each filarial infection has its own individual characteristics many commonalities exist and this can allows for the experiences of the LF to be of value to other filarial infections. The

approaches taken by the LF Programme to ensure that care is provided for lymphoedema and hydrocele patients can provide lessons for other filariasis disease programmes, including the global onchocerciasis programme. Understanding the pathogenesis of the different presentations is fundamental to providing the best care for these patients.

## 141

### SAFE MOTHERHOOD REVOLVING FUNDS - ARE THEY REALLY LIFE-SAVERS FOR THE POOR? PRACTICES AND IMPACT IN NEPAL

Baral K.[1], Kshetri R.[2], Gautam A.[2], Paudel G.[2], Khadka R.[2], Gautam P.[2], Rana S.[2]
[1]Swiss Red Cross, Country Coordination Office, Kathmandu;
[2]Nepal Red Cross Society, Community Empowerment for Health Promotion Program, Nepalgunj, Nepal

**Introduction:** The Swiss Red Cross in collaboration with the Nepal Red Cross Society implemented Safe Motherhood Revolving Funds (SMRF) within the MNCH project. The funds are raised and operated by local Health Mothers groups (HMGs).
**Aim:** This study enhances the understanding of the functionality of these community based revolving funds for safe motherhood and its potential for scale-up and integration in Government programme/policy.
**Methods:** A mixed method approach with quantitative and qualitative Methods was applied, using a semi-structured questionnaire survey and physical observation in health mothers groups (n=66), 14 Focus Group Discussions (n≈200) and key informant interviews (n=32). The research took place between November 2017 and March 2018 in five districts of rural Nepal.
**Results:** 94% of all Health Mothers Groups (HMGs) under study do monthly revenue collection and maintain separate register for record keeping. However, only 32% of the groups maintain a bank account and only 32% of groups receive financial contributions outside their own members. While the majority of groups disseminate the safe motherhood fund regularly in their community, only 44% of the HMGs support women who are non-members. All groups reported that members solely decide among themselves about the interest rates, administration and distribution of the fund to eligible women. All respondents from the interviews unanimously stated that the funds are distributed to the poor and vulnerable. However, more than half of the HMG (57.6%) are also utilizing the fund for issues other than safe motherhood. In all groups the fund utilization has increased from 17 women in the first year to 456 in the second year. District health authorities reported their appreciation and interest towards scaling up and integrating SMRFs in the government health programme.
**Conclusion:** The SMRF has been successfully continued and self-managed by the HMGs. There remains scope to increase access to the funds by including non-HMG members and by enhancing local fundraising from sources outside the group. This encourages increased participation from women, who cannot contribute financially to the fund. The funds are an important vehicle for improved health care seeking. Their scale up and development of national policy or guidelines is encouraged.

## 142

### THE DEVELOPMENT AND IMPLEMENTATION OF A PERFORMANCE FEEDBACK DASHBOARD TO CARE PROVIDERS FROM THE ELECTRONIC MATERNAL AND CHILD HEALTH REGISTRY IN PALESTINE: A QUALITATIVE STUDY

Abu Khader K.[1], Bungudo B.B.[2,3], Baniode M.[1], Frost K.[4], Frost M.[2] , Ghanem B.[1], Hijaz T.[5], Mørkrid K.[2], Salman R.[2], Frøen J.F.[2,3]

[1]The Palestinian National Institute of Public Health, World Health Organization, Palestine;
[2]Global Health Cluster, Division for Health Services, Norwegian Institute of Public Health, Oslo;
[3]Center for Intervention Science in Maternal and Child Health, University of Bergen, Bergen, Norway;
[4]Health Information Systems Programme (HISP), Dept. of Informatics, University of Oslo, Norway;
[5]Palestinian Ministry of health, Ramallah, Palestine

**Introduction:** Performance feedback (PFB) is used to enable health professionals to assess and improve the quality of health care, and works better in enhancing adherence to clinical guidelines. Automating PFB to care providers through a nationwide electronic registry would bring benefits to the health system. PFB is more effective when it is theory-driven and combined with quality improvement training.
**Aim:** Is to describe the development and implementation of a theory-driven PFB dashboard to care providers as a digital health intervention automated from the electronic maternal and child health registry (MCH eRegistry) at primary healthcare in Palestine.
**Methods:** We carried out interviews and focus group discussions with healthcare providers, supervisors and Ministry of Health employees to map and understand the current feedback procedures, and care providers' perceptions of feedback. Guided by the Model of Actionable Feedback and systematic reviews, we iteratively co-designed the PFB dashboard with the users. We trained healthcare providers in using the dashboard to identify quality gaps, set and monitor targets and use recommended "actions" from the dashboard for improvement. The "actions" was developed in dialog with nursing and medical directors.
**Results:** The feedback to healthcare providers were mainly restricted to irregular supervision visits from supervisors. The feedback was done based on predefined items, and not individualized. Some healthcare providers described the visits as a punitive evaluation. Overall healthcare providers were not satisfied with the frequency and content of the feedback. The co-designing with the users made possible to develop a PFB dashboard they recommended to have. The PFB dashboard is continuously available, private and not disclosed with supervisors. It prompts the healthcare provider with "actions" written in a friendly language. The data and "actions" are made easy to understand and individualized based on the healthcare providers' performance.
**Conclusion:** The theory-driven PFB dashboard; which is considered as one of the strategies used to improve clinical practice among health care providers; co-designed with users, is automated from the MCH e Registry to care providers. Its effectiveness is being put to randomized control trial in 140 clinics in the West Bank and Gaza.

## 143

### ASSESSING THE TRANSLATION OF NATIONAL LEVEL POLICIES AND STRATEGIES TO ADDRESS STILLBIRTH AT SUBNATIONAL LEVEL IN UGANDA

Ssegujja E.[1,3], Ddumba I.[2], Andipartin M.[3]
[1]Makerere University School of Public Health, Kampala;
[2]Mukono District Local Government, Uganda;
[3]University of Western Cape, South Africa

**Introduction:** Decentralization of health services has placed subnational implementers as key players in translation of policies into practice. With Global campaigns towards addressing stillbirth gaining momentum at the close of the MDG era, subsequent translation have seen concerted efforts at multi-level governance strata from national by formulating appropriate or revising existing policies to subnational and facility level for

translation of these policies. However due to implementation complexes, translation often times differ from the policy intent with health systems capacity playing a vital role. No study has analyzed the extent to which policies intended to address stillbirths have been translated into service provision. By analyzing the subnational level implementation processes, this study sought to document the translation of national policies to address stillbirths.

**Methods:** This was a cross sectional descriptive study conducted in a single case district with relatively high stillbirth rates in Uganda. Qualitative interviews were conducted on a purposively selected sample of 15 key informants comprising of the health workers, facility and district managers. Data was collected using digital audio recorders and transcribed verbatim with content analysis done using Atlas ti a qualitative data management software.

**Results:** Overall although stillbirth was a felt problem, policy implementation was selective at subnational level where aspects easily adopted being characterized by support and embedded within existing service delivery such as perinatal death reviews within the MPDR activities and fused in existing facility CQI activities. Facility specific initiatives like group ANC counseling/peer support, agreeing on MPDR recommendations before notification to DHO and MoH implemented for self-improvement also supported policy translation. Enforcement was constrained by inadequate human resources, focus on maternal mortality and less on stillbirths, a lack of a Behavioral Change Communication strategy for meaningful engagement with the community, deferral of hard to implement recommendations to higher authority. Implementing partner support was identified as key in policy translation which ranged from commodities and equipment supply to human resource capacity building and support to data transmission. Window of opportunity took advantage of the World Bank's Results Based Financing program to integrate MPDR as one of the output indicators of focus.

**Conclusion:** Beyond formulation of the policies, there is need to match it by strengthening the existing health system to deliver policy recommendations. Opportunities remain with engagement of health partners who in this case bridged the implementation gaps that couldn't be addressed by government calling for more coordinated efforts at the subnational level if policy objectives are to be realized.

## 144

### A HISTORIC COHORT OF OLD CASES OF MALNUTRITION IN CHILDHOOD IN THE CONTEXT OF EASTERN DR CONGO: A GREAT OPPORTUNITY OF RESEARCH 15 YEARS AFTER

**Mwene-Batu P.[1,2,3], Ngaboyeka G.[1], Bisimwa G.[1,3], Macq J.[4], Donnen P.[2]**

[1]Regional School of Public Health (ERSP), Université Catholique de Bukavu, Bukavu, DRC;
[2]Research Center 'Politique et Systèmes de Santé-Santé Internationale', Université Libre de Bruxelles, Brussels, Belgium;
[3]Nutrition Dept., Centre de Recherche en Sciences Naturelles, Lwiro, DRC;
[4]Institute of Health and Society (IRSS), Université Catholique de Louvain, Brussels, Belgium

**Introduction:** Malnutrition has been endemic in South Kivu since the 1960s. The Lwiro Hospital was among the first structures that were involved in the management of malnutrition. This Hospital has a database of children who were previously treated for severe acute malnutrition from 1988 to 2007. Unfortunately, there is no data based on long-term outcomes following discharge from severe acute malnutrition (SAM) treatment in DRC.

**Aim:** Our aim was to follow up patients over 15 years after their treatment for SAM and to describe the longer-term mortality.

**Methods:** A total of 1981 medical files were extracted from the data management unit of Lwiro Hospital and set up as the baseline sample size. The median age at admission was 41 months. Children's anthropometry at admission was adapt to the current WHO curves. From December 2017 to June 2018, we proceed to the tracing of the former malnourished. For deceased subjects, community health workers asked for the cause and year of death.

**Results:** On this day, 693 are alive in the area with a mean age of 23 years old, 201 dead, 441 displaced and 646 not found. For all-cause deaths, association stunting and acute malnutrition was responsible of 85,6 %, with men accounting for about two-thirds of deceased. About 3/4 of the deceased had an outdated immunization Schedule. About two-thirds of deaths occurred before subjects celebrated their tenth birthday and that more than half of deaths occurred within 5 years after admission, with a crude mortality rate of 8.36 deaths per 1000 person-years. Infectious diseases were the common cause of death followed by malnutrition. Diabetes accounted for 5% of deaths.

**Conclusion:** A follow-up study of this size and length in a setting where malnutrition is prevalent is rare. This cohort is a great opportunity to evaluate whether treatment programmes are effective or not. Few points of interest can be raised at this level: Do they have higher rates of Non-Communicable Diseases after discharge? Different body composition? Have their immune systems genuinely recovered optimally? These are research priorities required in a context of nutritional vulnerability.

## 145

### ONCHOCERCIASIS-ASSOCIATED EPILEPSY: THE EPIDEMIOLOGICAL EVIDENCE

**Siewe Fodjo J.N.[1], Menon S.[1], Hotterbeekx A.[1], Basanez M.G.[2], Colebunders R.[1]**

[1]Global Health Institute, University of Antwerp, Antwerp, Belgium;
[2]London Centre for Neglected Tropical Disease Research, Imperial College London, London, UK

**Introduction:** The relationship between onchocerciasis and epilepsy has been subject to debate by the scientific community. There is a need to investigate a possible association between both conditions in the light of recent findings.

**Aim:** To provide up-to-date scientific evidence regarding onchocerciasis-associated epilepsy (OAE).

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increased ivermectin coverage which had probably depleted the mf load in most participants. A common mechanism of molecular mimicry was suggested for both onchocercal retinopathy and seizure-causing cerebral lesions in OAE, thus fulfilling the criteria for analogy. Experimental evidence was weakest; mf had been detected in human cerebrospinal fluid decades before the worldwide institution of mass treatment with ivermectin, but not in recent studies.

**Conclusion:** Overall, applying the Bradford Hill criteria suggests strong epidemiological evidence that infection with *O. volvulus* may cause epilepsy, including nodding syndrome. However, the pathophysiological mechanisms remain elusive.

## 146

### COMMUNITY-BASED PREVALENCE OF TYPHOID FEVER, TYPHUS, BRUCELLOSIS AND MALARIA AMONG SYMPTOMATIC INDIVIDUALS IN AFAR REGION, ETHIOPIA

**Zerfu B.[1], Medhin G.[2], Mamo G.[3], Getahun G.[4], Tschopp R.[5,6], Legesse M.[2]**
[1]*Dept. Medical Laboratory Sciences;*
[2]*Aklilu Lemma Institute of Pathobiology;*
[3]*Dept. Veterinary Microbiology, Immunology and Public Health, Addis Ababa University, Bishoftu;*
[4]*Melka Werer Health Center, Melka Were, Ethiopia;*
[5]*Armauer Hansen Research Institute, Addis Ababa, Ethiopia;*
[6]*Swiss TPH, Basel, Switzerland*

**Background:** In sub-Saharan Africa, where there is the scarcity of proper diagnostic tools, febrile illness related symptoms are often misdiagnosed as malaria. Information on causative agents of febrile illness related symptoms among pastoral communities in Ethiopia have rarely been described.

**Method:** With a community based cross-sectional survey, we assessed prevalence of typhoid, typhus, brucellosis and malaria among individuals with a set of given symptoms in Amibara district, Afar Region, Ethiopia. Blood samples were collected from 650 participants and examined by Widal and Weilflex of direct card agglutination test (DCAT) and tube based titration tests for *Salmonella enterica* serotype Typhi (*S.* Typhi) and Rickettsial infections. Rose Bengal Plate Test (RBPT) and Complement Fixation Test (CFT) were used to screen *Brucella i*nfection. Thin and thick blood smears were used to diagnose malaria.

**Results:** Out of 630 sera screened by DCAT, 83 (13.2 %) were reactive to H and/or O antigens for *S.* Typhi infection. Among these, 46 (55.4%) were reactive by the titration test at the cut off value $\geq$ 1:80. The combined sero-prevalence for *S.* Typhi by the two tests was 7.3% (46/630). The sero-prevalence for *Rickettsia* infection was 26.2% (165/630) by DCAT and 53.3% (88/165) by the titration test at the cut off value $\geq$ 1:80. The combined sero-prevalence for *Rickettsia* infection by the two tests was 14.0 % (88/630). The sero-prevalence for *Brucella* infection was 12.7% (80/630) by RBPT, of which 28/80 (35%) were positive by CFT. The combined sero-prevalence for *Brucella* infection by the two tests was 4.4% (28/630). Out 650 suspected individuals for malaria, 16 (2.5%) were found positive for *P. falciparum* infection.

**Conclusion:** Typhoid, typhus, brucellosis and malaria were observed among symptomatic individuals. The study also highlighted that brucellosis cases can be misdiagnosed as malaria or other disease based solely on clinical diagnosis. Therefore, efforts are needed to improve disease awareness and laboratory services for the diagnosis of brucellosis and other zoonotic diseases to identify other causes of febrile illness in this pastoral setting.

## 147

### MOBILE SUITCASE LABORATORY FOR MULTIPLE TESTING OF PATHOGENS TO SUPPORT THE ELIMINATION OF MALARIA IN NIGERIA

**Ademowo G.O.[1], Oyinloye O.E.[1], Hansen S.[2], Raifu M.K.[1], Böhlken-Fascher S.[2], Bakarey A.S.[1], Czerny C.P.[2], Abd El Wahed A.[2]**
[1]*Institute for Advanced Medical Research and Training, College of Medicine, University College Hospital, University of Ibadan, Ibadan, Nigeria;*
[2]*Division of Microbiology and Animal Hygiene, University of Goettingen, Goettingen, Germany*

**Introduction:** The detection of cases with very low parasitemia is very crucial to achieve the goal towards malaria eradication. On top of that the identification of other pathogens causing similar clinical picture is important to avoid misdiagnosis and the unnecessary use of antimalarial drugs. The polymerase chain reaction is the gold standard of molecular diagnostics, but it is not suitable for point of need diagnostics.

**Aim:** The aim was to deploy a point of need diagnostic test to screen for Plasmodium, Rickettsia, Leptospira, Salmonella, Strep. pneumonia, Dengue, yellow fever and chikungunya.

**Methods:** A solar powered mobile suitcase laboratory was constructed and deployed in rural community in Ibadan, Nigeria. It contains all reagents and equipment for the detection of nucleic acid of the pathogens using SpeedXtract and recombinase polymerase amplification (RPA) assay. All reagents are cold-chain independent in order to ease the use at poor resource settings. The mobile suitcase laboratory was used to identify malaria cases as well as screening for other causes of non-malaria febrile illness in Nigeria.

**Results:** In total 88 blood samples were tested from patient (age 1-63 years). Interestingly, about 47% of the samples were positive in the Plasmodium RPA assay, despite that the screening was done during the dry season in Nigeria. Only one patient was positive for Salmonella. None of the other pathogens were detected.

**Conclusion:** The mobile suitcase has proven to be efficacious as a point of need diagnostic for the detection of Plasmodium and other pathogens that could cause fever in Nigeria and other tropical regions. Further study using sequencing (metagenomic diagnostics) is needed to identify the cause of non-malaria febrile illnesses.

## 148

### INNOVATIVE TOOLS FOR ASSESSING INFECTIOUSNESS IN ASYMPTOMATIC CARRIERS OF L.DONOVANI: A PROOF OF CONCEPT STUDY OF A NOVEL MICROBIOPSY DEVICE

**Cloots K.[1], Singh O.P.[2], Van der Auwera G.[3], Hasker E.[1], Singh A.K.[2], Gedda M.R.[2], Rai T.[2], Malaviya P.[2], Sundar S.[2], Boelaert M.[1]**
[1]*Dept of Public Health, Institute of Tropical Medicine, Antwerp, Belgium;*
[2]*Dept of Medicine, Banaras Hindu University, Varanasi, India;*
[3]*Dept of Biomedical Sciences, Institute of Tropical Medicine, Antwerp, Belgium*

**Introduction:** In 2005 the governments of India, Nepal and Bangladesh have committed to eliminating visceral leishmaniasis (VL) as a public health problem by 2020, and recent review shows they are close to reaching this target. However, unresolved questions remain about the role of asymptomatically infected individuals in sustaining transmission. Infectiousness is usually assessed by direct xenodiagnosis in which sand flies are allowed to feed on study subjects and later analysed for *L.donovani* infection. However, xenodiagnosis is not appropriate for

large scale population studies on asymptomatic people. Many authors therefore use parasite load in the blood as a proxy for infectiousness, but animal studies suggest that parasite load in the skin might be a better marker. As standard skin biopsies are too painful to be used on a large scale on asymptomatic individuals, we set out to pilot the potential of a prototype microbiopsy device.

**Aim:** To examine to what extent parasite load in the skin as collected with the novel microbiopsy device correlates with a) parasite load in the blood, and b) disease status.

**Methods:** We collected skin samples from 175 individuals; 30 VL patients, 21 Post-Kala azar leishmaniasis (PKDL) patients, 64 asymptomatically infected individuals, 30 endemic controls and 30 non-endemic controls. Each individual was sampled on the lower arm and in the neck, PKDL patients were sampled in addition on one of the skin lesions. A blood sample was collected to assess parasitaemia. Agreement between parasite load in skin and blood was assessed on a quantitative scale with correlation coefficients using regression analysis and on a binary scale using Cohen's kappa coefficient. Correlation between skin parasite load and disease status was assessed using a receiving operating characteristics (ROC) curve.

**Results:** Results are preliminary as data were not complete at the time of abstract submission. In the first available data we found no clear correlation between blood and skin parasite load, both on a quantitative scale (correlation coefficient 0.4198) and on a qualitative scale (kappa 0.1309). A strong correlation was present between skin parasite load and disease status (VL or PKDL), but not between skin parasite load and infection status.

## 149

### AUTOMATED "SAMPLE TO ANSWER" DIAGNOSTIC PLATFORMS (MALVEC-LABDISK / ARBOVEC-LABDISK) FOR IMPROVING THE IMPACT OF VECTOR CONTROL INTERVENTIONS

**Mavridis K.[1], Hin S.[2], Mitsakakis K.[2], Müller P.[3], Wipf N.[3], Medves S.[4] , Vontas J.[1,5]**
[1]*Institute Molecular Biology and Biotechnology – Foundation for Research and Technology (IMBB - FORTH), Greece;*
[2]*Hahn-Schickard-Gesellschaft für angewandte Forschung e.V., Germany;*
[3]*Swiss Tropical and Public Health Institute / Centre Suisse de Recherche Scientifique, Switzerland;*
[4]*Fast Track Diagnostics (FTD), a Siemens Healthineers Company, Luxembourg;*
[5]*Dept. of Crop Science, Agricultural University of Athens, Greece*

**Introduction:** Vector-borne diseases (such as malaria, dengue, chikungunya and Zika virus infections) cause thousands of deaths every year. Prevention of these diseases is best achieved by vector control which relies on the use of insecticides. Monitoring mosquito vector populations is an integral component for effective vector control programs.

**Methods:** An essential part of vector research is the characterization of field vector populations, such as species/subspecies, insecticide resistance traits and pathogen and symbiote infection status. Several diagnostic Methods have been used for this task, but all have important limitations including protocol complexity, technical training requirements and high per-assay and platform cost.

**Results:** To address these limitations, diagnostic platforms (MalVec-LabDisk / ArboVec-LabDisk) for monitoring *Anopheles* and *Aedes* mosquito populations will be established. We have already developed novel multiplex assays, which are applicable to pooled specimens and integrable to such automated platforms. These assays can reliably calculate the frequency of target site resistance mutations in pooled specimens (Mavridis et al, 2018, *Genes*, 9 (10), pii: E479), monitor the levels of major detoxification genes and metabolic resistance (Mavridis et al, 2019, *Parasit Vectors*, 12(1):9) and detect pathogens (such as *P. falciparum*) at the infective stage without the need of head/thorax dissection and post-PCR processing (Kefi et al, 2018, *Sci Rep* ;8(1):1462). We are currently in the phase of integrating these multiplex assays to the automated systems that will be evaluated as a whole in malaria and arbovirus endemic countries.

**Discussion:** We aim to deliver novel and improved tools to support informed decision-making in vector control and disease management to ultimately increase the efficacy of vector control programs.

## 150

### IMPROVING THE TIMELINESS AND COMPLETENESS OF CHILD-HOOD VACCINATION THROUGH COLOR-CODED BRACELETS: A PILOT STUDY AMONGST FULANI TRIBE IN NIGERIA

**Yau Inuwa B.[1], Müller O.[2], Jahn A.[2], Mahmud Zubairu M.[1], Nwaze E.[1], Aliyu M.M.[3], Ibrahim Gamawa A.[4], Abdullahi A.[4]**
[1]*National Primary Health Care Development Agency, Abuja, Nigeria;*
[2]*Institute of Global Health, Heidelberg, Germany;*
[3]*Federal Medical Centre, Azare;*
[4]*Bauchi State Primary Health Care Development Agency, Bauchi, Nigeria*

**Introduction:** Routine childhood immunization is considered one of the most cost-effective public health interventions for prevention of morbidity and mortality due to vaccine preventable diseases (VPD). However, the coverage of childhood immunization is still unacceptably low in a number of sub-Saharan African countries including Nigeria. Moreover, vaccine effectiveness depends largely on the timing of its administration. To achieve maximum protection against VPD, a child should receive all immunizations within the recommend intervals.

**Aim:** The primary objective of this study was to test the effects of a pilot intervention on vaccination parameters in infants born to Fulani parents. Infants received color-coded bracelets symbolising different levels of vulnerability to specific VPD as reminders of due dates for vaccination to enhance timeliness and completeness of immunization schedules. The provision of bracelets was supported by a peer education schedule, to further promote uptake and increase coverage.

**Methods:** In 2018, a total of 435 children (0-14 days old) were recruited across six study sites (three intervention and three comparison health facilities) in two districts of Bauchi State in north-eastern Nigeria and followed up for 11 months. During follow-up, the dates of their visits to the study sites were recorded for each of the five foreseen vaccination dates according to Nigeria immunization policy. All children in the three intervention sites (n=256) were provided with the 5-color coded bracelets and caregivers informed about the meaning of the colours with regard to vaccine type and timing of these vaccinations. The care takers of children at the three control sites (n=179) did not receive bracelets and were simply informed about the vaccination timing. At the intervention sites, mothers were voluntarily enrolled as peer-to-peer mobilizers to motivate other women to bring their children for vaccination.

**Results:** Preliminary findings point to an improvement of the timelines and coverage of vaccination associated with this pilot intervention. Full Results of the study will be presented at the conference.

## 151

### MEDICAL LABORATORIES AND QUALITY OF CARES: THE MOST NEGLECTED PART AT HOSPITAL LEVEL

**Linsuke S.[1,2], Nabazungu G.[1], Ilombe G.[1,2], Ahuka S.[1,3], Muyembe J.J.[1,3], Lutumba P.[1,4]**
[1]Dept. of Epidemiology, National Institute of Biomedical Research (INRB), Kinshasa, DRC;
[2]Dept. of Epidemiology and Social Medicine, Faculty of Medicine, University of Antwerp, Antwerp, Belgium;
[3]Dept. of Microbiology, University of Kinshasa, Kinshasa, DRC;
[4]Dept. of Tropical Medicine, University of Kinshasa, Kinshasa, DRC

**Introduction:** The quality of care is essential to save life. Many investments are done in terms of human resources, commodities, drugs, equipment. However, the clinical laboratory is one of the neglected components in the aim to have an acceptable quality of care. Indeed, bad diagnosis cannot end up with good management of patients. We conducted a descriptive cross-sectional in three general hospital in the Democratic Republic of Congo to assess the performance of clinical laboratory.

**Methods:** Observations, visit and structured interviews were performed using questionnaires. A team with national experts in laboratory visits the three laboratories. We used also recommendations from guidelines on laboratory platform at hospital level.

**Results:** Clinical laboratories had a lot of gaps especially regarding infrastructures, training of the personnel, equipment, supervision and the quality control. The platform is not adapted to the need of quality of care. For example, there is no one dedicated for laboratory supervision at te level of the hospital even at the level of health zone.

**Conclusion:** In Conclusion, there is a need of investments in laboratory to ensure the quality of care. Within the system, there is a need to dedicate more attention to the laboratory in term of budget but also in term of training, supervision etc. . .

## 152

### USE OF PATIENT REPORTED OUTCOME MEASURES TO DESIGN AND EVALUATE HUMAN RIGHTS IN CHILDBIRTH INTERVENTIONS IN ETHIOPIA

**Anteneh A.[1,2], Alison M.[2], Michelle K.[2]**
[1]School of Public Health, Hawassa University, Hawassa, Ethiopia;
[2]Nossal Institute for Global Health, University of Melbourne, Melbourne, Australia

**Introduction:** Ethiopia is one among the five countries hosting half of the global maternal mortality. There is robust evidence that Ethiopian women do not show up for facility-based delivery due to experienced and perceived mistreatment in health facilities (only 28% deliveries happen in health facilities).

**Aim:** This study aimed to identify and address the mistreatment of women during facility-based child birth.

**Methods:** Pre and post-intervention surveys were conducted in three hospitals in south Ethiopia. Initially, 25 previously tested indicators were administered to 198 women to benchmark the magnitude of mistreatment of women during childbirth. The indicators range from those inquiring on using simple languages to those with serious offenses like slapping and gagging. Based on the gaps identified, a training manual, job aids and action plan were developed and contextualized by stakeholders. Training was offered to 64 service providers from the study hospitals; three rounds of post-training supportive supervisions that were guided by the continuous quality improvement cycle approach were also conducted

after the training. Finally, post-intervention surveys were administered to 190 women. An adjusted Poisson regression analysis was used to identify the association between the interventions and the level of mistreatment during childbirth.

**Results:** The majority of participants were 15-44 years of age both in the pre and post-intervention groups (p=0.93). 87.9% of the pre-intervention and 77.4% of the post-intervention survey participants had vaginal birth (p=0.01). Almost all (99.2%) of women reported experiencing at least one of 25 mistreatment indicators during childbirth. After controlling for effects of potential confounders, the number of mistreatment items experienced by post-intervention survey participants was 18% lower (adjusted coefficient=0.82 [0.74-0.91]). Having vaginal delivery was also associated with higher number of mistreatment items experienced (adjusted coefficient=1.54 [1.07-2.22]). Similarly, the number of mistreatment items experienced was higher among women who had complications during pregnancy (adjusted coefficient=1.21 [1.06-1.41]) and delivery (adjusted coefficient=1.21 [1.07-1.38]).

**Conclusion:** This study has demonstrated that patient reported outcome measures can be used in maternity settings for monitoring and evaluation of service quality. The training manuals and job aids are currently being reviewed for national scaleup study by the ministry of health and stakeholders.

## 153

### IMPROVING THE QUALITY OF MIDWIFERY TRAINING IN RESOURCE LIMITED SETTINGS: A QUASI-EXPERIMENTAL STUDY

**Dickinson F.[1], Fahy K.[1], White S.[1], Godia P.[1], Maua J.[1], Muthigani W., Ameh C.A.[1]**
[1]Centre for Maternal and Newborn Health Liverpool School of Tropical Medicine, Liverpool, UK;
[2]Ministry of Health, Kenya

**Introduction:** An estimated 289,000 maternal deaths and 2.4 million newborn deaths occur globally each year. Most of these deaths occur in resource limited settings. Improving access to family planning, Emergency Obstetric and Newborn Care (EmONC) and skilled attendance at birth, are key strategies for improving maternal health. Although the proportion of births attended by skilled health workers has doubled over the last 15 years, studies have shown that health workers lack the knowledge and skills to provide good quality care. There is evidence that the pre-service training curriculum may be deficient in low resource countries.

**Aim:** To measure the effectiveness of pre-service EmONC training interventions on the knowledge and skills of final year midwifery students in Kenya.

**Methods:** Kenya PETI study (Pre-service Emergency obstetric care Training Interventions Study) ISRCTN74563398 https://doi.org/10.1186/ISRCTN74563398 was a quasi-experimental controlled trial with 2 intervention and 1 control arm, involving 12 Kenya Medical Training Colleges and 240 final year midwifery students. Midwifery colleges in the intervention arm, received EmONC skills laboratory equipment, training of teaching staff on teaching Methods, EmONC and clinical supervision skills. The teaching staff were also mentored for a period of 12 months. The colleges in the control arm had no intervention. Scores for the knowledge test, written skills test, and practical skills test were analysed using mixed effects linear models, with random effect for cluster (midwifery colleges). Fixed effects considered were the interaction of study arm. Likelihood ratio tests were used to compare models, in order to test the significance of the fixed effects. Fitted estimates of the significant fixed effects are reported with 95% confidence intervals.

**Results:** The effect of the study arm was significant (chi sq=9.49, p-value=0.009). The odds of achieving scores of 80% or higher in

the knowledge test was significantly higher in the intervention group compared to the control group OR 3.17 (1.1 – 9.83) p<0.05. The scores in the skills tests were significantly higher in the intervention group compared to the control group 19.85 (7.8-31.9) p<0.01

**Conclusion:** The EmONC interventions were effective in improving the knowledge and skills of final year midwifery students.

## 154

### USING MACHINE LEARNING PREDICTIONS OF MALARIA PREVALENCE TO IMPROVE GEOSTATISTICAL DISAGGREGATION MODELS OF INCIDENCE

**Lucas T.C.D., Nandi A., Nguyen M., Rumisha S., Battle K.E., Howes R.E., Cameron E., Gething P.W., Weiss D.J.**

*Malaria Atlas Project, Big Data Institute, University of Oxford, Oxford, UK*

**Introduction:** As more countries move towards malaria elimination, global risk maps with accurate estimates of transmission in low prevalence areas are increasingly vital. However, traditional mapping using prevalence point-surveys is ineffective in low prevalence areas due to low statistical power and geographic biases in data availability. Therefore, models must be developed that can estimate risk at high spatial resolution from surveillance data that reports incidence aggregated to a geographic polygon. Current models developed for polygon incidence data suffer from lower statistical power for learning relationships between malaria risk and environmental covariates.

**Aim:** We aimed to develop a model that combines prevalence survey data and aggregate incidence data.

**Methods:** The model uses prevalence survey data to train machine learning models and then uses geospatial, disaggregation regression to combine these machine learning models with incidence data. Using Colombia and Madagascar as case examples we examined the performance of the new model using six fold random cross-validation and three fold spatial cross-validation. We compared the predictive performance of baseline dissaggregation regression models using environmental covariates with our new model that combines machine learning models trained on prevalence data with the disaggregation model.

**Results:** When considering random cross-validation, predictions from the new model were more correlated with observed data than the baseline model in both Madagascar (baseline: 0.70, new: 0.76) and Colombia (b: 0.45, n: 0.55). Under spatial cross-validation, the new model outperformed the baseline model in Madagascar (b: 0.22, n: 0.63) but both models performed poorly in Colombia.

**Conclusions:** Our new method provides a way to combine information from prevalence surveys and aggregated incidence data, leveraging the strengths of both.

## 155

### AGROCHEMICAL POLLUTION INCREASES ABUNDANCE OF SCHISTOSOMA HOST SNAILS IN WESTERN KENYA

**Ganatra A.A.[1], Becker J.[2], Kandie F.[1], Muehlbauer L.[2], McOdimba F.[1], Torto B.[1], Lelo E.[3], Brack W.[2], Fillinger U.[1], Liess M.[2]**

*[1]Human Health Dept., icipe, Nairobi, Kenya;*
*[2]System-Ecotoxicology, UFZ, Leipzig, Germany;*
*[3]CBRD, KEMRI, Nairobi, Kenya*

**Introduction:** Schistosomiasis is a neglected tropical disease that occurs widely across Africa. The disease is caused by *Schistosoma* trematodes which are hosted by Planorbid snails of the genus *Biomphalaria* or *Bulinus*. Kenya's Lake Victoria shore, where both snail genera reside naturally, is surrounded by fertile lands used for commercial and subsistence farming of various crops (maize, sugarcane, tea and rice). Agrochemicals used on these farms wash into the waters and potentially affect the community composition of aquatic organisms. Because snails are generally highly tolerant to agrochemicals, we hypothesized that the community in a polluted environment may shift towards an increased abundance of host snails, resulting in an increased risk of infection with schistosomiasis.

**Aim:** The study aimed at investigating the effects of agrochemicals on the habitats of the host-snails present in the inland waters surrounding the Kenyan Lake Victoria.

**Methods:** Concentrations of agrochemicals were analysed in water samples from 48 sites ranging from streams to ponds Agrochemical pollution was quantified relating the concentrations to the sensitivity of the reference organism *Daphnia magna* (toxic unit). To confirm the comparably high tolerance of host snails, they were collected together with another 19 macroinvertebrate taxa and acute-toxicity tests were conducted using a neo-nicotinoid and an organophosphate insecticide.

**Results:** The sensitivity of Kenyan taxa to agrochemicals was comparable to European taxa. Snails (and particularly the Planorbid host snails) were highly tolerant to both insecticides. The incidence and the density of snails increased with agrochemical pollution. Additionally, with increasing agrochemical pollution snail communities became more dominated by the Planorbid host snails.

**Conclusion:** The results show that agrochemical pollution in East African inland waters have significant effects on the macroinvertebrate community structure that favour the highly tolerant host snails of *Schistosoma*. Because people are living in close contact with the investigated water bodies, we conclude that agrochemical pollution is a relevant driving factor for the risk of infection with schistosomiasis.

## 156

### A CRITICAL EVALUATION OF THE APPETITE TEST FOR CHILDREN WITH SEVERE ACUTE MALNUTRITION

**Zangenberg M.[1,2], Abdissa A.[3], Johansen Ø.H.[4,5], Tesfaw G.[3], Friis H.[6], Briend A.[6,7], Kurtzhals J.A.L.[1,2], Girma T.[8]**

*[1]Centre for Medical Parasitology, Dept. of Immunology and Microbiology, University of Copenhagen;*
*[2]Dept. of Clinical Microbiology, Copenhagen University Hospital (Rigshospitalet), Copenhagen, Denmark;*
*[3]Dept. of Medical Laboratory Sciences and Pathology, Jimma University, Ethiopia;*
*[4]Dept. of Clinical Science, University of Bergen;*
*[5]Dept. of Microbiology, Vestfold Hospital Trust, Tønsberg, Norway;*
*[6]Dept. of Nutrition, Exercise and Sports, University of Copenhagen, Denmark;*
*[7]University of Tampere School of Medicine and Tampere University Hospital, Center for Child Health Research, Tampere, Finland;*
*[8]Dept. of Pediatrics and Child Health, Faculty of Medical Sciences, Jimma University, Ethiopia*

**Introduction:** In children with severe acute malnutrition (SAM) the appetite test is used to risk-stratify for in-patient or outpatient care. The appetite test is recommended in national and international guidelines despite lack of evidence.

**Aim:** To evaluate the ability of the appetite test to identify children at risk of a poor treatment outcome.

**Methods:** We conducted a prospective observational study of children with SAM in three sites in Ethiopia. We did the appetite test and a simple

standardised examination for medical complications, performed blood cultures and analysed blood samples. The appetite test was done by research nurses independent of the routine staff, and the result did not affect decisions for hospitalisation, clinical care and treatment duration. Data were analysed using a mixed linear model for continuous outcomes and a mixed model logistic regression for binary outcomes.

**Results:** Appetite was tested in 298 (89%) of 343 enrolled children and only 56 (19%) passed. In most cases (94%) where the test was not performed this was due to a clinical condition that precluded testing. Counterintuitively, we found a trend towards a higher increase in weight during follow-up among children failing the test than children passing the test, adjusted for type and duration of treatment, oedema, duration of follow-up, and age (p=0.08). Furthermore, using a similar model but using weight gain from the first oedema-free weight, we found that children failing the appetite test had a higher weight gain than children passing the test (p=0.002). We found one or more medical complications in 179 (54%) of the patients. There was a trend towards those with complications having a lower weight gain than those without complications (p=0·07). Medical complications but not the appetite test result was associated with blood markers of metabolic disturbances. Neither the appetite test nor medical complications were associated with bacteraemia (n=11), treatment failure (n=57) or mortality (n=17).

**Conclusion:** Our findings question the rationale for using the appetite test and challenge its use to identify children who need in-patient care. While this should be confirmed in other settings, we suggest that assessment of medical complications alone could suffice for this purpose.

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### ENDEMIC LEPTOSPIROSIS IN SRI LANKA: VALUE OF CLINICAL PRESENTATION, LABORATORY DATA AND SUSPECTED CASE DEFINITION FOR EARLY DIAGNOSIS

Nisansala G.G.T.[1], Bandara A.W.M.K.[2], Weerasekera M.M.[1], Gunasekara T.D.C.P.[1], Gamage C.D.[3], Marasinghe M.G.C.P.[4], Fernando S.S.N.[1], Ranasinghe K.N.P.[5]

[1]Dept. of Microbiology, Faculty of Medical Sciences, University of Sri Jayewardenepura;
[2]Dept. of Basic Sciences, Faculty of Allied Health Sciences, General Sir John Kotelawala Defence University;
[3]Dept. of Microbiology, Faculty of Medicine, University of Peradeniya;
[4]Dept. of Medicine, Faculty of Medical Sciences, University of Sri Jayewardenepura;
[5]Base hospital, Panadura, Sri Lanka

**Introduction:** Leptospirosis is a neglected tropical zoonosis endemic to Sri Lanka. Diagnosis and treatment of leptospirosis in high-burden low-resource settings is a challenge due to limited access to diagnostics. Thus treatment is initiated based on clinical diagnosis. In resource poor settings evaluation of clinical diagnostic criteria supported by basic laboratory investigations can be useful in early diagnosis in absence of availability of specific diagnostics.

**Aim:** We analyzed patterns of disease of suspected and confirmed cases of leptospirosis during leptospirosis outbreaks in three high endemic districts of Sri Lanka to determine clinical background of endemic leptospirosis in tropical setting. Further, existing clinical leptospirosis case definitions for suspected case of leptospirosis were accessed by recommendations of World Health Organization (WHO), Centers for Disease Control and Prevention and from national guidelines on management of leptospirosis, Epidemiology unit, Ministry of Health, Sri Lanka to recruit patients for better management.

**Methods:** This was a retrospective multicenter study carried out during 2013-2017 in 5 selected hospitals representing three high endemic districts in Sri Lanka. Clinically suspected leptospirosis patients were recruited according to Communicable Disease Epidemiology Profile Sri Lanka, WHO. Leptospirosis was confirmed by either single microscopic agglutination test(MAT) titre ≥1:400 or by positive polymerase chain reaction(PCR).

**Results:** Out of 372 clinically suspected patients, 29% were found to be confirmed as leptospirosis by either MAT (50%) or PCR (52.7%) while 13% were presumptively identified as leptospirosis. Among confirmed group mean age was 44.8±15.7 years, with 87.6 % males. Clinical symptoms (headache, vomiting, jaundice and dyspnoea) and haematological (haemoglobin, platelet count) and biochemical (serum creatinine, serum urea, serum bilirubin and C-reactive protein(CRP)) alterations were associated (p<0.05) with confirmed cases. When case definition of Ministry of Health, Sri Lanka was evaluated, sensitivity, specificity, positive predictive value and negative predictive value were 96%, 9%, 31% and 92% respectively.

**Conclusions:** Haemoglobin, platelet count, serum creatinine, serum urea, serum bilirubin and CRP were useful diagnostic findings in leptospirosis which may be helpful in clinical care. The case definition of Ministry of Health, Sri Lanka was found to have higher sensitivity and enabled screening of all probable cases of leptospirosis in terms of initiate treatment strategies.

## 158

### MASS CAMPAIGN ON NON–COMMUNICABLE DISEASES – CITY OF KIGALI 2017: ASSESSING UTILITY AND EFFECTIVENESS

Mukantagara M.[1], Zinnen V.[2], Kangabire M.T.[3], Mbarushimana A.[4], Tihon V[2]., Ndayisaba G.[1], Condo J.[1]
[1]Biomedical Center;
[2]Enabel (Belgian Development Agency;
[3]Public Health Directorate, City of Kigali;
[4]Rwanda NCD Alliance, Kigali, Rwanda

**Introduction:** The City of Kigali organizes a mass campaign on Non-Communicable Diseases (NCDs) every year in order to raise awareness, for better prevention and for early detection. Thousands of people are screened for free (Body Mass Index, blood pressure and glycemia), education messages are provided, and people with abnormal values receive counselling.

**Aim:** This study aimed to evaluate utility and effectiveness of the campaigns.

**Methods:** Close follow-up of people screened during the 2017 mass campaign: all cases with abnormal values compared to the standard definition of hypertension and hyperglycaemia were extracted. A structured questionnaire was prepared to interview the selected people by phone.

**Results:** Of 2147 people enrolled, 674 had abnormal values (31%) and 439 could be reached and gave their consent. The main reason for people to attend the screening (94%) was to know their status. 73% of respondents didn't know their status beforehand. 90% of those screened received counselling primarily on more physical activity and a healthy diet, and less on alcohol (23%) and smoking (12%). 35% were advised to go to health facility to confirm diagnosis and/or for further management. Concerning knowledge, the majority knows about hypertension (62%), diabetes (61%), cancer (28%), and mentioned unhealthy diet (46%) as main risk factor. After the campaign, 39% of respondents changed their life habits through more regular physical activities, eating more fruits and vegetables, reducing use of salt and sugar. The majority found this mass campaign very useful for detection (63%) and declared to recommend it to others (94%).

**Conclusion:** The mass campaign contributed to detect NCDs as 73% of respondents didn't know their status. People received information and counselling, however, it did not cover all risk factors (especially tobacco and alcohol. While all had abnormal values, only 35% were advised to go to the health facility, and only 39% changed their life habits. In Conclusion, mass campaigns seem to be useful with room for improvement, especially on education and case management. This kind of evaluation should be repeated by including all screened people to get more information and continuously improving the impact of such mass campaigns.

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## CHARACTERISTICS OF PATIENTS AT RISK OF, OR WITH NEWLY DIAGNOSED DIABETES IN A SUB-URBAN TOWNSHIP, SOUTH AFRICA: SMART2D BASELINE SURVEY RESULTS

**Delobelle P.A.[1,2], Onagbiye S.O.[1], De Man J.[3], Manuga T.[1], Hassen M.[1], Puoane T.[1]**
[1]School of Public Health, University of Western Cape, Bellville;
[2]Chronic Disease Initiative for Africa, University of Cape Town, Cape Town, South Africa;
[3]Dept. of Primary Care, University of Antwerp, Antwerp, Belgium

**Introduction:** Type-2 diabetes is increasing rapidly in low- and middle-income countries, especially among populations with a low socio-economic status. SMART2D is an adaptive cluster randomised implementation trial aimed at testing innovative community-based self-management support for type-2 diabetes prevention and management in high-, middle- and low-income countries.[1] This study is part of the baseline assessment of SMART2D.
**Aim:** Assess the socio-demographic, anthropometric and glycaemic profile of patients with newly diagnosed type 2 diabetes, or at risk of type-2 diabetes.
**Methods:** Cross-sectional study using a structured contextually validated survey questionnaire among 294 newly diagnosed (<1 year) type-2 diabetes patients (n=197 women; 97 men) and 292 patients at high risk of type-2 diabetes (n=227 women; 65 men) recruited from two community health centres in a peri-urban township in Cape Town. Anthropometric (height, weight, waist circumference) and biomedical measurements (blood pressure, HbA1c, FPG) were conducted and Results analysed using descriptive statistics.
**Results:** The mean age of participants was 52±10 years (range 30-77), with 72% women, 70% having some secondary education, and 45% unemployed. Mean BMI and waist circumference were significantly higher among women and positively correlated with HbA1c in the at-risk group (p<0.01), whereas mean FPG was significantly higher among at-risk men (p<.05). Waist circumference, FPG and HbA1c were significantly correlated (p<.01) and higher in the diabetes group (p<.001). Higher education and income were significantly positively associated with FPG and HbA1c among diabetics (p<.01). A high proportion of the diabetic and at-risk group was obese and treated for hypertension with limited glycaemic control among diabetics.
**Conclusion:** Results of this study highlight the need to strengthen type-2 diabetes prevention and treatment efforts among socio-economically disadvantaged population groups in South Africa, with attention to gender differences and the impact of obesity.

**Reference:**
1. Guwatudde D., Absetz P., Delobelle P., Östenson C.-G., Olmen van J., Alvesson H.M., et al. Study protocol for the SMART2D adaptive implementation trial: a cluster randomised trial comparing facility-only care with integrated facility and community care to improve type 2 diabetes

outcomes in Uganda, South Africa and Sweden. *BMJ Open* 2018; 8(3). Doi: 10.1136/bmjopen-2017-019981.

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## EMERGENCE OF DIMINISHED CIPROFLOXACIN-SUSCEPTIBILITY *SALMONELLA* TYPHI IN AN ONGOING OUTBREAK FROM HARARE, ZIMBABWE

**Olaru I.D.[1,2], Feasey N.[3,4], Ferrand R.[1,2], Mabey D.[2], Hopkins H.[2], Zinyowera S.[5], Amos B.[6], Tarupiwa A.[5], Mashe T.[5], Kranzer K.[1,2]**
[1]Biomedical Research and Training Institute, Harare, Zimbabwe;
[2]Clinical Research Dept., London School of Hygiene and Tropical Medicine, London;
[3]Dept. of Clinical Sciences, Liverpool School of Tropical medicine, Liverpool, UK;
[4]Malawi Liverpool Wellcome Trust Clinical Research Programme, Blantyre, Malawi;
[5]National Microbiology Reference Laboratory, Harare, Zimbabwe;
[6]Amani, Swanpool, Falmouth, Cornwall, UK

**Introduction:** *Salmonella enterica* serovar Typhi (*S.* Typhi) is a major cause of blood stream infections throughout Asia and Africa. In sub-Sarahan Africa the multi-drug resistant H58-haplotype (genotype 4.3.1) has recently emerged, making ceftriaxone and ciprofloxacin essential agents in the management of typhoid fever.
**Aim:** We present blood culture data from outpatients recruited in Harare, Zimbabwe as part of a multi-centre study investigating the causes of febrile illness.
**Methods:** We recruited febrile adults and children presenting to an outpatient clinic in an area of Harare experiencing a typhoid fever outbreak since 2017. Blood was taken for automated culture using aseptic technique, filling one blood culture bottle per patient (BacT/ALERT, Biomerieux). Isolates were identified using biochemical tests (API 20E, Biomerieux) and confirmed by serotyping at the National Microbiology Reference Laboratory. Drug susceptibility testing (DST) was performed by disc-diffusion for ampicillin, chloramphenicol, co-trimoxazole, ceftriaxone using EUCAST breakpoints. Pefloxacin discs were used to screen for fluoroquinolone resistance. E-Test were used to determine minimum inhibitory concentrations (MICs) for azithromycin and ciprofloxacin. Multidrug resistance (MDR) was defined as resistance to ampicillin, chloramphenicol and co-trimoxazole.
**Results:** 43/229 (19%) blood cultures were positive for *S.* Typhi, 25/111 [23%] from children aged <15 years and 18/118 [15%] from individuals ≥15 years. 38/43 (88%) isolates were MDR and 36 were pefloxacin resistant. Ciprofloxacin MICs were available for 38 isolates, of which 6 were susceptible and 33 had MICs between 0.06 and 0.75 µg/mL and were thus of intermediate susceptibility and reported resistant in line with EUCAST guidelines. There was complete concordance between resistance determined using pefloxacin discs and ciprofloxacin MICs. All isolates were susceptible to ceftriaxone and azithromycin, which were used to treat these patients.
**Conclusion:** A very high culture positivity rate for *S.* Typhi was recorded in these patients, especially in children. Additionally, most of the isolates were both MDR and ciprofloxacin-resistant, which is typically the case for *S.* Typhi in Asia, but is an emerging problem in Africa. Increased availability of azithromycin, investment in infrastructure to ensure safe water and better diagnostic capacity are paramount to control the current and prevent future outbreaks.

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## NOVEL POINT-OF-CARE RAPID DIAGNOSTIC TESTS FOR INDICATING CLINICAL STATUS IN VISCERAL LEISHMANIASIS AND CHAGAS DISEASE

**Bhattacharyya T.[1], Singh O.P.[2], Cardinal V.[3], Sundar S.[2], El-Safi S.[4], Bern C.[5], Murphy N.[1], Mollett G.[1], Mertens P.[6], Miles M.A.[1]**
[1]*Faculty of Infectious and Tropical Diseases, London School of Hygiene & Tropical Medicine, London, UK;*
[2]*Institute of Medical Sciences, Banaras Hindu University, Varanasi, India;*
[3]*Facultad de Ciencias Exactas y Naturales, Laboratory of Eco-Epidemiology, Universidad de Buenos Aires, Argentina;*
[4]*Faculty of Medicine, University of Khartoum, Khartoum, Sudan;*
[5]*Dept. of Epidemiology and Biostatistics, School of Medicine, University of California, San Francisco, USA;*
[6]*Coris BioConcept, Gembloux, Belgium*

**Introduction:** Visceral leishmaniasis (VL) and Chagas disease are neglected tropical diseases (NTDs) that are responsible for major public health problems. Point-of-care (POC) rapid diagnostic tests (RDTs) are lacking for assessing cure versus relapse in VL, and for determining *Trypanosoma cruzi* infecting lineage in Chagas disease.
**Aims:** To develop an RDT for monitoring VL treatment outcome, and an RDT for *T. cruzi* TcII/V/VI lineage-specific serology.
**Methods:** We applied a novel combination of serology, using rK39 antigen and IgG1 detection by ELISA and RDTs, to paired pre-and post-treatment sera from Indian VL patients. We produced an RDT (Chagas Sero K-SeT) incorporating a synthetic peptide representing the *T. cruzi* TcII/V/VI–shared specific epitope (TSSApep-II/V/VI) to detect *T. cruzi* lineage-specific infections in humans and mammalian reservoir hosts.
**Results:** VL: in combination with rK39 antigen IgG1 provided greater discrimination than IgG between pre-treatment and paired cured 6-month samples, and between cured and relapsed samples (p <0.0001 for either comparison). The Chagas Sero K-SeT was at least as sensitive as ELISA; severity of chagasic cardiomyopathy among Bolivian chagasic patient groups was significantly associated with TcII/V/VI seropositivity (*p* = 0.007).
**Conclusion:** This is the first demonstration of an association between reaction to a specific *T. cruzi* antigen and severity of chagasic symptoms, and encourages development of a full range of lineage-specific serology to investigate clinical associations and ecological distributions. We have provided further evidence of the use of IgG1 as a potential biomarker for monitoring VL treatment outcome, now being validated in eastern Africa.

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### OPTIMIZING STRATEGIES TO DIAGNOSE INTESTINAL SCHISTO-SOMIASIS IN MINAS GERAIS STATE, BRAZIL

**Phillips A.E.[1], Viana A.G.[2], Gazzinelli-Guimarães P.H.[3], Fujiwara R.T.[2]**
[1]*Dept. of Infectious Disease Epidemiology, Imperial College London, London Centre for Neglected Tropical Disease Research (LCNTDR), London, UK;*
[2]*Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil;*
[3]*Laboratory of Parasitic Diseases, National Institute of Allergy and Infectious Diseases, NIH, USA*

**Introduction:** Schistosomiasis control through mass treatment with Praziquantel is progressing rapidly, and elimination has recently been included on the agenda by the WHO in certain areas. For design of effective control programs, it is important to determine an accurate estimate of infection in a program area. Current diagnostic Methods (detection of eggs in stool by Kato-Katz) are limited and may be particularly unreliable at low infection intensities, as would be expected after several rounds of treatment or where transmission is low. Point-of-Care Circulating Cathodic Antigen

(POC-CCA) detection in urine has been documented to be a sensitive and specific alternative to Kato-Katz through direct comparisons, however, data comparing multiple days of microscopy and antigen detection tests in low prevalence settings is currently lacking.
**Aim:** To compare the performance of POC-CCA with Kato-Katz in a low endemic area and in a moderate endemic area in Brazil. The study also enhances knowledge of the spatial distribution of schistosomiasis in Brazil that will assist planning of the preventive chemotherapy strategy for the national schistosomiasis control programme.
**Methods:** Samples were obtained from school-aged children in two different populations in Brazil: Januária, located in Minas Gerais, considered to be a region of low endemicity; and Malhador, in the state of Sergipe, considered to be moderately endemic. Samples were obtained from individuals who were diagnosed as having schistosomiasis by three days of duplicate Kato-Katz test and one urine POC-CCA diagnosis.
**Conclusion:** Overall, the present data support previous work showing that the rapid urine dipstick POC-CCA test is sensitive for the diagnosis of intestinal schistosomiasis and offers a practical alternative to microscopic assessment of multiple faecal samples. However, we also discovered significant variation in the sensitivity of the POC-CCA tests between batches, leading to an erroneous interpretation of the rapid test. There is an urgent need to quality control different batches. Furthermore, three days of duplicate Kato-Katz is highly sensitive even in low prevalence settings. The Results of this study will contribute to the literature as increasingly POC-CCA is being recognised as a mapping tool and therefore WHO guidelines need to be developed, particularly as many countries can realistically transition to achieving elimination.

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### IMPACT OF THE GUT MICROBIOTA ON ROTAVIRUS VACCINE RESPONSE IN INDIAN, AFRICAN AND EUROPEAN INFANTS: A PROSPECTIVE COHORT STUDY

**Bronowski C.[1], Parker E.P.K.[2,3], Sindhu K.N.C.[4], Praharaj I.[4], Babji S.[4], Chinyama E.[5], Darby A.C.[2], Grassly N.[2], Kang G.[4], Iturriza-Gómara M.[1] on behalf of the RoVI Consortium**
[1]*University of Liverpool, Liverpool;*
[2]*London School of Hygiene and Tropical Medicine;*
[3]*Imperial College London, London, UK;*
[4]*Christian Medical College, Vellore, India;*
[5]*Malawi-Liverpool-Wellcome Trust Clinical Research Centre, Blantyre, Malawi*

**Introduction:** Current rotavirus vaccines are less immunogenic in low- and middle-income countries compared with high-income countries, limiting their potential benefits. The development of the infant microbiome has been hypothesised to contribute to this phenomenon. However, previous studies have failed to identify reproducible signatures of vaccine failure.
**Aim:** We performed a multi-centre prospective cohort study to examine the association between bacterial microbiota development and rotavirus vaccine response.
**Methods:** We enrolled 318 infants in India, 112 in Malawi and 82 in the UK. Rotarix was administered according to the routine immunisation schedule in each country. Microbiota development was assessed by sequencing the V3–V4 region of the 16S rRNA gene in samples collected at 1 and 4 weeks of age, and before each vaccine dose (4 samples per infant). Rotarix immunogenicity was determined by measuring rotavirus-specific IgA pre- and post-vaccination, and rotavirus shedding was measured 1 week after each dose. At each site, we compared microbiota diversity and taxonomic composition according to seroconversion and shedding status.

**Results:** Based on preliminary analyses, we observed seroconversion rates of 28%, 23% and 53% in India, Malawi and the UK, respectively. Microbiota composition did not differ significantly according to rotavirus vaccine response based on taxon abundances. However, non-responders in India had significantly higher microbiota richness in early life (p = 0.010 in linear mixed-effects models).

**Conclusion:** Specific bacterial taxa do not appear to drive within-population differences in rotavirus vaccine response. However, overall microbial exposure may be higher in infants who fail to respond to vaccination.

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### SYSTEMATIC REVIEW AND META-ANALYSIS OF VACCINE EFFICACY AND EFFECTIVENESS AMONG HIV–INFECTED, HIV-EXPOSED UNINFECTED AND HIV-UNINFECTED CHILDREN

**Adetokunboh O.O.[1,2], Ndwandwe D.[1], Awotiwon A.[3], Uthman O.A.[1,2,4], Wiysonge C.S.[1,2,5]**
[1]Cochrane South Africa, South African Medical Research Council;
[2]Division of Epidemiology and Biostatistics, Dept. of Global Health, Stellenbosch University;
[3]Knowledge Translation Unit, University of Cape Town Lung Institute, Cape Town, South Africa;
[4]Warwick Medical School - Population Evidence and Technologies, University of Warwick, Coventry, UK;
[5]Division of Epidemiology and Biostatistics, School of Public Health and Family Medicine, University of Cape Town, Cape Town, South Africa

**Introduction:** The use of vaccines against various vaccine-preventable diseases is beneficial and an effective measure for protecting different age groups. Evidence-based approaches were used in making recommendations for vaccination against vaccine-preventable diseases for immunocompromised individuals but with limited substantiation.

**Aim:** This study investigated the efficacy and effectiveness of vaccines in HIV-infected and HIV-exposed children in comparison to HIV unexposed children.

**Methods:** We included randomised-controlled trials (RCT), cohort and case-control studies that included efficacy or effectiveness of vaccines in HIV-infected in comparison with HIV-exposed or HIV-uninfected children aged ≤ 18 years. The intervention group included those with standard vaccines or dosages while the comparison groups comprised of placebo, non-vaccinated groups, groups that were vaccinated with other control vaccines or other dosages among HIV-infected and HIV-exposed children. For case-control studies, cases were HIV-infected while controls were HIV-exposed uninfected and HIV-uninfected children.

**Results:** Vaccine efficacy of 9-valent pneumococcal conjugate vaccine (PCV9) in preventing first episodes of invasive pneumococcal disease was 53% among HIV-infected children and 42% among HIV-uninfected children. Efficacy of PCV9 against total vaccine serotype invasive pneumococcal disease was 32% in HIV-infected children and 78% among HIV-uninfected children. Vaccine effectiveness of Bacillus Calmette–Guérin vaccine in preventing tuberculosis in HIV-infected children was zero compared to 59% protection in HIV-unexposed children. Likewise, HIV-uninfected children have better protection against invasive *Haemophilis influenzae* type b (Hib) disease than the HIV-infected children. Effectiveness studies of rotavirus vaccines show that HIV-exposed uninfected children have similar protection against rotavirus gastroenteritis compared to the non-exposed children. Children who are severely immunosuppressed are poorly protected against invasive pneumococcal diseases.

**Conclusion:** Efficacy and effectiveness studies on vaccination exhibit possibilities for direct and indirect protection against various vaccine-preventable diseases among HIV-infected and HIV-exposed children. HIV-infected children tend to have less protection against vaccine-preventable diseases when compared to unexposed children. HIV-infected children who are immunocompetent are more likely to have better vaccine protection against vaccine-preventable diseases than the immunosuppressed ones. This study reveals that only a few vaccine-efficacy and effectiveness studies have been done in HIV-infected and exposed children previously.

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### FACTORS ASSOCIATED WITH THE NON-COMPLETENESS OF THE IMMUNIZATION SCHEDULE IN CHILDREN AGED 12 TO 23 MONTHS IN THE HEALTH ZONE OF BINZA OZONE, 2016

**Bile F., Mvumbi G., Okitolonda V., Babakazo P.**
*Kinshasa School of Public Health, Kinshasa, Congo*

**Introduction:** Vaccination has been shown to be the most effective way to fight the disease of all times. Non-compliance with the child immunization schedule is a serious problem in the city of Kinshasa in general, and in the health zone of Binza Ozone in particular. Several factors could be at the origin of this phenomenon. The objective of this study was to identify factors related to the non-completeness of the immunization schedule in the health zone.

**Methodology of the Study:** An analytical cross-sectional study was conducted in the health zone of Binza Ozone from January to December 2016. We interviewed 370 mothers / caregivers of children aged 12 to 23 months to obtain information on children's immunization status and reasons for non-compliance. -completeness of their vaccination schedule. The collected data were entered on the EPI Data 3.1 software and then analyzed on the SPSS version 21 software. The association between the state of non-completeness of the vaccination calendar on the one hand and the qualitative explanatory variables on the other hand was established by the Chi-square test of independence; the strength of the association was estimated by the calculation of the odds ratio and its confidence interval.

**Results:** Out of 370 children included in the study, 240 completed their immunization schedule, or 64.9%. Vaccine coverage was low for all antigens. The analyzes found that mothers' lack of knowledge of the vaccination schedule (p = 0.021), long waiting times (p = 0.012), low maternal education (p = 0.046) and low socio-economic level of the household (p = 0.010) are significantly associated with the non-completeness of children's immunization schedule.

**Conclusion:** In 2016, vaccine coverage in Binza Ozone Health Zone was below targets for all antigens. Communication with parents on immunization of children, reorganization of immunization services and staff training are ways to improve the completeness of the immunization schedule.

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### USE OF TWO ANTIVENOMS FOR SNAKEBITE ENVENOMING IN AGOK, SOUTH SUDAN

**Alcoba G.[1,6], Said M.[2], Mwongera C.[2], Baba S.P.[3], Lako R.L.[4], Kuch U.[5], Chappuis F.[6], Rusch B.[1], Ciglenecki I.[1], Coldiron M.[7]**
[1]Medical and Operations Dept., MSF (Médecins Sans Frontières/ Doctors Without Borders), Geneva, Switzerland;
[2]Agok Project, Médecins Sans Frontières, Agok;
[3]Dept. Community Health and Special Programs, Ministry of Health, Juba;

[4]Dir. Policy, Planning, Budget, and Research, Ministry of Health, Juba, South Sudan;

[5]Dept. of Tropical Medicine and Public Health, Goethe University, Frankfurt, Germany;

[6]Division of Tropical and Humanitarian Medicine, Geneva University Hospitals, Geneva, Switzerland;

[7]Epicentre, Médecins Sans Frontières, Paris, France

**Introduction:** Snakebite envenoming is the deadliest neglected tropical disease globally, with 5 million cases and 81,000-138,000 yearly deaths. Agok Hospital, South Sudan, where Médecins Sans Frontières (MSF) supports the Ministry of Health, reported 341 snakebites in 2018. A new treatment algorithm was introduced in 2017, using two antivenoms: Echitab-Plus for cytotoxic and haemotoxic envenoming (vipers, spitting cobras), and SAIMR-Polyvalent for neurotoxic envenoming (cobras, mambas).

**Aim:** To describe clinical symptoms, outcomes, and adverse reactions due to the antivenoms.

**Methods:** We performed a prospective observational study of snakebite patients, with clinical evaluations at admission, 6h, 24h, hospital discharge, and 28d. Patients identified snakes using a photo album and bite wounds were swabbed for snake DNA. Ethical approval was given by South Sudan and MSF ERBs.

**Results:** We describe 151 patients admitted 14 March-August 2018, of whom 46 (31.3%) were <15 years and 84 (55.9%) were male; most were students or farmers. Median travel time and distance to hospital was 2h (IQR 1-3), and 5 km (IQR 1-50); 100 (86.2%) arrived <6h of being bitten. Most bites (82; 55.8%) occurred between 18h00-23h59, occurring most commonly at home (69; 47.3%). Patients identified puff adders (*Bitis arietans*, 56.4%), spitting cobras (*Naja nigricollis,* 12.8%) and carpet vipers (*Echis pyramidum,* 7.7%); PCR analysis is pending. Thirty-three (22.3%) received traditional treatments. Patients requiring antivenom (56/146, 38.4%) presented with cytotoxic or cytotoxic-haemotoxic syndromes (including 25 bleeding, 15 with necrosis). Median extent of swelling was 9 cm (IQR 5-35). Two patients had continued bleeding at 6h that resolved at 24h. 20 minute-clotting test was abnormal in 5.2% (5/95). Patients received 1-4 "treatments" of 3 vials; among the 84 Echitab-Plus treatments, no anaphylaxis or respiratory symptoms were described; 6.1% had itching/urticaria. 3 patients had probable/definite serum sickness at 28d. No adverse events occurred after a single treatment of SAIMR. No patient died.

**Conclusion:** This group of patients is younger than others described in sub-Saharan Africa. Mortality was zero, likely due improved access to care and antivenoms. Unfortunately, pan-African polyvalent antivenoms are not yet available nor affordable in most places in Africa, contributing to snakebite's high burden. MSF welcomes WHO's Snakebite Roadmap.

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### SNAKE-BYTE: FIRST NATIONAL EPIDEMIOLOGICAL STUDY ON SNAKEBITE SHOWS HIGH ANNUAL INCIDENCES IN NEPAL AND CAMEROON

**Alcoba G.[1,2,3], Ochoa C.[2,4], Sharma S.K.[5], Nkwescheu A.S.[6], Wanda F.[7], Babo Martins S.[2], Ruiz de Castañeda R.[2], Bolon I.[2], Ray N.[2,4], Chappuis F.[1,2] , the Snake-Byte consortium∗**

[1]Division of Tropical and Humanitarian Medicine, Geneva University Hospitals (HUG);

[2]Institute of Global Health, Faculty of Medicine, University of Geneva (UNIGE);

[3]Medical Dept., Médecins sans Frontières;

[4]Institute for Environmental Sciences, University of Geneva (UNIGE), Geneva, Switzerland;

[5]Internal medicine Dept., BP Koirala Institute of Health Sciences (BPKIHS), Dharan, Nepal;

[6]Cameroon Society of Epidemiology (CaSE);

[7]Centre International de Recherche, Enseignement, et Soins (CIRES);

The Snake-Byte consortium (François Chappuis, Nicolas Ray, Sanjib Kumar Sharma, Armand Nkwescheu, Franck Wanda, Gabriel Alcoba, Carlos Ochoa, Sara Babo Martins, Rafael Ruiz de Castañeda, Isabelle Bolon, Pratibha Bhetwal, Manish Subedi, Bhupendra Shah, Anup Ghimire, Eric Comte, Ulrich Kuch)

**Introduction:** Snakebite envenoming affects 4.5-5.4 million people and kills 81,000-138,000 victims yearly according to the World Health Organization (WHO), but estimates are extrapolations, and community-based country-wide studies are very scarce.

**Aim:** To measure the impact of snakebite on human and animal health (incidence, mortality, disability) and livelihoods in Cameroon and Nepal.

**Methods:** This epidemiological study is part of the SNAKE-BYTE project that aims at understanding the impact of snakebite in Cameroon and Nepal through one-health, health economy, and epidemiology using digital epidemiology and geo-health tools (Kobo-collect®, Stata® qGIS®, Guru-Maps®, AccesMod®). Based on minimal expected snakebite incidence of 100/100,000/year, 0.05% confidence limit, design effect of 2.0, 99% confidence level, 15% non-response margin, sample size was 61,000 people per country, i.e. 11,700 households in Cameroon and 13,800 in Nepal (respectively 5.2 and 4.4 persons per household). Households were preselected from satellite images, among 500 (2x250) randomly preselected administrative areas, where six mobile survey teams conducted the e-questionnaires. After ethical approval by Cameroonian, Nepalese, and Swiss authorities, surveys started in November 2018.

**Results:** Interim data analysis on 5045 households in Cameroon and 10,163 in Nepal, showed respectively 120 victims per 29,537 persons-year and 141 victims per 46,888 persons-year. National snakebite incidence rates per 100,000 persons-year translate to 406.3 (95%CI: 338.3, 484.0) or 65,008 victims in rural Cameroon (population 16 million), and 300.7 (95%CI: 254.1, 353.5) or 39,993 victims in Nepal's Terai lowlands (population 13.3 million). Victims were young adults (median 30/31y), often farmers, predominantly males in Cameroon (54.5%) and females in Nepal (66.4%), and 22.5% were children <15y. Snakes were seen by victims in 66%-71.2% cases, indoors or outdoors. Snakebite case-fatality ratios were high: 5.8% (n=7/120) in Cameroon, and 6.6% (n=9/141) in Nepal. About 10% received some injections, likely antivenom. Only 46.0% and 50.4% were taken to medical facilities. Multivariate analysis will model "hotspots" including demographic, clinical, ecological and socioeconomic variables, and animals lost.

**Conclusion:** This first country-wide community-based study shows very high annual snakebite incidence and mortality in rural Cameroon and Nepal. It should help health authorities to estimate antivenom needs by geographical area.

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### FAILURE OF MEXICAN ANTIVENOM TO IMPROVE CORRECTION OF COAGULOPATHY IN CROTALINAE ENVENOMATIONS IN FRENCH GUIANA

**Heckmann X.[1], Lambert V.[2], Mion G.[3], Marty C.[4], Perotti F.[5], Carod J.F.[6], Jolivet A.[7], Boels D.[8], Lehida Andi I.[9], Larréché S.[10]**

[1]Emergency Dept., Western Guiana Hospital;

[2]Dept. of Obstetrics and Gynaecology, Western Guiana Hospital, Saint-Laurent-du-Maroni, French Guiana;

[3]Dept. of Anaesthesiology, Cochin Hospital, Paris, France;

[4]French Red Cross, Cayenne, French Guiana;

[5]*Pharmacy;*
[6]*Medical Biology Dept.;*
[7]*Dept. of Public Health, Western Guiana Hospital, Saint-Laurent-du-Maroni, French Guiana;*
[8]*Dept. of Clinical Pharmacology and Toxicology, Nantes University Hospital, Nantes, France;*
[9]*Dept. of Anaesthesiology and Intensive Care, Western Guiana Hospital, Saint-Laurent-du-Maroni, French Guiana;*
[10]*Dept. of Medical Biology Dept., Bégin Military Teaching Hospital, Saint-Mandé, France*

**Introduction:** In French Guiana most of the snakebites are caused by Crotalinae, leading to local necrosis, bleeding and acute kidney injury. Since December 2014 the Western Guiana Hospital (WGH) uses *Antivipmyn Tri*[TM], a Mexican polyvalent antivenom developed against *Bothrops*, *Lachesis* and *Crotalus* venoms.

**Aim:** The aim of the study was to assess the benefit of *Antivipmyn Tri*[TM] on the correction of hemostasis parameters and the frequency of envenoming complications.

**Methods:** This retrospective study recruited patients hospitalized at the WGH during 2013-2017 with a snakebite and: a prothrombin rate (PR) lower than 45%, an activated partial thromboplastin time (aPTT) ratio upper than 2 or a fibrinogenemia lower than 1 g/L. Patients who received *Antivipmyn Tri*[TM] from December 2014 to September 2017 were defined as the antivenom group. Patients who were admitted between January 2013 and November 2014 when no antivenom was ever available or between December 2014 and September 2017 during periods of antivenom shortage were defined as the control group. Graphical charts describing the time courses of PR, aPTT ratio and fibrinogenemia were constructed for each group and compared. Other endpoints were the length of hospital stay and the need for surgery or dialysis.

**Results:** 84 patients were included: 42 in the antivenom group, 42 in the control group. Both groups were similar in terms of age, sex-ratio, proportion of bleedings, necrosis and severity. All patients in antivenom group received three vials at least. Hemostasis dynamics didn't differ significantly between antivenom and control groups: PR and aPTT time courses were superimposable. Fibrinogenemia recovery was faster beyond the 30th hour after bite in antivenom group but the time needed to reach an efficient level of 1 g/L was not different between both groups. There were no significant differences in the other endpoints.

**Conclusion:** *Antivipmyn Tri*[TM] – as currently used – didn't show any benefit on recovery for the studied criteria. Immunotherapy is certainly part of the solution but further studies are needed in French Guiana, either with a higher dosage or with another product.

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### SNAKEBITES ENVENOMATION IN THE BRAZILIAN AMAZON: A COST OF ILLNESS

**Samara F.V.M.**[1]**, Henry M.P.**[1,2]**, Jacqueline S.**[3,4]**, Sâmella S.O.**[3,4]**, Alves E.C.**[3,5]**, Ibiapina H.N.S.**[3,4]**, Wuelton M.M.**[3,4]**, Maria R.F.O.**[1,2]
[1]*Núcleo de Medicina Tropical [Tropical Medicine Center], Universidade de Brasília (UnB), Brasília;*
[2]*National Institute for Science and Technology for Health Technology Assessment (IATS/CNPq), Porto Alegre;*
[3]*Fundação de Medicina Tropical Dr. Heitor Vieira Dourado (FMT-HVD);*
[4]*Universidade do Estado do Amazonas (UEA);*
[5]*Universidade Nilton Lins, Manaus, Brazil*

**Introduction:** Snakebite envenomation in the Brazilian Amazon is a recognized public health problem that receives no appropriate attention from stakeholders. The morbidity rate is relevant, but it is until underestimated. A study of cost analysis that will enable better understanding of its economic impact and contribute to the management and prevention of snakebites.

**Aim:** This study aimed to estimate the cost of snakebite envenomation a nd economic impact of snakebites on population in the Brazilian Amazon, for year of 2015.

**Methods:** We conducted a cost of illness study of snakebites in the Brazilian Amazon, in 2015, based on official surveillance data to estimate burden, from a societal, patient and public health system perspective. Direct medical costs were estimated through the top-down approach.

**Results:** The study included 11,503 cases and 56 deaths. The estimated costs from Health System perspective were US$ 1.199.013,11. The estimated costs of premature death due to snakebites were US$ 3.031.300,38. The costs related to the loss of productivity related in absence from work were US$ 1.539.518,62. Thus, the total cost of envenomation by snakebites in Brazilian Amazon was estimated to be more of US$ 6 million in 2015.

**Conclusion:** The economic burden of snakebites in Brazilian amazon is notably high, also arise for individual victims, their families and communities. Snakebites cause loss of productivity by inpatient treatment or deaths. This study provide a useful basis for developing improvements to snakebite management in Brazil and others countries by stakeholders for reduce number of cases and sequelae must be a priority especially for vulnerable populations, like rural workers that have most at risk.

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### NOMA PREVALENCE STUDY, NORTHWEST NIGERIA 2018

**Farley E.**[1,2]**, Modupe O.J.**[1]**, Schuurmans J.**[1]**, Saleh F.**[3]**, Ihekweazu C.**[3]**, Lenglet A.**[4,5] **on behalf of the Noma Prevalence Working Group**
[1]*Médecins Sans Frontières, Sokoto, Nigeria;*
[2]*Dept. of Public Health Medicine, University of Cape Town, Cape Town, South Africa;*
[3]*Nigerian Centre Disease Control, Abuja, Nigeria;*
[4]*Médecins Sans Frontières, Amsterdam;*
[5]*Dept. of Medical Microbiology, Radboud University Medical Center, The Netherlands*

**Introduction:** Noma (Cancrum Oris), a rapidly progressing oral cavity infection, associated with a reported 90% mortality rate, mainly affecting children, is frequently reported in northern Nigeria but the true disease burden is unknown.

**Aim:** We aimed to estimate the prevalence of all stages of noma in Sokoto and Kebbi states, Nigeria.

**Methods:** From Sept-Nov 2018, we conducted a prevalence survey using two stage cluster random sampling proportional to population size; using village geosampling through satellite imagery. We included 177 clusters and 3499 households, and sampled all persons <15 years (with household head consent and assent from children aged 7-15 years). We conducted mid-upper-arm-circumference (MUAC) in children <5 years and oral screening for all children. Caretakers answered survey questions. World Health Organisation classification of noma was used:S0:simple gingivitis;S1:necrotizing gingivitis;S2:oedema;S3:necrosis; S4:healing;S5:sequela. We conducted an unweighted analysis of noma prevalence in the study sample and severe and moderate acute malnutrition (SAM-MUAC <115mm; MAM-MUAC 115-125mm) in children ≤5 years with 95% confidence intervals(CI). Through further analysis of

this survey dataset, we aim to estimate risk factors using univariate and multivariate logistic regression.

**Results:** Most caretakers were female (n=3423;97.8%), median age was 30 years(IQR 25,35). Of the 7120 children included, 4268(59.9%) were 0-5 years. We identified S0 noma in 181 children(2.5%;CI 2.1%,3.1%); S1 in 10 children(0.1%;CI0.1%,0.3%) and S2 in 3 children(0.04%;CI0.01%,0.1%). No stage 3-5 was detected. Prevalence was higher in children aged 6-15 years (4.5%; CI 3.7,5.5%),compared to 0-5 year olds(1.5%;CI1.1, 1.9%;p<0.001). Households with a noma case had older caretakers (median 31.5 years;IQR 28,38) than those with no noma case(median 30 years;IQR 25, 35;p=0.006). Prevalence of SAM was 3.5%(CI 2.9, 4.1%) and MAM 7.3% (CI 6.4, 8.3%). There were no differences in prevalence, SAM or MAM between Sokoto and Kebbi states.

**Conclusion:** Many cases of precursor stages of noma (S0-1) were identified, particularly in children >5 years. The absence of stages 3-5 in the survey requires further investigation as it may be due to high mortality or low prevalence. These findings need to be taken into consideration for program planning. Additional prevalence surveys for noma are required to better map the burden of this disease.

**Acknowledgements:** We would like to thank the noma prevalence working group- Karla Bil, Bukola Oluyide, Adolphe Fotso, Mohana Amirtharajah, Jorieke Vynke, Raphael Brechard, Gloria Uzoigwe, Adeniyi Semiyu Adetunji, Koert Rietmeijer, Saskia van der Kam, Denise Baratti-Mayer, Ushma Mehta, Shafiu Isah. We would also like to thank all the caretakers and children who agreed to be a part of this study, the staff at the Nigerian MSF Mission and the Noma Children's Hospital for assistance in running this project and the volunteers of the Missing Maps project for assisting in identifying the villages on satellite imagery which were used for the random geosampling. We would also like to thank the Sokoto and Kebbi Ministry's of Health and the Usmanu Danfodiyo University Teaching Hospital for providing guidance on the project and ensuring the highest ethical standards were maintained during the study.

**Ethics:** The MSF Ethics Review Board (1848- Appendix 1), Usman Danfodiyo University Teaching Hospital Health Research and Ethics Committee in Nigeria (UDUTH/HREC/ 2018/No.729) and the Ministry of Health in both Sokoto (SKHREC/070/018) and Kebbi (MOH/KSREC/VOL.I/56) states approved the study protocol. Informed consent and assent were obtained.

**Conflicts of interest:** The authors declare there are no conflicts of interests.

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### ESTIMATION OF INCIDENCE RISK OF MORTALITY AND SERIOUS ADVERSE EVENTS FOR ANTILEISHMANIAL THERAPIES: AN INFECTIOUS DISEASES DATA OBSERVATORY SYSTEMATIC REVIEW OF PUBLISHED LITERATURE FROM 1980 TO 2018

**Singh S.**[1,2]**, Dahal P.**[1,2]**, Ngu R.**[1,2]**, Maguire B.**[1,2]**, Olliaro P.L.**[1,2]**, Stepniewska K.**[1,2]**, Guérin P.J.**[1,2]

[1]*Infectious Diseases Data observatory;*
[2]*Centre for Tropical Medicine and Global Health, University of Oxford, Oxford, UK*

**Introduction:** Despite historically been associated with poor tolerability, the safety of antileishmanial chemotherapies has not been well characterised and reported.

**Aim:** To estimate the incidence risk of mortality and serious adverse events in patients treated with antileishmanial therapies within 30 days of commencing therapy.

**Methods:** We conducted a systematic review to identify clinical trials of therapies for visceral leishmaniasis from 1980 to 2018 by searching four databases: clinicaltrials.gov, WHO International Clinical Trials Registry Platform (ICTRP), the Cochrane Library, and PubMed. We estimated the incidence rate of death occurring in the first 30 days from starting treatment for each of the study arms with confidence interval estimated using exact Poisson counts. Estimates were combined using a random effects meta-analysis of single incidence rates after applying continuity corrections to handle structural zeros. The pooled incidence rate was expressed per 1,000 person-days.

**Results:** We identified 152 published studies (1980 to 2018) which enrolled 28,593 patients in 339 treatment arms. Amphotericin B formulations were administered in 147 (43.4%) arms (10,544 patients), pentavalent antimonial in 73 (21.5%, 7,054 patients), and combination therapies in 35 (10.3%, 2,609 patients). A total of 382 deaths were reported in publications during treatment and follow-up, of which 212 (55.5%) were clearly described as occurring during the first 30 day of starting treatment. The overall expected incidence rate of death regardless of antileishmanial drug administered was estimated as 0.685 [95% CI: 0.577 - 0.813] per 1,000 person days. This was 2-fold higher in study arms which enrolled HIV patients: 1.308 [95% CI: 0.678- 2.523] from 14 arms compared to 0.659 [95% CI: 0.552 - 0.787] from 290 arms which excluded (or did not describe) HIV patients. The incidence rates stratified by drugs were comparable between treatment arms.

**Conclusion:** This comprehensive systematic review allows to estimate the incidence risk of mortality in VL patients treated with a range of therapies, and can serve as baseline against which mortality data from prospective studies can be compared.

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### TELEMENTORING WITH PROJECT ECHO, A PILOT PROJECT IN MYANMAR

**Tun N.N.**[1,3]**, Noe T.M.**[1]**, Lee C.**[2]**, Lee A.**[2]**, Hilmers D.C.**[2]**, Wilkins E.**[1]**, Smithuis F.M.**[1,3]

[1]*Medical Action Myanmar;*
[2]*Hepatitis B Free, Sydney, Australia;*
[3]*Myanmar Oxford Clinical Research Unit, Myanmar*

**Introduction:** An estimated 185 million people are infected with hepatitis C virus (HCV) worldwide and most of them are unaware of it [1]. In Myanmar, the prevalence of HCV infection is estimated at 2.7% [2] (approximately 1.4 million people) and accounts for 25% of hepatocellular carcinoma. As with HIV, the prevalence is concentrated among people who inject drugs and to a lesser extend among men who have sex with men and female sex workers. The high stigma for these key affected populations and the lack of adequate treatment for hepatitis C result in high transmission, late presentation and high mortality. Medical Action Myanmar (MAM) is a non-profit, medical organization, supporting 10 primary health care clinics with integrated HIV treatment targeting key affected populations who are reluctant to access the public health HIV services. Given the high degree of HIV/HCV co-infection, and the challenge to reach "hidden" at risk populations in Myanmar, MAM decided to offer HCV treatment at its clinics with the adoption of the Extension of Community Healthcare Outcomes (ECHO) project model [3]. ECHO is an educational intervention to transfer subspecialty knowledge about hepatitis C to primary care providers.

**Aim:** To improve access to hepatitis C treatment for HIV/HCV co-infected people at primary care settings.

**Methods:** Five general practitioners who routinely manage treatment of HIV patients were trained by a team of hepatitis experts (2 face to face trainings and regular discussions by email and skype conference calls). The doctors assessed 85 co-infected patients and proposed 72 patients for treatment with sofosbuvir and daclatasvir to the expert team. All patients were agreed to get treatment by the expert team.

**Results:** A total of 72 HIV-HCV co-infected patients were started on treatment and 48 patients completed the treatment. Among 48, 42

patients got virologically cured (87.5%) 4 patients failed treatment,1 patient died and 1 patient lost to follow. 24 patients are still under care.

**Conclusion:** This pilot project highlighted that the ECHO model is feasible and successful in Myanmar using community based primary health care doctors with the high cure rate to improve the access to hepatitis C treatment.

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### COST-EFFECTIVENESS OF DIFFERENT STRATEGIES OF STRONGY-LOIDES STERCORALIS SCREENING AND TREATMENT AMONG MIGRANTS FROM ENDEMIC COUNTRIES TO THE EUROPEAN UNION

**Wikman-Jorgensen P.**[1,2], **Shedrawy J.**[3], **Llenas-García J.**[4,2], **Gascon J.**[5], **Bisoffi Z.**[6], **Muñoz J.**[5], **Requena-Méndez A.**[5]

[1]*Internal Medicine Dept., Hospital Universitario San Juan de Alicante, San Juan de Alicante;*
[2]*Foundation for the Promotion of Health and Biomedical Research of Valencia Region (FISABIO), Spain;*
[3]*Dept. of Public Health Sciences, Karolisnka Institutet, Sweden;*
[4]*Internal Medicine Dept., Hospital Universitario Vega Baja. San Bartolomé, Alicante;*
[5]*Barcelona Institute for Global Health (ISGlobal, Hospital Clínic – Universitat de Barcelona), Spain;*
[6]*Centre for Tropical Diseases, Sacro Cuore Hospital, Negrar, Italy*

**Introduction:** Strongyloidiasis is a helminthiasis potentially severe in immunosuppressed patients. It is unclear which is the best strategy to deal with imported strongyloidiasis in migrants.

**Aim:** We aimed to evaluate the cost-effectiveness of six different screening and treatment strategies compared to the present base case scenario with no specific program in place.

**Methods:** We developed a stochastic compartmental Markov chain model. The target population were adult migrants from strongyloidiasis endemic countries to the European Union. The time horizon was a lifetime and the perspective of the health system was used. The outcome measures were incremental cost-effectiveness ratios(ICER) measured as 2016€ per life-year gained(LYG).

**Results:** *base case scenario results:* produced a total of 2,488,428 life-years with a cost of 847154.3 2016€. *Hospital based empiric treatment:* 2,488,440 life-years (an increase of 12.2 life-years); cost: 14,118,932 2016€; ICER: 1,087,803.75 2016€/LYG. *Hospital based serology and treatment:* 2,488,442 life-years (13.82 life-years increase); cost: 207,843,924.3€; ICER: 14,967,596.25 2016€/LYG. *Hospital based empiric treatment of immunosuppressed:* 2,488,440 life-years, cost: 748,996.2 2016€; ICER: -8,027 2016€/LYG (strategy cost-saving). *Hospital based serology and treatment of immunosuppressed:* 2,488,442 life-years (14.05 life-years increase), cost: 7,422,424.72016€; ICER: 467,882.22 2016€/LYG. *Primary care empiric treatment:* 2,488,441 life-years, cost: 7,768,318 2016€; ICER: 540,096.5 2016€/LYG. *Primary*

*care serology and treatment:* 2,488,442 life-years (14.62 life-years gained), cost: 207,729,670.2 2016€; ICER: 14,150,266.5 2016€/LYG. *Sensitivity analyses:* a one-way sensitivity analysis was carried out for each one of the strategies evaluated, varying key parameters. The parameters with the highest impact were the prevalence of infection and the probability of seeking care as an outpatient. Nevertheless, the Hospital based presumptive treatment of immunosuppressed patients' strategy, remained below the CE threshold for all the range of the parameters. A probabilistic sensitivity analysis was carried out to evaluate overall uncertainty. The strategy showing the highest probability of being cost-effective was the *hospital based empiric treatment of immunosuppressed patients*' strategy, with a probability of 0.85.

**Conclusion:** Our data suggest that it would be cost-saving to treat empirically migrants from strongyloidiasis endemic countries that are immunosuppressed.

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### TMek: A QUANTITATIVE RAPID DIAGNOSTIC TEST FOR MALARIA

**Giacometti M.**[2], **Milesi F.**[1], **Coppadoro P.L.**[2], **Ferrari G.**[2], **Fiore G.B.**[2], **Rizzo A.**[4], **Grande R.**[4], **Gismondo M.R.**[4], **Corbellino M.**[3], **Antinori S.**[3], **Bertacco R.**[1]

[1]*Dept. of Physics;*
[2]*Dept. of Elettronics Informatics and Bioengineering, Politecnico di Milano;*
[3]*Dept. of Biomedical and Clinical Sciences "Luigi Sacco";*
[4]*CLIMVIB Sacco Teaching Hospital, Milano, Italy*

**Introduction:** The search for new rapid diagnostic tests (RDT) for malaria is a priority to fight this endemic disease, according to WHO recommendations[1]. In fact, available RDT based on the detection of antigens, suffer from several limitations (i.e., are not quantitative, remain positive for up to 1 month, exibit prozone effect at high parasitaemas, may be falsely negative).

**Aim:** We present an easy to operate lab-on-chip diagnostic test (TMek) for the quantification of the plasmodium parasitaemia and hemozoin concentration in a blood smear. The method is based on the absolute paramagnetic susceptibility of hemozoin crystals[2] found within the infected red blood cells (RBC) and free in the blood of patients affected by malaria. A silicon microchip with an array of Nickel posts and some suitable electrodes is put in contact with a smear of blood (5 microL) diluted (1:10) with EDTA and PBS, in the field produced by external magnets. Due to the competition between the magnetic and the gravity forces, only infected RBC and hemozoin crystals are attracted towards the Nickel concentrators and electrodes. The entity of the electrodes impedance variation is thus proportional to the parasitemia and/or the hemozoin concentration.

**Methods:** The microchip, fabricated via optical lithography, is placed in a cartridge where the diluted blood smear is also loaded. After insertion of the cartridge in a portable reading unit, the quantification is automatically performed.

**Results:** TMek was tested at Sacco Hospital on control blood samples from healthy donors as well from patients affected by malaria, diagnosed by haemoscopy and LAMP ( Malaria Illumigene – Meridian EU). Preliminary Results show that the test has a limit of detection around 0.003%, comparable with that of currently used RDT. In just 10 minutes, a distinct quantification of both parasitemia and hemozoin crystals concentration is carried out, thus providing complementary information on the illness status.

**Conclusion:** TMek has shown to hold a great potential for implementing a rapid, quantitative and pan-plasmodic test for malaria suitable for on-field use in endemic zones. A preclinical validation is planned for

next April, in Cameroon, and related Results will be presented at the conference.

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### FEASIBILITY AND IMPACT OF LEPROSY POST-EXPOSURE PROPHYLAXIS: EVIDENCE FROM LPEP, A MULTI-COUNTRY, 5-YEAR IMPLEMENTATION RESEARCH PROGRAM

**Richardus J.H.[1], Cavaliero A.[2], Steinmann P.[3;4], LPEP Study Group**
[1]Erasmus MC, University Medical Center Rotterdam, Rotterdam, The Netherlands;
[2]Novartis Foundation, Basel, Switzerland;
[3]Swiss Centre for International Health, Swiss Tropical and Public Health Institute;
[4]University of Basel, Basel, Switzerland

**Introduction:** The number of newly diagnosed leprosy patients remains stable at over 200,000 per year since more than a decade. Post-exposure prophylaxis (PEP) with single dose rifampicin (SDR) for close contacts of leprosy patients is among the most promising new tools to control leprosy since the introduction of standardized multidrug therapy in the 1980s.

**Aim:** The Leprosy Post-Exposure Prophylaxis (LPEP) program was designed to evaluate the feasibility, effectiveness and impact of PEP with SDR in selected pilot areas representing different health systems, epidemiological conditions and socio-cultural settings across 3 continents and 8 countries: Brazil, Cambodia, India, Indonesia, Myanmar, Nepal, Sri Lanka, and Tanzania.

**Methods:** A standard protocol was developed[1] and then adapted to the specific context of each country. Household, and in some settings neighbour and social contacts of recently diagnosed leprosy patients were traced, screened for signs of leprosy, and assessed for a number of exclusion criteria. Eligible contacts were offered an age/weight-adjusted rifampicin dose. The intervention was maintained for 3 years. Leprosy programme staff implemented the intervention while international NGOs and academic partners provided technical support, quality control, and outcome evaluation. The funder also acted as program coordinator.

**Results:** Over 150,000 contacts of recently diagnosed leprosy patients were identified, of whom 1% could not be screened and 10% were excluded from SDR for medical reasons. Less than 1% of eligible contacts refused SDR administration. While representing a considerable added workload for front-line health workers and health volunteers, particularly in settings that had not yet routinely implemented contact screening, the program was appreciated by health workers as the inclusion of a preventive treatment made screening for signs of leprosy much more attractive to the population[2]. The program also resulted in the early diagnoses of several hundred leprosy patients. Impact modelling suggests the intervention will result in considerably reduced numbers of new leprosy patients if it is maintained.

**Conclusion:** The intervention was well accepted among health workers, patients and contacts. It is now recommended in the latest relevant guidelines of the World Health Organization[3].

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### KALA-AZAR VECTOR (PHLEBOTOMUS ARGENTIPES; DIPTERA: PSYCHODIDAE) CONTROL IN BANGLADESH: A CLUSTER RANDOMIZED CONTROLLED TRIAL

**Chowdhury R.[1,2], Faria S.[2], Huda M.M.[1], Chowdhury V.[3], Mondal D.[1], Akhter S.[2], Akter S.[2], Nabi S.G.[4], Dash A.P.[5], Banu Q.[6]**
[1]International Centre for Diarrhoea Disease Research (icddr,b);
[2]Dept. of Medical Entomology, National Institute of Preventive and Social Medicine (NIPSOM), Mohakhali;
[3]Dept. of Statistics, Dhaka College;
[4]Dept. of Parasitology, Mugda Medical College, Dhaka, Bangladesh;
[5]Central University of Tamil Nadu, Thiruvarur, India;
[6]Dept. of Biology, Asian University for Women, Chittatong, Bangladesh

**Background:** A number of studies on visceral leishmaniasis (VL) vector control tools have been conducted during the past decade with sometimes confirmative and sometimes contradictory Results.

**Aim:** We aimed to investigate a large sample different options which have not yet been fully explored including: (1) indoor residual spraying (IRS) with alpha cypermethrin 5WP; (2) long lasting insecticide impregnated bed-net (LLIN); (3) impregnation of local bed-nets using insecticide KOTAB-123 (KOTAB); (4) possible breeding places sprayed with chlorpyrifos 20EC (OUT) and five different combinations.

**Methods:** The study is a controlled cluster randomized trial where 3089 houses from 11 villages were divided into 10 sections, each section having six clusters and each cluster having about 50 houses. Vector density was measured before and up to 22 months after intervention using CDC light traps.

**Results:** Total 17,434 sandflies were collected during baseline and 9 follow-up surveys. At baseline, the average *Phlebotomus argentipes* density per household was 10.6 (SD=11.5) in the control arm and 7.3 (SD=8.46) to 11.5 (SD=20.2) in intervention arms. Among single type interventions, the effect of IRS with 2 rounds of spraying ranged from 13% to 75% reduction of *P. argentipes* density compared to control arm (rate-ratio [RR] ranged from 0.25 to 0.87). LLINs caused a vector reduction of 9% to 78% (RR, 0.22 to 0.91). KOTAB reduced vectors by 4% to 73% (RR, 0.27 to 0.96). The combination of LLIN and OUT reduced 26% to 86% (RR, 0.14 to 0.74) vector. The reduction for IRS and OUT together was 8% to 88% (RR, 0.12 to 0.92). IRS and LLIN combined resulted in a vector reduction of 13% to 85% (RR, 0.15 to 0.77). IRS plus KOTAB reduced vector densities by 16% to 86% (RR, 0.14 to 0.84). Some intermediate measurements for KOTAB alone and for IRS plus LLIN; and IRS plus KOTAB were not statistically significant. The bioassays on sprayed surfaces or netting materials showed favourable Results (>80% mortality) for 22 months (IRS was 12 months). In the KOTAB a gradual decline was observed after 6 months.

**Conclusions:** LLIN and outdoor spraying was the best combination to reduce VL vector densities for 22 months or longer.

The intervention Results presented as the range of percent reductions of sand flies and rate ratios in 9 measurements over 22 months.

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## CAN BUILDING A COMMUNITY OF PRACTICE IMPROVE PHARMACOVIGILANCE IN AFRICA?

Walker R.J.[1], Lang T.[2], Allen E.[3]
[1]The Global Health Network;
[2]The Global Health Network, University of Oxford, Oxford, UK;
[3]Division of Clinical Pharmacology, Dept. of Medicine, University of Cape Town, Cape Town, South Africa

**Introduction:** Undertaking effective drug safety monitoring can be particularly challenging in low-resource settings due to a lack of infrastructure, weak regulatory systems and limited access to training and education opportunities. Having identified that more could be done to provide new, or link to existing, free or low-cost resources, Global Pharmacovigilance (GPV) was launched as a new online member site on The Global Health Network (TGHN) in mid-2016. GPV hosts a broad range of information, including notices of events, training and education opportunities, news items, links to a pharmacovigilance organisations, institutions and societies, and a growing number of articles on related topics. The platform is consistently in the top 5 most-accessed sites forming TGHN, and, following on from this successful start, we will look to harness its membership to work together in a 'community of practice' on specific challenges facing pharmacovigilance in Africa.

**Aim:** To assess whether a dedicated online pharmacovigilance platform would be taken up and used within Africa, and to measure the impact of these resources and increased engagement on drug safety reporting.

**Methods:** This project will take an action research mixed Methods approach. The GPV platform will be used to identify volunteers with an interest in working in a community of practice to address areas of interest and perceived needs in African pharmacovigilance. Online surveys, and qualitative Methods will be used to identify and understand gaps in pharmacovigilance resources. The parties will then work together to develop identified training, guidance, tools, using the online environment as the workspace for discussions, networking and dissemination of outputs. A final survey will gather impressions of whether the project has impacted pharmacovigilance practice.

**Results:** Results will be presented in the form of a knowledge/resource gap analysis for pharmacovigilance in Africa, qualitative data on safety reporting in case study regions, and qualitative/quantitative data on the uptake and use of the platform and resources.

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### EVALUATION OF THE IMPACT OF AN INTERVENTION TO REDUCE MALARIA MORBIDITY AND MORTALITY IN BURKINA: 2006-2015 RETROSPECTIVE STUDY

Akotionga E.[1], Ouedraogo T.[2], Nassa S.[1], Nitiema A.P.[1], Bakiono F.[3], Bicaba A.[4], Bazira L.[5], Nakoulma R.J.F.[6], Laokri S.[7], Compaoré C.S.I.[8]
[1]Directorate General of Studies and Sectoral Statistics (DGESS) in Ouagadougou;
[2]JPHIEGO;
[3]Health Service of the Armed Forces of Burkina Faso;
[4]Public Health Research and Study Society (SERSAP), Ouagadougou, Burkina Faso;
[5]Faculty of Medicine, University of Burundi, Bujumbura, Burundi;
[6]Marie Stopes International Burkina Faso, Ouagadougou, Burkina Faso;
[7]Free University of Brussels (ULB), Brussels, Belgium;
[8]National Malaria Control Program, Ouagadougou, Burkina Faso

**Introduction:** Malaria remains a public health problem in the world and in Africa. In Burkina Faso, 45.7% of consultations and hospitalizations, as well as 25.2% of deaths are related to malaria. Each year, considerable resources are committed to combat this scourge.

**Aim:** The aim of this study was to evaluate the impact of health expenditure on malaria control monitoring indicators in Burkina Faso over a period of 10 years.

**Methodology:** This is a cost-effectiveness medico-economic study on the financing committed in the fight against malaria in Burkina Faso from 2006 to 2015. Through the analysis of the data of the health accounts and epidemiological data, the aim was to study the impact of funding on the reduction of morbidity and mortality related to malaria.

**Results:** In Burkina Faso, health expenditures were set at 4.990.040.000 $US from 2006 to 2015. 14.4% of these expenditures, with an average of 71.814.800 $US per year, were used to combat malaria. The contribution of households in this funding accounted for 42.2%. This has reduced the distances of access to care from 7.8 to 6.8 km, improved attendance of populations with a number of new contacts per capita and per year from 0.37 to 0.87 for the general population and from 1.4 to 1.7 for children under 5 years of age.

Among the observed effects, there is a reduction in malaria lethality from 2.3% to 1.2% in the general population, from 4.0% to 1.5%, in children under 5 and 1.5% to 0.2% in pregnant women (P = 0.0001). Malaria incidence has also been observed to increase from 181 ‰ to 449 ‰ in the general population and from 468 ‰ to 947 ‰ in children under 5, justified by the reduction in access distances to health care, the implementation of subsidy and free healthcare policies.

**Conclusion:** Direct payments challenge policymakers to maintain advocacy to mobilize more resources and direct action towards universal health insurance to help reduce malaria mortality by 40% by 2020.

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### ELECTRONIC DATA CAPTURING FOR THE WHO VERBAL AUTOPSY INSTRUMENT TO FACILITATE ROUTINE CAUSE OF DEATH MONITORING

Di Pasquale A.[1,2], Leitao J.[3], Nichols E.[4]
[1]Dept. of Epidemiology and Public Health, Swiss Tropical and Public Health Institute, Basel;
[2]University of Basel, Basel;
[3]Health Information and Statistics, WHO, Geneva, Switzerland;
[4]International Statistics Division, Centers for Disease Control and Prevention, Hyattsville, USA

**Introduction:** Verbal autopsy (VA) is a systematic approach for determining individuals' causes of death (CoD) in populations without a complete vital registration system. It consists of relatively lengthy interviews to collect information about the signs, symptoms, and other characteristics of a deceased person.

**Aim:** Our objective here is to describe the process used to implement, and standardise the WHO VA instrument using an electronic data collection system to make it feasible for application on a larger scale such as in routine civil registration and vital statistics (CRVS) systems.

**Methods:** Recent technological advances, specifically mobile devices used for electronic data collection (EDC), and adoption of data management best practices using Open Data Kit (ODK 1) survey software have the potential to resolve many of the major shortcomings of running a paper data collection (PDC) surveys. The WHO 2016 Verbal autopsy instrument (fully compatible with publicly available analytical software for assigning the cause of death) was translated in EDC format and used in different countries and settings to collect the data requested using Android devices through the ODK software. The conversion to EDC allowed the implementation of skips logic, relevancies and constraints needed

to ensure the robustness of the instrument and the easy use of it from fieldworkers without specific IT skills. ODK allows the possibility to localize the instrument (e.g. language, country specific variables), maintaining the core questions and functionality of the master VA instrument. After data collection, we assessed the time required for data collection and the completeness of the data feeding the analytical software for analysis available.

**Results:** Time to availability of a record is reduced with ODK (data flows to the database in near real time). Fieldworkers take on average 20 minutes less for a questionnaire than with paper forms. Costs are reduced by the absence of paper and data clerks also reducing the possibility of manual introduced errors.

**Conclusion:** EDC addresses some problems posed by PDC through validation at data collection time, near real time data to the central database, mostly automated review protocols, reports of data issues for managers allowing near real time review and processes. Electronic data capture can improve quality, timeliness, and costs (1).

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## 180

## BURDEN OF DISEASE IN NEONATAL UNITS IN NIGERIA AND KENYA

**Nabwera H.M.[1], Wang D.[2], Tongo K.[3], Talbert A.[4], Akindolire A.[3], Otieno W.[5,6], Ezeaka C.[7], Imam Z.[8], Umoru D.[9], Allen S.[1]**

[1]Liverpool School of Tropical Medicine, UK;
[2]Children's Hospital of Fudan University, China;
[3]University College Hospital, Ibadan, Nigeria;
[4]KEMRI-Wellcome Trust Research Programme, Kilifi;
[5]Maseno University, Kisumu;
[6]Jaramogi Oginga Odinga Teaching and Referral Hospital, Kisumu, Kenya;
[7]Lagos University Teaching Hospital;
[8]Massey St. Children's Hospital, Lagos;
[9]Maitama District Hospital, Abuja, Nigeria

**Introduction:** Sub-Saharan Africa bears the greatest burden of the 2.6 million neonates that die every year and progress in improving survival has been slow. A key challenge for quality improvement is a lack of good quality routine clinical data to quantify common neonatal morbidities and describe current treatment strategies.

**Aim:** To establish a central clinical database of all admissions to 7 neonatal units (NNUs; 5 in Nigeria and 2 in Kenya), to estimate the burden of newborn morbidity and mortality, describe care practices and identify key targets for interventions.

**Methods:** From August 2018-February 2019, participating NNUs completed standardised case report forms. Data was entered into a REDCap database and analysed using Stata v15.0.

**Results:** 1,617 newborns were included. Mean maternal age was 29 years (SD 6.2) and the majority (1455, 89%) were married. 176/1598 (11%) mothers had not attended antenatal clinic, 75/1595 (4.7%) were HIV positive and 18/841 (2%) Hep B positive. 239/1485 (16%) had pregnancy induced hypertension,108/789 (14%) an antepartum haemorrhage and 20/1242 (2%) gestational diabetes. Most infants were singleton: 1315/1598 (82%).

Most births were facility-based (1472/1604; 92%) and 923/1602 (58%) were vaginal deliveries. Mean birth weight was 2.44 kg (SD 0.95) and median gestation was 37 weeks (IQR 33, 39). 824/1617 (51%) infants were low birth weight (<2.5kg) of whom 351/824 (43%) were very low birth weight (vLBW; <1.5 kg). 88/239 (37%) of vLBW infants died before their first feed and only 5/150 (3%) received a feed within 1 hour of birth. 141/259, 54% received breastmilk as the first feed. Use of breastmilk fortifier was uncommon (2, <1%).

Common neonatal morbidities were jaundice (725/1617, 45%), sepsis (629/1617, 39%), respiratory conditions (471/1617, 29%), birth asphyxia (307/1617, 19%) and congenital anomalies (93/1533, 6%). Only 46/1617 (3%) had an abdominal condition including necrotising enterocolitis. 264/1617 (16%) newborns died prior to discharge.

**Conclusion:** Electronic linkage of clinical databases identifies a high burden of maternal and neonatal illness and identifies areas for quality improvement and research. Feeding practices in vLBW infants were suboptimal. The very low frequency of abdominal signs suggests feeds could be introduced earlier which may improve outcomes.

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## LITERATURE REVIEW: THE IMPACT OF HOUSEHOLD AIR POLLUTION AND EFFECTIVENESS OF CLEAN-BURNING COOKSTOVES ON MATERNAL AND NEONATAL HEALTH

**McIntosh A.**
*Norwich Medical School, University of East Anglia, Norwich, UK*

**Introduction:** Household air pollution poses a threat to the health of women worldwide, increasing the risk of cancer, cardiovascular and respiratory disease. Ambient air pollution is linked to adverse pregnancy outcomes, yet the impact of household air pollution on pregnant women who spend a large amount of time cooking is underreported, as is the effectiveness of clean-burning cookstoves in improving pregnancy outcomes.

**Aim:** To explore the impact of pollution exposure within the home from cooking during pregnancy in low to middle income countries, and if clean-burning cookstoves are effective in improving maternal and neonatal health.

**Methods:** Comprehensive search on multiple databases was conducted for relevant literature, using key terms related to maternal and neonatal health combined with Boolean operators, subject headings and the terms "household air pollution", "indoor air pollution" and "cook*". 47 studies met inclusion criteria.

**Results:** This review exploring the role of household air pollution on pregnancy shows that cooking with polluting fuels significantly increases the risk of stillbirth, low birth weight and neonatal mortality, which may be mediated by preterm birth or growth restriction. Early evidence suggests that it may also increase the risk of hypertension and birth defects. This risk varies amongst different fuels and may be higher for kerosene and coal users. Evidence that clean-burning cookstoves are effective in improving pregnancy outcomes is limited.

**Conclusion:** Despite evidence for an increased risk of stillbirth, low birth weight and neonatal mortality from household air pollution, it is unclear which pollutants cause adverse birth outcomes. Further research is required to establish if clean-burning cookstoves are effective and to better establish the role of household air pollution on outcomes such as preterm birth. A stronger evidence base is required to speed up the slow uptake of cookstoves across the globe to minimise the burden of disease and improve maternal and neonatal health.

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## A MIXED METHODS EVALUATION OF THE FEASIBILITY AND EFFICACY OF IMPLEMENTING INTEGRATED MANAGEMENT OF

## CHILDHOOD ILLNESSES THROUGH USE OF MOBILE TECHNOLOGY IN A DEVELOPING COUNTRY SETTING

**Munir M.[1], Siddique D.A.[1], Hussain O.[2], Habib A.[2], Khan A.J.[3], Chandir S.[3,4]**

[1]Maternal and Child Health, Interactive Research and Development;

[2]Interactive Health Solutions, Karachi, Pakistan;

[3]Interactive Research and Development, Singapore;

[4]Center for Global Health Delivery, Harvard Medical School, Dubai, UAE

**Introduction:** Launched by the World Health Organization (WHO) in 1995, the Integrated Management of Childhood Illnesses (IMCI) strategy was designed to reduce childhood mortality across the globe through better management of common childhood illnesses by frontline health workers (FHWs). However, due to persistent barriers to implementation, its impact has been limited and transient, especially in resource-constrained settings. We developed an electronic version of IMCI (eIMCI) using Android technology to overcome implementation problems, including poor protocol compliance, lengthy trainings, and paper-based data collection.

**Aim:** Our aim was to test the feasibility of eIMCI in low-resource settings.

**Methods:** We conducted a mixed Methods pilot study in Muzzafargarh, a rural district of Pakistan's Punjab province. The pilot consisted of 8-weeks of field-testing of eIMCI phone-application by 10 Frontline Health Workers (FHWs) in 5 public health facilities. Baseline and end line surveys were conducted to capture basic health data for pre-post evaluation. 5 in-depth interviews (IDIs) were conducted with FHWs and 3 IDIs were conducted with medical officers (MOs) at participating health facilities to elicit opinions and perceptions, and 3 Focus Group Discussions (FGDs) were held with mothers of enrolled children. The data analysed included health indicators from the eIMCI application, demographic and health information from the baseline and end line survey as well as the qualitative data from interviews and discussions.

**Results:** A total of 1,979 children were enrolled in the eIMCI application during the 8-weeks of implementation; average screening time per child was 15 minutes. FHWs appreciated the application's ease of use, and mothers reported enhanced FHW productivity. Medical Officers reported increased utilization of facility services following eIMCI deployment, revealing strengthened referral linkages between various cadres of the health system. Diarrhea incidence decreased from 84.2% to 69.0% and referrals to the community vaccinator by FHWs increased from 0 to 33.0%.

**Conclusion:** Evidence from eIMCI pilot indicates the feasibility of eIMCI, and delineates the benefits associated with digitizing the IMCI protocol. Further studies should be undertaken with larger sample sizes and randomized design to estimate impact of eIMCI on child morbidity and mortality.

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## IS CLIMATE THE GREAT DRIVING FORCE BEHIND DENGUE INFECTIONS IN URBANS AREAS? A STUDY IN DENGUE-ENDEMIC SANTO DOMINGO, DOMINICAN REPUBLIC

**Tapia L.[1,2], Arredondo-Abreu C.[2], Ruiz-Matuk C.B.[2], Paulino-Ramirez R.[1,2]**

[1]Institute for Tropical Medicine & Global Health, Universidad Iberoamericana;

[2]Research Dept., Universidad Iberoamericana, Santo Domingo, Dominican Republic

**Introduction:** The Caribbean Region is home to Dengue viruses and its vectors due its tropical climate. With new evidence of climate change, monitoring of climatologic factors has emerged as a prevention strategy for tropical infections. Understanding tropical disease dynamics based on climatologic variables is the key to achieve eradication of arthropod-borne diseases, especially in heavily populated urban areas.

**Aim:** The aim of this study is to describe the relationship between climatologic factors and dengue cases in Santo Domingo.

**Methods:** Weekly dengue reports from January 2012 to December 2017 were extracted from the Ministry of Health database. Meanwhile, Maximum, Minimum and Mean Temperature, Rainfall and Relative Humidity were obtained from to the National Meteorological Office. Correlations of individual factors were calculated using 1 weeks and 12 weeks. Regressions for these lags were conducted to explain the individuality of the climatologic factors.

**Results:** The 1-week lag shows a correlation between Dengue Cases and Average Temperature (rho=0.22, $p < .01$), Dengue Cases and Rain (rho = -.14, $p < .05$), and Dengue Cases and Humidity (rho = -.16, $p < .05$.). The regression model performed at 1 week lag explains 4% of the variance and was a significant predictor $F(3,308)$, $p < 0.01$; Average temperature (B = 11.26, $p < 0.01$) and Humidity (B = -4.08, $p < 0.01$) contributed significantly to the model. The12 weeks lag shows a negative correlation between Dengue Cases and Mean Temperature (rho= -0.20, $p<0.01$), Dengue Cases and Rain (rho= -0.15, $p<0.01$), and Dengue Cases and Humidity (rho= -0.20, $p<0.001$), the regression model explains 21% of the variance and was a significant predictor $F(3,297)$, $p < 0.001$; Average Temperature (B = -28.67, $p <0.001$) Humidity (B = -6.60, $p <0.001$) contributed significantly to the model.

**Conclusion:** The relation between climate and infectious diseases in urban areas is complex. Temperature, rainfall and humidity has demonstrated to individually correlate with Dengue infections in the city of Santo Domingo. Strategies must be developed to take into consideration the changing climate experienced in the Dominican territory as well to compare the climatologic drive for dengue infections in other parts of the nation.

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## IDENTIFICATION OF HIGH-RISK AREAS OF LEPROSY IN NORTH-WEST BANGLADESH – A GEOSPATIAL MODELLING AND ECOLOGICAL STUDY

**Bulstra C.[1,2], Butlin C.R.[3], Alam K.[4], Blok D.[1], Bowers B.[5], Roy J.C.[4], Nicholls P., Le Rutte E.[1,6], de Vlas S.[1], Richardus J.H.[1]**

[1]Department of Public Health, Erasmus MC, Erasmus University Medical Center Rotterdam, Rotterdam, The Netherlands;

[2]Heidelberg University Hospital, Institute for Global Health, Heidelberg, Germany;

[3]The Leprosy Mission England and Wales;

[4]The Leprosy Mission International, Nilphamari, Bangladesh;

[5]Menzies Health Institute Queensland, Griffith University, Brisbane, Australia;

[6]Swiss Tropical and Public Health Institute, Basel, Switzerland

**Objectives:** Countries often have difficulty to localise focal high-risk areas or 'hotspots' of leprosy. Geospatial tools seem promising to support the "final push" towards zero leprosy, to strengthen capacities in surveillance and to monitor new cases.

**Aim:** We aim to geospatially visualize leprosy incidence trends and identify the potential presence of leprosy hotspots in Bangladesh over the past two decades, and explore possible environmental predictors of leprosy.

**Methods:** Data come from four districts in northwest Bangladesh, where a total of ~10,000 cases were included between 2000-2018. GPS coordinates of the house of each leprosy patient were collected retrospectively.

A Poisson model was used to detect spatiotemporal hotspots of high incidence among the population. Hotspots among children <15 years and early stage MB cases (characterized by grade 0 disability and positive skin smear) were identified, indicating active foci of leprosy transmission. For the ecological analysis we utilize open-source environmental and location data (UN, NASA, Google) to explore possible predictors of leprosy hotspots: population density, landcover, and proximity to water bodies, clinics or towns.

**Results:** Preliminary results show that annual incidence levels dropped from ~3.3 to ~1.2 cases/10,000 capita during the study period; the number of MB cases (a quarter of all cases) remained relatively stable. Over 10% of the cases <15 years at time of diagnosis, which is above the reported mean global estimate (7.5%). Of all MB cases, 30% were detected during the early stage of disease. Statistically significant hotspots of both incidence and transmission were identified. Hotspots largely varied in size (2-40km radius), and captured 150-10,000 people. The relative risk of having leprosy was always ~2 times higher for inhabitants of hotspots, compared to those living outside hotspots. Hotspots of active transmission – characterized by large numbers of patients under the age of 15 years and early MB patients – appear to be located in areas with high population densities.

**Conclusion:** Comparable to other endemic pockets across the world, leprosy shows a heterogenous distribution with clear hotspots in northwest Bangladesh. Identifying such hotspots helps to geographically target active case-finding strategies towards achieving the WHO global leprosy goals.

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### SPATIAL DISTRIBUTION AND POLYMORPHISM OF THE *PFKELCH13* GENE IN AFRICA IN THE ERA OF EMERGING *PLASMODIUM FALCIPARUM* RESISTANCE TO ARTEMISININ AND DERIVATIVE DRUGS: A COMPREHENSIVE SYSTEMATIC REVIEW

**Kayiba N.[1,3], Yobi D.[4], Rosas-Anguirre A.[1], Devleesschauwer D.[1], Mvumbi D.[4], Okitolonda E.[3], DeMol P.[2], Mvumbi G.[4], Hayette M.P.[2], Speybroeck N.[1]**

[1]*Faculté de Santé Publique, Université Catholique de Louvain, Bruxelles;*
[2]*Centre Hospitalier Universitaire de Liège, Université de Liège, Liège, Belgique;*
[3]*Ecole de Santé Publique, Université de Kinshasa, Kinshasa;*
[4]*Université de Kinshasa, Faculté de Médecine, DR Congo*

**Introduction:** The emergence of *Plasmodium falciparum* (*Pf*) resistance to artemisinin (*Pf*ART-R) in Africa is a worrisome situation that would annihilate the progress made in reducing the global burden of malaria. The discovery of mutations occurring in portions of the *Pf* gene sequence encoding kelch 13 (*Pf*K13) – propeller domain and inducing *Pf*ART-R, has provided unprecedented opportunities for monitoring such resistance at large scale.

**Aim:** This study aimed to review the *Pf*K13 allelic polymorphism and its spatial distribution in Africa for drawing a baseline for subsequent epidemiological surveillance and containment efforts of *Pf*ART-R.

**Methods:** A systematic review was performed according to PRISMA guidelines through six electronic databases consulted up to December 2018. Studies assessing the *Pf*K13 gene in any of the 54 African countries were explored and data related to individual single nucleotide polymorphisms from each report and sampling location were geo-referenced and locus-referenced to be uploaded on maps displaying spatial and molecular patterns.

**Results:** From 8,678 screened records, 50 reports were identified as eligible providing 22,739 *Pf* isolates successfully sequenced for the *Pf*K13

and originating from 109 sites surveyed in 41 African countries. Overall 619 nonsynonymous (NS) mutants (2.7% of sequenced isolates) were reported at varied relative frequencies (0.5 to 50%) most often being K189T and A578S.Intermediate proportions (30 to 50%) of NS mutants were found in Western and Eastern Africa, moderate proportions (10 to 20%) in Middle Africa and low to very low proportions (<5%), elsewhere. NS mutations were not detected in 11 of 41 sampling countries. A total of 8 *Pf*K13 NS mutations (F446I, C469Y, R515K, S522C, P553L, V568G, P574L, and A675V) out of 24 known as "associated molecular markers" for *Pf*ART-R were noticed at relative frequencies from 0.08 to 10.2%. One NS mutation (M476I) out of 6 established as "validated molecular markers" for *Pf*ART-R was reported at a relative frequency of 0.42%. Possible foci of NS mutations were noticed in Eastern, Western, and Middle Africa.

**Conclusion:** Africa has noticed rare but alarming signals of possible emergence of *Pf*-ART-R. Proactive surveillance strategies are needed to be established in different African regions to refrain from massive development of resistance.

## 186

### THE PSYCHOSOCIAL BURDEN OF LOCALISED CUTANEOUS LEISHMANIASIS - A POINT OF VIEW

**Bennis I.[1,2], Boelaert M.[2]**

[1]*National School of Public Health, Ministry of Health, Rabat, Morocco;*
[2]*Dept. of Public Health, Institute of Tropical Medicine, Antwerp, Belgium*

**Introduction:** Localised cutaneous leishmaniasis (LCL) is considered to be a self-healing parasitic dermatological disease. However, depending on the severity, type of lesions or scars, and context, CL can lead to self- and social stigma influencing quality of life (QoL) and psychological well-being, with potential association with co-morbid depressive disorders. These dimensions have been spotlighted in recent reviews and are now the subject of research in additional sites around the world.

**Aim:** To highlight the substantial psychosocial burden and stigma linked to LCL as hidden problems that the scientific community and health professionals should be aware of.

**Methods:** This is a point of view based on the authors' previous work and on their review of the most relevant recently accepted articles (up to the end of 2018).

**Results:** LCL patients suffer from various psychological and social problems. Besides the skin lesion itself, there are other major problems associated with a loss of self-confidence, self-esteem, and self-awareness; the presence of stigma, segregation, social contempt, avoidance by others, marriage difficulties and self-harm due to feelings of embarrassment, shame, anxiety, sadness, depression, and/or suicidal thoughts which are not directly checked for or treated by health professionals, who only consider the dermatological condition. Moreover, the psychosocial burden on LCL patients is multi-dimensional, including self-acceptance, expectation of stigma, adaptation to anxiety and depression, fear of scars being of spiritual origin, and changes in perception of body image. However, this multi-dimensional interaction is dynamic and time dependant, decreasing or increasing the overall suffering of the individual and family. The perception of LCL scars as being due to a curse or a fatality destroys the life of young unmarried people and remains the most difficult mental health issue that needs addressing.

**Conclusion:** Considering LCL as a self-healing disease hides a consistent psychosocial burden; the scientific evidence is being reinforced by qualitative studies and pragmatic clinical trials. The latest studies show the negative psychosocial impact of LCL on the QoL and mental health.

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### PSYCHOLOGICAL AND PSYCHOSOCIAL CONSEQUENCES OF ZOONOTIC CUTANEOUS LEISHMANIASIS AMONG WOMEN IN TUNISIA

**Bellali H.[1,2], Ben Jemaa S.[3], Bellaj T.[3], Chahed M.K.[1,2]**
[1]*Dept. of Epidemiology and Public Health, Faculty of Medicine of Tunis, Tunis-El Manar University, Tunis;*
[2]*Research Unit 'Analysis of the Effects of Environmental and Climate Changes on Health', Dept. of Epidemiology and Statistics, A. Mami Hospital, Ariana, Tunisia;*
[3]*Psychology Dept., University of Human Sciences of Tunis, Tunis, Tunisia*

**Introduction:** Zoonotic cutaneous leishmaniasis (ZCL) is the most common form of leishmaniasis in Tunisia. The disease is not severe; it heals spontaneously but leaves a definite scar, which has a psychosocial impact, mainly when the lesion occurs on the face.
**Aim:** To assess the psychosocial impact of ZCL scars among Tunisian women.
**Methods:** We conducted an exploratory study among a volunteer group of girls and women selected randomly in primary health care facilities during medical visits for any pathology or for routine vaccination of children. A psychologist and/or a ZCL health educator administered the Revised Illness Perception.
Questionnaire (IPQ-R), Psoriasis Life Stress Inventory (PLSI), and World Health Organization Quality Of Life-26 (WHOQOL-26) questionnaires to this group in their homes or at the local clinic.
**Results:** The distributions of the scores collected from the three scales are heterogeneous: IPQ-R (M = 63.6, SD = 15.6), PSLI (M = 9.5, SD = 6.7), WHOQOL Physical (M = 63, SD = 12.9), WHOQOL-Psychological (M = 52.6, SD = 11.1), WHOQOL Social (M = 61.8, SD = 17.5), and WHOQOL-Environmental (M = 47.8, SD = 13.3). We demonstrated a wide range of psychological effects (anxiety, psychological distress, lack of self-confidence and self-esteem, frustration, etc.) and psychosocial impacts (stigma, rejection, discrimination in social and professional settings, etc.) of permanent ZCL scars, mainly when located on the face. Emotional representations associated with ZCL were correlated with a loss of self-esteem and feelings of inferiority (r = 0.77, p<0.05). High levels of education and knowledge about ZCL are positively correlated with cognitive and emotional representation in the IPQ-R (r = 0.33, p<0.05). "Rejection experiences" and the "anticipation and avoidance of stress" were negatively correlated with age (r = -0.33, p<0.05 and r = -0.31, p<0.05).
**Conclusion:** This study suggests the need for social and psychological support and professional integration for women and girls in rural remote areas. Combating real and/or perceived stigmatization is another decisive step in the delivery of care, because stigma has negative impacts on quality of life, mental health and participation in social and professional life.

## 188

### THE FUTURE OF GLOBAL TREATMENT OF CUTANEOUS LEISHMANIASIS

### Arana B.
*Drugs for Neglected Diseases initiative, Geneva, Switzerland*

**Introduction:** Ideally, treatment for cutaneous leishmaniasis (CL) would be based on the clinical presentation: local therapies for subjects with small/ few lesions, systemic oral drugs for subjects with numerous or large lesions, and an anti-*leishmania* drug in combination with an immunomodulator to enhance a Th-1 type immune response in subjects with complicated forms of CL.
**Aim:** To describe the current research landscape of programs aiming to develop new treatments for CL.
**Methods:** A literature review and landscape analysis of research groups working on different types of treatment for CL were conducted.
**Results:** Treatment of CL has long depended on antiquated drugs that would be considered far too toxic for introduction under modern registration systems. There are no examples of a pre-clinical testing strategy that has led to the formal clinical development of an anti-CL agent. Most efforts on discovering new chemical entities (NCEs) focus on visceral leishmaniasis (VL). Luckily, compounds that have been shown to be effective against VL have also shown activity against CL strains. DND*i*, in collaboration with other groups, is working to discover and develop NCEs, some of which are already in initial clinical development. Developing an NCE is, however, expensive and time consuming, hence it is not surprising that most efforts to find new treatments for CL focus on repurposing drugs that are already on the market for other conditions, or using existing CL treatments in combination. Immuno-chemotherapy and therapeutic vaccines represent an alternative modality of treatment. Conventional CL chemotherapy aims to kill most of the parasites and it is hypothesized that fostering an effective immune response in the host will improve the control of any remaining parasites. DND*i* is working on an immunomodulator which activates the innate and adaptive immune system by triggering Toll-like receptor 9 expressed on plasmacytoid dendritic cells. This very specific stimulation favors Th1 type responses that are known to be effective in clearing parasites and promoting lesion healing.
**Conclusion:** Although progress has been made for the treatment of VL, it is likely that currently available treatments represent almost the entire therapeutic arsenal for CL for the coming years.

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### SENTINEL SURVEILLANCE THROUGH TRAVELLERS: EVALUATION OF AN FTA CARD BASED MOSQUITO SALIVA TRAP FOR ARBOVIRUS MONITORING

**Hedrich N.[1,2], Vavassori L.[1,2], Guedes R.D.[3], Paiva M.H.S.[3], Beuret C.[4], Neumayr A.[1,2], Müller P.[1,2]**
[1]*Vector Control Group, Dept. of Epidemiology and Public Health, Swiss Tropical and Public Health Institute;*
[2]*University of Basel, Basel, Switzerland;*
[3]*Instituto Aggeu Magalhães, Fundação Oswaldo Cruz, Recife, Brazil;*
[4]*Spiez Laboratory, Spiez, Switzerland*

**Introduction:** Arboviruses (arthropod-borne viruses) represent a large and increasing burden of disease threatening both human and animal health. Many of these viruses are transmitted by mosquitoes, including dengue, chikungunya, and Zika virus, and are a particular hazard to travellers. The increase in international travel Results in a worldwide virus circulation, and favors the transmission in non-endemic areas. As such, arbovirus surveillance is fundamental to detect outbreaks before they expand, to inform vector control strategies, and to evaluate the risks for travellers. A new promising method of arbovirus surveillance is the use of nucleic acid preserving Flinders Technology Associates (FTA) cards to collect mosquito saliva.
**Aim:** To evaluate the use of FTA cards included into specialized kits for arbovirus surveillance and the use of travellers as sentinels as part of the global Zikaplan initiative.
**Methods:** We have developed mosquito saliva kits containing sugar-baited FTA cards, which are given to travellers who are going to Brazil, recruited through the travel clinic at the Swiss Tropical and Public Health institute. These cards are then sent back to Basel and analyzed for

the presence of arbovirus RNA using RT-qPCR and sequencing. Initial experiments with laboratory infected mosquitoes will be conducted to examine the usability of the cards to detect viruses from mosquito saliva, and the ability to detect multiple infections on one card.

**Results:** More than 50 travellers have been recruited to the study carrying 250 FTA card kits to various destinations across Brazil.

**Conclusion:** In our presentation we will give the latest results and discuss how this promising new tool could be expanded across the globe and possibly replace other Methods of surveillance.

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### MUTUAL FUNDS IN BURUNDI: AN OPPORTUNITY FOR UNIVERSAL HEALTH COVERAGE OR ONLY A VESTIGE OF COLONIALITY IN HEALTH SYSTEMS?

**Sere F.[1], Nkurunziza E.[2], Durnez D.[3], Van Belle E.[1]**
[1]Management & Funding, Memisa, Brussels, Belgium;
[2]Burundi's Office, Memisa, Bujumbura, Burundi;
[3]Projects & Operations, Memisa, Brussels, Belgium

**Introduction:** By the end of the 20th and beginning of the 21st century, international – mostly Belgian - organizations filled the gap of health coverage by promoting and supporting local non-for-profit mutual funds. A few years later, while the Ministry of Health ignores this initiative, the mutual funds were acknowledged and authorized by the Ministry of National Solidarity. Both public and private systems coexist, competing with each other and therefore increasing the financial risk for the population.

**Aim:** Burundi's health system faces important challenges regarding fragmentation within the sector. Our research put the question of relevance of this mutual funds based on a series of parameters, and builds bridges between public and not-for-profit health sectors, recognizing their strengths and difficulties and emphasizing the opportunity of learning.

**Methods:** As a framework, we assessed the mutual funds based on UHC models as well as development cooperation guiding principles. Qualitative Methods were used to assess the financial sustainability, efficacy and effectiveness of the mutual funds while participatory observation and semi-structured interviews were conducted to assess harmonisation, technical and social sustainability, ownership and alignment.

**Findings:** The mutual funds, organized within a national platform, are currently working towards harmonizing their efforts in the country. However, in some provinces, mutual funds supported by different international donors still compete with each other. In 2017, 91.782 inhabitants of Burundi were covered by the Mutual Funds, which represents 0,8% of Burundi's population and 3% of the direct target group.

The affiliation cost can cover the entire expenses for the year. However, all mutual funds are still supported by international cooperation in some way (logistics, administration, etc.). The mutual funds don't have resources to mobilize in case of outbreak or emergency.

**Conclusion:** After 20 years of experience, Mutual Funds are not sustainable and not well rooted in the country. The implementation of the national Medical Assistance Card experience difficulties as a UHC policy at this stage. It is thus not irrelevant for the community to look for alternatives. They play however an important role in community development, by organizing trainings and being presents in the entire country, and as advocacy organizations.

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### SPREADING INTERNATIONAL HEALTH IN PRIMARY CARE

**Sequeira-Aymar E., Carcasó-Díaz A., Jiménez-Lozano A.I., De Gispert-Uriach B., Saperas-Pérez C., García-Gozalbes J., González-Martínez M.A., Mallart-Raventós M., Gispert-sauch-Puigdevall N.**
*Commission for Cooperation and International Health (COCOOPSI), Catalan Society of Family Medicine (CAMFIC), Barcelona, Spain*

**Introduction:** Primary Care (PC) professionals are used to deal with different situations and scenarios regarding disease, prevention and health promotion. International Health is a flexible discipline that needs to be updated very often. In PC context, to introduce this discipline represents a big challenge. Travelers and migrants have their first access to the Health system in Catalonia through PC. If the professionals working in PC are sensitive to this matter a lot of work can be done at this level. For that a working group about Cooperation and International Health (COCOOPSI) was created twenty years ago inside the Catalan Society for Primary Care (CAMFIC).

**Aim:** Spread International Health matters in PC and improve the skills of the professionals in the Catalonian region through the activity of a working group from a scientific society. Give better care to travelers and migrants in PC.

**Methods:** Working group members come from different areas of the whole Catalan region. Meetings are conducted every two months and between that the contact is through a whats-app group and an e-mail group address. There are regular links with other organizations that work in these subjects as Public Health and Tropical Medicine Hospitals departments. There is also interaction with other groups inside the Scientific Society as Vaccines, Gynecology or Mental Health. There are connections with similar groups from other regions of the country.

**Results:** Protocols and guides about International Health adapted to PC are created, reviewed and presented. Same of them are discussed with other groups from different places or distinct disciplines. On-line course and different trainings for PC professionals are held. Also provides medical education for residents at least once a year. Scientific and opinion articles have been published. Yearly the group implements a funding cooperation between CAMFIC and health institutions or NGOs working in developing countries.

**Conclusion:** PC becomes a great scenario to train and develop abilities in International Health subjects weaving a network with other actors through the activity of the working group. Prevention, diagnosis and treatment for migrants and travelers have improved in the Catalonian region.

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### THE EFFICACY OF THE VILLAGE HEALTH CLUB IN CONTRIBUTING TO SUSTAINABLE MANAGEMENT OF CHILDHOOD MALARIA

**Ochieng D.[1], Gudoi S.S.[1], Bwanika J.B.[1], Tushabe B.[2], Ssegawa E.[3], Ngabirano T.[4], Opigo[5], Abesiga H.[1], Businge H.L.[2], Nampeera V.[1]**
[1]Malaria Consortium;
[2]Communication for Development;
[3]Banyan Global;
[4]Jhpeigo;
[5]Ministry of Health, Kampala, Uganda

**Introduction:** The village health club (VHC) concept has the power/potential ensuring sustainability of health interventions at community level and averting childhood illness with great outcomes. The VHC concept is a community led participatory approach that engages all members of the village to discuss issues that affect them. Currently Malaria is the leading

cause of morbidity and mortality in Uganda, contributing to 30-50% of outpatient visits and half of inpatient pediatric deaths. USAID's Malaria Action Program for Districts (MAPD) Projects have designed a Behavior Change and communication plan to Chase Malaria out of Uganda. One of the initiatives in changing behavior is the concept of the village health club that serve as a sustainability approach to the community health initiatives in improving malaria indicators.

**Aim:** To assess the efficacy of Village Health Clubs in contributing to sustainable management of childhood malaria.

**Methods:** The Project closely worked with VHCs and Health facilities, providing coaching, mentorship and support supervision. There have also been behavioral Change campaigns in place to aid in health promotion. Employing a quasi-experimental study methodology, Results looked at the implementation areas with VHCs and control areas without VHT in order to counteract the outcomes of the interventions.

**Results:** Uncomplicated malaria at the Outpatient department for children below 5 years reduced from 10.9% in 2016 to 10.8% and to 8.2% in 2017 and 2018 respectively in the intervention arm while in the control arm, it was at 13% in 2018. On the other hand, severe malaria reduced from 24.6% in 2017 to 15.9% in 2018. And In-patient deaths due to malaria for children under 5 reduced from 13.4% in 2016 to 5.4% in 2017 to 2.8% in 2018 on intervention arm.

**Conclusion:** To realize positive outcomes in the long run, there's need for a holistic approach at the community level to completely fight malaria in the region, since it greatly impacts on the country's economy and reverses the Gross domestic Product (GDP) since a lot of money is spent in treating malaria.

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### *SCHISTOSOMA MANSONI* INFECTION AMONGST SCHOOL-AGE CHILDREN IN MAROLAMBO, MADAGASCAR: RESULTS FROM A THREE YEAR ANNUAL FOLLOW-UP STUDY

**Spencer S.A.[1], Penney J.[2], Linder C.[2], Russel H.[2], Hyde K.[2], Henstridge-Blows J.[2], Young I.[1], Stothard J.R.[3], Bustinduy A.L.[4], Rahetilahy A.[5]**
[1]*North Bristol NHS Trust, Bristol;*
[2]*University of Manchester, Manchester;*
[3]*Liverpool School of Tropical Medicine, Liverpool;*
[4]*London School of Hygiene & Tropical Medicine, London, UK;*
[5]*Ministère de la Santé Publique, Antananarivo, Madagascar*

**Introduction:** *Schistosoma mansoni* causes substantial disease burden in eastern Madagascar, where prevalence of egg-patent infections can be greater than 94%. Madagascar Medical Expeditions (MADEX) is a voluntary research organisation set up by students from the University of Manchester to tackle this issue, integrating activities alongside actions of the national control programme.

**Aim:** To investigate and monitor schistosomiasis prevalence and morbidity in school-age children in response to annual mass drug administration (MDA).

**Methods:** Repeated cross-sectional surveys across six villages in the Marolambo district, every June from 2015 to 2017. Prevalence of *S. mansoni* was determined by Kato-Katz stool microscopy and urine circulating cathodic antigen (CCA) tests. Eggs of *S. mansoni* were visualised by microscopy with eggs per gram of stool (epg) calculated.

**Results:** Prevalence of *S. mansoni* by urine-CCA decreased from 94% (2015) to 88% (2017) (p=0.005) although prevalence of egg-patent infection did not change significantly (74% to 77%; p=0.27). However, the mean epg dropped from 482 to 277 (p <0.001) from 2015 to 2017. More importantly, heavy infections (>400 epg) declined from 32.1% (69/215) in 2015 to 17.1% (39/228) in 2017 (p<0.0001) while moderate infections did not change significantly (31.2% (67/215) to 36.4% (83/228); p=0.24)

light infections increased (36.7% (79/215) to 46.5% (106/228; p=0.04). Similar changes were observed in grading urine-CCA Results: reduction of 3+ grades from 32.9% (125/379) in 2015 to 3.1% (9/295) in 2017 and decrease of 2+ grades from 32.5% to 10.8% while increase in trace/1+ CCA grades from 28.4% (108/379) to 73.9% (218/295).

**Conclusion:** Despite annual MDA of praziquantel in this region, the prevalence of egg-patent infections remains a significant public health challenge. Although we have seen a general shift in the intensity of infection with *S. mansoni* from heavy to light, the overall prevalence remained unchanged (according to stool microscopy) thus we recommend biannual MDA is required in this high transmission zone.

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### CHILDHOOD CUTANEOUS TUBERCULOSIS: CLINICO-EPIDEMIOLOGICAL PROFILE FROM NEPAL

**Bhattarai S.[1], Shrestha S.B.[1], Pradhan S.[2]**
[1]*Dept. of Dermatology and Venereology, Kathmandu Medical College;*
[2]*Dept. of Clinical Pathology, Kathmandu Medical College, Kathmandu, Nepal*

**Background:** Although cutaneous tuberculosis constitutes a small percentage of extra pulmonary tuberculosis, it has not been fully documented in Nepal and more so in the pediatric population. Early detection and intervention could result in fewer morbidities and mortalities.

**Aims:** The aim of the study was to assess the epidemiology and clinical profile of childhood cutaneous tuberculosis at Kathmandu Medical College and Teaching Hospital, Nepal.

**Material and Methods:** Children (below 15 years of age) with cutaneous tuberculosis who attended the teaching hospital between April 2008 and Dec 2018 were studied.

**Results:** A total of 18 children with skin tuberculosis were identified during the study period, which constituted 34% of all patients with skin tuberculosis. There were 11 boys and 7 girls with a mean age of 8.8 years. The duration of the lesions ranged from 1 month to 4 years and 13 (76.5%) were brought for medical help after six months of onset of the disease. Lower limb was the most common site of involvement. Of the various patterns of cutaneous tuberculosis; scrofuloderma and lupus vulgaris were wthe most common in 7 (33.3%) followed by, erythema nodosum 2 (11.2%) and gumma 1 (0.05%). Combination of lupus vulgaris and scrofuloderma was noted in one patient. Three patients (16.6%) had internal organ involvement as pulmonary tuberculosis.

**Conclusion:** The pattern of skin tuberculosis had a wide variation with a few of them having systemic involvement. Therefore, these patients need a thorough evaluation or a uniform standard therapeutic regimen to cover both internal organ and cutaneous tuberculosis. Active surveillance and BCG vaccination could help reduce the burden of childhood cutaneous TB and its further dissemination which till now has reduced the incidence in children.

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### THE IMPACT OF INSULIN DONATIONS FOR CHILDREN IN 43 LOW- AND MIDDLE-INCOME COUNTRIES

**Hogerzeil H.V., Recourt S.**
*Dept. of Health Sciences Global Health, University Medical Centre Groningen, The Netherlands*

**Introduction:** Diabetes mellitus is rapidly becoming one of the major diseases affecting people's health globally. Over half of 100 million

diabetes patients who need insulin to survive, especially in low and middle-income countries (LMIC), are not able to get this life-saving medicine. Since 2000 the three major insulin-producing companies have started support programmes, some with a component of insulin donations, to children and youth with type 1 diabetes in 43 LMIC. The impact of these programmes has rarely been studied.

**Aim:** Study the impact of support programmes with a component of insulin donation in 43 Low- and Middle Income countries, over the period 2009-2016. This study is part of Health Action International's ACCISS study (Addressing the Challenge and Constraints of Insulin Sources and Supply).

**Methods:** Literature review of company and foundation websites, annual reports, peer-reviewed and grey literature, and conference presentations; discussions with key stakeholders from national diabetes programmes in LMIC and international experts.

**Results:** Public reporting is scattered, incomplete and sometimes inconsistent. Most programmes report large increases in the number of diabetes treatment centres. The estimated number of children and young adults benefitting from insulin donations rose from 8'193 in 2009 to 35'382 in 2015. The average body weight and/or body mass index increased from 4-23% over three years. The median reported HbA1c value after 1-3 years of treatment was 8,4% (range 7,9-9,8%), and 9,5% (range 8,2-10,43%) after 6-8 years. In several programmes the frequency of serious and fatal complications was reduced. Insulin donation programmes can lead to changes in national health systems.

**Conclusion:** We conclude, contrary to common belief, that the diagnosis, treatment and prevention of fatal complications in children with type 1 diabetes in LMIC is very well possible in practice. Medicine donations can never offer a sustainable solution and we now propose a ten-step transition process towards a fully sustainable national diabetes care and prevention programme for children and youth with diabetes type 1.

**Reference:**

1. Hogerzeil HV, Recourt S. Company and company-supported programmes with a component of donated insulin in low- and middle-income countries. Amsterdam: Health Action International, 2017. ACCISS report.

## 196

### ORAL FEXINIDAZOLE FOR GAMBIENSE HUMAN AFRICAN TRYPANOSOMIASIS: THE WHO TREATMENT GUIDELINES

Franco J.R., Priotto G., Barrett M., Chappuis F., Diarra A., Ebeja A.K., Kazumba L., Lejon V., Lindner A., Mwamba Miaka E., Olema E., Seixas J., Simarro P.P.
*WHO Guidelines Development Group for Human African Trypanosomiasis (HAT) Treatment*

Human African trypanosomiasis due to *Trypanosoma brucei gambiense* (g-HAT) is one of the neglected tropical diseases. Despite tremendous improvements, g-HAT treatment is disease stage dependent and remains complex, with intravenous therapy and hospitalization for second stage. Fexinidazole, developed by the Drugs for Neglected Diseases *initiative* (DND*i*) and partners, is the first oral monotherapy against g-HAT. Effective in both disease stages, fexinidazole also simplifies the diagnostic approach by not necessarily requiring a lumbar puncture and CSF examination for disease staging. In November 2018, the European Medicines Agency (EMA) adopted a positive opinion for fexinidazole treatment of g-HAT under article 58, a mechanism designed for drugs intended for use outside the EU. The approval of fexinidazole is a breakthrough in management of the disease. However, as pointed out in the EMA's

scientific opinion, this new drug also has limitations: Patients with severe central nervous system involvement are at higher risk of failing treatment with fexinidazole.

In December 2018, the WHO Guideline Development Group on the treatment of HAT met in Geneva. Backed-up by an independent evidence review using the GRADE approach (Grading of Recommendations Assessment, Development and Evaluation), an international panel of experts formulated new recommendations. Available evidence, the benefits and limitations of fexinidazole, resource implications, patient values and the aim of disease elimination were considered. The new WHO guidelines for the treatment of g-HAT, implicating fundamental changes for clinical practice, will be presented.

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### THE CHALLENGE OF THE LABORATORY DIAGNOSIS IN A CONFIRMED CONGENITAL ZIKA VIRUS SYNDROME IN UTERO: A CASE REPORT

Soriano-Arandes A.[1], Sulleiro E.[2], Rodó C.[3], Frick MA.[1], Rando A.[2], Suy A.[3], Espiau M.[1], Martín-Nalda A.[1], Pumarola T.[2], Soler-Palacín P.[1]
*[1]Paediatric Infectious Diseases and Immunodeficiencies Unit, Hospital Universitari Vall d'Hebron;*
*[2]Dept. of Microbiology, Hospital Universitari Vall d'Hebron;*
*[3]Dept. of Obstetrics, Hospital Universitari Vall d'Hebron, Barcelona, Spain*

**Introduction:** Congenital Zika virus (ZIKV) infection has been associated to microcephaly and other malformations. Laboratory diagnosis should rely on the detection of ZIKV-RNA, ZIKV-IgM response, or the persistence of the ZIKV-IgG serological response beyond the first months of age. However, there are important challenges for ZIKV laboratory diagnosis, partly due to the narrow ZIKV viremia time-frame.

**Aim:** To describe the clinical and laboratory outcomes at age 24 months of the first European alive case of Congenital ZIKV Syndrome (CZS).

**Methods:** To assess the risk of foetal involvement any pregnant woman was screened for ZIKV infection following the US-CDC protocol since February 2016 (1). Confirmed maternal ZIKV infection was defined when ZIKV RT-PCR tested positive during pregnancy. At birth, ZIKV RT-PCR assays of the maternal and neonatal samples were also performed. Infant serological ZIKV IgM/IgG responses were tested during the first 24 months of age. Any child born to ZIKV-infected mother was followed-up as per protocol at approximately 1, 4, 9, 12, 18-21, and 24 months of age, by a multidisciplinary team.

**Results:** We describe a two-year-old girl born in Barcelona to a confirmed ZIKV-infected mother. Maternal ZIKV RT-PCR tested positive for serum in the first term of pregnancy, and later in amniotic fluid. Foetal MRI revealed bilateral ventriculomegaly, a shortened corpus callosum, brain calcifications, and severe cerebral atrophy. Amniotic genetic and TORCH testing were respectively normal and negative. She was delivered at 37 weeks' gestation showing microcephaly and features of foetal brain disruption sequence. All neonatal ZIKV RT-PCR assays were negative, ZIKV-IgM was negative in serum and CSF, and congenital TORCH infections were ruled out. Postnatal neuroimaging studies confirmed the foetal findings. At 24 months of age her head circumference was 40.5cm (-4.8 z-score). The patient never tested positive for ZIKV RT-PCR or specific ZIKV-IgM. Her ZIKV-IgG response was monitored, seroreversion was first observed at 21-m-old, and confirmed at 24-m-old.

**Conclusion:** We presume that prenatal ZIKV infection ends during intrauterine life causing direct injury to foetal brain and other organs, therefore the infant's immune system is unable to build up a consistent immune response thereafter.

**Reference:**
Petersen EE, Staples JE, Meaney-Delman D, et al. Interim guidelines for pregnant women during a Zika virus outbreak- United States, 2016. MMWR January 22, 2016; 65(2): 30-33.

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### INCREASING UNCERTAINTY ON THE DENGUE VACCINE: A THEMATIC ANALYSIS OF THE ACUTE MEDIA COVERAGE OF THE PHILIPPINE DENGUE VACCINATION

**Valido E., Jumalon N.J., Roberto G.**
*Alliance for Improvement of Health Outcomes*

**Introduction:** The Philippines introduced the only mass dengue vaccination to school children in 2016 and has halted the vaccination after a dengue vaccine controversy in late 2017. Media coverage of the event played a role in shaping public opinion and has affected the acceptability of the dengue vaccine and other vaccines.

**Aim:** The study aims to explore the themes that emerge acutely after the start of the dengue controversy that could have affected dengue vaccine perception.

**Methods:** Online news clips were collected main news outlets in the country daily from Nov 31-Dec 31, 2017. The coding instrument captured how the headline was depicted, how the vaccine and vaccination was labelled, how the program was initiated, the pharmaceutical industry response, political motivations and societal issues surrounding the vaccine and vaccination and information on dengue. All three authors coded and codes were managed using Open Code 4.03.

**Results:** There were 308 articles recorded from 7 news websites. Analysis showed that media focused on the political motivations in running the mass dengue vaccination and to the unconfirmed child deaths that were associated to the vaccine.

**Conclusion:** The media focus on the possible corruption in the vaccine program and unverified cause of deaths of children vaccinated may have generated negative sentiment towards the dengue vaccine and general public vaccines.

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### IMPACT OF CONCOMITANT ADMINISTRATION OF ORAL OR INJECTABLE POLIOVIRUS VACCINE ON ROTARIX IMMUNOGENICITY IN SOUTH INDIA

**Parker E.P.K.[1,2], Babji S.[3], Sindhu K.N.[3], Immanuel S.[3], Kumar V.[3], John A.J.[3], Ganesan S.K.[3], Praharaj I.[3], Kang G.[3], Iturriza-Gómara M.[4], on behalf of the RoVI Consortium**
[1]*London School of Hygiene and Tropical Medicine, London, UK;*
[2]*Imperial College London, London, UK;*
[3]*Division of Gastrointestinal Sciences, Christian Medical College, Vellore, India;*
[4]*Global Vaccine Research Centre, Institute of Infection and Global Health, University of Liverpool, Liverpool, UK*

**Introduction:** The World Health Organization currently advocates the use of inactivated poliovirus vaccine (IPV) in combination with oral poliovirus vaccine (OPV) across much of the globe, although OPV will eventually be withdrawn to achieve a polio-free world. In India, oral rotavirus vaccination has recently been introduced into the infant immunisation programme with the aim of reducing the substantial burden of rotavirus-related mortality and morbidity. However, it is well known that in India, as in other low- and middle-income countries, rotavirus vaccine efficacy and effectiveness are lower than in high-income countries. One potential contributor to the impaired performance of oral rotavirus vaccine is the concomitant administration of OPV, which may interfere with vaccine immunogenicity.

**Aim:** We conducted a study in Vellore, India, to assess the immunogenicity of rotavirus vaccine administered concomitantly with either OPV or IPV.

**Methods:** Starting at 6 weeks of age, 305 infants were given either OPV (n = 206) or IPV (n = 99) with two doses of Rotarix®, 4 weeks apart. The OPV and IPV arms were sequentially recruited. Blood samples were collected pre-vaccination and 4 weeks post-vaccination to assess rotavirus-specific IgA levels. In addition, stool samples were collected 1 week after each rotavirus vaccine dose to measure vaccine virus shedding.

**Results:** Rotavirus-specific IgA levels post-vaccination were similar in the OPV and IPV arms (geometric mean concentrations and 95% confidence intervals of 23.3 [17.6, 30.7] and 18.3 [12.5, 26.7], respectively; p = 0.31) and the proportion of infants seroconverting to Rotarix® was also comparable (119/206 [57.8%] and 62/99 [62.8%], respectively; p = 0.42). Although fewer infants in the OPV arm shed rotavirus vaccine after the first dose compared with those receiving IPV, this was overcome during the second dose, in which shedding was more common in the OPV arm.

**Conclusion:** Our Results show that OPV is unlikely to be responsible for the lower immunogenicity and protection conferred by rotavirus vaccines, and that the planned switch to IPV should not alter rotavirus vaccine effectiveness in India.

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### *EX VIVO* EVALUATION OF CELLULAR IMMUNE RESPONSES ELICITED IN HUMAN PBMC BY LIVE ATTENUATED *LEISHMANIA* PARASITE VACCINE CANDIDATE

**Salotra P.[1], Avishek K.[1], Selvapandiyan A.[2], Gannavaram S.[3], Ramesh V.[4], Nakhasi H.L.[3]**
[1]*ICMR-National Institute of Pathology, New Delhi, India;*
[2]*JH- Institute of Molecular Medicine, New Delhi, India;*
[3]*Division of Emerging and Transfusion Transmitted Diseases, CBER, FDA, Bethesda, USA;*
[4]*Dept. of Dermatology, Safdarjung Hospital, New Delhi, India*

**Introduction:** Visceral leishmaniasis (VL) is a potentially fatal disease with an annual incidence of 50,000 to 90,000 worldwide and over 600 million people at risk. In the absence of a suitable and cost-effective anti-leishmanial drug, a viable alternative choice for the control of this disease is immuno-prophylaxis. We have developed a live attenuated *L. donovani* parasite as a vaccine candidate by deletion of growth regulating centrin1 gene (*Ld*Cen1$^{-/-}$) and demonstrated it to be safe, immunogenic and protective in various animal models including mice, hamsters and dogs.

**Aim:** Evaluation of the vaccine potential of *Ld*Cen1$^{-/-}$ for human VL by identifying correlates of protection induced in human PBMCs obtained from healthy individuals and those pre-exposed to *Leishmania*.

**Methods:** Infectivity of *Ld*Cen1$^{-/-}$ to human PBMC derived macrophages was evaluated microscopically following Diff-Quik staining. Cytokine levels in supernatants of PBMCs infected with wild type (*Ld*1S) or *Ld*Cen1$^{-/-}$ parasites was estimated using multiplex cytokine ELISA in healed VL (HVL, n=15), post kala-azar dermal leishmaniasis (PKDL, n=15), healthy (n=15) and VL (n=7) groups. A total of 8 human cytokines representative of Th1/Th2/Th17 response were analyzed. Cellular source of cytokines was determined using flow cytometry.

**Results:** Infectivity of macrophages with *Ld*Cen1$^{-/-}$ was similar to that of *Ld*1S parasite. PBMCs from HVL and PKDL patients showed predominant Th1 response with significant induction of IFN-$\gamma$, TNF-$\alpha$ and IL-2 in response to infection with *Ld*1S or *Ld*Cen1$^{-/-}$ parasites, compared to

uninfected cells. IL-4 and IL-10 levels remained unaltered in all the groups. Significant increase was found in IFN-$\gamma$ secreting CD4+ and CD8+ T cells in PBMCs of HVL group, with no increase in IL-10 secreting cells.

**Conclusions:** *Ld*Cen1$^{-/-}$ have great potential as live vaccine candidates against VL since they elicit strong protective immune response in human PBMCs from HVL, similar to the wild type parasite infection, mimicking a naturally acquired protection following cure. As a prerequisite for clinical trials, cGLP grade *Ld*Cen1$^{-/-}$ parasites have been prepared in collaboration with partners from industry. Toxicological studies in animals and evaluation of the immune responses elicited in human PBMCs *ex vivo* after exposure to the cGLP grade *Ld*Cen1$^{-/-}$ vaccine candidate are under way.

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### PARTICIPATORY RESEARCH METHODS TO IMPROVE COMMUNITY ENGAGEMENT AND PROGRAMME COVERAGE FOR MASS DRUG ADMINISTRATION

**Lar L.A.[1], Adekeye T.[1], Oluwole A.[1], Yashiyi J.N.[1], Isiyaku S.[1], Dixon R.[2], Dean L.[3], Thomson R.[4], Theobald S.[3], Bongkiyung P.[3], Ozano, K.[3]**
[1]Sightsavers, Kaduna, Nigeria;
[2]Sightsavers, UK;
[3]Liverpool School of Tropical Medicine, Liverpool, UK;
[4]COUNTDOWN, Liverpool, UK

**Introduction:** Nigeria has the largest burden of neglected tropical diseases (NTD) in sub-Saharan Africa. Recent changes in context, workforce and partnerships have led to decreased community engagement in the programme and coverage. In response, participatory action research (PAR) was conducted with stakeholders from the federal, state and local level and with non- governmental organizations.

**Aim:** To utilize a PAR approach to generate practical and sustainable modifications to NTD programme delivery to improve community engagement and equity by addressing barriers to availability, accessibility and acceptability of medicines in rural and urban settings.

**Methods:** Four phases: *Phase one* used participatory research (e.g. transect walks and ranking exercises) methods with community members and influential leaders to identify bottlenecks and solutions to improve engagement. *Phase Two* involved the adoption of innovative solutions. An enhanced package of programme delivery was co-created with programme implementers with innovative intervention ideas selected and monitored using observations, ethnography of the mass drug administration (MDA) process in communities. *Phase Three* will be the implementation of the developed community engagement strategy including a process and quality evaluation. *Phase Four* will involve a reflection workshop with stakeholders to assess the challenges and successes and develop recommendations for the next cycle of MDA.

**Results:** Preliminary findings from the ongoing PAR cycle showed engagement at different levels of the health system and between sectors and a more innovative and holistic approach to solution-based problem-solving. For example, stakeholders identified relevant community structures that could optimize community engagement and reviewed information, education and communication materials for more effective health education. Using innovative participatory research processes which considered intersectional data collection of gender, age and education ensured an equitable approach to solution finding and ownership of the programme. Engaging health systems actors as co-researchers presents opportunities for capacity strengthening and sustainability of the PAR process.

**Conclusion:** Using a PAR approach to foster multisectoral collaboration and partnerships results in the instant application of research findings in an ongoing solution-focused manner. It promotes mechanisms of health systems design and development that can allow for shared governance between sectors that enhance progress toward collaborative goals for social development.

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### THE PARASAHARA PROJECT: SCHISTOSOMIASIS EPIDEMIOLOGY AND CONTROL AT THE LAKES OF OUNIANGA IN THE SAHARA DESERT IN CHAD

**Moser W.[1,2], Ott R.[1,2], Batil A.A.[3], Greter H.[1,2]**
[1]Swiss Centre for International Health, Swiss Tropical and Public Health Institute, Basel, Switzerland;
[2]University of Basel, Basel, Switzerland;
[3]Institut de Recherche en Elevage pour le Developpement, N'djamena, Chad

**Introduction:** Schistosomiasis is a water borne parasitic infection predominantly occurring in Sub-Saharan Africa. In Chad, single case reports pointed at the disease being present in the Sahara desert, specifically at the lakes of Ounianga. The PARASAHARA project was initiated to investigate whether schistosomiasis is prevalent and if transmission is taking place in the Sahara.

**Aim:** This research aims at elucidating the schistosomiasis epidemiology at the lakes of Ounianga, with the goal to identify, test and validate a context adapted intervention in a setting where no schistosomiasis control programme is in place, as is the current situation in Chad.

**Methods:** An epidemiological, sociological and malacological assessment was taking place in January 2019. In order to establish the schistosomiasis prevalence, a population survey was carried out. Urine samples were collected from randomly selected people, tested for haematuria, and subjected to urine filtration followed by microscopy. Focus group discussions (FGDs) addressed knowledge, awareness and perception of schistosomiasis as well as access to treatment. Fresh water sources and water contact sites at different lakes of Ounianga Kebir and Ounianga Serir where systematically searched for the presence or absence of *Schistosoma* spp. intermediate host snail species following a standard protocol (15 min./site).

**Results:** The schistosomiasis prevalence among all age groups was 39% (CI 37.3 – 40.7), with the highest prevalence among school children (50% (CI 48.8 – 51.2)). Typical symptoms such as blood in urine and abdominal pain were mentioned as one of the major health concerns during the FGDs, its cause was also related to water contact. Yet, the population was not aware that these symptoms are caused by a parasite infection, and treatment was mainly traditional. Five snail species were detected at fresh water sources, among these the schistosomiasis intermediate host snail species *Bulinus truncatus* and *Biomphalaria pfeifferi*.

**Conclusion:** We show that schistosomiasis occurs at the Lakes of Ounianga at an elevated prevalence, and that transmission is taking place in the Sahara desert. Due to the remoteness and shear isolation of the population, the setting fits for an intervention trial to control and finally eliminate schistosomiasis locally.

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### THE CATASTROPHIC ECONOMIC BURDEN OF VISCERAL LEISHMANIASIS IN BANGLADESH, INDIA, ETHIOPIA AND SUDAN: FINANCIAL RISK PROTECTION IS NOT ENOUGH

**Paintain L.[1], Boudarene L.[1], Pearson M.[2], Edwards T.[1], Alatiaby A.A.[3], Mondal D.[4], Adera C.[5], Prakash M.[6], Ruiz Postigo J.[7], Argaw Dagne D.[7], den Boer M.[8], Burza S.[1,9], Webster J.[1]**

[1]*London School of Hygiene & Tropical Medicine, London, UK;*
[2]*Mott Macdonald, London, UK;*
[3]*World Health Organisation, Khartoum, Sudan;*
[4]*icddr,b, Dhaka, Bangladesh;*
[5]*KalaCORE Consortium, Ethiopia;*
[6]*Foundation for Health Systems Research, Bangalore, India;*
[7]*World Health Organisation, Geneva, Switzerland;*
[8]*Médecins Sans Frontières, London, UK;*
[9]*Médecins Sans Frontières, New Delhi, India*

**Introduction:** Visceral Leishmaniasis (VL) is a fatal NTDs with characteristics making VL patients and their households particularly vulnerable to catastrophic costs. Financial protection strategies consisting of the provision of free VL diagnosis and treatment are policy in Bangladesh, Ethiopia and Sudan, while an additional treatment completion incentive is used in India.

**Methods:** Cross sectional surveys with a total of 909 VL patients treated at 46 VL treatment facilities in endemic areas of Bangladesh, India, Ethiopia and Sudan were conducted between February and September 2016 and repeated in all sites aside from Bangladesh between March and October 2018 with a total of 777 VL patients. A structured questionnaire was used to collect data on patient and household characteristics, the treatment pathway and the financial and economic cost to the household of the recent VL illness episode, including financial coping strategies.

**Results:** For most VL patients, the pathway from onset of symptoms to VL diagnosis and treatment was long and involved multiple providers; this was particularly the case in South Asia. In all countries, once patients reached a provider with the capacity to manage their VL illness, diagnosis and treatment costs were minimal/zero supporting that VL-specific financial protection strategies were adhered to. However, diagnostic procedures and treatments received before a correct VL diagnosis incurred substantial financial loss for the patient's household. In addition, economic costs of illness, including reported loss of earnings for the patient and caretakers, were approximately double the financial costs. Full economic costs were catastrophic to around 40-50% of VL patients and their households (in relation to average annual household expenditure). The social protection strategy of a fixed-sum cash transfer payment of USD 100 for VL patients in India reduced the proportion of households facing catastrophic costs to approximately 20%.

**Conclusion:** VL illness resulted in substantial economic burden for patients and their households, largely due to medical and non-medical out-of-pocket costs incurred before diagnosis and loss of income to patients and/or caretakers. VL-specific financial risk protection is insufficient to prevent catastrophic health costs for VL patients; broader comprehensive social protection strategies are needed.

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## A HOLISTIC APPROACH TO MYCETOMA MANAGEMENT

**Bakhiet S.**
*The Mycetoma Research Centre (MRC), Khartoum, Sudan*

**Aim:** A study was conducted to assess the effectiveness of a holistic approach to mycetoma case detection and treatment at the village level, to improve patient outcomes by diagnosing earlier in disease progression and treating patients early on and close to home.

**Introduction:** Mycetoma, one of the most badly neglected tropical diseases, is a localised chronic granulomatous inflammatory disease characterised by painless subcutaneous masses and formation of multiple sinuses that produce purulent discharge and grains. In the absence of early and appropriate treatment, it usually spreads to affect deep tissue and bone, resulting in massive damage, deformities and disability. It can also spread via the lymphatics and blood leading to distant secondary satellites associated with high morbidity and mortality.

To date and despite progress in mycetoma research, a huge knowledge gap remains in mycetoma pathogenesis and epidemiology, resulting in the lack of objective and effective control programmes. Currently, the best available disease control method is early case detection and proper management. However, the majority of patients present late with advanced disease, and for many of them, major deforming surgical excisions or amputation are the only treatment options.

**Methods:** The MRC in collaboration with Sennar State Ministry of Health, Sudan established a regional mycetoma centre in an endemic village to pilot a holistic approach to increasing early case detection and treatment. Patients were treated locally at the centre, and local health personnel were trained on early case detection and case management, while the local community was educated on mycetoma and improvement of environmental conditions. This comprehensive approach also addressed patients' socioeconomic constraints that hinder early presentation and treatment, and also included the active engagement of local health authorities, and community and civil society participation, to deliver the best possible case management.

**Results:** This holistic approach for mycetoma patients' management proved to be effective for early case detection and management, optimal treatment and improved treatment outcomes, with more favourable disease prognosis. During the study period, the number of patients with massive lesions and the amputation rate dropped, reducing the disease and socioeconomic burdens on patients and their families.

**Conclusion:** In the absence of more effective therapeutic tools, a holistic and community-based approach, including local availability of treatment, can increase early case detection and treatment, and improve disease outcomes for mycetoma patients.

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## MYCETOMA AND INTEGRATED SKIN NTD MANAGEMENT

**Hay R.[1], Estrada-Castañón R.[2], Estrada-Chávez G.[2], Chávez-López M.G.[2], Bonifaz A.[3]**
[1]*Kings College London, London, UK;*
[2]*Dermatologia Comunitaria, Acapulco, Mexico;*
[3]*Hopital General de Mexico, Mexico*

The skin is the first and most readily available source of clues to diagnosis of many conditions including NTDs; helping disease recognition through skin signs has important implications for diagnosis, mapping, disease control and minimization of stigma. In this talk we will discuss the approach to identifying mycetoma cases adopted in an endemic area of Mexico using a community-based surveillance system, backed by training of community workers using direct contact, teledermatology and a manual adapted for local needs. But this work has highlighted other areas that would benefit from a skin NTD approach. These include the importance of making available simple diagnostic techniques such as direct microscopy in identification of cases; this was identified as an urgent need by an international consensus forum on simple diagnostic support for mycetoma and other fungal NTDs. It provides a focus for a new laboratory training initiative. A second area in development is the use of long range back up support, using a locally established referral network or teledermatology, via either real time or store and forward technology, where advice on the management of complex cases such as mycetoma can be accessed by front line staff. A third area of development lies in using an integrated strategy, together with other skin NTDs, to assess and combat disability and stigma through foot protection, local community groups and care packages. In some endemic areas sporotrichosis and mycetoma co-exist but there are other regions where approaches designed for other non-fungal foot disabilities such a podoconiosis or neuropathic foot injury have been combined in a package of community support which would benefit mycetoma patients.

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### OPPORTUNITIES AND CHALLENGES OF NON-ACADEMIC COL-LABORATIONS DURING PHD TRAINING

**Pissarra J.**
[1]UMR 177 INTERTRYP, Institut de Recherche pour le Développement (IRD), Montpellier, France

**Introduction:** Translation in the context of NTDs goes beyond innovation and R&D. It also means to contribute to capacity building through the continued improvement of research centres and future researchers, to prepare local health facilities and workers, as well as to advocate for the interests of the communities directly affected by NTDs.

**Aim:** Young researchers must be aware of the social, political and economic issues associated with NTDs and have an active role in the translation process. Also, individual communication and organisational skills must be developed to potentiate collaborations. For technology transfer to effectively translate to the field, it is pivotal to bring academic, local stakeholders and industrial partners together. Such partners have great expertise in product development and distribution, and have an important role to play in the deployment of diagnostic or therapeutic technologies.

**Results:** The inclusion of industrial partners in the Innovative Training Network EUROLEISH.net was extremely fruitful from both perspectives. There are 15 projects within this multidisciplinary network, including basic and translational sciences, and implementation projects. All students and projects benefitted from interactions with industrial or non-academic partners, important for leishmaniasis control worldwide, such as the Foundation for New Diagnostics (FIND), Médecins sans Frontières or Glaxo-Smith Kline. The international and innovative character of the collaborations integrated in EUROLEISH.net projects is noteworthy, and students were often a key element in the connection between the academic and private institutions.

**Conclusion:** Such symbiotic collaborations contribute to both the students' professional development and the company's own product portfolios and objectives. Successful collaborations rely on shared purpose and commitment, and imply high trust, interdependent resources, as well as shared leadership and management teams. Indeed, some obstacles are common, such as different goals and expectations among partners, or administrative and intellectual property issues. The main factors that will contribute to the success of industrial and non-academic collaborations, in the context of PhD training networks, are: i) a clear agreement about the common goals and expectations regarding the outcomes (objectives, workloads, methodology); ii) the establishment of data protection and confidentiality documentation; and, finally, iii) the investment in the relationships with periodic meetings and updates.

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### BRIDGING ACADEMIA AND THE PRIVATE SECTOR: THE WAY FORWARD IN DOCTORAL PROGRAMMES TARGETING REAL-WORLD SOLUTIONS

**Bremer Hinckel B.[1,2]**
[1]Dept. of Biomedical Sciences, University of Antwerp, Antwerp;
[2]Coris BioConcept, Gembloux, Belgium

**Introduction:** Over qualification, a late start in the career, frustration and lack of available positions in academia are unfortunately a reality in the life of recently graduated students. Still a great number of traditional doctoral programmes are mostly focused on fuelling controversial and debatable aspects of academia rather than targeting real-world problems. Bridging academia and the private sector can be beneficial for all parts involved.

**Aim:** To present the experience of a recently graduated PhD student who carried out his doctoral programme in close collaboration with the private sector.

**Methods:** The personal experience of a recently graduated PhD student, who carried out most of his doctoral programme in a private organization, will be presented orally. The scientific aims and achievements of the project will be briefly outlined. Points that shall be addressed/discussed include (I) the synergistic effect between the private sector and academia, (II) the importance of straightening this collaboration early on in the career of the graduate student and (III) the overall personal assessment of such a collaborative doctoral programme.

**Results:** Such a collaborative programme is of great advantage for the graduate student as well as for the corporation involved. While the graduate student has the chance of becoming acquainted with the corporative world early on in his career, he serves also as a bridge between the corporation and academia, which has its crucial role in fundamental aspects of research. Having participated in such a modern doctoral programme was of utmost importance for quickly finding a suitable position in a competitive corporate world for the involved graduate student.

**Conclusion:** Given the scarce availability of professorship positions in academia and the reality that a growing portion of graduate students become frustrate along their doctoral programmes, it is important to provide them with a solid training programme that is also a good fit for the private sector. Such a doctoral programme strengthens the collaboration between the private sector and academia, benefiting not only the graduate student involved, but also the private sector and academia. Finally, bridging the private sector and academia increases the chance of bringing real-world solutions for society.

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### ADDRESSING THE SOCIAL DETERMINANTS AND CONSE-QUENCES OF TUBERCULOSIS

**Dixit K.[1], Winfield T.[2]**
[1]Birat Nepal Medical Trust, Kathmandu, Nepal;
[2]Dept. of Clinical Sciences and International Public Health, Liverpool School of Tropical Medicine, Liverpool, UK

**Introduction:** Reducing poverty and health inequality remain a global imperative, enshrined in the United Nation's Sustainable Development Goals. Poorer people have a higher likelihood of ill-health, malnutrition, and limited healthcare access. This talk will highlight that there are few infectious diseases that better illustrate this health-wealth association than TB, the archetypal disease of poverty, and elaborate on socioeconomic support interventions for TB-affected households.

**Objectives:**

- To understand the social determinants of TB infection, disease, and adverse TB treatment outcomes.
- To explore the socioeconomic consequences at an individual- and household-level of being ill with TB disease.
- To review the available evidence on the health and non-health impacts of socioeconomic support for TB-affected households.

**Presentation summary:** This presentation will give a brief overview of the intimate relationship of TB and poverty throughout history. It will then describe recent research addressing the social determinants of TB, including the development of an innovative WHO-endorsed threshold for measuring catastrophic costs of TB-affected households and results from the world's first trial of an integrated socioeconomic intervention to improve TB prevention and cure in TB-affected households (the "HRESIPT" and "CRESIPT" trials in Peru).

Finally, the talk will disseminate preliminary results of an ongoing study developing and evaluating socioeconomic interventions for TB-affected households in Nepal.

**Conclusions:** Expansion of this multi-disciplinary research addressing the social determinants of TB, which involves strong community participation, will lead to policy and practice changes that reduce poverty and improve health and wellbeing of TB-affected households in diverse country settings.

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### ABOUT 125 PATIENTS ONE YEAR AFTER TRICHIASIS SURGERY IN MALI

**Touré A.[1,3], Keita M.[1], Dembélé B.[1], Traoré L.[2], Thonneau P.[3], Rapp C.[4]**
[1]Maladies tropicales négligées, Helen Keller International, Bamako, Mali;
[2]Santé Oculaire, Institut d'Ophtalmologie Tropicale d'Afrique, Bamako, Mali;
[3]Dépt. de Santé, Université Senghor, Alexandria, Egypt;
[4]Maladies tropicales infectieuses, Hôpital militaire Bégin, Saint-Mandé, France

**Introduction:** The World Health Organization's first preventable cause of infectious blindness in the world, trachomatous trichiasis (TT), is the ultimate stage of trachoma evolution before blindness. Poorly operated on, it can recur and continue its evolution towards irreversible blindness, thus aggravating the precariousness of families.
**Aim:** Our study aimed to assess the quality of TT surgery and patient satisfaction in Kayes, Mali.
**Methods:** A cross-sectional study conducted from June 22 to July 1, 2018, on 125 individuals randomly selected from among the 492 individuals operated on for trichiasis in 2017 in the health districts of Kita and Diema, one year after surgery. An experienced ophthalmologist examines the eyes with a magnifying glass at 2.5 mm magnification and a lamp, to look for possible recurrences and complications recorded in a standardized questionnaire. Eye care was provided where appropriate based on the informed consent of the participant.
**Results:** Women represented (62%), the over-60s were the most numerous (66%), with a median age (31 - 101 years). Recurrence (15%) at one year after surgery with a high frequency in women (72%). Minor complications (granuloma types) were 3 or (2%), with (88%) of the operations performed in the beneficiaries' homes. Azithromicin was administered immediately after surgery in 66.4% of cases. Of these, 95% were satisfied with the outcome of their operation.
**Conclusion:** Our study shows that TT surgery is of an acceptable quality. Indeed, TT surgery is a priority in the elimination of trachoma by 2020. In Mali, the National Eye Health Program with its partners, including Helen Keller International, has been working since 2007 to achieve this objective. Since studies have shown that there can be no recurrence, preventing and/or reducing the occurrence of complications would be a key to the success of any program. It is in this sense that the NGO HKI financed this study in order to get an overview of the well-being and satisfaction of the beneficiaries, a highly beneficial and encouraging act.

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### CO-DISPERSAL OF THE BLOOD FLUCK *SCHISTOSOMA JAPONICUM* AND *HOMO SAPIENS* IN THE NEOLITHIC AGE

**Yin M.[1], Zheng H.X.[1], Su J.[1], Feng Z.[2], McManus D.P.[3], Zhou X.N.[2], Jin L.[1,4], Hu W.[1,2]**
[1]State Key Laboratory of Genetic Engineering and Ministry of Education Key Laboratory of Contemporary Anthropology, Collaborative Innovation Center of Genetics and Development, School of Life Sciences, Fudan University, Shanghai, China;
[2]National Institute of Parasitic Diseases, Chinese Center for Disease Control and Prevention, Key Laboratory of Parasite and Vector Biology of the Chinese Ministry of Health, WHO Collaborating Center for Malaria, Schistosomiasis and Filariasis, Shanghai, China;
[3]QIMR Berghofer Medical Research Institute, Brisbane, Australia;
[4]Chinese Academy of Sciences, Key Laboratory of Computational Biology, CAS-MPG Partner Institute for Computational Biology, SIBS, CAS, Shanghai, China

**Introduction:** The global spread of human infectious diseases is of considerable public health and biomedical interest. Little is known about the relationship between the distribution of ancient parasites and that of their human hosts. *Schistosoma japonicum* is one of the three major species of schistosome blood flukes causing the disease of schistosomiasis in humans. The parasite is prevalent in East and Southeast Asia, including the People's Republic of China, the Philippines and Indonesia. We studied the co-expansion of *S. japonicum* and its human definitive host.
**Aim:** To investigate the expansion and migration of *S. japonicum* in South-east Asia.
**Methods:** A total of 119 *S. japonicum* samples were collected from 13 locations endemic for Asiatic schistosomiasis, including Japan, Indonesia, Philippines, Taiwan and mainland China. These 119 complete *S. japonicum* mitochondrial DNA (mtDNA) genomes were sequenced using Next-Generation Sequencing (NGS) technology. The phylogeny of the 119 complete mtDNA sequences was inferred by the Bayesian method via Mrbayes v3.2.1, which was further confirmed by both the maximum likelihood (ML) method via PhyML v3.0 and median-joining network via Network v4.6. The ages of S. japonicum haplogroups were estimated by two strategies of the ML method via PAML package v4.7 and the Bayesian method via BEAST v1.8. The 435 complete human mtDNA sequences of Haplogroups B5, M7 and F were used to construct the BSPs for the human population. The co-expansion of S. japonicum and its human definitive host were calculated from the BSP.
**Results:** It was shown that *S. japonicum* radiated from the middle and lower reaches of the Yangtze River to the mountainous areas of China, Japan and Southeast Asia. In addition, the parasite experienced two population expansions during the Neolithic agriculture era, coinciding with human migration and population growth. The data indicate that the advent of rice planting likely played a key role in the spread of schistosomiasis in Asia.
**Conclusion:** *S. japonicum* radiated from the lake region of China to the other endemic areas with the co-expansion of its human host driven by the rice planting agriculture spreading during the recent 10,000 years.

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### SYNDEMIC OF OPISTHORCHIASIS AND LEPTOSPIROSIS IN THAILAND: A NATIONALWIDE ANALYSIS

**Almanfaluthi M.[1,2], Widodo S.[1,2], Suttiprapa S.[1], Wongsaroj T.[3], Sripa B.[1]**
[1]WHO Collaborating Centre for Research and Control of Opisthorchiasis (Southeast Asian Liver Fluke Disease), Faculty of Medicine, Khon Kaen, Thailand;
[2]Faculty of Medicine, University of Muhammadiyah Purwokerto, Indonesia;
[3]Dept. of Disease Control, Ministry of Public Health, Thailand

**Introduction:** Opisthorchiasis caused by *Opisthorchis viverrini* is an important foodborne trematodiasis in Thailand, Laos and Cambodia.

Interestingly, the opisthorchiasis endemic region overlaps with an area of leptospirosis emergence. Syndemic of opisthorchiasis and leptospirosis needs to be explored.

**Aim:** To investigate the syndemic interaction between *O. viverrini* and *Leptospira sp*, its association with socio-economic determinants, occupation factors and reservoir hosts in Thailand.

**Methods:** Incidence data of opisthorchiasis and leptospirosis for years 2009 and 2014 were obtained from Ministry of Public Health of Thailand. Epidemiological data of opisthorchiasis was aggregated to provincial level and categorized by year so do for leptospirosis and related risk factors. Relationship between *O. viverrini* prevalence and leptospirosis morbidity rate were analyzed using linear regression. Correlation among socio-economic status, occupation risk and reservoir hosts factor was analyzed by Pearson's product moment correlation. To account for over-dispersion of Poisson data distribution, generalized linear negative binomial regression models were used to adjust the trend among regions and 2 different time setting across all risk factors.

**Results:** We found compelling evidence *O. viverrini* infection act as synergistic syndemic enhancing leptospirosis incidence (P<0.001). Interestingly, it also performs as counter syndemic reducing the number of case fatality rate particularly in north-eastern region. The level of poverty significantly showed high positive correlation for opisthorchiasis and leptospirosis incidence (P<0.001, r=0.6 and 0.4, respectively), followed with significant negative correlation for provincial GDP, income per-capita and individual income (P <0.001, r=-0.3, -0.6, -0.6, respectively). Northeast region significantly has the highest poverty level and the lowest economic saving in both year (based on subset regional analysis). Moreover, north-eastern region has the highest proportion for high risk workers for both diseases. Working in agriculture sector and animal husbandry correlate positively high (all P<0.001 and all r-value >0.4). Similarly, the role of animal reservoirs (particularly, dogs, buffalo and cows) showed high positive correlation to the syndemic between *O. viverrini* and *Leptospira sp* (r= 0.2, 0.5, and 0.3, P<0.001, respectively).

**Conclusion:** This study provides the syndemic evidence of opisthorchiasis and leptospirosis, particularly in Northeast Thailand and is highly associated with determinants tailing to the characteristics of neglected tropical diseases.

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### IMPORTED MALARIA IN WESTERN ROMANIA: A 9 YEAR RETRO-SPECTIVE STUDY

**Lupu M.A.[1,2], Lazureanu V.E.[1,3], Pasat A.A.[1], Olariu T.R.[1,4]**
[1]*Victor Babes University of Medicine and Pharmacy, Timisoara;*
[2]*Institute of Cardiovascular Diseases, Timisoara;*
[3]*"Victor Babes" Infectious Diseases Hospital, Timisoara;*
[4]*Municipal Clinical Emergency Hospital, Timisoara, Romania*

**Introduction:** Malaria was eradicated from Romania in 1963. Since then, it has been imported into the country by international travellers and immigrants from endemic regions.

**Aim:** The aim of the study was to evaluate the epidemiological, clinical, laboratory and therapeutic data of patients diagnosed with malaria in Western Romania over a period of 9 years.

**Methods:** A retrospective study was conducted on patients admitted to „Victor Babes" Infectious Diseases Hospital in Timisoara, Romania, between 01.01.2010-31.12.2018. Seventeen patients with malaria were diagnosed and included in this study. Clinical and epidemiological data were collected from patients' medical records.

**Results:** The 17 patients aged 19 to 60 years (mean=35.9), 15(88.2%) were males. Two patients were refugees from Eritrea (Africa), 2 were travelers returning from Asia and 13 from Africa. The journey time for travelers ranged from 2 weeks to 2 years. Eleven patients did not follow

any chemoprophylaxis and 6 followed an incomplete chemoprophylaxis prior or during their stay in malaria endemic regions. Symptomatology at admission included fever and shiver (100%), headache (47.1%), myalgia (23.5%) and diarrhea (23.5%). Time between arriving in Romania from a malaria endemic country and the onset of symptoms for malaria ranged between 2 days and 7 months. Malaria was confirmed by parasite detection in thin and/or thick blood smear. Thirteen patients were diagnosed with *Plasmodium falciparum*, two with *P.vivax* and one with *P.malariae;* a mixed infection of *P.falciparum* and *P.malariae* was reported in one patient. Hepatosplenomegaly was described in 3(17.6%) patients, splenomegaly in 4(23.5%), thrombocytopenia in 14(82.4%), anemia in 5(29.4%) and jaundice in 2(11.8%). The hospitalization period ranged between 1 and 19 days, with a mean length of hospital stay of 7.6 days. All patients received antimalarial drugs and had a favorable outcome, except one female patient, infected with *P.falciparum,* who died.

**Conclusion:** The number of malaria cases can increase in Romania in the near future due to increasing number of refugees, tourists and work-travelers to tropical regions and because prevention measures are not applied/known or are ignored by the travellers.

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### COMMUNITY-BASED SCREENING FOR CHAGAS DISEASE AND STRONGYLOIDIASIS AMONG LATIN AMERICAN MIGRANTS IN ALICANTE, SPAIN

**Ramos-Rincón J.M.[1], Llenas-García J.[2], Gil-Anguita C.[3], Gregori-Colomé J.[2], Garijo-Saiz A.M.[3], Wikman-Jorgensen P.[4], Torrús-Tendero D.[1], Ventero-Martín M.P.[5], Flores-Chávez M.[6], Navarro-Beltrá M.[7], on behalf of the #AlicanteSinChagas Network**
[1]*Internal Medicine Dept., Hospital General Universitario de Alicante – ISABIAL, Alicante;*
[2]*Internal Medicine Dept., Hospital Vega Baja - FISABIO, Orihuela;*
[3]*Internal Medicine Dept., Hospital Marina Baixa, La Vila Joiosa;*
[4]*Internal Medicine Dept., Hospital Clínico Universitario de Sant Joan d'Alacant – FISABIO, Alicante;*
[5]*Dept. of Microbiology, Hospital General Universitario de Alicante-ISABIAL, Alicante;*
[6]*Reference and Research Laboratory in Parasitology, Centro Nacional de Microbiología / Fundación Mundo Sano, Madrid;*
[7]*Public Health, History of Science and Gynecology Dept., Universidad Miguel Hernández – FISABIO, Alicante, Spain*

**Introduction:** Chagas disease (CD) and strongyloidiasis are parasitic infections endemic in Latin America. Asymptomatic cases may host the parasites for years unaware of the infection.

**Aim:** To describe the prevalence of CD and strongyloidiasis in Latin American migrants attending a community-based screening campaign.

**Methods:** A community-based screening campaign of CD and strongyloidiasis was simultaneously carried out in three municipalities of the province of Alicante (Spain), on 28th October 2018. After an informative talk, a blood sample of each participant was obtained to perform the serological tests. Two different ELISAs were performed against *T. cruzi*; a third test (IFAT) was used in discordant cases. Two positive serological test results were required to consider a person infected with *T. cruzi*. *Strongyloides spp.* serology was performed using *Strongyloides* IgG IVD-ELISA (DRG Instruments GmbH, Marburg, Germany).

**Results:** 369 people were screened, of whom 70 were children (19.0%). Of the 299 adults, 223 were women (60.4%). Main countries of origin were Bolivia (n = 133), Ecuador (n = 108) and Colombia (n = 28). Thirty-three participants (8.9%) had a positive *T. cruzi* serology, all of them adults of Bolivian origin. Seroprevalence in Bolivians was 25% (33/132) (p <0.001). No person screened under 18 was positive for *T. cruzi*, while 11% of adults

were positive (p = 0.004). Seroprevalence was 9.5% in women and 13.3% in men (p = 0.3) and was higher in the age group >40 years old (14.7% vs 7%; p = 0.04).

*Strongyloides* spp. seroprevalence was 10% (37/369), 5.7% in participants under 18 and 11.0% in adults (p = 0.2). Seroprevalence was of 12.9% in Bolivians, 11.1% in Ecuadorians and 10.7% in Colombians. More men were infected (16.7% vs 7.3%; p <0.01), with no significant difference by age. Six participants (1.6%) were co-infected with *T. cruzi* and *Strongyloides*, all of them adults >40 years old (p = 0.03) and from Bolivia.

**Conclusions:** Seroprevalence of CD in Latin American asymptomatic migrants was 9%. All the positive cases were adults from Bolivia. One in four Bolivian adults screened had CD. The seroprevalence of *Strongyloides spp* infection was 10%; children under 18 were also infected (5.7%).

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### CHAGAS DISEASE IN THE UNITED KINGDOM: A REVIEW OF CASES MANAGED AT THE HOSPITAL FOR TROPICAL DISEASES, LONDON 1995 – 2018

**Nolder D.[1], Dawood N.[2], Garcia Mingo A.[2], Gonzalez Sanz M.[2], De Sario V.[2], Alvarez M.[3], Lowe P.[2], Yacoub S.[4], Moore D.[1,2], Chiodini P.L.[1,2]**
[1]*Faculty of Infectious Diseases, London School of Hygiene and Tropical Medicine, London, UK;*
[2]*Hospital for Tropical Diseases, London, UK;*
[3]*IS Global Barcelona, Barcelona, Spain;*
[4]*Imperial College London, UK*

**Aim:** Chagas disease (CD) in non-endemic areas is an increasing concern. The Hospital for Tropical Diseases (HTD) provides tertiary care for management of *T. cruzi* infection in the UK. All cases of CD diagnosed at HTD between 1995 and 2018 were reviewed.

**Methods:** Patients were identified based upon positive CD serology from samples tested at The National Parasitology Reference Laboratory. Electronic records and paper notes were reviewed to analyse demographics, presentation, symptoms and case management.

**Results:** A total of 60 patients with serologically-confirmed CD were identified. 42 were female (70%). Median age was 37 years (1-58 years). All were born in Latin America, most in Bolivia (n=45, 75%). 67% were aware of their CD diagnosis on arrival in the UK (n=40). 46.7% were asymptomatic at presentation (n=28). Symptomatic patients reported cardiac, gastrointestinal or a combination of both (26.7%; 18.3%; 8.3% respectively). ELISA was positive in all; median IFAT titre 1:160 (1:20 to 1>2650). PCR was positive in 8 (13%) and equivocal in 2 (3.3%). Amongst patients with cardiac complaints, 62% had at least one abnormal cardiac test. Only 7% of patients with gastrointestinal symptoms had abnormal gastrointestinal studies. 25% of asymptomatic cases had abnormal cardiac and/or gastrointestinal investigations.

Seven patients (11.7%) had already been treated when presenting to HTD; eight (13.3%) were not eligible for treatment; six (10%) declined therapy; three (5%) are considering treatment and five (8.3%) were lost to follow up before treatment was discussed. 31 patients (51.7%) treated at HTD. 29 received Benznidazole as first line, 20 reported side effects and five of those were switched to Nifurtimox. Seven cases were treated with Nifurtimox, two as first line, 5/7 reported side effects, and 3 discontinued treatment.

**Conclusion:** It is important to recognize cases of imported CD. Urgent action is required to raise awareness of this disease among health care workers and Latin American migrants in the UK. Special efforts should be made to include pregnant women, babies born to mothers infected by CD, patients immunocompromised or due to receive immunosuppression, and relatives of CD patients. Cases identified should be referred to a specialist centre for management.

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### EMPOWERING MALARIA RESEARCH IN AFRICA: CONTROLLED HUMAN MALARIA INFECTION IN TANZANIA, KENYA, GABON, MALI, EQUATORIAL GUINEA AND THE GAMBIA TO TEST THE EFFICACY OF MALARIA VACCINES AND DRUGS AND TO INVESTIGATE INNATE RESISTANCE AND ACQUIRED IMMUNITY TO MALARIA

**Richie T.L., for the International PfSPZ Consortium**
*Clinical Dept., Sanaria Inc., Rockville, USA*

**Introduction:** Controlled human malaria infection (CHMI) by mosquito bite has been used for decades to test new malaria vaccines and drugs. However, African research institutions have not used this key research tool due to costs and safety concerns regarding the importation of the Anopheles stephensi vector.

**Aim:** Sanaria Inc. has developed methods to manufacture, purify and cryopreserve aseptic Plasmodium falciparum sporozoites (PfSPZ) that meet all regulatory requirements. With support from the International PfSPZ Consortium, PfSPZ Challenge, composed of non-attenuated, fully infectious PfSPZ, has been developed as a standardized "challenge in a bottle" for conducting CHMI without the requirement for mosquitoes. Sanaria's aim is to support African research institutions in using PfSPZ Challenge to test malaria vaccines and drugs in endemic populations.

**Methods:** PfSPZ Challenge is stored in liquid nitrogen vapor phase and shipped to African countries from Sanaria's clinical manufacturing facility (CMF) in Rockville Maryland. 3200 PfSPZ are injected by direct venous inoculation (DVI), a nearly painless procedure that reliably induces parasitemia in malaria-naïve recipients. Six days later, research subjects begin daily follow-up by thick blood smear (TBS), PCR assay and clinical assessment. Parasitemia is treated with a standard course of antimalarial drugs, and subjects remaining parasite free are treated empirically on day 28.

**Results:** CHMI by PfSPZ Challenge has now been conducted 25 times in 6 African countries: 2 CHMIs to optimize methodology, 17 to study vaccine efficacy, 5 to study malaria biology and host immunology, and 1 to study antimalarial drugs. The procedure has proven extremely safe and well tolerated, with no serious adverse events. Consistent with findings in malaria-naïve adults, 100% of minimally malaria-exposed Africans have developed parasitemia, while up to 50% of those with life-long exposure remain PCR and TBS negative. This spectrum of response is being used to identify innate resistance and acquired immune factors associated with protection. Vaccine-induced protection against CHMI is being evaluated as a surrogate for field efficacy.

**Conclusion:** PfSPZ Challenge has strongly promoted translational malaria research at several African institutions including the development of new interventions against Pf malaria. The results of these studies will be presented.

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### INTEGRATING SOIL-TRANSMITTED-HELMINTHIASIS AND SCHISTOSOMIASIS CONTROL PROGRAMS IN PRIMARY HEALTH CARE: A STEP FORWARD FOR UNIVERSAL HEALTH COVERAGE IN ENDEMIC AREAS

**Amor A.[1], Anegagrie M.[1], Barrio E.[2], Tashu B.[3], de los Santos J.J.[4]**
[1]*Mundo Sano Foundation, Mundo Sano -Ethiopia, Bahir Dar, Ethiopia;*
[2]*Spanish Society of Tropical Medicine and International Health;*
[3]*Amhara National Regional Health Bureau,Zenzelema Health Center, Bahir Dar, Ethiopia;*
[4]*Mundo Sano Foundation, Mundo Sano -Spain, Madrid, Spain*

**Introduction:** Soil-transmitted-helminthiases (STH) and schistosomiasis (SCH) control are major control programs of WHO agenda for neglected tropical diseases (NTDs). Periodic mass drug administration for at-risk population is the main public health strategy for reducing the burden. Despite all the efforts made, so far the burden of STH-SCH still is far from its control in endemic areas in Africa. Since 2017, WHO demands for integrating NTDs into global health programs, as an essential new step to ensure a universal health coverage (UHC) that "leaves no one behind". In developing countries, health centers are the main entrance door to the health system.

**Aim:** To improve the diagnosis protocol in a primary health center in a rural area of Ethiopia integrating, in an effective and efficient manner, STH-SCH control program in the primary health system.

**Methods:** According to the Ethiopian national guidelines, the wet mount technique is used for the diagnosis of STH-SCH infection in the health centers. We compared the results of that technique with the ones obtained by our protocol that includes three easy to perform techniques: formol-ether concentration, Kato-Katz and Baermann methods.

**Results:** From October to December 2018, 186 patients from the out-patient department were included in the study. Infections by hook-worm, *Ascaris lumbricoides*, *Trichuris trichiura*, *Strongyloides stercoralis* and *Schistosoma mansoni* were recorded. 24 (13%) patients were diagnosed by the wet mount technique in the routine laboratory, while with the new protocol the number of diagnosis increased until 131 (70.4%) (p=0.0008).

**Conclusion:** The vast majority of patients carrying intestinal helminths are not diagnosed in this health center. This pattern could be similar for the rest of health centers in endemic areas, working in similar conditions, as they all do the diagnosis by wet mount. Integrating a comprehensive management of intestinal helminth infection in primary health facilities, including an accurate diagnosis, will be a step forward to reach UHC. It will also be a turning point for the control of NTDs as this under-diagnosis (and therefore the lack of treatment) perpetuates these infections in endemic areas. More studies are necessary and make new and more promising steps to achieve UHC.

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### FOLLOWING UP COMMUNITY WIDE TREATMENT FOR SCHISTO-SOMIASIS IN THREE COMMUNITIES FROM THE GREATER ACCRA REGION, GHANA

**Cunningham L.J.[1], Campbell S.J.[2], Armoo S.[3], Koukounari A.[4], Watson V.[5], Selormey P.[3], Stothard J.R.[1], Idun B.[3], Adams E.R.[1], Osei-Atweneboana M.[3]**

[1]*Dept. of Parasitology, Liverpool School of Tropical Medicine, Liverpool, UK;*
[2]*Evidence in Action, De-Worm The World Initiative, Australia;*
[3]*Biomedical and Public Health Research Unit, Council for Scientific and Industrial Research - Water Research Institute, Accra, Ghana;*
[4]*Dept. of Infectious Disease Epidemiology, Faculty of Epidemiology and Population Health, London School of Hygiene & Tropical Medicine, London, UK;*
[5]*Clinical Sciences, Tropical Clinical Trials Unit, Liverpool School of Tropical Medicine, Liverpool, UK*

**Background:** Where a helminth control program has the goal of interruption of transmission, expanded access to anthelminthic treatments to additional demographic groups at-risk of schistosomiasis and soil-transmitted helminthiasis (STH) is recommended. This study reports on the findings of a pilot, community-wide, treatment intervention in the Greater Accra region of Ghana.

**Method:** From three communities 658 individuals were enrolled into the study; participants provided both urine and faecal samples to screen for the relevant helminth ova and answered an epidemiological questionnaire to identify risk factors *associated* with schistosomiasis and STH infections. Separately, logistic GEE models were used to investigate risk factor associations with infection prevalence.

**Results:** In all three communities both *Schistosoma* species were found with the prevalence of *S. haematobium* ranging from 3.3% (95% CI=1.9-4.7) to 19% (95% CI=15.8-22.2) and *S. mansoni* ranging from 30% (95% CI=26.5-33.5) to 78.3% (95% CI=74.7-81.9) at baseline. A six month follow-up survey revealed that the prevalence had been significantly reduced across all three sampling sites for *S. mansoni* now ranging from 19% (95% CI=14.7-23.4) up to 48% (95% CI=41.7-53.5). The effects of treatment on *S. haematobium* prevalence was a significant reduction in two sites. of the sites for *S. haematobium*. The total prevalence of STH across all three sites was negligible at 1.3% (24/1847; 95% CI=0.8-1.9) comprising mainly hookworm (10/1847).

Our statistical analysis also revealed that males were 2.3 times (95% CI=1.7-3.3) more likely to have a high intensity *S. mansoni* infection and 1.5 (95% CI=1.1-2) times more likely to have a *S. haematobium* infection than females. There was no significant difference in the likelihood of infection with *S. mansoni* between adults and school age children (SAC), however *S. haematobium* infections were 2.3 times (95% CI=1.7-3.3) more likely to occur in SAC than in adults.

**Conclusion:** Our study shows the effects of community wide treatment has on the prevalence and intensity of schistosomiasis. At baseline we detail the current prevalence of disease and highlight significant risk factors. Our six month follow up data also reveals the impact treatment has on prevalence but also intensity, with the latter being of greater significance regarding morbidity.

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### THE PREVALENCE OF COMMON MENTAL HEALTH DISORDERS AMONG MIDDLE-AGED WOMEN IN SRI LANKA

**Dheerasinghe D.S.A.F.[1], Kathriarachchi S.[2], Seneviratne H.R.[3], Cader M.[4], Fonseka P.[5]**

[1]*Ministry of Health;*
[2]*Faculty of Medical Sciences, University of Sri Jayewardenepura;*
[3]*Emeritus Professor of the Dept. of Gynaecology and Obstetrics, Faculty of Medicine, University of Colombo;*
[4]*Ministry of Health;*
[5]*Retired Professor of the Dept. of Community Medicine, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka*

**Introduction:** Common mental health disorders such as depression, anxiety, stress are increasingly identified as significant public health problems among middle-aged women due to various reasons, hence this study.

**Aim:** The aim of this study is to estimate the prevalence of depression, anxiety and stress in women aged 40 to 55 years, in the District of Colombo.

**Methods**: A cross-sectional descriptive study was carried out for a calculated sample of 1605 women aged 40-55 years using the multi-stage stratified probability proportionate to size cluster-sampling technique. A validated DASS-21 Sinhala version (to estimate the prevalence of depression, anxiety and stress) and pretested interviewer-administered questionnaire (to collect information on demographic and socio-economic factors and menopausal status) were administered by trained interviewers amongst middle-aged women in 40 to 55 years.

**Results:** One thousand five hundred and fifty-three (1553) women participated in the study with a response rate of 96.8%. The mean age of the study population was 47.7 years (SD±4.36). The study population was comparable to that of women in the district of Colombo.

The adjusted prevalence of depression, anxiety and stress among these women were 19.7%, 15.7% and 19.8% respectively. There is no

statistically significant association between sector of residence and the prevalence of depression, anxiety or stress among women aged 40 to 55 years (p>0.05).

A stepwise increase in the prevalence of depression was observed according to the menopausal status: premenopausal, perimenopausal and postmenopausal (11.5%, 19.9%, and 25.5% respectively). The prevalence of anxiety was highest among perimenopausal women (17.4%) compared to premenopausal (14.5%) and postmenopausal women (14.9%). Further, the prevalence of stress was observed to be increasing from premenopausal to postmenopausal state: 15.4%, 18.9%, and 23.7% respectively.

**Conclusions:** As prevalence of depression, anxiety and stress are high among middle-aged women, policies have to be developed and implemented to establish proper mental health screening programmes at existing primary health care settings (clinics at community level) to address the problem, after assessing the cost and acceptability of the programme to suit the low resource settings in Sri Lanka.

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### 'UNLESS I CAN WORK, I AM WORTHLESS' THE EMOTIONAL IMPACT OF ACUTE ADENOLYMPHANGITIS IN THOSE WITH PODOCONIOSIS: A CASE STUDY IN WAYU TUKA WOREDA, OROMIA, WESTERN ETHIOPIA

**Phillips C.[1], Samuel A.[1,2], Tiruneh G.[2], Deribe K.[1,3], Davey G.[1,3]**
[1]*Dept. of Global Heath and Infection, Brighton and Sussex Medical School, Falmer, Sussex, UK;*
[2]*Dept. of Medical Laboratory Sciences, Wollega University, Nekemte, Ethiopia;*
[3]*School of Public Health, College of Health Sciences, Addis Ababa University, Addis Ababa, Ethiopia*

**Introduction:** Podoconiosis, also known as mossy foot or endemic non-filarial elephantiasis, is a preventable form of lower-leg lymphoedema caused by prolonged (typically barefoot) exposure to soil derived from volcanic rocks. Acute adenolymphangitis (also called 'acute attacks') is a serious complication of podoconiosis resulting in significant symptoms and worsening disability. Furthermore, NTDs, including podoconiosis, are known to have a strong association with mental illness and those who have recently experienced an acute attack are more likely to be depressed[1,2].

**Aim:** This study explored the experiences and impact of acute attacks on those with podoconiosis in one endemic district of Ethiopia.

**Methods:** This qualitative study was based in Wayu Tuka *woreda* (district), Oromia, Western Ethiopia. 27 semi-structured interviews of those with podoconiosis and their caregivers were conducted in June 2018. Here we report on one aspect of the interviews with those affected by podoconiosis, the emotional impact. Data were analyzed using NVivo 12. Directed content analysis, a qualitative approach related to thematic analysis, was used to analyze the results.

**Results:** Interviews revealed the broad impact of acute attacks on individual's family life and community relationships, specifically, affecting access to education and the ability of individuals to earn a living. Notable was the emotional impact acute attacks had on individuals. A sense of resignation, or fatalism, along with feelings of regret, guilt, worthlessness, helplessness and desperation were all reported. Stigma was also discussed by some participants. Four key themes emerged: regret and reflection, guilt, stigma and helplessness and desperation.

**Conclusion:** Acute attacks have a significant and complex emotional impact on those with podoconiosis. This underscores the importance of prevention and early treatment of podoconiosis to reduce this complication and of including psychosocial care in the management of people with podoconiosis.

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### HEALTH DETERMINANTS OF CARDIOVASCULAR OUTCOMES IN PEOPLE LIVING WITH HIV RECEIVING ANTIRETROVIRAL THERAPY IN RWANDA – A STUDY PROTOCOL REVIEW

**Dushimiyimana V.[1,2], Twagirumukiza M.[1], Kateera B.[3], Mucumbitsi J.[3], Ntusi N.A.B.[4], Condo U.J.[2,3], Callens S.[1]**
[1]*Faculty of Medicine and Health sciences, Ghent University, Ghent, Belgium;*
[2]*Medical Research Center Unit, Rwanda Biomedical Center, Kigali, Rwanda;*
[3]*College of Medicine and Health Sciences, University of Rwanda, Kigali, Rwanda;*
[4]*Division of Cardiology, Dept. of Medicine, Cape Town University, Cape Town, South Africa*

**Introduction:** The global burden of cardiovascular diseases (CVD) in people living with HIV (PLHIV) is well known but less documented in Rwanda, where the expanded access to antiretroviral therapy (ART) has changed the natural history and outcomes of the disease into a manageable chronic condition. At the end of June 2018, the ART services coverage accounted for 189,362 people (83% of all PLHIV). Although this has improved patient prognosis and increased life expectancy, there is evidence that CVD are emerging.

**Aim:** To investigate the determinants of CVD risk in PLHIV receiving ART.

**Methods:** We will conduct a prospective longitudinal cohort study (36 months) and assess various predictors and outcomes among a cohort of PLHIV on ART, compared to a cohort of HIV uninfected individuals. All facilities with HIV and NCD clinics that have adequate infrastructure, electronic medical records and the ability to undertake monitored patient follow up will be selected for inclusion into the study. PLHIV receiving ART will be recruited randomly from those facilities' database; HIV uninfected individuals will be recruited randomly from multiple outpatient departments and the surrounding area of selected health facilities.

We will select a sample of 449 PLHIV and 1794 HIV uninfected individuals considering gender and age, and using a proportion of 1:5 to mitigate the potential high rate of lost to follow up. The analysis will be done using regression models to identify the significant determinants. CVD cases detected will be directly linked to the NCD clinics for the provision of treatment and care.

**Results:** This is a study protocol review. The study outcome is any cardiovascular event defined by cardiovascular morbidity (elevated blood pressure, abnormal lipid profiles, cardiomyopathy, ischemic heart disease and stroke) and mortality occurring within the study cohorts. The health determinants of interests include individual medical, biochemical and immunological characteristics, demographic factors like social economic status, gender, and cardiovascular risk factors such as metabolic syndrome, diet and lifestyles.

**Conclusion:** Knowing the determinants of CVD in PLHIV receiving ART is key for several reasons. This will inform preventive measures, develop innovative strategies for management, help set up comprehensive care, improve the quality of life for this specific population and provide research-based evidence for policy makers.

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### THE EKOS PROJECT - DEVELOPMENT OF A NOVEL CONCEPT TO ENSURE INFECTIOLOGICAL-MEDICAL CARE IN GERMAN TERTIARY CARE HOSPITALS OF PATIENTS SUFFERING FROM HIGH CONSEQUENCE INFECTIOUS DISEASES

**Stitterich N.[1], Heim K.[2], Grünewald T.[3], Rößler S.[4], Schöpke T.[5], Koeppen M.[6], Lichtner E.[7], Rösler U.[8], Gröschke D.[9], Kratz T.[10]**
[1]Institute of Tropical Medicine and International Health, Charité-Universitätsmedizin, Berlin;
[2]Dept. of Infectious Diseases and Respiratory Medicine, Charité-Universitätsmedizin, Berlin;
[3]Dept. of Infectious Diseases and Tropical Medicine, Nephrology and Rheumatology, St. Georg Hospital, Leipzig;
[4]Dept. of Hygiene, Chemnitz Hospital, Chemnitz;
[5]Emergency Dept. of Werner Forssmann Hospital, Eberswalde;
[6]Institute of Industrial Building and Construction Design, Technical University Braunschweig, Braunschweig;
[7]Hermann Rietschel Institute, Technical University Berlin, Berlin;
[8]Institute for Veterinary Hygiene and Environmental Health, Freie Universitaet Berlin, Berlin;
[9]Dept. of Intercultural Studies, Friedrich Schiller University Jena, Jena;
[10]Federal Information Centre for Biological Threats and Special Pathogens, Robert Koch Institute, Berlin, Germany

**Introduction:** Germany has got seven high level isolation units (HLIU) in order to care for patients who are suspected or confirmed to be suffering from high consequence infectious diseases (HCID). Provision of healthcare in tertiary care hospitals (TC) in Germany could be compromised by suspected or confirmed HCID patients due to contamination and loss of reputation. HCID patients are at risk to become neglected and to stay untreated for other diseases due to fear of contagion. The EKOS project was established in 2016 as a consequence of imported Ebola Virus Disease (EVD) suspect cases during the EVD West Africa outbreak.
**Aim**: We aim to close the gap in health care provision through strengthening tertiary care facilities with enabling them to manage a HCID patient for a maximum of 24 hours until transfer to a HLIU.
**Methods**: EKOS focusses on process-related and constructional-functional hygiene management as well as resilience strengthening. Process-related hygiene management includes a training concept targeting improvement of knowledge, attitude and skills towards HCID management. We assessed knowledge of hospital staff on HCID clinical management, infection prevention and control as well as public health (PH). Trainings took place in two German TCs (Chemnitz, Eberswalde) and were evaluated. Data analysis is ongoing. Upcoming results will be presented.
**Results:** From June 2018 to February 2019 seven trainings were carried out with 78 participants (63 (80.8 %) medical staff and 15 (19.2 %) non-medical staff).Evaluations on the question if they feel more safe in context with HCID after participation show a mean approval rate of 2.65 (n = 45) in Chemnitz and 3.11 (n = 20) in Eberswalde on a zero to five approval rating scale. Pretests show that concerning medical staff only 10 (32.3 % n = 31) in Chemnitz and 6 (37.5 % n = 16) in Eberswalde knew how to contact PH authorities outside regular working hours.
**Conclusion:** Further steps need to be taken to close the HCID clinical management supply gap in German TC.

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### MORTALITY AMONG CONFIRMED LASSA FEVER CASES DURING THE 2017–2019 OUTBREAK IN ONDO STATE, NIGERIA

**Ilesanmi O.[1], Ayodeji O.[2], Abejegah C.[2]**
[1]Dept. of Community Medicine, College of Medicine, University of Ibadan, Ibadan;
[2]Dept. of Community Health, Federal Medical Centre, Owo, Nigeria

**Background:** Lassa fever (LF) is an acute viral hemorrhagic disease endemic in Nigeria. In 2017 a new treatment center was started at Federal Medical Centre, Owo in Ondo State – a LF endemic state contributing 35-50% of total number of cases in Nigeria since 2017. This study aimed to determine factors associated with mortality among confirmed Lassa fever cases in Ondo State.
**Methods:** We analyzed surveillance, epidemiological, clinical and laboratory data during the 2017 to 2018 outbreak and the peak period (January to March) of 2019. The LF Emergency Operation Centre (EOC) was activated in 2018. Support from partners are received in the peak period of the first 12 weeks (January-March) yearly. We used descriptive statistics and logistic regression to identify factors associated with mortality.
**Results:** We reviewed 276 positive cases, 30 died (case fatality rate [CFR] = 10.9%; median age 34 years; Inter Quartile Range= 24-48 years). Male who died were 24 (15.5%). Fatality rates went from 1.6% in 2017 to 10.5% in 2018 and 16.7% in 2019, Chi square for linear trend: p=0.025. In peak period mortality recorded was 15 (8.5%) and another period (April to December) 14 (14.9%) was recorded (p=0.104). Fatality was 12.5% (1 out of 8) among pregnant women with 100% fatal death. Patients who were more likely to die were, those commenced on Ribavirin after 7 days of symptoms onset (Adjusted odds ratio [AOR] = 4; 95% confidence interval [CI] = 1.1, 15.4), those with elevated urea level (AOR 7.5; CI = 2.5, 23.1). Patients aged 18-45 years had 75% lesser odds of dying (AOR = 0.25; CI= 0.08, 0.76).
**Conclusions:** Coordinated response should be put in place during both peak period and other period. Attention to pregnant women, management of renal complications, strategy to ensure prompt patient presentation and laboratory confirmation and commencement of treatment should be intensified.

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### ELDER ABUSE IN A SELECTED MEDICAL OFFICER OF HEALTH AREA IN THE DISTRICT OF COLOMBO: PREVALENCE AND CORRELATES OF PHYSICAL, EMOTIONAL, FINANCIAL ABUSE AND NEGLECT FROM FIRST COMMUNITY BASED STUDY IN SRI LANKA

**Samaraweera P.C.[1], Sivayogan S.[2], Kathriarachchi S.[3]**
[1]National Dengue Control Unit, Ministry of Health, Colombo;
[2]Dept. of Community Medicine, University of Sri-Jayewardenepura, Sri-Jayewardenepura;
[3]Dept. of Psychiatry, University of Sri-Jayewardenepura, Sri-Jayewardenepura, Sri Lanka

**Introduction:** Elder abuse has been identified as a global phenomenon which demonstrated a considerable cultural diversity. Elder abuse is defined as physical, emotional, sexual and financial maltreatment and neglect of a person made vulnerable by advanced age.
**Aims:** The aim was to determine prevalence and correlates of physical, emotional, financial abuse and neglect among elderly aged 60 years and above in a selected Medical Officer of Health area in Colombo district.
**Methods:** This study was conducted in three components. First Component, developed and validated an interviewer administered questionnaire – Elder Abuse Assessment questionnaire (EAAQ), to assess the prevalence of elder abuse in a community setting. Subtypes and methods of abuse common to the Sri Lankan situation were generated by reviewing existing instruments, literature review and focus group discussions. Item reduction of EAAQ was established through the Modified Delphi Technique.

Judgmental validity was assessed by experts and the criterion validity by Consultant Psychiatrist as the gold standard. Second Component was a cross sectional survey conducted among a community sample of 1500 elders aged 60 and above to assess the prevalence of abuse by cluster sampling. Third Component was a comparative cross sectional study which assessed the correlates in abuse.

**Results:** The sensitivity for overall abuse in the EAAQ was 83.7% (95% CI 70.9-91.4) and specificity for overall abuse was 92.7% (95% CI 87.4-92.7). The overall response rate was 96.5%. The prevalence of any type of abuse was 19.2% while physical abuse was 2.7% (95% CI 1.9-3.7) and financial abuse was 3.7% (95% CI 2.8-4.6). Emotional abuse was 14.4% (95% CI 12.7-16.6) and neglect was 15.1 (95% CI 13.3-17.0). Children were the main perpetrators of abuse. The correlates of abuse were lower educational level of elder (AOR 2.2; 95%CI 1.2-3.4); problems of grand children(AOR 4.0: 95%CI 1.2-13.9); poor practical support from the family members (AOR 4.6: 95% CI 2.8-7.7); and having depression (AOR 11.1; 95% CI 6.5-18.5).

**Conclusions:** As elder abuse exists to a considerable extent in Sri Lanka. it is recommended that availability of valid instrument for its measurement should be made known to the relevant authority.

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### DRUG DISCOVERY EFFORTS AND DEVELOPMENT OF KINETO-PLASTID ASSAYS AT NOVARTIS INSTITUTES FOR TROPICAL DIS-EASES

**Pei L., Saldivia Concepcion M., Cheung H., Chen Y.L., Rao S., Williams S., Gable J., Song J.G., Patra D., Jiricek J.**
*Novartis Institute for Tropical Diseases, Emeryville, USA*

Collectively, kinetoplastid diseases caused 30,000 deaths annually with up to a billion people at risk of contracting the diseases. We have developed various assays in all three kinetoplastid disease areas and have carried out high-throughput phenotypic screenings. Several classes of compounds were prioritized with disease relevant secondary in vitro assays. Triazolopyrimidine (TP) inhibitors were among one of the classes identified that are active against all kinetoplastids. Resistant Trypanosoma cruzi parasites were generated and were mapped to F24L and I29M mutations in $\beta4$ subunit of 20S proteasome. We are also pursuing other classes of compounds with entirely different mode of action. Various biochemical assays and omics based approaches were also employed for target identification and validation. The most recent data on the assay development and compound prioritization will be discussed here.

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### CHAGAS DISEASE, AN EPIDEMIOLOGICAL CHALLENGE IN EUROPE

**Albajar Viñas P.**
*Dept. of Neglected Tropical Diseases, World Health Organization, Geneva, Switzerland*

**Introduction:** Chagas disease cases have been progressively detected in 17 European countries since the 70s, when the first patient was reported in Europe. This phenomenon has been mainly due to the increased population mobility between Latin America and Europe, but in the past three decades non-vector-borne transmission routes have been also detected in some European countries, what has significantly contributed to this public health problem.

**Aim and methods:** At the end of 2018 the World Health Organization (WHO) organized the fourth meeting of the nonendemic countries initiative (NECI). In the meeting the epidemiological profile of the disease outside Latin America was updated, together with the implemented measures to interrupt the transmission from transfusion of contaminated blood/blood products, mother to child (congenital transmission) and during organ transplantation.

**Results:** In the NECI meeting new strategies and innovative tools were also presented and endorsed, including the switch from the control to the elimination strategy of congenital Chagas disease, the necessity to combine and balance the biomedical and psychosocial approaches in a new intersectoral approach or the possibility to monitor and verify the interruption of transmission with the help of the WHO Information System to Control/Eliminate neglected tropical diseases.

**Conclusion:** At the very moment of the definition of the post 2020 agenda, in the framework of the United Nations Sustainable Development Goals to be reached in 2030, many European territories could be ready to initiate the process of verification of interruption of transmission in 2020.

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### STRATEGIES AND TOOLS FOR THE SCREENING OF STRONGY-LOIDIASIS IN MIGRANTS

**Buonfrate D.[1], Bisoffi Z.[1,2]**
*[1]Dept. of Infectious – Tropical Diseases and Microbiology, IRCCS Sacro Cuore Don Calabria Hospital, Negrar, Verona;*
*[2]Dept. of Diagnostics and Public Health, University of Verona, Verona, Italy*

**Introduction:** The burden of *Strongyloides stercoralis* infection has long been underestimated globally, consequently the infection has not received attention in relation to migrants' health in European countries. In recent years, new evidence based on more sensitive diagnostic tools has shed new light on the real prevalence of strongyloidiasis.

**Aim:** To discuss the possible approach for screening and individual diagnosis of strongyloidiasis in migrants, also in light of new estimates of prevalence of strongyloidiasis at global level and in migrants.

**Methods:** Elaboration of a model to obtain new estimates of the global prevalence of strongyloidiasis, and comparison with the results obtained by a systematic review of literature collecting data on prevalence in migrants. Review of diagnostic methods available for *S. stercoralis* infection.

**Results:** A global map showing the estimated prevalence of strongyloidiasis at country level is going to be presented. A proposal for the screening of populations at higher risk of the infections will be made. Serological tests are the methods with the highest sensitivity for strongyloidiasis, and are useful for screening. Molecular tests have better accuracy compared to conventional parasitological methods, and do not require fresh stools.

**Conclusion:** Screening for strongyloidiasis is recommended for migrants coming from highly endemic countries. Serology is the best tool for screening. In the European context, PCR can have a relevant role for individual diagnosis and as confirmatory test.

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### AUTOCHTHONOUS ARBOVIROSES OUTBREAKS IN THE MEDITER-RANIAN REGION. INNOVATIVE PREDICTIVE DATA ANALYSIS PLATFORM

**Molina I.**
*Tropical Medicine and International Health Unit, Vall d'Hebron Hospital, Barcelona, PROSICS Barcelona, Spain*

**Introduction:** Diseases transmitted by mosquitoes pose a threat to the European Region. Emerging arboviroses (such as Dengue, Chikungunya, Zika, West Nile virus) have acquired significant relevance in recent years. The favourable climatologically conditions, the presence of the transmitting vectors and the numerous international trips, make the Mediterranean a zone of high risk for the introduction of these diseases.

Such theoretical framework has been overcome for the recent arboviroses outbreaks in the southern countries of Europe.

Centralized surveillance systems and public health agencies with limited resources may not be sufficiently operational to provide an adequate response to a new threat of such type.

**Aim:** We pretend to give an overview of the current epidemiological scenario in our region and to present at premiere an innovative initiative based on an integrated management platform for epidemiological surveillance with advanced applications of predictive models and citizen participation which will help to control these epidemics.

The "PICAT" platform aims to integrate all the relevant information that can determine the emergence of autochthonous cases in our territory and create a network with the main agents involved (primary care, specialized centres, advanced research centres, public health agencies and civil society). By developing an innovative geo-localized data management system, they will help predict the potential risk of epidemics and the dynamics of infections, helping to optimize epidemiological control interventions.

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### ANTI-PEPTIDE ANTIBODIES AGAINST PLASMODIAL GAPDH, LDH AND PHOSPHOETHANOLAMINE-N-METHYLTRANSFERASE TO DIAGNOSE *PLASMODIUM FALCIPARUM, VIVAX* AND *KNOWLESI* MALARIA

**Goldring J.P.D.**

*Biochemistry, University of KwaZulu-Natal, Pietermaritzburg, South Africa*

**Introduction:** Rapid and accurate diagnosis of malaria is essential for patient survival and the administration of correct treatment. Point of care Rapid Diagnostic Tests employ antibodies to both capture and detect Plasmodial proteins on an immunochromatographic test strip. Histidine Rich Protein 2 expressed by *Plasmodium falciparum* parasites is the protein target in the most popular and widely used commercial RDT test kits. There are increasing reports of deletions of the gene for *Pf*HRP-2 in isolates from South America, Asia and Africa and thus failure of the *Pf*HRP-2 test to detect parasites. The reagents in RDTs are subject to high ambient temperatures leading to reagent degradation and false positives. Mouse IgG monoclonal antibodies, employed in some tests, cross-react with human rheumatoid factor.

**Aim:** There is therefore a need to develop new diagnostic biomarkers to replace *Pf*HRP-2 and to identify antibodies that are heat stable and do not interact with human rheumatoid factor.

**Methods:** An ideal biomarker: is present in high concentrations and has a short (few days) half-life in patient blood; is not expressed in the host or has parasite specific antigenic motifs; is essential for parasite survival; has minimal genetic variation; can be recombinantly expressed and the x-ray crystallographic structure is available. Ideal antibodies are heat stable, readily obtainable and do not cross-react with human proteins. Ideally the host does not produce high titres of antibodies against targeted antigenic structures.

**Results:** This rationale has identified two potential diagnostic biomarkers, Plasmodial glyceraldehyde-3-phosphate dehydrogenase and phosphoethanolamine-N-methyltransferase. The proteins from different Plasmodial species have been recombinantly expressed. Anti-peptide antibodies have been generated in chickens against antibody accessible "diagnostic" linear peptide domains on these proteins and on Plasmodial lactate dehydrogenase and the antibodies have been affinity purified. The peptide antibodies can identify the recombinant and native proteins and can differentiate between species of malaria. Chicken antibodies do not cross-react with rheumatoid factor and are stable for prolonged periods judged by from differential scanning fluorimetry measurements.

**Conclusion:** Reagents detecting and differentiating between *Plasmodium falciparum, vivax* and *knowlesi* parasites have been developed.

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### MINING THE SALIVA PROTEOME – DISCOVERY, VALIDATION, AND PROTOTYPE DESIGN FOR A NON-INVASIVE RAPID MALARIA DIAGNOSTIC

**Hamerly T.[1,2,3], Tao D.[1,2], McGill B.[1,2], Kobayashi T.[2,4], Khare P.[3], Dziedzic A.[1], Leski T.[5], Holtz A.[6], Shull B.[7], Jedlicka A.E.[1], Walzer A.[7], Slowey P.D.[8], Slowey C.C.[8], Nsango S.E.[9,10], Stenger D.A.[5], Chaponda M.[11], Mulenga M.[11], Jacobsen K.H.[12], Sullivan D.J.[1], Ryan S.J.[13], Ansumana R.[14], Moss W.J.[2,4], Morlais I.[9], Dinglasan R.R.[1,2,3]**

[1] *W. Harry Feinstone, Dept. of Molecular Microbiology and Immunology, Johns Hopkins Bloomberg School of Public Health, Baltimore, USA;*

[2] *Johns Hopkins Malaria Research Institute, Baltimore, USA;*

[3] *Emerging Pathogens Institute and Dept. of Infectious Diseases & Immunology, College of Veterinary Medicine, University of Florida, Gainesville, USA;*

[4] *Dept. of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, USA;*

[5] *United States Naval Research Laboratory (NRL), Center for Biomolecular Science and Engineering, Washington, USA;*

[6] *College of Science, George Mason University, Fairfax, USA;*

[7] *Thermo Fisher Scientific, Fremont, USA;*

[8] *Oasis Diagnostics, Vancouver, USA;*

[9] *Laboratoire de Recherche sur le Paludisme, Institut de Recherche pour le Développement–Organisation de Coordination et de Coopération pour la Lutte Contre les Grandes Endémies en Afrique Centrale (IRD-OCEAC), Yaoundé, Cameroon;*

[10] *Faculty of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Cameroon;*

[11] *Tropical Disease Research Centre, Ndola, Zambia;*

[12] *College of Health and Human Services, George Mason University, Fairfax, USA;*

[13] *Emerging Pathogens Institute and Dept. of Geography, College of Liberal Arts and Sciences, University of Florida, Gainesville, USA;*

[14] *Mercy Hospital Research Laboratory, Kulanda Town, Bo, Sierra Leone*

**Introduction:** A large proportion of ongoing malaria parasite transmission is attributed to low-density subclinical infections not readily detected by available rapid diagnostic tests (RDTs) or microscopy. *Plasmodium falciparum* gametocyte carriage is subclinical, but gametocytemic individuals comprise the parasite reservoir that leads to infection of mosquitoes and local transmission. Effective detection and quantification of these carriers can help advance malaria elimination strategies. However, no point-of-need RDTs for gametocyte detection exists, much less one that can perform non-invasive sampling of saliva outside a clinical setting.

**Aim:** We sought to develop a saliva-based rapid test to quantify subclinical gametocyte carriers that make up the malaria parasite reservoir.

**Methods:** Using liquid chromatography-mass spectrometry (LC-MS), we profiled the saliva proteome from children with subclinical infections and selected a candidate marker. We then performed a competitive profiling study using a liquid chromatography–multiple reaction monitoring (LC-MRM) mass spectrometry (MS) workflow to estimate the prevalence of our candidate marker in the saliva of children with subclinical infections. Last, we developed a prototype lateral flow immunoassay (LFIA) rapid test that

further validated the presence of the marker in saliva from children with subclinical infection.

**Results:** Our initial analysis of saliva revealed 35 malaria proteins, of which PF3D7_1218800 or *Plasmodium* sexual stage protein 17 (PSSP17), was the most abundant in gametocyte positive individuals. Using PSSP17 as a candidate gametocyte marker, we analysed saliva from 364 children and found a high prevalence (over 85%) of PSSP17 in saliva of gametocytemic individuals. We developed a prototype LFIA rapid test to detect PSSP17 and found our saliva-based diagnostic to have good correlation with our LC-MRM assay, validating these results. Furthermore, we found our RDT to be highly sensitive in the detection of PSSP17 from saliva, outperforming microscopy and achieving detection levels of <1 gametocyte/μL based on qPCR of matched blood samples.

**Conclusion:** We show here the discovery, validation, and development of a prototype, non-invasive saliva-based rapid test capable of identifying sub-microscopic parasite carriage in both clinical and nonclinical settings. The process that we demonstrate forms a template for the validation of other potential parasite biomarkers in saliva and other biofluids.

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### GOING VIRAL: INSIDER TIPS ON GETTING YOUR STORY ON THE FRONT PAGE FOR THE RIGHT REASONS

**Bigham B.**[1,2,3,4]
[1]*Dept. of Medicine, McMaster University, Hamilton, Canada;*
[2]*School of Medicine, University of Namibia, Windhoek, Namibia;*
[3]*Munk School of Global Affairs and Public Policy, University of Toronto, Toronto, Canada;*
[4]*Canadian Broadcasting Corporation, Toronto, Canada*

**Introduction:** In a world of fake news and pseudoscience, it's more important than ever that health experts engage with the public – but our traditional models of public engagement are flawed. Human beings are hard-wired to emotionally respond to stories about each other, an expertise held by the popular press.

**Aim:** This session introduces global health leaders to journalistic techniques so that they can generate strong stories that compel behaviour change and lead to action - action that can save a life, alter an epidemic, change public policy, or overcome social barriers to change.

**Methods:** In this interactive session, a doctor-scientist turned journalist will outline an algorithm which introduces the key criteria that make for compelling stories that will pique the interest of a newspaper editor or TV news producer. In a workshop, participants will put the criteria to practice by developing a "pitch" for an editor. The lessons shared offer an alternative approach to traditional "public communications" or "media relations" methods.

**Results:** In a presentation that defies common beliefs and challenges the scientific approach to storytelling, Blair will present a "BLS algorithm" - Basic Lifesaving Storytelling - to help participants frame their message in a way that promotes public attention and leads to personal action or policy change when it matters most by applying journalistic trade craft to global health prerogatives.

**Conclusion:** Either proactively or reactively, physicians and scientists can have a substantial impact when they engage effectively with the popular press. The algorithm and journalistic lessons gleaned from this workshop also apply to conversations with grant agencies, funding partners, public and private institutions, and governments.

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### A GROUNDED THEORY APPROACH IN THE DEVELOPMENT OF CULTURALLY APPROPRIATE PSYCHOSOCIAL SUPPORT FOR VICTIMS OF SEXUAL VIOLENCE IN THE DEMOCRATIC REPUBLIC OF THE CONGO

**Konan E.**[1], **Schmitz O.**[2], **Verelst A.**[3], **Bosmans M.**[4], **Bossyns P.**[5]
[1]*Prevention of Sexual Violence Programme, Enabel–Belgian Development Agency, Kisangani, DRC;*
[2]*School of Public Health, Université Catholique de Louvain-la-Neuve, Louvain-La-Neuve, Belgium;*
[3]*Faculty of Psychology and Pedagogical Sciences, Ghent University, Ghent, Belgium;*
[4]*Health Unit, Enabel-Belgian Development Agency, Brussels, Belgium;*
[5]*Health Unit, Enabel-Belgian Development Agency, Brussels, Belgium*

**Introduction:** In the DR Congo the Ministry of actively contributed to the development of the four national protocols for aid to victims of sexual violence (medical aid, psychosocial support and mental health, socioeconomic reintegration and legal aid). The sexual violence prevention programme supported by Enabel is aimed at strengthening the role of the health sector in improving access of victims to quality services. A one-stop centre model is developed focusing on the victim's right to health but within a multi-stakeholder and multidisciplinary approach. In view of improving the quality of the services, the programme builds on the hypothesis that evidence based approaches to victim support that are adapted to prevailing social and cultural norms and values are key for the effectiveness and the quality of the services. The programme has a duration of three years.

**Aim:** The aim of this presentation is to explain the process that has been followed in developing the grounded theory approach and to share preliminary results and lessons learned.

**Methods:** An action research model has been developed using the grounded theory methodology involving a multidisciplinary group of different stakeholders (health professionals, local authorities, academics, opinion leaders, victims).

**Results:** The action research model is comprised of two phases. The first phase consists of 1) literature review (scientific and grey literature); 2) a socio-anthropological survey among different stakeholders and institutions involved in aid to victims; 3) focus group discussions and interviews with victims, health professionals and community members; 4) analysis of the patient files. The data analysis is done in a participatory way. Based on the results of the data analysis the protocols and therapeutic models for aid to victims are adapted and piloted in the Alwaleed Health Centre in Kisangani. The implementation of the adapted protocols and therapeutic models is monitored and evaluated before finalisation.

**Conclusion:** The use of the grounded theory approach sheds a new light on how best to provide aid to victims of sexual violence in a sensitive social environment affected by strongly embedded taboos and cultural practices that enhance the vulnerability of women, girls and boys to sexual and other forms of gender-based violence, whilst at the same time fostering cultural sources of support. Three years is too short to ensure a scaling up of the initiative and embed it into national policies.

## 232

### RISK AND PROTECTIVE FACTORS FOR THE PSYCHOSOCIAL WELL-BEING OF ADOLESCENT VICTIMS OF SEXUAL VIOLENCE IN EASTERN DRC. IMPLICATIONS FOR SUPPORT

**Verelst A.**
*Dept. of Social work and Social pedagogy, Ghent University, Ghent, Belgium*

**Introduction:** Eastern Congo has set the scene for large-scale use of sexual violence in the context of war. In this (post) conflict setting also young girls and adolescence are often victims to sexual violence both

in as outside the context of armed conflict. Practice-oriented research by Centre for Children in Vulnerable Situations aims to unveil the risk and protective factors playing a role in determining the psychosocial impact of sexual violence in adolescent girls and determine how they could be addressed in psychosocial services offered to victims and their communities.

**Aim:** This presentation will address the psychological and social consequences that adolescent survivors of sexual violence in Eastern Congo face and the implications they have for psychological treatment and social acceptance for trauma survivors.

**Methods:** Based on a large scale triangulatory study this paper discusses the protective and risk factors associated with psychosocial well-being in girls that have experienced sexual violence in (post-)conflict Eastern Congo. Firstly, in a school-based study, (n=1300) self-report questionnaires on post-traumatic stress symptoms, externalising and internalising psychological problems, war-related traumatic events, daily stressors, coping and social support, rape myth acceptance were completed. Furthermore, this multi-method study included a qualitative exploration (n=27) of these psychological and social consequences of sexual violence.

**Results:** Findings of the intertwined studies combined show that adolescent victims of sexual violence face a myriad of psychological and social consequences of sexual violence. Stigmatisation, social support and daily stressors seem to be associated with the psychological problems adolescent survivors of sexual violence face. Important protective factors that are important for young victims of sexual violence are unveiled as well.

**Conclusion:** Implications for psychological treatment of adolescent survivors of sexual violence and individual context-specific needs for dealing with sexual violence in Eastern Congo are formulated.

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### RISK FACTORS FOR POSITIVE APPRAISAL OF MISTREATMENT DURING CHILDBIRTH AMONG ETHIOPIAN MIDWIFERY STUDENTS

Bakker R.[1], Sheferaw E.[1,2], Yigzaw T.[2], Stekelenburg J.[1], de Kroon M.[1]
[1]University of Groningen, Groningen, The Netherlands;
[2]Jhpiego Ethiopia, Addis Ababa, Ethiopia

**Introduction:** Only 28% of births in Ethiopia were attended by a skilled health worker in 2016, while maternal and neonatal mortality rates remain high. Care providers' mistreatment of women during childbirth can partially account for these findings due to creating a culture of fear that reduces pregnant women's healthcare utilization.

**Aim:** This study was carried out in order to identify risk factors for positive appraisal of mistreatment during childbirth among Ethiopian midwifery students. Insights may be of particular interest to the Ethiopian government that aims to promote respectful maternity care with its Health Sector Transformation Plan.

**Methods:** This study employed a cross-sectional design. We collected data among 391 Ethiopian final year midwifery students from six education institutions. Students were invited to complete a paper-and-pen questionnaire, which included questions on background characteristics, prior observation of mistreatment during education, self-esteem (using the Rosenberg Self Esteem scale), stress (using the Perceived Stress Scale) and mistreatment appraisal (using the MISAP Scale, work in progress). A multivariable linear regression analysis was applied to answer the research question.

**Results:** Age (p=.005), stress (p=.019) and previous observation of mistreatment during education (p<.001) were significant predictors of mistreatment appraisal. More positive mistreatment appraisal was observed among younger students, stressed students and students that observed more mistreatment during their education. Origin (p=.373) and self-esteem (p=.445) were not significantly associated with mistreatment appraisal.

**Conclusion:** Data collection among students allowed us to identify risk factors for positive mistreatment appraisal before employment. Findings can be used to develop educational interventions that increase professionalism and promote respectful maternity care among Ethiopian midwifery students.

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### EXPERIENCE WITH COMMERCIAL MOLECULAR DIAGNOSTICS FOR PARASITE DETECTION IN A ROUTINE DIAGNOSTIC LABORATORY

Polley S.D.[1], Watson J.[1], Kinson R.[1], Chiodini P.L.[2]
[1]Dept. of Clinical Parasitology, Health Services Laboratories Analytics LLP, London;
[2]University College London Hospitals Trust, London, UK

**Introduction:** Traditionally the world of parasite diagnostics has evaded molecular detection except where they could be detected by microscopic or macroscopic observation. With the advent of nucleic acid amplification techniques and lateral flow immunochromatographic techniques (also known as RDTs), parasite molecules been now been targeted for diagnostics. Whereas RDTs were quickly picked up and developed by commercial ventures, the world of NAATs has been mostly pioneered by scientists developing in-house assays. The decade has seen an increasing number of commercial molecular diagnostics released that claim to allow for sensitive and specific parasite diagnosis.

**Aim:** To review the different commercial molecular technologies tested and employed by Health Services Laboratories for the detection of parasitic infections in routine clinical samples. This will involve the opportunities, benefits and threat analyses of such technologies with discussion on mitigation of any associated risks.

**Methods:** Retrospective analysis of data generated from the verification and routine deployment of commercial diagnostic systems against in house assays acting as the "Gold Standard".

**Results:** Data will be presented for the Enteric Bio system and commercial multiplex PCR for enteric parasites compared to in house multiplex PCR for *Giardia intestinalis*, Cryptosporidium and *Entamoeba histolytica*, commercial Leishmania diagnostic real time PCR reagent against in house Noyes *et al* PCR, commercial LAMP reagents against in house Snounou PCR as well and experience of the use of the XTAG system and other commercial systems for the detection of parasites.

**Conclusion:** Commercial systems offer laboratories the ability to quickly and reliably initiate molecular testing for parasites and CE marked products are externally quality controlled allowing adherence to ISO 15189 guidelines. The rapid increase in the market does, however, bring its own challenges in that not all companies may be equal in the quality of their pre-release testing and not all kits may be tested for a given patient population meaning it is essential to locally verify any technology prior to its implementation.

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## 235

### LABORATORY DEVELOPED MOLECULAR TESTS COMPLIANT WITH ISO15189 FOR DIAGNOSIS OF INTESTINAL PARASITIC INFECTIONS

**Verweij J.J.**

*Laboratory for Medical Microbiology and Immunology, Elisabeth-Tweesteden Hospital, Tilburg, The Netherlands*

**Introduction:** In the last decades, molecular diagnosis of parasitic infections has evolved from confirmatory PCR in reference laboratories into first line diagnostics replacing microscopy. Clinical medical laboratories are inclined to comply with the requirements for quality and competence as set in the ISO15189 guidelines.
**Aim:** The validation and maintenance compliant with the ISO 15189 guidelines of in-house PCRs for the diagnosis of intestinal parasitic infections.
**Methods:** Relevant criteria were set for the validation of in-house PCRs including in silico sensitivity and specificity, multiplex efficiency, sensitivity and specificity, reproducibility and clinical applicability. These criteria were accessed on assays already in use as well as on modified and new assays for the detection of intestinal protozoa and helminths.
**Results:** The results of the validations provided new insights and were used to further improve, adjust and modify the existing assays to make them even more suitable for use in our setting.
**Conclusion:** Tailor-made interpretation and application of the ISO15189 guidelines provides a continuous improvement of the diagnostic performance of a clinical medical laboratory.

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## HOW ACCURATE IS THE DIAGNOSTIC PERFORMANCE OF YOUR STOOL PCR? EXPERIENCES FROM AN INTERNATIONAL EXTERNAL QUALITY ASSESSMENT SCHEME FOR PCR-BASED DETECTION OF PARASITES IN CLINICAL STOOL SAMPLES

**Van Lieshout L.**\*

*Dept. of Parasitology, Leiden University Medical Center, Leiden, The Netherlands*
*\*Representing the board of the Parasitology section of the Dutch Foundation for Quality Assessment in Medical Laboratories (SKML) and the international Helminth External Molecular Quality Assessment Scheme (HEMQAS) workgroup*

**Introduction:** In response to growing demand for proficiency panels for PCR-based diagnosis of stool parasites, the Dutch non-profit organisation for quality assessment in medical laboratories (SKML) initiated in 2012 an international External Quality Assessment Scheme (EQAS) for the detection of gastrointestinal protozoa. In an EQAS laboratories are regularly tested on their diagnostic performance by providing them with blinded samples. This SKML scheme makes use of well validated clinical stool samples and not of an artificial matrix spiked with purified DNA target, which allows control of the entire diagnostic workflow, including DNA extraction procedures.
**Aim:** Here we report about the PCR outcome of the SKML schemes of stool samples over the period 2012-2018.
**Methods:** Approximately 35 laboratories participate each year in the scheme for the detection of protozoa, i.e. *Giardia, Cryptosporidium, Entamoeba histolytica, Entamoeba dispar* and *Dientamoeba*. Based on the successes of this protozoa scheme, a pilot was introduced early 2018 to evaluate the feasibility of a similar scheme for the detection of helminths, i.e. *Ascaris, Trichuris, Ancylostoma, Necator, Schistosoma* and *Strongy-*

*loides*. This EQAS pilot was conducted by the international Helminth External Molecular Quality Assessment Scheme (HEMQAS) workgroup initiated by the STARWORM project and was driven by the need to improve laboratory diagnostic procedures for monitoring the efficacy of mass drug treatment programs for helminths.
**Results:** Reports of false-positive and false-negative PCR results occurred in every scheme. Misdiagnosis was more often seen for the helminths than the protozoa. In particular *Trichuris* was often missed, while false-positive results were mostly noted for *Strongyloides*. The reported semi-quantitative parasite loads (Cq-values) differed substantially between laboratories, while the intra-laboratory variation was low. Clusters of poor-performers and good-performers were noticed. Preliminary analysis suggests a relation between the performance within the scheme and the applied DNA extraction procedure.
**Conclusion:** Overall, our findings confirm that periodic participation in a quality assessment scheme is essential for any laboratory when establishing PCR-based detection as a routine procedure for the diagnosis of parasites in stool. In addition, inter-laboratory comparison is most informative when results are derived from well validated clinical samples and not by artificially prepared materials.

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## PAST, PRESENT AND FUTURE: A REVIEW OF THE UK NEQAS EQA SCHEMES FOR LABS PERFORMING PARASITE DIAGNOSTICS

**Shrivastava J., Saez A.C., Chiodini P.L.**

*UK NEQAS Parasitology, Public Health England, The Halo Building, London, UK*

**Introduction:** Parasitic diseases are continually on the rise with many parasitic diseases currently appearing or reappearing in non-endemic regions. Thus, there is increasing trend of using both commercial as well as in-house developed novel diagnostic tools to adress the need for simple, quick and accurate parasite diagnoses. These novel diagnostic tools are mostly molecular assays and rapid diagnostics tests (RDTs).
However, these diagnostic technologies are not without their challenges and there has been recent evidence of lack of consensus amongst protocols and results which have been observed via the External Quality Assurance (EQA) schemes run by UK NEQAS Parasitology.
**Aim:** External Quality Assurance (EQA) is an educational tool that allows participants to monitor, evaluate and improve their own performance. UK NEQAS is celebrating its 50th year this year as leaders in EQA provision. UK NEQAS Parasitology targets diagnostics in the field of blood and faecal parasitology and I will present the findings/recommendations from our existing EQA schemes. I will also discuss the need for new EQA schemes to address the advent of new technologies in the field- especially with respect to molecular assays and Rapid diagnostics (RDTs).
**Methods:** Participants' learnings and trend analyses were gathered. Two EQA schemes will be discussed in particular- Malaria Rapid and Malaria molecular.
**Results:** Consistent theme across all schemes were identified: lack of harmonisation of practices and protocols leading to missed or wrong diagnoses. Impact of human factors (e.g. lack of suitable training) was observed. Current lack of international standards for most blood and faecal parasites leads to use of in-house controls leading to erroneous results.
**Conclusion:** In parallel with technological advances there is an urgent need for EQA of these novel diagnostic methodologies as they become routine diagnostic procedures to ensure that such tests are accurate, precise and consistent.

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### DELAYED DIAGNOSIS AND ONGOING TRANSMISSION OF LEPROSY IN THE POST-ELIMINATION ERA IN BORU MEDA HOSPITAL, ETHIOPIA: WE NEED TO DO MORE

**Getahun S.[1], Diro E.[2], Tilahun F.[3], Tadese F.[1], Enbiale W.[4], Sisay K.[2], Tweya H.[5], Timire C.[5], van Griensven J.[6]**
[1]Wollo University, Dessie, Ethiopia;
[2]University of Gondar, Gondar, Ethiopia;
[3]Boru Meda Hospital, Dessie, Ethiopia;
[4]Bahir Dar University, Bahirdar, Ethiopia; [5]International Union Against Tuberculosis and Lung Disease (The Union), Paris, France;
[6]Institute of Tropical Medicine, Antwerp, Belgium

**Introduction**: Following the recommendation of the Global Leprosy Strategy, Ethiopia targeted to reduce the incidence of new leprosy cases and the proportion with severe disability (grade 2) from 13.6% in 2016 to <1% in 2020.

**Aim:** To assess the clinical profile of new leprosy cases and the sequelae of previously treated ones, 20 years after leprosy was eliminated as a public health problem in the country.

**Methods**: Medical records of all leprosy patients seen at the dermatology clinic of Boru Meda Hospital from August to December 2018 were reviewed and data captured using a standard data collection form.

**Results**: Over the study period, 57 (27.4%) new cases and 151 (72.6%) previously treated cases were seen. The median age was 44 years (interquartile range 32-57). Among the newly diagnosed two were children, 51 (89.5%) were multibacillary and 34 (59.6%) had grade 2 disability. This included visual loss or impairment in 10 (17.5%) and neurological complications in 44 (77.2%). Of the 151previously treated cases, 104 presented with disabilities, including 97 (64.2%) with grade 2. Amongst previously treated cases, 130 (82.8%) had neurological complications. In addition, 53 (35.1%) had vision loss or impairment.

**Conclusion**: This study showed evidence of ongoing leprosy transmission and delayed diagnosis in the country. This calls for operational research to determine the underlying reasons and provide ways forward. At the same time, the high burden of disabilities in previously treated cases should be addressed.

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### CYSTS AND PARASITES IN AN ABATTOIR IN NORTHWEST ETHIOPIA: AN URGENT CALL FOR ACTION ON "ONE HEALTH"

**Gebree D.[1], van Henten S.[2], Abera A.[1], Senkoro M.[3], Owiti P.[4], Lombamo F.[5], Girma B.[1], Ashenefe B.[6], Deressa A.[1], Diro E. [7]**
[1]Ethiopian Public Health Institute, Addis Ababa, Ethiopia;
[2]Institute of Tropical Medicine, Antwerp, Belgium;
[3]National Institute for Medical Research, Muhimbili Centre, Dar es Salaam, Tanzania;
[4]The Union, Paris, France;
[5]Saint Paul's Hospital Millennium Medical College, Ethiopia;
[6]Gondar Elfora Abattoir, Gondar, Ethiopia;
[7]Dept. of Internal Medicine, University of Gondar, Gondar, Ethiopia

**Introduction:** Zoonotic parasitic infections such as echinococcosis affect cattle, sheep and goats in terms of the quality of meat and hides as well as milk production. The burden among humans is usually underestimated as they are difficult to diagnose.

**Aim:** To investigate the trend and prevalence of echinococcosis and other zoonotic parasites among animals in an abattoir in North Gondar zone of Ethiopia during the period 2005 to 2018.

**Methods:** Data from 2005-2018 was used from the registry of an abattoir in Northwest Ethiopia. Frequencies, proportions and trends over time were analyzed. Meat inspection is conducted by visualization, palpation and incision.

**Results:** A total of 58,787 animals were slaughtered in the abattoir during the period. These included 51,956 (88.4 %) cattle 5,890 (10.0 %) sheep and 941 (1.6%) goats. The detected parasites include *Echinococcus* in 12,334/58,787 (21.0%) and *Fasciola* in 10,551/58,787 (17.9%) animals. *Echinococcus* infection was highest among goats, 267/941(28.4%), followed by cattle, 11,591/51,956(22.3%) and sheep 476/5,890 (8.1%). Fasciolosis was detected in 9877/51,956 (19.0%) of cattle and 178/941 (18.9%) of goats. The number of animals slaughtered was strongly decreasing over time from 8,405 (14.2%) in 2006 to 1,605 (2.7%) in 2018. However, the prevalence of the parasitic infection remained high with some fluctuations over the study period.

**Conclusion:** Echinococcosis and fasciolosis was very common with one out of five animals slaughtered being infected. This is of public health concern and needs urgent multi-sectorial efforts from stakeholders at the national and regional level and others for control of the diseases. One health programs approaches may warrant the control of transmission to humans.

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### TOWARDS THE 2020 TARGET OF TRACHOMA ELIMINATION IN SOUTHERN REGION OF ETHIOPIA: HOW WELL IS THE SAFE STRATEGY IMPLEMENTED?

**Asnakew M.[1], Zolfo M.[2], Nigussu N.[3], Tadesse F.[3], Tadele T.[4], Sisay A.[5], Seyum D.[5], Gezmu T.[1], Senkoro M.[6], Owiti P.[7,8], Adriaensen W.[2]**
[1]Arba Minch University, Collaborative Research and Training Centre for NTDs, Arba Minch, Ethiopia;
[2]Institute of Tropical Medicine, Clinical Sciences Dept., Antwerp, Belgium;
[3]Federal Ministry of Health, Neglected Tropical Diseases, Addis Ababa, Ethiopia;
[4]Southern Nation Nationalities and Peoples Regional Government Health Bureau, Neglected Tropical Diseases, Hawassa, Ethiopia;
[5]Orbis International, Ethiopia, Country office, Addis Ababa, Ethiopia;
[6]National Institute for Medical Research, Muhimbili Centre, Dar es Salaam, Tanzania;
[7]International Union Against Tuberculosis and Lung Disease (The Union), Paris, France;
[8]National Tuberculosis, Leprosy and Lung Disease Programme, Nairobi, Kenya

**Introduction:** Trachoma is one of the 20 neglected tropical diseases and a serious public health problem in Ethiopia. To reach WHO elimination target by 2020, SAFE (**S**urgery, **A**ntibiotics, **F**acial cleanliness, **E**nvironmental improvement) strategy has been implemented in many districts of Southern Nations, Nationalities, and Peoples' Region (SNNPRs), Ethiopia. Scarce evidence exists in the region regarding recent progress in achieving elimination of active trachoma (TF) (<5% in children aged 1-9 years) and on implementation results.

**Aim:** To assess how districts did progress in terms of achieving trachoma elimination and how well is the SAFE strategy implemented.

**Methods:** A retrospective analysis of programmatic data for the period 2013-2018 was used. All 134 trachoma endemic districts in SNNPR were included. Data collected from Federal Ministry of Health on trachoma

prevalence and SAFE strategy were analysed. To evaluate the most recent progress per district, we analysed the differences of prevalence between two most recent surveys. Implementation of SAFE strategy was assessed based on the reporting of the individual components of the SAFE strategy, using recent data, in 2017.

**Results:** Out of 134 endemic districts, only 35 had their planned impact survey, of which only 11 districts achieved elimination target (TF<5%). Six districts reverted back from eliminated status to low or moderate prevalence level. The median prevalence of active trachoma was 10% in 2017/18. In 2017, the mean antibiotic treatment coverage was 90%, and 56% and 68% of districts implemented and reported on "F" and "E" component of SAFE strategy, respectively. In the high prevalence districts, only 10% delivered the planned 5 rounds of Zithromax® mass distribution.

**Conclusion:** Only a limited number of districts reached the WHO elimination target by 2018 and in recent years some districts even reverted back to low or moderate prevalence levels. An urgent call for accelerated SAFE strategy implementation and in particular for the high endemic districts, as potential transmission drivers, is required in order to achieve the elimination target.

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### THE CLINICAL SENSITIVITY OF STANDARD DIRECT WET MOUNT MICROSCOPY FOR SOIL-TRANSMITTED HELMINTH INFECTIONS IN SCHOOL CHILDREN IN JIMMA, SOUTH-WEST ETHIOPIA

**Dana D.[1], Vlaminck J.[2], Mekonnen Z.[1], Ayana M.[1], Vogt F.[3], Verdonck K.[3], Tweya H.[4], Timire C.[4], Geldof P.[2], Levecke B.[2]**
[1]School of Medical Laboratory Science, Faculty of Health Science, Institute of Health, Jimma University, Jimma, Ethiopia;
[2]Dept. of Virology, Parasitology and Immunology, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium;
[3]Dept. of Public Health, Institute of Tropical Medicine, Antwerp, Belgium;
[4]The International Union against Tuberculosis and Lung Disease, Paris, France

**Introduction:** Soil-transmitted helminthiasis is a disease caused by *Ascaris lumbricoides*, *Trichuris trichiura* and the two hookworms (*Ancylostoma duodenale* and *Necator americanus*) and remains a major public health problem in school children in Ethiopia. Although direct wet mount microscopy is the standard means to diagnose intestinal parasitic diseases in health care facilities in Ethiopia, it remains unclear what its diagnostic performance is for soil-transmitted helminths.
**Aim**: To determine the clinical sensitivity of standard direct wet mount microscopy for soil-transmitted helminth infections compared to the composite reference standard in school children in Jimma, South-West Ethiopia**.**
**Methods:** A school based cross-sectional study was performed in Jimma Town and included 600 children from 10 primary schools. The clinical sensitivity of direct wet mount microscopy was compared to a composite reference standard consisting of Kato-Katz thick smear, McMaster and Mini-FLOTAC.
**Results:** The composite reference standard about 210 *Ascaris* (35.0%), 312 *Trichuris* (52.0%) and 102 hookworm cases (17.0%). The median intensity of infections [expressed as eggs per gram of stool (EPG)] equalled 2,057 EPG for *Ascaris*, 200 EPG for *Trichuris* and 110 EPG for hookworms. The sensitivity of direct wet mount microscopy was 73.8% for *Ascaris*, but was only around 17% for both *Trichuris* and hookworms. For each of the three soil transmitted helminths there was an increase in sensitivity as a function of increasing intensity of infections. For *Ascaris*, the sensitivity ranged from 30.2% for the lowest infection intensities to 94.3% for the highest levels of infection intensity. For both *Trichuris* and

hookworms, the sensitivity ranged from nearly 0% to 42.9% across the different levels of infection intensity.
**Conclusion**: Using direct wet mount microscopy severely underestimated the prevalence of soil transmitted helminths. The sensitivity of direct wet mount microscopy is low for STH, particularly for infections with *Trichuris* and hookworm when the infection intensities are low.

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### A PRELIMINARY REPORT ON THE SPILL OVER EFFECT OF MASS DRUG ADMINISTRATION FOR ONCHOCERCIASIS ON SCABIES CONTROL IN NORTHERN ETHIOPIA

**Yirgu R.[1], Tesfaye A.T.[1], Wassie A.F.[1,2], Callow C.[2], Middleton J.[3], Davey G.[2,4], Cassell J.[3]**
[1]CDT-Africa, Addis Ababa University, Addis Ababa, Ethiopia;
[2]Centre for Global Health Research, Brighton and Sussex Medical School;
[3]Dept. of Primary Care and Public Health, Brighton and Sussex Medical School, Brighton, UK;
[4]School of Public Health, Addis Ababa University, Addis Ababa, Ethiopia

**Introduction:** Scabies is a skin infestation caused by the mite *Sarcoptes Scabiei var. hominis*. WHO included the disease among the Neglected Tropical Diseases in the year 2017. Ethiopia bears a very high scabies burden and a series of scabies outbreaks have been recorded in the past few years. To respond to growing public health concern, the Ethiopian Federal Ministry of Health is looking for approaches to control the disease. In Ethiopia, Mass Drug Administration (MDA) with ivermectin has been taking place for the control of onchocerciasis since 2003 but its secondary effects on the transmission of scabies have not been evaluated.
**Aim:** The aim of this study was to evaluate the effect of MDA for onchocerciasis on the transmission of scabies.
**Methods:** A comparative cross-sectional study design with multi-stage sampling was used. Districts in Ethiopia, with varying time of onset of MDA were selected. Data were collected using a pretested structured interview questionnaire on the prevalence of scabies infestation, socioeconomic and socio-demographic variables, and health service utilization. The recently developed Consensus Criteria were used by the trained field data collectors (clinical nurses) and an experienced dermatologist to screen and identify clinical cases of scabies during a house-to-house survey. In one district, pre- and post- MDA data are being collected to measure the effectiveness of MDA.
**Results:** To date, data from one district have been analyzed. This comprises household and individual level data from 402 households and 1400 individuals. The prevalence of scabies was estimated to be 15% (210 cases/1400 individuals). Half (105) of the cases have been re-evaluated by the dermatologist.
**Conclusion:** Our preliminary findings suggest that prevalence of scabies in the district in which ivermectin MDA has been carried out since 2015 is still high. The agreement between clinical nurses and the dermatologist on scabies case identification was good. By finding out the impact of varying time of onset of ivermectin MDA on scabies, we anticipate formulating an improved control strategy for scabies, thereby reducing the burden of the disease.

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### INTEGRATING A HOLISTIC CARE PACKAGE FOR PODOCONIOSIS, LYMPHATIC FILARIASIS AND LEPROSY INTO ROUTINE HEALTH SERVICES IN ETHIOPIA – THE ENDPOINT PROJECT

*Ahmed O.A.[1,2], Tesfaye A.[1], Fekadu A.[1,2], Abebayehu T.K.[3], Hounsome N.[2], Kinfe M.[1], Mengiste A.[1], Davey G.[2], Semrau M.[2]*

[1]CDT-Africa, College of Health Sciences, Addis Ababa University, Addis Ababa, Ethiopia;
[2]Global Health and Infection Dept., Brighton and Sussex Medical School, Brighton, UK;
[3]Dept. of Sociology, Wolaita Sodo University, Sodo, Ethiopia

**Introduction:** Lower-limb lymphoedema resulting from podoconiosis, lymphatic filariasis (LF) or leprosy are common in Ethiopia and pose a significant burden on patients, in terms of disability, mental distress, depression, stigma and loss of economic productivity. However, morbidity management and disability prevention (MMDP) for these diseases is currently largely delivered by NGOs, which cannot reach the huge number of people affected. There have also been increasing calls to include mental health care within MMDP.

**Aim:** The EnDPoINT implementation research project aims to integrate and scale up a holistic package of physical, psychosocial and mental health care for patients with podoconiosis, LF and leprosy into the government-run health services in selected districts in Ethiopia.

**Methods:** EnDPoINT is being carried out over three phases: 1) formative work to inform the development of the care package, which has included a situational analysis, systematic review, three 'Theory of Change' workshops, and key informant interviews and focus group discussions with key stakeholders; 2) piloting of the care package in one district; and 3) scaling up of the care package in three districts. This presentation focuses on Phase 1.

**Results:** The care package was successfully developed based on the formative activities, and includes limb care, mental health and anti-stigma interventions at the healthcare administration, health facility and community level. Based on the care plan, an integrated guideline addressing podoconiosis, LF, leprosy and common mental illnesses has been prepared and peer-evaluated, and training has been piloted in one health centre. The focus group discussions of community representatives, health care workers and decision makers revealed the feasibility and acceptability of integrated care of the three diseases and co-morbid mental illnesses.

**Conclusion:** The EnDPoINT project takes a holistic approach, by integrating physical, psychosocial and mental health care for patients with lymphoedema caused by podoconiosis, LF and leprosy within all levels of the routine health system. By finding out what works best in the integration of care – integration both within the government-run health care system, and across the three diseases and co-morbid mental illnesses –, we hope that the care for people living with these diseases improves, thereby reducing their burden.

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### GEOGRAPHICAL DISTRIBUTION AND PREVALENCE OF PODOCONIOSIS IN RWANDA: A CROSS-SECTIONAL COUNTRY-WIDE SURVEY

**Deribe K.[1,2], Mbituyumuremyi A.[3], Cano J.[4], Mbonigaba J.B.[3], Giorgi E.[5], Ruberanziza E.[3], Bayisenge U.[3], Pullan R.L.[4], Newport M.J.[1], Davey G.[1,2]**
[1]Global Health and Infection Dept., Brighton and Sussex Medical School, Brighton, UK;
[2]School of Public Health, Addis Ababa University, Addis Ababa, Ethiopia;
[3]Malaria and Other Parasitic Disease Division, Rwanda Biomedical Center-Ministry of Health, Kigali, Rwanda;
[4]Dept. of Disease Control, London School of Hygiene & Tropical Medicine, London, UK;
[5]Lancaster Medical School, Faculty of Health and Medicine Lancaster University, Lancaster, UK

**Introduction:** Podoconiosis is a type of tropical lymphoedema that causes massive swelling of the lower limbs. The disease is associated with both economic insecurity, due to long-term morbidity-related loss of productivity, and intense social stigma. Reliable and detailed data on the prevalence and distribution of podoconiosis are scarce.

**Aim:** To determine the prevalence and geographical distribution of podoconiosis within all districts of Rwanda among the adult population ($\geq$15 years) and to estimate the number of podoconiosis cases by district across the country.

**Methods:** A population-based cross-sectional survey was conducted to determine the national prevalence of podoconiosis. A podoconiosis case was defined as a person residing in the study district for at least ten years with bilateral, asymmetrical lymphoedema of the lower limb present for more than one year, who tested negative for *Wuchereria bancrofti* antigen and specific IgG4 using the FTS and Wb123 test respectively and had a history of any of the associated clinical signs and symptoms. All adults ($\geq$15 years) who resided in all 30 districts of Rwanda for ten or more years were invited at the household level to participate. We then fitted a binomial mixed model combining the site-level podoconiosis prevalence with continuous environmental covariates to estimate prevalence at unsampled locations. Finally, we produced estimates of cases by district combining our mean predicted prevalence and a contemporary gridded map of estimated population density.

**Results:** In July 2017, a total of 1,360,612 individuals; 719,730 (52.9%) women and 640,882 (47.1%) men were screened from 80 clusters in 30 districts across Rwanda. In total, 1,143 individuals with lymphoedema were identified, of whom 914 (79.9%) confirmed podoconiosis cases were based on the standardized diagnostic algorithm. The overall prevalence of podoconiosis was 68.5 per 100,000 people (95% confidence interval [CI]; 41.0-109.7). Podoconiosis was found to be widespread in Rwanda. District level prevalence ranged from 28.3 (95% CI; 16.8-45.5, Nyarugenge, Kigali province) to 119.2 (95%CI; 59.9-216.2, Nyamasheke, Western province) per 100,000 people. We estimate that 6,429 (95%CI; 3,938- 10,088) people live with podoconiosis across Rwanda.

**Conclusions:** Despite relatively low prevalence, podoconiosis is widely distributed geographically throughout Rwanda. Many patients are likely to be undiagnosed and morbidity management is limited. The findings presented here are intended to inform national level planning, monitoring and implementation of interventions.

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### THE PREVALENCES OF COMMON INFECTIOUS SKIN DISEASES IN THE BIJAGOS ARCHIPELAGO, GUINEA-BISSAU

**Sammut T.[1], Teixeira Da Silva Cassama E.[2], Gomes Cabral M.[2], Goncalves A.[1], Roberts CH.[1], Last A.[1], Marks M.[1], Walker S.[1]**
[1]Faculty of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, London, UK;
[2]Ministério de Saúde Publica, Guinea-Bissau

**Introduction:** Scabies, impetigo, dermatophytosis, and tungiasis are very common and treatable diseases globally, which left untreated, may lead to morbidity and important sequelae in children. Prevalence of these diseases remains inadequately investigated in Guinea-Bissau.

**Aim:** To obtain prevalence data on common infectious skin diseases including scabies, impetigo, tinea capitis and tinea corporis amongst children in the Bijagos Archipelago, Guinea-Bissau.

**Methods:** Two population based cross-sectional prevalence surveys were conducted in the wet and dry seasons of 2018. Data from the dry season were collected from randomly selected villages across 6 islands in the archipelago. For logistical reasons, the wet season data were collected from all villages on the most populous island Bubaque. Trained investigators examined participants' skin and data were collected using the Open Data Kit platform.

**Results:** Wet season: 486 participants aged 1-15 years were recruited. Prevalences were: tinea capitis 20.6%, impetigo: 8.6%, tinea corporis: 8.4%, scabies: 1.7%, tungiasis: 0%. 94% had 1 diagnosis, 6% had 2 diagnoses, 1% had 3 diagnoses. 47% of participants were female, 53% were male.

Dry season: 1062 participants aged 0-9 years were recruited. Prevalences were: tinea capitis 14.5%, impetigo: 7.7%, tinea corporis: 7.9%, scabies: 5.3%, tungiasis: 0.8%. 83% had 1 diagnosis, 14% had 2 diagnoses, and 3% had 3 diagnoses. 52% of the participants were female, 48% were male.

Tinea capitis was associated with: the wet season (OR 1.9, 95% CI: 1.38-2.6, p <0.001), and with male gender (OR 3.1, 95% CI: 2.3-4.2, p <0.001).

**Conclusion:** This study is the first of its kind to demonstrate the high burden of treatable skin disease in Guinea-Bissau and we use a robust sampling method. The integrated approach for diagnosing and managing skin disease used in this study improves efficiency, use of resources and broadens the skill-set of local health workers.