Vector Control in Humanitarian Emergencies

Roll Back Malaria Vector Control Working Group
14-15 September 2017
Basel Switzerland

Mission Statement

To reduce human suffering and death from vector-borne diseases in complex operating environments by:

a) improving delivery, uptake, integration and evaluation of existing vector surveillance and control tools;
b) facilitating the development of an evidence-base and uptake of supplementary and emerging tools.

Contents

Summary:

The Integrated Vector Management Workstream of the Roll Back Malaria Vector Control Working Group convened a two- day meeting focused on vector control in humanitarian emergencies on 14- 15 September 2017 in Basel, Switzerland. The first day was devoted to the development and drafting of a Mission Statement, Objectives and *Modus Operandi* for the group by representatives of major emergency relief agencies (MSF, UNICEF, The MENTOR Initiative, the London School of Hygiene and Tropical Medicine and RBM) as a small *Steering Group.* Representatives from WHO, UNHCR and the Global Fund were invited on the second day to discuss specific ongoing Humanitarian Emergencies and cross-cutting issues in relation to vector control in humanitarian emergencies as well as the proposed objectives and *modus operandi* of the initiative and to outline specific activities to meet these objectives.

Background:

Forcibly displaced persons, including those internally displaced and refugees now total more than 65 million individuals.[1] Many suffer or are at increased risk for vector-borne diseases: e.g. malaria throughout much of Africa, leishmaniasis in Syria, Turkey and Iraq, dengue in Yemen. Relief agencies are struggling to meet the challenges of vector-borne diseases due to limited availability of resources and limited vector control options. While some displaced persons may be settled into camps where standard vector control tools can be deployed, many others are mobile, in makeshift shelters and situations where IRS or LLINs are not practical, but were tools under development can play a life-saving role. There is an urgent need to bring together relief agencies, donors, academia, industry and product development consortia, and the normative processes of WHO, to expand the use of existing vector control tools and to facilitate the development of new tools and processes for these contexts beyond the reach of current strategies.

Table 1: Objectives of the Vector Control in Humanitarian Emergencies Initiative

Improve use of Current Vector Control tools	**Improve learning around existing and new tools applicable for emergencies**	**Provide field platforms for evaluation of new tools applicable to Humanitarian Emergencies**
Ensure cross-agency learning from field experience with entomological monitoring, LLINs, IRS, LSM, etc.	Development and dissemination of Inter-agency guides for delivering supplementary tools (e.g. treated materials, spatial repellents, Attractive Toxic SugarBaits).	Offer advice to manufacturers on humanitarian crises contexts, to help inform tool development
Technical support through interagency exchange to help resolve technical and operational challenges	Interagency monitoring and evaluation templates developed to standardize data collection for these existing supplementary tools	Interface partners on the development of operational research protocols to ensure designs consider all factors relevant to humanitarian crises.
Technical support to help disseminate results	Collation and dissemination of field data / lessons learnt to partners and normative bodies to help expand the operational evidence base. Interface with WHO to ensure that development of Vector Control guidelines considers all data available from humanitarian crises	Offer platforms (where suited and where feasible) and partnerships, to manufacturers and others, to pilot new tools, or active ingredients, where these could provide solutions to current Vector Control challenges in humanitarian crises

[1] http://www.unhcr.org/en-us/figures-at-a-glance.html

The Interagency Field Handbook for Malaria Control in Humanitarian Emergencies, published by WHO and with contributions from various agencies, in 2013 notes (page 96): *Displaced populations have specific needs different from stable populations, and insecticide treatment of materials – tents, blankets, sheets, clothing and curtains – may be more acceptable and feasible than conventional interventions. At the time of publication, WHO had not made a formal recommendation on insecticide- treated blankets and plastic sheeting for malaria control. WHO will consider vector control products for policy recommendation on an individual basis as data for those products become available*.[2]

The RBM VCWG is uniquely positioned to convene agencies and partners from the public, private and commercial sectors to catalyze and focus efforts to meet these challenges. Much of what is done for vector control is either learned from malaria control or adapted from WASH, leaving much room for learning and improvement by cross-sectoral collaboration. The RBM VCWG will facilitate information exchange with a primary focus on service delivery and broader deployment of current vector control tools, but with clear actions to deploy and monitor nascent tools and to support product development consortia for new tools adapted to the varied contexts of Humanitarian Emergencies. Note that vector control and personal protection tools for emergency relief may be applicable to outdoor transmission more generally: e.g. for the goldminers in Amazonia or the wood cutters in the Mekong.

Partners:

This initial meeting included a *steering group* meeting with representatives from RBM, UNICEF, MSF, the London School of Hygiene and Tropical Medicine and the MENTOR Initiative. Additional partners at this meeting also included WHO, Global Fund and UNHCR (refer to Annex). Several other relief agencies and NGOs were not able to attend but are engaged in follow-up.

Top row (from left to right): Peter Maes, MSF; Corey Leclaire, MSF; Martin de Smets, MSF; Hans van Diller, MENTOR; Michael Macdonald, RBM; Sarah Hoibak, Global Fund; Richard Allan, MENTOR; Stefan Hoyer, WHO/GMP.

Front (from left to right): Vincent Kahi, UNCHR; Valentina Buj, UNICEF; Emmanuel Temu, WHO/GMP; Natacha Protopopoff, LSHTM; Konstantina Boutsika, RBM/STPHI; Claire Dorion, MSF

[2] http://www.who.int/malaria/publications/atoz/9789241548656/en/

Strategy

Results of *steering committee* meeting 14 September:

Mission Statement*:*

To reduce human suffering and death from vector-borne diseases in complex operating environments by:

a) improving delivery, uptake, integration and evaluation of existing vector surveillance and control tools.
b) facilitating the development of an evidence-base and uptake of supplementary and emerging tools.

Objectives:

- Provide a platform for information exchange, from the emergency viewpoint, including on existing vector control tools and processes to empower implementing agencies to do their work better.
- Advocate to improve operational collaboration among clusters in humanitarian or refugee emergencies, agencies, and relevant national programs and both emergency and development donors.
- Integrate across diseases and delivery strategies to improve efficiencies and effectiveness of program delivery.
- Facilitate bringing new tools to the field, including through contribution to the evidence-base through Standard Operating Procedures, collaboration with industry and academia and Research Ethics Board- approved Operational Research.

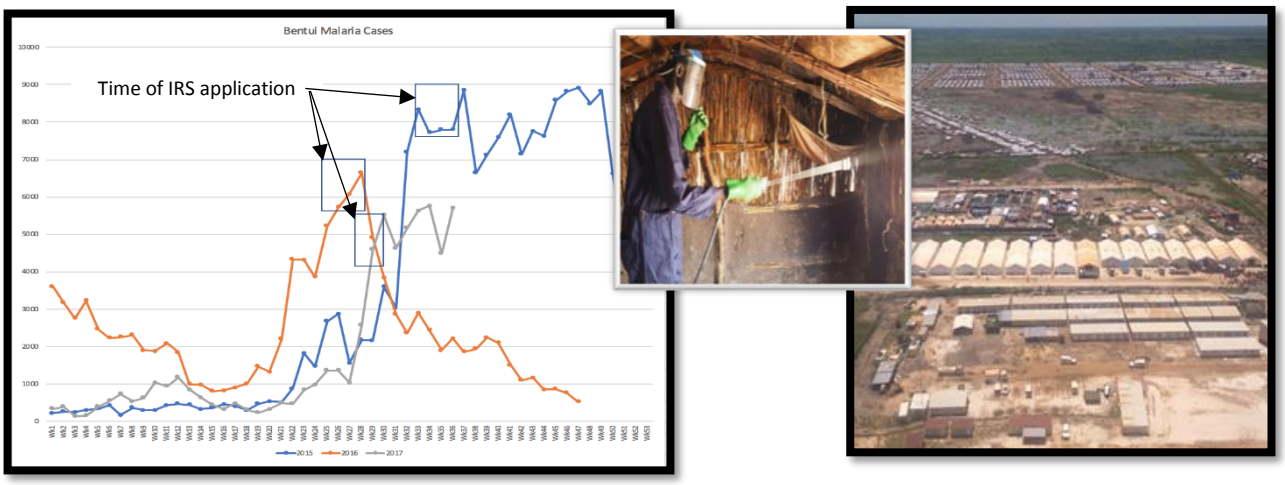
Modus Operandi:

- Establish a criteria-based steering committee of agencies implementing vector control in humanitarian emergencies. There will be regular teleconferences responsive to needs.
- The RBM VCWG secretariat will facilitate information exchange of vector control in the context of humanitarian emergencies.
- The Steering Committee will initiate and facilitate rapid, openly accessible vector control assessment and planning (if none are readily available).
    a) Acute emergency: threat assessment and recommended response in initial emergency phase
    b) Transition and established settlements: multi-agency strategic technical support to vested partners during ongoing operations to improve service delivery
- Facilitate deployment and evaluation of additional tool development through linking partners, academia, industry, providing SOPs, M&E guidelines, IRB materials; create opportunities for operational research.
- Advocate for inter- and intra-sectoral collaboration for Integrated Vector Management in humanitarian emergencies
- Develop advocacy and mobilize resources for donors and policy makers on the specialized needs and opportunities for vector control in humanitarian emergencies

Needs and opportunities

Bentiu Internally Displaced Persons Camp South Sudan (malaria):

Richard Allan, MENTOR



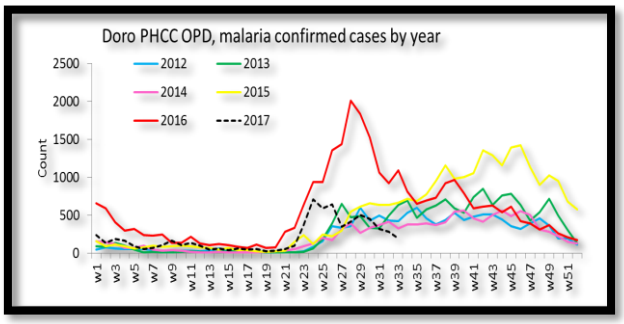
Context: Bentiu Camp, IDP population 90-130,000 persons, established since late 2013; population experiences intense seasonal malaria transmission. Vector control includes IRS, LSM and distribution of LLINs.

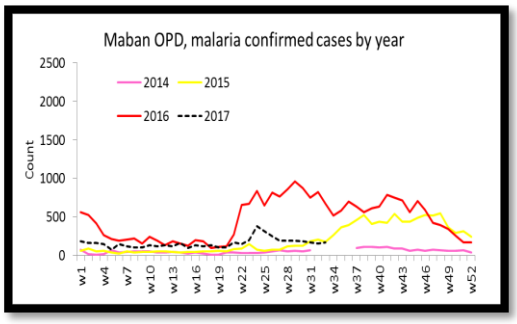
Challenge: Lack of WASH, shelter and health consultation and coordination during camp construction = vector larval habitats throughout the camp; fly control problem with defecation fields and insufficient solid waste disposal. Despite vector control efforts, malaria continued to rise. In 2015 late IRS application with lambdacyhalothrin did not have an impact (blue line). In 2016, there was no increase in LLIN distribution; IRS with pirimiphos-methyl still a bit late but with good response (red line). This year disaster: insecticide procurement delayed from June to November, primiphos-methyl not available so switched to bendiocarb (grey line). Cases continue to rise. Survey indicate only 17% coverage of "serviceable nets". Plan to distribute both conventional and PBO LLINs in different sectors to compare. *Coordination*: Lack of discussions between WASH and Shelter clusters created larval habitats. *Timing*: no good to do vector control at the wrong time. All spraying needs to begin before the rainy/malaria transmission season. *Entomological monitoring*: pyrthroid resistance reduced impact of 2015 IRS. *Logistics*: IRS chemicals not available in time. *Residual transmission*: continued transmission despite conventional control – need supplemental tools.

Resolution: Logistics/timing: Ensure forecasting and procurement of commodities in order to be able to spray before malaria season but population data may be limited. *Capacity-building*: Technical partners may be present but may not be sitting in the right place to drive policy change. *Security context:* limited access in many parts, some chemicals can't be stockpiled and stored when needed. ***Make the financing more impactful:*** flexible, innovative financing for stockpile and emergency supply. Improved supply chain management. Funding allocations and timing. Problem is coverage. Many different camps in South Sudan (IDP and Refugee), however we're only dealing with a small proportion, as there are displaced and host populations that are not in camps and are not being accessed. Need for advocacy to link data across agencies and to donors. Global supply chain, Humanitarian Emergency market small compared to national programs need to coordinate forecasting with producers and with national programs to include emergency response needs in their national strategic plans and in forecasting. Need comprehensive approach aligned with entry points including iCCM. Need new tools for cost-efficient IVM.

Mabaan County, South Sudan. Refugee & host community response (malaria):

Corey Leclair, MSF





Context: MENTOR and MSF supported Doro refugee camp 52,000 Sudanese refugees who fled fighting in Blue Nile state and Bunj Host community 60,000 persons. Vulnerable population, geographically isolated with presence of armed groups and consistent conflict between hosts and refugees. There's food insecurity and the influx of IDPs and refugees places more pressure on limited resources. In January 2017 there were clashes by the local militia, several dozen killed and 15,000 fled with several areas of the camp now vacant. The planned IRS was revised and limited LLIN distribution conducted in high-risk areas.

Challenge: The area has *black cotton* soil with poor drainage which enables myriad larval habitats for *An. arabiensis* and makes movement difficult during the rainy season. Early and outdoor biting reduces (but does not negate) impact of indoor IRS and LLINs. With the heat, the population often sleeps outside when not raining. Insecticide Resistance complicates vector control options. High coverage of IRS in both host and refugee community was achieved but there remains residual transmission. Vectors continue to be active during the dry season with harbourages and larval habitats in the riverbank. Further investigation of vector bionomics and human behaviours for potential community-based larvicide programs and integration of spatial repellents are required for successful malaria control.

Resolution: *Intervene at the epidemiologically right moment:* Positive results this year with the use of pirimiphos-methyl CS, timed correctly and with good coverage. However, there is still residual transmission and the need to understand the relative contribution of IRS and LLINs when bed net coverage or usage is low. There is need to develop an insecticide resistance management plan and incorporate new products such as Clothianidin 50WG. Operational research prospects include residual efficacy of IRS products on different substrates, resistance profiles and vector bionomics. IRS is expensive and logistically demanding, are there opportunities to introduce other approaches such as larviciding, which offer prospects for community involvement, spatial repellents and Attractive Toxic Sugar Baits?

Masisi, North Kivu, DR Congo. Vector Control in an insecure highland context (malaria):

Corey Leclair, MSF

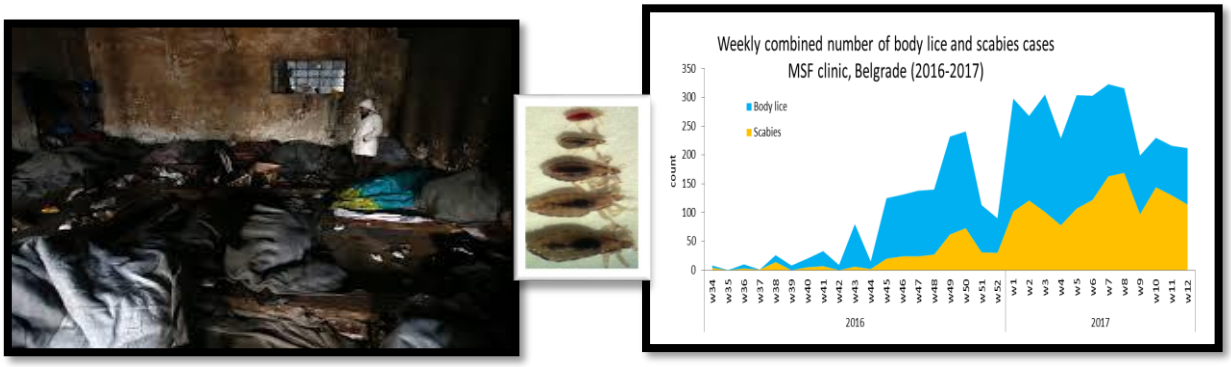
Context: 500,000 people isolated in region difficult to access region with few functional heath facilities; continual population influx creating "pop-up camps"; very volatile with 7 or 8 armed groups with access to health facilities far from guaranteed. Population movements, health education campaigns and access changes may impact passive case detection data. Now cases peak earlier in year but not clear if this is due to changing vectoral capacity, land use changes or climate changes? *An. gambiae* s.l. or *An. funestus* s.l not found above 1400 meters. Major larval habitats include abandoned fish ponds 80% of abandoned ponds (50% of total) had anophelines. Insecticide resistance studies suggest widespread permethrin resistance and increasing deltamethrin resistance.

Challenge: IRS is impractical because of population movement and temporary shelters. LLINs not practical because of high number of people sleeping in small shelters with constant population movement. There were small houses and lots of people with large temperature fluctuation, from >30°C to <15°C, therefore treated blankets were considered. [Note: in other contexts, vector mosquitoes often bite earlier in the evening during the cooler months.] Mass dipping of UNHCR blankets difficult. One needs space and time and there is the issue of vigorous washing and drying in the sun. The Skintex MRIII non-woven blanket with microencapsulated permethrin was considered, but this is a very thin and soft (need to take into consideration human behavior and preferences). Considered sewing polyethylene LLIN to the blanket which would presumably be used on the outside. Should the TPP be permethrin only or combined with PBO? Should the blankets be dual layers? How do we develop enough data for WHO? Will companies invest in such a product?

Resolution: With the very small housing, the Dumuria net, an "indoor/outdoor" UV resistant deltamethrin water-repellent net designed for nomadic populations was considered. Current treated blankets at $10 are expensive. One needs a company to make the right product; may be possible to working with industry to develop a TPP more aligned with the needs of this context. While this information may not be publication quality as it is limited sample size, this field experience should in the public domain. There are still questions if PBO is necessary or possible to put on a blanket. What is the evidence, including anthropological, needed for product development? Industry has developed a number of prototypes but how do we facilitate a market to encourage investment and development? The development of pre-treated shelter for camps an example of collaboration between aid agencies, experts and industry to develop a fit-for-purpose tool. Need to examine commercial challenge of trade-off between the investment required for product development and market size for such products within this niche market.

Belgrade, Serbia. Vector Control within urban migratory context (pediculosis):

Corey Leclair, MSF



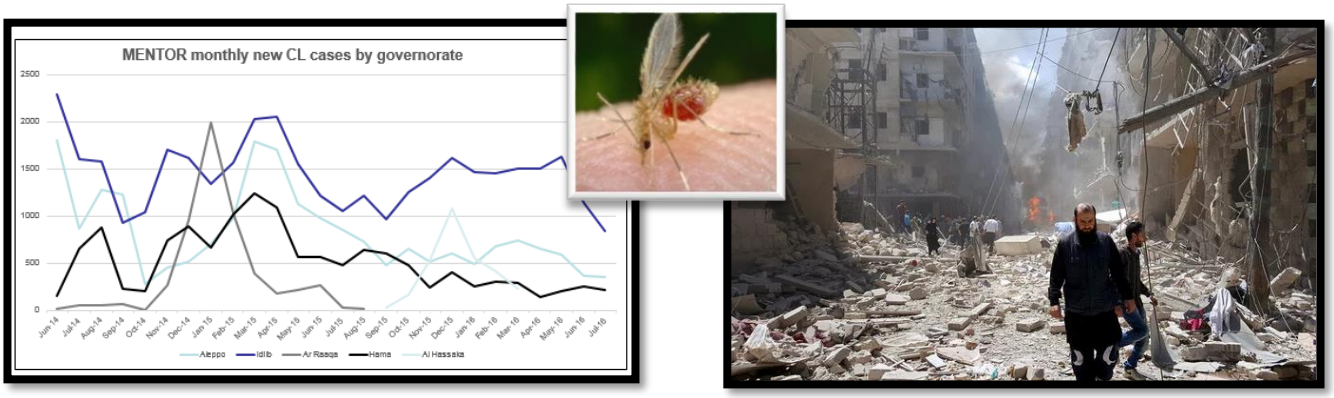
Context: One of the largest population movements in recent history, the "Balkan Corridor" through Serbia peaked in March 2017 with 8-10,000 people. Formal camp capacity was overwhelmed; many migrants did not engage with formal centers and established informal settlements in the woods or abandoned buildings excluded from humanitarian and government assistance. Many similarities to urban homeless populations in Europe and North America. There were reports of violence against the migrants and unmet minimal wash standards. Body lice, *Pediculus humanus humanus,* potential vector of relapsing fever, typhus and trench fever, became a major problem; there was also high exposure to rats and rodent-borne diseases. Little information available on the current prevalence of these diseases, but reports of infection foci in Afghanistan and Pakistan from whence many of the migrants originate.

Challenge: The presence of body lice *per se* is not an issue, but if the potential pathogens were to take hold in the population the conditions were rife for potential epidemic and spread into Europe. Overcrowding cold weather, multiple layers of clothing and no showering or laundry facilities exacerbate the situation. Past outbreaks of louse-borne diseases have been successfully contained through a combination of insecticidal and physical interventions. For example, Burundi prison populations were treated with permethrin dust and the clothing and bedding washed or replaced. But in Serbia, lice resistance status was not known, dusting powder not available, and correct dosages for treating blankets never calculated. People use multiple layers of blankets (temperature often dropped to -5°C) and there was a great deal of blanket exchange, thus treated blankets were not an option.

Resolution: In a survey of men's clothing the mean number of body lice per person was 6.7 [95%CI (1.3-12.1)]. Of clothing voluntarily surrendered for examination before washing: lice were present in 0% of socks, 50% of pants, 74% of T-shirts and 86% of underwear. Large-scale laundry facilities were installed but there were compliance problems: even with 10 big washers, turnaround time was three days, too long for such a rapidly moving population. In addition, this was a linguistically, ethnically and religiously diverse group making effective communication a challenge. Traditional tools don't work: more than 70 blankets of persons with lice were examined, but all negative for all louse life stages. Spray application of permethr in 20% EC to blankets was proposed by local authorities, but was not supported by evidence. Ivermectin was considered, but the lack of ovicidal impact and the dosing schedule when the average stay in the shelter was only 5-6 days suggested this would have only a transient effect. Undergarments were dipped with 20% permethrin EC (0.5g/a.i./m2) , along with access to shower and laundry facilities, but showed no impact. Attack rates could not be calculated because of population movement and could not deploy interventions with any degree of certainty behind them. Lice are one of the most untouched issues in many refugee setting, but there is a lack of technical capacity and tools for threat assessment and feasible interventions.

Syria, cluster-wide response to a disease crisis created by war (leishmaniasis):

Richard Allan, Mentor Initiative



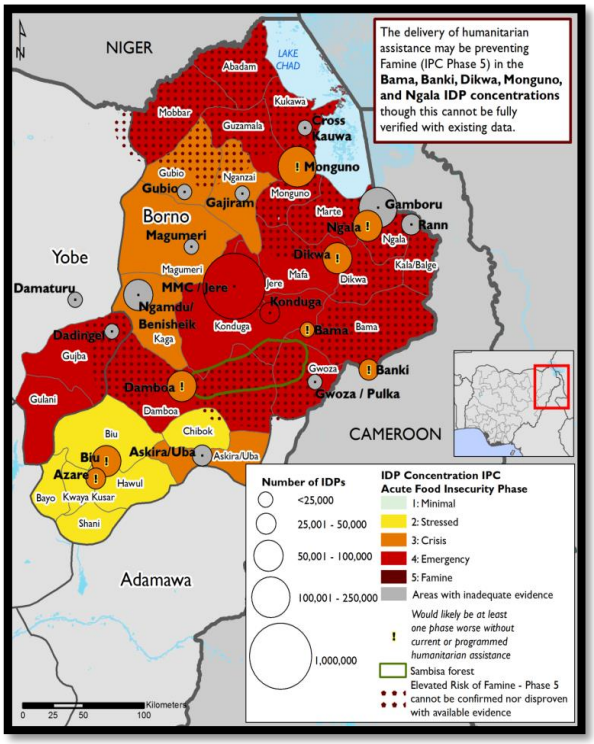
Context: Leishmaniasis, "Allepo Boil", in Syria is a cross-cluster issue. There are an estimated 1.3 M cases across the region. There are very high prevalence rates and mortality rates especially for Viscereal Leishmaniasis. Work since 2013 has been supported by OFDA. Very large population movement, including contribution to Balkan Corridor migration moves disease around. The sandfly vector lives in cracks of buildings, animal and human shelters; barrel bombs make buildings crunch and crack increasing harborages for sand flies. The very act of war is increasing the risk of disease. There is good data from 180 Health Facilities, showing the importance of surveliance and the source of data as other data sources are incomplete. There is a shrinking map of operational accessiblity with Allepo still the epicenter. Complex operating environment with 300 core staff across the region. Allepo and all urban centers have Cutaneous Leishmaniasis with visceral leishmaniasis in Iraq; spreading because of the 6 M people on the move including to Turkey. Very difficult working environment with health facilities being targeted. The waste manaement system has broken down adding to sandfly popuations. Crowding in camps is also increasing vector populations.

Challenge: Need to think about how the tools fit. Have used IRS, insecticide treated curtains as barriers to the upper stories, spray the lower story. In rural setting curtains and nets were used. Difficult to rely on chemical insecticides in a context where communities fear chemical warfare. Entomological data gathering is tied to the clinical data in a holistic approach. IRS works well in urban areas and camps. ITPS and treated blankes would help but the current product design (blanket is too thin) is not useful in this setting. Gender-balanced teams for IRS is important in this culture as are rotating chemicals for resistance management They are using more than 2 million mosquito nets but need smaller mesh for the sandflies, and to have UV protecton as they are used outdoors on rooftops. Nets are often torn because people are on the move. Tools work when applied well. WASH: important to move trash at least 400 meters from human habitations. Need to interlink WASH, health and SBCC to optimize service delivery contact points. Develop communications specific for the culture you are working in. There are 3.5m with IRS, 600k nets per year and 100k curtains. Treatment takes 3 to 4 months (need contact access to patients). Program effectiveness: Prevalence has come down but incidence fluctuates because of access and fighting. The disease is spreading to Turkey and Iraq.

Resolution: Fit the program to the context; challenges and frustrations with the Cluster system as everyone thinks it is the responsibility of another cluster. Need to bring in more tools, insecticide treated shelter, treated blankets, curatins, rubbish and waste mangement including environmental management.

Nigeria, Borno State (malaria, cholera, measles, famine and insecurity):

Stefan Hoyer, WHO



Context: Severe food insecurity and famine emergency (up to 40% acute malnourished) exacerbated by military conflict and recent outbreak of cholera. Malaria by far the most common disease accounting for up to 40% of the deaths with peak morbidity July to November. More than 3.7 M in need of assistance; 1.4 million IDPs but just 210,000 in camps, hyper-endemic malaria. Health Facilities largely dysfunctional, 2.3 M with no access, especially in North.

Challenge: LLIN shortage. GF and PMI supplying to Yobe and Adamawa, GoN responsible for Borno but not able to deliver. UNICEF recently supplied a further 600,000 LLINs but far short of what is needed. Only 25% of population is reached by the World Food Programme. IRS in the IDP camps ($1.1m) and full coverage of LLINs ($9.1M needed) has not yet been funded.

Resolution: strengthen disease surveillance by *WHO Emergency Warning and Response System (EWARS)* and case management in the IDP camps.

With few options for standard vector control the strategy is currently placing more emphasis on chemoprevention: either Seasonal Malaria Chemo-prevention (SMC) or Mass Drug Administration (MDA). First round of the SMC campaign for 1,116,000 children under 5 yrs. was implemented by the polio teams (July 2017). At first there was reluctance by the polio teams to be involved with malaria, but benefits were noted to the expanded package which is increasing uptake of polio vaccinations. UNICEF is supporting community-based interventions through making available polio assets for SMC, supporting resource mobilization for vector control and strengthening access to iCCM and IPTp. Sometimes there are no vector control tools available and mass chemoprevention campaigns are the most viable solution to keep people alive until more sustained vector control can be rolled out. Many agencies, esp. UNICEF, have long experiences on integrated campaigns to deliver multiple life-saving interventions including Vit. A, de worming, vaccinations, etc. Programs should map out the opportunities for increasing contact points, through food distributions, vaccination programs, WASH activities, etc.

Recently released WHO-guidance specific to NE Nigeria recommends: “Chemoprevention (**SMC**) to all children less than 5 years (ideally 4 to 5 monthly rounds) and to all pregnant women (**IPTp**) and **Mass drug administration (MDA)** for all ages whenever an opportunity arises to access population in partially accessible areas where security risk is a major concern. MDA should be coupled with either IRS and/or LLINs as appropriate.” SMC with SPAQ is recommended for the Sahel regions and this strategy may be less effective in areas with longer transmission seasons. There were stock-outs of ASAQ due to manufacturing issues. Stockpiling is difficult as it is requested in relatively small volumes and is rather cheap. There is a need to facilitate information exchange on technical issues and improving standard operation procedures, including standby stocks and supplies. Currently orders must be placed 9 months in advance for Guilin, sole source supplier of AQ+SP, to manufacture sufficient supply. By 2018/9 there should be 1 or 2 more suppliers available. There also need for advocacy for country programs supported through Global Fund and PMI to have flexibility in allocating resources for changing dynamics that arise with such emergencies.

Nduta Refugee Camp, Tanzania. Entomological surveillance and targeting interventions:

Claire Dorion, MSF

Context: Camp supports about 25,000 Burundi refugees who originate from both hyper- and hypo-endemic areas. The camp is divided into 22 zones with diverse shelter types (tents, poorly build sheeting shelters, brick and traditional mud houses) and surrounded by water bodies and marshlands. During the first six months of 2017 there were 55,614 confirmed malaria cases, with 2.5% of cases hospitalized (the majority in paediatrics). The health facility had to be expanded from 100 to 300 beds, mostly due to malaria. Malaria incidence has been as high as 380 cases/10,000 people/week, reaching 778/10,000 people per week in some high-risk camp zones. Entomological surveys with CDC light traps indicate presence of *An. gambiae*, *An. arabiensis* and *An. funestus.* High level (30%) of outdoor biting as determined by tent traps. There are numerous man-made larval habitats from roads, brick pits and tap stands. Teams conducted larviciding with the Labiofam/Tanzan-produced *Bti*; first round was late because of delayed supply, second round at the end of the rainy season targeted brick pits. Also conduct health promotion, diagnosis and treatment services.

Challenge: Heterogeneity of vector populations throughout the camp, 6/22 zones had high vector density that correlated in space and time with malaria transmission. Newly arriving families receive one LLIN per family, but coverage as low as 17%. Many of the nets, especially less desirable smaller nets, were sold for food as the food ration was cut. Some families are provided with metal roofing materials but must make bricks for walls. Brick pits and water-tap stands with poor drainage contribute to vector larval habitats, especially during the 6-month dry season. There has been Mass Drug Administration with DHA-PQ for everyone over 6 months except Pregnant Women in the 1st trimester; with 900 deliveries per month this excludes a sizable part of the population - need to combine Vector Control with the drug administration. The budget for MDA is CHF 800k for MDA and CHF150k for Vector Control in 6/22 zones. The more expensive PBO nets are being distributed, necessitating targeting to the highest risk areas of the camp. Standard survey instruments may not apply to refugee situations.

Resolution: Improve coordination with WASH and Shelter to reduce and manage man-made larval habitats; conduct quality control on locally produced *Bti*. Incorporate more environmental management, including issue of firewood harvesting/deforestation in areas surrounding camp. While MDA can have short-term impact, should not be at the expense of resources for longer-term vector control. Highlight risk area stratification but not at the exclusion of parts of the camp with transmission; work with remote sensing and UAV mapping as part of camp management to incorporate entomological indicators.

Additional partner contributions

UN High Commission for Refugees:

Vincent Kahi

In areas where UNHCR is working malaria is responsible for 30% deaths and the number two cause of morbidity. The main UNHCR strategy for vector control is distribution of LLINs to refugees as part of the core commodity kit when they are registered. However, there are different interpretations of the policy to distribute one net for two persons. Sometimes is it two nets per household and sometimes one net per household depending on the supply or the need to ration by the camp coordinator. There are often shortages of LLINs. The type of net distributed often has an impact on retention, with the refugees generally liking bigger nets. Move to PBO LLINs is in discussion but the main issue is cost and UNHCR needs to make an institutional decision how to proceed. There is often a discrepancy between distribution and utilization: e.g. where there should be 65% net coverage according to distribution records/survey, the actual retention and utilization may be as low as 21%. There are many reasons given by the refugees such as selling them or not use if being bitten outside. There have been recent malaria assessments in Uganda (1.2 M refugees last year) and Tanzania (300,000 refugees). Malaria control strategies are high on the agenda. UNHCR would like to implement a more integrated vector control strategy, including potential funding for IRS. Previously it was felt that LLINs alone were sufficient, but looking at the incidence rates over time, despite the LLIN distributions there are indications that we may need to move beyond LLINs to an IVM strategy. Standard questionnaires need to be adapted and developed for displaced populations, e.g. the standard survey instruments for net retention and net usage may not apply to refugee situations. Instead of a set questionnaire would be helpful to have a methodology guide so we can derive the answers needed for these unique contexts.

The environmental impact of refugee camps is important, e.g. brick making. Refugees may be given zinc sheets for roofing but are expected to construct the superstructure for themselves and dig their own holes for brickmaking. We need to work with other sectors for source reduction including WASH (e.g. tap stands and latrines). We have situations where there is a prolonged dry season but malaria transmission continues throughout the year because of man-made larval habitats. The WASH and Shelter/Non-Food Items clusters need to be involved. Likewise, the environmental impact on the areas surrounding the camps with regard to firewood and deforestation. We need to consider the needs of the refugees in the camps and the impact this has on the environment.

World Health Organization

Emmanuel Temu, WHO

Since the experience with Ebola epidemic in West Africa WHO embarked to reform its emergency work through the establishment of one single Health Emergency Programme (HEP) with independent mechanism of assessment and monitoring performance, and a clear mandate to be more operational at the ground level. GMP provides technical support on malaria to the HEP as well as member states in emergency situation. Specifically, for vector control in humanitarian emergencies, WHO-GMP may establish an Evidence Review Group to review current guidelines and decide if they should be revised and or develop new guidance. Many of the present group may be involved

There are also changes in how vector control products are evaluated at WHO. Under the revised process, the evaluation pathway to be followed is determined by whether or not a product is part of a product class with an existing WHO policy recommendation. The WHO "Pre-Qualification" has taken over many of the functions of WHOPES, since the first of January 2017 but that only applies to vector control tools with policy recommendations. All new tools, technologies and approaches will follow the New Intervention Pathway, supported by the Vector Control Advisory Group (VCAG). VCAG will validate whether the intervention under assessment has public health value. Once public health value has been demonstrated, WHO will issue a policy recommendation.

The challenge is how to evaluate new products and generate quality evidence to inform policy. Vector control in emergency situation may provide opportunity to generate evidence on public health value of some of new tools. However, evidence generation need to be based on robust study design. There is often lack of data and poor quality of evidence from the field. As such organisations planning to evaluate vector control products should invest in developing robust study design to generate quality evidence that can be used to inform policy decision. WHO will soon publish a manual on design for vector control efficacy studies which will give pointers, based on which investigators can delve further into literature or consult experts where appropriate. Vector control in emergency relief is a different context and this provides opportunity to link to the normative processes of WHO to improve deployment and evaluation of new tools in emergency settings.

Yemen: Planning response for malaria, dengue and leishmaniasis

Richard Allan, Mentor Initiative

Context: Widespread crisis over large area. Population in need of humanitarian assistance: 18.8M; 14.8M lack access to basic healthcare; Health facilities destroyed/ damaged: ~274–600 (31 health workers injured, 13 killed); 10/22 governorates at IPC "crisis" phase and 7/22 "emergency "phase". ~3.3 million people have been displaced due to conflict and insecurity. Massive displacement but most living within structures rather than camp setting. Politically need to deal with both political administrations. Multifaceted context across a wide area needing all clusters input. Major malaria vectors *An arabiensis*; *An culicifacies, An sergentii*

Challenges: Range of ecology from lowland coastal areas to highland areas. Who are you working with and where are they? Large population squeezed into small area, with severe access problems. Epidemic risks with massive population movement – some may have prior exposure and partial immunity to malaria if they come from lowlands, whereas others from highlands may not. Anthropology and understanding community risks is vital. Low LLIN utilization. Food insecurity and other crises, especially cholera will greatly increase mortality. Dengue and Leishmaniasis are also greatly affected by displacement but there will be large geographical differences, especially related to altitude.

Resolution: Review pre-crisis health and vector-borne disease information for malaria, leishmaniasis and Dengue/*Aedes*-borne viruses. Understand vector distribution and transmission ecology and the factors that influence, including abandoned fish ponds, brick pits, bombed buildings (esp. sandflys). Altitude is a critical factor – population cluster at higher elevations where there is risk of epidemics. Historical data stratified by health facility can suggest current risk area. Many of the present surveillance protocols are for static populations. These need to be adapted for rapid assessment of mobile, displaced populations where behaviour risk for outdoor transmission maybe different. Also need to factor in malnutrition and access problems because of insecurity. Most malaria survey protocols were developed decades ago and were for prevalence in camps – that is not adequate for mobile populations because of travel history and difficulty in determining place of infection. There is no current standard protocol. In some situations, parts of Yemen, Syria, cell phone technology can greatly aid assessment and surveillance. Open and accessible assessments is key – there is a call for interlink the different factors and potential interventions. Improved assessment and monitoring is a key priority for the present group.

Communications for Development: activities for malaria in emergencies

Valentina Buj, UNICEF

Context: Equity is a key driver: reducing barriers to access by vulnerable populations. This is a whole spectrum for affecting change, from the individual to household to community and policy making. We need understand the communities where we are working. Much will be through interpersonal communication within their own social networks: peer to peer, woman to woman. Community health workers can be especially important as in South Sudan where they move with their communities. Social organizations, schools, clergy are also important partners. Monitoring and evaluation is critical to determine if change happened and the desired outcomes are achieved. This is also critical for resource mobilization (both human and financial). If the impact of the communication strategy cannot be demonstrated, the intervention may be dropped. Emergency relief should be linked with longer-term development, looking ahead when the displaced population is finally able to return home and carry with them the knowledge and behaviour changes from these efforts.

Challenges: Are we problem-solving? Is there a feedback loop to affect long-lasting change? Not enough community engagement – community should be talking to itself. Integrate malaria and vector control themes into a holistic packet getting to more than one disease at time. Use non-traditional channels, especially in the private sector. Many emergency situations don't take into account that this is a vulnerable population and understand taking up the behaviour, the issues is not just commodity delivery.

Resolution: Resources are available. The UNICEF *Communication for Development* is a systematic process to promote positive and measurable individual behavior and social change that is an integral part of development programs, policy advocacy and humanitarian work. There are C4D officers in all UNICEF offices. The Ebola response offers lessons in terms of community engagement, understanding the community dynamics, and differentiation between communities – by bring people from outside communities or even sub-clans. Likewise cholera and polio has lessons in terms of contact points. Gender-sensitive uptake is key. Amongst the relief agencies is there a way to share best practices in emergency situations where the vulnerability, fragility and priorities for safety and survival may differ from traditional circumstances?

Best practices for increasing access to technical support

Valentina Buj, UNICEF

Context: Within UNICEF malaria is a multi-sectoral response linked across immunization, WASH, Health Systems Strengthening, Nutrition, Early Childhood Development, Communications, supply, and Innovations. Emergency situations are often challenged by insecurity and lack of access; insufficient human resources; weak or broken supply chain; destroyed infrastructure; weak coordination; inadequate funding; and poor data & information management. A key area is logistics and supply-chain management. There is a focus on preparation, risk mitigation and building resilience. UNICEF, WHO, CDC and other agencies are coordinating under a *Health Emergency Preparedness Initiative* (HEPI) that aims to build capacity, stockpile emergency supplies, improve delivery and reach the last mile.

Challenges: The cluster system structure can be an impediment if there isn't sufficient cross-pollination, coordination, collaboration and communication. Flexibility is important to move resources from one area to another and break down the silos among Shelter, WASH, Health, etc. Flexibility is needed not just for funding but also attitude to do more "problem solving" instead of just "solution implementing". Transparency and collaboration between individual agencies bringing in necessary supplies needs to be improved to reduce duplication, ensure priority gaps are being filled and contact points optimized. All countries have national strategic plans, but many don't have contingency for emergencies and flexible financing. Global Fund is starting to put this into some parts of the grant portfolio. Need to improve communications between the development and emergency units of agencies to proactively meet and plan where collaboration is necessary and how we would react.

Resolution: Clear definition of roles and responsibilities is vital to help ensure coordination (e.g. within a cluster-based system). Need to break down silos and the "agency hat". Flexible funding is needed for the rapid deployment of Technical Assistance; strengthening community health systems in fragile settings is key to ensure population having access to services; Grant implementation Technical Assistance needs a longer-term in-country solution through partners; Local actors are key to effective response before and after the emergency; the state of devastation will depend on preparation, preparedness and in-built resilience. Emergency Plans should include four phases: Preparation, phase; the acute phase (e.g. Bangladesh and Rohingya); Intermediate phase (e.g. South Sudan refugees in Uganda); Established camp phase (e.g. South Sudan IDP camps). Best practices include mission-specific deployment plans tailored to the local context. Also where possible take services to populations (e.g. mobile clinics).

Proposed activities

Platform for information exchange from the emergency viewpoint, including on tools and processes for all vested partners to empower implementing agencies to do their work better.

- Provide technical and operational best practices.
- Disseminate information on pilots, e.g. new delivery mechanisms research, e.g. polio workers
- Conduct gap analysis for what kind of tools we are missing. For example, the Zika crisis stimulated a great deal of tool development for *Aedes* surveillance and control; could be used for advocacy.
- Coordinate with WHO: TDR, Health Emergencies Program, NTD and GMP. TDR and the multi-sectoral approach may also be useful. Normative function by the GMP Evidence Review Group.

Advocacy to improve operational collaboration among humanitarian clusters, agencies, and relevant national programs and both emergency and development donors.

- Provide widely available situational analyses highlighting priority gaps and coordinated response
- Choose a success story for bringing in added value of collaboration (e.g. Bangladesh)
- Invite colleagues from industry and other sectors/inter-clusters (leads) to next meeting.
- Submit letter to *Lancet* or similar platform (call for collaboration with multiple authors, short policy letter) and may be expanded to a supplement for spring 2018
- Create platforms where these stories can be told, e.g. MIM, regional network meetings.
- Provide advocacy and communication materials to donors and agency collaborators

Integration across diseases and delivery strategies to improve efficiencies and effectiveness of program delivery.

- Show examples of integration when there are contact points, e.g. polio and vector control
- Facilitate improved supply chain management for insecticides, nets and other vector control products so they can be available in time
- Advocate for improved financing flexibility

Facilitate bringing new tools to the field, including through contribution to the evidence-base, through dissemination of Standard Operating Procedures, collaboration with industry and academia, and promoting IRB-approved Operational Research.

- Involve industry and product development consortia to the discussions and development of Target Product Profiles for the particular needs of vector control in humanitarian emergencies.
- Develop and disseminate Standard Operating Procedures and protocols for good study design and data collection.

Agenda and List of Participants

Vector Control in Humanitarian Emergencies

Roll Back Malaria Vector Control Working Group
15 September 2017
Hotel Bildungszentrum 21
Basel Switzerland

8:30	**Coffee**	
9:00	Introductions, goals and objectives	Michael
9:15	Summary and discussion of steering committee meeting on proposed objectives, *modus operendi* and outputs	Konstantina
9:30	Current and new tools for vector surveillance and control in humanitarian emergencies	Michael
	Examples of needs and opportunities	
9:40	• South Sudan (malaria) • DRC Massisi (malaria)	Richard/Corey
10:00	Discussion	
10:15	**Coffee**	
10:30	• Belgrade, Serbia (body lice and scabies)	Corey
10:50	• Syria/Turkey/Iraq (leishmaniasis)	Richard
11:10	• Nigeria – Borno State (malaria)	Stefan
11:30	• Tanzania (malaria)	Claire
12:00	• TBD (from partners)	
12:30	**Lunch**	
	Cross-cutting opportunities for support	
13:30	• Assessment, surveillance for planning	Richard/Hans
13:50	• Communications for uptake and equity	Valentina
14:10	• Technical support and best practices	Valentina
14:30	**Coffee**	
14:45	Final discussions:	
	Additional comment on groups objectives, *modus operendi,* outputs and projected timelines	
	Roles of partners and next steps	
16:00	**Close**	

List of Participants

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