



# 6th Emergency Environmental Health Forum

16-17 October 2015

Lea Wende  
November 2015

# Building knowledge. Improving the WASH sector.

## Acknowledgements

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We would like to thank Miss Lea Wende for taking and putting together the minutes of this meeting. Special thanks go to the Editorial Committee members:

- Andy Bastable (Chair), Oxfam
- Jeroen Ensink, SHARE/London School of Hygiene & Tropical Medicine (LSHTM)
- Peter Maes, MSF
- Marion O'Reilly, Oxfam
- Jamal Shah, UNICEF
- Nick Brooks, CARE Australia
- Jean Lapegue, ACF
- Libertad Gonzales, IFRC
- Liz Walker, IRC
- Murray Burt, UNHCR

Report formatted by: Alexandra Chitty

## Contributors



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## Introduction

The 6th Emergency Environmental Health Forum (EEHF) took place 16-17th October 2015 in Nairobi, Kenya, and brought together water, sanitation and hygiene (WASH) experts from organizations such as Médecins Sans Frontières (MSF), Care, the International Rescue Committee, UNHCR, UNICEF, the Red Cross, Oxfam and Action Contre la Faim to exchange recent field experiences and explore new approaches to action and intervention in the WASH sector.

## Friday 16th October: First Session

### Opening Address

**Andy Bastable, Chair of the Interagency Group and Editorial Review Committee**

Andy Bastable's introductory speech gave a brief overview of the content and objectives of the 6th EEHF. He highlighted that as opposed to the rather technically oriented meetings of the past years, the 6th was aimed at integrating more health issues than had previously been the case. Under the umbrella objective of the forum to bring together research and fieldwork experiences to establish how current field practices can be improved, focus this year would be placed on disease outbreaks, moving from the unprecedented Ebola outbreak that hit West Africa in 2014/15 on to a variety of other disease outbreaks, such as cholera and typhoid fever.

### Keynote Speech

**Peter Maes, Coordinator of the Water, Hygiene and Sanitation Unit at MSF**

To set the scene, Peter Maes gave an insight into the Ebola outbreak that so tragically hit West Africa - namely Liberia, Guinea and Sierra Leone - in 2014/15 from an MSF perspective as the organization traditionally involved in the management of Ebola outbreaks. While there is as yet no licensed treatment proven to neutralize the virus, early supportive care with rehydration, symptomatic treatment improves survival, which is further determined by virology and age. As emphasized by Peter Maes, community participation based on a two-way communication process taking into account local beliefs, traditions and practices is key to successfully controlling outbreaks.

In its Ebola response, MSF follows a six pillar strategy:

1. Isolation & care
2. Safe burials and psychosocial support
3. Awareness raising
4. Outreach
5. Contact tracing (i.e. monitoring people who were in touch with cases)
6. Access to care for non-Ebola patients (i.e. maintaining basic healthcare services in-country)

As opposed to the previously seen, containable Ebola outbreaks - such as in Sudan, Uganda or the Democratic Republic of Congo (DRC) - the unprecedented, overwhelming scale of the 2014 Ebola epidemic led to a paradigm shift, in the response opening a 250 bed instead of the usual maximum 50 bed management structures, with piloting a stop gap household disinfection kit distribution, with MSF joining as partner into clinical trials, with an unprecedented training effort for all agencies involved in the fight against ebola.



As described by Peter Maes, the Ebola outbreak unfolded in 4 different phases, from Phase I characterized by the outbreak remaining undetected while spreading quickly across porous borders and Phase II comprising the alert of a “mysterious disease”, confirmation of active Ebola transmission in 60+ locations and MSF calling on other agencies to respond to the crisis as well in addition to MSF opening 16 Ebola Treatment Centers (ETCs), quickly reaching admission limits to Phase III “From global fear to action” during which WHO declared the outbreak a public health emergency of international concern, with MSF continued call calling on other aid agencies to engage as hands on ground were still missing; and Phase IV in which Ebola cases began to decline, however slower than expected, and cured patients remained “patients” in the face of trauma and potential unclear transmission risks.



In conclusion, Peter Maes stressed that in terms of future outlooks, it was of critical importance to prepare for the unexpected as well as the importance of WASH in creating an enabling, safe environment for medical staff to carry out their crucial work. He furthermore highlighted the need to further elaborate how performant the WASH sector has been during the crisis and the non-feasibility of a “cut and paste” WASH sector approach to emergency response to future disease outbreaks (not necessarily Ebola).

## Friday 16th October: Second Session - Ebola Outbreak 2014/2015 (1)

### Ebola Virus Disease Water and Sanitation Risk management

Julii Brainard, The Norwich Medical School, University of East Anglia

Julii Brainard presented on the risk of fecal transmission of Ebola (i.e. What is the possibility that the disease could spread through non-typical routes especially disposal of human body waste?) and handling of sanitation waste from Ebola. In an attempt to establish what the dominant risk factors for Ebola disease transmission are in the community, how much virus is in feces, urine and other body fluids, and how long Ebola survives in sewage, a systematic literature review on Medline, Scopus, and various grey literature sources including meta-analysis was conducted alongside a Hazard Analysis of Critical Control Point (HACCP) assessment.

Risk Environment	Type of risk, associated with...	... Blood-contaminated materials	...Other body fluid contamination	Recommendations
1. Latrine use	Contamination of environment	High	Medium	Suspected and confirmed cases use isolated and segregated latrines and keep secure for 7 days <sup>1,2</sup> after last use by suspected case. Secure from surface water inflow via external channels or concrete surroundings, and ensure adequate quality of construction to limit risk of collapse and contamination of groundwater sources <sup>3</sup> . First, clean surfaces using a single-use cloth with water and detergent which should then be incinerated. Following cleaning, wipe 0.5% chlorine solution <sup>2,4-7</sup> on all surfaces, including door handles, toilet seat, floor, walls <sup>7</sup> . <u>Wash hands with soap and water after using latrine.</u>
6. Emptying of latrine	Contamination of handler	Variable	Variable (age of waste, latrine construction)	Wait a minimum of seven days after last use by a known case before desludging <sup>6,10</sup> . If not possible to wait seven days, wear full PPE* <sup>11-13</sup> .
12. Discharge and treatment of wastewater through sewer	Contact with virus by general public through open sewers, or with workers at treatment plant	Low	Low	Public health education of community representatives and construction of physical barriers <sup>15</sup> . Ensure appropriate conditions of carriage (in many places effluent streams are used by neighbours) <sup>3</sup> by following sanitation safety planning guidelines <sup>3,16</sup> .

Table 1 presents the HACCP assessment recommendations for the disposal of waste potentially contaminated with EVD viral material.

As demonstrated herein, the risk of sewage/fecal transmission close to Ebola patients (i.e. handling feces, fecal smearing of environment/latrines) is probably moderate, with the risk distance to a patient most likely being low to very low due to dilution and the probably rapid decay in feces at ambient temperatures. Also, the risk of transmission drinking water was found to likely be low. Moreover, the risk of widespread rapid transmission via indirect causal contact in communities can be estimated low as it requires close person contact to spread the infection while the risk increases to 33 % in case of close contact. Therefore, disinfection of faeces might even be pointless.



## Social Mobilisation and Hygiene Promotion - Where to now after Ebola?

**Marion O'Reilly, Head of Public Health Promotion at Oxfam GB**

Marion O'Reilly reported on the outcomes of an Interagency Meeting bringing together representatives from UNICEF Communication for Development (C4D),

the US Centre for Disease Control (CDC), Johns Hopkins University, WHO, IFRC and various international and national non-governmental organisations (NGOs) to share examples of intervention approaches used and discuss principles of social mobilization in the context of the 2014/15 West African Ebola outbreak, to determine what the sector has learned about working with communities throughout this period and how this knowledge can be applied to future WASH responses to disease outbreaks.

Key issues highlighted during the meeting were the lack of clarity on the role of WASH in some agencies, the weak coordination of the social mobilization pillar, the overlap between social mobilization and hygiene promotion, hygiene promotion personnel being unable to adapt to respond to high risk practices, with messages used to sensitize respective communities often being cholera messages, neglecting sensitization about Ebola, and the fact that community engagement cuts across all response pillars.

To overcome the prevailing shortcomings, various measures including the establishment of a common services platform as advocated for by Communicating with Disaster Affected

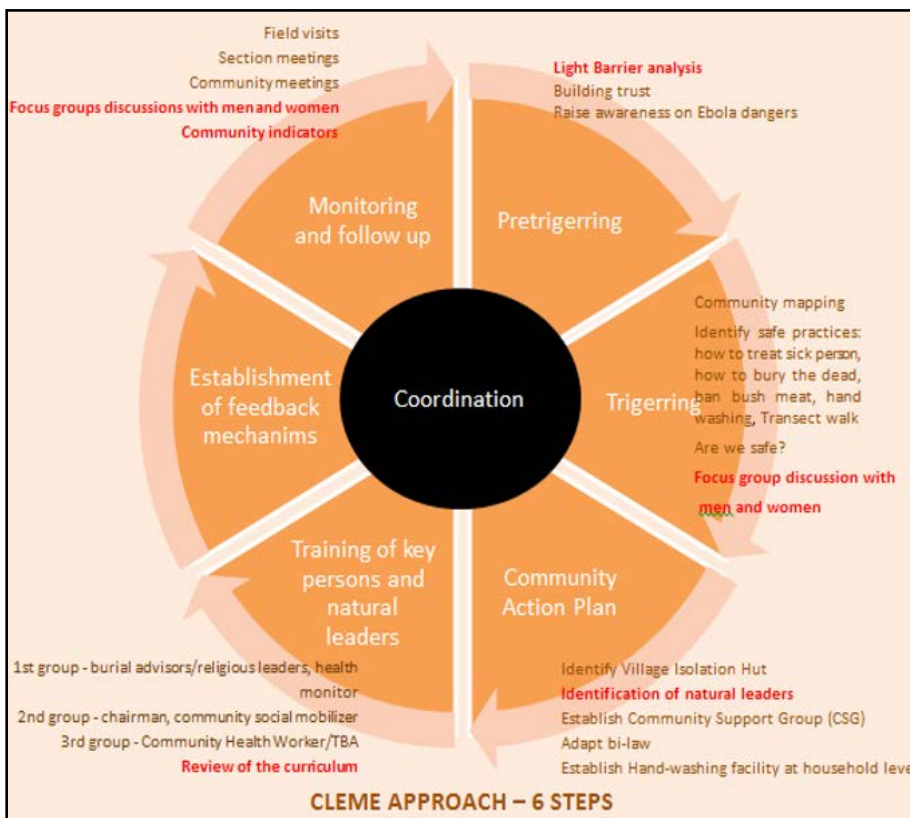
Communities Network, better linkage with other agencies working in the same field to improve overall quality, thereby ensuring that

communities experience a more coordinated rather than many different approaches, and flexibility in terms of the approach used dependent on emergency context, were proposed. While different agencies were found to use different approaches and methods, these were underpinned by common principles, with actors reaching a consensus on working to give social mobilization/community engagement a greater profile within the respective organizations.

Morover, the different stakeholders involved articulated a commitment to develop principles, frameworks, standards and indicators to help clarify what constitutes social mobilization/community engagement as well as to support efforts to ensure more effective intersectoral coordination and leadership for social mobilization and the instigation of a real time emergency knowledge management system to engage with communities and support and inform all sectors. By improving the underlying evidence base and data sharing, analyzing modalities to inform WASH sector work, and strengthening coordination and leadership, the sector can better prepare for the next response.

## Community Led Ebola Management and Eradication (CLEME) - ACF Sierra Leone - Social Mobilisation

Karine Deniel, Former WASH Cluster Coordinator from the Rapid Response Team of the Global WASH Cluster



Karine Deniel outlined ACF's engagement in the Ebola outbreak response in West Africa, supporting the Ministry of Health and Sanitation in the design and implementation of social mobilization activities. As simply providing information was found insufficient, resulting merely in better knowledge among community members but not effective behaviour change, the CLEME approach was adapted by ACF in October 2014 from the organization's commonly practiced Community Led Total Sanitation (CLTS).

An essential shift towards a two-way communication approach based on 6 components - namely Pretriggering, Triggering, Community Action Plan, Training of key persons and natural leaders, Establishment of feedback mechanisms, Monitoring and follow-up - aimed at assessing what type of local practices were in place and how these could be built upon was put into effect.

However, as a result of the short timeframe for implementation, scale-up and monitoring of the CLEME approach, the methodology raised a number of issues that should in future be further investigated, including the fact that the triggering factor used in CLEME is fear as opposed to disgust and shame in CLTS, operational difficulties such as the high number of well trained staff required for scaling up CLEME, and the impact of the given size and typologie of the communities - generally, CLEME seems to be more effective in smaller communities with preexisting leadership.

In order to improve future CLEME implementation, Karine highlighted a number of essential steps, such as an enhanced understanding of targeted communities (e.g. rapid context specific barrier analysis), adaptation of the community engagement model taking into consideration different environments (e.g. rural vs. urban), and gender mainstreaming (i.e. identification of specific needs), better follow-up on the action plan and the establishment of feedback mechanisms between ACF, the community and the Ebola Virus Disease (EVD) response mechanisms. The CLEME approach should now be adapted to the post-Ebola context in order to maintain the vigilance and resilience of communities as EVD will most probably become endemic.

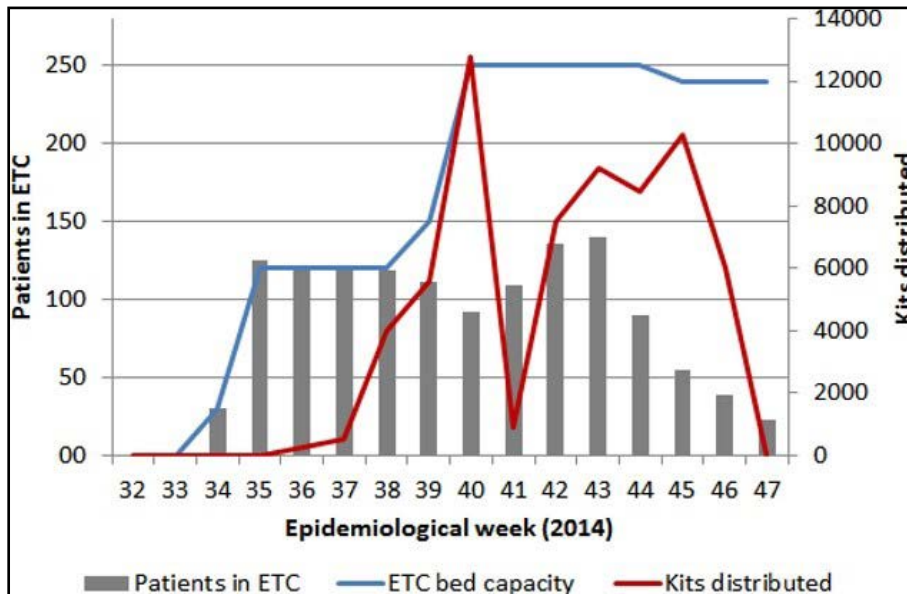
## Household Disinfection Kit (HDK) Distribution During the Ebola Outbreak in Monrovia, Liberia: the MSF Experience

**Peter Maes, Coordinator of the Water, Hygiene and Sanitation Unit at MSF**

Peter Maes gave an insight into the distribution of Ebola HDKs in the challenging urban slum context of Monrovia. The overwhelming, unprecedented scale of the West African Ebola outbreak of 2014/15 lead to a paradigm shift and required unconventional measures to be taken, with MSF calling on other agencies to engage in the critical work needed on ground to limit the spread of the epidemic as logistical limits were quickly reached and the organization was unable to admit all patients in their ETCs.



HDK distribution was part of the wider ongoing MSF Ebola intervention in Liberia as a direct response to the critical lack of ETC capacity, constituting a vital stopgap measure aiming to make the ongoing domestication of the intervention less risky, thereby enabling increased household member involvement. Alongside the at risk population and health workers, a total of 65,000 kits were also distributed to the general population using a mobile approach, with promotion sessions before and after mass distribution.



To evaluate this unconventional EVD control approach in Monrovia and more specifically assess whether HDKs were appreciated and used correctly as well as for the intended purpose, a phone survey with a semi-structured questionnaire targeting a total of 1386 recipients from the three different groups was carried out. Results showed that the kits were relevant for all three groups of beneficiaries, with generally high motivation and correct use of products, making EVD kit distribution a feasible intervention in this setting. An interesting observation was that 75 % of the contacted recipients burned their waste invalidating to some extent the counter argument that this intervention would result in littering Ebola contaminated waste.

However, while use of the full kit was high for intended purposes, chlorine use was high even in households without a case following distribution which was against the instructions by MSF to use kits only during care of sick patients while waiting for the ambulance, and during - if unavoidable - the handling of dead bodies while waiting for collection. Clearly, there was contradiction between the overall social mobilization on the use of chlorine for prevention purposes and the tailored messaging to use kits only if a case occurred. Consider distribution as well of kits with chlorine only in future interventions.

## Applied Research on Disinfection to Prevention Ebola Transmission

**Daniele Lantagne, Tufts University**

In this short presentation, Daniele Lantagne presented some of the findings of a currently ongoing laboratory study concerning the effectiveness of different types of chlorine.

### First Panel Discussion: Ebola

This session concluded by inviting any unanswered questions from the floor for discussion by a panel consisting of the speakers Julii Brainard (University of East Anglia), Peter Maes (MSF), Marion O'Reilly (Oxfam) and Karine Deniel (ACF).

The first question from the audience was why Nigeria had been able to control the Ebola outbreak so quickly, as compared with the three worst-hit countries in the West African outbreak Sierra Leone, Guinea and Liberia. The panel concluded that the response in Nigeria had been more immediate, applying a well-controlled approach considering all 6 pillars of Ebola management with the support of MSF.

The next question was directed at Peter Maes and focused on Ebola household disinfection kit distribution during the Ebola epidemic in Monrovia, more specifically on how MSF dealt with kit demand being higher than what they could offer and why only females were considered as direct recipients. Peter Maes responded that some patients could not be treated due to limited admission capacities in ETCs in town, and thus received kits as a last resort stop-gap measure. Female recipients were targeted specifically simply to avoid potential difficulties and violence, with MSF signaling to pull-out in case of any disturbance. Another question concerning the distributed kits focused on their potential misuse, but as pointed out by Peter Maes overall reported use was good, with no further issues becoming eminent. Communities were generally very happy about the possibility to be engaged in the Ebola response and wanted to continuously be involved and responsible. It was furthermore mentioned that MSF purchased tools like chlorine outside the respective countries not to raise domestic prices.

Another question queried what the 2014/15 West African Ebola outbreak will mean in terms of future outlooks and response strategies on the basis of lessons learned. In response, it was stressed that there is a critical need for better coherence and coordination as well as evidence-based field practices. It was added that technically easy solutions are required, enabling actors to quickly set up treatment centers and the like in response to potential future Ebola outbreaks.

A question regarding the research findings presented by Julii Brainard concerned the relative risk of sweat and vomit that thus far remains unclear, just like the role of semen. Peter Maes added that MSF has been carrying out sample collections on dead bodies

and their surroundings that were subsequently stored and are now awaiting exportation to be tested by means of culture. He moreover stressed that overall data collection during the Ebola outbreak should have been better among WASH actors.

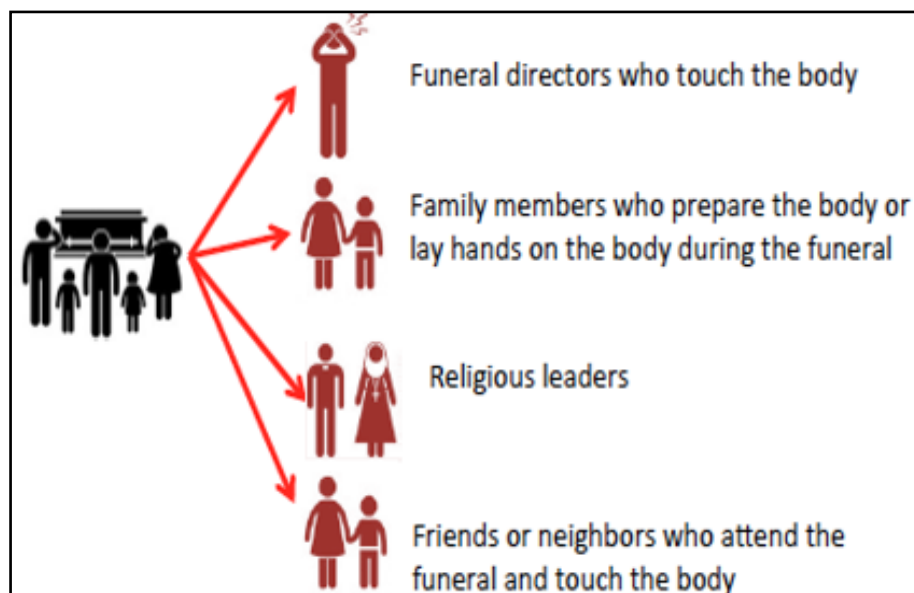
Lastly, Daniele Lantagne responded to a question from the audience regarding her ongoing research on disinfectant effectiveness, more specifically the potential impact of detergents, by saying that a lot of them might be effective, but have not yet been tested.

## Friday 16th October: Third Session - Ebola Outbreak 2014/2015 (2)

### From Cremation to Safe and Dignified Burials in Montserrado County - Coordinating the Social Mobilisation Component

**Karine Deniel, Former WASH Cluster Coordinator from the  
Rapid Response Team of the Global WASH Cluster**

Karine Deniel talked about how through social mobilization communities in Montserrado county, Liberia were enabled to engage in the setting of a national cemetery following a switch from normal burials in the early onset of the Ebola crisis to cremation believed to act as a deterrent for community members to seek out proper treatment and disposal.



While the practice was carried out for months, the public outcry against cremation induced the Dead Body Management group to explore more culturally appropriate solutions in the beginning of October 2014. The Task Force was commissioned to set up a suitable cemetery for safe and dignified burials that respect Liberian tradition and religion beliefs as well as to implement an adequate

social mobilization package aimed at increasing acceptance of safe burials among community members. A set of harmonized messages targeting specific groups - ranging from communities in proximity to the the chosen burial site and on the transport route to the general public, funeral home directors and morticians and safe burial teams - were implemented alongside a comprehensive action plan ensuring their engagement.

Among the key lessons learnt were the critical importance of ensuring community engagement, social mobilisation and communication in the wider dead body management process as well as awareness activities within the humanitarian community concerning the cultural and social aspects of managing corpses. While few humanitarian organizations dealt with dead body management, its coordination and integration with public health promotion is key to respond to Ebola outbreaks.

## EVD - ETUs' Liquid Waste Desludging in Monrovia

### Andrés Casal, ICRC Water and Habitat Coordinator

Andrés Casal reported on the ICRC experience of desludging of Ebola contaminated waste in ETUs in Monrovia, Liberia - made increasingly challenging through high water tables during the rainy season, triggering concerns of overflowing pits & septic tank systems in ETUs, and a critical lack of knowledge regarding Ebola virus environmental survival, exacerbated by other critical constraints like llimited human resources and technical and coordination challenges.



Under the overall objective to reduce environmental risks, the implemented approach combined both containment (i.e. collection, transportation, storage/disposal), decontamination and the development of Protocols for the

Safe Collection and Disposal of Ebola Contaminated Sewage (SOPs). As set out in technical proposal, two vacuum tanker trucks were sent for desludging the ETU's sanitation facilities, with waste to subsequently be disposed in an old and unused 8000 m3 digester in Fiamah WWT plant that fulfilled all the necessary requirements (i.e. vicinity of ETUs, sufficient volume, water proof and isolated from network and acceptable by neighboring community and authorities). This approach was based on the assumption that ZEBOV remains



infectious in vitro in fluids-like media for 46 days & 50 days dried onto surfaces derived by in vitro research and epidemiological data. An important aim of the project was to develop SOPs that would help minimize potential hazards related to the handling and management of sewage generated from the ETUs and the Community Care Centres in collaboration with other actors like WHO and UNICEF. Due to poor coordination between actors and delayed validation of SOPs by authorities and stakeholders, however, it took 4 times longer to adopt the protocol than to develop the technical proposal.

Despite considerable implementation delays, numerous valuable opportunities were identified, e.g. sharing of solutions with other actors (Ebola fora) at HQ and FD level, exploring out of the box technical solutions, and on-site learning.

## Understanding the Drivers of High Risk Behaviours in Ebola: Qualitative Studies from Sierra Leone

**Marion O'Reilly, Head of Public Health Promotion at Oxfam GB**

During the 2014/15 Ebola outbreak many of those affected presented behaviors of taking cases to traditional healers as opposed to health facilities equipped to take adequate care of patients. Based on two qualitative studies carried out in the form of interviews with IDI community members and Ebola survivors in Sierra Leone, prevailing treatment seeking behaviors and causes of failure to seek treatment and persistence of high risk practices were analyzed, aiming to establish what motivates and disincentivizes people to comply with recommended behaviors.

Following iterative analysis processes of community reports of treatment seeking behaviors and community perceptions of response interventions and their impact, data were then coded across key themes that were common across the two studies: fear and (mis)trust of the treatment system; community participation in Ebola prevention; proximity to and familiarity with treatment centres; rules and bylaws on high-risk practices; and the role and presence of survivors.

Fear and lack of appropriate information, distance from and inaccessibility of facilities, and unfamiliarity and perceived resistance to outsiders were among the main causes of failure to seek treatment and persistence of high risk practices, while community perspectives on addressing the underlying causes identified “sensitization” such as in the form of household and community level dialogue, community engagement, building hope through survivors and proximity and familiarity of treatment facilities as important means to achieve better compliance.

The lack of involvement of local people in the context of the West African Ebola outbreak constituted a substantial barrier to safe treatment seeking behaviours among communities, with local

consultations often slow to engage with local leaders and healers, and neglecting to consult with the wider population.

## Second Panel Discussion: Ebola

The second discussion invited questions from the audience to the speakers of the last session Karine Deniel (ACF), Andrés Casal (ICRC) and Marion O'Reilly (Oxfam).

The first question was directed at Andrés Casal who had shared his experiences on desludging of Ebola contaminated waste was what is going to happen to the desludging containers now. He explained that at that time a digester was the only plausible option, and that nowadays to the best of current scientific knowledge the virus contained in the sludge should be inactivated so that digesters can be emptied safely. In this context, he highlighted the necessity to explain to surrounding communities the procedures to be undertaken.

Marion O'Reilly was asked whether the fears of community members assessed by means of qualitative studies were different between different groups, to which she responded that children were particularly targeted and that it was particularly difficult to establish what children felt and thought or what their biggest fears in the crisis were.

Next, someone from the audience asked whether there was a system in place to keep track of people (i.e. Ebola cases), e.g. for affected families, and whether this would have helped to improve the overall situation. As stressed in the discussion, some people managed to keep track of their loved ones by themselves, using their own devices (i.e. mobile phones). In other places active case finding and contact tracing was undertaken, aiming to obtain telephone contacts for patients in care facilities, but at the same time giving other cases a chance to identify themselves and seek appropriate treatment as well. The importance of trust through improved information was highlighted.

A question from the audience to the broader panel was how the WASH sector can be better setup to cope with future outbreaks (not necessarily Ebola), what possible recommendations could be and how to overcome barriers that were faced this time. Some stressed that finding solutions does not constitute the main problem, but rather their validation, requiring a higher level authority to speed up the decision-making and implementation process. This could be in the form of a validation body with authority to push governments to approve and allow steps/interventions. Also, it would be of critical importance to create another pillar responsible solely for coordination. A participant mentioned that people on the ground should have been involved in higher level discussions and decision-making processes, making it possible to synthesize what has been learned and come up with recommendations based on valuable field experiences.

Moreover, the critical need for a stronger focus on community involvement was emphasized. The importance of community-

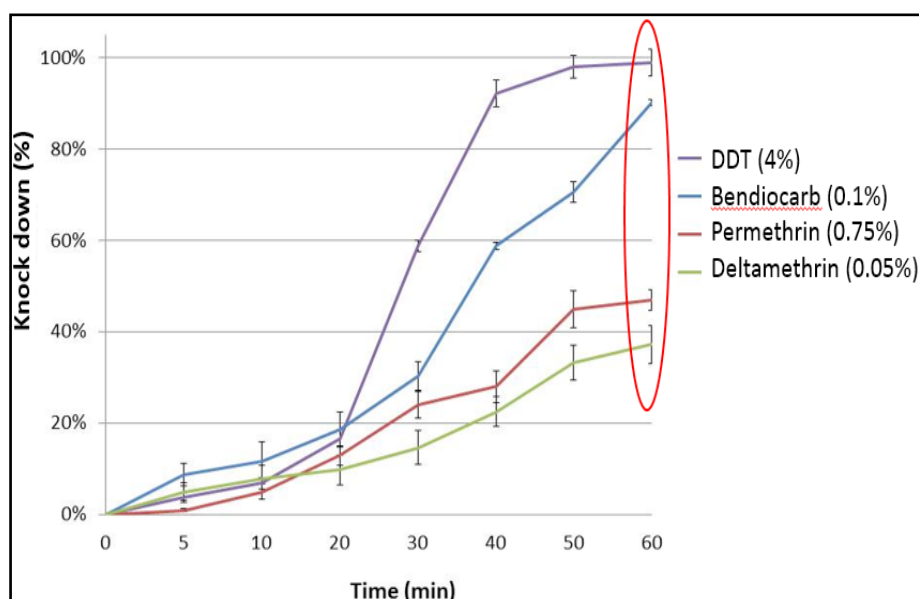
focused action was described as the biggest lesson of the West African Ebola outbreak. In order to quickly and more effectively engage communities in future Ebola (or other outbreak) responses, social mobilizations needs to be implemented much earlier next time. It was also mentioned that WASH should be more proactively integrated with health through better linkage with health actors and focus on public health approaches. In that sense, the Ebola outbreak was described as a tragic “window of opportunity” to shape the wider WASH sector and its actions.

## Friday 16th October: Fourth Session - Disease Vectors

### Identification of Main Malaria Vector Species and Their Sensitivity to Insecticides Used for Malaria Control in the DRC

Jeanine Loonen, Entomologist at MSF

Jeanine Loonen presented the findings of the MSF Malaria study in DRC with the objective of identifying the main malaria vectors in the research area and whether or not the identified vectors displayed resistance to the family of chemicals (i.e. pyrethroids) used in Long Lasting Insecticide Nets (LLINs) and Indoor Residual Spraying, also known as knock-down resistance. This was part of a wider attempt to interpret the increase in malaria cases in the area in combination with a series of other studies (e.g. Knowledge, Attitude and Practices study, artemisinin-based combination therapies (ACT) efficacy study and ACT adherence study).



Following mosquito catches by means of CDC light trap collection, indoor resting collection and pyrethrum spray collection from 102 houses in Shamwana, DRC, vector resistance to four different types of insecticides - namely DDT, Bendiocarb, Permethrin and Deltamethrin - was tested. From the same houses, 67 LLINs of four brands were randomly collected: Netprotect (14), Olyset (6), DuraNet (11), and PermaNet (36).

The study results identified *A. funestus* and *A. gambiae* as the main vectors in this Shamwana, with local mosquitoes showing insecticide resistance especially towards permethrin, and tested LLINs being ineffective in killing susceptible mosquitoes, however potentially providing physical protection. While the knock-down effect of Bendiocarb and DDT after 1 hour exposure indicates high potency of these insecticides in the vector population in Shamwana, the tested Pyrethroids had very low proportion of vectors (less than 50%) knocked-down after 1 hour exposure.

The results of this study strongly suggest that the risk of malaria transmission is high in the area and that current malaria prevention methods are only partially effective due to increased resistance and poor quality bednets, with an important rise in malaria cases seen without any programmatic changes.

## Madagascar Pest Control in Prisons

**Jean Vergain, Water and Habitat Engineer at ICRC**

Jean Vergain outlined the ICRC Madagascar Pest Control in Prisons project, having at its heart the objective of protecting detainees in Madagascar's prisons characterized by severe overcrowding and poor sanitary conditions against diseases resulting from improper hygiene through the creation of hygiene committees supporting the prison administration with hygiene material, rehabilitation and construction of infrastructures; disinfestation of premises and personal belongings; and ratting of those prisons located in plague areas.

With plague remaining endemic in Madagascar, resulting in approximately 500 cases annually, the control of invasive rodents to prevent rodent-borne diseases like the plague in Malagasy prisons constitutes a core target for improved detainee and more widely public health on the island. Reducing rat populations and disease transmission was carried out in 4 successive steps: disinfestation aimed at killing fleas; rat control through trapping; ratting undertaken regularly with the application of hygiene measures; and subsequent analysis of captured rats through autopsy.

This project outlines the importance of a multidisciplinary approach to prison pest control and rat control in prison for reducing the risk of rodent-borne disease transmission to detainees, thereby promoting better health of prisoners and prison staff.



## MSF Dengue Prevention and Control in Guiuan, Eastern Samar, the Philippines

Azzurra D'inca, MSF

With 3.9 billion people at risk of dengue fever (DF) in 128 countries, dengue remains an important public health threat in many regions of the world. During the MSF Typhoon Hayan Emergency Response in the Eastern Philippines in early November 2013, the organization decided to implement a dengue prevention program following a dengue risk assessment based on the WHO guidelines for Communicable diseases following natural disasters - Risk Assessment and Priorities (2006).

Azzurra D'inca outlined the different levels of action of the 6 months intervention aimed at decreasing the risk of a dengue outbreak and enabling early detection and response in case an outbreak occurred, from surveillance and case management to semi-permanent breeding sites monitoring, sentinel sites monitoring and prevention in the islands.

Crowding of susceptible hosts	✓
Weakened health system	✓
Disruption of national prevention program	✓
Increased vector population	✓
Disruption of water supply and increased storage	✓
<b>+ endemicity</b>	
<b>+ last outbreak 2010</b>	
<b>+ excellent collaboration with MoH</b>	
<b>+ literature gap</b>	

Natural disasters create an atypical environment which may favour dengue transmission, making monitoring of site-specific conditions essential for prevention purposes. As demonstrated in the context of the aftermath of typhoon Hayan where an outbreak of DF could successfully be prevented, dengue prevention in emergency settings constitutes a feasible measure, but presents specific challenges including the difficult predictability of the epidemiological evolution.

### Third Panel Discussion: Disease Vectors

The third panel discussion with Jeanine Loenen (MSF), Jean Vergain (ICRC) and Azzurra D'inca (MSF) as panel members kicked off with a discussion of the findings presented by Jeanine Loenen, highlighting bednets as essentially feasible malaria control tools slowly being undermined by high levels of pyrethroid resistance in many parts of the world, especially Africa and Asia. As mentioned here, resistance levels are highly context and setting-specific, with

currently observed resistance patterns being further exacerbated by the use and misuse of insecticides in agriculture (as opposed to use for public health purposes). To prevent the inefficacy of bednets and indoor residual spraying alike as essential malaria control tools due to rising resistance, industry is currently developing new insecticides and other tools of critical importance to global malaria control efforts (“new tools in the pipeline”). Also, new methods - especially biological control methods (e.g. fungus killing mosquito larvae) - are further being explored.

Another question directed at Jean Vergain concerning prison hygiene committees was how these are effectively managed. He explained that hygiene committees are well functioning systems due to their hierarchical and well organized nature, characterized by clear steps/instructions. He mentioned that a critical risk in terms of prison hygiene is the reinfestation of prisoners by lice.

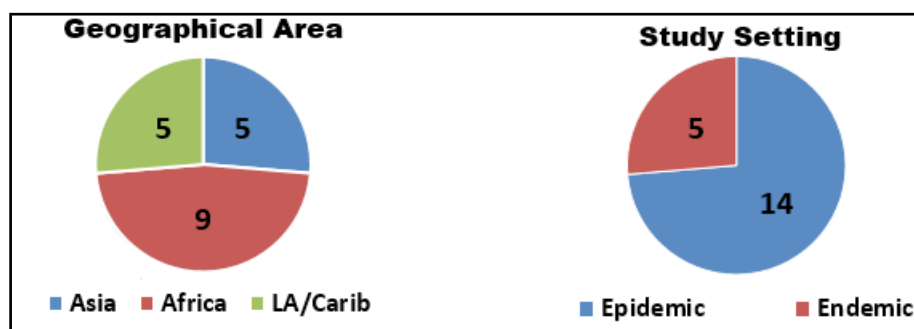
## Saturday 17th October: First Session - Evidence

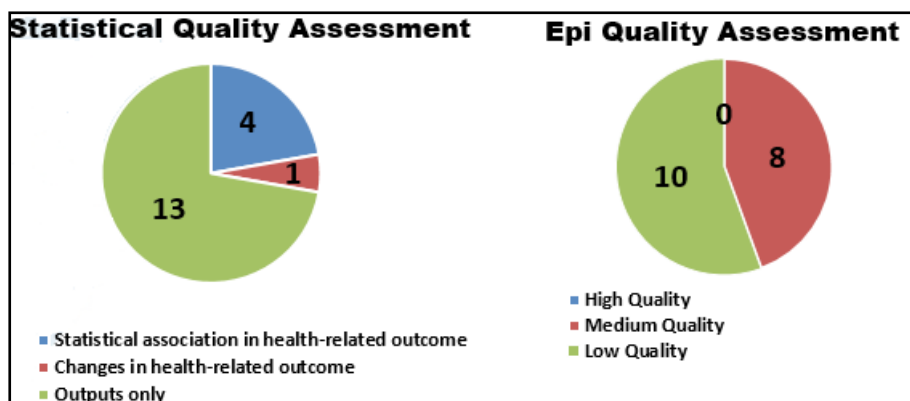
### The Impact of WASH Interventions to Control Cholera: A Systematic Review

Jeroen Ensink, Senior Lecturer at London School of Hygiene & Tropical Medicine (LSHTM)

Jeroen Ensink outlined the findings of a recently published systematic literature review by Taylor et al. regarding the impact of WASH interventions on cholera control.

Based on the established search criteria, the review yielded a total of 18 studies of which five reported on health impact, four on outcomes associated with water treatment at the point of use, and one with the provision of improved water and sanitation infrastructure. The majority of retrieved papers described water quality interventions, with those at the water source focusing on ineffective chlorination of wells, and the remaining being applied at the point of use.





The 3 retrieved studies concerning water treatment at source (i.e. well and pot chlorination) failed to evaluate the acceptability by the beneficiary population, highlighted the risks of a false sense of security among beneficiaries, the critical need to be accompanied by information and education, difficulties to implement these interventions at scale, and their inefficiency if hygienic water handling practices are not promoted.

Regarding water treatment at point of use, chlorination was identified as the most popular household water treatment method, with eminent inconsistencies of product use and dosage. Dependent on availability and affordability, use was found to be rather sporadic - mass distributed products were poorly used even where prevention knowledge was high.

Not a single study evaluated the impact of a sanitation intervention alone; one study carried out in the in the Philippines suggests a 68% reduction in cholera incidence by implementing shared toilet facilities alongside water supply. Critical research gaps - such as the evaluation of function and use of communal latrines in public places and behavior change interventions to promote latrine use - prevails.

In terms of hygiene promotion, 4 studies evaluated community knowledge and cholera awareness, but focused on changing behavior related to water treatment practices rather than hygiene (hand washing with soap). Improved knowledge, however, does not translate into safer practices. Other WASH interventions such as Water Storage Vessel Disinfection were found to fail to prevent recontamination at household level. Household disinfection kits can constitute a valuable alternative to household spraying, and may encourage sustained and improved hygiene at household level by placing responsibility with families.

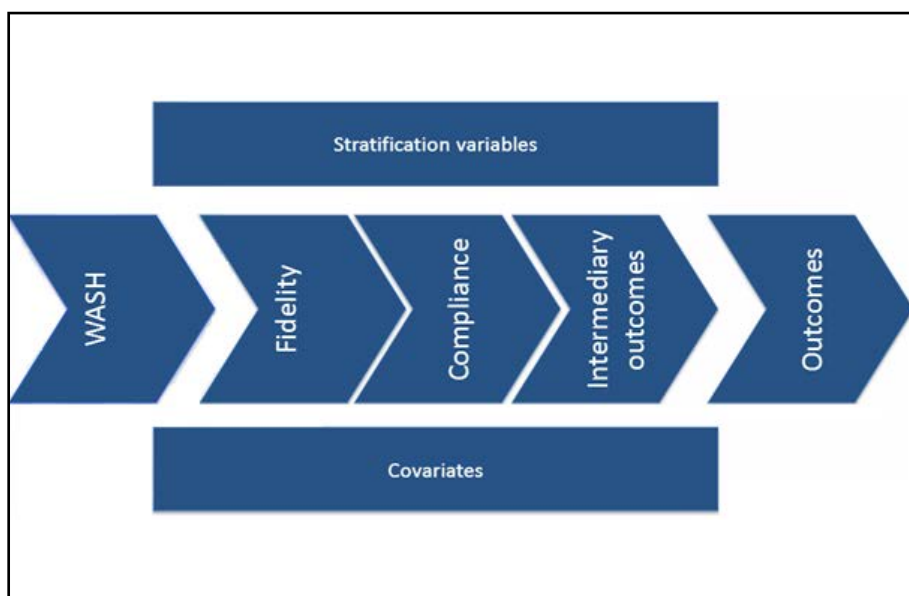
Among the most profound research gaps highlighted through the systematic review were evidence on uptake, correct and sustained use linked to hygiene and evaluation of health impact (household water treatment); evaluation of targeted distribution and prevention of inter-familiar transmission (hygiene kits); and evaluation of health impact of handwashing with soap (hygiene promotion).

## Evidence for WASH in Emergencies

Jeroen Ensink, Senior Lecturer at LSHTM

Jeroen Ensink highlighted that while randomised controlled trials are commonly seen as the golden standard in terms of evidence generation, other designs may likewise produce sound evidence. He went on to explain the concepts of random and systematic error, outlining different types of systematic error like information bias due to respondents' misreporting (e.g. people lying about disease status), selection bias (e.g. self-selection bias) and confounding. Especially systematic error such as self-selection bias constitutes a critical problem in WASH-related research, but can be minimized through a variety of epidemiological methods - such as random allocation, posterior adjustment of measured variables and blinding.

Jeroen then outlined different approaches to the measurement of WASH intervention outcomes, from the measurement of fidelity (e.g. through process evaluation and structured observation) and compliance (e.g. through observation of use/practice, self-reported use/practice and other indicators such as presence of chlorine residuals in water and fill rates on pits and tanks) over intermediary outcomes (i.e. linking the intervention to health outcomes through measurement of pathways interruption, e.g. hands, soils, flies, food, water) to program outcomes (e.g. self-reported diarrhea or hard outcome measures like shedding of enteric pathogens, anthropometrics, direct measure of nutritional status, and soil-transmitted helminths in stool samples).



As the key challenges, Jeroen highlighted the complexity of interventions combined with multiple exposure pathways, the need for changes in infrastructure and behavior, the fact that most interventions cannot be blinded as well as that most studies have used self-reported (soft) outcomes measures. After all, WASH outcomes/behaviors are hard to change and hard to measure (especially in regard to sanitation and hygiene).



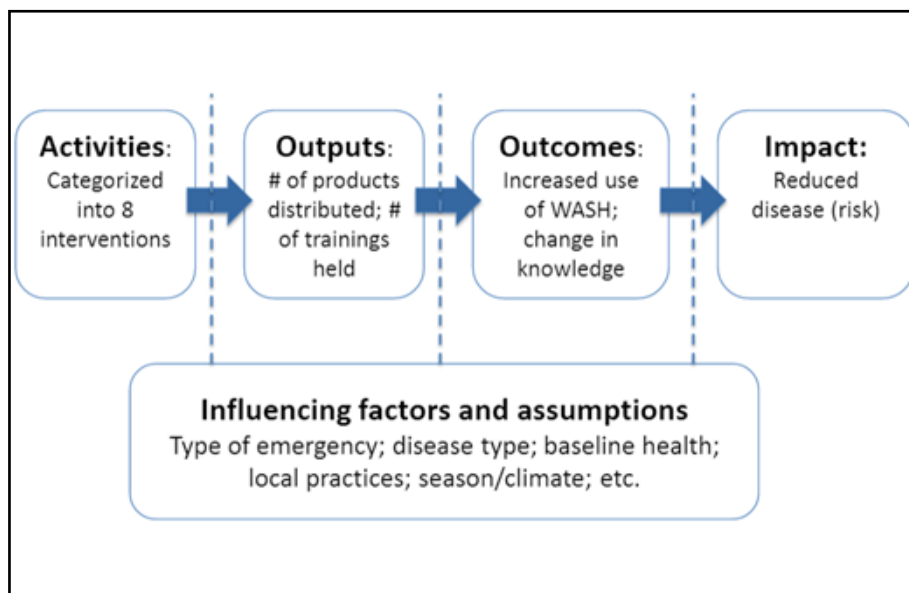
## WASH Interventions in Emergencies: Two Systematic Reviews and Impact Analyses

Travis Yates, PhD Student at Tufts University

In this ongoing study the issue of how to generate evidence regarding WASH interventions in emergencies was addressed in an attempt to answer the two underlying research questions:

- What is the effectiveness of short-term hygiene interventions conducted in emergency response situations?
- What is the impact of WASH Interventions during Disease Outbreaks in Humanitarian Emergencies?

Both published academic studies retrieved by means of searches of the Cochrane and C2 databases as well as other evidence in the form of grey literature (i.e. NGO reports and lessons learned) were collected. For this purpose, WASH interventions were separated into 8 categories: water (increasing water access, source based treatment, household water treatment), sanitation (sanitation facilities, latrine alternatives), and hygiene (hygiene promotion, NFI distribution, environmental hygiene). Among the outcomes of interest are use-of-services, health outcomes (i.e. disease impacts), economic outcomes and non-health related data such as quality of life, with additional desired outcomes being synergies between WASH interventions and barriers and facilitators to interventions.



Theory of change constitutes the basis of the review, bringing up both quantitative but also qualitative information. By accepting more research designs (qualitative and quantitative information) and accessing more data sources (NGOs), it is expected to obtain an improved understanding of the WASH casual chain, assess barriers and facilitators to emergency WASH, highlight synergies between interventions and sectors, and integrate grey literature (NGO documents) with academic literature for policy-relevant field recommendations.

## Fourth Panel Discussion: Evidence

The fourth panel session with Dawn Taylor (MSF/LSHTM), Jeroen Ensink (LSHTM) and Travis Yates (Tufts) began with a question on the requirements for the implementation of a cholera vaccination strategy in affected settings. It was mentioned that vaccination against cholera is a frequently applied measure in camp settings, where cholera outbreaks are a substantial threat.



Furthermore, the ongoing debate among actors on whether to implement WASH or vaccination approaches to cholera control was highlighted. It was mentioned that there are contexts in which the implementation of WASH interventions

is not feasible, and vaccination thus used. However, as two doses are needed, observed low levels of compliance to get the booster injection make vaccination a complex undertaking. Nevertheless, findings from Haiti where a vaccination strategy was implemented indicate that 95% of people came back in time to receive their second dose.

The next question referred to the wider scientific evidence base concerning hygiene behavior. Jeroen Ensink mentioned that hygiene behavior is generally difficult to measure as the presence of a researcher most likely changes people's behavior, resulting in research observations commonly not being 'field-safe'.

When asked how to improve the poor quality of WASH research papers as highlighted by the systematic review on cholera control interventions, Jeroen Ensink stressed that experts should increasingly be involved upstream, in the design and setup of databases to be used, in order to ensure their quality. Also, increased focus on economic evaluation is crucially needed.

In response to the next question from the audience on how to promote handwashing with soap in colder settings, it was highlighted that a number of publications on this very topic are available and would be shared with EEHF participants following the conference.

The following question targeted the role of anthropologists in field responses such as the Ebola outbreak response, with MSF Belgium stating it had been a real benefit to engage anthropologists in their 2014/15 Ebola outbreak response and other missions.

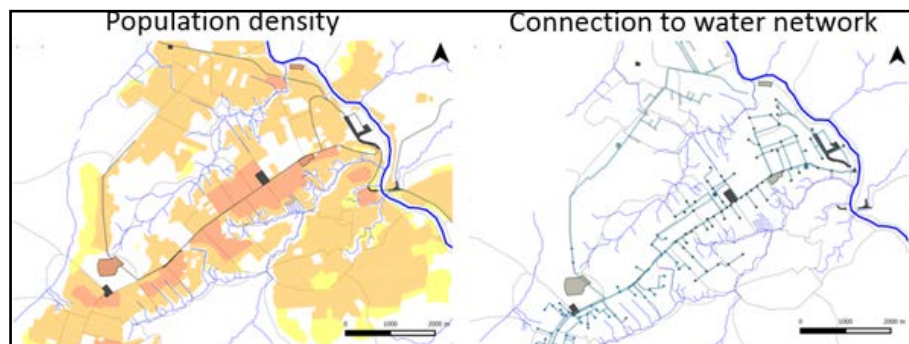
## Saturday 17th October: Second Session - Water Treatment

### Evidence Levels for Waterborne Transmission of Typhoid Fever (TF) during an Outbreak in Kikwit, DRC

**Rob D'hondt, Water, Hygiene and Sanitation Officer at MSF**

TF, a possibly deadly enteric fever with an estimated global burden of 21-26 million disease episodes/year, is transmitted via the fecal-oral route. Kikwit, DRC has been plagued with recurrent TF outbreaks, with recorded TF outbreaks in 2006 and 2011.

In this study presented by Rob D'hondt, plausible waterborne transmission was further investigated on the basis of 4 levels of evidence - namely descriptive epidemiology, case-control study, water quality failure and pathogen detection.



Descriptive epidemiological analysis showed that military camps were affected strongly and early in the outbreak and were found to play a key role in further transmission, with the outbreak spreading from the camps to the wider population. Comparison of environmental risk factors favoring the high observed secondary attack rates (i.e. spreading out from the camps) using a negative binomial regression model highlighted distance to markets and military camps and connection to water network as significant determinants. While transmission inside military camps was exacerbated by factors such as low socio-economic status, bad hand hygiene, poor water storage and latrine sharing, the strongest predictor for TF status in the general population was use of piped water as primary water source.

In conclusion, while initial transmission within military camps was not associated with water, further transmission to the general population was strongly associated with water.

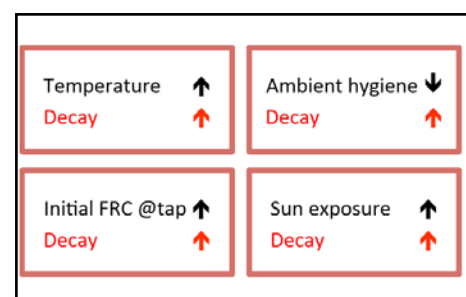
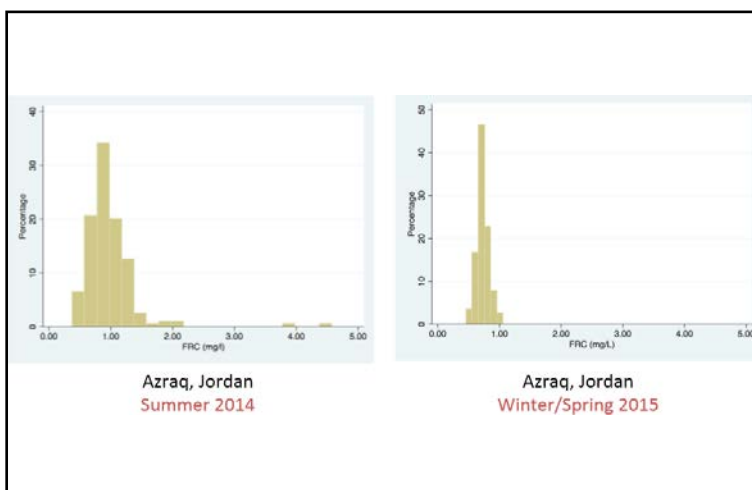
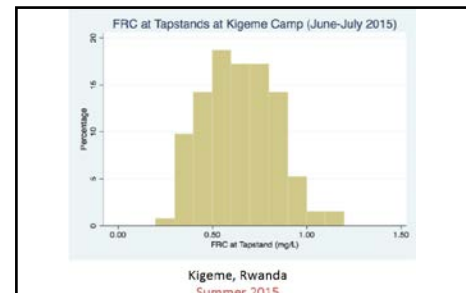
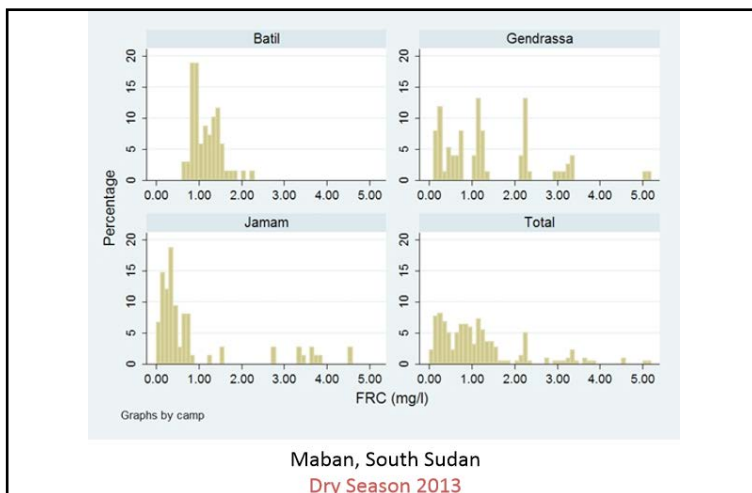
As this example demonstrates, spatiotemporal data is essential in understanding transmission dynamics, guiding timely and targeted interventions like reinforcing (hand) hygiene and proper sanitation in high-density areas, appropriate health messages, safe centralized water provision and quality monitoring and quality case recording.

## Evidence-based Guidelines for Water Treatment in Humanitarian Operations

Murray Burt & Syed Imran Ali, UNHCR

This study investigated the effectiveness of emergency water treatment practices (i.e. residual chlorine decay after water leaves the tap of the distribution system) in refugee camps in three different settings - conflict-affected Maban County, South Sudan, Azraq, Jordan and Kigeme, Rwanda.

While current free residual chlorine (FRC) guidelines (at tapstands: normal: 0.2-0.5 mg/l; outbreak: 0.8--1.0 mg/l) that are derived from the WHO Guidelines for Drinking-water Quality are appropriate when users drink directly from the flowing household taps of a municipal piped water systems, they are unlikely to provide sufficient residual chlorine protection in the fundamentally different reality of a refugee camp. On grounds of a critical lack of evidence from emergency settings, this study sought to (i) investigate residual chlorine decay after distribution in the refugee camp setting and (ii) identify factors that preserve or compromise the safe water chain by exploring how water quality, water handling practices and contextual factors influence residual chlorine decay to develop evidence-based FRC guidelines for emergency contexts.



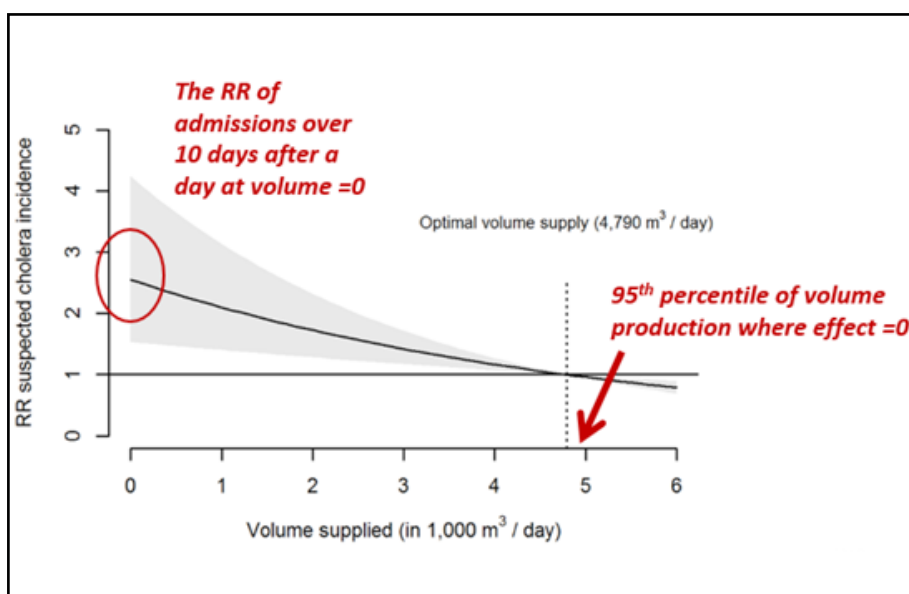
Among the factors influencing residual chlorine were temperature, ambient hygiene, initial FRC at tap and sun exposure. FRC concentration was subsequently modelled in MATLAB 7.12. Study results indicate that while current FRC guidelines may be sufficient for cooler climates w/good hygienic conditions, they appear insufficient for settings with high temperatures and poor hygienic conditions. New guidelines should be specific to prevailing climate and hygienic conditions, and may require seasonal adjustments. In conclusion, a guidance table may be more useful than a uniform rule as set out in the WHO guidelines.

## Water Supply Interruptions and Suspected Cholera Incidence: A Time-Series Regression in the DRC

Jeroen Ensink, Senior Lecturer at LSHTM

This study was conducted in Uvira, South-Kivu, DRC, a conflict-hit and cholera endemic zone, with one water supply system in town, inadequately dimensioned distribution, frequent equipment failures, irregular power supply, and highly unpredictable access to water, with 16% of the population reporting using river water as their main source of drinking water and 42% as their alternative source of drinking water.

It investigated the temporal association between water supply interruptions and Cholera Treatment Center (CTC) admissions in a medium-sized town. For this purpose, time-series patterns of daily incidence/admissions of suspected cholera cases admitted to the CTC in Uvira between 2009 and 2014 were examined in relation to the daily variations in volume of water produced by the only town water treatment plant and distributed in ~4,500 taps across town.



As highlighted by means of regression analysis including seasonality and long-term trends, day of the week and rainfall as possible confounders, compared to the 12 days following a day with optimal



water production, there were 2.55 times as many cases of cholera in the 12 days following a water supply interruption (95% CI 1.54 - 4.24). 23.2% of all cases (95% CI 11.4-33.2%) were attributable to a water production of < 4,790 m<sup>3</sup> (~23 l/person/day), with effect peaking at 5-7 days after supply interruption. Although generally reporting less admissions to the CTC, neighborhoods with a higher consumption of tap water were more affected by water supply interruptions, with a rate ratio of 3.71 (95% CI: 1.91-7.20) and an attributable fraction of cases of 31.4% (95% CI: 17.3%-42.5%). Generally, a clear association is observed between reduced availability of tap water and increased incidence of suspected cholera in the entire town of Uvira in Eastern DRC.

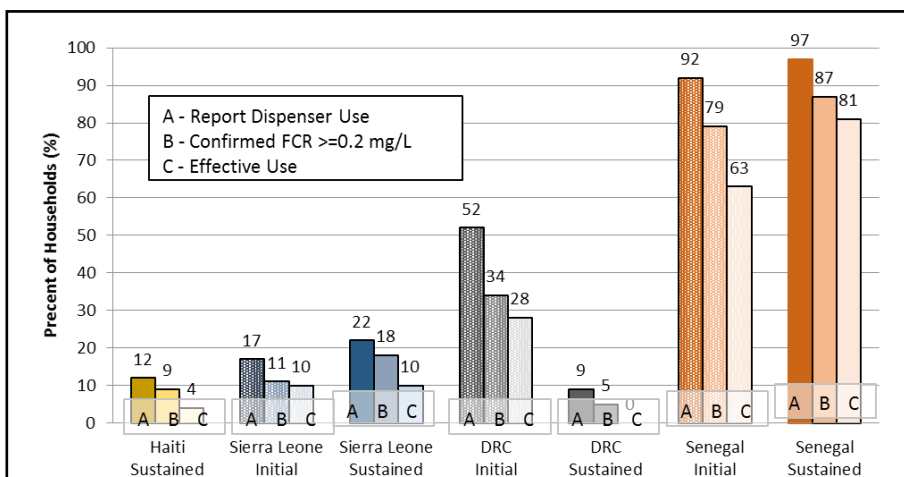
## Implementing Dispensers in Emergencies: Case Studies from Haiti, Sierra Leone, DRC, and Senegal

Daniele Lantagne, Tufts University

Daniele Lantagne presented a series of case studies regarding the implementation of dispenser systems, a source-based water quality intervention, in emergencies.

Dispenser programs include a tank of chlorine with a dosing valve that is installed next to a water source, a local promoter who conducts community education and refills the dispenser, and chlorine refills. To establish whether chlorine dispensers that have demonstrated promising uptake results in development contexts could replace bucket chlorination in emergencies, the effectiveness of dispensers in four emergency settings was assessed in collaboration with four emergency response organizations.

The scope of the Bill and Melinda Gates Foundation-funded project entailed the pre-position of dispensers, manuals and training materials, the implementation of dispensers in the four chosen settings and the subsequent evaluation of uptake and effective use within 3-12 weeks after implementation as well as sustained use of dispensers (6 months).



To evaluate dispenser effectiveness, household surveys, water quality testing, key informant interviews, focus group discussions and structured observations were carried out, with the three applied metrics being self-reported use, confirmed use (FCR  $\geq$  0.2 mg/L) and effective use.

Results indicate that dispensers can be, but are not always, an appropriate strategy to reduce the risk of waterborne diseases in emergencies, with high uptake in Senegal and low uptake in Haiti and Sierra Leone.

## Fifth Panel Discussion: Water Treatment

The fifth panel discussion on water treatment with the speakers Rob D'hondt (MSF), Syed Imran Ali (Berkley University), Jeroen Ensink (LSHTM) and Daniele Lantagne (Tufts) started off with a discussion concerning chlorine thresholds in terms of taste acceptability, stressing that different communities may highly vary in terms of the levels of chlorination they find acceptable or “allow”.

Daniele Lantagne mentioned a body of informal, unpublished research regarding chlorine taste acceptability based on focus group discussions that pointed to very substantial differences between communities in different settings (context-specific), acceptability generally being higher in Africa than in Asia.

In a discussion concerning the findings of the outlined systematic review on WASH interventions' impact on cholera control, it was stressed that the apparent focus on water quality interventions was critical as water quality constitutes only one of many highly important transmission routes for diarrheal disease. It is of crucial importance to also target other relevant transmission routes, e.g. by maximizing water supply. In the same context, it was highlighted that there is no evidence that well chlorination is effective in reducing cholera transmission.



A practical challenge to effective bucket chlorination was stressed, i.e. the problem that people can in certain instances only guess how big the respective containers to be chlorinated are, resulting in applied chlorination doses being insufficient.

Regarding the research carried out in Uvira, DRC, Jeroen Ensink highlighted the critical need to determine overall willingness-to-pay for water services among community members as well as of the inclusion of a cost recovery element as an essential project component.

## Saturday 17th October: Third Session - Mixed

### WADHE Project: Water Disinfection Protocols for Hepatitis E Virus

Laura Guerrero, University of Barcelona

Hepatitis E Virus (HEV) is a waterborne pathogen transmitted mainly via the fecal-oral route such as through fecally contaminated drinking water, with an estimated 3 million acute cases of Hepatitis E, and 56 600 Hepatitis E-related deaths annually. A critical challenge for HEV prevention is the lack of evidence on the effective dosage and time of contact of disinfectant (neither for chlorine nor for UV) to inactivate HEV in water matrices.

Laura Guerrero introduced the WADHE project aiming to produce experimental data on HEV stability in water and bring to humanitarian actors specific protocols for interventions on water or foodborne HEV epidemics as well as a better understanding of risk factors and routes to HEV infection.

While Phase 1 of the project consisted of an In vitro model for testing infectious virus stability and infectivity, Phase 2 aimed to describe the kinetics of disinfection for Chlorine treatment, ultraviolet (UV) treatment and rapid flocculation + chlorination sachets. Summary HEV water disinfection treatment recommendations established are as follows:

- Chlorine treatment
  - Treatment recommendations of 0.5 mg/l Free Residual Chlorine after 30 min of contact time will reduce HEV (infective particles) in at least 99%
- UV treatment
  - A reduction of 99,99% is achieved with a radiation of: 231,94 J/m<sup>2</sup> in a UV low pressure lamp (253nm)
  - Rapid flocculation-chlorination sachets
  - After treatment with sachets in turbid water (> 30 NTU)
  - HEV (viral particles) reduces: 79.6% (PURTM) and 91.5% (WaterMakerTM)
  - MS2 (infectivity) as a surrogate reduces: 99.84% (PURTM) and 99.83% (WaterMakerTM)

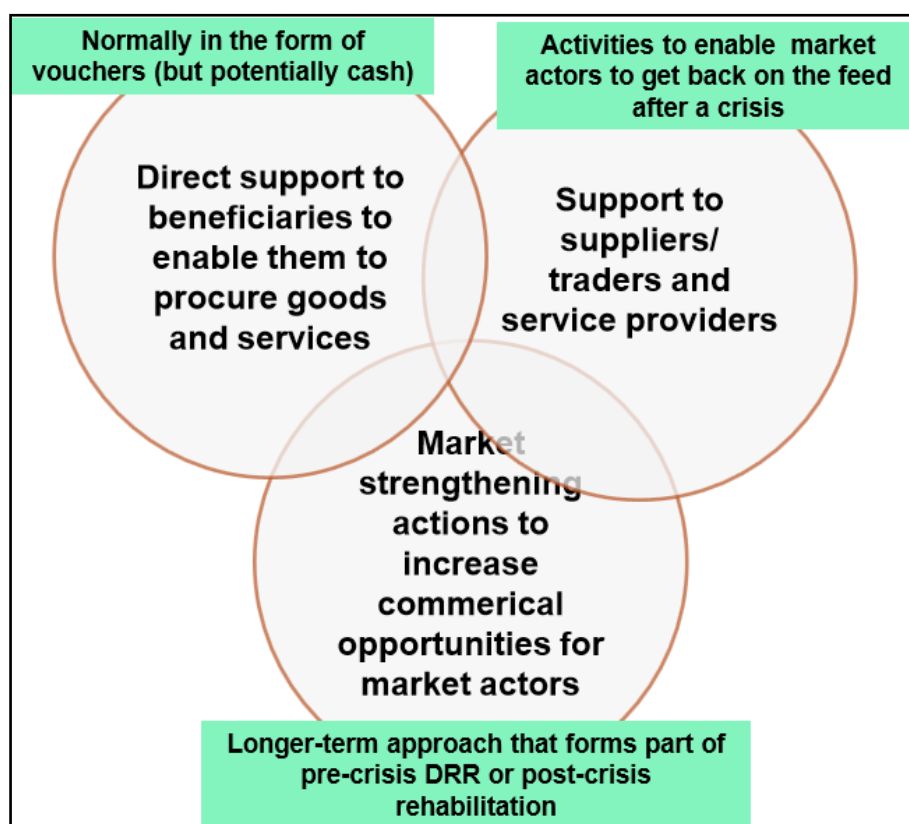
An environmental investigation in South Sudan was carried out during which two affected camps were sampled for the collection of surface, ground and household water samples. Environmental investigations elucidated the potential sources and patterns of HEV transmission in the affected camps during the study period, demonstrating a high risk of transmission at household level. Current protocols for WASH interventions in HEV epidemics recommend to respond coordinated with health and WASH teams, with WASH activities focusing on water treatment (chlorination as recommended by UNHCR- 0.8-1 mg/l at tapstands;

boiling or chlorination as recommended by WHO; UV treatment as recommended by MSF), water quantity (20 liters/person/day), sanitation (1:20 latrines:people, reduce open defecation) and hygiene promotion (basic hygiene measures at communal, household and individual levels).

## Market-based Programming and WASH

**Jonathan Parkinson, Senior WASH Programme Development Specialist at Oxfam GB**

Jonathan Parkinson talked about the application of market-based approaches in the WASH sector. He highlighted that market-based programming is by no means a “new” approach and that in many instances we are already working with market actors.



He stressed some of the critical problems underlying non-market based (in-kind) emergency responses including the distortion of the market “equilibrium”, unexpected negative consequences for affected communities and dependencies on external assistance, then highlighted the benefits of market-based programming - from efficiency of delivery (from humanitarian agency perspective), to efficacy of delivery (from beneficiary perspective, including choice/preferences and dignity), direct/indirect benefits to market actors/livelihood opportunities, market system rehabilitation and benefits for the local economy (multiplier effect).

Below are outlined different types of WASH market-based programming.

	Emergency interventions	Preparedness	
	<i>Direct support to beneficiaries</i>	<i>Support to supplies / service providers</i>	<i>Market strengthening</i>
<b>Water</b>	Vouchers to purchase water	Provision of fuel to water tuckers, rehabilitation of bore holes	Capacity building for vendors, producers
<b>Sanitation</b>	Vouchers to purchase sanitation components or for desludging	Provision of equipment for latrine construction or desludging	Forming associations to connect masons with wholesalers
<b>Hygiene</b>	Vouchers to purchase hygiene commodities	Small grants to enable market traders to re-establish businesses	Working with local advertising company for messaging including social media

In terms of monitoring and evaluation, it is essential to develop a framework that captures the broad impacts of market-based WASH programming, using pre-crisis market mapping analysis data as the baseline for monitoring and efficacy, and is relevant to perspectives from both humanitarian/donor agencies, beneficiaries and market actors. Different manuals have been developed for market analysis to support market-based programming such as the “Emergency Market Mapping and Analysis Toolkit” and “Market Analysis in Emergencies”.

In conclusion, Jonathan Parkinson highlighted a number of priority action items, including increased dialogue and engagement with the private sector, more attention on upstream market strengthening, capacity building of humanitarian actors for market based programming, better engagement with government agencies to strengthen regulation, the endorsement of market-based programming and its active promotion as a standard practice in program design and implementation in WASH, and ensuring co-ordination to avoid conflict between market-based approaches and in-kind distribution as well as that WASH market based programming is in line with market based programming in other sectors (multi-sectoral approach). This can result in better responses based on the functionality of the market.

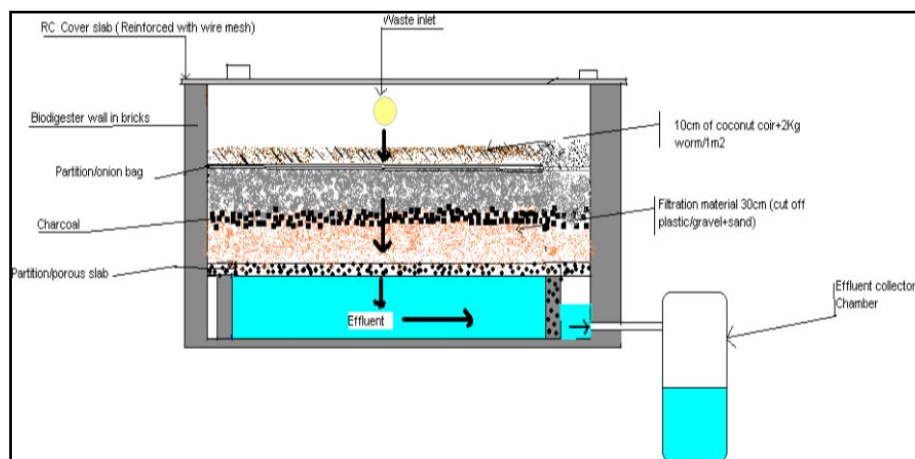
## Tiger Worm Toilets + Peepower

Andy Bastable & David Watako, Oxfam

Oxfam is constantly looking at new ways to improve sanitation in its programmes and the Tiger Worm Toilet is just one novel method that is currently being trialed. It constitutes a flushing system that treats both liquid and solid waste using composting worms (*Ensenia fetida*) that feed off human feces, breaking it down, thereby reducing pathogen load and the frequency with which it needs to be emptied.



There are 9 successive steps of construction: from constructing the bio digester foundation, bio digester, top slab, porous slab and effluent collector connection to the installation of the filtration layers, the positioning of the onion bags to the adding of coconut fiber and 2 kg of worms. Andy highlighted that women should always be involved in the construction and maintenance of latrines as they are the ones traditionally responsible for hygiene.



Another such technology is the so-called PeePower urinal, the result of a partnership between researchers at University of the West of England (Bristol) and Oxfam, able to supply light over a 6 m radius around the toilet. It is hoped the pee-power technology will light cubicles in slums or refugee camps, which are often dark and dangerous places particularly for women, making it safer environments.

## Sixth Panel Discussion

This panel comprised of: Laura Guerrero (University of Barcelona), Jonathan Parkinson (Oxfam), Andy Bastable (Oxfam) and David Watako (Oxfam). The first question was whether it would be possible to construct Tiger Worm toilets for private households, which is possible - even inside the house. They are especially feasible in urban slums, with people sharing constructed latrines. The Tiger Worm toilet mimics the natural habitat of the worm, enabling worms to follow their normal life cycle inside the digester, resulting in frequent multiplications making the replacement of worms unnecessary. This makes the Tiger Worm toilet a self-regulating system, requiring worm replacement only if things go unplanned. Within the system, organic waste goes straight into the tank, and can then be digested by the worms.

Supporting education is required for the adequate use of toilets that function purely based on bioprocesses, with worms dying off if plastics etc... were added. In regard to community acceptability and sustainability of Tiger Worm toilets, Andy Bastable mentioned that they are already on replication in Liberia, with so far 180 existing toilets and 200 more to be constructed in the next months. Sustainability is granted as most materials can be found in-country (in this case Liberia) and no items needs to be imported.



Another question regarded their feasibility in colder temperatures. Implementation is only feasible between 5-35 °C as worms are likely to die outside of that range. Under appropriate temperatures, worms can survive for up to 4 years.

## Saturday 17th October: Fourth Session - Interagency Panel Discussion on Opportunities and Constraints in the WASH Sector

Focus during the following interagency panel discussion was placed on suggestions for improvement of the EEHF setup (e.g. regarding location, frequency, etc...). Most panellists, as well as wider audience members, agreed that it was valuable to hold the EEHF once a year, and maybe combine it with the annual WASH cluster meeting. While many thought it was a good idea to next year combine the EEHF with the WASH cluster meeting, the importance to keep the EEHF's specificity (i.e. its focus on emergencies) to avoid a risk of overlap between the two was stressed. As such it was clear that the agenda setting of the EEHF would remain unchanged and solely the responsibility of the informal interagency working group with support of the [SHARE consortium](#). Alongside presentation of operational research, the EEHF could also remain a platform for the discussion and dissemination of technical innovations in the WASH sector.

It was furthermore suggested that in case of a wealth of presentations to be held, the conference could be held on two following days; otherwise one day of presentations and discussions would suffice. The need to keep the EEHF focused while at the same time representing all relevant stakeholders was emphasized. In this context, it was suggested to invite more representatives from universities and other less represented institutions in future years. A wider variety of actors might want to attend the conference, especially universities from the areas where the EEHF will be held in the future. However, a balance of more practitioners versus academic institutions should be maintained.

While the opinion was voiced that it might be difficult to maintain the overall level of EEHF quality over the coming years and that

maybe the EEHF should only be held every two years, solely focusing on emergencies, most participants seemed to agree that holding the EEHF annually was important due to new lessons learned that need to be shared.

The overall consensus reached was to next year combine the EEHF, as at least a one-day conference, with the 2016 WASH Cluster meeting which will be held in Katmandu, and evaluate next year how to proceed. It will be held at the location where the WASH Cluster meeting will be organized and costs related to its venue will be covered by the WASH Cluster.

It was suggested that relevant documents (e.g. presentation slides) are shared online so that not all stakeholders would have to fly to the locations where the EEHF will be held in future years.

Some of the new topics to be discussed in future EEHF conferences include:

- Cross-border programming;
- The relationship between WASH and health, WASH and nutrition, and WASH and gender;
- Sustainability approaches and how to achieve greater sustainability in field work.

Also, the critical need for a stronger focus on action points in future EEHF meetings was emphasised.

# Building knowledge. Improving the WASH sector.

The Sanitation and Hygiene Applied Research for Equity (SHARE) consortium seeks to contribute to achieving universal access to effective, sustainable and equitable sanitation and hygiene by generating, synthesising and translating evidence to improve policy and practice worldwide. Working with partners in sub-Saharan Africa and Asia, two regions with historically low levels of sanitation, SHARE conducts high-quality and rigorous research and places great emphasis on capacity development and research uptake.

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 @SHAREresearch

SHARE Consortium  
London School of Hygiene & Tropical Medicine  
Keppel Street  
London  
WC1E 7HT, UK.

Tel: +44 (0)20 7927 2301  
Email: [contactshare@lshtm.ac.uk](mailto:contactshare@lshtm.ac.uk)



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