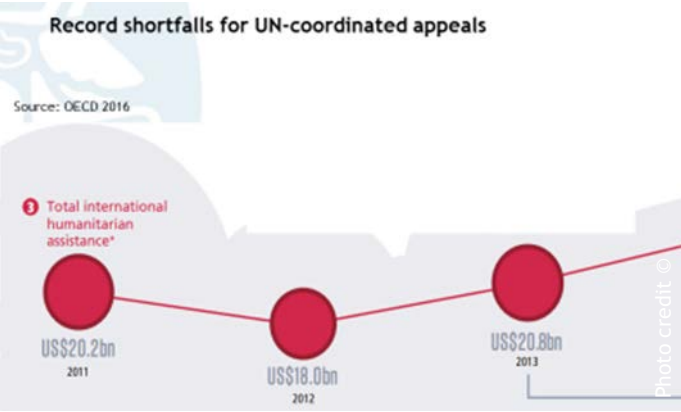
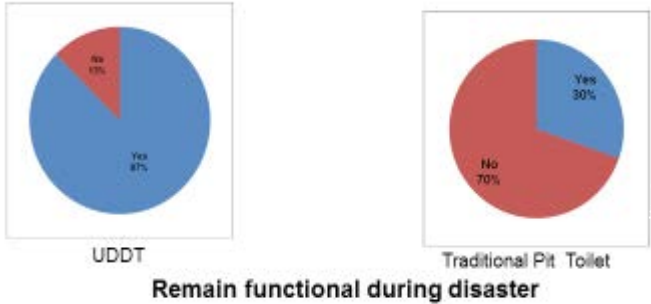


Environmental and health aspect



**7th Emergency Environmental
Health Forum
Abstract Booklet**

Building knowledge. Improving the WASH sector.

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1. Environmental and health aspects of UDDTs during disasters | Andy Bastable ©
2. Nudges handwashing intervention in Democratic Republic of Congo | Victoria Trinies ©
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Partners



Theme 1: Handwashing in Emergencies

Presentation 1.1

Title: Using emotional motivators to promote handwashing with soap in emergencies

Authors and affiliations: Sonya Sagan (Oxfam), Foyeke Tolani (Oxfam), Marion O'Reilly (Oxfam)

Abstract: In an attempt to develop innovative ways to promote the practice of handwashing with soap in emergency contexts, this research examines behaviour, motivators and barriers amongst affected mothers. Studies in development context suggest that behaviour change programs based on motivators such as disgust, nurture, fear, affiliation or social status are more effective than those which focus on health alone (Biran et al., 2014). While the impact of using emotional motivators for behaviour change in development has been well documented, there is limited evidence for their use in emergency contexts.

To determine the potential of using emotional motivators in emergency contexts, Oxfam conducted formative research with mothers in three countries affected by crises - Pakistan, The Philippines and Nepal, to better understand motivating factors for handwashing with soap among this target group. Using both quantitative and qualitative methods, the researchers found that despite the disruption an emergency causes to a mother's life, she continues to be motivated by handwashing drivers related to nurture, affiliation, purity and disgust. Although some motives were context specific - such as the concept of shame in The Philippines and purity in Pakistan and Nepal - nurture and affiliation were found to be crosscutting drivers of behaviour in all 3 contexts.

Presentation 1.2

Title: Handwashing for Ebola outbreak contexts: comparison of the safety and efficacy of soap, hand sanitizer, and 0.05% NADCC, HTH, and NAOCL chlorine solutions

Authors and affiliations: Marlene Wolfe (Tufts University), Karin Gallandat (Tufts University), Daniele Lantagne (Tufts University)

Abstract: To prevent transmission, frequent handwashing is recommended in Ebola Treatment Units and communities impacted by Ebola. However, recommendations differ between organizations and there is debate on whether chlorine is appropriate for handwashing. We evaluated six handwashing methods (soap and water, alcohol-based hand sanitizer (ABHS), and 0.05% NaDCC, HTH, stabilized and non-stabilized chlorine solutions) in two studies; 1) evaluating the impact of frequent handwashing on skin irritation that may increase transmission risk, and 2) evaluating the efficacy of handwashing methods on the removal, inactivation, and persistence of model organisms.

In study 1, 91 subjects in six handwashing methods groups washed their hands 10 times per day for 28 days. Outcomes were visible irritation, signs of transmission risk (e.g. cracking), and dermatitis diagnosis. In study 2, 18 volunteers had their hands spiked with surrogate organisms *E. coli* and Φ 6 (with and without organic load), washed, and remaining organisms retrieved; rinse water was also collected to test persistence.

In study 1, all groups experienced significant increases in irritation; the greatest increases were in neutral pH chlorine solutions and least with ABHS. Signs of transmission risk were observed most frequently with soap and least frequently with ABHS and HTH. However, all irritation was not clinically relevant, and only 4 subjects (one each in four groups) were diagnosed with dermatitis. In study 2, handwashing resulted in a 2-3 log reduction of *E. coli* and 2-4 log reduction of Φ 6.

Chlorine performed similarly or better to water only, soap and water, and ABHS for removal of both organisms and resulted in significantly less *E. coli* in rinse water. These results suggest all handwashing methods are comparable in terms of safety and efficacy, and that chlorine methods can reduce ongoing transmission via rinse water. We recommend responders use the most readily available handwashing method for their context.

Presentation 1.3

Title: Rapidly deployable handwashing interventions in complex emergencies: results from a trial in a displaced persons camp in the Democratic Republic of the Congo

Authors and affiliations: Victoria Trinies (Independent), Mimi Kambere (University of South Africa, Pretoria), Lauren S. Blum (University at Buffalo), John Kanani (University of South Africa, Pretoria), Manenji Mangundu (University of South Africa, Pretoria), Jelena Vujcic (Consultant), Foyeke Tolani (Oxfam), Marion O'Reilly (Oxfam), Robert Dreibelbis (LSHTM), Thomas Handzel (CDC), Susan T. Cookson (CDC), Pavani K. Ram (University at Buffalo)

Abstract: In camp settings, rapidly deployable handwashing interventions have the potential to decrease rates of diarrheal disease and respiratory infections, particularly during the acute phase of emergencies when mortality rates are highest and aid agency resources are stressed. We undertook a trial of three rapidly deployable handwashing interventions in a displaced persons camp in the Democratic Republic of the Congo:

- Handy wash taps: Provide easy to use, water-conserving taps on handwashing containers at latrines and distribute soap and handwashing container with the taps to households.
- Nudges: Paint colourful footpaths connecting latrines to handwashing stations.
- Triggering: Provide participatory handwashing promotion activities employing disgust. Each intervention was implemented in a separate cluster of four public latrines, with

a fourth cluster serving as a control group; 48-52 households were recruited per cluster. Soapy water and rinse water were provided at all latrines during the study.

We evaluated rates of handwashing with soap or soapy water at the latrines and in households in each intervention arm compared with the control arm over a five-week period. We found improved handwashing practice at latrines in the handy wash tap (RR 1.18, 95%CI 1.04-1.34) and nudge arms (RR 1.20, 95%CI 1.13-1.27) compared with those in the control arm. Improved household handwashing practice was observed in the handy wash arm compared with the control arm (RR 1.96, 95%CI 1.42-2.71). We saw no difference in handwashing practices at latrines or households between the triggering and control arms.

Our findings suggest that improved taps for handwashing containers, behavioural nudges, and improved access to handwashing stations and soap in the household can improve handwashing behaviour in a camp setting.

Theme 2: UDDT and Sanitation

Presentation 2.1

Title: Urine-diverting dry toilet in emergency settings

Authors and affiliations: Mohammad Ali (Oxfam, Bangladesh)

Abstract: Over the past four decades there has been a reported increase in the occurrence of disasters (CRED), 2013 #109}. Outbreaks of diarrhoeal diseases including dysentery and cholera are common in emergencies with faecal-oral diseases accounting for more than 40% of deaths in the acute phase of an emergency (Connolly et al., 2004). Sanitation is one of the vital barriers for diarrhoeal disease prevention. In emergency latrine pits need to be emptied in very frequency and in many densely populated, emergency environments it is simply not feasible to dig a new pit every time they fill up and also huge logistic issue to proper managing of the faecal sludge, including getting space for decommissioning and sludge desludging technologies (Harvey, 2007).

Not surprisingly most of the cases delay this unpleasant task which can often result in toilets overflowing. During flood, pit latrine or other type of conventional latrine flooded, excreta come out with flood water and cause serious health hazard. This also causes serious degradation of environment. During floods, people lose sanitation facilities and are forced to do open defecation. This causes additional health hazards. Also ground water table remains high after flood. So it is very difficult to take out water from pit latrines. Flood water also contains a large amount of silt that filled the latrine during flooding. As a result people lose their sanitation facilities permanently and move to open defecation after floods(Uddin, 2011) .

Presentation 2.2

Title: An acceptability and environmental evaluation of urine diverting dry toilets (UDDT) in Hiloweyn Camp, Dollo Ado, Ethiopia

Authors and affiliations: Molly Patrick (CDC), Jennifer Murphy (CDC), Patricia Akers (CDC), Travis Brown (CDC), Yegerem Tsige (UNHCR), Ahmed Adow (Norwegian Refugee Council), Mohamed Abdirashid (Norwegian Refugee Council), Mohamed Nur Mohamed (Norwegian Refugee Council), David Githiri (UNHCR), Vincent Hill (CDC), Curtis Blanton (CDC), Thomas Handzel (CDC).

Abstract: Urine-diverting dry toilets (UDDTs) are a form of alternative sanitation that could ensure the safe and hygienic disposal of human waste in humanitarian crises. There is a lack of evidence in this context on the factors contributing to acceptability of the system as well as optimal environmental conditions for inactivation of microbes in stored UDDT waste. We will present results from an evaluation of acceptability and treatment efficacy of UDDTs installed and scaled-up between 2012 and 2014 in Hiloweyn refugee camp in Ethiopia. The overall aim of this evaluation is to document the suitability and role of UDDTs in this setting, and determine factors contributing to acceptability and performance to inform introduction in other Ethiopian refugee camps and other potential settings.

To assess acceptability of shared and individual UDDTs, as well as acceptability over time, two cross-sectional household surveys (April 2015 and October 2016) collected observations and information on sanitation knowledge, attitudes and practices. The first survey found that observed and reported correct and current usage of UDDTs was high. However, observations identified that 16-30% of the UDDTs had structural faults and lack of cleanliness indicators. Shared-family UDDTs had more lack of cleanliness indicators than single-family UDDTs, and lack of cleanliness was highest in shared-family UDDTs that were newer (<1 year). In terms of acceptability, single-family were more satisfied than shared-family UDDT users and satisfaction was lowest among new UDDT users. Factors significantly associated with greater satisfaction with UDDTs were cleanliness of the UDDT and length of time in the camp (possible proxy for length of time of exposure to and/or use of the UDDTs). UDDT user satisfaction was also compared to that of traditional latrine users, and there was no significant difference found between UDDT and latrine users. The second survey results are currently being analyzed.

To assess environmental conditions and microbial inactivation over time, 20 closed, shared-family UDDTs were studied. Nylon bags seeded with *Ascaris* ova were embedded into existing waste in vaults. After 0, 6, 9 and 12 months, temperature, pH, and moisture content of waste were measured; bags were also assayed to determine inactivation of *Ascaris* and naturally-occurring *E. coli*. Over 9 months of storage, temperature inside UDDTs ranged from 32-36°C, the average moisture content of material decreased from 9% to 4%, and pH remained at ~9.0. UDDTs containing <1000

E. coli/g total solids increased from 30% and 89% from 0-9 months. Ascaris ova percent viability decreased from 77% to 3% by 6 months; 9- and 12-month data are currently being analysed. These data suggest a substantial decrease in Ascaris viability and E. coli concentrations in waste stored for at least 9 months in closed UDDT vaults under hot, dry, alkaline conditions.

Theme 3: Water treatment and supply

Presentation 3.1

Title: Borehole diagnosis and rehabilitation as an alternative to new borehole drilling- the Medecins Sans Frontieres approach in rural Niger

Authors and affiliations: Mamadou Zongo (Médecins Sans Frontières (MSF)), Jean-Yves Nuttinck (MSF), Guy Faure (Idées-Eaux, St Lupicin, France), Rafael Van den Bergh (MSF), Huggins Madondo (MSF), Boubacar Magagi Dadinkowa (Direction Régionale de l'Hydraulique et de l'Assainissement de Maradi, Maradi, Niger), Abdoul Razak Mamadou Badjé (Direction Régionale de l'Hydraulique et de l'Assainissement de Maradi, Maradi, Niger), William Etienne (MSF), Mery Dongiovanni (MSF), Peter Maes (MSF)

Abstract

Background: Water supplies are under pressure in many regions around the world, in particular in low- and middle-income countries (LMIC). When faced with dysfunctional boreholes and thus failing provision of water, a common approach is to drill a new borehole, which can improve the water availability and quality but is expensive, time-consuming, and not always successful. We implemented an innovative mobile workshop for the diagnosis and rehabilitation of dysfunctional boreholes in the Guidan Roumdji district of Niger.

Results: Over a period of 109 weeks, 50 boreholes in the district were diagnosed. The most common diagnoses were chemical and/or coliform contamination. Six (12%) did not require any rehabilitation, for 10 (20%) the identified problems were too slight, and for 3 (6%) the necessary skills and material for rehabilitation were not available. The remaining 31 boreholes (62%) were rehabilitated successfully: for 7 (23%) minor problems persisted, but all provided sufficient quantities of potable water post-intervention. In the specific case of fluoride contamination in a subset of boreholes in the region, a proof-of-concept of sealing off the fluoride-holding layer in one borehole was performed successfully. For the 31 rehabilitated boreholes, the total cost (diagnosis + rehabilitation) was 130,200 USD, amounting to 2 USD per capita.

Discussion: This study showed the feasibility and added value of diagnosing and rehabilitating boreholes in LMIC. Interestingly, the mobile workshop allowed a refined diagnosis of the hydrogeology around the borehole, on the one hand allowing for specifically

tailored interventions (such as patching of the contaminated layer, as illustrated in the case study), and on the other hand providing a better understanding of the hydrogeological complications in the area, guiding future drilling initiatives. We encourage other actors working on provision of water in LMIC to develop similar approaches, or to build collaborations with partners capable of offering diagnostic and rehabilitation services.

Presentation 3.2

Title: Bulk chlorination of drinking water supplies in cholera-affected wards of Dar es Salaam

Authors and affiliations: Colleen Hardy (CDC); Anu Rajasingham (CDC); Stanislaus Kamwaga (UNICEF); Kiwe Sebunya (UNICEF); Lindsay Templin¹; Andrea Martinsen (CDC); Jane Mulungu (CDC); Rachel Eidex (CDC); Thomas Handzel (CDC)

Abstract: Tanzania is in the midst of a cholera outbreak that has resulted in over 21,800 cases. The highest number of cases, 5,067, have occurred in Dar es Salaam (MoHCDGEC, 2016) . During a cholera outbreak, access to safe drinking water is critical and chlorine is an effective tool to disinfect and protect water supplies from recontamination. Water supplied by trucks and water vendors in cholera affected areas of Dar es Salaam was often not chlorinated adequately. The Centers for Disease Control and Prevention, the Ministry of Health, Community Development, Gender, Elderly and Children of Tanzania, and UNICEF collaborated to pilot the use of 8.68gm NaDCC tablets to treat bulk drinking water supplies to improve chlorination during this outbreak (Medentech, 2015) .

It is estimated that only a small proportion of Dar es Salaam households have connections to piped water. The remainder of households obtain water from multiple sources including, water trucks and vendors, who sell water in 20 litre increments from plastic tanks that range in size from 1,000-15,000 litres. The sources used by vendors include piped water, water trucked from filling stations, and boreholes. Water sold by the vendors did not have consistent detectable free chlorine residual (FCR); in response, we collaborated to improve the chlorination of this water by treating it with 8.68g NaDCC tablets.

A pilot three-month supply of NaDCC tablets was distributed to 644 water vendors in cholera affected areas of Dar es Salaam by ward health officers. In Kinondoni district, 73% of vendors visited reported treating their water during the first monitoring visit and of these, 88% had detectable FCR; at the second visit, 71% of vendors visited reported treatment, and of these 87% had detectable FCR. Results from a comprehensive evaluation of the program will be shared. Encouraging preliminary results may justify expansion and use in other emergencies.

Presentation 3.3

Title: How do we monitor the effectiveness and appropriateness of innovative approaches in humanitarian WASH? : a case study

on point of use (POU) water treatment with ceramic water filters (CWFs) in IDP camps in Rakhine, Myanmar?

Author: Tom Wildman (Oxfam)

Abstract: Water supply in the IDP camps of Rakhine State, Myanmar, is overwhelmingly provided through the hundreds of shallow tube wells that have been installed to access shallow aquifers. Due to the logistical challenges of ongoing bucket chlorination, coupled with the target populations' dislike of chlorine, WASH actors almost universally chose to distribute CWFs for household-level treatment of water.

While this approach was hailed by many as an innovative approach to water treatment in a protracted crisis, monitoring of performance was limited initially to a small number of focus group discussions which focused solely on user satisfaction, with limited or no monitoring of filter performance and effluent water quality. Subsequent monitoring of filter performance demonstrated that nearly 40% of household filters were not providing safe water, and many households had broken filters with no means to replace them, in a context of regular flooding and poor environmental sanitation where contamination of drinking water is a high risk.

This presentation shall focus upon the factors which are necessary to determine the effectiveness and appropriateness of new/ innovative approaches in humanitarian response and ensure we do not put beneficiaries at risk: rigorous monitoring systems, ongoing/ iterative training approaches, and an understanding of potential supply chain barriers.

Presentation 3.4

Title: Emergencies: from data to decision (beyond data for the sake of data)

Author: Matt Arnold, Médecins Sans Frontières (MSF)

Abstract

The Problem: The contribution of water chlorination to the improvement of Public Health is immeasurable. Often we are working in contexts where the disinfection/treatment of water, whether supplied by network or other means, is, at best, inconsistent. Furthermore, when the humanitarian sector provides water we have a duty to ensure the safety of that supply and the measurement of Free Residual Chlorine remains most reliable indicator. In any given situation how do we best measure, monitor and represent/report FRC data to a quality that can better guide decision making? Can this be 'crowd sourced'?

Past Solutions: Haiti chlorine monitoring 2011 to identify areas of Port-au-Prince (PaP) that were poorly served with adequately treated water and see if this relates to Cholera incidence. All measurements, data collection, data entry and mapping done manually. Show GIF of Google Earth time series chlorine monitoring in PaP by district.

Present Solutions: Manual measurements (PoolTester and DPD) and data entry in Open Data Kit (ODK) using a smartphone. This gives good spatial, temporal and quantitative data which enables adjustment of automatic chlorination or the network itself.

Example: 2016 - MSF in Mtendeli, Tanzania.

Future Solutions: A totally integrated solution - hardware and software. A simple Phone App or colorimeter connected to a phone:

- Accuracy - Measurements and observations made in the field, no 'subjective' FRC measurements,
- Automation - data uploaded and stored to a dedicated server,
- Visualisation - create maps, analyse and share,
- Making decisions - Target activities, improve treatment, and intervene when and how appropriate.

Introduce the Akvo Caddisfly™. See; <http://akvo.org/akvo-caddisfly> and present preliminary field trial data.

Conclusions: An adaptable and scalable solution which can be 'outsourced' to the public or other stakeholders and inform better Public Health strategies in emergencies.

Theme 4: Menstrual Hygiene Management, WASH in Health Care Facilities and WASH and Nutrition

Presentation 4.1

Title: Learning from the development of a cross sectoral toolkit for improving menstrual hygiene management in complex humanitarian emergencies

Authors and affiliations: David Clatworthy (IRC), Margaret L Schmitt (Columbia University), Ruwan Ratnayake (IRC), Gina Bramucci (IRC), Erin Wheeler (IRC), Marni Sommer (Columbia University)

Abstract: Global attention towards improving the integration of menstrual hygiene management (MHM) into humanitarian response has increased in the past decade. However, there continues to be a lack of consensus on the most effective strategies to address MHM through water, sanitation and hygiene (WASH) together with other relevant sectors.

To fill this gap, a global assessment was conducted to examine MHM in humanitarian response, including key challenges, lessons learned, and existing practices. Information was collected through a literature review, key informant interviews with humanitarian practitioners across disciplines, and qualitative research conducted with adolescent girls, women, and program staff in two diverse emergency contexts (displacement camps in Myanmar and refugee

settlements in Lebanon). The objective was to identify gaps in the existing research and guidance, and to develop an MHM toolkit for emergencies with a particular focus on WASH. This presentation will share key findings identified from the global assessment, and the priority WASH and related tasks incorporated in the toolkit.

This includes learning on the key components necessary for a comprehensive MHM response, the sectoral leadership and coordination required from the WASH sector, and recommendations for improving the monitoring and evaluation of MHM programming. Insights will also be shared on the most effective methods for providing technical guidance and sensitizing and training staff on the topic. Existing gaps identified in MHM practice and areas requiring improved WASH-related programming will also be discussed, such as the gaps in the global knowledge on most effective disposal and waste management approaches for MHM. This body of research and the toolkit seek to enhance the current state of evidence and guidance available on MHM in emergencies to ensure that the needs and the dignity of girls and women living in humanitarian contexts can be more readily achieved.

Presentation 4.2

Title: Disinfection of surfaces in the Ebola context: efficacy assessment of four chlorine types using *E. coli* and bacteriophage Phi6

Authors and affiliations: Karin Gallandat (Tufts University), Marlene Wolfe (Tufts University), Qais Iqbal (Tufts University), Brittany Mitro (Tufts University) and Daniele Lantagne (Tufts University)

Abstract: During the 2014 Ebola outbreak in West Africa, different recommendations were provided by the World Health Organization (WHO), the Centers for Disease Control and Prevention (CDC) and Médecins sans Frontières (MSF) on how to disinfect surfaces and clean uncontrolled spills in Ebola treatment units.

The objectives of this research were to: 1) compare the efficacy of four commonly available chlorine solutions (sodium dichloroisocyanurate (NaDCC, pH 6-7), high-test hypochlorite (HTH, pH 9-11), stabilized sodium hypochlorite (NaOCl, pH 9-11) and non-stabilized NaOCl (pH 7)) for the disinfection of three surface types; 2) evaluate how recommended practices affect surface disinfection efficacy; and 3) determine how presence of a soil load mimicking human liquid waste affects surface disinfection efficacy.

The test organisms were *E. coli* (ATCC 25922) and Phi6 (HER #102), which was selected as a surrogate for the Ebola virus based on preliminary work. The surface carriers were 8-cm discs of stainless steel, heavy duty tarp and nitrile. The surface types were chosen based on needs communicated by MSF. The four tested recommendations were representative of the MSF, WHO and CDC guidelines for surface disinfection: 1) do nothing before applying chlorine, 2) wipe the disc with a surgical towel, 3) cover the spill with a surgical towel and 4) wipe the disc and then cover the spill.

A 10-minute exposure time was sufficient to remove minimum 5.1log E. coli across all recommendations, surfaces and chlorine types. Phi6 was never detected after disinfection, except on nitrile in three opportunities when covering the spill. A qualitative examination of our results shows that: 1) surface type has a stronger influence on disinfection efficacy than chlorine type, and rough surfaces such as heavy duty tarp can be particularly challenging to disinfect; 2) wiping or covering spills does not increase disinfection efficacy in the laboratory but this will need to be balanced with practical considerations such as limiting splashes; 3) at a chlorine concentration of 0.5%, the soil load did not significantly reduce disinfection efficacy. We will complete further laboratory work by the time of the EEHF in order to determine the minimum required exposure time to ensure safe disinfection under all tested conditions.

Presentation 4.3

Title: Impact of WASH on the treatment of Severe Acute Malnutrition (SAM): scientific research in DRC, Chad and Pakistan and an operational manual

Authors and affiliations: Nicolas Villeminot (ACF), Mathias Altmann (ACF), (ACF), Maureen Gallagher (ACF), Jean Lapegue (ACF)

Abstract: The various “WASH in Nutrition” strategies encourage the provision of a minimum WASH package in households with wasted children, including water treatment, soap and hygiene sensitization. Beyond the longer term effect on behaviour change in the family, it is expected that safer WASH practices will support the recovery of children affected by Severe Acute Malnutrition (SAM).

This is based on the hypothesis that the addition of safe drinking water and/or handwashing to SAM treatment will reduce exposure to pathogens, and that the reductions in pathogen exposure and diarrheal disease will result in shorter recovery periods for children with SAM.

However, if WASH and stunting are clearly connected, there is currently a lack of evidence of direct links between WASH and wasting, the acute form of undernutrition. ACF is conducting a series of research projects in DRC, Chad and Pakistan with the aim of demonstrating the effect on the recovery of children between 6 and 59 months admitted in SAM treatment.

Following an initial study in DRC that showed an encouraging 13%, or 4 days, of reduction in the length of stay of children in treatment while using P&G PUR, ACF is conducting randomized control trials in Chad and Pakistan with various options of household water treatment, soap provision or basic hygiene sensitization. ACF will measure the effect on the length of stay in the treatment, weight gain and the risk of relapse.

If an impact of WASH can be demonstrated, a cost-effectiveness analysis will be done to support nutrition programming: the savings on costly Ready-to-Use Therapeutic Food used for treatment would

need to outweigh the cost and burden of adding a WASH component to the treatment.

Data collection will end in the summer 2016, and initial findings will be shared during the conference.

Theme 5: Waste Treatment

Presentation 5.1

Title: Sludge treatment unit in Mae La Refugee Camp, Thailand

Authors and affiliations: Bansaga Saga (Solidarities International), Alberto Acquistapace (Solidarities International) and Fabrizio Cavalazzi (Solidarities International)

Abstract: More than 10 years after the creation of the refugee camp (38,000 people in 2.5km²) in 1984, the findings of an assessment conducted by the Asian Institute of Technology in 2006 noticed the presence of faecal coliform bacteria in springs and wells water samples, outbreaks of cholera and diarrhea diseases because of soil and water contamination by sludge. The study recommended the provision of sludge removal services and Solidarités International (SI) was to identify and design a solution that was adapted to the context.

The SI Sludge Treatment Unit (STU) model and concept is based on a project developed in Nonthaburi District, in the north of Bangkok. The process is done through the collection, the treatment and re-use of sludge as bio-fertilizer. The management of the STU is linked to 3 complementary activities:

- Desludging and transfer to the STU: based on the accessibility, 25% is done with a truck and 75% with a mobile pumping system.
- Transforming sludge into bio-fertilizer: The treatment of the sludge is composed of 4 different processes involving both anaerobic and aerobic cycles in the 4 different sections of the STU:

1- Digestion tanks,

2- Sand gravel beds,

3- Effluent storage ponds

4- Dry area.

- Testing the fertilizer: once the fertilizer is produced, the quality is certified by a Laboratory and also tested in gardening plots.

The management of the STU was carried out as part of a broader WASH program including hygiene promotion activities, construction of watertight latrines and water supply. Since the installation of the STU, health related situation has significantly improved with 54.9% reduction of diarrhea cases from 2011 to 2015 (PU-AMI, 2015) .

Presentation 5.2

Title: Innovation in sanitation - Pushing the limits of CLTS/CATs in emergency response (Or knowing when to stop supply driven latrine building)

Authors and affiliations: Richard Luff (Regional WASH Consultant) and Prasad Bhagwan Severaki (Independent Consultant)

Abstract: This presentation considers the damage to household toilets in the aftermath of the 2015 Nepal earthquake and draws upon an article written by Richard Luff (then national WASH cluster coordinator) and Prasad Sevekari (then Oxfam GB) and published in Waterlines April 2016 (Luff and Sevekari, 2016) . It puts a spotlight on conflicting approaches of supply driven versus demand led (CLTS/ CATs) approaches in the transition phase and seeks to understand how these were navigated at the national policy level and in practice at the district level. It also highlights other post emergency contexts and where these tensions have arisen. In doing so it highlights the very different drivers of development and emergency relief.

The key recommendation is that it is necessary stop relief as soon as possible in order to make way for development, taking into account any significant residual public health, dignity and protection risks. While humanitarian agencies often need to implement a supply driven response at the acute relief phase, they invariably perpetuate this approach in their planning in the early recovery phase and sometimes beyond, thereby undermining attempts to return to a demand led approach. The paradigm shift is to plan for a demand led intervention at the outset, while implementing supply driven emergency measures as required in the relief phase. In reality this can only be achieved if there is;

- much clearer WASH programme policy developed with this goal in mind
- stronger leadership from the global level to ensure it is implemented
- a critical mass of major agencies committed to this approach

It is hoped this presentation will catalyse debate within the GWC/ WASH IA group and elsewhere to review their emergency sanitation policies and practices to align these with this recommendation.

Presentation 5.3

Title: Biological additives to enhance sanitation facilities lifespan in refugee camps

Authors and affiliations: Murray Burt (UNHCR), Franklin Golay (UNHCR), Claudia Perlongo (UNHCR)

Abstract: In Sub-Saharan Africa the most commonly used sanitation solution used in refugee camps is the basic pit latrine, which is cheap to construct. However basic pit latrines quickly fill up and require replacement after an average of 2 years. As UNHCR

faces the facts that (1) we have more refugees than ever before in history, and (2) as the resources available to support them are increasingly limited, and (3) 6.4 million refugees are now in 'protracted situations (5 years +)' with an average life of camps at almost 20 years, and some older camps now beyond 40 years old. The need for suitable sanitation solutions taking into account social, economic and environmental considerations is now becoming increasingly important. A two-step trial of biological and chemical additives research commissioned by UNHCR and undertaken by UNHCR Chad field operation and by 2 Master Students from UNESCO-IHE has shown the potential of biological and chemical additives to enhance the lifespan of sanitation facilities.

The study consisted of a field trial in Chad - implying the use of a commercial biological product called the LICE, and a laboratory scale research field study conducted in Naivasha, Kenya (at Sanitation research centre) - implying the use of the following additives.

- Chemical additives: Ikati and Soda
- Biological additives: LICE, Sannitree, Ecotreat

The UNHCR field trial in Chad showed that 50% of the family latrines (same volume, same number of users) tested with LICE, had 100% volume reduction (0 cm of faecal sludge in the latrines), 20% of the latrines showed 90% volume reduction and 30% of the latrines showed 50% volume reduction. All the latrines treated with LICE over a 50 days field trial period showed 100% reduction on odour and flies.

The UNHCR-UNESCO IHE laboratory scale research study in Naivasha discovered that the LICE could considerably reduce odour and flies (95%-100% reduction) in fresh faecal sludge, nevertheless, no stabilization or sanitization could be achieved, potentially due to the non-optimal ambient conditions (temperature below the optimal 37°C, which might have inhibited exogenous bacteria). The same research showed promising results on Ikati and Soda as they are able to rapidly sanitise faecal sludge, though further optimization of the dosing is needed to prove achieving stabilisation and volume reduction. On the other hand, no evidences were found to support the claim that biological additives can speed-up degradation rate of faecal sludge, thus extending the life of pit latrines.

This paper will present the findings of the field trial and the research study and explain the next phases of the project, which proposes to invest resources into further research (i.e. use of the LICE in septic tanks in schools or urban-type refugee settings - at controlled temperatures).

Presentation 5.4

Title: Sanitation marketing, septage management and innovative financing models to support the entire sanitation chain post-Typhoon Yolanda Philippines.

Authors and affiliations: Tom Wildman (Oxfam)

Abstract: In December 2014, the Philippines were hit by Typhoon Yolanda, the largest storm to ever make landfall. Post-emergency WASH interventions focused heavily on increasing sanitation coverage, through CLTS and sanitation-marketing based approaches, many with limited success due to inconsistent/competing approaches and insufficient skill sets. The problems were twofold: (1) many aid agencies lacked the capacity to understand the entire sanitation value chain (and hence understand how to support its successful functionality), particularly the critical role of finance institutions, and (2) while several agencies focused on the provision of household-level sanitation based on a septic tank system, most intervention areas possessed no facilities for emptying and properly disposing of fecal waste.

This presentation shall focus upon a multi-faceted approach taken by Oxfam to support the entire sanitation chain in a post-emergency context, which involved:

1. Partnership with micro-finance institutions to reduce interest rates and fees on loans for sanitation, both to households and sanitation entrepreneurs;
2. Introduction of low-cost toilet designs to sanitation entrepreneurs;
3. Advocacy to the government (Department of Social Welfare & Development) to provide social welfare funds to subsidize the cost of sanitation loans for the poorest;
4. Provision of technical assistance and setup of a revolving fund for municipalities to access a no-interest loan to construct municipal-level septage treatment units with desludging services.

This presentation shall focus upon Oxfam's failures and learnings from a nearly 1.5 year process, demonstrating (a) pitfalls of a sanitation marketing approach in a post-emergency context, and (b) the essential components and skill sets necessary in this type of approach and context.

Theme 6: Disease Outbreaks

Presentation 6.1

Title: Ensuring socio-cultural perspectives influence responses to disease outbreaks: recommendations for WASH actors

Authors and affiliations: Sophie T'Kint (Oxfam) and Michelle Farrington (Oxfam)

Abstract: The Ebola epidemic in West Africa in 2014-16 dramatically highlighted the importance of factoring socio-cultural perceptions of disease, health and humanitarian activities into emergency programming; neglecting these cost lives, time and funds. Based on its experience during the Ebola response, Oxfam undertook an analysis of its historical responses to health-related emergencies to determine the extent to which socio-cultural perspectives had influenced programming and whether lessons learnt had contributed to progressively more effective responses. The analysis - which looked at responses from 2006 - 2015 - showed that findings from community dialogue and action research on socio-cultural perspectives, and their application to adapt programming have been varied in their extent and success.

The analysis identified similar themes relating to socio-cultural perspectives across different responses, including patterns of health seeking behaviour, gender roles, social status and religion. It sought to highlight examples of good practice - where investment in understanding such perspectives influenced positive change in programmes - and to investigate the consequences of not investing time and resources into determining what these perspectives are, how they change over time, and how they should be leveraged to ensure responsive programming.

The analysis supported the formulation of a set of recommendations, aimed to influence the way that Oxfam - and other WASH actors - respond to health-based emergencies in the future. The recommendations seek to encourage better integration of socio-cultural perspectives into response design and implementation. Core recommendations include:

- The need for a phased, agile, dynamic response based on community consultation;
- Recognition that appropriate research and its application requires additional resources - such as anthropologists and social scientists - to be mobilised in the early phases of a response;
- And that WASH actors need to improve their use of rapid, action centred learning that can shape responses appropriately as culture and behaviours shift throughout emergencies.

Presentation 6.2

Title: How to change hygiene behaviours during emergencies: qualitative analysis of programmatic approaches chosen by international responders to the Liberian Ebola (EVD) outbreak (2014-2016)

Authors and affiliations: Alexandra Czerniewska (LSHTM); Sian White (LSHTM)

Abstract

Background Evidence for how hygiene behaviours are determined or change is largely based on research from non-emergency settings and has led to interest in creative interventions e.g. using 'nudges'

or non-health motivators. Little evidence exists to guide programme design/implementation for emergencies. Promoting hygiene behaviour change was a key pillar of the Ebola response in Liberia, and a uniquely challenging task. Hygiene behaviours were poor pre-outbreak, communities had limited trust in public services, and a powerful international response structure (arguably) limited the potential for trialling novel approaches.

This research looks at how international responders met this challenge, the features of interventions they considered most effective, and barriers and opportunities for future research or interventions in emergencies.

Methods: Thematic analysis of semi-structured interviews with 12-15 key informants from international agencies funding/ designing/ implementing hygiene behaviour change interventions in communities and/or routine health facilities.

Results: Research is ongoing. Early analysis suggests themes and relevant implications including:

1. Strong preference for hygiene promotion messages to be identical across the country

A coherent national campaign is a common goal in times of crisis. How does this fit with approaches driven by formative research tailored to motivators/barriers at a local level?

2. Overwhelming emphasis on a biomedical understanding of Ebola transmission

Ebola was 'new', therefore communities needed information to tackle it. However, biomedical emphasis seemed to minimize the role of other approaches e.g. nudges/non-health motivators. Can multiple approaches be combined without diluting the message?

3. Goal of sustainability, but an ill-defined strategy for the transition between 'emergency' and 'development'

Behaviour change researchers have an opportunity to explore benefits of different strategies to sustain momentum over this transition.

4. Health worker training shifted in focus from protecting the health worker to protecting patients to improving the quality of health system

What is the likely impact of this changing focus? How will individuals' motivations to practice good hygiene fare within a 'quality improvement' agenda?

Presentation 6.3

Title: WASH interventions in emergencies and outbreaks: two systematic reviews and impact analyses

Authors and affiliations: Travis Yates (Tufts University), Jelena Allen (Consultant), Myriam Landre Joseph (Consultant), Daniele Lantagne (Tufts University)

Abstract: Two systematic reviews were funded by the International Initiative for Impact Evaluation (3ie) and the Humanitarian Evidence Program (HEP) on the topics of WASH in emergencies and WASH in outbreaks. A systematic review process was used to identify 15,026 documents through peer-reviewed academic databases (10,326) and unpublished 'grey literature' (2,676 from websites and 2,024 from emails and personal contacts).

For the outbreak review, 51 evaluations were included and stratified into 11 WASH intervention categories. The majority of outbreaks focused on cholera in Haiti and Zimbabwe. Grey literature made up nearly half (49%, 25/51) of the included studies. We found limited evidence of measured disease reductions, but stronger evidence of breaking disease transmission routes from source and household water treatment interventions.

For the emergency review, 115 evaluations were included and stratified into 13 WASH intervention categories. Haiti was the most evaluated of the 39 included countries and grey literature included a similar balance as the outbreak review (50%, 58/115). Only well pumping to reduce salinity after seawater intrusion was clearly not efficacious and not recommended.

Implementation features and psychosocial characteristics were key to the success of WASH interventions and common to both reviews. Six implementation design features were associated with more effective interventions: simplicity, timing, experienced staff, clear communication, community engagement and having linkages to development programs. Psychosocial considerations for successful interventions include five themes: taste and smell, preferred communication (radio and face-to-face communication), overestimation of effectiveness by community, trust/fear, and ease-of-use. The importance of quick and flexible funding, expert staff, and pre-positioned stock were also important factors.

Overall, emergency WASH interventions consistently reduce disease risk through improved access to services and have a potential to build stronger communities; however, effectiveness of interventions is contingent on design features and community psychosocial characteristics.

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

Partners



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