WASH in Emergencies
Problem Exploration Report

Handwashing

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Preface

The Humanitarian Innovation Fund (HIF) is a programme of ELRHA, and we are here to support organisations and individuals to identify, nurture and share innovative and scalable solutions to the challenges facing effective humanitarian assistance.

The HIF has a dedicated fund to support innovation in water, sanitation and hygiene (WASH) in all types of emergencies, from rapid onset to protracted crisis. WASH is a broad theme with serious consequences in many other areas such as health, nutrition, protection and dignity. In the absence of functioning toilets, clean water systems, effective hygiene practices, and safe disposal of waste, pathogens can spread rapidly, most commonly causing diarrheal and respiratory infections which are among the biggest causes of mortality in emergency settings.

Despite this, there is a significant gap between the level of WASH humanitarian assistance needed and the operational reality on the ground. This is why the HIF works closely with multiple stakeholders from across many humanitarian agencies, academia and private sector to understand and overcome practical barriers in the supply and demand of effective solutions.

Over the past three years the HIF has been leading a process to identify the key opportunities for innovation in emergency WASH. Fundamental to this is having a strong understanding of the problems that need to be solved. We note that many innovations focus on improving technology because the problems can often be clearly defined, compared to more complex problems with supply chains, governance or community engagement.

Our problem research began with an extensive Gap Analysis (Bastable and Russell, 2013) consulting over 900 beneficiaries, field practitioners and donors on their most pressing concerns. From these results we prioritised a shortlist of problems including handwashing. However drawing lines between where one problem ends and another starts is difficult given the feedback loops within each system. For example reducing waste from plastic bottle usage relies on the availability of other safe water options which in turn is linked to environmental sanitation and hygiene.

This report is one of a series commissioned by ELRHA to explore priority problems in emergency WASH. The researcher selected for each report was asked to explore the nature of the challenges faced, document the dominant current approaches and limitations, and also suggest potential areas for further exploration.

The primary purpose of this research is to support the HIF in identifying leverage points to fund innovation projects in response to the complexity of problems. We seek to collaborate closely with those already active in these areas, avoid duplication of efforts, build on existing experiments and learning, and take informed risks to support new ideas and approaches.

In publishing these reports we hope they will also inform and inspire our peers who share our ambitions for innovation in emergency WASH. In addition to engineers and social scientists who are crucial to this work we hope to engage non-traditional actors from a diverse range of sectors, professions and disciplines to respond to these problems with a different perspective.

The content of this report is drawn from a combination of the researcher's own experiences, qualitative research methodologies including a literature review that spanned grey and published literature and insights from semi-structured interviews with global and regional experts. The report was then edited and designed by Science Practice.

We would like to thank the members of our WASH Technical Working Group for their ongoing guidance: Andy Bastable (Chair), Brian Reed, Dominique Porteaud, Mark Buttle, Sandy Caincross, William Carter, Jenny Lamb, Peter Maes, Joos van den Noortgate, Tom Wildman, Simon Bibby, Brian Clarke, Caetano Dorea, Richard Bauer, Murray Burt, Chris Cormency, and Daniele Lantagne.

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The report was edited and designed by Science Practice.

Abbreviations

ACF	Action Contre la Faim (Action Against Hunger)
BPHWC	BushProof Handwashing Container
CLTS	Community-Led Total Sanitation
ECHO	European Commission's Humanitarian Aid and Civil Protection Department
ELRHA	Enhancing Learning and Research for Humanitarian Assistance
FOAM	Focus on Opportunity, Ability, and Motivation
HIF	Humanitarian Innovation Fund
ICRC	International Committee of the Red Cross
LSHTM	London School of Hygiene and Tropical Medicine
MSF	Médecins Sans Frontières (Doctors Without Borders)
NGOs	Non-Governmental Organisations
PHAST	Participatory Hygiene and Sanitation Transformation
PPPHWS	Public-Private Partnerships for Handwashing with Soap
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
WASH	Water, Sanitation and Hygiene
WHO	World Health Organisation

Glossary

The terms listed in this glossary are defined according to their use in this report. They may have different meanings in other contexts.

Chlorhexidine — A mild alcohol-free antiseptic, made synthetically.

Contact dermatitis — A red, itchy rash caused by a substance that comes into contact with skin.

Food grade (silicone) — A type of silicone that is safe for use with foods.

Gap Analysis — A comparison of desired results with actual results, to investigate underlying causes.

Hardware — Devices or objects used in a handwashing process or system.

Hookworms — Parasitic worms that can infect humans in countries with poor sanitation and a warm, moist climate. Hookworm larvae are capable of penetrating the skin in a few seconds; hence even people standing in contaminated waters in epidemic areas can quickly contract the larvae.

Human Design Centric — A design process that starts with testing among intended users of a product.

Latrine — A toilet or a simpler version of a toilet such as a communal trench in the earth in a camp or a hole dug in the ground (pit).

Nudge — A trigger or reminder used to effect behaviour change.

Refugee — A person who has been forced to leave their country in order to escape war, persecution, or natural disaster.

Sphere Project — Launched in 1997, the aim of the Sphere Project is to develop a set of minimum standards in core areas of humanitarian assistance, improve the quality of assistance provided to people affected by disasters, and enhance the accountability of the humanitarian system in disaster response.

UV-Stable — A material that does not become altered in any way when exposed to UV light.

Vector — An organism, or agent, that can carry an infectious disease to another organism.

Wastewater — Water that has been adversely affected in quality.

Water main — A principal pipe in a system of pipes for conveying water, especially one installed underground.

Water reservoir — Container used to store water.

Executive Summary

The promotion and uptake of effective handwashing practices are critical in ensuring the health of populations affected by emergencies and humanitarian crises. Along with general public health benefits, handwashing can reduce the risk of diarrhoeal disease by up to 50% (Curtis and Cairncross, 2003; Fewtrell et al., 2005; Luby et al., 2005). Handwashing with soap is recognised as an easy, effective and affordable method to protect and prevent disease transmission and should be achievable, even in emergency settings. However, handwashing practices in humanitarian crises are often found to be deficient and less effective than expected programming, with many socio-cultural, technical and financial factors likely contributing to the problem.

Access to, and implementation of, appropriate handwashing technologies are recognised as significant barriers to the uptake of effective handwashing practices in emergencies. Even with the existence of handwashing stations such as BushProof water containers, Oxfam buckets, the Tippy Tap, the Handy Wash and emerging technologies such as the Spa Tap and LaBobo (also known as the Happy Tap), hurdles still exist.

Key challenges that impact on the effectiveness of existing handwashing technologies or 'hardware' include, but are not limited to: unreliable access to water and soap (including issues of soap theft), prioritisation of distributed soap or purchased soap for laundry, bathing and dishwashing over handwashing, insufficient drainage around handwashing stations, and handwashing stations that break easily or are difficult to use (International Rescue Committee, 2011; Oxfam, 2011; Brown et al., 2012; Curtis, 2011).
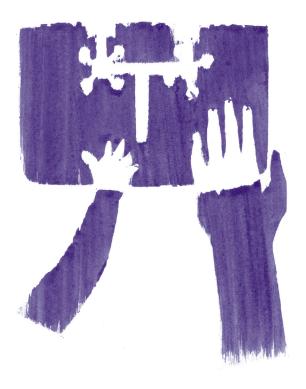
For optimal engagement and investment, innovative, exciting and 'fun' solutions are often deemed most effective, have the greatest 'buy-in' and will most likely ensure a sustainable uptake. While devices with running water may be preferred in certain contexts, it is important this does not result in wet feet. This is a deterrent to washing hands and can potentially violate 'do no harm' principles (i.e. where conditions such as hookworm or dermatological conditions of the foot may develop).

In order to achieve greater public health benefits associated with good handwashing practices, WASH actors need to identify and apply collaborative and sustainable methods to improve handwashing solutions and promotion for those affected by emergencies and humanitarian crises. The present research puts forward three exploration areas which would benefit from additional attention.

Links between practitioners and developers of handwashing technologies should be improved: Encouraging these kind of collaborations would ensure that the limitations of existing handwashing technologies are addressed and solutions are designed with the needs of the displaced population in mind.

Develop 'universal' or adaptable handwash station infrastructure: One of the key handwashing concerns for WASH experts is to identify the most acceptable handwashing technology that meets the needs of the emergency-affected population and matches their pre-existing practices (Vujcic et al., 2014). Ideal solutions should be designed to fit existing water reservoirs and dispensing devices, they should be accessible by adults, children and the disabled, and should be durable, robust and easy to transport and construct.

Identify clear drivers to promote handwashing practice and maintenance of facilities: Research has shown that factors such as emotional drivers, social status or affiliation, disgust or aesthetics are more likely to provide the motivation for change than health-based messages. Regardless of the approach used, the key message needs to be simple, consistent and reinforced. Behaviour change typically requires messaging via four or five 'triggers', or 'nudges', to be effective. Scaling-up handwashing promotion interventions and appropriate messaging is a widespread problem across most intervention approaches. Lack of operation and maintenance remains an issue both at community and institutional level. Concerted effort and investment are required to connect researchers in behavioural change with WASH practitioners to develop practical guidance on hygiene promotion techniques, and to identify drivers that will lead to improved operation and maintenance of handwashing facilities in emergency contexts.

Part 1: The Challenge of Handwashing in Emergencies

Access to water, sanitation and hygiene promotion is one of the key aspects to securing the health status of populations affected by emergencies and humanitarian crises. The impact of hygiene promotion and washing of hands with soap has wider health implications, as hands are vectors that can transport disease agents from humans to humans, directly or indirectly. Furthermore, the ability to wash hands contributes to maintaining the dignity, human rights, mental health, safety and security of an affected population.

The main purpose of this research piece is to explore the challenges and opportunities around handwashing practices in emergencies. This report complements and builds on the findings of a comprehensive review undertaken by the University at Buffalo, 'Strategies & Challenges to Handwashing Promotion in Humanitarian Emergencies' in 2014 (Vujcic et al., 2014) and is intended to engage those involved in handwashing research, development and implementation.

The present report employed qualitative research methodologies including a literature review that spanned grey and published literature (including, but not limited to, government reports, conference papers and abstracts, theses, discussion papers, newsletters, program evaluation reports, standards/best practice documents, working papers and peer-reviewed academic papers) and expert interviews.

1.1. Understanding the Problem

Faecal-oral disease can account for more than 40% of deaths in the acute phase of an emergency (Connolly et al., 2004). In some emergencies and post-emergency situations, diarrhoea can lead to increased morbidity. For example, in the Kurdish refugee crisis of 1991, diarrhoea was deemed the leading cause of death (Toole and Waldman, 1997).

Faecal-oral disease can account for more than 40% of deaths in the acute phase of an emergency.

Systematic reviews have consistently shown that handwashing with soap is effective in reducing diarrhoeal disease and there is evidence that handwashing can reduce the risk of diarrhoea by up to 50% (Curtis and Cairncross, 2003; Fewtrell et al., 2005; Luby et al., 2005). Research and evidence of the benefits of handwashing with soap also extend to emergency settings. For example, in the context of a refugee camp in Malawi, regular provision of soap was associated with a 27% reduction in diarrhoea and handwashing with soap was also shown to be an effective strategy against cholera outbreaks (Peterson et al., 1998; Reller et al., 2001; Hutin et al., 2003).

Handwashing can reduce the risk of diarrhoea by up to 50%.

Based on this research and evidence, humanitarian organisations aim to distribute soap routinely in crisis situations. However, precise quantities for soap in the case of different washing activities such as bathing or laundry are not indicated in known standards such as those set by the Sphere Project. This makes it difficult to assess whether minimum standards are met in the field (Vujcic et al., 2014). In addition to this, the distribution of soap assumes sufficient quantities of water to support handwashing practices. In most emergency situations, especially during the acute phase, water is often limited and tends to be allocated firstly for drinking and cooking. Handwashing tends to be regarded as less of a priority, even though

Despite the evidence outlining its benefits, handwashing tends to be regarded as less of a priority in a crisis situation.

the setting would provide optimum conditions for disease outbreaks (Brown et al., 2012). Despite the overwhelming evidence outlining its benefits, it is not only the provision of soap, but more broadly the targeting of handwashing as a core intervention during an emergency that is often overlooked by responding organisations and responsible governments (Oxfam, 2011; The Sphere Project, 2011).

Although there is no simple, easily employable and reliable indicator of whether hands have been washed with soap or not, handwashing practice in humanitarian contexts is often found to be lacking. Formative research conducted in three long-term refugee camps in Thailand, Kenya and Ethiopia, found that the proportion of defecation events followed by handwashing was just 20% across all three camps (Biran et al., 2012). Despite the complexity associated with handwashing practices, inevitably handwashing with soap has been recognised as an easy, effective and affordable method to protect and prevent disease transmission (Unilever, n.d.).

Handwashing with soap is an easy, effective and affordable method to protect and prevent disease transmission.

By leveraging findings from academic research, observations from humanitarian practitioners and the institutional knowledge embedded in organisations which respond to humanitarian emergencies, this report provides an overview of the technologies available to assist handwashing in emergencies. Further, it identifies the current barriers and trends in hygiene promotion and practice that can be capitalised upon to improve the uptake of handwashing practice. In synthesising the various technical, political and social barriers to overcome, this research aims to make the results accessible to a wide audience of innovators and supporters who may or may not be directly involved in handwashing in humanitarian crises.

Part 2: Current Handwashing Technologies and Practices

'Enabling products and technologies are some of the "external factors" that influence individuals' likelihood to perform a behaviour, regardless of their ability or motivation to take action' (Biran, 2011:1).

While there have not been significant changes to the way that handwashing has been addressed in the humanitarian sector, there are key aspects that have been recognised to influence proper handwashing practices. This section describes and evaluates the determinants of handwashing habits and common technologies used in emergency humanitarian settings to facilitate handwashing practice. The aim of this section is provide a better understanding of how WASH actors have responded, and continue to respond, to handwashing in emergencies.

2.1 Determinants of Handwashing Habits and Practice

Globally, only around 19% of people regularly wash their hands with soap and water following contact with excreta.

At the outset of an emergency, handwashing practices may be poor either due to a lack of knowledge regarding the benefits of handwashing with soap or because basic materials and designated handwashing locations are not available. However, the levels of handwashing observed in humanitarian settings such as camps are consistent with the estimate that, globally, only around 19% of people regularly wash their hands with soap and water following contact with excreta. This indicates that broader socio-cultural factors could be at play (Freeman et al., 2014).

The University at Buffalo report examined in detail some of the factors that determine whether or not handwashing is adopted in emergencies, and if so, what practices were used (Vujcic et al., 2014). Key observations from the report suggested that populations characterised by strong hygiene behaviours prior to an emergency were more likely to adhere to the same hygiene and handwashing practices once soap and water were available. While in the refugee camps, these populations made attempts to obtain materials and employ handwashing approaches typically used in their home settings. Previous exposure to handwashing promotion and knowledge of the relationship between handwashing and disease prevention also influenced the acceptance of good handwashing practices.

Populations with strong hygiene behaviours prior to an emergency are more likely to adhere to the same hygiene and handwashing practices once soap and water are available.

In addition to behaviours prior to an emergency, the diversity of the affected population and any prior exposure to handwashing promotion or messaging also influenced handwashing behaviour (Vujcic et al., 2014).

2.2 Handwashing Devices Used in Emergencies

The following is a summary of the most commonly used handwashing devices that have been used and are still used by WASH actors during emergencies.

2.2.1 Oxfam Buckets

Oxfam buckets are a standard emergency response technology widely used in humanitarian emergencies by a wide range of WASH actors. The technology was initially designed and field-tested to improve safe water collection and storage during disaster response, and its design won a Millennium Prize for Innovation. The device can hold up to 14 litres of water and the tap and lid allow water to be poured without risk of contamination (Figure 1). Oxfam buckets further differ from

normal buckets as the moulding stud commonly found on the bottom of buckets has been removed to make it easier to carry on the head. The bucket is also stackable, easy to clean due to its rounded edges and does not degrade when exposed to sunlight (Oxfam, 2015; Oxfam n.d.). The design concept of the Oxfam bucket is often replicated in emergency and development situations using locally available materials.

Figure 1.
Volunteer demonstrating handwashing with Oxfam Bucket in Sierra Leone, during the Cholera Outbreak 2012. (Source: Jane Beesley, Oxfam)
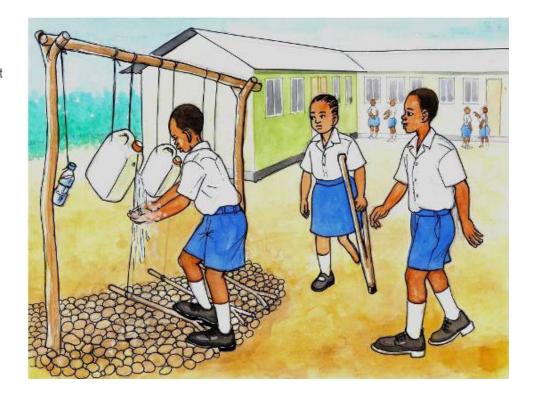

2.2.2   The Tippy Tap

A common handwashing device used in the developing world is the Tippy Tap. Originally developed in Zimbabwe by Jim Watt and Jackson Masawi, the Tippy Tap is a simple and economical device made with commonly available materials (often a container similar to that of a jerry can, with a capacity of 5 litres). It allows for a small release of water for handwashing, thereby avoiding water wastage. The container is filled with water, suspended from a wooden frame and the neck of the container is tied to a piece of wood at ground level, allowing the device to be operated hands-free (Figure 2). The mechanical tipping action of the Tippy Tap is generally considered an appealing feature of the technology and can be useful in initiating community interest and engagement.

A case-study on the Tippy Tap was carried out in Uganda in 2010, which highlighted both positive and negative attributes (Biran, 2011). Tippy Taps were mostly embraced by householders, with the most salient advantage thought to be their operation by foot pedal which prevents contamination. Whilst there is no clear consensus as to whether hands-free operation is an essential component of handwashing device design, experts interviewed for this research indicated that a preference is often expressed for no-touch or one-touch systems. In addition to this factor, Tippy Taps are considered simple to use and provide a visual cue for handwashing which may play a useful role in nurturing handwashing habits in children. Tippy Taps are also very water efficient, having been shown to use just 0-50 ml for one handwash.

Figure 2.
Tippy Tap with soap for
hand-washing, Tanzania.
(Source: Rashid Mbago, Government
of the United Republic of Tanzania)

A main drawback of Tippy Taps is the need to repair or replace the component parts regularly, which can lead to decreasing motivation to construct and use these devices. This is due to the 'scavenged' nature of Tippy Tap components and the 'home style' methods of construction, both of which can contribute to the break-down and inevitable abandonment of the technology. The scavenged nature of Tippy Tap components is also considered as a barrier to uptake as little status is attached to the device. Additionally, Tippy Taps employ a 'batch' system, with containers needing to be refilled on a regular basis. Although instructions for building Tippy Taps generally include attachment of soap bars via a string, soap is often lost from the unit. Users also report a general dislike for getting wet feet when using the devices.

Figure 3.
Hand washing device with soap
slung from wire to protect it from
the rain and from thefts.
(Source: Peter Morgan, 2009)

The placement and convenience of use of the Tippy Tap is also important for uptake. In the Uganda study, all respondents only used the Tippy Taps after latrine use as they had not constructed additional Tippy Taps besides the house (Biran, 2011).

Another example is the use of Tippy Taps in Sierra Leone at roadside chlorine handwashing stations associated with the Ebola response. In crisis situations, easy uptake and understanding of the Tippy Tap option makes it a simple and effective solution, however the negative impacts of wet feet, lack of durability and propensity for soap being stolen are not fully understood.

In the development context, the durability of Tippy Taps has been improved with the inclusion of professionally constructed concrete poles. Field observations suggest that appealing to cultural preferences for solidity, durability and materials used (e.g. metal or concrete) may improve uptake.

2.2.3 BushProof Handwashing Containers

In 2006–2007, Oxfam conducted a pilot study on the BushProof Handwashing Container (BPHWC) — a two litre hanging bag with an attached nozzle — in 10 rural villages in Southern Zimbabwe (Oxfam, 2007). They found that BPHWCs were being consistently, yet exclusively, used for washing hands after defecation and not before eating. This was because the BPHWCs were located near or out-side latrines as locals did not want the inconvenience of constantly moving the container from the house to the latrine. The BPHWC was found only to be useful at household level and not communal level because of their limited water capaci-ty (2 litres). Theft of the container was also a key concern.

Despite these limitations, respondents felt the most positive characteristic of the BPHWC was the ability to use it without assistance. Further, the attached nozzle to release water gave the feeling of using a tap (however, under fives and the disabled had a hard time opening the nozzle). Respondents found the BPHWC acceptable and consistently used the container, though their motivation to use it decreased as it became old and dirty.

Following this study, Oxfam recommended that BPHWCs should have extra pro-tection from UV light so they can last longer and that nozzles should be adjusta-ble to allow flexible flow rate as per the demand of the individual. Other possible adaptations included chemically pre-treating the container for the slow release of hand-disinfecting chemicals and using the surface of the container to pass on key hygiene messages to the rest of the camp (Oxfam, 2007).

Oxfam found BPHWCs to be less cost effective than communal concrete hand-washing vessels. However, they argued that in emergency camps (where com-munal handwashing facilities are often only built near communal latrines), BPH-WCs could be provided as part of household hygiene kits to develop compliance at the beginning of an emergency (Oxfam, 2007).

2.2.4 Handwashing Bags

A 2012 pilot study among Sudanese refugees during the acute phase of the emergency in Benishangul-Gumuz, Ethiopia, assessed the use of an inexpensive handwashing bag similar to a BPHWC, but with a mesh bag containing a bar of soap and pictorial instructions. At the end of the six-month study findings showed that fewer than half of respondents used the handwashing bags as their primary handwashing device (45.9%) (Husain et al., 2015). Furthermore, only 38.4% of all handwashing bags had water in them at the time of the end-line visit, which indicated that usage was low and their acceptability had decreased over time.

Handwashing bags are rarely used because they are often defective, too small, lack adequate soap provision and change the smell of the water when exposed to sunlight.

Focus group discussions suggest the primary reasons given for not using the bag were: an inability to hang the bag, the bag was defective, or there was no soap available and promotion of the handwashing bag was lacking. Over half of respondents felt the bag was too small (10 litres) and some believed the bag was not strong enough and had a bad smell if left in the sun for too long. However, keeping bags stationary throughout their life was seen to be popular among respondents, and bags did seem to be durable over three months (the mean survival rate of the bag was 2.73 months), though outcomes beyond three months were unclear. Longevity issues with handwashing bags were also raised by experts during interviews for this research.

It is possible that acceptability of handwashing bags may be increased with a stronger heat resistant bag that would not easily break down or change the smell of the water, and with an enabling environment in which there is adequate soap provision and handwashing promotion (Husain et al., 2015).

2.2.5 Communal Wash Stations

Tanks with taps can facilitate handwashing for more than one person at a time and may be locally constructed from sourced materials.

In settings where the implementation of communal handwashing facilities is appropriate, such as in health centres, schools or child friendly spaces, tanks with taps (or variations thereof) can facilitate handwashing for more than one person at a time and may be locally constructed from sourced materials. The size of the tank and flow from the tap determines how often the water supply needs to be replenished. Where water is scarce or needs to be sourced externally, this can be problematic. A consistently raised issue regarding tanks with taps is that the manufacture of stands and supporting structures can be difficult during emergencies. Similarly, if provision for drainage of excess surface water away from the tank is not provided, usage will decrease.

An alternative to the 'tank with taps' option is a row of wall mounted taps, (Figure 4) or a freestanding tapstand itself unadapted for handwashing. These are common in schools, or camps, and while on the face of it handwashing seems adequately covered, problems are nearly always experienced with broken or stolen taps, or taps left running for other reasons, leading to water tanks being emptied. Soap is often missing and, in general, management of such infrastructure seems problematic.

Figure 4.
Water taps along the side of a communal shower block, Qah camp, Syria. (Source: Mark Buttle, Save the Children, 2013)

Taking elements from 'tanks with taps' and learnings from the field with respect to features that enhance uptake and usage, the International Committee of the Red Cross (ICRC) is currently refining a 120 litres communal wash station that has so far been tested in Sierra Leone and Nepal (Figure 5). The unit dispenses approximately 50 ml per wash and is operated by a foot release valve located at the bottom of the unit. Wastewater is collected in the base of the structure and the unit can also be connected to water mains, thus eliminating the need to refill the unit manually.

Figure 5.

A communal handwashing station currently under field try and development by the ICRC. (Source: William Carter, ICRC)

2.3 Emerging Technologies for Handwashing

This section describes and evaluates some of the emerging technologies and practices to promote handwashing in developing and emergency settings. This highlights what is presently being developed and changed based on learning from past innovations related to handwashing.

2.3.1 The LaBobo

The LaBobo, also known as the 'Happy Tap', is a portable bright green plastic sink which brings soap and water together in a single handwashing device for children (Figure 6, 7 and 8); the device is currently available in Vietnam and Cambodia (WaterSHED, 2014). Initially, the LaBobo was developed for the commercial market for handwashing devices, but has since been included in a Vietnamese Ministry of Health campaign to address an outbreak of foot and mouth disease in twelve of the most seriously affected provinces.

The LaBobo is not supplied with soap but provision is made for the storage of a bar with the unit. This is to allow for users to make decisions based on their personal preferences. In both Vietnam and Cambodia, there is a strong user preference for bar soap, as readily available liquid soaps dry hands.

In designing the LaBobo, the developers undertook a 'human design centric' process with significant investment in consumer research and prototyping. The design research covered all elements of the device including whether to use a tap or not, whether to include soap, and if so, what type, and whether the soap and water should be pre-mixed or separate.

Consumer research concluded that prioritising a low-cost or upcycled device would not lead to the desired increase in handwashing practices. Instead, key factors in the design and marketing processes were to create a device that attracted attention, was associated with elements of desirability, aspiration and status, and thus generated a perceived value. The developers consider that this commercial approach has been a key element to the successful uptake of the device.

Figure 6. (Left)
The LaBobo, or Happy Tap.
(Source: WaterSHED)

Figure 7. (Right)
The LaBobo, or Happy Tap, in use.
(Source: WaterSHED)

Figure 8.
The LaBobo in front of a latrine. (Source: WaterSHED)

With respect to its applicability to acute emergency contexts, the LaBobo is designed for household use, but could be redesigned to accommodate a larger supply. In its current state, the device is completely portable, which could raise issues of theft. However, there is little intrinsic value in the device apart from as a handwashing station as the components are designed in a manner that cannot be repurposed.

2.3.2   The SpaTap

The SpaTap is a 'one size fits all' silicone fitting for water bottles, resulting in a flow-controllable camp shower or camp tap. The bottle fitting can fit small drinking-sized bottles (25mm opening) through to larger 'fountain type' bottles (42mm opening). When hung by a strap, the inverted bottle and SpaTap assemblage can facilitate the placement, storage and drying of a soap bar (Figure 9).

The SpaTap, constructed from food grade, UV-stable silicone, can be utilised in three modes including: low volume pump action for handwashing (utilises squeeze action), 'trickle' mode to facilitate handwashing, and a moderate flow shower mode. Fitted to a one-litre bottle, the SpaTap delivers at least 25 effective hand washes (SpaTap, 2015).

The SpaTap has been tested in both developing countries (in schools in Kenya and India) and in developed world settings (as a device to take hiking or camping). The device has reportedly been well received in both settings due to its low water use, its 'pocket size', durability, and fun or novelty attraction factors. When interviewed, the developer of the SpaTap cited 'intuitive use' as one of the most critical aspects of design success. Regarding engagement with the product, children in particular seem to enjoy the running water.

Intuitive use and the ability to take ownership of devices are key traits of well designed hand-washing solutions.

The ability to take ownership of the device at a personal, household or classroom level is also considered important for its uptake, especially in Kenya. This has been capitalised on in implementation programmes in schools where the device is supplied without the strap and children design and create their own.

The device has also been used in recent emergency responses in Vanuatu (100 units, complete with soap bars, bottles and laminated instructions) and Nepal (50 units). Direct feedback from NGO implementers was that the devices were well received.
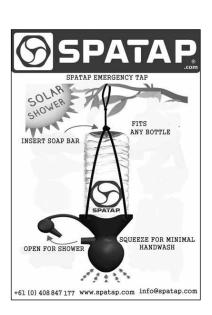

Figure 9.
The SpaTap schematic (left) and examples of soap storage. (Source: SpaTap)

2.4 Soap and Water Alternatives

There are no defined standards for soap distribution for handwashing in an emergency situation.

Organisations that respond to humanitarian emergencies always aim to distribute soap routinely, as indicated by Sphere standards (The Sphere Project, 2011). However, while Sphere standards make recommendations for soap distribution for bathing (250g per person per month) and laundry (200g per person per month), there is no standard for the amount required for handwashing.

In extreme emergency situations, soap and water may not be available for handwashing purposes due to environmental, logistical or financial constraints. In addition to this, the type of soap available may not be appropriate for the local population. This can be distributed as liquid soap, powdered soap, soapy water mixture, antiseptic bar soap and luxury bar soap designed for laundry and/or bathing. Communally-available soap bars are also prone to theft or can be misplaced. There has hence been an emergence of alternatives that aim to be as effective as soap and water, and can be used and distributed easily in emergency situations.

2.4.1 Waterless Hand Sanitiser

Waterless hand sanitiser is a proposed alternative to soap and water handwashing devices (Figure 10). It has been tested in a non-emergency context, in primary schools in urban Kibera, Kenya (Pickering et al., 2013). Two schools received a waterless hand sanitiser intervention, two a handwashing with soap intervention and two schools received no intervention. Hand cleaning behaviour after toilet use was monitored for two months. The hand sanitiser intervention was found to markedly increase hand cleaning after toileting, whereas the soap intervention did not (hand cleaning after toileting was 82% at sanitiser schools, 38% at soap schools and 37% at control schools). The hand sanitiser intervention, however, had no significant impact on handwashing before lunch. This is possibly because in Kenya it is common to eat with hands, not utensils, and the students did not like the smell of the alcohol-based hand sanitiser on their hands.

A study looking at primary schools in Kiberia, Kenya, found that providing hand sanitiser rather than regular soap lead to a significant increase in handwashing after toileting.

82% SANITISER   38% SOAP   37% CONTROL

As waterless hand sanitisers usually contain alcohol, these are unacceptable for use in populations that have a religious or cultural objection to alcohol.

In a humanitarian emergency, a waterless hand sanitiser could overcome the problem of limited water supply. It would also require less frequent replenishment than water containers. In some countries, the use of sanitisers is accepted within the population, especially by those who can afford it. However, evidence and observations from experts suggest that sanitisers are limited in their effectiveness to remove organic matter so are not necessarily an effective solution to washing after working or after faecal contact (CDC, 2015). As waterless hand sanitisers usually contain alcohol, these are unacceptable for use in populations that have a religious or cultural objection to alcohol. To avoid this issue, there are alcohol-free alternatives than can be used, such as chlorhexidine (Ram, 2015).

Beyond cultural issues with alcohol-containing products, experts raised logistical and behavioural concerns in the distribution of waterless hand sanitisers in the emergency response context. Firstly, the products are unlikely to be made locally and therefore rely on maintenance of external supply chains which are often broken or fail in emergency contexts. For alcohol-based products, there is also the additional logistical problem of transporting what may be considered a dangerous (flammable) or controlled substance, depending on the national context and mode of transport. There is also the potential for deliberate misuse of alcohol-containing products for fuel or consumption. In addition to this, communities not familiar with the product may unintentionally use it and cause harm, for example if the product is splashed or rubbed into eyes.

2.4.2 Non-Soap Agents

In situations where water and supplies such as soap or sanitising agents are scarce, there is increasing evidence that naturally occurring abrasives and cleaning agents such as sand, soil and ash may be used as alternatives to handwashing with soap and water. This is because the abrasive action of these agents, together with the mechanical action of cleaning and rinsing represent the key components of the cleaning process. Soap in itself does not have any disinfecting properties unless these are added.

There is an increasing body of evidence that indicates that, when used for handwashing after faecal contact, ash or soil could clean hands as effectively as soap (Nizame et al., 2014). In addition to this, baseline assessments prior to any handwashing promotions or interventions have indicated that other cleansing agents such as ash or mud can be habitually used and thus provide a culturally acceptable alternative to soap use (Vujcic et al., 2014). Advantages of employing these agents include their ready availability in most situations.

Figure 10.
Commercial waterless hand sanitiser.
(Source: D Coetzee, flickr)

CASE STUDY — The use of ash, sand and soil to wash hands

In many low-income countries, where soap is either not available or prohibitively expensive, ash, sand and soil are options that are commonly used to wash hands. In Bangladeshi communities, where ash and soil are traditionally used as handwashing agents, community members report that these agents wash their hands as effectively as soap (however, this is yet to be independently verified). Although there may be some resistance to the use of ash, uptake has been improved greatly when the ash is sieved to remove any harsh or abrasive particles.

In Ethiopia and South Sudan, humanitarian WASH practitioners have observed individuals cleaning hands with sand. This self-initiated behaviour has however only been observed to be used very informally.

2.4.3 Chlorine Solutions

Weak (0.05%) chlorine solutions are a standard hand disinfection method used in healthcare across emergency responses. More recently, these were adopted by the Guinean Government as a standard household measure to curb the spread of the Ebola virus.

In adopting this approach, experts have expressed concern that chlorine solutions may not be mixed properly, resulting in too weak or too strong solutions. These solutions may also lead to additional complications such as increasing incidences of contact dermatitis.

However, feedback from experts involved with hygiene promotion in the early phases of an emergency indicates that barriers to correct uptake and implementation can be overcome with effective health messaging and promotion. While some argue that these messages can be disseminated by trusted sources, others advocate that practice can be enforced through checkpoints on roads and in public areas.

Part 3: Limitations to Effective Handwashing Practice and Promotion

Despite the availability of various handwashing technologies, effective handwashing practice and promotion in emergencies is often affected by the same factors (International Rescue Committee, 2011; Oxfam, 2011):

- a lack of water supply and soap,

- crowded living conditions,

- a novel mix of ethnicities and cultures, some of which may have poorly formed handwashing habits.

This section analyses the limitations and barriers associated with handwashing in emergencies and provides insights on how to overcome these issues to ensure the successful implementation of existing handwashing solutions and future innovations.

3.1 Device Design

Research states that there are five attributes that contribute to the diffusion of innovation (Biran, 2011):

- the ease with which an innovation can be understood and used,

- the opportunity to experiment with it on a limited basis,

- the relative advantage of the innovation over existing practice,

- the ease with which the innovation can be observed before adoption,

- compatibility with existing values and needs.

To be effective, the design of a handwashing device must take into account user preferences and perceptions around the mechanics of handwashing with soap.

Common concerns regarding existing handwashing devices include: the inconvenience of frequently refilling the container, getting the user's feet wet whilst washing hands and, in the case of the tap-up sink, the requirement of a support structure such as a tree branch or building (Danielsson, n.d.).

A project undertaken to design a handwashing station in rural Vietnamese households provides some key insights into user preferences (Devine, 2010). Users showed a preference for taps which do not have to be continually pressed, which allow flow rate to be adjusted, and which can be turned on and off with the back of the hand. A hanging bag of soap was favoured over a covered dish as it allowed soap to dry and prevented it from being misplaced or stolen. Appearance was also important and users expressed a desire for 'something nice and new', rather than old, re-purposed bottles. Handwashing containers mounted to a wall or post were preferred over containers rested on a stand, as they were perceived as more permanent structures. Clear containers, which allow the water level to be seen, and a minimum capacity of 10–15 litres were other important features for users. Flip lids rather than removable lids were also preferred as they were less easily misplaced.

The user's size should be considered when determining the height of the hand-washing device and drainage should be installed where necessary to ensure comfort when using the device (Danielsson, n.d.).

Experts highlighted that to overcome failures and barriers to uptake from a 'device' perspective, technological solutions need to be durable and robust. Where soap forms a component of the unit, there must be a place for it to be stored safely between uses.

For optimal engagement and investment, solutions that are perceived to be 'modern' and practical, and have novelty and 'fun' factors are most effective, have the greatest initial 'buy-in' and are most likely to have a high sustainability in uptake. While devices with running water may be preferred in certain contexts, it is important that this doesn't result in wet feet. This is a deterrent to washing hands and potentially violates 'do no harm' principles (i.e. where conditions such as hookworm or dermatological conditions of the foot may develop).

CASE STUDY — Ownership of Handwashing Devices

In Kenya, some schools do not currently have their own water facility, meaning children must supply their own water. They do so by carrying it from their homes or other communal sources. When water is available on site, communal taps are most common, and at times there is only one available for use by all students. This means students have to spend time queuing to fetch water from the available tap, leaving many younger children at a disadvantage because they are not able to reach or operate the tap.

Developers and practitioners have tested many smaller-scale devices in Kenya. Investment from the community, particularly at the school level, is greatest when students are able to participate in the construction of the device, or at least part of it.

Developers of the SpaTap, for example, issued the devices to students without straps and engaged the school children to make their own from whatever materials they could find. This greatly enhanced the children's engagement and practice with the device as well as presenting an active opportunity for ownership.

3.2 Linking Developers and Responding Organisations

Developers often cite difficulties in accessing people in the humanitarian sector to actively test devices in the field. This limitation goes hand-in-hand with observations from practitioners which state that introducing new devices, technologies and practices in an acute emergency situation is often not feasible and can be fraught with ethical concerns.

More investment is needed in linking developers with implementers who can check appropriateness and undertake due diligence outside of an emergency situation. Specifically, investment needs to be made by donors and humanitarian agencies into determining practices, technologies and modes of delivery appropriate to affected communities prior to emergency situations.

The importance of implementing and 'normalising' handwashing behaviours prior to an emergency is supported by existing research. This highlights that uptake of handwashing during emergencies correlates with both familiarity with practices and devices, as well as prior exposure to handwashing promotion (Vujcic et al., 2014).

Technological developments in areas such as 3D printing can also play a significant part in this process by allowing for the rapid development of prototypes.

This way, different designs can be trialled and quickly iterated in an emergency to produce a handwashing system that better suits the needs of the local population (Oxfam, 2014). However wider investment and commitment to field trials of innovative technology and practices, among both implementing agencies and donors, is a key step to moving forward solutions to handwashing deficiencies in emergency settings.

3.3 Soap Availability

Lack of soap as a barrier to handwashing is a recurring theme in the existing literature; however, whether this truly presents a barrier is debatable (Curtis, 2011; Biran et al., 2012). Although organisations usually aim to distribute soap routinely in quantities indicated by Sphere standards (The Sphere Project, 2011), these standards do not specify quantities needed for handwashing. The soap distributed is often prioritised for laundry, bathing and washing dishes over handwashing and may even be sold in the markets (Vujcic et al., 2014). The risk of soap being stolen or used for other purposes can be minimised by tying the soap bar to the washing device with string (Oxfam, 2011).

The prioritisation of soap use for other purposes or prioritising other assets over soap was reiterated by experts during interviews for this research. However, there is little consensus on how to effectively and appropriately increase the perceived value of soap for handwashing in a temporary accommodation.

A solution suggested during the expert interviews was to flood the market with soap during an emergency. However, soap distribution in vast quantities may disrupt the endeavours of local retailers and distributors of soap (Vujcic et al., 2014). The impact of camp activities on the local commercial sector during and post-emergency is of real concern to relief agencies. One viable approach is to distribute vouchers to obtain both food and non-food items. Vouchers have the advantage of allowing people to be more selective and choose a preferred item or brand and thus can be more empowering (Vujcic et al., 2014).

3.4 Location and Availability of Handwashing Facilities

A crucial component in encouraging handwashing is to ensure that handwashing facilities are conveniently located for users. These need to face the direction the users are approaching the facility, and should be aligned to their daily routines.

Handwashing stations need to be located not only next to latrines, but also near kitchens and households to enforce handwashing behaviour at critical times.

Handwashing after latrine use is addressed in The United Nations High Commissioner for Refugees (UNHCR) standards for humanitarian emergency assistance. Their recommendation is to provide handwashing stations with soap next to communal latrines (UNHCR, 2007). These standards, however, make no reference to handwashing stations at the household level and thus overlook the importance of handwashing at other critical times such as before eating and before preparing meals (UNHCR, 2007).

This message was reinforced by experts who highlighted the critical need for the placement of handwashing stations at the entrance to community facilities such as kitchens, meeting places and school rooms and, where appropriate, at the household level. Such actions have been observed to improve uptake of handwashing practices simply by increasing their convenience, as well as reinforcing messages of behavioural change.

3.5 Community Ownership and Uptake

Experts highlighted the need to appreciate the socio-cultural context of each emergency situation and to respond to the affected communities' preferences when designing handwashing programmes. These considerations should cover the content of the hygiene kits, as well as the methods by which information and behaviour change messages are disseminated. With regards to hygiene kits, experts stated that content use can be as low as 10% in the field, however more research is required on this topic. For example, the research can be as informal as approaching community members and asking what has been used.

The use of hygiene kits in practice can be as low as 10%.

Using culturally-appropriate adult teaching principles, as well as engaging ways for teaching children to adopt effective handwashing practices is crucial in improving uptake. Engaged local champions that can help develop and promote handwashing initiatives is also a key component of a successful campaign.

Experts also highlighted that in order to be accepted and embraced, proposed technologies and practices need to be familiar to the affected community and supported by the government or trusted local body. Critically, it was highlighted by experienced practitioners that introducing a new practice or technology in the acute phase of an emergency is unlikely to work. This is because priorities higher than handwashing are likely to take precedence. This is especially true in communities where handwashing practice is low or does not exist already.

Familiarity and attraction to a device are key in maximising user engagement.

Developers of handwashing technologies recounted that familiarity and attraction to a device were key in maximising user engagement. Significant efforts are usually made in the research and design phases of product development to ensure that devices are appealing to the target communities. Key considerations often include the type of soap to use, how much water to dispense, as well as the colours used and the name of the unit.

CASE STUDY — The Impact of Culture on Handwashing Approach Design

Understanding context and culture are essential in implementing effective WASH campaigns that focus on key messages such as the importance of handwashing and safe sanitation.

This also relates to the type of devices and infrastructure used, and whether it is targeted at community or household level. For example, the Nuer from South Sudan have strong extended 'family' units. Practitioners have observed that in camp settings, these family units will lock and care for latrines and handwashing facilities that they consider to 'own'. By doing so they often prevent others outside of the 'family' from using the facilities.

Hence, in this particular case, to support handwashing practices and safe sanitation, appropriate devices and infrastructure need to be planned at the family level.

Funding and tools needed to maintain and repair existing handwashing devices are often limited during a crisis.

3.6 Operation and Maintenance of Handwashing Facilities

Another problem related to community ownership and uptake of handwashing is the lack of operation and maintenance of facilities, particularly the failure to replenish materials (Vujcic et al., 2014), but also failure to complete simple repairs such as replacing broken taps. Materials and tools need to be available to maintain and repair devices, as well as engagement with management bodies and authorities. Also, steps may need to be taken to ensure the security of handwashing water supply where the water is appropriated for drinking. In addition to this, facilities must be safe to use, with well lit and maintained access paths.

One key challenge is to secure the funding needed to continue maintenance and upkeep for the duration of the crisis. For example, experts from humanitarian agencies cited the difficulty in maintaining soap supply and available funding after the initial six to twelve months after the response, and indeed after initial distributions of hygiene kits. This barrier to maintaining handwashing practices was also cited by respondents in Vujcic et al. (2014). They recalled the 'nonsensical' situation of having to actively promote handwashing activities without a secure supply of relevant materials such as soap. In extreme crisis situations, water for handwashing may simply not be available or seen as a top priority. Effective and sustainable solutions to manage these situations need to be investigated.

Some of these solutions could include the use of no-water options such as sand, soil and ash, or waterless hand sanitisers. Interviewees also cited the need to create demand for handwashing facilities through social marketing. This could be another strategy to increase awareness surrounding issues of ownership, uptake, operation and maintenance, by increasing demand for accessible, properly maintained facilities.

3.7 Behaviour Change Messaging

A growing understanding of what drives hygiene behaviour has led to evolving approaches to promoting handwashing behaviour change in developing areas (Curtis, 2011). There is now a significant body of evidence that suggests that in emergency settings, the traditional educational approaches that aim to use health messages to change behaviour are not effective. This approach may be somewhat effective if there is a particularly high perceived risk of disease out-break or transmission (Curtis, 2011; Vujcic et al., 2014).

Psychosocial factors such as disgust towards faeces, increased feelings of security, attractiveness, aesthetics and nurture have been identified as alternative motivators for handwashing, and have been used with success in the development context (Curtis, 2001; Devine, 2009; Vujcic et al., 2014; Contzen and Mosler, 2015).

The Saniya programme in Burkina Faso boosted handwashing in mothers from 1% to 17% after latrine use.

For example, the Saniya programme in Burkina Faso aimed to improve hand-washing in mothers using existing motivations for hygiene that were social and aesthetic rather than health based. Researchers found that following the pro-gramme, handwashing with soap after cleaning a child's bottom rose from 13% to 31% and the proportion of mothers who washed their hands after using the latrine increased from 1% to 17% (Curtis, 2001).

Another frequently cited study is SuperAmma, an intervention in India which used the emotional drivers of nurture, disgust, affiliation and status to promote hand-washing with soap. The results of the study showed that the proportion of the in-tervention group handwashing with soap was 31% higher than that of the control group (Biran et al., 2014). The campaign combined community and school-based events including a SuperAmma animated film, skits contrasting the clean habits of SuperAmma with her dirty, 'disgusting' comic counterpart, and public pledging ceremonies during which groups of women promised to wash their hands with soap at key event times and help ensure their children did likewise (Biran et al., 2014).
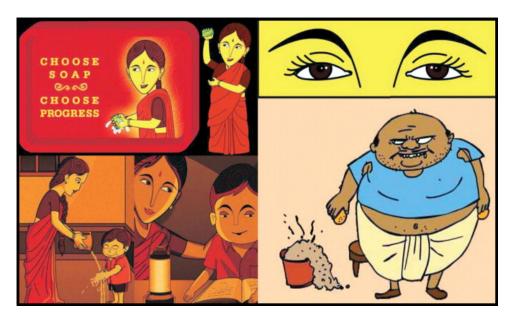

Figure 11.
Imagery from the SuperAmma campaign. (Source: Biran et al., 2014)

It has been debated whether the SuperAmma approach should be trialled in an emergency context (RedR UK, 2012). Some of the concerns raised include: whether nurture messages are still appropriate considering some families may be spilt in emergencies, whether the lengthy formative research is still feasible, whether the drivers for behaviour change are still the same in emergencies, and if it is appropriate not to use health messages in situations such as Cholera outbreaks (RedR UK, 2012). In addition to this, some experts highlighted that the use of humour in the SuperAmma programme may not be appropriate in emergency contexts. However, results of a cross-sectional study of communities in Haiti, who had experienced Oxfam's hygiene promotion activities in response to the 2010 earthquake and the following cholera outbreak, point favourably to trialling SuperAmma in an emergency context (Contzen and Mosler, 2013).

Knowledge and beliefs about the risks of cholera were found to be of minor importance in determining handwashing behaviour compared to attitudes, ability, beliefs and norms of the study population (Contzen and Mosler, 2013).

Traditionally, health-based messages have been used to promote handwashing in humanitarian crises. However, studies are increasingly showing that psychosocial factors and drivers such as emotional drivers, social status or affiliation, disgust or aesthetics, can provide a greater motivation for change. The experts consulted for this report were of the opinion that health-based messaging is, on its own, rarely effective in improving handwashing behaviours and also highlighted that there are significant limitations in the way programmes are usually delivered.

Some of the critical factors that need to be considered when designing a handwashing behaviour change campaign include:

• Engagement with the national or local (host) government is critical in ensuring cultural appropriateness and uptake.

• Information needs to be presented to the affected community in an appropriate manner (i.e. by persons trained in adult learning for adults and with appropriate techniques and elements for children).

• Handwashing promotion is best achieved through engagement of local champions. Where sessions are presented by NGOs (training the trainers or otherwise), these should be delivered by experienced adult education specialists who are familiar with styles of learning and communication that are appropriate to the target audience.

• Maximum uptake and message reinforcement is essential and relates to placement of handwashing stations not only at the exit of latrines, but also at the entry to kitchens, communal spaces (meeting places, schools) and at the household level tents.

• Regardless of the approach used, the key message needs to be simple, consistent and reinforced, as behaviour change requires messaging via four or five 'triggers', or 'nudges', to be effective.

In addition to these factors, strategies need to be flexible, and take into account local resources and human capacities, address issues around funding and sustainability, and adapt the approach according to changing practices, preferences and accessibility to hardware.

Understanding the cultural context and community preferences is also crucial, as highlighted in interviews with technology developers and humanitarian practitioners. This relates to all aspects of design, from the type of soap used to whether status and ownership of a device and technology are important uptake factors. In practice, however, there is general consensus that little is done to adapt handwashing promotion strategies to existing and evolving knowledge and social structures within the camp settings (e.g. this knowledge could include information about the leadership structure, ethnicity or religious background of the population). Other approaches such as involving beneficiaries in identifying solutions to health problems could also prove valuable in creating a more participatory approach to encouraging uptake in handwashing practices, yet attempts in this area are also lacking.

3.8 Behaviour Change Initiatives

Common approaches to handwashing promotion in terms of methodology are Participatory Hygiene and Sanitation Transformation (PHAST), child-to-child approaches, child-to-community approaches, and community health clubs (Peal, 2010). PHAST is a participatory learning methodology centered around making people feel more confident about themselves and their ability to take action and improve their communities.

PHAST has become the predominant approach to supporting hygiene promotion in both developing and emergency contexts (Curtis, 2011), most emergency hygiene promotion manuals and recommendations for 'best practice' being rooted in this approach (Ferron, 2000). PHAST is, however, mostly an educational approach that is heavily reliant on the skills of trained facilitators and is difficult to implement on a large scale (Curtis, 2011). There is no rigorous data to support the effectiveness of PHAST with regard to hygiene behaviour change (Curtis, 2011) and PHAST tools are relatively time intensive (Peal, 2010). Community-Led Total Sanitation (CLTS) programmes are also widely used. This approach involves provoking shame and disgust about poor sanitation in order to bring about change.

Participatory, interactive approaches that include the perspectives of the target community are generally considered as the most successful and sustainable methods of hygiene promotion (Vujcic et al., 2014).

The engagement of handwashing 'champions' to promote hygiene messages in a camp was cited as key in implementing successful handwashing programs by experts. Camp residents can be encouraged to develop examples to promote good handwashing behaviours. Peer counselling groups devoted to handwashing can also be used where culturally appropriate (Vujcic et al., 2014).

In emergency settings, women are typically the primary target for hygiene promotion initiatives due to their role as principal caregivers of young children, the sick and elderly, and overseers of household management and food preparation. In camp settings, women are more typically at home during the day and more accessible by hygiene promotion staff, volunteers and champions (Vujcic et al., 2014). To ensure the inclusion of women in gender-hostile environments, the setup of community health clubs specifically for women can be an effective tool (Vujcic et al., 2014).

Children, especially adolescents, can be more responsive to peer influence and can act as effective change agents.

Engaging children in hygiene promotion through child health and hygiene clubs, or in the school setting is common in participatory approaches, especially in the post-acute emergency phase (Vujcic et al., 2014). Children can be given written material or encouraged to make or learn songs, poems and drama skits to share hygiene-related information with their parents. Children, particularly adolescents, may be more responsive to peer influence or pressure in group settings and can thus act as effective change agents (Vujcic et al., 2014). Children's natural inquisitiveness and creativity can also be capitalised upon to enhance engagement with a tool or device, especially if that device is in some way unique or attractive. Further, ownership over a device can be enhanced by involving children in building a stand or adding to the technology to increase its usability (e.g. by creating a strap for a hanging device).

Enforcement is another tool that can be used to initiate behaviour change. This was demonstrated in the West African countries recently affected by the Ebola outbreak. For example, in Guinea, handwashing with a weak chlorine solution was enforced by government officials at road blocks, in government buildings, public places and other strategic control points. Although compliance was reportedly high (as reported by a responding expert), extraordinary steps were taken by many community members to avoid control points due to time, inconvenience or fear reasons.

Enforced handwashing behaviours are unlikely to be willingly adopted by communities.

It was also observed that when an area had been cleared of Ebola risk, communities reverted to pre-outbreak behaviours that generally did not include handwashing. This was despite the fact that the messaging around handwashing was clear, consistent and broadly disseminated. This could indicate one of two things: firstly, enforced behaviours are not willingly adopted by communities or secondly, the health-based message (as was promoted) did not create a sustained change in attitudes towards health and hygiene.

Without national or regional government commitment, scaling-up handwashing promotion interventions has also been a challenge (Peal, 2010). The Public-Private Partnerships for Handwashing with Soap (PPPHWS) attempts to address this by enabling the private industry and public sector to work together (with other partners) to develop programmes to promote handwashing (Peal, 2010). The most prominent success story for PPPHWS is Unilever's Lifebuoy brand which partners with public agencies such as USAID to improve handwashing on a large scale (Unilever, n.d.).

Global Handwashing Day (15th October) aims to raise awareness of the importance of handwashing and critical moments to wash hands.

Another important initiative is Global Handwashing Day (October 15th), launched in 2008 by The Global Public Private Partnership for Handwashing. The day aims to raise awareness of the importance of handwashing and critical moments to wash hands and has been celebrated in many refugee camps. For example, the Ashura and Sherkole camps in Ethiopia used festival-like songs, poems, hand-washing demonstrations, competitions for volunteers and health education to acknowledge the day (The Global Public-Private Partnership for Handwashing, n.d.). While evaluating the effectiveness of such methods is difficult because of the heterogeneity of methods and potential bias, creative approaches to hygiene promotion such as these represent potentially valuable tools in handwashing promotion.

In scaling-up handwashing messages, mass media campaigns (loud speakers and public demonstrations on how to wash hands, radio, TV, university students, boy scouts, religious leaders or programs, child health clubs, SMS messaging) are increasingly feasible with the development of communication technologies. Experts, however, highlighted the importance of the involvement of the local government or a trusted local body in the dissemination of these types of messages to enhance community trust and uptake.

Behaviour change initiatives tend to be less effective in acute emergency contexts compared to relatively stabilised situations or development contexts.

Regardless of the handwashing initiative or messaging technique employed, there is evidence that populations who habitually washed their hands prior to the crisis are more receptive to handwashing promotion and therefore initiatives in these contexts may be more successful. In contrast, the challenges may be greater when dealing with populations that lack basic hygiene knowledge and have poor baseline hygiene practices. In addition to this, experts commented that behaviour change initiatives are less effective in acute emergency contexts compared to relatively stabilised situations or development contexts. This is due to personal and cultural priorities, and the reluctance or incapacity of stressed and traumatised persons to absorb new messages and adopt new behaviours.

From the perspective of responding agencies, a lack of understanding regarding pre-existing knowledge of disease transmission, traditional hygiene practices and handwashing behaviour prior to the emergency can hinder the development of a comprehensive and locally relevant handwashing promotion strategy. These factors can also negatively impact decision-making regarding appropriate hardware and methods to promote handwashing. Adding to this challenge is the absence of consensus among humanitarian agencies for quantitative goals for handwashing practice in humanitarian settings. This lack of information and consensus often leads to the promotion of culturally- or contextually-inappropriate messaging or teaching styles, especially in the early acute emergency stages (Vujcic et al., 2014).

Handwashing toolkits and proposed solutions need to be adapted to the local context and available resources.

Different types of toolkits are available to support humanitarian workers in developing handwashing promotion strategies. These kits may contain multiple information, education, and communication materials such as pile sort cards, flip charts, visual aids and training tools that can be adapted to local situations (Vujcic et al., 2014). It is, however, crucial that hygiene promotion staff have the capacity to adapt materials to the local context and that the logistical and financial support to supply handwashing hardware (e.g. water, soap and receptacles) is consistent with the proposed initiative (Vujcic et al., 2014).

3.9 Monitoring and Evaluation

While collecting rigorous field data can be challenging in emergencies, agencies should improve the process of recording monitoring data and lessons learned. This way, future approaches can be adapted and improved based on past experience (RedR UK, 2012). Focus on Opportunity, Ability, and Motivation (FOAM) is one example of a conceptual framework of handwashing behaviour that can be used to guide or inform design, implementation, monitoring and evaluation of handwashing promotion programmes (Coombes, 2010).

There is a significant lack of evidence on what works to improve handwashing behaviour in emergencies (Nicole, 2015).

This is in spite of manuals outlining proper monitoring and evaluation techniques for hygiene promotion interventions in the emergency field and existing learnings from development activities (Ferron, 2000; Brown et al., 2012). The reason for this is partly the intrinsic challenges posed by monitoring and measuring handwashing behaviour change, combined with the difficulties posed by the emergency context.

There is no simple, easily employable and reliable indicator of whether hands have been washed with soap or not. While self-reporting can produce heavily biased results, structured observations are considered more reliable but are expensive and labour intensive. Also, even a structured approach can lead to results that are biased as an outcome of the 'Hawthorne Effect' - where individuals improve their behaviour in response to their awareness of being observed (Song, 2013). In addition to this, in an ideal situation, any monitoring and evaluation programme should be carried out by individuals independent of the response organisation.

Part 4: Areas for Further Exploration

In order to achieve greater public health benefits associated with good hand-washing practices, dedicated focus is required from leading WASH actors to identify and apply collaborative and sustainable methods to improve handwash-ing solutions and promotion for those affected by emergencies and humanitar-ian crises. Three areas for further exploration have been identified through the course of this research. The following is by no means an exhaustive list, and further thought around paths for innovation is encouraged.

4.1 Improve Links Between Practitioners and Developers

In improving handwashing technologies, developers often cite difficulty in ac-cessing people in the humanitarian sector to actively test handwashing devices in the field. On the other side, practitioners cite that introducing new devices, technologies and practices in an acute emergency situation may not be feasible and can be fraught with ethical concerns.

To overcome this barrier, investment in linking developers with the organisations responding to an emergency is required. By reinforcing this type of collabora-tion, hardware aspects relating to current barriers for handwashing in emergen-cies could be addressed. The best way to achieve this will be to build on existing institutional knowledge and support organisations' capacities to develop and maintain links between key stakeholders (researchers, developers and prac-titioners) involved in handwashing. Experts consistently identified local gov-ernment involvement as being critical to the successful implementation of any handwashing intervention. This includes technology and hygiene promotion to encourage behaviour change, along with the particular requirements of a local community.

At a more external level, research groups at the London School of Hygiene and Tropical Medicine, the University at Buffalo and the International Centre for Diar-rhoeal Disease Research, Bangladesh, were identified as academic institutions leading advances in hygiene promotion, behavioural change and handwashing research. The SuperAmma programme was also noted as being key in imple-menting behavioural change in development contexts. Humanitarian and inter-national organisations with noted institutional interest and capacity include the ICRC, UNICEF, the UNHCR, Oxfam, MSF, ACF and the WHO.

4.2 Develop 'Universal' Handwash Station Infrastructure

Core to the development of robust handwashing promotion programs is the distribution and promotion of acceptable, inexpensive hardware that is readily sourced and easy to be moved to the area where displaced persons are settled. Experts on WASH in emergencies are less concerned about the development of new water dispensing devices than identifying the devices most acceptable to the emergency-affected population and their pre-existing practices (Vujcic et al., 2014).

To further improve handwashing practice in terms of technology or 'hardware', focus is required on the development of a full handwashing station infrastructure that is designed to:

- suit, or be able to be adapted to suit, multiple types of water reservoirs (typical, but also various-sized buckets, drums, jerry cans, water bottles, 14 litre Oxfam buckets);

- suit, or be able to be adapted to suit, different types of water dispensing devices (where separate from the main reservoir);

- provide for adequate drainage away from the station;

- feature a solution for the secure storage of soap that also encourages soap use;

- have the facility to attach hygiene promotion messages;

- be accessible by adults, children and the disabled.

Such an infrastructure must be durable, robust, stable, secure, lightweight, easily transportable and easy to construct. Infrastructure that could be easily manufactured 'locally' would also be an important consideration.

These aspects could be incorporated into a simple structure that secures a drum or bucket to become an instant handwashing station. Depending on the need and suitability of the targeted communities, more complex structures could be built using a stand from which other existing solutions, such as the Tippy Tap or SpaTap, could be hung.

4.3 Improve Software Support for Handwashing

Traditionally, health-based messages have been used to promote handwashing in humanitarian crises. However, studies are increasingly showing that approaches require a shift from health-based messages to those rooted in psychosocial factors and drivers that provide the motivation for change, such as emotional drivers, social status or affiliation, disgust or aesthetics.

Experts interviewed confirmed that health-based messaging is, on its own, rarely effective in improving handwashing behaviours. They also commented on the ways in which handwashing promotion programmes are delivered.

Beyond the content of the message, several other factors need to be considered when designing a successful handwashing promotion programme:

- Engagement with the national or local (host) government is critical in ensuring cultural appropriateness and uptake.

- Information needs to be presented to the affected community in an appropriate manner (i.e. by persons trained in adult learning for adults and with appropriate techniques and elements for children).

- Handwashing promotion is best achieved through engagement of local champions. Where sessions are presented by NGOs (training the trainers or otherwise), these should be delivered by experienced adult education specialists who are familiar with styles of learning and communication that are appropriate to the target audience.

- Maximum uptake and message reinforcement is essential and relates to placement of handwashing stations not only at the exit of latrines, but also at the entry to kitchens, communal spaces (meeting places, schools) and at the household level tents.

- Regardless of the approach used, the key message needs to be simple, consistent and reinforced, as behaviour change requires messaging via four or five 'triggers', or 'nudges', to be effective.

Scaling-up handwashing promotion interventions and appropriate messaging is a widespread problem across most intervention approaches. Concerted effort and investment are required to connect researchers in behavioural change with WASH practitioners to develop practical guidance on hygiene promotion techniques.

In addition to creating a demand for handwashing, support on operation and maintenance of handwashing facilities can only be strengthened by boosting the software approaches available to handwashing practitioners in emergencies.

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About the HIF

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