

Research Paper

Handwashing promotion in humanitarian emergencies: strategies and challenges according to experts

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ABSTRACT

Diarrhea and acute respiratory infections account for nearly 30% of deaths among children displaced by humanitarian emergencies. Handwashing with soap reduces the risk of diarrhea and acute respiratory infection in non-emergency settings. However, the practice and the effectiveness of handwashing promotion efforts and the health benefits are not well documented in emergency settings. We conducted key informant interviews with 12 experts working in water, sanitation, and hygiene and examined current approaches, challenges, and knowledge gaps in relation to handwashing promotion in emergency settings. We identified many constraints to implementing effective handwashing promotion efforts including a failure to define objectives and targets for improvements in handwashing rates, lack of technical expertise and attention to the development and implementation of effective behavior change communication approaches, and limited understanding of the appropriateness, use, and acceptability of different handwashing hardware. Respondents identified multiple knowledge gaps and research needs that could improve current efforts. Collaborations between response agencies and research institutions could generate high quality data and facilitate contextualized and potentially more effective and robust handwashing promotion strategies.

Key words | behavior change communication, handwashing, handwashing hardware, humanitarian emergencies, key informant interviews, qualitative research

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INTRODUCTION

Currently, more than 51 million people are forcibly displaced worldwide (UNHCR 2013). Diarrhea and acute respiratory infections account for nearly 30% of deaths among children displaced due to humanitarian emergencies (Hershey *et al.* 2011), with diarrhea causing up to 40% of child deaths in acute emergencies (Connolly *et al.* 2004). In non-emergency settings, handwashing with soap by caregivers could reduce diarrhea and pneumonia by up to 50% among young children (Luby *et al.* 2005). In a recent meta-analysis, summary risk reductions for handwashing with soap were 31% for gastrointestinal illness and 21% for respiratory infections in non-emergency settings (Aiello *et al.* 2008).

Despite the robust evidence supporting the health benefits of handwashing with soap, handwashing practice remains low, particularly in low- and middle-income countries. A recent systematic review of 42 studies found that 19% of fecal contact events (after toileting or contact with child feces) are followed by handwashing with soap (Freeman *et al.* 2014). Little information is published in the peer-reviewed literature describing handwashing behavior among people affected by humanitarian emergencies (our literature search in PubMed yielded only three studies). Some evidence indicates that in long-standing refugee camps, handwashing is practiced infrequently, especially at critical times when pathogens can be transmitted (IRC 2011; Biran *et al.* 2012). Even less

information is available describing handwashing promotion strategies, challenges to improving handwashing behavior, and whether these strategies improve handwashing practices or health outcomes among emergency-affected populations.

Several international and non-governmental organizations support Water, Sanitation, and Hygiene (WASH) programs in humanitarian emergencies. Individuals within these organizations have an abundance of field experience, expertise, and institutional memory of handwashing promotion strategies employed. We sought to understand current approaches, challenges, and knowledge gaps by consulting representatives of humanitarian aid agencies with experience in providing WASH services during humanitarian emergencies. We conducted key informant interviews with WASH experts to collect information on handwashing promotion strategies in humanitarian emergencies and to identify barriers in implementing such efforts. We also aimed to describe monitoring and evaluation of hand hygiene programs and to identify research needs related to handwashing in emergency settings.

METHODS

Study design and sampling

We conducted open-ended key informant interviews with representatives of organizations providing WASH services to emergency-affected populations. Eligible respondents were WASH experts with field experience in multiple humanitarian emergencies. We used purposive sampling to include a mix of respondents with either extensive experience in operational issues related to providing handwashing hardware (e.g. handwashing devices, handwashing stations, soap) or developing and implementing behavioral change strategies. In order to understand the range of challenges to handwashing promotion, we selected individuals working at the global, regional, and country level within an organization. We initially identified potential key informants from among attendees of the Emergency Environmental Health Forum held in London, UK, in December 2012, and used snowball sampling to identify additional respondents. We stopped identifying new respondents once we reached data saturation.

Data collection and analysis

The three co-authors conducted the interviews. We initially contacted potential key informants by e-mail, in which we included an information sheet describing the study. We aimed to interview each eligible respondent on two occasions for approximately 1 hour each via phone or Skype™ and audio-record each interview. Before the first interview, we confirmed that each respondent understood the study purpose and procedures and his/her rights, and provided verbal consent to participate in a recorded interview.

We used a list of core questions to guide the interview, which included the following: respondent's background, organization for which the respondent worked, perceptions of handwashing behaviors of beneficiaries, hardware, and behavioral change strategies used for handwashing promotion, measurement of handwashing behavior, potential role of waterless hand sanitizer, new or innovative promotion strategies, and gaps in knowledge and research needs related to handwashing strategies in emergencies. We adjusted the questions according to the respondent's background, field experience, and specific interview responses.

We transcribed each interview using Microsoft Word. An iterative process involving the review of completed transcripts and additional questioning continued until we reached data saturation. We developed a coding system with categories derived from the initial research themes, questions, and key concepts that emerged during data collection. We used ATLAS.ti (v7) to code each interview. We performed content analysis to identify trends of concepts in and across individual codes and used data triangulation to interpret and validate the findings between different respondents. The study protocol was approved by the institutional review board at the University at Buffalo (Protocol # 405288-2).

RESULTS

Study population

Of the 17 respondents we contacted, 12 agreed to participate. Of the five non-participants, three did not respond, one cited a lack of experience in emergencies, and one

refused to participate. All but 1 of the 12 respondents was interviewed twice; the twelfth respondent was interviewed once. Respondents were either current or former advisors or officers in WASH or public health. Five respondents provided support on a global level and the rest were region or country focused. Respondents represented two different United Nations agencies, four different non-governmental organizations, and one government institution. A majority of respondents dedicated all of their time to WASH in humanitarian emergency settings, although most had been or were involved with WASH in non-emergency settings at the time of the interview. Their main responsibilities were advisory, technical support, coordination, and capacity building. All respondents had worked in regions of Africa, some worked in Asia and Latin America, and several reported being involved in the response to the earthquake in Haiti. At the time of the interviews, respondents had been in their current positions between 6 months and 12 years, with some working in the WASH sector for 20 years or more.

Humanitarian emergency context

Respondents indicated that the circumstances surrounding each emergency are unique. Broad descriptions included emergencies resulting from unpredictable, rapid, and highly traumatic events, to cyclical and more predictable emergencies, such as floods, that allow humanitarian agencies to be prepared in advance. Respondents described the acute phase (period immediately following emergency onset) as chaotic, explaining that people affected are generally under extreme stress as they seek protection and basic needs to survive and try to locate family members. During this phase, response agencies focus on providing essentials such as shelter, food, medicine, drinking water, and latrines. Hygiene and handwashing promotion are considered a secondary priority except in WASH-related disease outbreaks, in part because it requires that populations become more settled and have access to basic infrastructures. In the post-acute phase, the environment becomes more ordered and typically basic needs are met. Social structures and community leadership are established, local markets may form, and a cash economy starts functioning. Respondents emphasized that humanitarian emergencies evolve over time,

requiring that services, such as handwashing promotion, be modified accordingly.

Factors that affect handwashing practices prior to handwashing promotion

Respondents emphasized that exposure to handwashing messages and hand hygiene behaviors prior to the emergency affects practices before the introduction of handwashing promotion. They mentioned that socio-economic, religious, and demographic factors influence previous handwashing practices and the extent to which people are willing to improve behaviors. Diversity among emergency-affected populations creates challenges in communicating or adapting messages that address varying bottom-line sociocultural practices and knowledge associated with water-related diseases and hygiene. Our respondents indicated that these differences are generally not taken into consideration when developing programs and messages. One respondent offered the following description of Shimelba camp, Ethiopia, as an example of the extreme variation that can exist in the camp.

In the Shimelba camp, there were more men than women and two very distinct populations. The Tigrinya men were highly educated, and they reportedly fled Eritrea due to forced military conscription. The Kunama were traditional farmers, much less educated, and described as family-centered. The government had taken their land and/or they were forced off their land, causing conflict and leading to a mass exodus. The two populations settled in different parts of the camp, so that there were Kunama and non-Kunama areas of Shimelba camp. Despite these variations, there were no differences in terms of the hygiene promotion approach.

Populations characterized by strong hygiene behaviors prior to the emergency were believed likely to try to adhere to the same handwashing practices and to seek materials habitually used in their home. Some mentioned that using familiar promotion mechanisms was important to facilitate habitual behaviors and allow the refugees to feel better adjusted in their new environment. For example, one respondent suggested introducing SOPO, a widely

recognized animated character used to promote handwashing in East Africa, to camp residents in that region.

Handwashing promotion strategies

A handwashing promotion strategy typically includes technical components (handwashing materials such as soap and water dispensers) and behavioral components (communication to encourage handwashing). However, approaches can vary radically between organizations, camps, and emergencies. Despite the diversity of approaches, it appears there is a stronger emphasis on implementation of technical aspects rather than behavioral ones. Many respondents stressed that behavioral change strategies, with target objectives, audiences, and time frames, are typically not defined. One respondent said:

I don't think that the community has a consensus as to what are our goals and aspirations for handwashing. We could go into each camp, do a household survey, do some behavioral observations, find out that handwashing in general is 17%. Then what would we be trying to raise it by? ... What is our target? ... That sort of conversation hasn't even taken place ...

Respondents stressed that organizations lack an understanding of which approaches effectively improve behavior. Several respondents stressed the need for more robust strategies, involving greater balance between hardware distribution and behavior change communication. We were also told that the unique nature of each emergency limits the effectiveness of implementing prototype strategies.

Technical components of handwashing promotion

Hardware provision and distribution

Although response agencies routinely distribute soap according to SPHERE standards (250 g of soap for bathing, and 200 g of soap for laundry per person per month) ([Sphere Handbook 2011](#)), several respondents pointed out that SPHERE does not recommend the quantity of soap specifically for handwashing. Respondents did not discuss access to or distribution of water in detail as water is provided

separately from handwashing promotion. However, some respondents mentioned that water supply can be insufficient. In some emergencies, hygiene kits have been distributed to beneficiaries. While kit contents vary according to the emergency, the organization, funding, and supply chains, they typically contain soap and other hygiene materials, such as a hairbrush, toothpaste, toothbrush, shampoo, towels, or sanitary wear. Most respondents indicated that emergency-affected populations are rarely involved in deciding what materials are included in hygiene kits.

The distribution of water containers such as water tanks, jerry cans, buckets, or basins depends on the availability of local materials, cost, funding, and logistical constraints related to importing items that are not locally available. There are no guidelines or standards for water containers, dispensers, or devices. Water containers can be repurposed or used for multiple purposes other than handwashing and, like soap, when used for other reasons may become less of a priority and less convenient. Devices dedicated to handwashing, such as a tippy-tap or a handwashing station at the household or communal level are variably distributed. New devices designed to improve convenience, conserve water or soap, or provide cleaner water for household or individual use are being tested (e.g. a plastic bladder-like device). Several respondents suggested integrating handwashing hardware with other activities, such as building handwashing stations at the same time that latrines or temporary housing are being built, or adapting approaches such as Community-Led Total Sanitation (CLTS) and Community-Activated Total Sanitation to include construction of handwashing stations alongside latrine construction. There is a debate about the balance between providing materials for handwashing that are locally available, cheap, and easy to obtain rapidly versus materials that are more sophisticated, costly, and that beneficiaries might aspire to have. The former approach is likely more sustainable, while some respondents suggested that using improved hardware may be considered more dignified and thus motivate good handwashing practices.

Nearly all the respondents were skeptical about the value of waterless sanitizer for community use in emergencies. Many suggested that sanitizer could undermine efforts to promote and habituate handwashing with soap.

Respondents expressed concerns about cost-effectiveness, difficulties in obtaining, importing, and transporting waterless sanitizer, challenges to maintaining the product in the camp setting, and sustainability. Respondents raised questions about the acceptability of hand sanitizer in regard to the smell, whether it makes hands feel clean, and whether an alcohol-based product would be appropriate for Muslim populations. A few respondents mentioned that sanitizer is presently used in the health clinics and schools of some camps and that it is appropriate in these settings.

Behavioral components of handwashing promotion

Target audience

The target audience for behavior change communication is typically women, due to their role as principal caregivers of children and overseers of household management and food preparation. Women in camps are typically at home during the day and can be reached through door-to-door visits more easily. Children are also targeted in the school setting during the post-acute emergency phase. Since hygiene affects all family members, respondents emphasized that it is important to reach a wider range of audiences, and particularly to include influential males.

Communication channels/approaches

Typically, communication about handwashing involves educational campaigns that disseminate health-related messages and demonstrate proper handwashing. Specific behavior change strategies usually are not employed in emergency settings. A few respondents mentioned using the Participatory Hygiene and Sanitation Transformation (PHAST) approach, which was described as having limitations but to be the only practical strategy available. Messages are delivered by hygiene promoters, who are generally female members of the local community who make household visits within a designated geographic area. They often use existing educational materials developed by the WASH community such as flip charts, pile sort cards, and posters, and deliver messages face-to-face using a didactic approach. In more literate settings, distribution of printed material, such as flyers and pamphlets, may accompany interpersonal or group

communication. While a wealth of communication aids have been developed, our respondents indicated that these materials are not widely disseminated or shared within the WASH community.

Handwashing advocacy events, such as Global Handwashing Day, are common in emergency settings and usually involve prominent community members in promoting handwashing. Respondents deemed participatory, interactive communication approaches that included the perspectives of the beneficiaries as more successful than didactic approaches. For example, in the Philippines, camp residents developed pictures to promote good handwashing behaviors, and in Ethiopia, children developed 'mini media' such as songs, drama skits, and poems about good hygiene, and showed their work to captive audiences. Multiple respondents recommended greater involvement of children who can read written material and subsequently share hygiene-related information with their parents.

Short message service (SMS) texting has been employed to disseminate messages and was viewed as effective. However, it is only feasible in literate populations with phones and consistent cell service. Respondents who promoted SMS messaging appreciated the flexibility in targeting specific audiences and fine-tuning messages. One respondent said:

We see SMS texting as the next frontier. When you're in a rural environment you have volunteers who can visit the population, but when you're in a city or a very big area it's logistically impossible to carry out enough household visits to have an impact. There are other ways to do this and SMS is one of them.

Multiple respondents recommended using a combination of communication channels with consistent messages and highlighted the importance of employing visual aides to accompany verbal messages.

Expertise/capacity

Several respondents stressed the difficulties in identifying people from local communities with adequate skills and prior experience with basic community-based

communication approaches to work as hygiene promoters. One respondent specified:

It's quite difficult to find people with the right sort of mix of qualitative skills and personality to interact with communities in a way that brings about change. It is a tough area of environmental health because it is not formulaic like a water plan or putting in pipes or disposal systems. The challenge is finding people with a qualitative skill set or the capacity to be trained, and then have them run with their own creativity.

Key informants underlined the imbalance between many technical staff (engineers) and few practitioners with behavior-change communication expertise within the WASH sector. One respondent pointed out that organizations may place more emphasis on hardware because it is easier to implement, shows more tangible results, and is often the focus of government collaborators.

Motivators employed to facilitate good handwashing behavior

Most handwashing promotion uses disease avoidance or health benefits as key motivators for good handwashing practice. Several respondents suggested that the health emphasis is likely more effective in emergency settings (compared to non-emergency) due to the densely populated living conditions, which may foster a greater sense of vulnerability to disease. A few respondents suggested that when the risk perception is high, such as during a disease outbreak, messaging regarding health and disease transmission is particularly appropriate. However, some pointed out that once the risk dissipates, the population often reverts back to their habitual hygiene practices. One respondent explained:

In Zimbabwe, there was a major [cholera] outbreak in 2009 and 2010. People were afraid they would get cholera if they didn't wash their hands. But when cholera disappeared, I think that people reverted to their old habits ... In the schools they were saying, 'Oh don't tell us any more about handwashing, there is no more cholera. I don't think it will affect us again.' ... It was a missed opportunity.... I suggest that organizations don't

stop promoting handwashing practices until it becomes a lifestyle ...

Many respondents stressed the importance of exploring the use of more socially and emotionally driven motivators increasingly being employed outside the emergency context, such as dignity, disgust, attractiveness, or nurture. In the non-emergency context, some respondents considered approaches like CLTS successful at changing behaviors related to sanitation, explaining that by using disgust as an emotive trigger, the communication approach is less didactic than typical promotion strategies. Several respondents highlighted the potential value of using peer pressure, social norms, or stigma to encourage handwashing. A few respondents suggested that religious tenets and norms could also serve as motivators. Respondents also stressed that little is done to understand changing knowledge and practices and relevant motivators and barriers as the emergency dissipates, people become more settled, the socioeconomic environment changes, and daily practices become routine. The failure to adapt strategies to the evolving camp setting was seen to undermine promotional strategies.

Monitoring and evaluation of handwashing promotion

While program monitoring is common in emergency settings, rigorous evaluation of programs is rare. Most data that are collected reflect program-level achievements, such as input, activity, and output indicators, rather than population-level achievements such as improvements in behavior and health. Evaluating whether hardware worked well or was acceptable is also rarely done, despite the fact that respondents viewed this type of data as useful. Also, the extent to which communication materials are tested for clarity, relevance, appropriateness, and acceptability is unclear. When carried out, evaluations most often involve cross-sectional surveys after the program or, if baseline data are available, a pre- and post-comparison. Respondents indicated that response agencies generally do not collect baseline information on handwashing knowledge and behavior and exposure to handwashing messages. They suggested that such data would be extremely useful before developing a handwashing promotion strategy. In addition, the lack of baseline data was cited as an important limitation

to measuring change associated with handwashing programs. Follow-up assessments are deployed variably, making it difficult to determine whether a strategy was effective. When asked to describe a successful strategy, respondents could not confidently determine program success since an evaluation had not been carried out and only anecdotal information was available. Even when handwashing behavior is measured, organizations often use Knowledge-Attitude-Practice (KAP) surveys. Most respondents understood that self-reported handwashing behavior overestimates true handwashing behavior and is considered an unreliable measure. One respondent offered this description regarding how program effectiveness is monitored and evaluated:

... government departments have budgets for how they want to spend the money, this is not just aid, this is across the board, and they want to deliver successful projects. So, what generally happens is people want to dish up to the donors a successful project, they do their KAP survey that shows that 98% of the population now knows about the five times they should wash their hands, and the donor says, 'oh that's great, that justifies our expenditure, job done'. No one really wants to ask the extra questions about why we spent all this money and behavior change still hasn't been achieved.

Respondents considered direct (structured) observations of handwashing practices to be the best method to measure handwashing behavior, but emphasized its notable limitations. They described that observations are resource and time intensive and require skilled data collectors and statisticians. Several respondents were concerned about reactivity to the presence of an observer and thus a deviation from normal behavior. Some had safety concerns due to poor security in camp settings.

Health impacts of WASH or hygiene programs are also not typically measured other than in outbreaks, where disease incidence and/or deaths are monitored usually by organizations intervening medically. Most respondents felt evaluating health impacts outside of an outbreak would be difficult to achieve because health outcomes are hard to measure and require expertise, large sample sizes, and extra human and financial resources.

Several respondents mentioned using formative research to understand how to improve hygiene promotion programs. Some reported the use of qualitative methods, generally involving focus group discussions, to examine certain facets of programs and to assess how conditions and behaviors change over time as the emergency evolves. However, several respondents explained that these data are often not analyzed or used to improve existing programs.

Challenges to monitoring and evaluation

Although respondents agreed that evaluations would be valuable, we were told that resources, expertise, and time are often not available. Lack of qualified persons and the resources to engage data collectors are key barriers to setting up monitoring and evaluation. Respondents explained that data collectors come from local communities or are in-country office staff and have varying skills. If data is collected, field staff who implement programs are often not able to manage or use data to guide programmatic decision-making because they are typically overworked and under-resourced. In some organizations, monitoring and/or evaluation is done by regional level staff who are generally responsible for conducting trend analysis, applying strategic thinking, and modifying the direction of programs. Due to the unpredictability of emergencies, it is difficult to get third party evaluators who can be mobilized quickly after the onset of the emergency. Competition with other sectors collecting information from beneficiaries was cited as another challenge to monitoring and evaluation.

Soliciting input from beneficiaries in order to understand their needs, practices, and cultural beliefs was viewed as an important strategy to inform program development. One respondent, who supported increasing the involvement of camp residents, offered the following:

... I said, 'are you telling me that we should be taking a group of women who have just been severely traumatized, and start asking them about their toilets?' And the message I got from the hygiene promoters was, 'well, I think we definitely should because this person has just been under artillery bombardment, couldn't leave wherever they were and has now been put in a government camp where they have no decision-making

power over their life. You're actually asking them something, what their preferences are? Isn't that a good thing?' ... I think there's a fear of doing that kind of development research through a focus group to understand what is the problem ...

However, several respondents suggested that this type of bottom-up approach is rarely done due to the perception that it is difficult and time-consuming or because the organization lacks personnel with the appropriate skills.

Many respondents stressed that better methods of measuring program effects on handwashing behavior are needed. While some noted that observations may not be appropriate or feasible especially during the acute emergency phase when people are trying to meet basic needs, others stated that it would be possible to carry out direct observations if sufficient human resources were available. Overall, respondents had varying opinions on whether direct observation of behavior is a useful or feasible tool to measure behavior.

Knowledge gaps and research needs

Respondents identified a number of gaps related to motivating handwashing behavior, developing strategies for handwashing promotion and influencing the effectiveness of handwashing programs (Figure 1). Specifically, there is a need to generate rigorous evidence regarding motivators and barriers to handwashing with soap in the emergency context. Most of the knowledge gaps cited by the respondents were associated with sociocultural characteristics of emergency-affected populations.

DISCUSSION

We obtained a wealth of information on handwashing promotion in humanitarian emergencies from 12 respondents. The WASH experts we interviewed deemed handwashing to be a critical component of a WASH strategy, but identified several gaps in operationalizing handwashing promotion in emergency settings. First, the lack of understanding or agreement between the relevant actors regarding the goals, objectives, and targets of handwashing

promotion hampers strategic development of programs. Second, technical and behavioral components are not well balanced. While a focus on rapid hardware distribution is certainly appropriate in emergency contexts, that achievement appears to come at the expense of strong behavior change communication. Lack of experts trained in behavior change communication is a key barrier to implementing effective behavioral approaches and pertains to operations at global through to local levels.

Our respondents underscored that numerous challenges elevate the complexities in developing and implementing appropriate handwashing programs. These include difficulty in accessing re-settlements in remote locations, security issues, limited numbers of skilled workers at camp sites, diverse sociocultural and economic backgrounds of the populations, and varying exposure to messaging and understanding of handwashing. Variability in the composition of the camps and the evolving nature of the emergencies undermines the effectiveness of uniform and static strategies, underlining the need to contextualize and modify strategies over time. Such efforts would require research capabilities and resources.

A core concern elicited by key informants was that approaches to handwashing promotion rely on uniform health-based messages. In the non-emergency context, health was not a key motivator of handwashing in numerous countries, while socially and emotionally driven factors were widely cited as motivators of individuals' handwashing behavior (Curtis *et al.* 2009). To date, relatively little is known about the motivators and barriers to handwashing in populations affected by humanitarian emergencies. Respondents cited this as a major data gap, emphasizing the importance of identifying motivators most effective in improving handwashing behavior. The lack of understanding of behavioral drivers, such as nurture, disgust, comfort, and affiliation, or if alternative drivers would better serve as motivators, may be a missed opportunity to incorporate approaches that are effective in non-emergency settings. At the same time, literature in the behavioral sciences illuminates a general lack of understanding of effective interventions to address behavioral obstacles at the community and societal level, while there is more evidence regarding how to change individual behavior (Waisbord 2014). In handwashing promotion, drivers of change related to

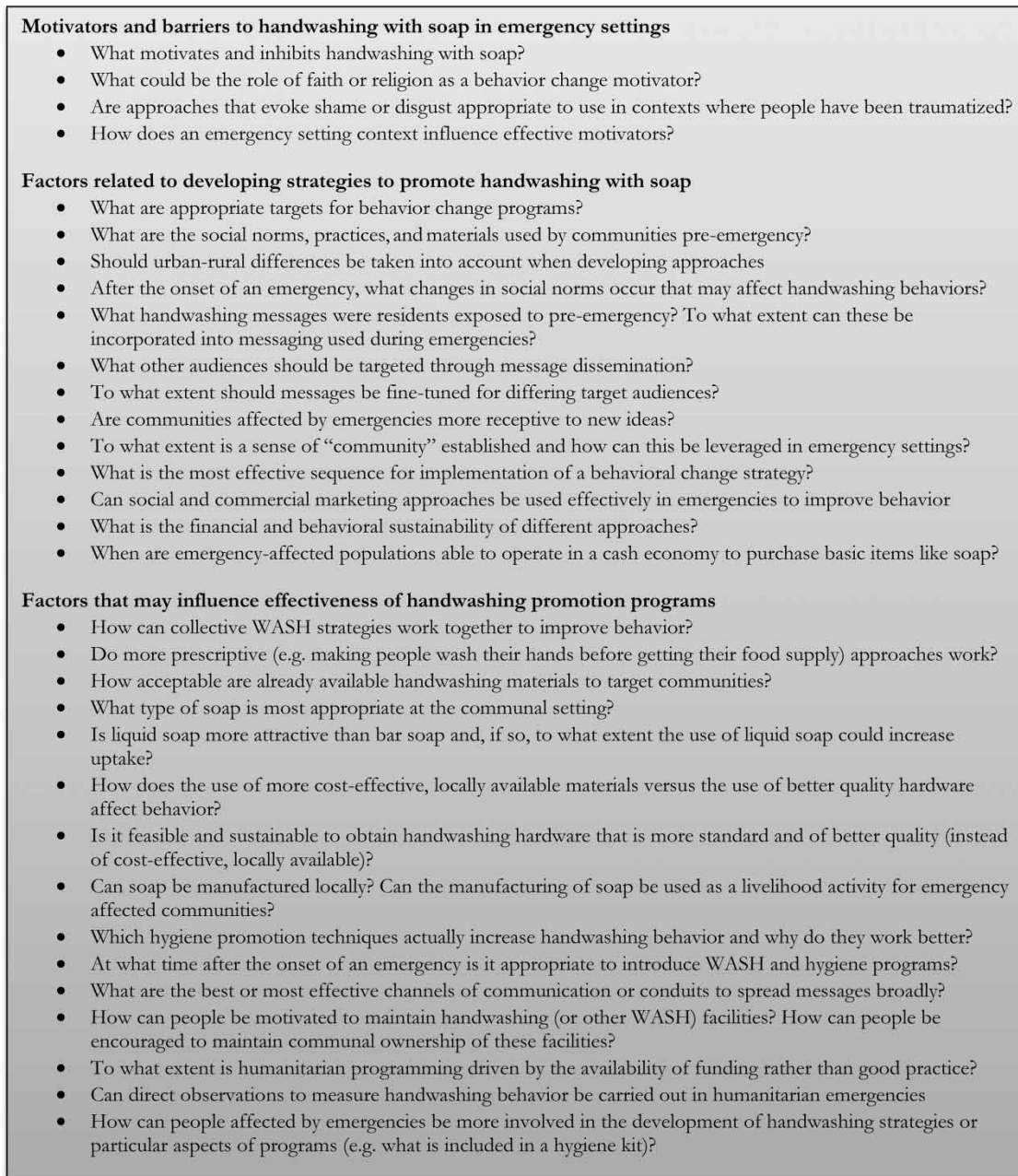


Figure 1 | Knowledge gaps identified by respondents regarding handwashing promotion in emergencies.

social factors that influence collective decision-making also need to be better understood. Challenges to understanding social determinants are particularly acute in an emergency setting where the social complexities are more profound and the situation is fluid.

Respondents cited a lack of adaptation of handwashing promotion strategies to the local context, which may be

attributed to a limited understanding of context-specific motivators and barriers. But we also detected a need to implement activities quickly, necessitating the use of a basic set of tools and materials. Our data suggest a need for agencies to develop and utilize a standard set of tools to be applied early in the course of an emergency, but then to collect the necessary formative data in order to

adapt the overall handwashing promotion strategy to the local context. The information gathered should focus on pre-emergency behaviors, hardware preferences, social norms, and former exposure to handwashing promotion programs, and solicit input from emergency-affected populations as the handwashing promotion strategy is adapted.

The nature of an emergency setting requires that promotion efforts be viewed as ongoing, and when an internal emergency such as an outbreak ends, program adaptations will likely require informal or more rigorous research on changing perceptions and practices associated with the altered conditions and risk. We also identified a substantial need to develop the capacity to train, supervise, and strengthen a relatively unskilled hygiene promotion workforce quickly to deliver what can be complex, participatory methods to improve behavior. It is critical to understand whether targeting women through one-on-one interactions at the household level is the best way to disseminate information and change behavior, or whether alternative, more innovative approaches involving other influential community and household members, are feasible and more effective.

Core to the development of robust handwashing programs is the distribution of handwashing hardware to meet basic needs for the practice. Our data indicate the need for identifying the devices most acceptable to the beneficiaries and that are feasible to provide. Identifying such devices could involve understanding hardware preferences from locally available materials, or soliciting information regarding the value of devising new water dispensers that may be more efficient and convenient, or may include materials such as a mirror as an added incentive to go to a handwashing station. A specific benchmark for soap provision in the SPHERE standards could better guide provision of soap for handwashing in emergencies. Since soap is used for multiple purposes such as laundry, bathing, and washing dishes, or may be resold in the markets, it is difficult to understand soap consumption for handwashing purposes. Data from studies in non-emergency settings suggest that people use about 2–4 g per person per day for handwashing, but it is not clear whether this would apply to emergency settings (Luby *et al.* 2005; Gadgil *et al.* 2010). Soap preferences for handwashing among emergency-affected populations are largely unexplored. Such insights

could guide development of handwashing promotion strategies better suited for the target population. An important point of consensus regarding handwashing hardware was that waterless hand sanitizer is not a viable option, except in certain settings such as in schools or health facilities.

Currently, response agencies rely more on anecdotal information than systematically collected data for understanding the effects and gaps in handwashing promotion programs applied in emergencies. Nearly all respondents were unable to cite examples of successful handwashing promotion in emergency settings mainly due to a lack of empirical data demonstrating that strategies actually improved behavior. Respondents indicated that handwashing promotion programs are hampered by a lack of understanding of pre-existing behaviors and attitudes, formative research during the emergency, and rigorous evaluation of the effectiveness of handwashing promotion strategies that are applied. Personnel qualified to design and carry out research are limited in emergency settings; better educated community members are often involved in health programming, and if they also engage in research efforts, can bias results. Even when research is carried out, it is not clear how the data results are analyzed or used.

Evaluations and KAP surveys rely on self-reporting. Thus, basic questions regarding how often camp residents wash their hands with soap remain unanswered. One exception is a recent study carried out in three long-standing refugee camps that showed handwashing using soap accompanied 30% of critical events and 20% of defecation events using structured observations (Biran *et al.* 2012). While research in non-emergency settings has shown that the presence of an observer may influence behaviors (Cousens *et al.* 1996), currently, structured observation is considered the best method to measure practice. Whether structured observations are feasible or appropriate in emergencies, especially during the acute phase, is unclear. Given the considerable benefits to understanding handwashing behavior, assessing whether observations are an appropriate method in multiple and diverse emergency settings is needed. Handwashing promotion in emergencies could be improved by applying rigorous formative and operations research and data analysis, and using data to develop and strengthen more contextualized WASH programming. Such achievements would require increasing institutional

capacity or developing partnerships with academic and research organizations to design and analyze operations and qualitative research.

Our research was limited to individuals working at global and regional levels responding to emergencies in the WASH sector. Data collection among hygiene promotion program managers, hygiene promoters, and camp residents in an ongoing humanitarian emergency will elucidate the challenges faced by individuals operating on the ground.

CONCLUSIONS

Handwashing promotion is a priority for experts working in WASH in emergency settings. Despite this, our findings identified multiple constraints to implementing effective handwashing promotion efforts among emergency-affected populations. These include a lack of objectives and targets for improvements in handwashing behavior, attention to and capacity for developing and implementing effective behavior change communication approaches, and understanding the appropriateness, use, and acceptability of different handwashing hardware. It is difficult for interventions involving behavioral change to demonstrate the same sort of empirical findings found in the medical sciences. However, improved research methodologies, preferably combining qualitative and quantitative approaches, would generate evidence-based data regarding effective interventions and subsequently harmonize expectations regarding handwashing behavior. Partnerships between response agencies and research institutions that aim either to improve in-house expertise or to allow the collaborating institution to carry out the research and transfer the findings to response agencies could generate high quality data and facilitate contextualized and potentially more effective and robust handwashing promotion strategies. While the former approach would improve research capacity, setting up collaborations with research experts would improve the ability of response agencies to share study findings and minimize internal research needs. Efforts to strengthen research should work towards better maximizing human and financial resources targeted for improved hygiene,

and ultimately reducing morbidity and mortality related to infectious disease among displaced, emergency-affected populations.

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REFERENCES

- Aiello, A. E., Coulborn, R. M., Perez, V. & Larson, E. L. 2008 *Effect of hand hygiene on infectious disease risk in the community setting: a meta-analysis. Am. J. Public Health* **98**, 1372–1381.
- Biran, A., Schmidt, W. P., Zeleke, L., Emukule, H., Khay, H., Parker, J. & Peprah, D. 2012 *Hygiene and sanitation practices amongst residents of three long-term refugee camps in Thailand, Ethiopia and Kenya. Trop. Med. Int. Health* **17**, 1133–1141.
- Connolly, M. A., Gayer, M., Ryan, M. J., Salama, P., Spiegel, P. & Heymann, D. L. 2004 *Communicable diseases in complex emergencies: impact and challenges. Lancet* **364**, 1974–1983.
- Cousens, S., Kanki, B., Toure, S., Diallo, I. & Curtis, V. 1996 *Reactivity and repeatability of hygiene behaviour: structured observations from Burkina Faso. Soc. Sci. Med.* **43**, 1299–1308.
- Curtis, V. A., Danquah, L. O. & Auger, R. V. 2009 *Planned, motivated and habitual hygiene behaviour: an eleven country review. Health Educ. Res.* **24**, 655–673.
- Freeman, M. C., Stocks, M. E., Cumming, O., Jeandron, A., Higgins, J. P., Wolf, J., Pruss-Ustun, A., Bonjour, S., Hunter, P. R., Fewtrell, L. & Curtis, V. 2014 *Hygiene and health: systematic review of handwashing practices worldwide and update of health effects. Trop. Med. Int. Health* **19**, 906–916.
- Gadgil, M. A., Sharker, M. A. Y., Ram, P. K., Unicomb, L. & Luby, S. P. 2010 *Pilot Study of Serial Soap Weights as New Method of Measuring Handwashing in Dhaka, Bangladesh.* American Society of Tropical Medicine and Hygiene, Atlanta, GA, USA.
- Hershey, C. L., Doocy, S., Anderson, J., Haskew, C., Spiegel, P. & Moss, W. J. 2011 *Incidence and risk factors for Malaria, pneumonia and diarrhea in children under 5 in UNHCR refugee camps: a retrospective study. Confl. Health* **5**, 24.
- IRC 2011 *Understanding Hand Washing Behavior: Results of Formative Research on Hand Washing in Refugee Camp*

- Populations in Thailand Kenya and Ethiopia. http://www.rescue.org/sites/default/files/resource-file/Hand%20washing_0.pdf (accessed November 2014).
- Luby, S. P., Agboatwalla, M., Feikin, D. R., Painter, J., Billhimer, W., Altaf, A. & Hoekstra, R. M. 2005 *Effect of handwashing on child health: a randomised controlled trial. Lancet* **366** (9481), 225–233.
- Sphere Handbook 2011 Humanitarian Charter and Minimum Standards in Disaster Response. <http://www.sphereproject.org/handbook/> (accessed 1 June 2014).
- UNHCR 2013 UNHCR Global Trends Report. <http://unhcr.org/trends2013/> (accessed November 2014).
- Waisbord, S. 2014 *Where do we go next? Behavioral and social change for child survival. J. Health Commun.* **19** (Suppl 1), 216–222.

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