EVIDENCE SYNTHESIS
Humanitarian Evidence Programme

FEBRUARY 2017

EXECUTIVE SUMMARY

WASH INTERVENTIONS IN DISEASE OUTBREAK RESPONSE

UKaid from the British people
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About this executive summary
This is the executive summary of an independent evidence synthesis commissioned by the Humanitarian Evidence Programme – a partnership between Oxfam GB and the Feinstein International Center at the Friedman School of Nutrition Science and Policy, Tufts University. It was funded by the UK government through the Humanitarian Innovation and Evidence Programme at the Department for International Development. The views and opinions expressed herein are those of the authors and do not necessarily represent those of Oxfam, Feinstein or the UK government.

The evidence synthesis was conducted by Travis Yates (Tufts University), Jelena V. Allen (Consultant), Myriam Leandre Joseph (Consultant) and Daniele Lantagne (Tufts University).

The initial database and website searches took place between September 2015 and March 2016. The searches were re-run in September 2016 to check for updated studies.

The full version of the evidence synthesis, which forms part of a series covering child protection, market support, mental health, nutrition, pastoralist livelihoods, shelter, urban contexts, and water, sanitation and hygiene, can be accessed from:

- https://www.gov.uk/dfid-research-outputs
- http://fic.tufts.edu/research-item/the-humanitarian-evidence-program/
- http://policy-practice.oxfam.org.uk/our-work/humanitarian/humanitarian-evidence-programme.

The series editors are: Roxanne Krystalli, Eleanor Ott and Lisa Walmsley.

Citation
Yates, T., Allen, J., Leandre Joseph, M. and Lantagne, D. (2017). *WASH interventions in disease outbreak response*. Humanitarian Evidence Programme. Oxford: Oxfam GB.

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Kieran Doherty/Oxfam 2014.

0 EXECUTIVE SUMMARY

The evidence synthesis *WASH interventions in disease outbreak response* identifies, synthesizes and evaluates existing evidence of the impacts of water, sanitation and hygiene (WASH) interventions in disease outbreaks in 51 humanitarian contexts in 19 low and middle-income countries (LMICs). It was commissioned by the Humanitarian Evidence Programme and carried out by a team from the Civil and Environmental Engineering Department of Tufts University.[1]

What are water, sanitation and hygiene (WASH) interventions?

WASH interventions are commonly implemented as part of emergency response activities (i.e. in response to disease outbreaks) in LMICs. WASH interventions are provided to large populations to reduce the risk of disease transmission in a variety of settings. This synthesis focuses on WASH interventions targeted at populations affected by cholera, Ebola virus disease (hereafter 'Ebola'), hepatitis E, hepatitis A, typhoid, acute watery diarrhoea and bacillary shigellosis (dysentery).

The review focuses on the following 10 WASH interventions:

1 well disinfection

2 source-based water treatment

3 household water treatment (HWT) – chlorine-based products

4 HWT – other products

5 community-driven sanitation

6 hygiene promotion

7 social mobilization

8 hygiene kit distribution

9 environmental hygiene

10 WASH package

'Outbreaks' are defined as follows, in accordance with World Health Organization (WHO) guidelines (WHO, 2016b):

- the occurrence of disease in excess of the normal baseline (two times the baseline) or a sudden spike in cases (two times the incidence of new cases)
- a single case of a communicable disease long absent from a population, or caused by a pathogen not previously recognized in that community or area
- emergence of a previously unknown disease
- a single case of particular diseases of interest (cholera, Ebola and hepatitis E).

The evidence synthesis aims to:

- verify the quality of existing evidence relating to WASH interventions in humanitarian settings
- help researchers identify the strengths and weaknesses of this evidence, and thus to recognize potential improvements and opportunities for future research
- assist practitioners and policy makers in evaluating the impact of choices and investments.

The research team:

- developed theories of change for the WASH interventions under consideration, documenting the theoretical route from intervention activities to outputs (products distributed, promotion carried out), outcomes (improved WASH conditions and knowledge) and impacts (reduction in disease risk); it also noted influencing risk factors and assumptions between each step (see the review protocol for details: Yates, Vijcic, et al., 2015)[2]

[1] The Humanitarian Evidence Programme is a partnership between Oxfam GB and the Feinstein International Center at the Friedman School of Nutrition Science and Policy, Tufts University. It is funded by the United Kingdom (UK) government's Department for International Development (DFID) through the Humanitarian Innovation and Evidence Programme.

[2] http://policy-practice.oxfam.org.uk/publications/impact-of-wash-interventions-during-disease-outbreaks-in-humanitarian-emergenci-605152

- mapped and documented existing relevant research (15,026 studies)
- filtered and selected the most relevant evaluations or studies for analysis (47)
- identified gaps in the studies, the strength of the evidence included and their findings
- synthesized the evidence in response to four key research questions.
  - What are the health impacts of WASH interventions in disease outbreaks?
  - What are important WASH programme design and implementation characteristics in disease outbreaks?
  - What are the population-related barriers and facilitators that affect WASH interventions in disease outbreaks?
  - What are the economic outcomes of WASH interventions in disease outbreaks?

What evidence was eligible for review?

Of the 15,026 studies identified in the systematic review process, 47 were deemed suitable following title, abstract and full screening:[3]

- the search criteria included studies published or written between 1995 and 2016 – those included in the review span the period 1998 to 2015[4]
- the review covered disease outbreak-affected populations in LMICs
  - 19 countries and 51 contexts are included, with the highest frequency of evaluations from Zimbabwe and Haiti
- only selected diseases of interest were eligible (cholera, Ebola, hepatitis E, hepatitis A, typhoid fever, acute watery diarrhoea and shigellosis)
  - cholera is the most researched and discussed disease, representing 86 percent (44/51) of the diseases in the included evaluations, followed by Ebola (4%, 2), acute diarrhoea (6%, 3), shigellosis (2%, 1) and typhoid fever (2%, 1)
- eligible interventions include water, sanitation, hygiene and WASH package interventions within 12 months of an outbreak of disease of interest
  - water interventions are the most evaluated (43%, 22/51 contexts), followed by hygiene and WASH package, which make up 29 percent (15) and 24 percent (12) of included interventions, respectively; sanitation is least evaluated, making up only 4 percent (2/51) of the included studies
- in terms of research design, 49 percent (25) of the studies were quantitative, 18 percent (9) qualitative and 33 percent (17) field commentary.

A near equal number of evaluations were identified from the peer-reviewed (26, 51%) and grey literature (n=25, 49%). Although the overall number of evaluations is approximately equal between published and grey literature, differences were seen by intervention, with water having more published evaluations and hygiene and WASH package having more grey literature evaluations.

What are the health impacts of WASH interventions in disease outbreaks?

WASH interventions consistently reduce both the risk of disease and the risk of transmission in outbreak contexts.

- **Reduced disease risk**: Evaluations of the health impacts of WASH interventions in disease outbreaks using measured change in disease rates were rarely conducted. Only six such evaluations were identified. Five of these involve less common HWT interventions (PUR, simple filters, SODIS and safe storage) and in all cases showed reduced disease rates. The sixth evaluation – a long-running Community-Led Total Sanitation (CLTS) intervention implemented before and during an Ebola outbreak – recorded a large and significant reduction in disease risk.

[3] See the review protocol (Yates, Vijcic, et al., 2015).

[4] The initial database and website searches took place between September 2015 and March 2016.

- **Reduced transmission risk**: Evaluations of the impact on risk of transmission of WASH interventions were more common than disease risk evaluations and included: well disinfection, chlorine dispensers and HWT (liquid chlorine, chlorine tablets and flocculant/disinfectants). Some evaluations also demonstrated reduced short-term transmission risk with environmental hygiene interventions.

Programme design and beneficiary preferences are important factors in ensuring WASH interventions reach their potential, as described in the following sub-section.

What are important WASH programme design and implementation characteristics in disease outbreaks?

The following four design and implementation characteristics are identified as important for effective programming.

- **Simplicity** – Some of the most basic interventions had a clear positive impact; interventions requiring little to no promotion led to incremental improvements that reduced the risk of disease and disease transmission.
- **Timing** – Prepositioned stock, quick release of funds and early triggers for rapid scale-up were important facets of a positive response, particularly with hygiene kit and HWT interventions.
- **Engagement in the community** – Community-driven interventions can increase awareness, trigger behaviour change and lead to local solutions.
- **Linking relief, rehabilitation and development** – Linking with pre-existing programming reduces the need for rapid beneficiary behaviour change, and is an opportunity for responding agencies to increase local cultural understanding for future emergency response programmes.

What are the population-related barriers and facilitators that affect WASH interventions in disease outbreaks?

Four community perceptions and preferences affecting the success of WASH outbreak interventions are identified.

- **Taste and smell**: Taste and smell of HWT may hinder use (e.g. chlorine treatments can have an off-putting smell or taste) or facilitate use (e.g. filters and flocculant/disinfectants improve taste)
- **Preferred communication**: Radio and face-to-face communication were consistently reported as ‘most trusted’ or ‘most valued’ for hygiene communication
- **Perception of risk**: Community understanding of some interventions overestimate effectiveness and risk reduction potential (i.e. household spraying and well disinfection)
- **Trust/fear***:* Social mobilization and open communication between the community and responders builds trust and greater community cohesion.

What are the economic outcomes of WASH interventions in disease outbreaks?

It was not possible to assess the economic outcomes of WASH interventions as no economic evaluations were found and only minimal cost information is reported.

What's the state of the evidence?

Overall, the amount and quality of evidence of the health impacts of WASH interventions in outbreaks is found to be lacking and low. As illustrated in the evidence map (see Figure 0.1), the review found better and more quantitative evidence relating to water interventions,

source-based treatment and HWT than to hygiene, sanitation and WASH package interventions, which tend to be assessed with lower quality and in more qualitative studies.

While the 47 studies analysed provided solid information to generate comments, there were some limitations of the evidence, including:

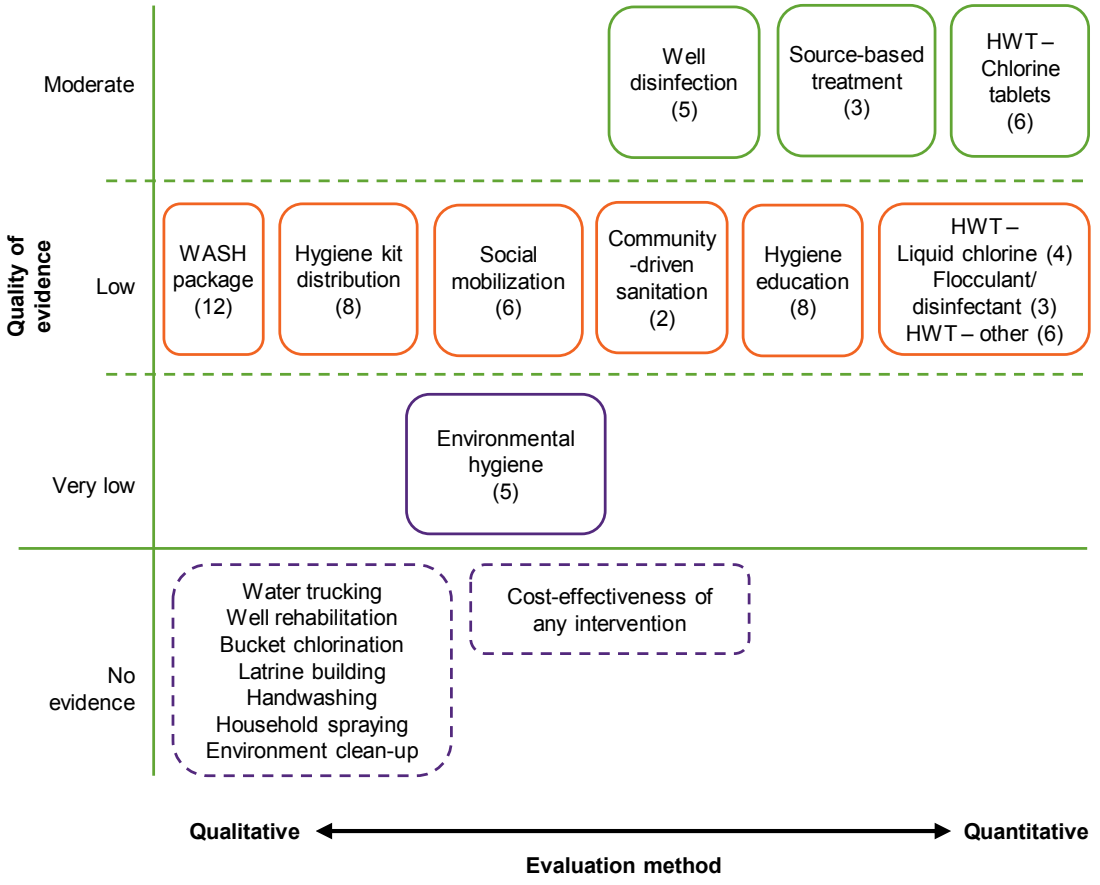
- none include high quality evidence relating specifically to health impacts
- while they show consistent findings, most are low quality cross-sectional study designs, only two randomized controlled trials are included in the review
- those that are quantitative studies (mainly published and relating to water interventions) have less risk of bias
- those that evaluate WASH package interventions tend to be field commentary, unpublished and with a high risk of bias
- none provide evidence of the impacts of well rehabilitation, bucket chlorination, latrine building, handwashing, household spraying, water trucking, environmental drainage/clean-up or cost-effectiveness of any intervention
- none provide formal economic analysis of WASH interventions in disease outbreaks.

This weak evidence base is attributed to two factors:

1 the prioritization of rapid response activities over research in emergency contexts

2 the difficulty of conducting research in the rapidly changing and unstable settings where disease outbreaks often occur.

Figure 0.1: WASH interventions in disease outbreaks – evidence map. Source: The research team



Additional insights and observations

While WASH interventions in disease outbreaks are under-researched, it is likely that population-related barriers and facilitators will remain critical to the success of WASH interventions and remain context specific. As such, for the sake of more effective interventions in the future, the following activities should be considered:

- well-designed non-experimental and qualitative studies to increase the evidence base, particularly on well rehabilitation, bucket chlorination, latrine building, household spraying, handwashing, water trucking, environmental drainage/clean-up and cost-effectiveness
- developing templates and protocols for consistent and robust evaluations
- evaluating interventions at the beneficiary level
- identifying intervention factors that lead to more scalable and more timely responses
- increasing responders' understanding of community preferences and cultural differences.

Overall, we found low quality but consistent evidence that some WASH interventions are successful at reducing the risk of disease transmission, although programme design, implementation characteristics and community aspects are critical to programme success.

Published by Oxfam GB for Oxfam International under ISBN 978-0-85598-879-1 in February 2017.
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