About this evidence brief

This evidence brief provides an overview of WASH interventions in disease outbreak response – an evidence synthesis published in February 2017 by the Humanitarian Evidence Programme and carried out by a team from the Civil and Environmental Engineering Department of Tufts University. It summarizes key findings in response to four research questions, indicates the country contexts from which evidence is drawn, outlines the methodology, highlights research gaps and provides references to the original literature.

The brief aims to assist policymakers, practitioners and researchers in assessing the available evidence in this field. It does not provide advice on which interventions or approaches are more or less appropriate in any given context. The varied and varying nature of crisis, vulnerability, goals of humanitarian programming, local conditions and quality of available data make the evidence highly contextual. The views and opinions expressed herein are those of the authors and do not necessarily represent those of Oxfam, Feinstein or the UK government.

Objectives of the evidence synthesis

The evidence synthesis 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). Specifically, it set out to answer 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?

About the evidence synthesis

The protocol, full synthesis and executive summary on which this evidence brief is based are available from Feinstein International Center, Oxfam Policy & Practice and UK government websites. Citation:


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About the Humanitarian Evidence Programme

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.

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Contents

About this evidence brief .............................. 1
Objectives of the evidence synthesis .......... 1
Evidence map ........................................... 2
Findings ................................................. 3
Methodology ........................................... 3
Research gaps ......................................... 4
Further considerations ............................ 4
References ............................................. 5
Figure 1: WASH interventions in disease outbreaks – evidence map. Source: The research team

Quality of evidence

Moderate

Low

Very low

No evidence

WASH package (12)
Hygiene kit distribution (8)
Social mobilization (6)
Community -driven sanitation (2)
Hygiene education (8)
HWT – Liquid chlorine (4)
Flocculant/ disinfectant (3)
HWT – other (6)

Environmental hygiene (5)

Cost-effectiveness of any intervention

Water trucking
Well rehabilitation
Bucket chlorination
Latrine building
Handwashing
Household spraying
Environment clean-up

Evaluation method

Qualitative

Quantitative

HWT: household water treatment.
Findings

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 household water treatment (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 virus disease (‘Ebola’) outbreak – recorded a large and significant reduction in disease risk.

- **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.

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.

Methodology
The initial database and website searches took place between September 2015 and March 2016. Of the 15,026 studies identified in the systematic review process, 47 were deemed suitable following title, abstract and full screening.

Definitions
This synthesis focuses on WASH interventions targeted at populations affected by cholera, Ebola, hepatitis E, hepatitis A, typhoid, acute watery diarrhoea and bacillary shigellosis (dysentery).

The 10 WASH interventions covered are: well disinfection, source-based water treatment, HWT – chlorine-based products, HWT – other products, community-driven sanitation, hygiene promotion, social mobilization, hygiene kit distribution, environmental hygiene and WASH package.

‘Outbreaks’ are defined 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 search criteria included studies published or written between 1995 and 2016. Those included in the review span the period 1998 to 2015.

The review encompassed:

- 19 low and middle-income countries and 51 contexts – the most frequently represented countries in the studies were Zimbabwe and Haiti
- cholera, Ebola, hepatitis E, hepatitis A, typhoid fever, acute watery diarrhoea and shigellosis
- 10 eligible interventions (see Definitions on previous page).

In terms of research design, 49 percent (25) of the studies were quantitative, 18 percent (9) qualitative and 33 percent (17) field commentary. A roughly equal number of evaluations were identified from the peer-reviewed (26, 51 percent) and grey literature (25, 49 percent). Although the overall number of evaluations is roughly 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.

**Research gaps**

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 (Figure 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.

The weak evidence base is attributed to two factors:

- the prioritization of rapid response activities over research in emergency contexts
- the difficulty of conducting research in the rapidly changing and unstable settings where disease outbreaks often occur.

**What were the most frequently represented diseases and interventions in the studies reviewed?**

Cholera was the most researched and discussed disease, present in 44 of 51 contexts (86%), followed by acute diarrhoea (6%, 3), Ebola (4%, 2), shigellosis (2%, 1) and typhoid fever (2%, 1).

Water interventions were the most evaluated (22/51 contexts), followed by hygiene and WASH package, which made 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.

**Further considerations**

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.
References

Articles included in evidence synthesis


World Health Organization (WHO). (no date). Guidance on communication with respect to safe drinking water and household hygiene: Literature review, interviews and case studies.


Other studies cited in the synthesis


George, C.M, Shirajum, M., et al. (2016). *Randomized controlled trial of hospital-based hygiene and water treatment intervention (CholBi7) to reduce cholera*. Emerging Infectious Diseases 22, 233–.


