



WASH Interventions for Cholera Outbreak Response

WASH Interventions, the Real-time Evaluation of Cholera Outbreak
Response (WASH-RECORD) Research Project

Phase 2 - A review of current guidelines and practice literature

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Introduction

Cholera outbreaks are a global public health threat, occurring in emergencies where water supply, sanitation, and hygiene (WASH) infrastructure is poor or has been damaged. The WHO estimates that there are between 3 and 5 million cholera cases every year, only a fraction of which are reported. There has been an increasing trend in morbidity from 2006 to 2011 with large outbreaks (>50,000 cases) in Africa (Angola, Ethiopia and Zimbabwe) and the massive epidemic in Haiti. Even though globally cases decreased slightly in 2012, cholera remains a global public health threat and since the 2010 Haiti outbreak, emergency responders have realised that they need to be quicker, more targeted, and efficient if they are to have any impact of containing outbreaks.

Several recent reviews have highlighted a severe lack of evidence for WASH interventions in emergencies, and all express the need for further research to help guide interventions during outbreaks. The Research for Health in Humanitarian Crises (R2HC) Evidence Review Report published in November 2013 found that only 2 out of 8 papers related to WASH, were specific to cholera, and only one reported a health outcome. This report also confirmed our understanding that the WASH community as a whole is seeking leadership, and guidance on how best to evaluate the health impact of their activities. Whilst different agencies have vast practical experience of outbreak response, each uses their own guideline, the lessons learned from past outbreaks remain unpublished and evidence for best practices remain unevaluated. As such there is a clear need for more robust evidence on which to base international WASH policy and practice in order to ultimately reduce the global burden of cholera.

In light of this need, the research project 'WASH Interventions, the Real-time Evaluation of Cholera Outbreak Response' (WASH-RECORD) has been conceived by the authors, aiming to strengthen the evidence base and to provide evidence-based guidance for international WASH policy and practice during emergencies.

The research project comprises four phases.

Phase 1: Systematic review of peer-reviewed evidence on the health impact of WASH interventions in cholera outbreak response.

A systematic literature review has been completed, the results of which were presented to the Global WASH Cluster at the 19th Meeting in Oslo, Norway, (April 2014) (Annex 1). The completed manuscript was submitted for publication to the open access Journal PlosOne on 30th April 2014 (Annex 2).

Phase 2: Review of current practice through a systematic appraisal of published cholera guidelines and grey literature from international agencies, to distil an evidence based selection of best practice.

This report will present the findings of the review with recommendations for the next phase of research.

Phase 3: Real-time evaluation of the health impact of WASH interventions in a series of outbreaks.

A series of research studies will be conducted during several cholera outbreaks, providing the unique opportunity for a range of WASH interventions to be evaluated for health impact as they are implemented. The research studies will be undertaken subject to available funding.

Phase 4: Synthesis of existing and new evidence to inform international WASH policy and practice

The findings and results of the first three phases will be synthesised in to one final research report combined with publications in peer reviewed journal and dissemination in international forums to ultimately inform WASH policy and practice supported by an interagency cholera guideline.

Objectives

The objectives of the review of current practice were to:

1. Analyse the key components of current practice from available cholera guidelines used by international agencies.
2. Identify lessons learnt from recent cholera outbreaks
3. Compile recommendations for evidence based best practice for WASH interventions
4. Develop a set of recommendations to guide operational research

Methods

The sources of information used for reviews were:

1. Guideline review - Current recommendations for community WASH intervention for cholera control presented in publically available cholera guidelines.
2. Practice Literature - Current practice as presented in unpublished evaluation reports and lessons learnt documents from international WASH agencies' response to a specific outbreak.

Guideline review

An initial search of the internet was conducted to identify publically available cholera guidelines developed by the main responding agencies. Terms used included 'cholera, WASH, guideline, cholera control, cholera prevention, WASH guideline, best practice'. A snowballing method was then used to identify further resources via links from main agency and WASH websites.

Table 1 List of websites searched

www.who.int	www.msf.org	http://wedc.lboro.ac.uk/knowledge
www.cdc.gov	www.acf.org	https://wca.humanitarianresponse.info
www.unicef.org	www.oxfam.org.uk	www.washadvocates.org
www.icddrb.org	www.actionagainsthunger.org	www.washplus.org
www.paho.org	www.wateraid.org	www.hip.watsan.net
www.google.co.uk	www.icrc.org	www.wescoord.or.ke
www.un.org	www.washcluster.info	www.watersanitationhygiene.org
www.unocha.org	www.sheltercentre.org	www.wsscc.org
www.taskforce.org	www.ifrc.org	watsanmissionassistant.wikispaces.com
www.choleraalliance.org	www.reliefweb.int	sanitationupdates.wordpress.com

The selection criteria for the guidelines was limited to publications by major international agencies, or institutions involved in cholera outbreak response and associated research.

The identified guidelines were printed for review and a framework, developed in Excel, was used to systematically extract information from the documents. This framework was based on that presented in the recent 'Comprehensive Integrated Strategy for Cholera Prevention and Control', Coalition for Cholera Prevention and Control, August 2013 which pulls together various recommendations of cholera treatment, vaccination and prevention. The information extracted was

limited only to those interventions implemented at a community level to reduce cholera transmission. Interventions in health facilities and cholera treatment centres were therefore excluded.

WASH interventions were classified according to:

1. water supply
2. water quality (i.e. treatment at source or point of use)
3. water storage
4. sanitation
5. hygiene promotion (incl. cholera awareness and hand washing with soap (HWWS))
6. environmental health and food safety
7. disinfection
8. safe funeral practice
9. non-food item (NFI) distribution

A simple analysis was conducted to highlight those interventions recommended by all agencies, the majority and some agencies through to those interventions which were limited to a mention by one agency only. The consensus and discrepancies were subsequently presented for comparison with current published evidence (from Phase 1).

Practice Literature

Representatives of the Global WASH Cluster were contacted by email and followed up, requesting practice literature (evaluation reports and lessons learnt documents) relating to recent cholera outbreak responses. This request was followed up during the presentation of the Phase 1 (current published evidence) findings at the 19th Global WASH Cluster Meeting on 3rd April 2014, in Oslo Norway. Direct offers of information were immediately followed up, and a snowball method was used to contact other WASH experts from international agencies for other sources of grey literature to inform the review (i.e. cholera resource websites).

A list of literature, with its source location was compiled, and limited to the French and English language (Appendix 1). Each document was reviewed individually to extract relevant information against a similar framework as for the guidelines but additionally including information on the agency, context of the outbreak, the lessons learnt and key recommendations made as a result of the response. Again the information extracted was related to community WASH interventions only. If there was no reference to an intervention, the document was excluded. Where no information was presented on a particular WASH area the framework was left blank.

Table 2 Information extraction form for practice literature

PARAMETER	DESCRIPTION
Agency	Name of organisation
Context	Name of country. Urban or rural settings
COMMUNITY WASH INTERVENTIONS	
Water Supply	Wells, springs, reservoirs, tankers
Water Treatment at source	Well chlorination, filtration
Water Treatment at point of use	Bucket chlorination, chlorination products for household water treatment
Safe Water Storage	Water containers, narrow necked vessels
Sanitation	Latrines, waste management

Hygiene Promotion	Message dissemination, behaviour changes activities, hygiene kits
Disinfection Practices	Household spraying, disinfection kits
Food Safety and Hygiene	Food hygiene promotion
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	What worked well or not? If not why not?
Main recommendations made	Key points for future implementation or research.

The main lessons learnt and recommendations compiled were then assessed against the current guidelines and current evidence to highlight gaps and areas for further research.

Results

Guideline review

A total of six publically available cholera guidelines were selected for review (Table 3). These are commonly considered by WASH implementers as the main guidance, based on compilations of local guidelines, past experience and consultation with experts. Cholera training manuals were intentionally excluded in order to maintain a level of generality related to the use of a guideline for reference in an outbreak.

Table 3 List of selected guidelines

No.	TITLE
1	UNICEF Cholera Toolkit (2013) UNICEF, New York
2	Manual pratique, Eau, assainissement, hygiene dans la lutte contre le cholera (2012), ACF , Paris
3	Cholera Outbreak Guidelines, preparedness, prevention and control, (2012), Oxfam, Oxford
4	COTS Program (2006), ICDDR'B, Dhaka
5	Cholera Guidelines (2004), MSF, Paris
6	Cholera Outbreak, assessing the outbreak response and improving preparedness (2004), WHO, Geneva

The results of the systematic extraction of information is presented in Appendix 2.

ALL SIX guidelines recommend that the following community WASH interventions be implemented as soon as is feasible and appropriate in a cholera outbreak:

- Sufficient safe water supplied for drinking (20 litres/person/day)
- Treated water provided (0.5mg/l Free Residual Chlorine (FRC)) at household level
- Communal latrines in public places are provided, and that they are adequate, accessible, clean and maintained (i.e. camps, market places)
- Hand washing points are provided in public/market places (includes construction, operation and maintenance)
- Hygiene promotion and cholera awareness is raised through Information Education and Communication (IEC) and messaging

- Food safety training and food hygiene education is provided to public food outlets
- Education and mobilisation is provided on the safe handling of the dead
- Cholera safety education at funerals is provided to community leaders and health workers

THE MAJORITY (4-5) guidelines recommend:

- Temporary water systems are installed, and improvement of unprotected water sources (repair, operation and maintenance) incl. water distribution systems, tankering, wells, boreholes, springs and surface water
- Water quality is monitored and actions taken where necessary
- Household water treatment and safe storage (HWTS) is implemented (products distributed, use monitored, information and training provided on correct dosage)
- Safe water containers are provided (i.e. covered container with tap, narrow neck, water extraction implement)
- Mass media is used to disseminate messages (i.e. TV, radio)
- Food safety and hygiene promotion is prioritised at household level, institutions and social events
- Training and support is provided to authorities responsible for regular inspections of food outlets and institutions
- Supplies for WASH safety distributed with training and support (i.e. jerry cans, soap)

HALF the guidelines recommend:

- Water vendors, and tanker owners should be involved in water supply activities to increase awareness of the necessity for continuous supply of safe water
- Bucket chlorination to be implemented at unprotected water sources
- Interpersonal communication (household visits by community health workers)
- Exclusive breastfeeding, safe fluids and food promotion
- Non-food items as defined in the SPHERE guidelines are distributed
- Soap or cholera prevention kits are distributed particularly in rural areas

ONLY SOME guidelines recommend the following, therefore these are deemed as lower priority interventions:

- Urban water supply activities involve community groups (i.e. water network leak detection)
- Safe drinking water practice promoted (BCC, IEC)
- Chlorination of high risk lined wells (direct chlorination not pot chlorinators with regular FRC testing)
- Safe water handling practices are promoted (i.e. water container disinfection)
- Behaviour change interventions to promote latrine use and open defecation free (ODF) communities
- Community led sanitation action promoted
- Chlorinated lime distributed for disinfection of latrines
- Behaviour change interventions (HWWS at critical times)
- Awareness raising to alleviate stigma
- Hygiene promotion in schools
- Solid waste is collected at ports, markets and public places (community clean-up campaigns with tools etc.)
- Solid waste education and communication sessions in schools
- Simple fly control measures (cover food, clear waste)
- Drainage channels kept open
- Disinfectant materials and education provided on disinfection of HH and vehicles

- Safe laundry practice education provided (i.e. do not wash laundry near open water sources)
- Soap or cholera prevention kit distribution in urban areas
- Targeted distribution of kits to high risk and vulnerable sectors of population

NO guidelines recommend the following, states it is to be used as a last resort, or that it is no longer recommended

- Chlorination of unlined/unprotected wells
- Borehole drilling
- Households and vehicles disinfected using pressurised sprayer

Practice Literature

A total of 21 documents were reviewed individually for relevant information which was entered into an individual data extraction framework. The full grey literature document list is presented in Appendix 1.

Document 1: Le choléra transfrontalier en Sierra Léone et Guinée en 2012 et les stratégies d'intervention associées, ACF, 2012

Agency	ACF
Context	Sierra Leone and Guinea. Urban capital cities - Freetown and Conakry.
COMMUNITY WASH INTERVENTIONS	
Water Supply	Repairs to water reservoirs.
Water Treatment at source	Bucket chlorination. Chlorination of water points
Water Treatment at point of use	Distribution of Sur Eau (local bleach product)
Safe Water Storage	
Sanitation	
Hygiene Promotion	Hygiene promotion activities. Hygiene kit distribution. Radio messages
Disinfection Practices	Household disinfection and kits distributed to ports and markets
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Conakry – Correct use of chlorine products improved from 28% (2009) to 95% (2012). Identification of social groups in areas with clusters of cases allowed more focussed group discussions. Guinea - Good adherence to use of Sur Eau during outbreaks.
Main recommendations made	Systematic use of GPS to locate clusters of cases to improve targeted response. Urban settings should use targeted distribution rather than mass distribution of hygiene kits. Supervision of funerals by authorities offers the opportunity for population to ask public health questions. Household visits are important to detect other cases.

	Use film 'Story of Cholera' in schools, cinema and market places. Training of water and ice vendors on chlorination.
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Studies on stigmatisation of cholera cases were carried out in both settings. In particular related to sensitisation activities and household visits. Findings suggested that since in this setting cholera cases appear continuously and frequently, they are not considered outcasts but victims of disease. Cholera is discussed openly in the community, and by authorities.

Document 2: Le choléra au Tchad en 2011 et les stratégies d'intervention associées, 2011

Agency	ACF
Context analysis	Chad – large town and rural areas
COMMUNITY WASH INTERVENTIONS	
Water Supply	
Water Treatment at source	Disinfection of water sources.
Water Treatment at point of use	Distribution of chlorine products.
Safe Water Storage	
Sanitation	
Hygiene Promotion	Hygiene promotion sessions in public places. Household sensitisation visits. Distribution of hygiene kits. Hand washing points in markets
Disinfection Practices	Disinfection of households. Distribution of disinfection kits.
Food Safety and Hygiene	Inspection of public food outlets by authorities.
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Important to involve both men and women in prevention activities. Involve local knowledge when designing hygiene promotion images.
Main recommendations made	Develop channels for sale of bleach in the community. Disseminate hygiene messages through religious and medical channels. Closure of markets and schools during outbreaks.

Document 3: Réduction du risque de propagation des épidémies de choléra à Conakry: IEC, alerte précoce et barrières sanitaires, 2012

Agency	ACF
Context	Guinea Conakry. Urban, 5 ports/markets and 10 neighbourhoods.
COMMUNITY WASH INTERVENTIONS	
Water Supply	Rehabilitation of water points in identified public sites.
Water Treatment at source	Chlorination of water tanks in identified public sites.
Water Treatment at point of use	Promotion of use of Sur Eau at household level.
Safe Water Storage	

Sanitation	Improvement of sanitation in public places. Construction of blocks of latrines/showers and laundry areas in public places. Strengthening of community-based sanitation initiatives for reduction and the improvement of solid waste management.
Hygiene Promotion	Improvement of community knowledge and practice IEC for leaders and workers in public places (waterborne diseases, environmental health). Distribution of hygiene kits during outbreaks (households). Development of communication strategy for key messages.
Disinfection Practices	
Food Safety and Hygiene	Improvement of hygiene for food vendors in public places.
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Emptying of communal latrine pits by vacuum truck or manual method should be carefully assessed. Final disposal of sludge should be clear defined. Wastewater drainage should be adequately managed on site. Household waste management is not a priority.
Main recommendations made	Support initiatives for community management of communal water and sanitation facilities. Clear plan for latrine emptying should be developed. Keep messages few and simple based on participatory approach. Promote of safe handling (use of utensils) of food by vendors.

An example of good practice highlighted was the management of communal water points and latrines by a local committee. Sustainable management by a committee of local key people with training and support for first phase of 9 months. Community empowerment on the importance of hygienic sanitation facilities and their vital role in an outbreak. Community ownership of the management system, maintenance and use fees based on consultation of users.

Document 4: Réponse d'urgence à l'épidémie de choléra en Haïti, 2011

Agency	ACF
Context	Haiti – Urban and rural, Port-au-Prince and Artibonite.
COMMUNITY WASH INTERVENTIONS	
Water Supply	
Water Treatment at source	Production of chlorinated water - water treatment unit and bucket chlorination. Local production of chlorine solution.
Water Treatment at point of use	Distribution of household water treatment products (Aquatabs).

	Distribution of ceramic filters to certain communities.
Safe Water Storage	Distribution of bucket with tap (locally available).
Sanitation	Construction of communal latrines (short term, camps).
Hygiene Promotion	Sensitisation campaigns (local radio, theatre groups, community workers).
Disinfection Practices	Disinfection of public places.
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	The distribution of ceramic filters was questionable due to issues of sustainability, affordability by the population and efficiency. Simple filtration through cloth or sand could have produced similar results. Sanitation activities replaced by promotion activities due to time and resource constraints offering little impact.
Main recommendations made	Sanitation should be regarded as a longer term initiative. Ensure correct dosage and use of chlorine products.

Document 5: Evaluation externe du programme d'intervention pour limiter et prevenir la propogation de l'epidemie du cholera en Republique Democratique du Congo, 2014

Agency	ACF
Context	Democratic Republic of Congo, South Kivu.
COMMUNITY WASH INTERVENTIONS	
Water Supply	
Water Treatment at source	Bucket chlorination points.
Water Treatment at point of use	Promotion of chlorination products.
Safe Water Storage	
Sanitation	Communal latrines in public places.
Hygiene Promotion	Sensitisation campaigns (household visits, mass media).
Disinfection Practices	Disinfection of households.
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Systematic household spraying is of no higher priority than managing safe funeral practices. One type of latrines is no better than another if a hand washing point in not included. Market places are deemed to be high risk in the absence of water and sanitation facilities. Bucket chlorination should only be continued only as long as the epidemiological information justifies it. Dissemination of messages in schools considered too short and limited and lacks involvement of teachers.

Main recommendations made	<p>Improve evaluation methods. Focus on hygiene and hand washing initiatives rather than sanitation.</p> <p>Consider installation of latrines for fishermen to reduce defecation in lake.</p> <p>Social marketing of chlorination products is a longer term objective and required specific expertise and appropriate resources.</p>
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Document 6: Integrated chlorination campaign in Mogadishu. WEDC Conference, 2000

Agency	ACF
Context	Mogadishu, Somalia
COMMUNITY WASH INTERVENTIONS	
Water Supply	
Water Treatment at source	Single pot chlorination of 600 wells. Chlorine tablets pressed locally, inserted into pierced pipes and suspended in wells. Monitoring twice per week with tablet replacement.
Water Treatment at point of use	
Safe Water Storage	
Sanitation	
Hygiene Promotion	Information about chlorination technique disseminated to population.
Disinfection Practices	
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Water vendors and donkey carts play a role in cholera transmission. Chlorination affects the taste of water, therefore acceptability by the population is critical.
Main recommendations made	Systematic follow-up of cholera cases to determine water source and potential contamination with follow-up to ensure chlorination procedure in place. Education and sensitisation campaigns must underline the importance of chlorination for cholera prevention.

Document 7: ACF, Cholera operational positioning paper

Agency	ACF
Context	General
COMMUNITY WASH INTERVENTIONS	
Water Supply	<p>Ensure access to safe water according to SPHERE standards.</p> <p>Safe water distribution (installation of pumping stations with water trucking).</p>
Water Treatment at source	Chlorination of water networks, chlorination at the water points, etc.

Water Treatment at point of use	Household level - distribution of chlorine or chlorine combined with a flocculation product (Aquatab, PUR, Watermaker, etc.)
Safe Water Storage	
Sanitation	Except in camps, building public latrines are not recommended, as it is generally too time consuming to be effective. Requires employing workers to clean the toilet and make sure that the place is secure and does not become another path of transmission.
Hygiene Promotion	Distribute cholera prevention kits (hygiene kits) at the household level in the affected and at risk areas with intensive and extensive cholera prevention sensitisation. Analyse cultural beliefs of cholera and to adapt the approach to beliefs for improving prevention through group discussion in communities and in health centres.
Disinfection Practices	Disinfection of public places (markets, schools, public toilets, etc.) and the houses of cholera patients by spraying chlorine solutions.
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Depending on the context and the operational means available, spraying houses of cholera patients might be hard to implement causing a problem of stigmatization of the cholera patients and/or be of low efficiency.
Main recommendations made	As detailed above.

Document 8: DREF Final Report. Uganda: Cholera outbreak in Mbale district, 2012

Agency	IFRC
Context	Uganda. 4 districts. Small towns.
COMMUNITY WASH INTERVENTIONS	
Water Supply	
Water Treatment at source	Water quality analysis.
Water Treatment at point of use	Distribution of chlorine tablets.
Safe Water Storage	Distribution of jerry cans
Sanitation	Construction of communal latrine blocks.
Hygiene Promotion	Training of community volunteers using PHAST methods. Media campaigns (radio, TV). Social mobilisation through film vans. IEC (Posters, leaflets, t-shirts). Soap distribution. Distribution of 5L jerry can to make hand washing facility.
Disinfection Practices	
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	

Key lessons learnt	<p>Radio spots using key political leaders to spread messages was deemed positive.</p> <p>Social mobilisation campaigns involved collaboration with district authorities enhancing the sustainability of the activities.</p> <p>Distribution were targeted to Extremely Vulnerable Individuals (EVI).</p> <p>Use of IEC materials increased knowledge of disease and literacy levels (not evaluated).</p>
Main recommendations made	<p>Water quality analysis data made available to authorities can help to prioritise where improvements or targeted distributions of treatment products are made.</p> <p>Continue outbreak control measures during next wet season.</p> <p>Focus hygiene promotion activities mainly in schools.</p>

Document 9: OCG response to cholera in Haiti, October 2010 – March 2011, evaluation report (external), 2011

Agency	MSF-Geneva
Context	Haiti, Leogane, Urban and rural
COMMUNITY WASH INTERVENTIONS	
Water Supply	
Water Treatment at source	
Water Treatment at point of use	Some distribution of chlorine products.
Safe Water Storage	
Sanitation	
Hygiene Promotion	Social mobilisation and communication strategy. Radio messages - Job announcements, followed by cholera spot. Local journalist recruited.
Disinfection Practices	
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	<p>Lack of preparedness due to uncertainty about likelihood of cholera outbreak led to insufficient risk assessment. WASH – Focus on CTCs due to lack of local capacity</p> <p>Multiple chlorination products, differing dosages and dilution methods caused confusion.</p>
Main recommendations made	<p>At the minimum, WASH technical activities for each cholera outbreak should include: Bucket chlorination by dedicated staff/volunteers at water sources; (and/or/then) chlorine distribution, always combined with training and IEC on how to chlorinate home water for individuals.</p> <p>In order to address the danger of markets as sites of cholera transmission, MSF should</p>

	include safe market-related activities (latrines, hand-washing points, hygiene education, control of water sold in the markets etc) in its WASH strategy and/or lobby for other actors to address these needs. Develop guidelines for social mobilisation and hygiene promotion in a cholera response.
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Document 10: Review of the MSF response to the 2008-2009 cholera epidemic in Zimbabwe, 2009

Agency	MSF
Context	Zimbabwe, urban and rural
COMMUNITY WASH INTERVENTIONS	
Water Supply	
Water Treatment at source	Bucket chlorination of open wells in high risk areas.
Water Treatment at point of use	Distribution of Aquatabs. Pilot project to evaluate home use of Aquatabs and Waterguard.
Safe Water Storage	
Sanitation	
Hygiene Promotion	Message based approach with leaflets and posters.
Disinfection Practices	Household spraying initiated, though quickly abandoned as too resource intensive. Cholera prevention kits distributed did not contain disinfection materials (bucket with lid and tap, water purification tablets, ORS, soap IEC material)
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Household spraying is not recommended. Mass distribution of Aquatabs questionable with only minimal information provided on use. Important to ensure correct dosage of chlorine is available.
Main recommendations made	Evaluate chlorine products on a technical and community level. Evaluate use of household disinfection kits. Promote research on the transmission and control of cholera in both urban and rural contexts. Improve the role of hygiene promotion in the community.

Document 11: Overall response to cholera epidemics in Angola in 2006, 2007

Agency	MSF
Context	Angola, Luanda and 10 provinces
COMMUNITY WASH INTERVENTIONS	

Water Supply	Chlorination of water trucks at pumping station. Installation of water tanks, tank cleaning. Repair of hand pumps.
Water Treatment at source	Bucket chlorination at wells. Water quality testing.
Water Treatment at point of use	
Safe Water Storage	
Sanitation	Clearing of drainage channels and garbage.
Hygiene Promotion	Community based volunteers.
Disinfection Practices	Distribution of disinfection kits, hygiene kits.
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	General slow response. Security issues related to supply of free water in fee-paying society. Water network complicated by treated and untreated systems. Tank cleaning should only be implemented alongside supply of treated water, otherwise ineffective. Hygiene promotion leaflets inappropriate for low literacy levels.
Main recommendations made	Tank cleaning and tanker chlorination should be implemented simultaneously. Bucket chlorination should be implemented with support of hygiene promoters to encourage acceptance. Use local chlorine products where possible. Emphasis messages related to safe excreta disposal and hand washing.

Document 12: MSF-OCA Nigeria Emergency Response Unit's (NERU), End of intervention report, Gusau Cholera Outbreak Response, from September to December 2013

Agency	MSF
Context	Nigeria. Rural village communities.
COMMUNITY WASH INTERVENTIONS	
Water Supply	
Water Treatment at source	Bucket chlorination points.
Water Treatment at point of use	
Safe Water Storage	
Sanitation	
Hygiene Promotion	Hygiene promotion using posters and mass media.
Disinfection Practices	Household disinfection kits distributed to families of patients (bucket, soap, 500ml bleach)
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Take into account political aspects regarding outbreaks, when designing sensitisation materials. Disinfection kits should be in place at start of outbreak to avoid delay in implementing.

	Information relating to the use of kits translated into the local language which supported the correct use of kits. Kits were used to disinfect floors, furniture surfaces, latrines, dishes, laundry, and bedding. Initial assessment showed that kits were used and effective (no data presented).
Main recommendations made	Trained staff should distribute kits to facilitate accurate data collection and evaluate the use of kits through survey questionnaire.

Document 13: National plan for the elimination of cholera in Haiti 2013-2022, 2013

Agency	MSPP (Ministry of Health)
Context	Haiti. Urban and rural.
COMMUNITY WASH INTERVENTIONS	
Water Supply	Water supply network. Tankering to camps. Water tanks. Repairs to rural systems. Installations of water testing laboratories.
Water Treatment at source	Chlorination of water systems and private pumping wells. Chlorination monitoring system.
Water Treatment at point of use	Mass distribution of water treatment products.
Safe Water Storage	
Sanitation	Cleaning of pit latrines in displaced camps. Construction of wastewater treatment plants for disposal of sludge from septic tanks and latrines.
Hygiene Promotion	Hygiene promotion activities in at-risk areas.
Disinfection Practices	
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Weak application of preventative hygiene measures by population. Training materials not adapted to the community level.
Main recommendations made	Implement community health agent system for surveillance in at-risk areas (1 agent per 500-100 people). Promote food hygiene measures. Implement monitoring system for chlorine residuals in household water and community systems. Educate families how to add chlorine to water tanks. Link with community agents to identify areas where water system repairs or treatment products are required.

Document 14: Evaluation of the cholera prevention emergency program in the provinces of Equateur, Bandundu and the city province of Kinshasa, 2011

Agency	OXFAM – Search for Common Ground
Context	Dem. Rep. Congo. Urban and provinces
COMMUNITY WASH INTERVENTIONS	
Water Supply	
Water Treatment at source	
Water Treatment at point of use	
Safe Water Storage	
Sanitation	
Hygiene Promotion	Radio programmes and spots to inform and promote positive attitudes to cholera prevention. Evaluated using a case-control method. The test group selected from those owning a radio compared with control group who did not.
Disinfection Practices	
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	The information relating to cholera prevention was transmitted through different sources which were classified, by order of importance, as follows: radio (79%); television (70%); friends (68%); neighbourhood (62%); health centre (61%); family (49%); church (44%); school (22%); work (17%) and the newspaper (16%). The radio remains the most important communication means through which a significant proportion of the population has been informed about cholera. 77% heard about cholera through the programmes. 87% of key messages were remembered by the population. 83% of the test group compared to 42% of the control group were aware that cholera can be caught from drinking contaminated water.
Main recommendations made	Take into consideration the different local languages for the radio programs and the various sources of information (TV, radio, posters). In order to better measure the level of audience of programmes, agencies should have for each site and for each partner radio a database with the telephone numbers of the callers.

Document 15: Real time evaluation of the Cholera response in Zimbabwe, 2009

Agency	OXFAM
Context analysis	Zimbabwe - rural areas and Harare city
COMMUNITY WASH INTERVENTIONS	
Water Supply	Water trucking, rehabilitation of wells and boreholes.
Water Treatment at source	
Water Treatment at point of use	Distribution of NFI including Aquatabs for household level treatment.
Safe Water Storage	Part of hygiene promotion.
Sanitation	No communal latrines, due to regulatory restrictions.
Hygiene Promotion	Hygiene promotion activities. House-to-house visits, dramas, and focus group discussions, to promote hand washing, safe water management, cholera transmission routes among other things. Other forms of dissemination included flyers, stickers and the distribution of IEC materials.
Disinfection Practices	
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Need for clearer understanding by WASH team of principle cholera transmission pathways. Adequate drainage for water points is required, i.e. raised water tanks. Gender balance of hygiene promoters reached a wider audience. Targeted NFI distribution to high risk areas was perceived as appropriate.
Main recommendations made	Advocate and support 'cholera learning' to improve understanding of principle cholera transmission pathways for a given context, to improve cholera response and risk reduction targeting. Develop and monitor specific indicators for both gender and HIV & AIDS mainstreaming. Ensure there is clear involvement of Gender and HIV & AIDS staff at all phases of the project and put in place clear lines of accountability for these issues and adequately utilise the focal points for both Gender and HIV & AIDS. Quickly develop exit strategies and indicators and link to longer-term risk reduction WASH strategy. Develop a system by which the beneficiaries are able to give feedback and use it. Develop strategy around what Oxfam can do with regard to WASH in urban areas. Water Supply: As well as water trucking operation, rehabilitation of wells and

	<p>boreholes, construction of new boreholes and the use of Aquatabs, the possibility of shock chlorination and protection of shallow community wells need to be considered.</p> <p>Sanitation:</p> <ul style="list-style-type: none"> - periodic cleaning campaign - promotion of appropriate use of pit latrines in places where they exist - in areas where there is space and the views of local authorities rules are relaxed, use of temporary communal pit latrines .
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Document 16: Lutte contre le cholera. Réponse aux flambées et prévention des risques en zones endémiques, 2011

Agency	Solidarites International
Context	General guidelines based on experience in the Great Lakes region.
COMMUNITY WASH INTERVENTIONS	
Water Supply	Water trucking. (15lppd)
Water Treatment at source	Bucket chlorination, well chlorination. Water quality monitoring.
Water Treatment at point of use	Chlorine products
Safe Water Storage	
Sanitation	Emergency latrines, waste pits, liming, showers
Hygiene Promotion	Hygiene promotion – posters, leaflets, t-shirts, radio messages.
Disinfection Practices	Chlorine spraying
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Priority to provide drinking water to high-risk groups. If chlorination is provided at household level, it should be ensured that products are available locally at affordable prices. Monitoring of water quality should be established for all un/protected sources.
Main recommendations made	Ensure water trucks deliver on time and at capacity and that population accept the taste of the water. Ensure that staff is well trained. Install cholera awareness posters at bucket chlorination sites. Distribution of chlorine products at household level should be accompanied by strong sensitisation and training.

Document 17: Strategie de lute contre le cholera, Republique Democratique du Congo

Agency	Solidarites International
Context	DRC
COMMUNITY WASH INTERVENTIONS	
Water Supply	Construction of water tanks and water points and repair of water systems.
Water Treatment at source	Mobile treatment plants, chlorination points
Water Treatment at point of use	Household water treatment
Safe Water Storage	
Sanitation	Emergency latrines in public places, (ports, markets, stations, schools)
Hygiene Promotion	Hygiene promotion targeted at high risk communities.
Disinfection Practices	
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Importance of maintaining pressure in distribution network in times of load shedding.
Main recommendations made	

Document 18: Evaluation of the WASH response to the 2008-2009 Zimbabwe cholera epidemic and preparedness planning for future outbreaks, 2009

Agency	UNICEF
Context	Zimbabwe
COMMUNITY WASH INTERVENTIONS	
Water Supply	Drilling and rehabilitation of boreholes. Water trucking.
Water Treatment at source	Water quality monitoring.
Water Treatment at point of use	Use of chlorination products
Safe Water Storage	
Sanitation	Rehabilitation of public latrines and sewer pipelines. Removal of solid waste and clean up campaigns.
Hygiene Promotion	Targeted distribution of non-food items followed by delayed mass distribution. Production and dissemination of IEC materials. Mobilisation of communities.
Disinfection Practices	Disinfection of households including spraying of contaminated areas.
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Religious beliefs and unhygienic practices played a crucial role in spreading the disease. Water scarcity, use of unsafe water, burst sewers, lack of access to sanitation and unhygienic environments have all contributed to the cholera epidemic. Unhygienic environment characterised by water scarcity, sewer burst and overflows

	<p>created a conducive environment for the cholera epidemic.</p> <p>Provision of water at the peak of the epidemic has been necessary, and contributed significantly to the control of the epidemic. This strategy has widely been used in urban and rural areas and has included water trucking, drilling of boreholes, and rehabilitation.</p> <p>While the blanket NFI does not immediately demonstrate health impact, it contributed significantly to psycho social support and convenience. Most urban households, used to running water did not have containers with which they could use to collect water from the public standpoints. Soap was also scarce in the shops and unaffordable. The chlorine tablets gave a sense of comfort to users and indeed if used properly would improve quality of water. Bucket chlorination of domestic water was not seen as practical and comprehensible given the technical requirements of determining the chlorine demand and level of residual chlorine which could not be done easily by the community.</p>
Main recommendations made	<p>Develop targeted messages for school children. Decentralise production of IEC materials to account for local languages, cultural practices and religious beliefs. Consider printing messages on buckets, tanks and billboards as wells as paper. Repackage chlorine tablets or use solutions, so that those religious sects that are against the use of tablets will use chlorine without necessarily feeling that they are taking tablets.</p> <p>Advocate for alternative sanitation options. Consider initiatives for social mobilisation for cleaner environments and waste disposal.</p>

Document 19: Evaluation of the WASH activities undertaken to prevent and control cholera outbreaks in Guinea-Conakry & Guinea-Bissau, 2009

Agency	UNICEF - LSHTM
Context	Guinea-Conakry, capital city and district of Kindia. Guinea-Bissau, several towns and districts.
COMMUNITY WASH INTERVENTIONS	
Water Supply	
Water Treatment at source	
Water Treatment at point of use	G-C: Provision of Sur Eau to selected households. G-B: Distribution of bleach
Safe Water Storage	

Sanitation	
Hygiene Promotion	<p>G-C: Billboards promoting use of Sur Eau. Daily radio commercials promoting Sur Eau and hand washing. Group health education sessions for male head of household. Voucher for soap, jerry can with tap, Sur Eau and leaflet.</p> <p>G-B: Door to door visits using UNICEF posters and leaflets. 5-10 minute visit with provision of bleach or voucher to female head of household. Demonstrations of using bleach and hand washing with soap. Rural areas – demonstration done for large groups. Use of radio to access dispersed population. Bucket of chlorinated water for hand washing at port on route to market.</p>
Disinfection Practices	G-C: Cholera disinfection teams in operation, disinfection of latrine, well and household.
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	<p>G-C: Large scale media programmes promoting Sur Eau and mass distribution of free bottles resulted in a high uptake and knowledge of the product. However, the actual use of the product still seems to be low, with only 40% of households practising daily use.</p> <p>Both cities showed much higher TTC counts in the household as compared with the source which indicates considerable in-house contamination as a result of poor hygiene and poor household water storage facilities. This would suggest that a greater focus needs to be put on promoting household hygiene and safe water storage.</p> <p>Free provision of Sur Eau and soap will not automatically lead to higher rates of hand washing with soap or cleaner drinking water and vegetables.</p>
Main recommendations made	<p>Strengthen local municipalities and grass root and youth organizations, by providing them with WASH and formative research trainings. Conduct baseline surveys before an intervention is to be implemented so that the successes (and failures) of an intervention can be monitored and lessons learnt can be applied to future interventions.</p> <p>Conduct (formative) research before an intervention is planned so that messages and interventions can be tailored to the population at risk.</p>

	<p>An increased and equal focus on all cholera transmission pathways including food quality and safety at local markets/households. Inclusion of those responsible for water provision (tanker trucks etc) into the cholera working groups in both countries. Identify and target those motivational drivers within the community that can achieve sustainable behaviour change, as health education alone will not bring about a change in behaviour. Distribution of soap exclusively for hand washing.</p>
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Document 20: Position paper on household spraying, 2011

Agency	UNICEF, CDC and MSF
Context	General
COMMUNITY WASH INTERVENTIONS	
Water Supply	
Water Treatment at source	
Water Treatment at point of use	
Safe Water Storage	
Sanitation	
Hygiene Promotion	
Disinfection Practices	Spraying of households of cholera patients
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	<p>One-off disinfection of a household will not prevent recontamination. No residual effect of chlorine solution on dry surfaces. Excreta from asymptomatic family members poses risk of recontamination the household. Impractical, with high resources and time needed when multiple cases. Presence of spraying teams has potential to stigmatise cholera patients.</p>
Main recommendations made	<p>Households affected by cholera should be encouraged to carefully wash bedding, soiled clothes, hands, places where the patient has vomited, etc. with dilute sodium hypochlorite (bleach) or other disinfectants (if available), water, and soap and let affected bedding, etc. dry in direct sunlight.</p> <p>Bedding, clothing and other materials from cholera patients should not be washed in open waters.</p> <p>As an alternative to spraying, provide households with the means and knowledge to do proper home disinfection for several weeks (as opposed to a one-off event). This can be done in conjunction with efforts to provide households with products and education for</p>

	household drinking water treatment, safe food preparation, and hand washing.
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Document 21: WASH cholera - Trip report in Guinea and Sierra Leone, 2012

Agency	UNICEF
Context	Guinea and Sierra Leone. Island fishing communities.
COMMUNITY WASH INTERVENTIONS	
Water Supply	
Water Treatment at source	
Water Treatment at point of use	Household water treatment products
Safe Water Storage	
Sanitation	
Hygiene Promotion	Key message dissemination via radio and household visits.
Disinfection Practices	
Food Safety and Hygiene	
LESSONS LEARNT AND RECOMMENDATIONS	
Key lessons learnt	Manipulation of fresh fish by women linked to high cholera incidence in under five years old children.
Main recommendations made	Develop specific hygiene messages related to food and seafood preparation alongside hand washing. Sierra Leone: Where water is exported from the mainland to islands, disinfection of water containers and safe handling of water should be promoted.

Discussion and Conclusions

General

As already identified in Phase 1 of the research project there is a general lack of literature documenting experiences of the effectiveness or health impact of WASH intervention in cholera outbreaks. Whilst many agencies have a mandate to respond to cholera outbreaks and have their own individual guidelines there appears to be a lack of consensus on how, and which WASH interventions to prioritise. By reviewing the publically available guidelines, and some of the recent practice literature we have been able to highlight general discrepancies between different agencies' approaches, and furthermore distil useful information that can guide future practice and more importantly further research.

Water supply

The supply of safe water in sufficient quantity is regarded as high priority in a cholera outbreak response. The way in which it is delivered will depend on the water systems available and may include but not limited to: provision of temporary water system (tanks and reservoirs), water trucking, improved wells, or repair and maintenance of piped water distribution systems.

Examples of good practice have recognised that community involvement is important in the management of communal water points including their maintenance (ensuring adequate drainage) and the administration of user fees (where necessary). The link with the community to identify areas where water systems need repairs (i.e. leakage detection) is also useful to understand potential

cholera transmission sites. Ensuring water distribution systems are kept under pressure in times of electric load shedding is key to ensuring contamination episodes are kept to a minimum as water outages are linked to spikes in cholera incidence.

In other locations the role of water vendors and donkey carts owners is considered important as they can play a role in cholera transmission, particularly where water is sold in public places such as markets. The monitoring of tankering operations, and ensuring tanker drivers are trained in the safe delivery of water is also key to ensuring that sufficient water arrives where and when it is needed.

Water treatment at source

The monitoring of water quality parameters at all water points is considered as a routine activity by the majority of responding agencies. This is in order to be able to make decisions about actions to improve quality where necessary. Data from analysis may also be passed onto the relevant authorities to help prioritise their actions to high risk areas. Data has been used in the past to encourage water authorities to increase chlorination doses at central water supply works or at individual reservoirs (MSF, Haiti, verbal communication).

Bucket chlorination, the administration (by trained technicians) of chlorine direct to the user's container is considered by some agencies as feasible, and appropriate for the short term as long as the epidemiological data justifies it. However other organisations consider it to be too labour intensive, too complex to understand, and only to be implemented as a last resort. Local chlorine products should be used where available, and preferably administered by trained hygiene promoters to encourage acceptability. In the past if sensitisation and explanation of the benefits are not properly explained, misperception of NGO activities may arise such as 'they are poisoning the water or 'infertility chemicals are being added to the water'. In other cases, acceptability of the chlorine taste has been an issue where incorrect dosage has taken place. Training of technicians and intensive sensitisation of community leaders and the general community is key to ensuring acceptance and adherence to the procedure. Manual chlorine dispensers have also been used as an alternative to bucket chlorination but so far no information on their function and use in emergencies is available (verbal communication).

Chlorination of high risk lined wells is recommended by some agencies but in general the practice of chlorinating unlined wells either directly or by using pot chlorinators is no longer recommended. This is due to it being unsustainable and ineffective as the chlorine is used up by the organic matter of the well walls.

The practice of regular tank or reservoir cleaning should only be implemented if treated water is being supplied simultaneously to the tank, otherwise it will be ineffective.

Water treatment at point of use

All guidelines recommend that treated water (0.5 mg/l FRC) should be provided at the household level in a cholera outbreak, and most advocate this through household water treatment combined with safe storage (HWTS). This comprises the distribution of appropriate treatment products (Aquatabs, PuR, Sur Eau, Watermaker), monitoring of their use, and ensuring that users have the relevant information and training to be able to apply the correct dosage, or follow the correct procedure.

Where adherence to the use of products has been good, this has generally been during the outbreak period, tailing off in the inter-epidemic period. Chlorination is seen as an emergency intervention rather than a sustainable long term solution. This is probably explained by the fact that in order to

achieve sustained behaviour changes towards water treatment, longer term objectives involving social marketing approaches, require specific expertise and appropriate resources.

Issues that have also arisen in practice, relate to the variety of products that exist and potential confusion over different dosages and methods of application. This can also extend to the social and religious aspects in some cases where the use of tablets is forbidden. Also where products are distributed free this does not necessarily translate into safer drinking water.

The distribution of ceramic filters has been implemented in cholera outbreaks, but questions over sustainability, affordability and efficiency have been raised and alternatives such as simple filtration through cloth or sand may have achieved the same results.

Safe water storage

Safe water storage means that once water has been collected and/or treated it is kept in a container that prevents it from becoming contaminated by dirty hands or animal faeces etc. Most guidelines recommend the use of containers as outlined in the Centres for Disease Control (CDC), Safe water System; a closed container with a tap, a narrow necked container or use of a dedicated water extraction implement. Safe water handling practices including disinfection of container are also promoted alongside distribution of vessels such as jerry cans. Experience shows that communities that are used to running water will not necessarily have access to water collection or storage containers. These items are seen as a priority for distribution not just in cholera outbreaks but other types of emergency.

Sanitation

Provision of household sanitation in cholera outbreaks is rarely implemented as a priority due to the amount of time and resources required to achieve sufficient coverage to have a health impact. Agencies tend to prefer to focus on promotion of latrine use rather than get involved in delivery of the facilities. The provision of sanitation is more often than not implemented as a result of other humanitarian crises, for example for displaced people living in camp settings.

All cholera guidelines do however recommend the construction or rehabilitation of communal latrines in public places such as markets and ports. This is followed up by examples of good practice where hand washing facilities are provided and the latrines are adequately maintained and cleaned by community committees.

Issues have arisen relating to the safe management of sewage sludge where latrines have to be emptied manually. As experienced in Haiti the final disposal of sludge is a challenge where no central wastewater treatment facilities exist.

Several other initiatives are recommended by different agencies such as behaviour change initiatives to promote latrine use and open defecation free communities or community led sanitation action, but experience has shown that this has to be a long term objective and requires specific expertise.

The disinfection of latrines using chlorinated lime has also been implemented in outbreaks and solid waste management and clean up campaigns of public places are promoted by some agencies but not seen as a high priority in an outbreak.

Hygiene Promotion

The promotion of hygiene and raising awareness about cholera through information, education and communication of messages is considered as the main outbreak response intervention by all agencies, as first and foremost it enables people to protect themselves and their families, without

using massive resources. The majority of agencies will advocate the use of mass media such as radio and TV to disseminate messages followed by household visits by community health workers. Films such as the 'Story of Cholera' have been screened in public places to raise awareness. Messaging may be accompanied by the distribution of non-food items aimed at preventing cholera such as water containers and chlorine products, but most importantly soap to encourage hand washing at critical times.

More recent guidelines encourage the use of behaviour change theory to identify and target motivational drivers within the community which can bring about a sustained change in hygiene practices. This involves a more participatory approach rather than the more traditional health education and message based approach. Experience has shown that identifying diverse social groups allow a more focussed group discussions and schools in particular have been targeted by some agencies. Lessons learnt from past outbreaks mainly centre around the appropriateness of messaging and materials related to social, cultural, religious, political aspects as well as gender balance and literacy. Messages should consider multiple transmission pathways of cholera and a focus on household hygiene with particular effort related to promoting hand washing with soap.

Disinfection practices

The main interventions related to disinfection revolve around education and mobilisation of the safe handling of the dead, as funerals have been implicated as potential sources of outbreaks. All guidelines will promote safe handling of corpses where culturally appropriate, supervised burial practice by a trained person. This is to ensure that whilst cultural and religious practices are respected, those involved in preparing the corpse and funeral attendants reduce their risk of contamination and transmission to others through poor hygiene and food handling.

In the past, it was a common practice in cholera outbreaks to spray the houses of cholera patients with disinfectant, with the aim of controlling the spread of infection to family members. In the initial stage of an outbreak, disinfection teams would be sent to the households to disinfect floors, surfaces, latrines and bedding. This had the potential of causing damage to domestic property and stigmatising the patients and their families, putting in jeopardy the reporting and detection of cases and thus the whole outbreak control effort. Due to the large amount of resources involved and more recently the scale of outbreaks making the intervention unmanageable, agencies have questioned the effectiveness and feasibility of continuing this strategy whilst seeking alternative solutions. Consequently several agencies came to the conclusion that:

- One-off disinfection of a household will not prevent recontamination.
- There is no residual effect of chlorine solution on dry surfaces.
- Excreta from asymptomatic family members will still pose a recontamination of the household.
- The intervention is impractical, with high resources and time needed when multiple cases arise.
- The presence of spraying teams visiting the household has the potential to stigmatise cholera patients in their community.

Nowadays, the practice of household spraying is, in general, considered an inefficient use of resources and ineffective. However, some agencies still value the importance of visiting the houses of cholera patients in order to detect further cases, whilst other agencies are implementing an alternative solution of distributing household disinfection kits to family members of patients admitted to treatment centres. The distribution of kits places the responsibility with the family, which aims to reduce the stigma attached to the disease and hopefully encourages sustained and improved hygiene at the household level. More recent experience shows that sample kit comprising a bucket, soap and bleach could be an alternative to spraying.

The disinfection of public places, in particular, markets has also been implemented in outbreaks, presumably as a way to raise awareness that cholera is transmitted through multiple routes including unsafe handling of food as well as poor hygiene and contaminated water.

Food Safety and Hygiene

The recommendations in cholera guidelines related to food safety focus around training and education of food vendors in public places. Training and support is also recommended for authorities responsible for inspection of food outlets. Food hygiene promotion also extends to the household level as well as schools and social events. Some guidelines also recommend activities promoting exclusive breastfeeding and safe fluids and food.

Information on practical implementation of these activities is very scarce, limited to some information highlighting the role of preparation of fresh seafood in high incidence of cholera in children, particularly in fishing communities.

Recommendations for evidence-based best practice

Water supply

Currently there is no published evidence on the impact of improved water supply alone on cholera incidence. The only study attempting to link this with cholera incidence was carried out in 1974 [1] where a reduction of 73% in cholera incidence was recorded when water distribution system improvements were implemented and maintained. This study however suffered from the methodological weakness of attempting to compare one community with a control community effectively the same as comparing one person with another.

In light of the lack of evidence, best practice should build upon the current guidelines and practice experience.

- Ensure access to adequate safe water (according to SPHERE Standard). 20 litres per person per day through safe water supply systems (monitoring and maintenance of water supply works, tankering operations, temporary water tanks and tap stands, improved wells and springs)
- Involve the community (community leaders, tanker owners, water vendors) in the cholera control strategy from the start of the outbreak. Set up community systems to implement activities including; water leakage detection, maintenance of water tanks and drainage, management of use fees and mapping and monitoring of free chlorine residuals at communal water points (i.e. water points linked to water distribution network and tanker operations).

Water treatment at source

The published evidence of water treatment at source focusses solely on well chlorination methods [2-4] and all report problems with maintaining adequate levels of chlorine for prolonged periods, and finding an appropriate design that could be locally made and affordable. The acceptability of the devices and chlorinated water by the local population was not rigorously tested, however, interventions in one country appeared to show that well chlorination without proper promotion and education led to a false sense of security. This highlights that water quality interventions are likely to be futile if not accompanied by adequate training, health education and hygiene promotion. In the case of well chlorination, implementers must be trained how to treat wells and monitor residual chlorine levels, while users must be informed of the contact time necessary for disinfection. Lastly and most importantly, hygienic water handling practices must be promoted as poor hygiene is likely to undermine an intervention.

In light of the evidence, recommendations for best practice for treatment of water at source is:

- Water from unlined, unprotected wells should be treated by controlled bucket chlorination at the source or alternatively at the household level.
- High risk lined wells should only be directly chlorinated if no other alternative, such as controlled bucket chlorination, is feasible.

Since there is a lack of evidence on which to base best practice it is also recommended that:

- All water treatment methods used at the source (e.g. bucket chlorination) should be monitored and evaluated to establish effectiveness in terms of function, use and impact on health.
- Water quality of all water points used for drinking purposes be monitored for quality (pH, turbidity, FRC if appropriate) and microbiological parameters (when feasible). All water points are assumed to be contaminated until proved otherwise.
- Cleaning of water tanks should be implemented simultaneously with the provision of treated water not as a stand-alone intervention.

Water treatment at point of use

Options for water treatment at the household level (HWTS) are the most studied interventions in current published literature with distribution of chlorination products the most popular [5-9]. Simple filtration using cloth and solar disinfection have also been studied in this type of setting [10-12].

HWTS systems, as they focus exclusively on transmission via drinking water, are not suitable interventions in every cholera outbreak and should not be employed as a universal remedy. For chlorination in particular, evidence from non-cholera emergencies indicates that effective use was highest where households with contaminated water were targeted, the treatment method effectively treated the water and the population was familiar with the method and was willing to use it. In particular, issues relate to inconsistency of product use throughout the year, with chlorination in particular seen as an emergency measure, being used sporadically depending on its affordability and accessibility. Furthermore, mass distributed chlorine products are poorly used even where prevention knowledge was high.

Based on the evidence recommendation for best practice are:

- Water quality interventions must be preceded by formative research and accompanied by health education so that socially and culturally appropriate products for HWTS can be selected and sustainable behaviour change can be achieved.
- HWTS (with locally available products) should be implemented using a targeted approach to those communities most at risk and where social mobilisation is used to raise awareness of how to use the products correctly and efficiently.
- Where chlorination products are distributed, water quality analysis and free residual chlorine monitoring systems (at household level) should be set up to evaluate not only coverage but effective use of the products.

Safe water storage

The evidence relating to safe water storage is generally presented in combination with household water treatment. A study in an endemic setting in India [5] showed that the spread of cholera among household contacts of index cases was reduced by 75% when a group of families using a narrow necked container was compared with a control group. Another study in Bolivia [9] showed that the use of a safe water container alone was not enough to improve quality as the source water was

contaminated. Furthermore even if source water is free from contamination the disinfection of jerry cans does not prevent recontamination at the household [13].

Recommendation for best practice are therefore:

- Provision of safe water containers must be accompanied by the treatment of water and the intensive promotion of hygienic water handling practices.
- Containers should be provided to allow for separate collection and storage.

Sanitation

It is well documented that provision of sanitation and the removal of excreta from the environment will have a significant impact of burden of diarrhoeal disease, however there is almost no useful evidence for its impact on cholera incidence. In light of this recommendations for best practice should continue to build upon the following:

- Support to community authorities to provide temporary communal latrines with hand washing points in public places or the rehabilitation of existing facilities. In particular the focus should be on markets, ports and schools.
- Support short term initiatives to promote latrine use and community management of facilities.
- Assessment of option for the final disposal of sludge before initiating manual emptying of latrines and septic tanks.
- Advice to authorities on behaviour change and sanitation action where initiated by the authorities and expertise exists.

Due to lack of evidence and general consensus the following interventions are considered low priority and resources are better directed towards more effective interventions:

- Disinfection of latrines with chlorinated lime
- Solid waste management (unless in a cap setting or initiated by the local authorities, then support should be offered)

Hygiene Promotion

In our evidence review four studies were identified as evaluating community knowledge, and awareness of cholera prevention, all reported a positive effect [14-17]. In light of the abundance of evidence supporting the promotion of hand washing to reduce diarrhoeal disease, and since the same WASH interventions apply to cholera it is surprising that no study specifically evaluated hand washing with soap to prevent cholera. Only one study presented results for self-reported use, and access to soap, which in itself can be subject to bias [14]. The remaining studies focussed on the effectiveness of hygiene promotion intervention in eliciting behaviour change and water treatment practices. It should also be appreciated from these findings that improved knowledge does not necessarily translate into improved practices, and as such there is a need to find ways to evaluate hand washing interventions in more depth. Even where hand washing has been ascertained by observation, the use of self-reported diarrhoea incidence as an outcome measure still introduces bias. In future, more objective outcomes such as pathogen presence will need to be used.

Evidence for diarrhoeal disease suggests that hygiene behaviour is sustained following implementation and is best delivered using small groups and frequent personal contact with a hygiene promoter. The studies in this review all suggest that radio and TV are popular dissemination methods. Therefore the role of mass media should be explored further in comparison with more traditional methods, in those contexts where it is feasible.

In light of the evidence the following recommendations for best practice are made:

- Hygiene promotion, more precisely hand washing with soap, should be an integral component of any cholera control program. The use of mass media should be considered as a first method of dissemination.
- Formative research for messaging and behaviour change should include the analysis of cultural practices, political attitudes and religious beliefs surrounding cholera and identify the main social groups that can influence improved understanding of the disease and hence reduce any stigmatisation. Formative research will ensure that messages and activities are appropriate for the context and adapted to language and literacy levels.
- The distribution of soap is a simple and relatively affordable intervention. In particular soap for the purpose of hand washing should be distributed in addition to soap for laundry.
- Distribution of cholera prevention kits (hygiene kits) at the household level in the affected and at risk areas. These distributions should be accompanied with intensive and extensive cholera prevention sensitisation. The kits are composed of soap, water disinfection product, and any other relevant item depending on the context;

Disinfection practices

There is currently no published evidence of the effectiveness of household spraying. Therefore the decision to not recommend the practice is based more of the need to use resources more efficiently. Fortunately there is one study published which evaluates the uptake and use of household disinfection kits as an alternative to spraying [18]. Whilst limited in its generalizability, the study did record that certain items such as soap and bleach were more popular than others and that when information sessions were improved, the use of kits increased.

Based on the limited evidence, the recommendations for best practice are:

- As an alternative to spraying, provide the families of cholera patients, with a household disinfection kit (bucket, soap and bleach) and knowledge to do proper home disinfection for several weeks.

In the absence of evidence but based on experience:

- Provide support and training to health authorities on safe handling of the dead and safe funeral practices.
- Support initiatives in public places aimed at improving the hygiene practices of market and food vendors as well as those attending funeral and other religious or social events.
- Bedding, clothing and other materials from cholera patients should not be washed in open waters where others may collect water.

Food Safety and Hygiene

There is no specific published evidence available for the impact of food safety and promotion activities on cholera incidence, however epidemiological investigations have implicated food-borne outbreaks related to consumption of raw vegetable, fish and leftover foods.

In light of the lack of evidence recommendations for best practice should focus on:

- Food safety and hygiene promotion in public places (markets, fishing ports and schools). Safe handling of food, i.e. the use of utensils, by food vendors.
- Provision of hand washing facilities in markets to improve personal hygiene.
- Training and support to food regulation authorities where feasible.

Recommendations for further research

Potential areas for research include:

Water supply

- Link between water outages and cholera incidence in different settings (ongoing research by LSHTM, Jeandron, A.)
- Effectiveness of tanker operations at delivering safe water (0.5mg/l FRC) at the tap (camp setting)
- Use of GIS and mapping to monitor water system leaks and repairs and links to high cholera incidence areas.
- Knowledge, attitudes and practice of water vendors during a cholera outbreak.
- Impact of behaviour change interventions to improve safe water sales in markets during cholera outbreaks.

Water treatment at source

- Water quality monitoring to identify high risk transmission areas and the relation to cholera incidence.
- The impact of bucket chlorination on cholera incidence.
- The use of chlorine dispensers as an alternative to bucket chlorination.
- Acceptability of bucket chlorination as a cholera control intervention.
- The chlorination of high risk lined wells – chlorine decay over time in relation to number of users and environmental factors.

Water treatment at point of use

- Evaluate chlorine products on a technical (efficiency) and community (acceptability and adherence) level.
- Conduct baseline surveys so that the successes and failure of interventions can be monitored.
- Health impact evaluation of different chlorination products (Aquatabs, Sur Eau)
- Evaluation of effective use of household water treatment products and impact on cholera incidence.
- Evaluation of the adherence and acceptability of chlorine products delivered through mass distribution compared to targeted distribution.

Safe water storage

- Evaluation of the impact of promotion of hygienic water handling practices on the levels of FRC in household water. Measured through water quality analysis and bacteriological measurement (i.e. hand rinses)

Sanitation

- Evaluation of function and use of communal latrines in public places and the impact on hygiene practices of market vendors, fishermen and school children.

Hygiene Promotion

- Evaluation of different methods of hygiene promotion dissemination. Comparison of mass media and interpersonal communication methods.
- Health impact evaluation of hand washing with soap at the household level.
- The effect of conducting formative research on the knowledge, attitudes and practice of communities affected by cholera.
- Qualitative research on the effect of community activities on reducing stigma associated with cholera.

Disinfection practices

- Evaluation of the impact of household disinfection kits on interfamilial cholera transmission.
- Research on the impact of household visits in reducing the risk of household transmission.
- Risk factors for household transmission of cholera.

Food Safety and Hygiene.

- Evaluation of food safety interventions, (hand washing facilities, hygiene kits) and their delivery methods on improved hygiene practices of market vendors and public food outlets.

Limitations of this review

This review has been limited to publically available information and those documents collected through communication with representatives of international agencies. Whilst we have confidence that we have addressed the key objectives of the review, there is no doubt some information we have missed.

Due to the variety of grey literature collected, the documents were not evaluated for strength of evidence but rather for the content and technical aspects of the specific WASH interventions implemented. This may have resulted in bias towards those interventions where more detailed information was presented. It is acknowledged that this is a weakness of the review and that there is potential to carry out a more in depth analysis of this literature.

Despite these limitations we have been able to bring together and analyse a substantial amount of practical information which will certainly benefit the future phases of the project including providing recommendations for the key WASH interventions which need to be investigated in future cholera outbreaks.

Appendix 1 Practice literature list

DOC	AGENCY	TITLE	AUTHOR	SOURCE
1	ACF	Le choléra transfrontalier en Sierra Léone et Guinée en 2012 et les stratégies d'intervention associées, ACF, 2012	Dunoyer, Sudre	https://wca.humanitarianresponse.info
2	ACF	Le choléra au Tchad en 2011 et les stratégies d'intervention associées, 2011	Dunoyer, Sudre	https://wca.humanitarianresponse.info
3	ACF	Réduction du risque de propagation des épidémies de choléra à Conakry : IEC, alerte précoce et barrières sanitaires, 2012	Grayel	Email - Ben Allen, ACF (and annexes)
4	ACF	Réponse d'Urgence à L'Epidémie de Choléra en Haiti, 2011	Grayel	Email - Ben Allen, ACF
5	ACF	Evaluation externe du programme d'intervention pour limiter et prevenir la propogation de l'epidemie du cholera en RDC, 2014	Grayel	Email - Ben Allen, ACF (preliminary report)
6	ACF	Integrated chlorination campaign in Mogadishu. WEDC Conference, 2000	Libessart	http://wedc.lboro.ac.uk
7	ACF	Cholera Operational Positioning Paper	ACF	http://www.missions-acf.org
8	IFRC	DREF Final Report. Uganda: Cholera Outbreak in Mbale District, 2012	DREF, IFRC	http://reliefweb.int
9	MSF	OCG response to cholera in Haiti, October 2010 – March 2011, evaluation report (external), 2011	Bergeri	http://evaluation.msf.at
10	MSF	Review of the MSF response to the 2008-2009 cholera epidemic in Zimbabwe	Alberti	http://www.missions-acf.org
11	MSF	Overall response to cholera epidemics in Angola in 2006, 2007	Gerstl, Alberti	http://www.missions-acf.org
12	MSF	MSF-OCA Nigeria Emergency Response Unit's (NERU), End of intervention report, Gusau Cholera Outbreak Response, from September to December 2013	MSF -OCA	Email – Jeff Fesselet
13	MSPP Haiti	National plan for the elimination of cholera in Haiti 2013-2022, 2013	MSPP, DINEPA	Email World Bank Technical Meeting, 2014
14	OXFAM	Evaluation of the cholera prevention emergency program in the provinces of equateur, bandundu and the city province of Kinshasa, 2011	Search for Common Ground	https://www.sfcg.org
15	OXFAM	Real time evaluation of the Cholera Response in Zimbabwe, 2009	Simpson, Legesse	http://www.alnap.org
16	Solidarites	Lutte contre le cholera. Réponse aux flambées et prévention des risques en zones endémiques, 2011	Solidarites	Email - Jean-Marc Le Blanc
17	Solidarites	Strategie de lutte contre le cholera, Republique Democratique du Congo	Solidarites	Email - Jean-Marc Le Blanc
18	UNICEF	Evaluation of the WASH Response to the 2008-2009 Zimbabwe Cholera Epidemic and Preparedness Planning for Future Outbreaks, 2009	Zimbabwe WASH Cluster	http://www.unicef.org
19	UNICEF	Evaluation of the WASH activities undertaken to prevent and control cholera outbreaks in Guinea-Conakry & Guinea-Bissau, 2009	Ensink, Cairncross	https://wca.humanitarianresponse.info
20	UNICEF	Position paper on household spraying	UNICEF,CDC,MSF	http://www.unicef.org
21	UNICEF	WASH cholera - Trip report in Guinea and Sierra Leone, 2012	Bellet	https://wca.humanitarianresponse.info

Appendix 2 Guideline information extraction table

AGENCY GUIDELINE	UNICEF	ACF	OXFAM	ICDDR'B	MSF	WHO		
YEAR OF PUBLICATION	2013	2013	2012	2006	2004	2004		
COMMUNITY AND HOUSEHOLD WASH INTERVENTIONS							SCORE	%
WATER SUPPLY								
Sufficient safe water supplied for drinking (20lppd)	Y	Y	Y	Y	Y	Y	6	100
Temporary water systems installed and improvement of unprotected water sources (repair, operation and maintenance) incl. water distribution systems, tankering, wells, boreholes, springs and surface water	Y	Y	Y		Y	Y	5	83
Water vendors and tanker owners involved to increase awareness	Y	Y	Y				3	50
Urban water supplies involve community groups (leak detection)	Y						1	17
WATER QUALITY								
Treated water provided (0.5mg/l FRC at HH level)	Y	Y	Y	Y	Y	Y	6	100
Water quality is monitored and actions taken	Y	Y	Y		Y	Y	5	83
HWTS implemented (products distributed, use monitored, information and training provided on correct dosage)	Y	Y	Y			Y	4	67
Bucket chlorination at water source	LR	Y	Y		Y		3	50
Safe drinking water practice promoted (BCC, IEC)	Y		Y				2	33
Chlorination of high risk lined wells (direct chlorination not pot chlorinators with regular FRC testing)	Y	Y			N		2	33
Chlorination of unlined/unprotected wells	N				N		0	0
Borehole drilling	LR						0	0
WATER STORAGE								
Safe water containers are provided (covered container with tap, narrow neck, water extraction implement)	Y		Y		Y	Y	4	67
Safe water handling practices are promoted (i.e. water container disinfection)			Y			Y	2	33
SANITATION								

AGENCY GUIDELINE	UNICEF	ACF	OXFAM	ICDDR'B	MSF	WHO		
YEAR OF PUBLICATION	2013	2013	2012	2006	2004	2004		
COMMUNITY AND HOUSEHOLD WASH INTERVENTIONS							SCORE	%
Communal latrines in public places are provided that are adequate, accessible, clean and maintained (i.e. camps, market places)	Y	Y	Y	Y	Y	Y	6	100
Behaviour change interventions to promote latrine use and ODF communities	Y	Y					2	33
Community led sanitation action promoted	Y			Y			2	33
Chlorinated lime distributed for disinfection of latrines			Y				1	17
HYGIENE PROMOTION - CHOLERA AWARENESS								
Hand washing points provided in public/market places (construction, operation and maintenance)	Y	Y	Y	Y	Y	Y	6	100
Hygiene promotion and cholera awareness through IEC and messaging	Y	Y	Y	Y	Y	Y	6	100
Mass media interventions (radio)	Y	Y	Y		Y	Y	5	83
Interpersonal communication (HH visits by community health workers)	Y	Y	N		Y		3	50
Behaviour change interventions (HWWS at critical times)	Y						1	17
Awareness raising to alleviate stigma	Y	Y					2	33
Hygiene promotion in schools			Y				1	17
ENVIRONMENTAL HEALTH AND FOOD SAFETY								
Food safety training and food hygiene education is provided to food outlets	Y	Y	Y	Y	Y	Y	6	100
Food safety and hygiene promotion is prioritised at HH, Inst and social events	Y		Y	Y	Y	Y	5	83
Training and support to authorities with regular inspections of food outlets and institutions	Y	Y	Y	Y		Y	5	83
Exclusive breastfeeding, safe fluids and food promotion	Y			Y		Y	3	50
Solid waste is collected at ports, markets and public places (community clean-up campaigns with tools etc)	Y	Y	N		N	N	2	33
Solid waste education and communication sessions in schools	Y		N		N	N	1	17
Simple fly control measures (cover food, clear waste)			N		Y	N	1	17
Drainage channels kept open					Y	Y	2	33

AGENCY GUIDELINE	UNICEF	ACF	OXFAM	ICDDR'B	MSF	WHO		
YEAR OF PUBLICATION	2013	2013	2012	2006	2004	2004		
COMMUNITY AND HOUSEHOLD WASH INTERVENTIONS							SCORE	%
DISINFECTION								
Disinfectant materials and education provided on disinfection of HH and vehicles	Y	Y					2	33
Safe laundry practice education provided (i.e. not near open water sources)	Y					Y	2	33
Households and vehicles disinfected using pressurised sprayer	N	N	N			N	0	0
SAFE FUNERAL PRACTICE								
Education and mobilisation on safe handling of dead	Y	Y	Y	Y	Y	Y	6	100
Cholera safety education at funerals provided to community leaders and health workers	Y	Y	Y	Y	Y	Y	6	100
NFI								
Supplies for WASH safety distributed with training and support	Y	Y	Y		Y		4	67
Items as defined in SPHERE distributed	Y	Y	Y				3	50
Soap or cholera prevention kits (rural)			Y	Y	Y		3	50
Soap or cholera prevention kits (urban)			N	Y	Y		2	33
Targeted distribution to high risk and vulnerable populations	Y	Y					2	33

Y= recommended and mentioned in guidelines, N = Not recommended in the guideline, LR = Only recommended as a last resort

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