



## **Global Task Force on Cholera Control (GT FCC) Working Group on WASH**

**WASH-related research for cholera control**

Webinar, 7 July 2021

## CONTENTS

Acronyms and abbreviations .....	2
Participants .....	3
Introduction .....	3
Overview of GTFCC WASH-related research priorities.....	3
Recent research on cholera at Tufts University .....	5
Effectiveness of hygiene kit distribution to reduce cholera transmission in Kasai-Oriental, Democratic Republic of Congo: a prospective cohort study and process evaluation.....	7
Randomized controlled trials of evidence-informed WASH programmes to reduce cholera in Bangladesh and the Democratic Republic of Congo .....	8
Breakout groups.....	9
Group 1 report .....	9
Group 2 report .....	9
Group 3 report .....	10
Closing statement.....	11

## Acronyms and abbreviations

AMR	antimicrobial resistance
CATI	case area targeted intervention
CHoBI7	Cholera Hospital Based Intervention for 7 Days
CISUR	commonly-implemented, severely under-researched
CORTS	Community outreach response team
CTU	cholera treatment units
DRC	Democratic Republic of Congo
GTFCC	Global Task Force on Cholera Control
HDK	household disinfection kit
HWT	household water treatment
IPC	infection prevention and control
LRV	log reduction value
mHealth	mobile health
NCP	national cholera control plan
OCV	oral cholera vaccine
RCT	randomized control trial
RRT	rapid response team
US CDC	US Centers for Disease Control and Prevention
USAID	United States Agency for International Development
WASH	water, sanitation and hygiene
WHO	World Health Organization

## Participants

Ahmad Syed Yasir  
Alberti Kate  
Awal Nurullah  
Barboza Philippe  
Blanc Damien  
Bonnet Sophie  
Broban Anaïs  
Burt Zachary  
D'Mello-Guyett Lauren  
Drolet Adam  
George Christine-Marie  
Gojon-Gerbelot Marianne  
Groves Helen  
Haag Justine  
Lantagne Daniele  
Lim Jacqueline  
Maes Peter  
Martinez Valiente Marion  
Mohamud Dr.Mohamed

Montgomery Maggie  
Mulualem Yibeyin  
Nunn Mark  
Oger Pierre-Yves  
Olu-Daniels Ibiyemi  
Picot Valentina  
Porche Anne-Sophie  
Raja Muhammad Ali  
Rajasingham Anu  
Ratnayake Ruwan  
Reichert Albert  
Riems Bram  
Smith Kyla  
Valingot Christophe  
Vallis Stuart  
Wendland Annika  
West Laurence  
Wilson Jones Megan

## Introduction

This was the third webinar organized by WaterAid in 2021, following webinars that focused on the progress and experience towards ending cholera in Zanzibar and Zambia. With support from the GTFCC Secretariat, WaterAid organized this important discussion focused on the Water, Sanitation and Hygiene (WASH) related aspects of cholera control required to support the achievement of the Global Task Force on Cholera Control (GTFCC) global roadmap, Ending cholera: a global roadmap to 2030. Dr. Nurullah Awal, Health Adviser of WaterAid Bangladesh chaired the session.

The objectives of this webinar were as follows:

- To take stock of new developments in the field of research on water, sanitation and hygiene (WASH) and Cholera
- To identify gaps and define priority needs and potential partners for research on topics related to WASH for cholera control and elimination
- To discuss the GTFCC research agenda with a special focus on WASH topics.

Another similar meeting will be held in September 2021 to identify new and emerging workstreams.

## Overview of GTFCC WASH-related research priorities

*Daniele Lantagne, Tufts University*

The GTFCC Cholera Roadmap Research Agenda identifies the knowledge gaps most important to cholera experts and stakeholders and establishes a prioritized list of research questions. Its objective

is to accelerate progress toward the goals of the Global Roadmap: a 90% reduction in cholera deaths and cholera elimination in 20 countries by 2030.






The origins of this work date back to July 2018, when the GTFCC, the Wellcome Trust and DFID identified the following priority research areas for the WASH Working Group:

- Commonly-implemented, severely under-researched (CISUR) areas
- Community outreach response teams (CORTS) (formerly rapid response teams/RRTs and CATI)
- Minimum WASH packages for response
- Synergy between oral cholera vaccine (OCV) and WASH
- Motivators and barriers for behaviour and practices
- Programmatic learning for integrated response for control and elimination.






This precipitated a consultancy effort by EpiLinks (funded by the US Centers for Disease Control and Prevention/US CDC), under the leadership of UNICEF, to outline a harmonized research plan that would guide and prioritize WASH and cholera research and support advocacy and resource mobilization. Outcomes from the work were shared with the GTFCC for inclusion in the broader research agenda (the GTFCC WASH community remained deeply involved in the development of the Agenda throughout the consultation).

Prioritization of cholera research questions was done through consultations with 177 cholera experts and global, regional and country stakeholders. The agenda provides a list of the top 20 highest-priority research questions, along with the top five priorities per roadmap pillar (those pillars being OCV, WASH, surveillance, case management and community engagement). In addition, it outlines the three highest priority areas for discovery research.

The top 5 priorities under the WASH pillar are as follows –

Rank Within Pillar	Research Question
1 	What levels of coverage for relevant water, sanitation and hygiene interventions is required in cholera hotspots to control and ultimately eliminate the risk of cholera?
2 	What are the most essential (or what is the minimum set of) infection prevention and control (IPC) interventions in cholera treatment facilities and oral rehydration points to reduce risk of transmission within these facilities?
3 	Is improved access to safe water (e.g., water points and distribution networks) effective in controlling and preventing cholera outbreaks?
4 	How can “design thinking” be used to improve the delivery and uptake of water, sanitation and hygiene interventions? Design thinking focuses on understanding the needs of people who will use the intervention and working with them to improve it.
5 	What are the factors and determinants that lead to sustainable investments in water, sanitation and hygiene at the country level?

– and the prioritized multi-sectoral research questions are as follows:

	Is there additional benefit to adding WASH packages, for example household WASH kits, to an oral cholera vaccine campaign?
	What is the incremental benefit of implementing a comprehensive interventions package (including water, sanitation and hygiene, antibiotics, oral cholera vaccine, oral rehydration therapy) to reduce cholera mortality during an epidemic?
	What is the most cost-effective package of water, sanitation and hygiene and oral cholera vaccine in different situations, based on transmission dynamics in cholera hotspots?
	What is the role and added value of CORTs (community outreach response teams) in enhancing case investigation and outbreak detection?
	What are effective strategies to scale up the use of household water treatment in controlling cholera outbreaks?

All GTFCC stakeholders can use the research agenda in some way. For researchers, it can be a tool to prioritize the design and execution of research activities. Donors can use it to identify research projects that will have the greatest impact on practice and policy. Programme implementers can collaborate with researchers to address implementation barriers and update operational plans. National policymakers can incorporate research priorities and goals into their national cholera plans (NCPs) and use research to strengthen cholera policies and strategies.

Working group members are asked to share examples of where research has been used or is being used to inform policy or implementation. A research tracker will be launched later this month. This will monitor progress against the agenda by collecting information on cholera research projects and displaying it on an interactive map available on the “research” section of the GTFCC website. GTFCC partners are requested to assist by contributing research project information directly through the GTFCC website: [www.gtfcc.org/cholera-research-tracker/submit-your-project](http://www.gtfcc.org/cholera-research-tracker/submit-your-project)

## Recent research on cholera at Tufts University

**Daniele Lantagne**, Tufts University

Household spraying with disinfectant is a traditional approach to cholera control; but it is not recommended by many guidelines for several reasons. These include lack of evidence, concerns about stigmatization, possibility of surface recontamination, delays in reaching patient households, desiccation of *V. cholerae*, a general lack of spraying recommendations, the possible damage spraying can cause to household items, and the fact that this method is resource- and staff-intensive.

Dr Lantagne’s group carried out a laboratory study to evaluate the efficacy of different spraying and wiping guidelines against *V. cholerae* on various surfaces. After carrying out 240 different tests on a range of different surfaces inoculated with 2 mL 10<sup>6</sup> *V. cholerae* CFU/100 mL, the conclusions were that the use of different chlorine types showed no significant differences. Mean log reduction value (LRV) was significantly higher on sprayed surfaces and significantly lower on porous surfaces. Based on this, the recommendations of the study are to use 0.2/2.0% chlorine solutions when spraying on both porous and non-porous surfaces, and to use 2.0% solutions when wiping.

A further study evaluated three programmes spraying during cholera outbreaks. Key results were that spraying can reduce contamination on household surfaces if implemented properly, but that coverage

is limited and the identification of households is a particular challenge. Recommendations for programmes implementing household spraying are to use a systematic procedure that ensures complete coverage. Spraying should be done until the target surface is wet, and spraying kitchen areas with a 2.0% solution is critical. Community coverage should be increased and household spraying opportunities should also be leveraged for hygiene promotion.

A further study was done in Haiti on facilitators, barriers, training and evidence needs around the implementation of household disinfection kits (HDKs). 14 implementers of household disinfection interventions were interviewed (five international level and nine national level informants) and a pilot field study on kit use in Haiti consisting of two sessions (a lecture and a demonstration) was given to 20 participants, followed by surface sampling. Interview results revealed widespread confusion between HDKs and hygiene kits. Respondents often failed to choose between the two because of a lack of knowledge or their position in the decision-making chain. Their perceptions in the interviews were classified according to four themes: effectiveness and certainty of the method, implementation of the intervention, perception of chlorine/bleach and beneficiaries' behaviour change. Perceptions revealed more drawbacks than advantages for both HDKs and household spraying; a perceived effectiveness gap for both methods causing reliance on other approaches; and a tendency to question the use of household disinfection completely and/or give it a low priority. Field study results showed bedrooms, latrines, and kitchen floors to have the highest contamination, and 60-73% participants reported using correct concentrations. They also showed the following differences between training groups:

	Lecture-based session (1)	Demonstration session (2)
Significant bacteria reduction (p-value)	<i>Vibrio</i> spp. (p=0.012)	<i>Vibrio</i> spp. (p<0.001) <i>E. coli</i> (p<0.001)
Self-reported HDK use	17-50% of participants	78-89% of participants

Neither spraying nor HDK use was shown to be better or more worthy of promotion. Factors affecting effectiveness are related to complex issues such as efficacy, implementation, training, and socio-behavioral factors.

A further study looked at the effectiveness of ceramic filters for *V. cholerae* removal. Ceramic filters often provide a locally acceptable household water treatment (HWT) option to remove *E. coli*. They work through three possible mechanisms: size exclusion, physio-chemical removal and silver disinfection. This study looked at their effectiveness for *V. cholerae*. Filters containing silver showed high LRVs for both *E. coli* & *V. cholerae*, while filters without silver had lower LRVs for *V. cholerae* when compared to *E. coli*. The silver mechanism therefore seems to be critical – though its effectiveness depends on manufacturing, and inflowing water quality can cause elution over time.

In discussion it was noted that the silver impregnated filter evaluated in the WHO HWT evaluation scheme did not have an added removal benefit, suggesting that the level of benefit is dependent on both filter quality and the type and application of silver. The take home point here is the need to look at each type of HWT, checking each product –a problem with ceramic manufacturing and local manufacturing in general. Even within a product group there are big performance gaps. Each ceramic filter made locally has a different manufacturing variable (though the working group does make recommendations). On balance, silver is the most important exclusion mechanism for *V. cholerae*.

# Effectiveness of hygiene kit distribution to reduce cholera transmission in Kasai-Oriental, Democratic Republic of Congo: a prospective cohort study and process evaluation

*Lauren D'Mello-Guyett, London School of Hygiene and Tropical Medicine*

The Democratic Republic of Congo (DRC) accounts for 5-14% of the annual global cholera burden annually, with >56,000 cholera cases and 1190 deaths in 2017 alone. DRC has experienced outbreaks of cholera annually since the 1970s, whilst also experiencing multiple humanitarian crises across the country that further exacerbate the risk of cholera epidemics. 80% of cholera transmission in DRC is within households, and household contacts have 100 times the risk of cholera. Transmission occurs through shared drinking water, food and caring responsibilities.

The objectives of this study were (1) to investigate the effectiveness of hygiene kit distribution combined with health promotion to reduce suspected cholera and self-reported diarrhoea among household contacts of suspected cholera patients admitted to Médecins sans Frontières (MSF)-supported cholera treatment units (CTUs) in Kasai-Oriental province, DRC; and (2) to identify the successes and barriers of hygiene kit distribution for cholera control in order to understand delivery, use and scalability, and to propose recommendations to optimise future programmes.

The study site was in Kasansa district, Kasai-Oriental province, home to about 230 000. Road access is limited, SES is low and the number of healthcare facilities is limited. The cholera burden in 2017-2018 was high and an outbreak started on 9th August 2018. The study design was a prospective cohort study that enrolled suspected cholera patients and their patient-household sets at CTUs. Baseline data collection was done within 48 hrs and households were revisited after seven days. Data was analysed for association between hygiene kit use and disease outcomes and the evolution of water and food contamination from enrolment to seven-day follow-up. A process evaluation ran in parallel to the prospective cohort study, exploring three domains of implementation of the intervention, participants' responses to the intervention and the context in which it was delivered. Data was collected between October 2018 and February 2019

The prospective cohort study population included 94 suspected cholera cases/households with 444 household contacts (defined as individuals sleeping under the same roof and sharing a cooking pot with the suspected cholera case during at least the previous five days). The process evaluation study population was made up of 27 household members that had received a hygiene kit (13 were female and the average age was 43) and 17 implementers (seven from MSF, four from local government and six from other NGOs, a total of three of whom were female). Thirty-four programme reports/datasets were produced.

The study intervention was one hygiene kit per household, accompanied by standard WASH-related health promotion messages, delivered by community health workers (CHWs) to the household contacts of patients on the day of the patient's admission to either of the two MSF-supported CTUs. The hygiene kit included a 10 litre handwashing device – a bucket with tap, a 20 litre jerrycan, water treatment products (Aquatabs™ disinfectant and/or P&G Purifier of Water™ combined with flocculant/disinfectant ) – and 1kg of soap.

Data collection for the prospective cohort study was done through household surveys measuring WASH conditions and uptake and use of the intervention; individual surveys measuring self-reported clinical outcomes, including symptomatic cholera and/or diarrhoea; and water and food samples to measure environmental contamination with indicator bacteria *Enterococcus* spp. Data collection for the process evaluation included a review of inventories (supply chain manifests and receipts); a review



of clinical data; structured observations at health care facilities; a review of project documents; and a series of semi-structured and in-depth interviews.

In the prospective cohort study, multivariate analysis suggested evidence of a dose-response relationship with increased kit use associated with decreased risk of suspected cholera. Household contacts in the high kit-use group had a 66% lower incidence of suspected cholera; the mid-use group had a 53% lower incidence; and the low-use group had 22% lower incidence compared to household contacts who had not received a hygiene kit. Drinking water contamination was also significantly reduced among households in receipt of a kit. There was no significant effect on self-reported diarrhoea or food contamination among this study population.

In the process evaluation, successes included the fact that the majority received kits at admission to facilities; demonstrations of their use were clear; households were satisfied with the kit contents and used all components; there was high adherence to the use of handwashing devices, jerrycans and soap; and overall improvements were observed in household WASH conditions. Barriers included delayed cholera response; delayed supply of kits; limited supply of kits; kits that were insufficient for one-month use; poor recall of water treatment practices by households; and limited water supply in some areas.

Conclusions from these studies suggest that integration of WASH at the point of admission of suspected cases is possible and seems to be a promising intervention for case-targeted cholera control. There was positive response to, use of and adherence to the use of hygiene kits by households, but there are barriers to timely supply and availability of kits, and consequent limited coverage. Further work is required to identify ways to improve the implementation and delivery of this promising intervention.

In response to questions, it was clarified that it is not possible to say which parts of the kit provided more or less protective effects. Use of water treatment was low. Regarding limited supply, thinking about prepositioning could have facilitated great improvements.

## **Randomized controlled trials of evidence-informed WASH programmes to reduce cholera in Bangladesh and the Democratic Republic of Congo**

*Christine Marie George, Johns Hopkins School of Public Health*

The Johns Hopkins Bloomberg School of Public Health partnered with the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) to develop the Cholera Hospital Based Intervention for 7 Days, or CHoBI7. This is a healthcare facility-initiated WASH intervention whereby health promoters visit patients' bedsides in healthcare facilities to deliver a WASH communications module on water treatment, handwashing with soap and safe water storage. This is later reinforced through home visits. In a randomized controlled trial of the CHoBI7 programme it was shown to reduce cholera significantly among household members of cholera patients, and to lead to sustained improvements in household stored drinking water quality and handwashing with soap practices 12 months post intervention.

Building on this, a further study partnered with the Bangladesh Ministry of Health and Family Welfare to develop scalable approaches to deliver the CHoBI7 programme across Bangladesh, using funding from the United States Agency for International Development (USAID); this led to the development of the CHoBI7 mobile health (mHealth) programme. Delivery of WASH through mobile health is a promising approach in Bangladesh, where over 150 million mobile phones are registered with the



government and 90% of households have at least one active SIM card. The CHoBI7 mHealth programme builds on the previous version of the CHoBI7 programme by removing the need for home visits. This programme is initiated in the healthcare facility, where a health promoter delivers a WASH communication module to the patient and their accompanying family members and provides them with a hygiene kit. Patient households are then sent weekly reminders of the promoted WASH behaviours by voice and text message over a 12-month period. The cost of delivering weekly mobile messages to patient households in Bangladesh for a year is USD 2. A recent randomized control trial (RCT) of the CHoBI7 mHealth programme demonstrated this intervention was effective in significantly reducing diarrhoea and improving child growth in patient households over the 12-month programme period. Results showed that mHealth is a promising, very low-cost approach for delivering cholera control programmes, and the programme is now being scaled across Bangladesh.

A further trial is being conducted on the impact of rapid response teams in hotspots. Work is also being done to evaluate CHoBI7 in a new setting in eastern DRC. A site was established in 2015 and a grant has been received to evaluate evidence-based approaches to reduce cholera in hotspots in Bukavu. This includes formative research to develop a WASH intervention and a randomized control trial to assess its effectiveness, as well as an mHealth component and a lab component to investigate transmission dynamics. An enteric microbiology lab has been set up, the only one in the area with the facilities to culture *V. cholerae*, which is also being run as a capacity building facility in partnership with the Ministry of Health.

## Breakout groups

The meeting then split into **three breakout groups** that spent 20 minutes discussing current and future research plans and opportunities for collaboration and identifying research priorities and gaps before reporting back to the plenary.

### Group 1 report

The broader health benefits of WASH are well known, particularly from large scale infrastructure improvements. Many questions remain around implementation in emergencies and in different contexts, and how to scale up in the most cost-effective way. Keeping high political priority for WASH is important: the research community needs to be smart and careful about how to message the broader benefits of WASH beyond cholera.

The group also discussed health outcomes and challenges around sustaining behaviour change. Hygiene and behaviour change communication mechanisms should be a research priority, to establish how best to encourage hygiene behaviour. Building on that, a great deal could be learnt from infection prevention and control (IPC) practices in healthcare settings and applying this learning to household and emergency settings – not just training, but provision of ongoing support, monitoring etc.

### Group 2 report

This group had a wide range of different participants including funders and implementers of research in several different countries, which provided an interesting mix of perspectives. The group heard about a number of pieces of research that will be starting soon, after COVID-related delays over the past year.

New and continuing work in DRC is looking at role of lakes in transmission: there has been a series of outbreaks in these settings so rather than waiting for next one, researchers are looking at historical data to identify hotspots and elements of transmission. This project is in the study phase.

Research starting up in Nepal in partnership with the Vaccine Institute in Korea is working with the Nepal NCP to start surveillance and get baseline information. This will include additional projects, including one on CATI with vaccines and WASH in Kathmandu. The project is also collecting samples from clusters of random individuals across country to do health systems analysis that will be starting soon.

There was discussion about working with GTFCC and how to continue building, acknowledging and disseminating work around linking up GTFCC working groups over the coming year.

Questions to prioritise include the need to define the research priorities of Member States. There is a need to assess learning across different areas to see how to get the best WASH packages; to target specific groups looking at CATI approaches; and to examine high risk areas and evaluate main transmission routes. WASH packages accompanying OCV campaigns should also be addressed.

As a general comment, it is pleasing to see increased research into cholera interventions. With the increasing amounts of data due to all this work, it is a good time to look at WASH coverage against cholera data and address any gaps. There are still important gaps on comparative interventions in the long term, and little information on the best holistic WASH approaches to address cholera.

### Group 3 report

New ways are needed to enable and maximise knowledge sharing of research and evidence. Following the presentations in this meeting, the working group should make a plan for how to transfer interventions which have evidence of success in some countries, like ChoB17 in Bangladesh and now PICH7 in the DRC, to other countries.

Priorities for *what* research and evidence is needed over the next 1-3 years include the following:

- Identification of research questions and generation of research addressing sanitation management for cholera control (e.g. how to limit contamination through adapted faecal sludge management)
- Establishing the optimal components a hygiene kit for effective cholera prevention and control
- Establishing how WASH interventions can be implemented effectively when there is limited access to the population at risk (e.g. during COVID-19 lockdowns)
- Looking into how systems and learnings from COVID-19 mobile health interventions can be adapted to cholera outbreaks
- Establishing what WASH interventions – particularly hygiene interventions – have and have not worked for COVID-19, and how can this be used to inform cholera control WASH interventions. This should involve research into how interventions that have worked can ensure that any hygiene improvements are not lost
- Research into what WASH messages are effective in demonstrating the cross-benefit of WASH interventions and behavioural change across COVID-19 and cholera

There are also a number of priorities for *how* research should be conducted. There is a need to prioritise research that collaborates with implementing partners. There is a lot of opportunity and scope within implementation programmes where research could aid and act, but this is not being done enough now. Community engagement should be a core component of WASH research for designing and evaluating interventions. Operational research being conducted in different countries and across different contexts should be prioritised.

## Closing statement

Philippe Barboza, GTFCC

It is always important to be reminded how little we know about one of the oldest diseases, and how much we need to develop to be able to move forward. It is also important to keep the focus on integrating the communities at the heart of the problem: there will be no long-term solution to cholera if we do not. This meeting was a good illustration of what we can do together.