Global Task Force on Cholera Control (GTFCC) Working Group on Water, Sanitation and Hygiene (WASH)

WASH data in cholera hotspots

Webinar 02, 22 April 2020

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Acronyms and abbreviations

DRC	Democratic Republic of Congo
FCR	free chlorine residuals
GTFCC	Global Task Force on Cholera Control
IHME	Institute for Health Metrics and Evaluation
JMP	Joint Monitoring Programme
KAP	knowledge, attitudes and practices
MDGs	Millennium Development Goals
OCV	oral cholera vaccine
SDGs	Sustainable Development Goals
TCV	typhoid conjugate vaccine
WASH	water, sanitation and hygiene
WHO	World Health Organization

Note to the reader

This report condenses discussions according to the subjects addressed, rather than attempting to provide a chronological summary. The summaries address the themes emerging from wide-ranging discussions among all speakers, and do not necessarily imply consensus. Summaries of presentations and points made in discussion are presented as the opinions expressed; no judgement is implied as to their veracity or otherwise.

Participants

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25. Laure Anquez
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27. Margot Nauleau
28. Marianne Gojon-Gerbelot
29. Mark Nunn
30. Monica Ramos
31. Nandini Sreenivasan
32. Paul Cottavoz
33. Peter Maes
34. Philippe Barboza
35. Pierre Fourcassie
36. Rick Johnston
37. Robert D'hondt
38. Rochelle Rainey

39. Shamim Qazi
40. Stephen Kiberti
41. Tom Handzel
42. Vincent Sodjinou

This webinar presented tools, approaches and strategies to collecting and assessing water, sanitation and hygiene (WASH) data in cholera hotspots. It was moderated by **Monica Ramos,** Coordinator of the WASH Working Group of the Global Task Force on Cholera Control (GTFCC).

Modelling of WASH in cholera hotspots

***Bobby Reiner and Ani Deshpande**, Institute for Health Metrics and Evaluation (IHME)*

Bobby Reiner began by underlining that access to safe drinking water and sanitation are human rights: unsafe water and sanitation increase vulnerability to the spread of infectious agents that cause diarrhoea, including *Vibrio cholerae*, and were respectively the first and second leading risk factors for under-5 mortality from diarrhoeal diseases in 2017, contributing to over 530 000 deaths around the world. Despite substantial expansion of access to WASH during the era of the Millennium Development Goals (MDGs), less than 75% of the population in many countries in sub-Saharan Africa and south and South East Asia had access to improved facilities in 2017. Water and sanitation indicators are defined by the WHO-UNICEF Joint Monitoring Programme (JMP).

Digging into the modelling initiative he explained that data sources used came from four countries: Kenya (22 water sources, 20 sanitation sources); Ethiopia (9/13); Tanzania (12/12); and Zimbabwe (5/4). The mapping procedures used do not make estimates for each administrative region, but rather for every 5km x 5km "pixel" across each country for each year. This allows for the generation of specific, customised shapefiles for custom regions, but does raise some issues in analysis. For example, there can be substantial variation between 5x5 km blocks in urban areas. Where data is not available to that degree of spatial resolution, the current approach is to assume the available data is representative of the region—which of course it is not—smoothening the estimates and lowering spatial variation.

There are several limitations to this approach. The analysis focuses on access by facility type, thereby providing a best-case scenario for the Sustainable Development Goals (SDGs) (i.e. assuming that all improved facilities are safely managed and provide basic services). As previously mentioned, the results may not fully represent intra-urban disparities in water and sanitation, and resampling polygon data to points could result in smoothed estimates in areas with predominantly areal data: there has not yet been enough of a systematic worldwide effort to collect this kind of geospatial data at sufficiently high resolution. Only covariates available at a degree of high spatial resolution and not strongly correlated with the current suite of covariates were incorporated, and the data do not capture the impacts of recent conflicts or weather events related to climate change. Survey data are also subject to biases and inaccuracies in reporting, and these issues, coupled with data scarcity in some locations, may affect the accuracy of the estimates. Due to computational limitations, uncertainty is not explicitly incorporated from the survey data or the intermediate covariates generated from the stacking procedure. It was also noted that data does not show differences between cholera hotspot priority areas, but it does suggest that hotspots in general had worse sanitation access than national averages, providing some signal that hotspots in general are worse off in terms of WASH access.

The relationship of WASH with water quality is more complex. In places like Zanzibar, where WASH access is available in 98% of circumstances, water quality—especially in hotspots—is the real challenge. Parsing this requires deeper understanding: looking at sanitation options where the water table is high, and those who depend on underground water, water quality becomes the main

confounder in terms of infection spread during the rainy season. But microbiological data are not available for most places (and are impossible to collect at a large scale, as this would involve taking thousands and thousands of samples). There is one meta-analysis that estimates faecal contamination of water sources in different countries, which is being incorporated into the analysis, and the manuscript of the forthcoming paper based on this research will look at how water access impacts the burden of diarrhoea diseases generally.

WASH in oral cholera vaccine (OCV) coverage surveys

***Nandini Sreenivasan**, US CDC, and **Malika Bouhenia**, WHO/GTFCC*

Oral cholera vaccine (OCV) coverage surveys permit evaluation of vaccination services and coverage, helping—among other things—to identify ways to improve future campaigns and coverage. Using a 2018 cluster survey methodology, they usually include one household questionnaire and several individual questionnaires per selected household. They require a large sample size (because coverage estimates are calculated by age group and include a category for 1-4 years), and typically enrol at least 1 000 households.

WASH questions—asked only at household level—are included in OCV surveys to allow estimation of access to safe WASH among households in targeted areas; evaluate knowledge, attitudes and practices (KAP) regarding WASH; improve understanding of WASH conditions and water quality among households in targeted areas; evaluate WASH messaging during OCV campaigns; and estimate coverage of WASH interventions if and when they are integrated with the campaigns. They can also include testing of household water for chlorine residuals. These questions help inform future WASH messaging in OCV campaigns and can help target WASH interventions; they impose negligible additional cost and time burdens; and they typically provide an aggregate coverage estimate for the targeted area, though the WASH indicators can be analysed descriptively at lower levels and adapted to suit individual countries/settings.

Malika Bouhenia and Nandini Sreenivasan presented a number of illustrative questions on water sources, sanitation and hygiene practices and messaging, then outlined the results for a number of example countries (Somalia, Democratic Republic of Congo and Zimbabwe) and the details of an upcoming OCV coverage survey planned for Cox's Bazaar in Bangladesh.

The limitations of this approach in WASH terms include the fact that OCV surveys do not always provide insight into WASH indicators early in, or at the peak of, a cholera outbreak; they require data collectors to be trained in WASH and to know how to respond appropriately to questions from households (though this can be incorporated easily into survey training); they do not allow for pre/post comparisons, and so cannot assess changes in knowledge, attitudes or practices; and sample sizes have to be based on vaccination coverage estimates.

The next steps in this integration project include the development of a set of standardized questions to incorporate into OCV surveys; the further piloting and development of a systematic approach for conducting surveys ; examination of ways in which to link data on vaccination status to WASH indicators; and exploration of the data from the Zimbabwe typhoid conjugate vaccine (TCV) coverage survey.

WASH baseline surveys

***Tom Handzel**, US Centres for Disease Control and Prevention (US CDC)*

The purpose of WASH baseline surveys in cholera hotspots is to create baseline estimates for WASH coverage in those hotspots; link to other activities (such as costed cholera plans or OCV coverage surveys); monitor progress in WASH coverage over time as WASH infrastructure is developed; demonstrate progress on the Cholera Roadmap; and link with preventative OCV campaigns.

Tom Handel presented a review of existing WASH assessment methods and the surveys and assessments that have already been conducted, along with the geographic areas they covered, the WASH indicators included, and the methodology and sampling strategies. Questions and indicators used for this type of survey are non-standardized (e.g. "where does your household get most of its drinking water?" or "During the last 3 months, were there times when drinking water was not available at your primary source?"). It can be difficult to compare results from different surveys, as they collect different information, so there is a case for some standardization of tools to benefit the bigger picture.

The assumptions and goals for the proposed WASH baseline are as follows: cholera hotspots are pre-defined; representative sampling is used, with random or cluster sampling (and no convenience sampling); and standard WASH questions are used to allow comparisons across surveys and over time, with a standard methodology powered for comparison of surveys over time. There will be a baseline, midline and an endline, and the surveys will be designed so that they can be conducted by local institutions with minimal external support.

There are two proposed methodologies:

- Scenario 1: surveys are done in cholera hotspots with planned OCV campaigns, and the WASH questionnaires will be included in the OCV coverage survey. These are often multi-stage cluster surveys, and paired water quality samples could be taken from a proportion of households in each cluster from stored household drinking water and source water. Pre-planning would ensure the sample size is sufficiently powered to make WASH coverage estimates by hotspot(s).
- Scenario 2: surveys are done in cholera hotspots with no planned OCV campaigns. The hotspot to be assessed is selected, potentially with a focus on a particular portion of the defined hotspot, or with more than one hotspot combined in a single assessment. Representative sampling methodology will be used.
    - For smaller hotspots, simple random samples will be done with the following assumptions: 80% power, 95% confidence intervals, 10% non-response, and a proportion of 50%; and that a sample size of 430 households is powered to make an estimate and detect at least a 10% difference between survey rounds.
    - For larger hotspots, a multi stage cluster survey approach will be used, with the assumptions of a default design effect of 1.5, 80% power, 95% confidence intervals, 10% non-response and a proportion of 50%; and that a sample size of 698 households is powered to make an estimate and detect at least a 10% difference between survey rounds. A standard WASH questionnaire will be used, based on JMP tools, and additional information can be collected beyond base information. Paired water quality samples will be collected from a proportion of households and the water sources of those households, with testing for free chlorine residuals (FCR) and faecal coliforms/E. coli.

This plan raises a number of topics for discussion, including whether there should there be one baseline per hotspot, or whether nearby hotspots should be merged for baselines; whether a cholera hotspot should be redefined if only a portion of the district is reporting cases (i.e. "hotspots within hotspots"); whether to include measurement of WASH in healthcare facilities within hotspots as an additional module; what level of change we expect to see or want to be able to detect; and how to balance rigorous data collection with the inevitable costs of collecting it.

The next steps in the project, upon agreement to go forward, are to develop a draft methodology document and have it reviewed by the WASH working group. When this is done, the draft methodology will be piloted in several cholera hotspots, both rural and urban, documenting the costs of data collection. Pilot WASH estimates will then be compared to modelling estimates for WASH coverage in those hotspots.

Q&A

A short period of general discussion raised the following themes:

- The integration of data collection for WASH in health care facilities might be good idea. WASH in these facilities is part of the roadmap, but it adds extra information and data collection requirements that need to be incorporated into surveys.
- On whether WASH baselines should be separate for each hotspot or not, both approaches are likely to happen. They have different characteristics and parameters, but separate baselines can only be done where sufficient resources are available (ideally, coverage surveys would be done in each hotspot, but the cost issue will be restrictive). If there is to be investment in WASH, significant funding will be required to raise WASH provision for each hotspot, of which the amount needed for surveys would be a small proportion; but it is not always easy to get funds for data collection in hotspots. If they are combined, though, some granularity of information is lost: this is the trade-off.
- With regard to questions around surveying hand washing practices in OCV coverage surveys and whether this was part of cholera elimination strategies, it was clarified that WASH prevention messaging is part of OCV campaigning, assessing whether households practice good prevention; but there is no analysis on whether vaccinated people are also those who have soap; instead, it is done just to assess whether the practices are carried out or not.
- With regard to cross cutting needs for WASH, especially hand hygiene, WASH data—especially in specific communities—is an important surveillance tool that allows prediction and modelling of interventions. Data is more consistent since about 2010, so there is potential for future geospatial analyses of hand hygiene data, but not at the same level of quantity as WASH data.
- Water quality versus water access raises concerns around data limitations, and whether having a sink in the house is related to actual hand washing behaviour.
- An exercise in Rwanda around 2000 looked at sanitation coverage and water coverage over three years. Sanitation was not a problem because population density was too high, so defecation was not an issue, but coverage of water points was. MSF obtained information on coverage, but found no correlation between data points over three years—though they did find very strong correlation between proximity to the lake and risk for Cholera, up to 50 times higher. Such higher risk factors flatten out other risk factors in these situations.

Concluding remarks

- It would be interesting to see how different data can be used to fine tune assessments of hotspots. This requires multilateral collaboration—not just hotspot teams defining what other pillars do, but also how other pillars can contribute to fine tuning the definition of a hotspot.
- The question of hotspots within hotspots should be approached globally. Hotspot calculation and estimation is a starting point, though it is subject to many limitations. For example, the way administrative areas are defined is extremely variable from country to country, and the level of reporting introduces biases, especially when very large administrative units make

targeting the at-risk population very difficult. This will be discussed with the surveillance working group. Lists of indicators and possible refinements have already been proposed to improve the definition of hotspots, and this is a work in progress.

- Integration with OCV work is a practical way to optimise GTFCC's multilateral approach, with all different pillars interacting. Cross-pillar work should be implemented as much as possible. On this note, discussion of WASH issues with regard to COVID-19 could be possible in future, though the short-term priority of the working group is to get through the content of the meeting initially planned in March. There are other ongoing COVID-19 webinars that already cover this topic, so it is important not to duplicate efforts. This theme could be explored, and probably best suited across all the different working groups (not solely focusing on WASH).
- The current trend in WASH as a key intervention across different epidemics could be a way to strengthen data surveillance as a predictor and a tool for modelling across different epidemics, and there are cross cutting issues with COVID-19 and other waterborne diseases. Doing surveillance would strengthen the WASH component of prevention activities—for example, it remains difficult to get good data on hand hygiene. There is lots of scope for how WASH can be used as an indicator across various diseases.