Global Task Force on Cholera Control (GTFCC) Working Group on Surveillance

Cholera Indicators

Webinar 01

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Acronyms and abbreviations

CFR	case fatality rate
DHIS2	District Health Information Systems
EBS	event based surveillance
GTFCC	Global Task Force on Cholera Control
IBS	indicator based surveillance
IDP	internally displaced population
IDSR	Integrated Disease Surveillance and Response
M&E	monitoring and evaluation
MAI	mean annual incidence
MOHCC	Zimbabwe Ministry of Health and Child Care
MSF	Médécins sans Frontières
NCCP	national cholera control plan
NCDC	Nigeria Centre for Disease Control
NGO	non-governmental organization
OCV	oral cholera vaccine
RDT	rapid diagnostic test
RWIMS	Zimbabwe Rural WASH Information Management System
UN	United Nations
US CDC	US Centers for Disease Control and Prevention
WASH	water, sanitation and hygiene
WHO	World Health Organization
ZIMSTAT	Zimbabwe Statistical Agency

Note to the reader

This report condenses discussions according to the subjects addressed, rather than attempting to provide a chronological summary. It addresses 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.

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This webinar was moderated by **David Olson** (WHO).

GTFCC hotspot identification tool: background to development and deployment

***David Olson**, WHO*

The GTFCC End Cholera Roadmap was formally presented in October 2017. It is based on the principle that cholera control can be achieved by implementing the necessary interventions in priority hotspots.

Country-led situational analysis is the first step in developing a National Cholera Control Plan (NCP). This suggests a need for ways to facilitate situational analysis by assisting in identification of hotspots.

The GTFCC definition of a hotspot is a geographically limited area (e.g. a city, second administrative level or health district catchment area) where environmental, cultural and/or socioeconomic conditions facilitate the transmission of the disease, and where cholera persists or reappears regularly. Hotspots also play a central role in the spread of the disease to other areas. Cholera hotspot identification is not new.

In developing the Cholera Hotspot Tool, the GTFCC aimed to create a tool that was simple and replicable, which used standardized indicators, and which could be used easily by country ministries. The tool should be able to define areas with geographic dimensions and population sizes that facilitate implementation and allocation of often limited resources.

The tool was published in its current draft September 2019, and defines and prioritizes hotspots using epidemiologic indicators alone: mean annual incidence (MAI) and "persistence" over the past five years. Areas with low transmission may be prioritized if contextual factors and/or WASH (water, sanitation and hygiene) indicators are added—especially if the goal is cholera elimination.

The tool's application should be a dynamic process by country authorities, consisting of an initial baseline assessment and annual monitoring to report and update the NCCP as needed.

The development of the tool was predicated on a few assumptions: that recent history of cholera is an adequate predictor of future risk; that the last five years of disease data will accurately describe cholera epidemiology; that all suspect cases are considered cholera cases and confirmation is not required; and—for now—that district/second administrative level populations can be considered to be equally at-risk across the district.

The tool is expected and planned to evolve with subsequent iterations.

Known weaknesses to date include the fact that some countries have epidemiology that does not fit the recent significant annual transmission pattern presupposed by the tool; that cholera risk is known not to be uniform across some types of districts (e.g., metropolitan areas or large districts); that three levels of priority (high, medium and low) as outcomes are probably too broad, and so further within-group priority guidance is probably required; that suspect cholera does not necessarily equal the presence of cholera; and that it is currently not possible to enter blank or "No Data" fields into the tool. Furthermore, in the graph visual that the tool produces, there is no automatic adjustment of axes to data or cutoffs, and there are no place names. The number of weeks-per-year of cholera (persistence) also requires separate counting from incidence data, and there is no mapping tool.

The objectives of this series of web meetings on hotspots is to attempt to answer concrete questions that will help achieve:

- A refined, simple, adaptable tool for developing NCCPs
- Ascertainment of the top priority interventions for each hotspot by relative ranking (oral cholera vaccine/OCV, WASH, surveillance, case management, etc.)
- A replicable tool for baseline assessment and (semi-) annual monitoring and evaluation (M&E) to note progress and/or any need to adjust the NCCP.

Some questions that could be considered in order to achieve these goals include:

- Does the tool serve its purpose of helping select and prioritize administrative areas for a

feasible, effective NCP?

- How should the tool distinguish between "no data" and zero reporting in calculating MAI?
- How should priority areas be ranked within categories?
- Is the default data source/administrative area (district or equivalent) fit for purpose, in the context of significant intra-area cholera heterogeneity and/or large populations?
- What should be the lower limit incidence/persistence boundaries for ranking?

Cholera hotspot mapping with the GTFCC tool: the Zimbabwe experience

***Manes Munyanyi**, Deputy Director Health Information and Surveillance Systems, Zimbabwe*

Zimbabwe implements Integrated Disease Surveillance and Response (IDSR) through two mechanisms: indicator based surveillance (IBS) for 17 diseases and conditions, including cholera; and event based surveillance (EBS). For IBS, every health facility is expected to report weekly, using a mobile phone-based platform, into DHIS2 (District Health Information Systems software). Both mechanisms are used for detection and response. A weekly epidemiological bulletin is produced by the Health Information and Surveillance Unit of the Epidemiology and Disease Control Department of the Ministry of Health and Child Care (MOHCC).

Zimbabwe's first cholera outbreak was reported in 1972. The largest outbreak to have occurred to date was in 2008-2009, when 98 592 cases led to 4 288 deaths, a case fatality rate (CFR) of 4.3%. The most recent massive outbreak was in 2018-2019, when 10 671 cases resulted in 68 deaths at a CFR of 0.63%. Harare province city was most affected in this instance, seeing 96.9% of all cases and 83.6% of deaths.

The government of Zimbabwe is dedicated to cholera elimination, and so the MoHCC has conducted a hotspot mapping exercise, using an adapted version of the GTFCC tool, to serve as a basis for development of a National Cholera Elimination Plan (NCP) and roadmap.

The tool looks at population at risk and cholera cases by administration level and for a period of not less than five years. In Zimbabwe, the mapping exercise used population and epidemiological surveillance data from 1 200 Wards in 63 Districts of 10 Provinces, with a combined total population of 13 061 239. This was split into an urban population of 4 284 145 (33%) and a rural population of 8 777 094 (67%). Two data sources were considered: IDSR by health facility at the lowest level, by year; and linelist data, for accuracy. Population data was obtained from the country's statistical agency, ZIMSTAT, and population projections were based on the 2012 population census.

The GTFCC also recommends using WASH Data with the tool. In Zimbabwe, WASH data from surveys is available at secondary or higher administrative levels, and it is challenging to disaggregate coverage at ward level (WASH data was used to identify geographical risk areas during the cholera outbreak in 2018). The Rural WASH Information Management System (RWIMS), an alternative data source, could not be used because its data was for rural provinces, and most cases were reported from urban provinces. As a result, WASH data was not used for the mapping exercise.

Incident-based surveillance data was extracted from DHIS2 by facility and by week, but it was difficult to align these facility cases to the population at risk, and so the linelist data was used instead. Cases were aggregated by village (extracted from physical addresses) and aligned to wards and populations.

Data was captured by the tool, then cleaned and analysed. The process took six people two weeks.

Interpretation of the results at a glance was difficult. The tool output indicated no problem of cholera in terms of mean annual incidence (MAI); but the persistence was accurate. Approximately 90% of cases from 2015-2019 were reported in 2018, and the seasonality of cholera was evident. Risk profiling dating back 10 years could have been used to support and improve the interpretation.

Using the GTFCC tool, wards were ranked into three categories: high, medium and low priority:

- High MAI & high persistence = high priority
- High MAI & low persistence = medium priority
- Low MAI & high persistence = medium priority
- Low MAI & low persistence = low priority

For classification purposes, the MAI cutoff was set at 60/100 000 population, and persistence at 2%. The MAI minimum threshold was set at >=5/100 000 based on MOHCC assessments carried out in consultation with WHO, referencing data from previous epidemics and known cholera risk in the country. 95 of all wards reported at least one case of cholera. Wards with MAI of <5/100 000 were excluded from further analysis, leaving 81 remaining wards. MAI for wards that reported cholera ranged from 0.9 to 694.4 per 100 000 population. Of the 106 wards that reported at least one case between 2015 and 2019, nine wards were categorized as high priority; 18 wards were categorized as medium priority; and the rest were low priority.

This process raised a number of discussion points. The tool is arguably not universally applicable, given that cholera in Zimbabwe is seasonal compared to other countries. It also raises questions of how frequently the hotspot mapping exercise should be conducted (the Zimbabwe team propose that it should be done every five years to inform changes in strategy) and what effect the absence of WASH data in the tool has on to the final output. In Zimbabwe there was not much of a difference, as most affected areas had low WASH coverage.

Discussion

- Other indicators may be useful for the tool. There have been long, circular conversations about the exclusion of extrinsic factors, and taking a more complicated approach in terms of indicators; but the best predictor of future cholera risk is historic cholera risk. Even if it is very simple, it is still the best predictor we currently have.
- The working group recognizes the importance of other indicators—deaths, case fatality rates, WASH coverage, population density and/or displacement, special populations, etc.—but we do not currently have the data necessary to understand the relationships between cholera and these indicators, or how best to measure them, especially with regard to WASH and population density. There are some anecdotal trends, and obviously good WASH means no cholera, but we struggle to measure this properly, translate it and integrate it into tools for decision making. For example, in the case of Zimbabwe, even though the relationship between WASH factors and cholera was known, data was not available at the required scale.
- There is an argument that even the two existing factors are too complicated, and that MAI and persistence could be collapsed into a single metric. In Yemen, work is being done with a short cholera history because that is all that is available. There are no long histories and cutoffs are different. For sensitivity, and to compare years, MAI and persistence were squeezed together and a product of both was used to produce a rank order. It was an

insightful experience, but remains a work in evolution. Limited historical data means observations are necessarily limited too.

- Our job is to encourage the community to develop this body of evidence to help integrate these important factors into tools and figure out how to measure them across many settings. Places that experience cholera maybe once every five years are very much at the limit of being able to fit it into this tool; it is better suited to areas where cholera is more endemic.
- Other ranking scores can be added—rather than adding an indicator directly into the mix with the main outputs of MAI and persistence, it could be considered a subsequent layer of ranking to push both up or to get a good sense of what interventions are most needed.
- There are questions around immunity, how to assess risk after a big outbreak, and how to factor vaccination into measurements. Many identified hotspots are places that received vaccination in 2018 or 2019, and so would not now be targeted with OCV. There may be risk factors in the absence of vaccine derived immunity that play a part in those areas, like the WASH situation: contextual things that we must be able to note. Unless things change structurally or in terms of behaviour in these areas, cholera may resurge every time it is reintroduced.
- There was some discussion about changes in the rankings when only confirmed cases were used: generally, real life surveillance systems work with suspected cases: a lot more data is available on unconfirmed cases, so this metric is used. But the question is an important one and should form part of the coming discussions. There is a laboratory part of the surveillance working group, and a major goal for this and the coming years is to find out how to include laboratory data more effectively—even rapid tests—into epidemiological data, to provide a better sense of the burden of confirmed or highly suspected cases in an area versus other areas. Trying to bring laboratory and epidemiological together more closely is a major strategic goal.

Concluding remarks

Philippe Barboza

- It is interesting to explore different real world examples—especially the differences between places with endemic cholera and without, or countries—such as Ethiopia—where that difference exists within a single nation. There is a big diversity of situations in the world and work on the tool has to take this into account.
- There is a lot of discussion about the strategy of making the tool initially so simple. This is still a very valid approach. More things can be included in the equation to try to refine the analysis over time.
- It is also evident already that good surveillance systems are a necessity. We all know this: for many years—decades—cholera surveillance was more based on outbreak response than on having a good surveillance system like for other diseases; but now we see that even countries that are very actively engaged are having difficulties with the old ways of collecting data, because data collection approaches are not adapted to the real world situation. For example: Zimbabwe not being able to use IDSR data because it was reported by case facility and therefore not relevant to where people were infected.
- One necessary big step forward will be to get countries to think about this and reimagine their cholera surveillance systems to include laboratory and other data, and to have ways to assess their hotspots efficiently. This is important: the hotspot analysis will have to be revised on a frequent basis, and a lot of questions will be discussed in these upcoming webinars—for example, how to plug OCV areas into the equation.
- It is important to highlight that hotspots are not just for OCV. It will never be possible to vaccinate everybody. While already-vaccinated areas will obviously not be an OCV priority

for the next three years, they will still remain priority areas for other activities, such as WASH. OCV will not solve cholera in the long term, and all of this goes far beyond just hotspot assessment.

- A great deal of progress has been made. The overall cholera burden has fallen and there are very few major outbreaks now compared to past. All of these discussions about surveillance strategy, implementation of all the five pillars defined by GTFCC, etc. are important, but this is a special time during which surveillance will be increasingly central: good surveillance including collecting relevant, reliable epidemiological and laboratory data that really informs assessment and refinement of hotspots, not just on an administrative basis but also to target the precise activities that will document the reduction of the cholera burden.
- The next phase is really the implementation of the roadmap. We are all looking forward to seeing other country experiences and learning about the various efforts going on around the world to make this idea a reality. With the tool, we need to create and maintain something practical and feasible: easy to use and not a big resource drain for countries doing it themselves. These priorities must remain high on the agenda.