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Chapter 4

# Responding to Cholera Outbreaks in Zimbabwe: Building Resilience over Time

Anderson Chimusoro, Stephen Maphosa, Portia Manangazira, Isaac Phiri, Tonderai Nhende, Sydney Danda, Ottias Tapfumanei, Stanley Munyaradzi Midzi and Juliet Nabyonga-Orem

Additional information is available at the end of the chapter

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**Abstract**

Cholera is still a major cause of disease epidemics in sub-Saharan Africa (SSA). During the period January 2017–March 2018, 15 countries in the WHO African Region (AFR) reported cholera outbreaks of varying magnitudes. Zimbabwe has experienced cholera outbreaks dating as far back as 1971 with an unprecedented outbreak occurring in 2008/2009 when 60 of the 62 districts in the country were affected. The outbreak was declared over in May 2009 and by then, 98,592 cases and 4288 deaths had been reported. In Zimbabwe, outbreaks have occurred against a backdrop of a struggling economy and a weak health system. The role of a resilient health system in emergencies response is accentuated premised on experiences from the Ebola outbreak that largely affected three countries in West Africa. Amidst economic and persistent system wide challenges faced by Zimbabwe, preparedness and response capacity has been built over the years. This is evidenced by the rapid response and containment of the recent cholera outbreak. Skilled and equipped rapid response teams, strengthened surveillance and maintaining high alert, effective multisectoral collaboration and high level political engagement are among the critical elements that have built resilience.

**Keywords:** cholera, outbreaks, emergency, response, resilience

## 1. Introduction

Disease outbreaks are a common occurrence and often result in untoward suffering and loss of life. Delayed response has led to loss of life, economic losses and disruption of health

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systems which are already weak especially in low income countries. Researchers estimated the real total economic loss attributable to cholera in the WHO African Region (WHO AFR) as US$38,958,750 assuming a minimum regional life expectancy of 40 years; US$53,240,859 assuming a regional average life expectancy of 53 years; and US$64,208,880 assuming a maximum regional life expectancy of 73 years using 2015 figures [1]. Further, the three Ebola virus disease (EVD) hard hit countries in West Africa lost an estimated $2.8 billion in gross domestic product (GDP) [2]. Drawing from the experience of the three EVD affected countries in West Africa, the social and economic impact would have been less profound if health systems were strong to respond to the outbreak. The health system capacity in Guinea, Liberia and Sierra Leone was suboptimal [3]. Essential health systems functions were not in place negatively impacting timely response to the outbreak. Scholars accentuate the role of resilient health systems to guard against loss of life, and collapse of basic health care services in the face of a crisis [4].

### 1.1. History of cholera and risk factors

Cholera, an enteric infection caused by the bacterium *Vibrio cholerae,* causes diarrhea that can lead to severe dehydration and death in people of all ages. Cholera is transmitted through ingestion of food or water contaminated with the bacterium *Vibrio cholerae* and can lead to explosive, widespread epidemics. Humans carry and spread the disease globally. If untreated, the case fatality rate can be as high as 50% while up to 80% of all infections will have only mild or no symptoms at all [5]. Cholera is traced as far back as the nineteenth century when it spread across the world from its original reservoir in the Ganges delta in India. Since then, six subsequent pandemics have been reported across all continents which have killed millions of people. The current pandemic is the seventh which arrived in Africa in 1971. Estimates show that each year, 1.3–4.0 million cholera cases, and 21,000–143,000 deaths occur worldwide due to cholera [6].

During the period January 2017 to March 2018, 15 countries in the WHO African Region (AFR) reported cholera outbreaks of varying magnitudes [7]-as shown in **Table 1**. Risk factors for cholera include poor sanitation and hygiene, inadequate access to safe water [8], reduced or nonexistent stomach acid, cohabitation in the same household with someone who has the disease, type of blood group, consumption of contaminated food and raw or undercooked shellfish [9]. Having an unprotected water source close to the residence, drinking poorly treated water and eating away from home [10] have also been cited as risk factors. Other studies highlight bathing in the river, long distance to water source, and eating dried fish as risk factors [11]. Furthermore, scholars draw our attention to a possible correlation between socio-economic and demographic indices as factors that might serve as national risk predictors with the assertion that, infant mortality and the human development index may denote a risk of sustained transmission of cholera [12]. On the contrary however, other researchers found no association between the risk of cholera and socio-economic factors although they highlight the association between occurrence of severe dehydration in cholera patients and the household size [13]. Peri-urban slums and camps for internally displaced persons or

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| Country | Date of notification to WHO | Date of latest report | Cases | Deaths | CFR |
|---|---|---|---|---|---|
| Angola | 15 Dec 2017 | 25 Mar 2018 | 861 | 15 | 1.7% |
| Angola | 15 Dec 2016 | 22 Oct 2017 | 375 | 21 | 5.6% |
| Burundi | 20 Aug 2017 | 31 Dec 2017 | 171 | 0 | 0% |
| Chad | 19 Aug 2017 | 10 Dec 2017 | 1250 | 81 | 6.5% |
| DRC | 1 Jan 2018 | 4 Mar 2018 | 6080 | 140 | 2.3% |
| DRC | 1 Jan 2017 | 4 Mar 2018 | 60,492 | 1288 | 2.1% |
| Kenya | 1 Jan 2018 | 16 Mar 2018 | 1910 | 41 | 2.1% |
| Kenya | 6 Mar 2017 | 31 Dec 2017 | 4079 | 76 | 1.9% |
| Malawi | 28 Nov 2017 | 28 Mar 2018 | 844 | 26 | 3.1% |
| Mozambique | 12 Aug 2017 | 25 Mar 18 | 2285 | 5 | 0.2% |
| Mozambique | 16 Feb 2017 | 13 Mar 2017 | 1400 | 3 | 0.2% |
| Namibia | 31 Jan 2018 | 2 Mar 2018 | 1 | 1 | 0.0% |
| Nigeria | 7 Jun 2017 | 3 Mar 2018 | 5058 | 126 | 2.4% |
| South Africa | 26 Feb 2018 | 10 Mar 2018 | 1 | 0 | 0 |
| South Sudan | 25 Aug 2016 | 7 Feb 2018 | 20,438 | 436 | 2.1% |
| Tanzania | 20 Aug 2015 (Cases from 1 Jan 2018) | 25 Mar 2018 | 1445 | 27 | 1.9% |
| Tanzania | 20 Aug 2015 (Cases from 1 Jan 2017) | 31 Dec 2017 | 4627 | 95 | 2% |
| Uganda | 28 Sep 2017 | 30 Jan 2018 | 250 | 4 | 1.6% |
| Uganda | 15 Feb 2018 | 25 Mar 2018 | 1901 | 39 | 2.1% |
| Zambia | 4 Oct 2017 | 25 Mar 2018 | 5190 | 103 | 2.0% |
| Zimbabwe | 22 Jan 2018 | 24 Mar 2018 | 111 | 4 | 3.6% |
| Total | | | 118,769 | 2531 | 2.1% |

Source: WHO/AFRO Weekly bulletins on outbreaks and emergencies, January 2017–March 2018.

**Table 1.** Countries in the WHO AFR that have reported cholera outbreaks: January 2017–March 2018.

refugees are typically at risk due to challenges of accessing adequate safe water and good sanitation facilities [12].

In this chapter, we focus on cholera which is still a major cause of disease epidemics in sub-Saharan Africa (SSA). We review the trend of cholera in Zimbabwe and how the country has built resilience overtime. Our findings provide lessons to other countries who are seeking to put in place measures to control cholera and other diseases outbreaks.

## 2. Methods

### 2.1. Defining resilience

Health systems must have the capacity to effectively respond to crises and maintain core functions before, during and after crises. Resilience refers to patterns of positive adaptation in the context of significant risk or adversity [14]. A range of definitions for resilience have been proposed including a stable trajectory of healthy functioning after a highly adverse event; a conscious effort to move forward in an insightful and integrated positive manner as a result of lessons learned from an adverse experience; the capacity of a dynamic system to adapt successfully to disturbances that threaten the viability, function, and development of that system; and a process to harness resources in order to sustain well-being [15]. Resilient health systems are defined as health systems that are aware of inherent strengths and weaknesses; diverse with the capacity to respond to a broad range of challenges; self-regulating with the ability to isolate health threats while continuing to deliver core health services; integrated, and bringing in diverse actors from health and non-health actors as well as local and international players in a smart dependence; and adaptive with the ability to transform in ways that improve function in adverse situations [4]. In all these definitions resilient is understood in terms of a continuum of positive response in the face of adverse events.

### 2.2. Approach to the review

Four of the authors were involved in the response efforts and their insights are provided here along with the review of important literature on the outbreak. The literature yielded information on the nature and trend of cholera response activities between 2008 and to date, and provided insights into changes in the health system over the same period that may have had an effect on the response to epidemics. The review took place between February and May 2018.

## 3. History of cholera in Zimbabwe

The first recorded cholera case in Zimbabwe was in Mashonaland East Province (Mudzi district) in 1972. In the same year another outbreak was reported in Mashonaland Central (Mt Darwin district) [16]. Thereafter outbreaks occurred every 10 years until 1992. More frequent outbreaks occurred in the late 1990s, with the largest being recorded in 1999 when 4081 cases were reported in low lying border areas covering six provinces. Since the year 2000, cholera outbreaks were reported on an annual basis, with unprecedented outbreaks occurring in 2008/2009, when 60 of the 62 districts in the country were affected, and by the time the outbreak was declared over in May 2009, 98,592 cases and 4288 deaths had been reported [17]. The 2008/2009 cholera outbreak tested the strength of the Zimbabwe emergency preparedness and response at a time when the country was ill prepared for emergencies. Smaller outbreaks occurred in 2010 and 2011 each covering four districts and recording 1022 and 1140 cases respectively but these were controlled in reasonable time given the built response capacity from the 2008/2009 outbreak. After 2011, the country continued reporting cholera outbreaks

| Year | Cases | Deaths | Number of districts affected |
|---|---|---|---|
| 2008/2009 | 98,592 | 4288 | 60 |
| 2010 | 1022 | 22 | 4 |
| 2011 | 1140 | 45 | 4 |
| 2012 | 22 | 1 | 1 |
| 2013 | 2 | 0 | 1 |
| 2014 | 0 | 0 | No |
| 2015 | 42 | 0 | 6 |
| 2016 | 4 | 1 | 2 |
| 2017 | 6 | 3 | 3 |
| 2018 | 111 | 4 | 2 |

[1]Source: National Health information and surveillance, Ministry of Health and Child Care, Zimbabwe.

**Table 2.** Cholera cases and deaths in Zimbabwe between 2008 and March 2018[1].

on an annual basis to date with varying magnitudes. Remarkably, from 2012, all the outbreaks have been controlled at source without further spread to other districts. Chiredzi and Chipinge districts remained as hot spots with cases coming from these two districts for most years. **Table 2** shows cholera cases and deaths in Zimbabwe from 2008 to March 2018.

Since 2008, most of the cholera outbreaks in Zimbabwe were in urban settlements where the main drivers of cholera included the overloaded and dilapidated water and sanitation infrastructure which has been deteriorating over the years, inadequate water, contaminated water sources and poor water storage [18, 19]. In addition, cultural practices such as unsafe handling of corpses during burials add to the list of risk factors. In most of the reported outbreaks a great number of cases had been associated with deaths and reported to have attended a funeral [17].

## 4. Response to cholera outbreaks overtime

### 4.1. The period from 2008 to 2009

#### *4.1.1. The health system*

Zimbabwe's health system is built under the principle of primary health care, with a district health system anchored on a district hospital and a network of rural health centers (RHC) or clinics providing first line health services. The district health system is supported by provincial hospitals at tertiary level and central hospitals at national level stationed in the two major cities of the country.

The first line health facilities are serviced by nurses, for curative services and environmental health technicians (EHT) to support public health preventive services in the community. In addition to nurses, for curative services, the district level has doctors, laboratory scientists and

other clinical and public health experts. The ideal for the country is two to three nurses and one EHT for every RHC. The district hospital is ideally supposed to be supported by 50–100 nurses, and three to eight doctors depending on the size. From independence, the supply of health workers improved up to about year 2000, when almost all the district hospitals had at least one doctor. Nurses' coverage at RHC level had been improving up to a time when every RHC had at least one nurse.

The health system, during the period 2008–2009, was far from being resilient and being able to absorb shocks whilst maintaining normal functionality. By the time the 2008/2009 cholera outbreak struck, the health system was at its weakest. It was characterized by a critical shortage of skilled as well as motivated health workers; critical shortages of essential medicines and supplies and medical technologies; dilapidated health infrastructure; unreliable health information systems and weak surveillance systems; poor service delivery and poor health stewardship under inexperienced health leadership [20]. In one study on community mortality from Cholera in Zimbabwe, the poor access to health services and limited availability of oral rehydration salts were some of the causes for high community mortality [20].

The health system was dysfunctional as far as promoting provision of core health services because of the nationwide economic decline and staff attrition. For instance, most health workers including nurses, doctors, EHTs and laboratory scientist left for greener pastures either within or outside the country leaving RHCs without nurses and many district hospitals without doctors [21]. This left the health system poorly serviced by human resources [22]. According to the World Health Organization (WHO), the ratio of health workers per 1000 population was 0.162 in 2004 dropping to 0.05 in 2007 for physicians and that for nurses and midwives dropping from 1.491 in 1995 to 1.215 in 2009 [23]. With the country's economy at its worst, affected by hyperinflation, financing for health was at its lowest during this period. Total health expenditure was 8.9% of GDP, with out of pocket expenditure constituting 50.4% of health expenditure [24]. Total health expenditure per capita was estimated at $16.21 in 2008 [25]. As such, surge capacity was nonexistent. With the lack of confidence in the health system a good proportion of the population was seeking for health care elsewhere which meant that some threats would not be detected by the health system late. Such a system could not adapt, transform and improve performance in the face of an outbreak.

An up-to-date map of human, physical, and information assets that highlight areas of strength and vulnerability was not in place. Real time strategic health information and epidemiological surveillance systems as well as the use of indicator and event based surveillance systems were not in place. Some information was however available on the vulnerabilities of the population to different threats although not well disseminated to impel action. The functionality of the health information network was at its lowest, human resources were poorly motivated and not available at work to record surveillance data, analyze it and use the information for decision making. The surveillance system which was then largely paper based and not real time was severely affected by the transport and communication systems which were also at a low level.

Resilient systems have the ability to harness human, financial and logistical resources from health and non-health fields, coordinate actors and manage partnerships. The strength of the country was the availability of inbuilt structures for coordination including the Civil

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Protection Committee at all levels of the system, chaired by the local government ministry. Although this committee remained functional, due to the poor economic performance all actors' roles in responding to the outbreak were constrained. Although international players were eager and willing to provide support, the country did not declare the cholera outbreak as an emergency in sufficient time to allow inflow of such support. This is evidenced by the fact that although the first official report of the outbreak was on 22 August 2008, unofficial reports had been circulating in the media much earlier. Since the first official report of the outbreak became public, the Government was silent on the issue until December 2008, when the Minister of Health and Child Welfare eventually declared the cholera outbreak a state of emergency. After this declaration of a state of emergency, donors responded immediately and provided financial support through UN agencies and NGOs to fight the cholera outbreak.

*4.1.2. Status on IHR and IDSR*

The International Health Regulations (2005), or IHR (2005), represents a binding international legal instrument involving 196 countries across the globe, including all the WHO Member States. The purpose and scope of the IHR (2005) is "to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade." The IHR (2005), to which Zimbabwe is a signatory, has shaped the country's preparedness [26], prevention and response efforts to public health risks, but only after the 2008/2009 cholera outbreak.

The IHR (2005) sets guidelines for core capacities which must be implemented in order to prevent or respond to disease outbreaks and other public health events of international concern. This includes strengthening of core capacities at ports of entry to prevent exit or entry of infectious hazards. Alongside this is enabling legislation, establishment and strengthening IHR national focal points for the coordination of stakeholders and reporting of diseases of public health importance to WHO.

The 2008/2009 cholera outbreak occurred outside the period of implementation of IHR (2005) for the country which was to start in 2011 with discussions and base-lining of country capacities for implementation of IHR (2005). State parties, in line with IHR (2005), are required to strengthen capacities in preparedness and response efforts. This requires countries to have multi-hazards national public health emergency preparedness and response plans which have to be periodically tested, including identification of hot spots and developing mechanisms for resource pooling and deployment during times of emergencies. This kind of plan did not exist before the 2008/2009 cholera outbreak.

Integrated Disease Surveillance and Response (IDSR) was adopted as a tool for detection and response to epidemics by the WHO Regional Committee for Africa in 1998. In Zimbabwe, training modules were developed between 2001 and 2007, national adaptation carried out, training of trainers and training of health workers conducted. Although the training of trainers covered the whole country, cascade training of health workers was at a slower pace because of the limited financial resources. This capacity in IDSR was later to be negatively affected by the health worker attrition. With the coming of IHR (2005) AFR member states agreed that the implementation of IHR (2005) in Africa was going to be through IDSR.

*4.1.3. Magnitude of the 2008/2009 outbreak and response efforts*

This outbreak, described as the worst the country has ever experienced, resulted in 98,592 cases and 4288 deaths with all provinces, and 60 of the 63 districts in the country affected. The outbreak toll could have been reduced were it not for the lack of resilience in the health system and the adverse macroeconomic and political climate.

The 2008/2009 cholera outbreak came amid repeated calls by all sectors that Harare City Council urgently resolves the dilapidated water and sanitation infrastructure. The outbreak came at a time when the country was experiencing its worst economic downturn when most health institutions were closed down due to unavailability of health workers. Health service delivery was left to non-governmental organizations (NGO). The outbreak response was marred by sluggish response due to several reasons among which were weak health systems and leadership.

Apart from the human resources, the resources required to implement a rapid response where not available at the initial stages of the outbreak because of economic challenges. The harsh economic climate characterized by hyperinflation meant that the common people did not have sufficient funds to get them to the health facility as well as procure the sugar and salt for preparing the oral rehydration solution [20].

**4.2. The period: 2010–to date**

*4.2.1. Building resilience*

The situation gradually improved with the various interventions by the government and donor community realizing that there would be no good implementation of donor supported programs without public sector human resources for health. This led to various schemes to support retention of key health personnel at implementation levels including the creation of human resource retention schemes as part of the Global Fund and the Health Development Fund (then the Health Transition Fund). These schemes improved the availability of medicines and supplies for health including human resources which improved the country's responsiveness to emergencies.

With the support of partners, health commodities called the primary care packages were deployed to the health facilities at a regular basis using an approach called the Zimbabwe Informed Push System (ZIP). This improved the availability of medicines and as soon as the situation stabilized, the National Pharmaceutical Company (Natpharm) was capacitated to resume its role as the national supplier of pharmaceuticals and the distribution of medicines reverted back to the pull system. The pull system is whereby the distribution of medicines by Natpharm is on a quarterly basis in response to orders placed by health facilities. The implementation of the pull system followed an intermediary assisted pull system where the district pharmacists made quarterly visits to health facilities and assisted them in placing orders to Natpharm based on the stock levels.

The health information and surveillance system also improved quite significantly with the introduction of the District Health Information Software (DHIS) version 1.4, and then latter version 2.1. For reporting of outbreaks and other public health events under the rapid disease

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notification system (RDNS), the Front line SMS® was adopted for reporting from initial 1200 cell phones procured under the Global Fund using the DHIS 2.1. This system started in 2012 and improved reporting of the weekly disease surveillance system (WDSS) from about 40% to above 90% by 2015, and has maintained timeliness and completeness of the weekly reporting at above 95% from 2015 to 2018 (MOHCC WDSS Reports, 2015–2018).

The initiative to strengthen Rapid Response Teams (RRTs) started during the cholera outbreak of 2008/2009. Tools for guiding RRTs were developed which included the Guidelines for Rapid Response Teams and training of RRTs at all levels. In 2011 a Compendium for Rapid Response Teams was developed to guide the work of these teams. Cascade training of RRTs was carried out since then and in 2016, following the Harare typhoid outbreak, another training of RRTs from 20 priority districts was carried out, mainly focusing on case management and surveillance. The IDSR technical guidelines and training manuals were revised in 2011 and used for training of health workers at all identified outbreak response levels. However because of inadequate funding not all identified health workers were trained.

A number of disease specific guidelines were developed in 2009 and these include guidelines for cholera, typhoid, anthrax and rabies. These were distributed to all health facilities as resource materials for reference and guidance should they meet any of the conditions in their areas of work.

The UN established the Office of the Coordination of Humanitarian Affairs (OCHA), in 2008 and the cluster system was formed. The main clusters that were formed were the Health Cluster, with WHO as cluster lead, the WASH Cluster, under UNICEF, the Food Cluster (FAO), Education (UNICEF) and Protection (UNHCR and IOM). As Ministry of Health structures were not functional at the time, the Health Cluster established the Cholera Command and Control Centre (C4), which became the response organ and nerve center for the cholera response at the WHO offices located at Parirenyatwa Hospital grounds. Technical experts including clinicians, epidemiologists, water and sanitation specialists, health promotion officers, data managers and administration staff were engaged to work in the C4. A Health Cluster Coordinator post was established and filled. The WHO mobilized experts through global outbreak alert and response network (GOARN), and these experts were from United States, Centers for Disease Control (CDC), International Centre for Diarrheal Disease Research, Bangladesh (ICDDRB), Burnet Institute Australia and SMI Sweden among others. Surveillance centers were strategically established throughout the country, and toll free lines were set up for surveillance and real time data transmission to C4.

Cluster Coordination System was established and continued until 2012. The Health Cluster was abolished in 2012, and the Interagency Coordination Committee on Health (IACCH) was re-established, and this coordination system is chaired by the Ministry of Health and Child Care (MOHCC). The C4 brought in the concept of the Public Health Emergency Operations Center (PHEOC) and a room within the MOHCC headquarters was set aside for the purpose.

Community health workers who had almost disappeared in the system were resuscitated following strong recommendations from the C4 and the finding that a significant proportion of the 2008/2009 cholera cases and deaths had been in the community. The Village Health Worker (VHW) training curriculum was reviewed, and the training resuscitated. Through

the support of stakeholders, and using the updated IDSR technical guidelines of 2008, the training has been ongoing since then and the numbers have been increasing steadily, and this greatly improving community health surveillance, awareness and reporting of public health events. Village Health Workers were found very useful in the recent Chegutu cholera outbreak of 2018, supporting in health promotion and surveillance.

The 2008/2009 cholera outbreak in the country drew a lot of interest from the local and international scenes including journalists, scientists and human rights activists [17–22]. From the documentation on the various themes pertaining to this outbreak the country remains with a wealth of information to learn from and avoid similar situations from happening in the future.

### 4.3. Reaping the results of building resilience: Response to cholera in the aftermath

It should be noted that during and following the 2008/2009 outbreak many positive steps were taken, including:

- Mobilizing resources for supporting and retaining core health workers through the Global Fund, Health Transition fund and other donors.
- Pooling resources for maintaining core health at the primary level through the supply of primary care packages by a mechanism called Zimbabwe Informed Push System.
- Development of key guidelines and training materials for RRTs, IDSR and cholera, typhoid, anthrax and rabies guidelines which are in use to date.
- Training of core health staff in updated IDSR and rapid response.
- Establishment of the cluster coordination systems and the C4 as a precursor to PHEOC.
- Revitalization of the Village Health Worker program.

As a result of the devastation left by the 2008/2009 outbreak, the affected communities still remember the impact this deadly disease can inflict on them. As a result of this the cooperation of the community in the cholera outbreaks following the 2008/2009 outbreak has been exemplary. We describe some important outbreaks to show how the detection and response has been improved.

#### *4.3.1. Chiredzi cholera outbreak: May 2012*

Chiredzi was the only district which had an outbreak in 2012. This outbreak which, was controlled within one month, remained localized in Chiredzi and resulted in 22 cases and 1 community death. Although the control took longer than the country's target of control within two weeks, the country's efforts to control this outbreak were commendable and the time taken to control the outbreak was much shorter that the 2008/2009 outbreak which took more than six months.

On the 3rd of May 2012 a case of cholera was reported to a RHC in Chiredzi district in a 30 year old man from a village in the communal areas. Thereafter a number of cases were seen mostly from three neighboring villages. The local response was swift in detection, reporting and

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responding to the initial cases. The Secretary for Health and Child Welfare sent the Director Epidemiology and Disease Control and Provincial Medical Director (PMD) Masvingo on an urgent directive to plan swift action and ensure adequate control of the Chiredzi cholera outbreak. Following communications with the PMD, the National RRT comprising the Director Epidemiology and Disease Control, Deputy Director Environmental Health, Health Promotion and Laboratory Services, WHO, the Environmental Health Alliance (German Agro Action-GAA and Save the Children-SC), European Civil Protection and Humanitarian Aid Operations (ECHO) and the Masvingo Provincial Health Executive teamed up on a support visit to Chiredzi. The National RRT was joined by the PMD, Provincial Environmental Health Officer, Chiredzi District Health Executive (DHE), Save the Children and Action Against Hunger (ACF). Investigations conducted pointed to an adult female who fell ill on 27th April 2012 with diarrhea and vomiting, and subsequently died at home on the 28th of April, as the index case. This cholera suspect had sought treatment from a traditional healer. She was buried on the 1st of May in her village. The burial was not supervised because cholera had not been suspected. Thereafter cases started presenting at a local health facility, three of them with a history of having attended this unsupervised burial.

*4.3.1.1. Response measures*

The PMD dispatched the provincial RRT to support Chiredzi on 7 May. They investigated, provided supplies and supported the district RRT and the partners on the ground, who had already set up a cholera treatment center (CTC) at the health facility on May 5th. Thereafter there was regular communication between the local, district and provincial teams, and updates to the Provincial Administrator's office. The Chiredzi DHE mobilized one nurse from a mission hospital and three EHTs, one from each of surrounding health institutions, all motorized to boost the staff at health facility receiving cholera patients. The team received support from local partners which included ACF, Save the Children and Plan International. Together they conducted active surveillance, contact tracing, decontamination of infected patients' homes and conducted participatory health and hygiene trainings for the affected villages.

Supplies were said to be adequate; diarrhea kits and laboratory consumables were received from the C4 through Save the Children. Some of the supplies were received from ACF and Plan international. The district also had left over supplies from the past outbreaks. A CTC and two Cholera Treatment Units (CTUs) were set up in health facilities in the catchment area. Case management protocols were delivered to the CTC and were used to guide patient management and staff managing patients had received training in cholera, typhoid and dysentery case management. On discharge the patients received health education; IEC materials, aqua tablets, and soap. The staff seconded were initially doubling up the clinic duties and those at the CTC until they were provided relief. ORT was made available at community level through EHTs and VHWs.

The district laboratory was supported with consumables to conduct rapid diagnostic tests (RDT), culture and sensitivity tests. Laboratory support for this outbreak was very commendable with results of rapid test conducted as well as culture and sensitivity, and with good correlation between the RDT and culture results. *Vibrio cholerae,* serogroup O1, biotype El Tor, Inaba serotype, was isolated. This was the first time in many years that Inaba has been isolated in Chiredzi, Ogawa having dominated in the previous outbreaks.

The district had an average of two nurses manning each RHC. At any one time therefore one was likely to find just one trained nurse as a result of capacity building sessions and workshops being conducted from time to time on the various ministry programs, and at times the nurse aides were left on their own attending to patients. This was the case when the first cholera case presented to the health facility on the 3rd of May. Fortunately the nurse aide had attended to cholera patients during the 2008/2009 outbreak and quickly raised the alarm with the district, resulting in the swift outbreak response that ensued.

*4.3.2. Chegutu cholera outbreak 2018*

Chegutu cholera outbreak is one of the most recent cholera outbreaks the country faced. This outbreak had the potential to escalate into a massive outbreak because of the prevailing water and sanitation situation in the town, the easy link between the town and the capital, Harare City, which also had worse water and sanitation situation and being a link between the two major cities of the country, Harare and Bulawayo. However because of the built in resilience anchoring on health worker capacity, availability of extension workers, swiftness of response by RRTs and coordination of response through the Civil Protection Committee at district level and IACCH at national level, the outbreak was controlled in 20 days with 106 cases and 4 deaths reported. It should be noted that the four deaths were the alert which occurred before the outbreak was detected.

On the 16th of January 2018, a report was made to the Chegutu District Medical Office of an increase in diarrhea cases at Chegutu Hospital in a male ward in which two cases had died. A follow up visit was made to the male ward and revealed that there were three male cases presenting with watery diarrhea and vomiting. Two deaths had occurred and a stool specimen had been collected from one of the deceased patients and sent to hospital laboratory for culture. The result was received on the 19th of January 2018 confirming *Vibrio cholerae*. The national office was immediately notified on the 19th of January 2018 who also notified WHO on the 22nd of January.

Subsequent investigations revealed that all cases and deaths were associated with a funeral which had occurred in Pfupajena Township of Chegutu on the 8th of January 2018. A visit made to the given address revealed that the deceased (index case) had reported for treatment suffering from diarrhea and vomiting at a local private clinic before her death on the same day. The daughter to the index case also reported for treatment at Chegutu hospital on the 9th of January 2018 where she was admitted and discharged on the 11th. A stool specimen was collected and the results were negative.

It was further established that there was a funeral which occurred on the 29th of December 2017 in the same neighborhood which was attended by two relatives from Zambia (Zambia was at the time experiencing a cholera outbreak). Among those who attended the funeral were members of a religious group who later visited the index case. It is highly possible that the source of infection could have been from those who came from Zambia who could have been healthy carriers.

On notification of the national office, the Minister of Health and Child Care immediately visited the area together with members of the National RRT to assess the situation and advise on

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the correct course of action in support of actions that had already started. Isolation of patients requiring hospitalization and appropriate rehydration, infection prevention and control in the hospital, safe and dignified burials, water quality monitoring and health promotion activities were already ongoing.

A follow up visit by the Minister of Health and Child Care was on the 20th of January, teaming up with the local member of parliament and a minister colleague in the president's office, in the company of the WHO Officer In Charge, to provide further support to teams on the ground and assess the evolution of the outbreak. On the 20th of January, the National RRT together with the District RRT worked together with the Civil Protection Committee, chaired by the District Administrator and allocated tasks to teams on the following thematic areas: (i) Coordination, (ii) logistics, (iii) Case management and surveillance, (iv) Health and hygiene promotion (v) Water, Sanitation and hygiene. The teams became immediately operational with coordination meetings taking place twice a day at district level. Community members were trained to participate in contact tracing. A treatment camp was set up to receive patients for diagnosis and treatment. Food premises were inspected and those not meeting minimum health requirements closed. Water quality monitoring was carried out and samples taken for testing.

At National level the IACCH started coordination meetings on a weekly basis with the National RRT having daily coordination meetings. A cholera preparedness and response plan was developed and used to guide the response. Gaps in the response were identified and filled by the donor community, UN, NGOs and the private sector.

## 5. Discussion

Among the major issues we single out as having been strengthened over the years are the political commitment, multisectoral engagement, capacity to harness resources and coordinate actors, surveillance and RRT and, the health system capacity.

Political commitment is evidenced by the personal involvement of the Minister and other senior MOHCC staff, provincial and district health leadership. The role of political commitment in implementation of health programs is emphasized in literature and indeed effective institutionalization of cholera control measures has been reported in Mexico following the recognition of cholera as a national security problem [27]. The central role of high level political commitment in instituting rapid response measures and mobilization of resources is underscored [27]. Leadership at high level is a necessity for the response if properly managed, but in situations where it is not properly managed [28] it may lead to conflicts among workers in the field thereby delaying the implementation of activities and allowing the prolonged progression of the outbreak. Liberia offers a good example of proper coordination of response with high political leadership during the Ebola outbreak [29]. In the Zimbabwe cholera outbreak of 2008–2009, the failure by the political leadership to accept that a cholera outbreak was brewing led to delays in the response allowing uncontrolled continued infection and the resultant mortality. In years after 2008/2009 outbreak, political leadership has been prominent in all the outbreaks and their control within reasonable time can be explained.

We also note the importance of multisectoral engagement in emergency response and in particular, these reported recent cholera outbreaks. Multisectoral engagement is observed in the name of the cluster system during the cholera outbreak of 2008/2009, the civil protection committees at various levels led by the ministry of local government and the IACCH, all for the purposes of streamlining and coordinating the response. The success of controlling the cholera outbreaks is built upon functional multisectoral engagement. The Global Task Force on Cholera Control's Ending Cholera—A Global roadmap to 2030, recognizes multisectoral engagement as one of the three key axis for cholera control [30]. The key cholera drivers are largely known and most of them are outside the health sector. The tools for prevention and control of cholera outbreaks are also known to work and anchor on improving access to clean water and improving sanitation, improving community awareness and hygiene practices including the hand washing [10–13]. The health sector is mainly responsible for responding to outbreaks in terms of case management and surveillance. The requirement of multisectoral engagement becomes more important realizing the limitations of the health sector in cholera prevention efforts.

Over the years Zimbabwe has witnessed rapid response to, and reducing case fatality rates from, cholera. The investments made over the years to strengthen the health system partly explain this phenomenon given the fact that the cholera case fatality rate reflects the access to basic health care [31]. Availability of HRH, strengthened surveillance and improved availability of basic commodities have been realized over the years. The per capita expenditure on health increased from $9 in 2009 to $24 in 2015. Regarding retention of health workers, average in-post rate stands at 81% [32]. Indeed the Ebola viral diseases outbreak in West Africa brought to the fore the central role of strengthened health systems in responding to diseases outbreaks [3, 4, 33].

The presence of skilled rapid response teams, especially following the scale up of training following the 2008/2009 cholera outbreaks, as well as the recent training sessions in response to the typhoid outbreaks in Harare, has improved the capacity of health workers to manage epidemics. Health worker capacity for rapid detection and swift control of outbreaks is essential in emergency preparedness and response [34]. RRTs which are multidisciplinary teams ensure this takes place and where they are functional this has led to reduced mortality and shortened period for control [35]. The timing of activation of RRTs is also important for good outcome for delayed activation may also lead to increased mortality.

Correct information is necessary for the communities to take appropriate action to prevent infection or to get immediate assistance when they get infected [36, 37]. The sustained information dissemination through the district structures made the people**'s** perception of risk remain high and to quickly adopt responsible behaviors as advised. Majority of the population anywhere in Zimbabwe still remember and reminisce the events of 2008/2009 which left them devastated and hence are very responsive to behavior change communication messages. Lessons from the field show us that when inadequate information is given it may lead to information gaps allowing unorthodox sources to lead with misinformation resulting in panic or inappropriate actions [3]. On the other hand clear information dissemination on a regular basis from trusted sources has led to communities taking part in the response measures leading to rapid containment of epidemics as reported in Uganda during an EVD outbreak the

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country faced [3]. Furthermore, surveillance is a key requirement for epidemic detection and control. Zimbabwe has registered improvement in this area and has built capacity for real time reporting. This has enabled fast detection and response to outbreaks. Capacitation of health workers in IDSR has improved their interpretation and use of data at local level.

## 6. Conclusion

Emergencies and in particular outbreaks of infectious hazards remain a global concern. The IHR (2005) together with other guiding documents on specific themes on emergency preparedness and response remain available to guide countries in building capacities for emergency preparedness and response. The capacity of countries to mount adequate response to control emergencies depend on the resilience of their health systems build upon organizational, community and individual resilience and to a large extent dependent health systems institutional capacities as defined by the WHO health systems building blocks.

Zimbabwe having gone through a period of economic difficulties, faced one of its worst ever cholera outbreaks, which resulted in high rates of infection and deaths. This being said the country managed to use this event as a stepping stone which has resulted in the country building resilience to mount adequate response to outbreaks in the recent years. Understandably, resilience is not an all or none event but a process with levels of attributes, and Zimbabwe continues to work towards achieving all resilience attributes. Other countries can learn from Zimbabwe's experience to build resilience.

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## Conflict of interest

None declared.

## Notes/Thanks/Other declarations

This work was conceived by Dr. Juliet Nabyonga-Orem when she was Officer in Charge of WHO Country Office in Zimbabwe having observed with appreciation the country's response to the cholera outbreak which occurred in Chegutu district starting in January 2018.

## Abbreviations

| | |
|---|---|
| ACF | Action Contra La Fame |
| AFR | African Region of the World Health Organization |
| C4 | Cholera Command and Control Center |
| CTC | cholera treatment center |
| CTU | cholera treatment unit |
| DHE | District Health Executive |
| DHIS | District Health Information Software |
| ECHO | European Civil Protection and Humanitarian Aid Operations |
| EHT | Environmental Health Technician |
| EVD | Ebola virus disease |
| FAO | Food and Agricultural Organization |
| GAA | German Agro Action |
| GOARN | global outbreak alert and response network |
| IACCH | Inter Agency Coordination Committee on Health |
| IDSR | Integrated Disease Surveillance and Response |
| IEC | Information Education and Communication |
| IHR | International Health Regulation |
| IOM | International Organization for Migration |
| MOHCC | Ministry of Health and Child Care |
| NGO | non-governmental organizations |
| OCHA | UN Office of the Coordination of Humanitarian Affairs |
| ORT | oral rehydration therapy |
| PHEOC | Public Health Emergency Operations Center |
| PMD | Provincial Medical Director |
| RDNS | rapid disease notification system |
| RDT | rapid diagnostic tests |
| RHC | Rural Health Center |
| RRT | rapid response teams |
| SC | save the children |

| | |
|---|---|
| SSA | sub-Saharan Africa |
| UNHCR | United Nations High Commission for Refugees |
| UNICEF | United Nations Children's Fund |
| VHWs | village health workers |
| WASH | water, sanitation and hygiene |
| WDSS | weekly disease surveillance system |
| WHO | World Health Organization |
| ZIP | Zimbabwe Informed Push System |

## Author details

Anderson Chimusoro[1]*, Stephen Maphosa[1], Portia Manangazira[2], Isaac Phiri[2], Tonderai Nhende[2], Sydney Danda[2], Ottias Tapfumanei[2], Stanley Munyaradzi Midzi[1] and Juliet Nabyonga-Orem[3]

*Address all correspondence to: achimusoro@gmail.com

1 World Health Organization, Country Office for Zimbabwe, Harare, Zimbabwe

2 Department of Epidemiology and Disease Control, Ministry of Health and Child Care, Head Office, Harare, Zimbabwe

3 World Health Organization, Inter-Country Support Team for Eastern & Southern Africa, Health Systems and Services Cluster, Harare, Zimbabwe

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