

Cholera Outbreak in Haiti 2010-2011

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Abstract

The cholera epidemic that started with just a few cases soon found its way in all the corners of the republic of Haiti and this was a major blow to the public health and sanitation of the country. For the nation that had not experienced cholera cases in more than 100 years, this was one of the most devastating catastrophes of all time. For a disease that causes severe diarrhea and dehydration that can lead to death within 48 hours, Haitian authorities and supporting organizations were fighting against time to reduce the morbidity and mortality associated with the cholera outbreak. This article review explores the efforts made by various actors to contain the outbreak, the retrospective review looks at the origin, magnitude of the catastrophe, the efforts to contain it, the factors that aided the spread and the public health social determinants that would have helped reduce the magnitude.

Keywords: Cholera; Diarrhea; Public health; Epidemic; Viral outbreak.

Introduction

The 2010-2011 cholera outbreak in Haiti is said to be one of the worst cholera outbreaks ever recorded and was the first in the country in over a century. According to this epidemic resulted in 57% of all cholera cases and 45% of all cholera deaths reported in 2011 and 2012 by the World Health Organization, WHO.

Cholera if left untreated, is a disease that causes severe diarrhea and dehydration that

can lead to death within 48 hours. According to Orata, et al., eating food or drinking water contaminated with feces containing the *Vibrio cholera* bacteria is the main method of getting the infection which is treatable and more so preventable [1].

Origin

Nine months after the catastrophic earthquake in Haiti that affected more than 3.5 million people, the country is hit by a

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cholera outbreak. The earthquake had devastated the infrastructure and public health and sanitation programs were in their knees during the time. This fueled the spread of the disease across the country. The two hypotheses that were used to explain the origin of the epidemic were centered on; a climatical perspective where authors argued that the indigenous micro bacteria in the rivers of Haiti evolved after getting the right conditions to become pathological. On the other hand, it was thought that the pathogen was introduced by infected people from other countries into Haiti [1]. However, the explanation linking the army with the outbreak is explained in a chronological way where during their camp, human wastes were not well managed, and found their way into a tributary that saw the first case reported downstream.

Morbidity and mortality during the outbreak

A retrospective study done in Northern Haiti by Centers for Disease Control and prevention, CDC in conjunction with Medicens Sans Frontiers, MSF, showed that the death toll from the outbreak was largely under reported especially during the first days of the scourge [2]. The national cholera surveillance system for instance reported 132 deaths during the cholera period in Gonaives whereas after the survey, 1254 deaths due to watery diarrhea and 1028 cholera deaths were recorded in the same area. The study notes the crude mortality rate, which is the Total number of deaths per calendar year/estimated mid-year population that year $\times 1000$, to have increased by 2.9-fold. The baseline data showed a total number of 4856

deaths in the entire country which still represented an increase in the crude death rate by approximately 1.1-fold. The authors acknowledge that there could have been bias because the survey was done retrospectively and recalling the exact information could have affected the results. In the northern part of the country the survey showed an increase of 14-fold with recorded 127 deaths per 1000 person-years. Immediately after the earthquake devastation, there were surveillance systems put in place to get data on the watery diarrhea in the groups of the internally displaced people, IDPs and the sentinel surveillance system. However, these were not able to provide the kind of surveillance data needed for giving real time information on a national epidemic magnitude event. The need for proper cholera surveillance was imminent. The national cholera surveillance system, NCSS, was formed and collected and analyzed and disseminated data for two years. It was made up of both governmental and non-governmental agencies with CDC giving technical support. The case fatality rates were generated daily with the cumulative case fatality rate being taken as the ratio of the total number of deaths to the total number of cases. The deaths were calculated as both the hospital ones and the community ones.

“Through October 20, 2012, the health ministry reported 604,634 cases of infection, 329,697 hospitalizations, and 7436 deaths from cholera. Children under 5 years of age accounted for 78,938 cases of infection (13.1%), 34,394 hospitalizations (10.4%), and 580 deaths (7.8%), including 460 of 4807 institutional deaths (9.6%) and 120 of 2629 community deaths (4.6%) [3].”

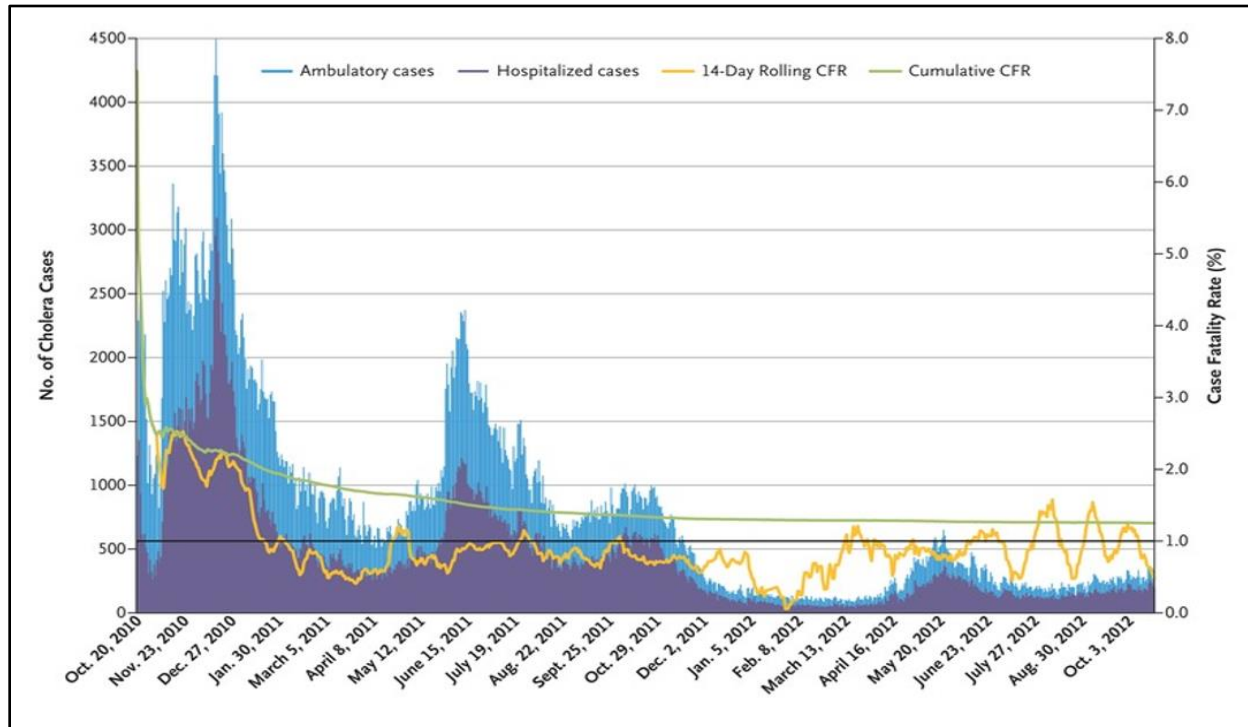


Figure 1: New Cases of Cholera and Hospitalizations in Haiti during a 2-Year Period showing the cumulative case fatality rate [3].

The authors give the cumulative attack rate as 5.1% in the first year, 2011 and 6.1% in the second year, 2012. One area concentrated along the Artibonite River showed an increased attack rate than the other regions. The primary attack rate is defined as the number of cases/the number at risk $\times 1000$ while the secondary attack rate is the number of new cases among contacts with primary cases/total number of contacts $\times 100$ or 1000. The data that was used to estimate the morbidity and mortality rates from the cholera outbreak was partially gotten from the social and the mainstream media. This enhanced the epidemiological assessment, especially during the initial stages when there was no official means to do so. This ensured that timely data was gotten to enhance response in a targeted manner [4]. As authors

have seen, the fatality level was very high and so was the morbidity, way above the WHO estimations.

Factors that aided the spread of the outbreak

The epidemic that started with just a few cases soon found its way in all the corners of the republic of Haiti and this was a major blow to the public health and sanitation of the country. For the country that had not experienced cholera cases in more than 100 years, this was one of the most devastating catastrophes of all time.

The strain of the cholera bacteria that was involved in the epidemic could also have played a part in the spread. This was shown in a study done by Chen-Shan, et al., [5]. "The

Haitian outbreak strains can be distinguished from earlier seventh-pandemic strains by several genetic polymorphisms, including those in ctxB. Alterations in the ctxB sequence in the context of other structural variations (e.g., within SXT and VSP-2) are hallmarks of the variant strains that have emerged in South Asia. Because these variant strains replaced previously dominant strains of the seventh pandemic in South Asia, it has been hypothesized that their unique genetic composition increases their relative fitness, perhaps as a consequence of increased pathogenicity. Specifically, by causing more severe dehydrating disease, variant strains increase their own dissemination through the increased production of infectious stools by their human hosts [5].”

However, in an article by P Farmer, it is argued that social inequalities play a critical role in the emerging of infectious diseases and how interconnected the populations are in different areas with their complexities [6]. Most of the analytic frameworks will obviously obscure the most issues that are related to the causality and other disease epistemology only to concentrate on the complicated issues. In this case, the epidemiologists, clinicians, nurses, social scientists, laboratory scientists and all other people involved in an outbreak have to be involved in order to know all the aspects of the epidemic in a study. In the Dalghren and Whitehead model of health determinants, 1991, attention is drawn to the fact that factors in the various layers of influence differ in the degree that are easily modifiable or within our control to change. On the other hand, Barton and Grant model of health determinants, 2006, highlights the importance of the

natural and built environment on health. Both the models map the relationship that is there between people, their health and the environment. Hillary G argues that the social inequalities between the societies have to be addressed if health inequalities have to be dealt with amicably [7]. There is a great difference between the people ‘who have’ and those ‘who do not have’ in society. The areas which are well catered for when it comes to the social determinants have less problems when it comes to health. Infectious diseases follow the same trends. The individual lifestyle, the social and community networks and the general social economic cultural and environmental conditions all play a role in the well-being of an individual.

The preliminary investigations showed that the first cases were reported from a densely populated area with no portable water and with limited sanitary infrastructure. The epidemic took shape following the areas that the Artibonite River passed through. Partners in Health, which is the organization working in the region first affected by the scourge explained that all their 7 hospitals in the region had received cholera patients within the period. In the slum areas that were near the area with the index cases, cases were reported by the Doctors without borders, so were cases reported from the nearby camp [8]. The fact that these areas were densely populated means that the basic infrastructure for the latrines and toilets was not enough to cater for everyone. The people living near the river, owing to the fact that river did not have enough clean and treated water to drink, drank from the river which might have been contaminated with feces by people living upstream. This would only be disastrous.

Well, everybody in Haiti was caught by surprise when cholera struck. The staff in the health facilities were not used to managing cholera and were not enough to handle the cases that were trickling into the hospital day and night. In this part of Haiti that is considered rural, people had increased in their numbers simply because after the town was hit by the earthquake, most people moved to live with their relatives in the Artibonite area. Haiti is known to be one of the worst hit countries with water insecurity and actually in the survey that looked at the water poverty index in 2002, it emerged number 147 out of 147 countries. "After the earthquake, more than 182,000 people moved from the capital to seek refuge with friends or family in the Artibonite and Central regions, increasing stress on small, overcrowded homes and communities that lacked access to latrines and clean water. In addition, in many areas of Haiti, the costs associated with procuring water from private companies and the lack of adequate distribution systems have rendered potable water even less accessible for those most at risk [8]".

The fact that many people were unemployed after the earthquake catastrophe meant that even buying the portable water was out of context to the people living in the affected areas. The earthquake itself destroyed most of the sanitary infrastructure in the various areas making control of the scourge difficult. There was an argument that there were Minustah troops from Nepal who were stationed in Haiti in 2010 and set up a camp in Meille. These troops used to dispose their feces appropriately and this led to the contamination of River Meille. The index case is reported to have been reported from an

area along the river [1]. The news agencies showed improper sewage waste disposal by these United Nations troops that were sent to the area for stabilization of the country after the deadly earthquake. River artibonite is also said to play a very big role in the spread of cholera in early days because many people live along it and the cases were reported from the areas surrounding it in large numbers. The people along these rivers were poor, most did not have any form of employment and therefore could not afford to protect themselves from the scourge. Other factors that could have played a role in the Haiti cholera outbreak according to Renaud, et al., are the absence of immunity of the people [9]. The entire population had not encountered the disease again in their lives. The higher infectivity of the strains that were shed in the human rice-water stools and the fact that the hyper virulent variant strains of the *Vibrio cholerae* were involved.

Public health recommendations

The social determinants of health model analysis as mentioned earlier include things like the individual lifestyle, social and community lifestyle, general social economic cultural and environmental conditions including the built environment. Lifestyle play a very critical role in ensuring that a person lives a healthy life. The environment that one lives in, including the building and what is contained inside should promote healthy living and not be a hazard. Most of the things are within the control of the individuals, policy makers and policy implementers in prevention of disease. According to Hillary G social inequalities exist in different societies among groups and

individuals and must be dealt with [7]. The social determinants of health include water and sanitation, unemployment and social welfare, education, transport, enough food, access to health and social care services, housing and living environment that promote good health. Improving health care facilities is paramount. All the staff working in the facilities should be provided with all the necessary equipment and knowledge so that the emerging health problems and the outbreaks can be dealt easily. The staff numbers should also be adequate because understaffed facilities who encounter an epidemic of a magnitude witnessed in Haiti will be overwhelmed out rightly. The sanitary deficiencies that are noted in the camp for the Nepalese troops who had just camped next to a stream that emptied into the river that had many cases of concentrated infections should be avoided [9].

The authorities in any country should have policies in place to govern how waste is managed. The sewage system that was discharging into the stream that eventually emptied into a river that was used for drinking by the poor people downstream. This resulted in the cholera cases, may be the index case and the many other cases that were reported after that. The continuous surveillance of the potential outbreaks for prevention and early interventions purposes should always be ongoing. The targeted epidemiological surveys in the areas that have the potential to have cholera epidemics should be done on a regular basis. This enables the responders to plan on when and where to intervene as well as the kind of interventions needed. The ongoing epidemiological survey during an outbreak is

also very critical as we see happening during the cholera outbreak in Haiti. Various organizations including the Centers for Disease and Prevention, CDC, World Health Organization, WHO, Medicens Sans Frontiers, MSF as well as the government health agencies were involved in continuous surveys that provided data that informed their interventions. According to Renaud, et al., as soon as the epidemic started, a monitoring program was commenced that was multi sectoral in nature that collected up to date data and correspondences [9].

The use of the community health workers in Haiti to distribute Oral Rehydration Salts, ORS during the outbreak in the communities was a positive move. This helped in the survival of many cases that would not have been able to get to the hospital in time. These are people who should be used to teaching the community members on the issues of hygiene in such situations and can be used to distribute water purifiers to the people in the affected areas, contact tracing, active case referrals and community-based reporting. The health education given to the populace should center on hygiene and proper sanitation. However, the health workers in the facilities handling the cholera cases should be given specialized training on the Cholera Treatment Center, CTC management, and case handling, infection prevention protocols and contact tracing.

The international collaboration during epidemics is of utmost importance. Authors observed that the epidemiologists from France and other countries joining the teams in Haiti for response purposes [9]. The international organizations involved as well

are in a position to give the expertise and both material and human resources required in the process. The International Health Regulations by the World Health Assembly, IHR 2005, recognizes the importance of establishing a global disease surveillance system for public health emergencies of international concern [10].

It recognizes that there would be obstacles in implementation, but it requires full support by the national governments with political good will and the World Health Organization. The diseases of concern include cholera, plague and yellow fever. Prior to the epidemic in Haiti, there had been

no cholera vaccine that had been given in the country nor has it been used in most of the countries to date. Louise, et al., notes that the first doses of oral cholera vaccine were offered 18 months after the first cases of the disease were reported [11]. All vaccine preventable diseases in the post vaccine era should be prevented at all costs.

Publishing consent

We, Kenneth Mwenda and Issac Kiroso, authors of a student paper submitted to Intercollege, give our consent to publish the work in the Journal of Biomedical and Allied Research.

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