

**Forum:** World Health Organization

**Issue #27-02:** Measures for the prevention and management of the Cholera Outbreak.

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## Introduction

Throughout the years, there have been numerous epidemics which have brought nations together, and have affected a wide range of the population. However, besides the recent epidemics and emerging diseases, it is also pivotal to address those which have not been abolished for years. Given the previous statement, it is increasingly important to recognize infectious diseases such as Cholera, which require priority consideration and immediate management. According to WHO, Cholera is a global public health problem, and its abrogation is not only important to ensure the health of the population, but also to establish the proper infrastructure, sanitation regulations and health conditions worldwide. Cholera is an infectious waterborne disease caused by the *Vibrio cholerae* Bacterium, which is contracted by the act of ingesting feces, or contaminated food and water. It is a highly contagious disease and it's characterized by causing acute diarrhea which subsequently leads to an extensive loss of electrolytes and fluids, a fatal case of dehydration. Due to extreme dehydration, fatality rates are high when it is left untreated, especially in children.

Cholera first emerged in the early 1800s in the rise of the Asiatic Cholera Pandemic (1846-1863), the third of a series of outbreaks which began in India and spread all over Asia. When Cholera arrived at Florence, Filippo Pacini (physician), conducted examinations of the intestinal mucosa of Cholera patients and discovered the existence of the *Vibrio*. Furthermore, other researchers such as Robert Koch and John Snow, also provided theories and further

discoveries on the organism and whether it's correlation with the disease was causal or consequential. Throughout history, Cholera has been a constant disease having seven pandemics in different locations. Some of the most well-known Cholera Pandemics are those of Brazil, North Africa, Russia, the United States and Egypt. While the cases of Cholera have reduced, it is still an issue in regions facing famine, war, natural disasters, and have a lack of proper hygiene/sanitation. Most recently, it's countries such as Somalia, Kenya, China, India, the Democratic Republic of Congo, and Tanzania which have been struggling to contain the disease and provide basic sanitation services. However, that does not narrow the problem to developing countries. In fact, developed and industrialized countries are highly encouraged to aid in the process of infrastructure, funding, and the creation of regulations on proper sanitation.

The main issue is that, while there is already an existing vaccine for Cholera (Vaxchora) and other oral treatments, it does not only require more than a single dose, but also complete isolation from possibly contaminated environments in order to confer protection. Therefore, the use of vaccines and treatment can only be beneficial if measures are taken to address the proper disposal of feces, sewage, and trash. Consequently, the improper disposal of sewage into waterways could contaminate the water supply, any foods washed in the water and organisms living in the water bodies. It is estimated that Cholera affects between 1.3 to 4.0 million people worldwide and causes 21,000 to 143,000 deaths each year. Therefore, the scope of the damage is global and is taking a toll on the world's population. Despite the negative effects, the outbreak of Cholera has shown the newfound importance which is given to hygiene, access to clean water and proper sanitation; a lesson of cleanliness and the consequences of the conditions of our environment in our health.

The WHO currently has a global task force which established a policy and recommendations for the prevention and control of the Cholera outbreak, and specific case management. They promote health education and good food hygiene in order to prevent its expansion. However, they still face the issue of various countries not following the policy, and lacking the resources to contain the disease. It is the duty of countries to collaborate and create new regulations, progress records, and penalties to further promote the control of Cholera.

## **Definition of Key Terms**

### **Pandemic**

According to the Merriam-Webster dictionary, a pandemic refers to an event which occurs over a wide geographic area, affecting a large part of the population. In this case, the expansion of a disease across various continents- worldwide.

### **Epidemic, Endemic or Outbreak**

Epidemic, Endemic, and Outbreak are terms which complement each other. An outbreak is the sudden or violent start of a disease. An epidemic is the occurrence of an infectious disease in a community at a specific time. An Endemic is a disease which is particularly found in a certain area or group of people.

### **Vibrio Cholerae Bacterium**

Vibrio cholerae Bacterium is the causative agent responsible for Cholera. It is a bacteria which naturally occurs in warm coastal areas and small bodies of water such as contaminated ponds and rivers.

## General Overview

### Eradication of *Vibrio Cholerae* Bacterium

*Vibrio cholerae* Bacterium is native to the aquatic environments and naturally occurs in bodies of fresh water, therefore it cannot be fully eradicated from the ecosystem. However, various methods of prevention can be established. Epidemic regions are characterized for the sporadic outbreaks of Cholera, and inevitably, it's the environment which contributes to these outbreaks. When these regions go through an episode of warm air temperature and low river flows, it creates favorable conditions for the Cholera Bacteria to grow. Moreover, during heavy rainfall, floods or breakdown of infrastructure, there is a wide interaction between human activities and contaminated sources of water. This causal mechanism is inevitable, as it's part of the environment's natural cycle. To truly eradicate Cholera, organizations, and nations need to focus on concepts which are under human control such as hygiene and sanitation.

### Transmission

Transmission commonly occurs through the ingestion of contaminated food and water, however, there's a process through which the water obtains the *Vibrio cholerae* Bacterium. As a survival strategy, the *Vibrio* forms an interaction with a crustacean known as a copepod. The interaction forms a biofilm, which becomes a protective barrier and allows the bacteria to survive unfavorable conditions. Copepods are found in almost any body of freshwater, specifically in areas which have a lack of water infrastructure, increasing the risk of Cholera Infection. Transmission of the bacteria varies from drinking fecally contaminated water to cleansing foods or utensils with it. Moreover, there is also direct transmission, which is very rare and consists of an individual ingesting feces from another infected individual.

### Effect on children

Cholera shows the same symptoms in both adults and children in a different magnitude. Children are not only more susceptible to Cholera, but also show a greater risk of

dehydration during infection. Children may be more susceptible to Cholera because they generally have less stomach acid, which kills the bacteria during ingestion. In the most recent 2017 outbreak in Yemen, it is estimated that there are 8 million children which do not have access to clean water and basic sanitation services, increasing the risk factor of Cholera infection. In countries such as Bangladesh, children under five years old bear the largest Cholera burden in rural areas.

### **Basic hygiene education**

Health education is one of the most important factors in the prevention of Cholera. Because Cholera depends on sanitation and water contamination, it is pivotal to stress the importance of sanitation among the population and conclude whether there is a change in behavior towards it. Not only promoting high awareness of the disease itself but also promoting the easy at-home methods which any individual in a developing country could adopt in order to combat Cholera. Just the simple acts of washing hands, cleaning a bathroom, boiling water, avoiding raw food, using latrines and keeping good infrastructure conditions could reduce the risk of contracting Cholera. As the WHO states, “washing hands with soap and water is the basis of health.” The WHO has been working to change the basic hygiene activities which are taken in developing countries, and the basis of them is the lack of access to clean water. Due to this issue, there is no clean water source to wash food, drink or basic sanitation. Moreover, it has been concluded that hygiene behaviors are particularly difficult to change because they relate to daily activities which are shared among the community. Therefore, nations will have to work in the selection and implementation of educational methods to provide a wide awareness of hygiene in the fight of Cholera.

### **The role of clean water**

According to Water Crisis Organization, there are approximately 844 million people with no access to safe water and 2.3 billion living without access to improved sanitation. Water is the key to unlocking education, work opportunities and improved health for women, children, and families around the world.

The lack of water and sanitation are keeping women in a cycle of poverty. As they are mostly responsible for the collection of water which takes a six-hour walk for some and also keeping them from school, work and family. 266 million women and girls spend their day finding a water source. Not only is it important to empower and aid women in the process of accessing water, but also making sure they go beyond their traditional roles.

Aside from the access to water being a women's crisis, it also holds a lot of potential in the sector of health. Every 90 seconds a child dies from a water-related disease. It is not only important for general health activities, but also to strengthen our ability to fight any water-borne disease, including Cholera.

### **Vaccine development**

Currently, there are two options in order to combat Cholera. There are two oral vaccines which induce antibodies that prevent the bacteria to attach to the intestinal wall, and there is the injectable vaccine which requires various doses throughout the years to work effectively. However, these vaccines or remedies are neither effective nor do they provide long-term immunity. Therefore, the WHO does not recommend the use of these vaccines because of their unreliability and encourages the use of genetic engineering to develop both effective and accessible vaccines.

Moreover, another issue about the current vaccines is the use and further treatment needed. Both remedies need continuous doses in order to be effective against the virus. This comes as an issue for the populations of developing countries, which can rarely afford various doses, or a medical center is not accessible. Therefore, the WHO highly recommends to not only develop a remedy, but also strengthen the prevention system through better sanitation and hygiene which is an accessible alternative in developing countries. In Countries such as India, where the vaccine is manufactured and considered somewhat effective, it is still not implemented into the National Immunization Program due to its flaws.

The first vaccines for Cholera had a very short-term effect of 3-5 years and were discontinued by the WHO in the 1970's due to side effects of local erythema, fever, pain and general

discomfort. Following the creation of the two oral vaccines, it was discovered that they were only effective towards one serogroup of Cholera and the protective capability took 3-6 weeks to be in full effect. Overall, it was stated that the use of vaccines would only be truly beneficial if it was followed by preventive measures of hygiene.

## Controversy

The subject of Cholera is not only controversial in terms of how long it's been an issue, but also in the way which nations participate and contribute towards it. There are more developed countries which, through industrialization, have managed to leave Cholera behind. On the other hand, there are countries who are in the midst of the process, and developing countries that still struggle to abolish the disease. It might seem that Cholera cannot be a controversial issue, but along the years there's been a myriad of events which have built up tension among the international community. For example, after the 2010 earthquake in Haiti, the UN sent a mission in order to stabilize the country in the aftermath. However, there was something about the enforcement of the law which caused severe widespread violence, and unexpectedly, a massive Cholera Outbreak. The UN was blamed for the Cholera Outbreak, which has not been abolished to this day. The way in which organizations address issues such as Cholera should be delicate and attentive. Generally, it is incredibly important for nations to strengthen the health sector in terms of fighting diseases such as Cholera.

## Major Parties Involved and Their Views

### India

According to the Water Crisis Organization, there are 162 million people living without access to safe water in India, and 210 million without access to improved sanitation. These two being major risk factors for sporadic outbreaks of Cholera. The estimated actual burden of Cholera is of 3 to 5 million cases with 100,000 to 300,000 deaths each year. India has a myriad of Cholera Hotspots spread all over the country, which are dangerous for the rural areas that utilize polluted

water for many daily activities.

## **Mexico**

Approximately three-quarters of people drink packaged water in Mexico due to the risks that come when drinking tap water. As one of the leading countries in Latin America, it is ranked as one of the worst countries in terms of access to clean water. About 5 million Mexicans currently live without access to clean water. When the Cholera outbreak spread to Mexico in 2010, there were 180 cases reported. Due to the lack of access to clean water, there was a major risk for the population living in rural areas. Mexico might not be currently facing the Outbreak of Cholera, but there's still work to do in terms of the water infrastructure and sanitation in the rural area as preventive measures.

## **The Democratic Republic of Congo**

Just from November 2017 to February 2018, there have been 1065 cases of Cholera reported. Following intense rains and heavy floods in January 2018, there has been a major risk of Cholera. Democratic Republic of Congo is an endemic region for Cholera, suffering sporadic outbreaks constantly. Poor infrastructure, lack of adequate drainage, and limited access to water and sanitation make the country susceptible to water-borne diseases. It has been working with the WHO to implement general hygiene practices, and access to safe water and sanitation through the Global Task Force.

## **Brazil**

Since the Cholera outbreak of 1998, the Health department of Brazil has been working in health education activities, water chlorination and case management. According to Water Crisis Organization, about 5 million people in Brazil lack access to safe water, and 25 million to improved sanitation. However, for those who do have access to water, the water supply downtime, disruption in services and deficiencies in drinking water systems are challenging. Brazil is a major hotspot for Cholera due to water pollution.

## **China**



The third Cholera pandemic was carried to China in 1854, and had a huge toll on the population causing about 300,000 deaths. In 2016, there were 26 Cholera cases in China. While Cholera is not such a big issue anymore, still 80% of China's underground water is not suitable for drinking and most rivers suffer from heavy pollution making China vulnerable to a major risk of Cholera outbreaks. 80% of the rural water supply is not safe for either drinking or bathing. This is increasingly important as a risk factor for Cholera and providing the population with access to safe water.

## United States

As a leader in the international community, the United States managed to overcome Cholera in the 1800s through the process of industrialization and the modern water and sewage treatment systems. As it has managed to fully improve its infrastructure, Cholera is now rare. Therefore, the United States stands as a great example to developing countries for the prevention and management of water-borne diseases such as Cholera.

## Timeline

<b>Date</b>	<b>Description of event</b>
1817	The first Pandemic occurred, causing a very lethal outbreak in India, Myanmar, Bangladesh, Sri Lanka, Thailand, Indonesia, the Philippines and Turkey. There were approximately 500 million people infected and the mortality rate was between 10% to 20% up to 25 million deaths in first 25 weeks.
1829	Another serious outbreak of Cholera known as the Second Pandemic reached Europe and the Americas affecting major cities of Russia and spreading to Poland and Finland, making its way to Germany and England.

- 1832 Cholera reached Canada and the United States, the Outbreak continued to spread towards Mexico and Cuba.
- 1852 After the two major outbreaks, the third pandemic was the deadliest. It began in India, reaching the Middle East, Europe, Africa, and the United States. 23,000 people died alone in Great Britain.
- 1854 English Physician John Snow proved that Cholera was being caused by contaminated water. The outbreak was reduced when the water pump identified as the source was shut down.
- 1863-1881 The fourth and fifth pandemic affected Spain, Russia, China and Japan. Throughout these events, the German physician Robert Koch discovered the causative agent for Cholera was the *Vibrio Cholerae bacterium*.
- 1892 Prophylactic vaccination against Cholera was invented for the first time in Paris by Jamie Ferran.
- 1899-1923 The sixth Cholera outbreak began affecting India, Egypt and Russia.
- 1961 The seventh Pandemic Began in Indonesia and was particularly devastating to Africa in countries such as Zimbabwe and Tanzania.

2016 The first Vaccine against Cholera is approved by the FDA. (Vaxchora)

2016- 2018 Cholera Outbreak in Yemen and the Central African Republic.

## UN involvement, Relevant Resolutions, Treaties and Events

In 2011, the **WHA 64.15 resolution for “Cholera Mechanisms for control and prevention”** requested the creation and revitalization of the Global task force for Cholera Control in order to ensure WHO policy and strengthen collaboration within nations towards the issue. The Global Task Force is incredibly important in the process of eradicating Cholera as it restarted the development of a research agenda to evaluate and create innovative approaches towards the control of Cholera. Furthermore, to strengthen the capacity of countries to control Cholera, and the implementation of effective strategies and monitoring systems.

Moreover, in October 2017, the **Global Task Force** created a statement calling out for action in order to end Cholera through a **global roadmap to 2030**. Through the roadmap, the UN is committed to helping reduce cholera deaths by 90% and eliminate the disease in about 20 countries by 2030. The WHO fully recognizes the magnitude of the effect of Cholera and states that “Vaccines will not be enough” in order to control and maintain Cholera. The UN states that access to basic sanitation and water is a right, yet, there are 663 million people without access to such, which is a major risk factor for Cholera. Due to the previous fact, the UN implemented a programme for basic hygiene education in developing countries in order to emphasize the role of hygiene in the transmission of Cholera.

On September 17 of 1993, the UN adopted resolution **WPR/RC44.R13 on Cholera and Diarrheal diseases** in order to urge member states to follow the international cholera management policy to contain the disease within regions. Hereby, it is clear the UN has attempted to address the ancient disease of Cholera, but the actions taken are simply not

sufficient to eradicate the disease due to factors such as hygiene education and activities, urbanization, conditions of water systems and infrastructure.

## **Evaluation of Previous Attempts to Resolve the Issue**

On May 7th, 2018, UN health experts stated that “Vaccinations would not be enough” regarding a Cholera outbreak across Africa. This is an issue which is relevant across every single resolution that has been proposed by the UN. Partners and agencies have been addressing the issue through the medical factor and ways to cure the disease, however, the prevention and management of already existing cases are being ignored. Previous actions by the UN, including the Global Task Force, urge countries to take the necessary steps of improving infrastructure, health conditions, and water systems. The help of the medical sector and medical innovation are not enough to contain the disease, and therefore, the resolutions proposed are redundant. Given the previous information, it is increasingly important that countries take into account major risk factors such as educational hygiene, food hygiene, correct disposal of sewage and feces, and access to safe water and basic sanitation. Overall, the disadvantages of resolutions such as this, are the short-term effects. It will get to a point where the need for the human to act upon the issue will outweigh the benefits of the already existing one.

Another issue that comes with past attempts of resolutions is the accessibility. Cholera is known to be a disease which is determined by economic sufficiency. The part of the population living in rural areas which do not have access to safe water or basic sanitation is the most vulnerable to a disease such as Cholera. Therefore, the issue with treatments such as oral vaccines, or medicinal kits is that they are not affordable. Most kits require more than a single dose and constant surveillance in order to be effective, making the healing process extremely difficult. The issue of accessibility does not only come in terms of money difficulties, but also in the number of people that can access facilities. WHO report shows that 400 million people do not have access to a hospital and therefore cannot access the necessary treatment.

It is assumed that if the medical and technological sector of the resolution is addressed,

that everything else will work out on its own. However, it is increasingly important to recognize that vaccines, medicine, and other treatments will only be truly effective if they are consistent with a clean and safe environment. Given the previous information, the UN must create resolutions that address both parties (the population and the organization), in order to have a balanced, accessible and effective aim.

## Possible Solutions

The importance of this issue is to not only prevent the expansion of the disease of Cholera, but also treat the already existing cases around the world, while at the same time, preparing for a possible outbreak. Therefore, nations should be addressing the issue according to their different positions, yet still contributing to the bigger picture of Cholera. The disease of Cholera is known as an ancient disease, however, it is still taking a toll on a huge part of the population.

Nations should not focus on the innovative and technological sector, but more on the human activities and steps the population could take in order to make these effective. By starting with global awareness of the issue, basic hygiene programs in developing countries, rural areas, and poor regions could change the livelihood of the population to a safe and clean one. Demonstrating steps to take for basic food hygiene, for the management of water sources, and avoiding water-borne diseases. The UN has attempted to see a change in the behavior of communities after hygiene education and has realized that common activities involving water are hard to change due to customs.

This leads us back to another possible solution. The UN has not produced any sort of monitoring system towards already existing policies or resolutions for Cholera, therefore, there is no record of the progress made. The creation of a monitoring system would not only ensure that progress is happening, but also that there is a fair and balanced contribution to the issue and that policies are being implemented. In recent years, the WHO has collected information on the location and regional disease of Cholera, but has not tracked the progress towards the 2030

roadmap to end Cholera.

Moreover, some extremely important factors that should be addressed in resolutions are ensuring the rights of access to clean water and basic sanitation. Whether it is working with organizations such as Charity Water or the Water Project, or implementing new infrastructure in developing countries; Making such sources accessible will reduce a major risk factor for Cholera. Nations must work together to find effective solutions which are accessible to the most vulnerable part of the population and include community action.

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## **Appendix or Appendices**

### I. Cholera: Transmission, Symptoms, and Treatment

[http://applications.emro.who.int/dsaf/emropub\\_2011\\_1306.pdf](http://applications.emro.who.int/dsaf/emropub_2011_1306.pdf)

### II. Glossary of terms for Cholera and Cholera Vaccine Programs

[https://www.stopcholera.org/sites/cholera/files/glossary\\_of\\_terms\\_for\\_cholera\\_and\\_cholera\\_vaccine\\_programs.pdf](https://www.stopcholera.org/sites/cholera/files/glossary_of_terms_for_cholera_and_cholera_vaccine_programs.pdf)

