Having been created on 7 April 1948, just three years after the United Nations itself was formed, the World Health Organization (WHO) has made a vast impact since its formation. Currently, the organization has more than 150 countries working with them to complete their mission of promoting health, keeping the world safe, and serving the vulnerable.¹ WHO defines health as, “complete physical, mental and social well-being and not merely the absence of disease or infirmity,” and they strive to promote health and provide health services globally.² WHO completes this goal by leading health initiatives, researching health issues and publicizing their findings, setting standards for the implementation of health programs, promoting ethical health policies, and monitoring and assessing world health trends.

I. Addressing the Global Threat of Cholera

Statement of the Issue:

Recently, one of the largest issues facing the World Health Organization and posing a health threat worldwide has been cholera. Cholera can be contracted by the ingestion of food or drink contaminated with the bacterium *Vibrio cholerae* and is a rapidly-dehydrating diarrheal disease and, if left untreated, can kill within hours. The disease is a worldwide threat to public health and one of the largest indicators of global inequity regarding social development due to the disease’s association with poor sanitary conditions, lack of clean drinking water, malnutrition, and poverty.³ This disease also frequently takes place in areas affected by

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humanitarian emergency situations, thus making it known as “the disease of inequality.” While half of all cholera cases are estimated to occur in children, cholera can affect anyone, including the elderly. The bacteria typically live in waters that are warm and somewhat salty, making it prominent in coastal regions. Recent studies also link the issue of climate change with the spread of cholera due to the creation of more favorable environments for the bacteria that causes cholera to manifest, further emphasizing the need for global prevention and control measures.

Currently, cholera is endemic in many countries. A cholera endemic is defined as an area where confirmed cholera cases were found in the last 3 years and were from that area and not imported from elsewhere. Many middle and low income countries also face cholera epidemics, which are defined as an area where there has been at least one confirmed case of cholera in the past three years with evidence that the cholera was locally transmitted and not imported from elsewhere. Typically, cholera epidemics are synonymous to what are more commonly known as cholera outbreaks. Areas can also be considered cholera hotspots, where the environmental, social, or economic conditions of the area facilitate the spread of cholera and where the disease persists or reappears regularly. Cholera can be experienced via ongoing cases or on a seasonal basis. Today, there are approximately 47 countries impacted, most of them experiencing extreme poverty and lack of social development.

Yemen currently faces the largest outbreak of cholera with over 700,000 suspected cases and over 2,000 deaths as of April 2019. 800 deaths have been reported in Somalia, 500 in the Democratic Republic of Congo, and, during the most recent outbreak in Haiti, 10,000 people died and nearly 1 million cases were reported. Other countries affected by cholera include Zambia, with 7,500 people infected and 100 killed, Uganda and Malawi, both with 900

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5 Ibid.
8 Ibid.
9 Ibid.
people affected, Nigeria, with more than 1700 cases reported, and South Sudan, which remains at great risk for cholera during the rainy season.12

History:

The origin of the cholera bacteria has been identified as the Ganges Delta, a reservoir in India. In this region, the first detailed account of the disease was documented in 1543, when an outbreak of cholera, or what the Indian locals called “moryxy,” killed so many people that it was a struggle to bury all the dead.13 In the 19th century, the first pandemic of cholera began when cholera spread from the reservoir; this was a result of contaminated rice. The rice was then traded to Europe and eventually affected modern-day Myanmar and Sri Lanka, then leading to Thailand, Indonesia, and the Philippines. After this, the outbreak continued to China and Japan, which in turn reached Eastern Europe.14 This pandemic was believed to have ended due to a severe winter that spread across the continents, thereby killing off the disease.

During the second pandemic, which took place around 1830, cholera reached Western Europe, making its way to Great Britain. This pandemic led to many attempts to curb the disease and its symptoms, while also making a majority of the British population fearful of cholera and the related symptoms.15 After reaching Great Britain, cholera eventually spread to the Americas, causing many deaths from Quebec to New York and even down into Mexico.16 Since these first instances, cholera has caused 7 pandemics and killed millions.17 During later pandemics and outbreaks of cholera, Great Britain and the United States were mostly unaffected due to updated modern water systems and stronger infrastructure.18 Despite many countries having access to better infrastructure, thereby allowing for less countries to be affected, we are currently still in the 7th and most recent pandemic. The 7th pandemic began in 1961 and heavily affects the African and South-East Asian continents. This disease, if not eradicated, will continue to affect thousands of people due to factors such as urbanization, population growth, and contaminated water supplies.

14 Ibid.
15 Ibid.
16 Ibid.
The WHO has made copious efforts to help stop the disease, one of which was by creating the Global Task Force on Cholera Control (GTFCC) in 1992. The task force was initially shut down once cholera was eliminated in the Americas, but was called to be revitalized in 2011 by the WHA 64.15 resolution stating that, “Cholera mechanisms for control and prevention requests the WHO Director-General to revitalize the GTFCC and to strengthen WHO’s work in this area, including improved collaboration and coordination among relevant WHO departments and other relevant stakeholders.” This process was completed in 2014 and has since been updated again in 2017 with the creation of the Global Roadmap: Ending Cholera by 2030. The Global Roadmap operationalizes a new global strategy to ensure that cholera will no longer be a threat to public health and includes a two part plan: the early detection and quick response to prevent outbreaks of cholera and a targeted multi-sectoral approach to prevent cholera reoccurrence in known hotspots. The WHO calls for these strategies to be implemented by working with partners at both the local and global levels.

Analysis:

Cholera is unique in the sense that it can be treated and prevented with the correct supplies and medical care. Additionally, potential outbreaks can be mitigated and prevented by eliminating the risk factors that lead to cholera. Ensuring proper cholera detection, having accurate disease monitoring measures, and having the ability to receive the necessary resources to treat the disease allows for early detection of the disease. With proper detection, those affected by cholera are treated in a shorter amount of time, thus improving their chances of survival despite the rapidly dehydrating nature of the disease. This can be done with the proper implementation of capable laboratories in medical facilities, community readiness, adequate supplies, and creating rapid-response teams, especially in places considered to be cholera hotspots. These response methods can lead to early detection, thus a better chance of containing an outbreak.

Once someone is determined to have been infected with cholera, typically by a positive culture test of a fecal sample, ensuring they have access to the necessary treatment is vital for

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20 Ibid.
that individual’s survival. The main treatment focuses on giving the infected individual fluids to replenish those that have been lost due to the disease, especially rapid rehydration done through oral or IV treatments.\textsuperscript{24} Surveillance of the patient is crucial to ensure the accurate reporting of those affected by the disease as well as transparent feedback from local sources to information sharing globally.

Aside from treatment, the current focus of cholera is what preventative actions can be taken by people at risk of the disease, especially in areas determined to be hotspots. The most basic preventative action is the distribution of oral cholera vaccines (OCV) and disinfecting water tablets to those at risk. Targeting the disease at the individual level has been known to be extremely affective. Distribution of cholera kits, recently revised by the WHO, can also help affected areas. These kits are called (Interagency Diarrheal Disease Kits (IDDK)) and they have modules within that are focused on treatment of patients in places with existing structures at community levels, setting up structures to combat cholera in places where they do not yet exist, and the investigation of cholera outbreaks.\textsuperscript{25} As said previously, ensuring proper detection measures and structures put into place allows for a better chance of containing the disease, thus preventing it in individuals within impacted countries.

Because this disease is known as the disease of inequality, one of the more drastic preventative actions that can be enacted is helping to stabilize a country’s health infrastructure to improve sanitary conditions and provide access to clean water. This can be done by having other countries with stronger infrastructures be partners that commit to providing oversight and technical expertise of the implementation of these new systems. Additionally, transfer of the disease over long distances is rare, as determined by the WHO, and no countries currently require proof of a cholera vaccine for entry.\textsuperscript{26} It has also been determined that food embargos placed on countries that are affected by cholera are unnecessary because there has been no link between outbreaks. WHO believes that food import restrictions are not justified based on the sole fact that cholera is epidemic or endemic in a country.\textsuperscript{27}

\textsuperscript{27} Ibid.
Conclusion:
Cholera is a widespread disease that, despite it being easily preventable, kills millions worldwide. People all over the world dealing with the disease have a right to health, wellness, and proper medical treatment. It is up to the United Nations to help the countries that are affected by this disease improve their health conditions and assist their citizens by providing the necessary resources. Eradicating this disease of inequality is possible via realistically achievable solutions from distribution and easy access, to preventative medication, to helping affected countries improve their infrastructure. WHO helps to provide and distribute cholera kits, as well as assisting continues with promoting their Global Roadmap. These solutions are working to fight against cholera, but the World Health Organization should take further action to end the current cholera pandemic. The difficulty of solving this issue is how to distribute the kits, how to safely go into an area affected by cholera to attempt and improve the water system, and how other countries who are not affected by the disease are able to help those that are, whether financially or otherwise.

Questions to Consider:
1. What can countries with sufficient infrastructure do to try and help other nations combat this disease?
2. What systems can be implemented by the WHO in cholera hotspot areas to prevent the disease?
3. How can technology be implemented in areas affected by the disease, especially those experiencing conflict?
4. Are there other actions that the WHO should be taking to help affected countries?
5. Is there anything missing in the cholera kits that the WHO should add?
Resources


II. Antimicrobial Resistance

Statement of the Issue:

In the past 5 years, the issue of antimicrobial resistance (AMR) has posed a large threat to overall global and public health; AMR is a world-wide threat to humans and animals alike. Antimicrobial resistance happens when microorganisms (bacteria, fungi, viruses, and parasites) change when they are exposed to antimicrobial drugs, such as antibiotics, antifungals, antivirals, and antimalarials. Contrary to the common belief that people themselves become resistant to certain microbials, these changes are made by the microorganisms when they are exposed to medications and allow the organisms to be resistant to the drug. As a result of the organisms changing, the medicines we use to fight disease become ineffective and infections persist in the body, increasing the risk of spread to others. These changes in microorganisms take place because they are rapidly regenerative and can easily adapt genetic changes across a population. Microorganisms that develop antimicrobial resistance are sometimes referred to as “superbugs.” Many common infections are becoming resistant to the antimicrobial medicines used to treat them, resulting in longer illnesses and more deaths. These include bacterial infections, tuberculosis, malaria, influenza, and HIV/AIDS.

Antimicrobial resistance occurs naturally over time, usually through genetic changes. However, the misuse and overuse of antimicrobials is accelerating this process. In many places, antibiotics are overused and misused in people and animals, and often given without professional oversight. Examples of misuse include when they are taken by people with viral infections like colds and flu, and when they are given as growth promoters in animals or used to prevent diseases in healthy animals. A number of medical professionals have also been known to prescribe antibiotics unnecessarily or for an extended period of time, also contributing to the acceleration of resistance. Antimicrobial resistance increases the cost of health care with lengthier stays in hospitals and more intensive care required. Without effective antimicrobials for prevention and treatment of infections, medical procedures such as organ transplantation,

cancer chemotherapy, diabetes management and some surgeries (for example, caesarean sections or hip replacements) become high risk. As of current reports (May 2019), it is estimated that antimicrobial resistance causes 700,000 deaths annually.32

History:

Antibiotics are defined as medicines used to prevent and treat bacterial infections.33 While antibiotic use is known to have become widely prevalent only in the 21st century, these medicines have been used to treat diseases since the 19th century by those who did not know diseases were caused by bacteria. These treatments included mold, soil, and certain plants; some of these were successful due to certain properties found in what we use today as modern antibiotics. One of the first breakthroughs in the use of antibiotics was in 1928 when Alexander Fleming, a Scottish biologist, discovered penicillin.34 The impact of penicillin was recognized as it was used in World War 2 to fight a wide array of infections and prevented a number of war related deaths. Because of this, penicillin was considered the “miracle drug.” In his Nobel Peace Prize speech, Fleming warned that bacteria had the risk of becoming resistant to penicillin, especially with the incorrect amount of dosage being used.35

The first case of penicillin being used on a human was in the 1940s. A man named Constable Alexander fell ill from an injury that became infected, making him increasingly ill to the point that he was close to death. Researchers felt they could use him to test the new drug and administered him the drug in a small dose with repeated doses every few hours.36 His initial recovery was remarkable, yet when they ran out of the drug, the man once again fell ill and eventually died. After seeing the results of its first time use, researchers knew there was potential to heal others with the drug and therefore called for the continued production of penicillin.

When the antibiotic penicillin became widely distributed and used by the public, especially with certain medications not paying attention to proper drug dosage, resistant bacteria strains capable of inactivating the drug became prevalent, just as Fleming had warned. Because of this, many studies were performed to modify penicillin to prevent this problem. This research was mainly performed between the 1950s and 1970s, when there were a number of additional antibiotics discovered. After this period of time, not many new antibiotics have been discovered since, but instead, those that have previously been used have been modified and this is another reason for the ever-growing issue of antimicrobial resistance.

The first concrete steps towards acknowledging antimicrobial resistance were taken in 1998 by the United Nations in passing resolution WHA 51.17. The main aims of the resolution were to raise awareness about antimicrobial resistance and potentially find a solution to lessen the spreading of human pathogens that are resistant to the available antibiotics. Despite this resolution, the latter part of the 20th century saw an ever-growing number of “superbugs” resistant to penicillin and other conventional drugs, and global death tolls continued to rise. This increase of “superbugs” called various nations to action and set the stage for future global involvement to help solve this international issue.

Analysis:

Antimicrobial resistance is unique in that it cannot be treated or eradicated; the process can only be slowed through education of the public, limiting the spread of infections that could turn into ones that will need antibiotics, lessening the misuse of antibiotics, and continued research of the issue.

One of the large goals of the WHO has been the promotion of awareness and education about antimicrobial resistance. In order to meet this goal, World Antibiotic Awareness Week was created by the WHO in 2015 and every year, a week in November is dedicated to the cause with the aim to “increase global awareness of antibiotic resistance and to encourage best practices among the general public, health workers and policy makers to avoid the further emergence and spread of antibiotic resistance.” During this week, social media campaigns and health conferences are held around the globe to ensure the spread of education about the issue. In response to this concern, national and international agencies have collaborated to

combat the growing threat of antimicrobial resistance. In 2014, President Obama issued an Executive Order on Combating Antibiotic-Resistant Bacteria, which declared the issue a national security priority and charged a multiagency task force with devising a five-year National Action Plan to combat antimicrobial resistance (The White House). In addition, the Food and Drug Administration issued the Veterinary Feed Directive Final Rule in 2015, which strictly limits the use of antibiotics of medical importance to humans in food animals (US FDA). In May 2015, the World Health Assembly, led by the World Health Organization Secretariat, endorsed a Global Action Plan on Antimicrobial Resistance (WHO). The WHO also calls for the collection of data and trends about AMR in order to better understand and convey the scope of the issue. The UN uses the system they refer to as GLASS (Global Antimicrobial Resistance Surveillance System) for surveillance and evidence based research to help improve the understanding of the issue as well as inform about potential future policies and actions that might be able to be implemented worldwide.

Many efforts have been made in order to try and limit the spread of infections that might become worse and require the use of antibiotics. Some effective solutions to this objective include administering more vaccinations, better sanitation, hand washing, and food and water safety, thus decreasing the spread of microorganisms. Vaccinations have been highly promoted because studies show that those who are vaccinated have a less likely chance to need to use the antibiotics in the first place. Improper infrastructure also advances the spread of infectious diseases due to the lack of proper sanitation, therefore improving health infrastructure worldwide would help prevent these infectious diseases from spreading and allow the use of antibiotics to be more limited to be administered only to those who truly need the medication. It is also important to remember that these resistant microbials are not only present in humans but also animals. Because of this, proper animal care and handling is also an essential factor in helping lessen the spread of infection.

The misuse of antibiotics, especially by doctors of all types including clinical, pharmacy, and veterinary, who prescribe them for illnesses that are viral or that prescribe them for an unnecessary extended period of time, causes antimicrobial resistance. Stronger compliance to antibiotic treatment regimes, quality assurance measures to prevent consumption of substandard medications, and restrictions of non-therapeutic uses of antibiotics within agriculture will provide a foundation for antimicrobial stewardship. Regulations for antibiotic

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distribution, quality, and use could preserve the effectiveness of antibiotics as a public good.\textsuperscript{41} Because of this, countries have begun implementing tools that allow for the monitoring of dispersion of these products and the WHO created guidelines for the optimal use of antimicrobial medicines in humans and animals.

There is also the current threat of new medicines being discovered at a slower rate than needed in comparison to the rate than antimicrobial resistance is rising. The report, “Antibacterial agents in clinical development – an analysis of the antibacterial clinical development pipeline, including Mycobacterium tuberculosis” – shows a serious lack of new antibiotics under development to combat the growing threat of antimicrobial resistance.\textsuperscript{42} Since there have not been any new discoveries of antibiotics after the 1970s, it is critical that continued research is funded to find new solutions. If antimicrobial resistance persists at the current rate, humans might not be able to use antibiotics in the near future to treat illnesses.

\textbf{Conclusion:}

Antimicrobial resistance is a global problem that requires every nation to have a plan of action to help combat. If this issue is not resolved, a number of medications that people rely on for survival could become ineffective due to mistreatment and misuse. It’s up to the United Nations to create a plan that countries can follow to help and avoid this potential reality. Lessening AMR is possible via educational awareness, close monitoring of distribution of antibiotics, and helping to provide a more stable infrastructure in countries that require better hygiene for preventing illness. The WHO has brought this issue to light and provided some resources to countries, but the World Health Organization needs to take further action to help and slow this problem. The difficulty of this problem lies in how to get countries to work together to raise awareness and now to better collect data on the issue to track the rate of growth at which this problem continues.

\textbf{Questions to Consider:}

1. What research can be done to try and combat antimicrobial resistance? (Could we try to put more funding into finding novel antibiotics instead of just changing the ones we currently have?)


2. What strategies can be implemented to help spread the awareness and promote education of the issue?

3. How does microbial resistance affect your individual country? What has been done to help combat this issue?

4. What would the WHO plan of action consist of that all countries could follow to lessen AMR?
Resources


