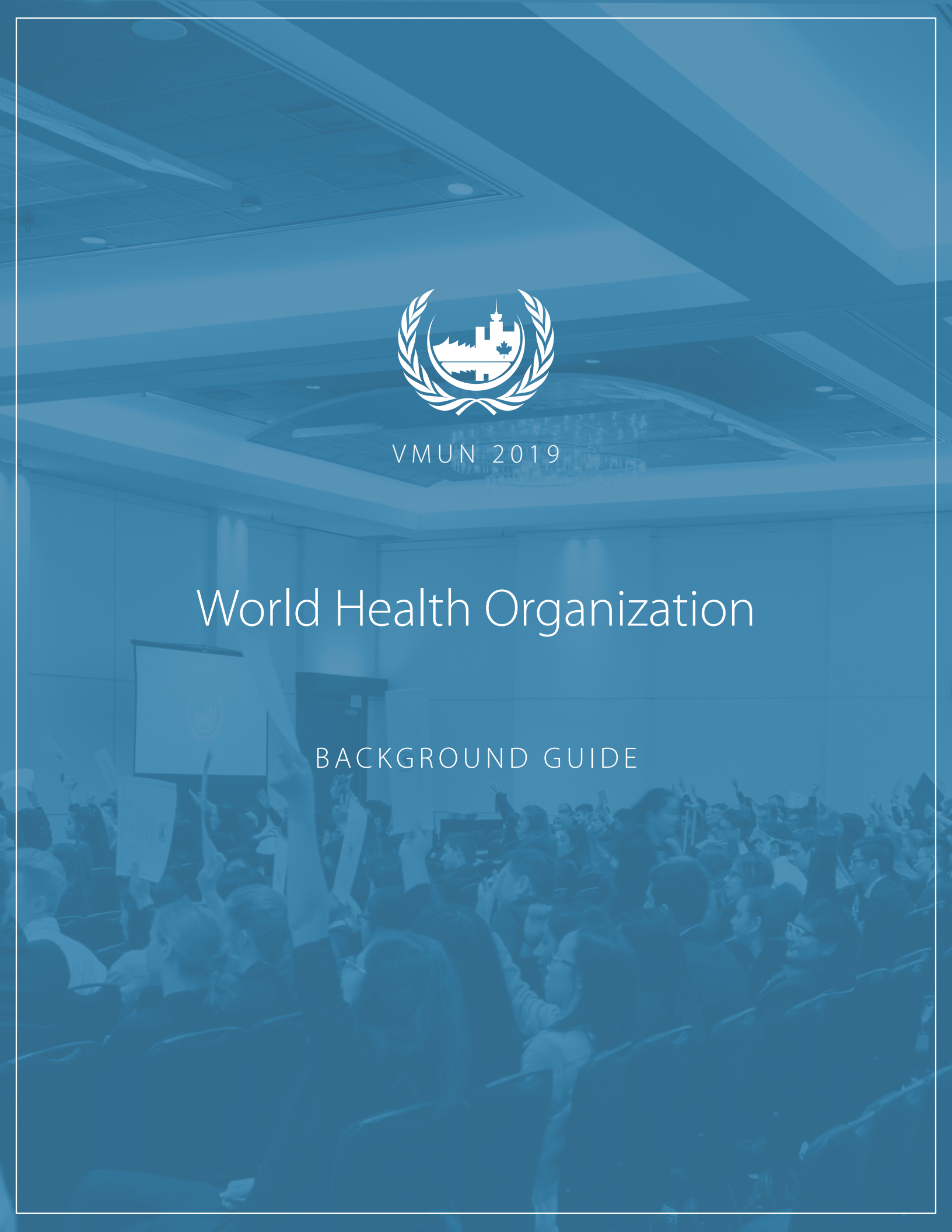

VMUN 2019

# World Health Organization

BACKGROUND GUIDE

# Vancouver Model United Nations

The Eighteenth Annual Session | January 25–27, 2019



Dear Delegates,

My name is Cindy Gao and it is my distinct pleasure to welcome all of you to Vancouver Model United Nations 2019. I am currently a senior at Little Flower Academy and I am honoured to be serving as the Director of the World Health Organization (WHO).

Model United Nations truly holds a special place in my heart; not only did it spark my passion for global affairs, but it also introduced me to some of my closest friends—people whom I would now consider my second family. As one of the first committees I ever delegated in and now one of the last committees I will staff, WHO holds a special place in my heart. It is my hope that after VMUN 2019, the same will be true for you.

To all my first-time delegates: remember that everyone in the committee room was once in your position. The initial feelings of nervousness, confusion, shyness, and excitement are all too familiar to us. I encourage you to introduce yourself to the people you will meet; I can guarantee that you will emerge with at least one new friend after the conference. Have fun, ask questions, and most importantly, contribute ideas to the committee as much as possible; you will learn the most by putting yourself out there. The dais team, Jaskirt, Ben, Catherine, and I, will make sure to explain the procedures of Model UN as we move through committee sessions.

During our three days together, we will be discussing two significant topics: Antimicrobial Resistance and Epidemics and Global Health Security. Although seemingly simple topics, I urge you to look beneath the surface and delve further into your research to discover the true roots of these issues. I believe that the true complexity of these topics will captivate you, and I cannot wait to see what each and every one of you will bring to the table. Throughout the conference, delegates must collaborate to consider all facets of the problems presented and develop solutions that can encompass and satisfy the needs of all nations. I believe that a combination of each delegate's unique perspective and ideas will create a both comprehensive and applicable resolution.

As your Director, I hope to facilitate both an innovating and encouraging platform for discussion; please do not hesitate to contact me if you have any questions at all. I look forward to meeting all of you in January. Welcome to the World Health Organization at VMUN 2019!

Sincerely,

Cindy Gao
WHO Director

# Position Paper Policy

## What is a Position Paper?

A position paper is a brief overview of a country's stance on the topics being discussed by a particular committee. Though there is no specific format the position paper must follow, it should include a description of your positions your country holds on the issues on the agenda, relevant actions that your country has taken, and potential solutions that your country would support.

At Vancouver Model United Nations, delegates should write a position paper for each of the committee's topics. Each position paper should not exceed one page, and should all be combined into a single document per delegate.

For the World Health Organization, position papers are not mandatory but highly recommended, and required for a delegate to be considered for an award.

## Formatting

Position papers should:
— Include the name of the delegate, his/her country, and the committee
— Be in a standard font (e.g. Times New Roman) with a 12-point font size and 1-inch document margins
— Not include illustrations, diagrams, decorations, national symbols, watermarks, or page borders
— Include citations and a bibliography, in any format, giving due credit to the sources used in research (not included in the 1-page limit)

## Due Dates and Submission Procedure

Position papers for this committee must be submitted by midnight on January 13, 2019.

Once your position paper is complete, please save the file as your last name, your first name and send it as an attachment in an email, to your committee's email address, with the subject heading as your last name, your first name — Position Paper. Please do not add any other attachments to the email or write anything else in the body.

Both your position papers should be combined into a single PDF or Word document file; position papers submitted in another format will not be accepted.

Each position paper will be manually reviewed and considered for the Best Position Paper award.

The email address for this committee is *who@vmun.com*.

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# Antimicrobial Resistance

## Overview

The world has seen various medical revolutions over the course of history, each shifting the very paradigm from which medicine is viewed, but none have been more influential than the creation of antibiotics. Scottish biologist Sir Alexander Fleming uncovered the revolutionary treatment in 1928 through his discovery of penicillin.[1] As medical research capabilities have increased in the past century with significant advancements in technology, the spectrum of uses for antibiotics has grown as well. However, in the past decade, global dependence on antibiotics has risen at an unprecedented rate; unchecked antibiotic usage can produce more resistant pathogens which can render certain antibiotics useless. For instance, the risk of contracting a resistant infection is low in the United States—about 2 million people each year become infected by "resistant" bacteria that are harder to treat—however, more than 20,000 people die of these infections every year.[2] It is likely that the speed of increasing resistance will outpace the slow drug-development process, posing a significant threat to public health.

At the 71st session of the UN General Assembly, World Health Organization (WHO) Director-General Dr. Margaret Chan, stated that "antimicrobial resistance poses a fundamental threat to human health, development, and security."[3] The scope and scale of antibiotic usage in daily life shows that more and more people becoming reliant on antibacterial agents while certain microbes are developing equal resistances. This evolution of antimicrobial resistance has led some to believe that a post-antibiotic era is imminent.[4] Moreover, ill-advised antibiotic use, poor infection control, and unheeded warnings can often lead to natural defences in the body weakening, inducing further antibiotic use. Thus, delegates must debate how effective treatment can be delivered in a fashion that preserves the integrity of valuable antimicrobial drugs.

Delegates must recognize the wide spectrum of issues presented in dealing with the antibiotic crisis, ranging from the ethical to the humanitarian. It is imperative that all nations consider existing international mandates, such as the Global Action Plan on Antimicrobial Resistance, when moving forward with discussion.[5] Delegates must keep in mind that, although unified international action is important, national solutions are an equally integral component. Finally, countries must recognize the impacts of enhanced monitoring systems, as well as the volumes of antimicrobial substances used in humans, animals, and crops. The issue of antibiotic resistance will be a threat to global health in the near future unless delegates provide both innovative and pragmatic solutions to this very imminent problem.

## Timeline

**1928** — While researching a cure for common infections, Sir Alexander Fleming, a Scottish biologist, accidentally discovers penicillin, marking the beginning of the antibiotic era.

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[1] Rustam I. Aminov, "A Brief History Of The Antibiotic Era: Lessons Learned And Challenges For The Future," December 8, 2010, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3109405/.
[2] Susan Scutti, "The World Is Running Out Of Antibiotics, WHO Says," CNN, September 19, 2017, https://www.cnn.com/2017/09/19/health/antibiotic-resistance-who/index.html.
[3] FAO, "At UN, Global Leaders Commit To Act On Antimicrobial Resistance," September 21, 2016, http://www.fao.org/news/story/en/item/434147/icode/.
[4] Ibid.
[5] Ibid.

**April 7, 1948** — The World Health Organization is founded in Geneva, Switzerland.

**1943** — Penicillin is deemed a "miracle cure" for troops fighting in the Second World War. The drug is widely used to treat any and all ailments, despite warnings of resistant bacteria developing.[6]

**1948** — Robert Stokstad, an animal nutritionist, and Thomas Jukes, a biochemist, successfully discover that antibiotics can be used on animals. The discovery marked the beginning of the modern-day practice of administering antibiotics to mass-market farm animals.

**1970** — Very few new antimicrobial agents are discovered, and the only way for researchers to combat resistant bacteria has been to modify pre-existing antibiotics. The gap between resistant bacteria and existing agents seems to be growing as a result of the significant time gap.

**May 16, 1998** — WHO resolution *WHA 51.17* is passed, noting emerging and other communicable diseases, as well as antimicrobial resistance.[7]

**September 2013** — The first meeting of WHO's Strategic and Technical Advisory Group on Antimicrobial Resistance (STAG-AMR) aims to advise the Director-General on WHO's strategic plan to tackle antibiotic immunity. [8]

**2014** — After major superbug outbreaks such as *Klebsiella pneumonia* and gonorrhea all over the world, WHO releases its first statement on the matter, noting that, "This serious threat is no longer a prediction for the future, it is happening right now in every region of the world and has the potential to affect anyone, of any age, in any country."[9]

**September 25, 2015** — UN General Assembly Resolution 70/1 (*A/RES/70/1*), "Transforming our world: the 2030 Agenda for Sustainable Development," is adopted, including several provisions relating to global health.

**2015** — The infection tuberculosis is labelled as a global health security risk by the United Nations. That year, the airborne infection kills nearly 200,000 people worldwide. [10]

**May 2015** — The international community adopts a global action plan which identifies a set of strategic objectives for countering antimicrobial resistance at the 68th World Health Assembly, presented in the form of resolution *WHA 68.7*. [11]

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[6] Lecia Bushak, "A Brief History Of Antibiotic Resistance: How A Medical Miracle Turned Into The Biggest Public Health Danger Of Our Time," Medical Daily, February 17, 2016, https://www.medicaldaily.com/antibiotic-resistance-history-373773.

[7] "Essential Medicines and Health Products Information Portal," World Health Organization, http://apps.who.int/medicinedocs/en/m/abstract/Js21472ru/.

[8] "1st Strategic and Technical Advisory Group on antimicrobial resistance (STAG-AMR) meeting," World Health Organization, September, 2013, https://www.who.int/antimicrobial-resistance/events/meeting_summary09013/en/.

[9] "WHO's first global report on antibiotic resistance reveals serious, worldwide threat to public health," World Health Organization, 2014, http://www.searo.who.int/mediacentre/releases/2014/pr1574/en/.

[10] "Tuberculosis," World Health Organization, September 18, 2018, http://www.searo.who.int/mediacentre/releases/2014/pr1574/en/.

[11] World Health Organization, "Global Action Plan On Antimicrobial Resistance," 2015, http://apps.who.int/gb/ebwha/pdf_files/WHA68/A68_R7-en.pdf.

**May 2016** — The Drugs for Neglected Diseases initiative and WHO launch a global research and development partnership aiming to develop new antibiotics and promote their responsible use.[12]

## Historical Analysis

Antibiotics are defined as any compound or chemical that can be applied to kill or inhibit bacteria that cause infectious diseases.[13] While antibiotic use may have become widely prevalent only in the 21st century, their existence dates back to Ancient Egypt; researchers are said to have found traces of an antibiotic, tetracycline, in the bones of corpses that lived ca. 350–500 CE. This fact, in combination with evidence showing there was a low number of documented diseases in that timeframe, suggests that antibiotics were in use before the 20th century.

In 1928, Alexander Fleming, a Scottish biologist, took the research of infection-fighting to the next level when he discovered penicillin.[14] Before the drug was available to the general public, it was sent to the allied troops as a "miracle drug" during the Second World War. The controversial decision was questioned, however, when Fleming won the Nobel Prize for his discovery; in his acceptance speech, he warned of bacteria becoming resistant to penicillin.[15] Once the antibiotic became widely used, resistant strains capable of inactivating the drug percolated, and synthetic studies were undertaken to modify penicillin to prevent this problem. The period between the 1950s and 1970s marked the golden era of discovery of novel antibiotics; no new classes of the antibacterial agents have been discovered since.[16] This gap between the golden age and the current day regarding antibiotic discoveries is a key reason for the ever-growing issue of antimicrobial resistance. With the decline of new discoveries, the mainstream approach for the development of new drugs to combat emerging and re-emerging pathogen resistance has been the modification of existing antibiotics. While governments and various regulatory networks have previously lampooned the growing antimicrobial resistance epidemic as non-existent, the warnings given by Alexander Fleming ring eerily true today.

The first concrete steps towards acknowledging antimicrobial resistance were taken in 1998 by the United Nations in passing resolution *WHA 51.17*.[17] The main aims of the resolution were to mention emerging and other communicable diseases, as well as health considerations such as antimicrobial resistance. Although it was the first time a global resolution was passed, it was not the first time that resistance had been acknowledged. For instance, in 1955, many countries had tried to counter this immunity by limiting penicillin use to prescribed treatments, but this attempt proved unsuccessful. Shortly thereafter, scientists developed methicillin, a different antibiotic in the penicillin class that could work against resistant pathogens; however, this solution did not ultimately prove successful. News of bacterial resistance began to spread throughout the world, and many saw that this had become a pressing issue. The latter part of the 20th century saw an ever-growing number of MRSA (Methicillin-resistant *Staphylococcus aureu*) cases, a "superbug" resistant to penicillin and other conventional drugs, and global death tolls rose as a result. This increase in incidence called various nations to action and set the stage for future global involvement.

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[12] Drugs For Neglected Diseases Initiative, "Global Antibiotic Research & Development Partnership (GARDP) Garners Key Financial Support For Launch," May 24, 2016, http://www.dndi.org/2016/media-centre/press-releases/gard-garners-key-support-for-launch/.
[13] Ibid.
[14] Ibid.
[15] Centre For Disease Control, "About Antimicrobial Resistance," https://www.cdc.gov/drugresistance/about.html.
[16] Ibid.
[17] Ibid.

Ultimately, the mistakes of the past established greater potential for future action. With the creation of the STAG-AMR in 2013 to advise the World Health Organization on tackling antibiotic resistance, the world has fully acknowledged and taken steps to tackle the alarming trend. While recent resolutions have established concrete and strategic ground rules for effecting change in the global antimicrobial resistance sphere, a blanket solution is simply not enough to challenge such a diverse set of problems. For instance, various geographically-specific issues that arise when trying to implement one of the various solutions are largely unconsidered. Similarly, there exists an issue of global funding to procure the resources necessary to complete sophisticated projects. The problems in past UN legislation must be further explored in order to increase the effectiveness of the fight against this so-very-prevalent issue. Delegates must come prepared with a knowledge of past action in order to comprehensively and meaningfully resolve this sophisticated issue

## Past UN/International Involvement

Ever since the creation of antibiotics, scientists have warned against their potential to spawn medicine-resistant bacteria. However, WHO has only been working to mitigate the effects of antimicrobial resistance in the last decade; in fact, it was only in 2014 when major superbug outbreaks of pathogens such as *Klebsiella pneumonia* and gonorrhea encouraged WHO to release its first official statement on the matter: "This serious threat is no longer a prediction for the future, it is happening right now in every region of the world and has the potential to affect anyone, of any age, in any country."[18] The bulk of UN involvement regarding this topic has taken place within the last five years.

Despite numerous warnings from scientists for years before, a UN action plan to tackle antibacterial agent resistance was only drafted in 2015. The UN General Assembly has only discussed health-related topics four times since its inception; one of which was to discuss the issue of antimicrobial resistance. At the 68th World Health Assembly, a global action plan on antimicrobial resistance was adopted, marking the first step in a worldwide solution to the grave threat.[19] The goal of the global action plan was to ensure the continuity of treatment and prevention of infectious diseases with effective and safe medicines, responsible usage, and accessibility.[20] In order to achieve the very goals mentioned above, the global action plan set out five strategic objectives:

1. To improve awareness and understanding of antimicrobial resistance;
2. To strengthen knowledge through surveillance and research;
3. To reduce the incidence of infection;
4. To optimize the use of antimicrobial agents; and

[18] Ibid.

[19] "Global action plan on antimicrobial resistance," World Health Organization, May 26, 2015, http://apps.who.int/gb/ebwha/pdf_files/WHA68/A68_R7-en.pdf.

[20] Alexandra Sifferlin, "It's Been One Year Since the World Took On Superbugs. Here's What's Changed," Time Magazine, September 22, 2017, https://news.un.org/en/story/2017/11/635832-antibiotic-resistance-crisis-we-cannot-ignore-un-warns-calling-responsible-use.

5. To develop the economic case for sustainable investment that takes into account the needs of all countries and increases investment in new medicines, diagnostic tools, vaccines, and other interventions.[21]

Although the action plan had been launched, there still remained a lack of involvement from all nations, which is crucial in tackling the issue. The action plan has created a symbol of a global consensus against the issue but is not a binding agreement between nations. In past frameworks, particularly those of General Assembly Resolution 70/183 (*A/RES/70/183*), entitled "Transforming our world: the 2030 Agenda for Sustainable Development," a general, far-reaching and people-centred set of universal and transformative Sustainable Development Goals (SDGs) and targets were created to be fully implemented by 2030. Although broad in their focus, the SDGs established the framework for the "draft political declaration of the high-level meeting of the General Assembly on antimicrobial resistance," to be signed by nations on September 21, 2016. The UN's declaration is the first tangible step towards mitigating the effects of antimicrobial resistance, requiring nations to prepare a two-year plan to protect the potency of antibiotics, while also encouraging states to create ways to monitor the use of antibiotics in medicine and agriculture, eliminate unnecessary consumption, and begin developing new, more effective antibiotics.[22] Although there have been some minor concerns with the plan, it is predicted that the declaration may share similarities with that of the HIV crisis: that same declaration brought a 45 percent drop in AIDS-related deaths in countries supported by global anti-HIV campaigns.[23]

WHO continues to take steps to ensure that all nations take a stand against the antimicrobial resistance crisis. For instance, former WHO Director-General Dr. Margaret Chan assembled an interagency group that would support various governments around the globe, as well as advise on the misuse of antibiotics in people and livestock.[24] The group comprises experts in the field across various international agencies, NGOs, and regulatory bodies, serving as yet another example of how WHO is taking an active role in combatting antibiotic resistance. It is now up to delegates to decide the next step in this vital process.

## Current Situation

Before proceeding further, it is important to set the parameters for antimicrobial resistance taking place. As per the World Health Organization, antimicrobial resistance is defined as "the ability of a microorganism (like bacteria, viruses, and some parasites) to stop an antimicrobial (such as antibiotics, antivirals, and antimalarials) from working against it."[25] An important point in the fight against antimicrobial resistance is the misconception that the crisis is simply related to one country. This leads to one of the root causes of the crisis: a broken prescription system. In reality, the misuse of antimicrobials has increased the number of resistant organisms, which could, in turn, lead to these resistant organisms becoming uncontrollable. The United States' Centers for Disease Control and Prevention (CDC) states that at least 30 percent of antibiotic courses prescribed in the

[21] "Global action plan on antimicrobial resistance," World Health Organization, http://www.who.int/antimicrobial-resistance/global-action-plan/en/.
[22] "UN plans response to rising antibiotic resistance," Deutsche Welle's, September 21, 2016, https://www.dw.com/en/un-plans-response-to-rising-antibiotic-resistance/a-19564891.
[23] Ibid.
[24] "UN announces interagency group to coordinate global fight against antimicrobial resistance," UN News, March 16, 2017, https://news.un.org/en/story/2017/03/553412-un-announces-interagency-group-coordinate-global-fight-against-antimicrobial.
[25] "10 facts on antimicrobial resistance," World Health Organization, August 2017, http://www.who.int/features/factfiles/antimicrobial_resistance/en/.

outpatient setting are unnecessary, meaning no antibiotics are needed at all in these cases.[26] With the growth of global trade and travel, resistant microorganisms have gained the ability to spread rapidly to any part of the world.

In direct correlation with the previous point of unnecessary prescription, another facet that further hinders progress is the inappropriate use of medicines. When used in conjunction with one another, underuse, overuse, and misuse can all result in increasing antimicrobial resistance. According to the academic medical centre the Mayo Clinic, antibiotic overuse and overprescription can be attributed to premature diagnoses, patient pressure to receive a prescription from their provider, as well as patients using leftover prescriptions after the recommended dosage.[27] Failing to follow prescribed dosage amounts can lead to complications and promotes bacterial resistance by not fully eradicating the infection from a host. To make matters worse, overprescription and overuse not only increase antibiotic resistance, but also exacerbate disease severity, risk of death, healthcare costs, and a plethora of other health-related issues. There are a number of steps in the supply chain of antibiotics that are required to target all of these issues. At the root of these problems is action from prescribers, pharmacists and dispensers, the public and patients, as well as policymakers. Delegates should consider this root cause in any solution, and must consider the severity of the consequent issues at hand.

On another side of this issue, the livestock industry often overuses and misuses antibiotics; approximately 80 percent of all antibiotics administered in the United States are within the animal agriculture industry, and the practice is projected to dramatically increase over the course of the next 15 years.[28] The main purpose is for subtherapeutic doses of antibiotics to be used in animal-rearing in the pursuit of promoting growth and fighting diseases. While the practice continues to expand, so too do the risks; inevitably, as seen in humans, antibiotics seem to become resistant as usage increases and bacteria adapt. Resistant bacteria are often transmitted to humans through direct contact with animals, exposure to animal manure, and consumption of undercooked meat and surfaces meat has touched.[29] If people do not recognize this issue, global food and health security will be jeopardized. Delegates must thoroughly understand that the context of antimicrobial resistance does not solely lie with humans, but also with other animals as well.

## Possible Solutions and Controversies

### Prescription Monitoring

One of the largest problems related to antibiotic usage is the over-prescription of drugs, which eventually leads to exacerbated infections. In an ideal world, all drugs would be administered accurately, but that is unfortunately not the case. This stark reality continues to accelerate the process of resistance and must be addressed in great detail. In the United States alone, nearly USD 1.1 billion worth of unnecessarily-prescribed antibiotics are

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[26] Katherine E. Fleming-Dutra, Adam L. Hersh, Daniel J. Shapiro, Monina Bartoces, Eva A. Enns, Thomas M. File Jr, Jonathan A. Finkelstein, Jeffrey S. Gerber, David Y. Hyun, Jeffrey A. Linder, Ruth Lynfield, David J. Margolis, Larissa S. May, Daniel Merenstein, Joshua P. Metlay, Jason G. Newland, Jay F. Piccirillo, Rebecca M. Roberts, Guillermo V. Sanchez, Katie J. Suda, PharmD, Ann Thomas, Teri Moser Woo, Rachel M. Zetts, and Lauri A. Hicks, "Prevalence of Inappropriate Antibiotic Prescriptions Among US Ambulatory Care Visits," May 2016, https://www.ncbi.nlm.nih.gov/pubmed/27139059.

[27] Jen O'Hara, "Mayo Clinic Radio: Antibiotic resistance and antibiotic allergies," Mayo Clinic, July 5, 2018, https://newsnetwork.mayoclinic.org/discussion/mayo-clinic-radio-antibiotic-resistance-and-antibiotic-allergies/.

[28] Ibid.

[29] Ibid.

distributed annually.[30] It imperative that a system to mediate these realities is implemented, not only to limit to fiscal costs, but also to hinder the rise of resistance. Seeing as a 2015 study published in scientific journal "Nature" found that global antibiotic consumption rose by 30 percent between 2000 and 2010, extreme overuse appears to be the root of the problem.[31] To combat this, delegates must consider an oversight system to increase the accountability of doctors and avoid the improper prescription of antibiotics.

CDC has defined surveillance as "the ongoing systematic collection, analysis and interpretation of health data essential to the planning, implementation and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know."[32] Surveillance systems would enable researchers to achieve a greater depth of knowledge related to existing antibiotics, and would allow for more swift action by policymakers. Such systems are particularly beneficial because they allow global health authorities to monitor changes in resistance over time, allowing countries to take more decisive and more efficient action. Moreover, the system allows for healthcare workers to limit inappropriate prescribing and dispensing, misuse and overuse, inaccurate diagnosis, patient pressure, and unnecessary financial costs. In essence, surveillance systems can result in more definitive and efficient action by policymakers to challenge other facets of this topic.

## New Antimicrobials

There has been no major antibiotics discovery since 1987, and very few antibacterial agents are attempting to battle multidrug resistance.[33] There seems to be a very clear stagnation in innovation regarding these commonplace drugs, posing a risk to the issue at hand. The lack of new antibiotic synthetization has been one of the root causes of antimicrobial resistance. Seeing as outdated medicines begin to be rendered wholly ineffectual, it is imperative that pharmaceutical providers start creating new and innovative solutions to combat this growing issue. Furthermore, new ideas are required to provide motives for innovation and collaboration among global policymakers, researchers, and the pharmaceutical industry to research new technologies preventing, diagnosing, and treating resistant infections.

In an ideal world, the creation of new medicines and technology would be achieved with nothing but human ingenuity; however, this is most definitely not the reality. Before any research can be conducted, there needs to be significant investment in the practice; currently, the process of developing any new drug is extremely expensive, and the potential profit of an antibiotic after such a massive investment is relatively low.[34] To combat this issue, global investment, as well as partnerships between the public and private sectors, are integral in mitigating the risks associated with the development of new drugs. Delegates must note that simply encouraging innovation is not the same as creating an incentive to do the same. On the other hand, delegates should also consider that creating new drugs does not prevent doctors from overprescribing; delegates will need to look at a combination of solutions in order to combat the issue holistically.

## Alternative Incentives

A different approach to combatting antimicrobial resistance would be to establish incentives for their non-use, particularly in agriculture and livestock. For example, consumer product certification conforming to specific

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[30] Ibid.

[31] Erin Biba, "How we can stop antibiotic resistance," BBC News, June 8, 2017 http://www.bbc.com/future/story/20170607-how-we-can-stop-antibiotic-resistance.

[32] Ibid.

[33] "Global Action Plan on Antimicrobial Resistance," World Health Organization, 2015, http://www.wpro.who.int/entity/drug_resistance/resources/global_action_plan_eng.pdf.

[34] Ibid.

industry practices would enable non-antibiotic-fed beef, for example, to be readily identified by consumers. As previously expressed, antibiotic use in agriculture is recognized as a contributor to increasing antibiotic resistance. While public awareness of this problem is sufficient to strengthen market incentives against the still-prolific use of antibiotics in agriculture, when combined with a widely-recognized certification, this, and future proposed actions, will be instrumental in reducing antibiotic use for animal growth promotion—the next-best alternative to a ban such as Europe's, which is simply unfeasible as a global solution.

In concert with counter-antibiotic incentives, more stringent regulations governing the administration of antibiotics to animals could also be pursued. The scientific community's prevailing opinion is that agricultural antibiotic use significantly contributes to the emergence of resistance in clinical facilities, and that animal growth-induced antibiotic use is an unacceptable means of squandering the limited lifespan of antimicrobial effectiveness.

## Bloc Positions

### Western Europe and North America

This bloc of countries is the most directly impacted by the topic; Western states generally have accessible healthcare and high levels of antibiotic use. As a result, the vast majority of citizens have used antibiotics in their lifetime. However, the advanced urbanization in these areas is the primary factor that has led to the widespread growth in antibiotic-resistance infection; immune bacteria spread more effectively in close quarters. Understanding this, there are two clear perspectives from this bloc. The first regards these nations' national stances Reasonably, these nations would work towards preventing antibiotic resistance through developments in the quaternary sector. Yet, this solution is severely mitigated by the lack of resources and knowledge to develop these technologies alongside existing ethical codes. Internally, the bloc may be divided on ethics of safe research, as well as the bounds of technical information-sharing. The second perspective these nations may have regards their stance on international development. The propagation of this problem through urban contact means that it needs to be combatted by developing nations as well in order to develop urban areas safely. Therefore, this bloc would seem to align developing nations; however, the practicalities of this remain unclear, with both social and ethical concerns having to be balanced.

### Eastern Europe

These nations face many of the same problems as Western states do, but to a lesser extent. Rather than having large, scattered populations such as in the United States and Canada, these nations are smaller or more clustered in terms of population. Their public stance is largely similar to that of Western states, however, internal issues relating to a lack of resources, economic setbacks, high crime rates, and government corruption frequently place growth of doctors' abilities to engage in the development of medical technologies as a low priority.

### Asia-Pacific

This bloc plays a very critical role in regard to the development of the quaternary sector. While geographically proximal to many Western states, there is one critical difference between them—whereas Western democracies are relatively equal in development across each nation, many Asia-Pacific countries have highly-developed urban centres but very low levels of development in other areas. Therefore, while they have the resources and knowledge to contribute towards combating this issue, their prioritization of these issues may be different than that of others.

### Latin America and Africa

The topic at hand does not heavily impact these regions as they are plagued primarily instead by a lack of updated medical technologies. Nevertheless, while antibiotic resistance is a burgeoning issue, an inherent lack of antibiotics in the area proves to be a much more substantial problem than resistance itself. Fundamentally, this is the reason this bloc would much prefer to advocate for universal access to antibiotics than fight to halt the spread of antibiotic resistance.

## Discussion Questions

1. How can policymakers ensure that innovations in the realm of antibiotics will not be further misused? What is wrong with the current antibiotic system? What mechanisms are necessary to prevent doctors from overprescribing?
2. In what ways has the stagnant development of new drugs encouraged the onset of antimicrobial resistance?
3. How does antimicrobial resistance in animals compare to that in humans? What are some of the similarities and differences between the two functions?
4. Seeing as high- and low-income countries contain very different medical environments, what kinds of solutions need to implement in order to fully mitigate the effects of antimicrobial resistance?
5. How can nations be held accountable for their individual measures combatting antimicrobial resistance?

## Additional Resources

It's Been One Year Since the World Took on Superbugs. Here's What's Changed:
http://time.com/4952014/antibiotic-resistance-amr-united-nations/

Antimicrobial Resistance: Translating Political Commitment into National Action:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5407258/

UN Pledges to Fight Antibiotic Resistance In Historic Agreement:
https://www.npr.org/sections/goatsandsoda/2016/09/21/494914739/u-n-pledges-to-fight-antibiotic-resistance-in-historic-agreement

State of The World's Antibiotics 2015:
https://cddep.org/wp-content/uploads/2017/06/swa_edits_9.16.pdf

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# Epidemics and Global Health Security

## Overview

Humanity has struggled against the onslaught of infectious diseases for millennia. However, with rapid globalization, modernizing transportation, and densely-packed urban zones, epidemics have been able to spread at a much faster rate than ever before. The international community must adapt to the changing climate of global health, brought about by its own development.

It is important to note the difference between an endemic, epidemic, and a pandemic. An endemic is a disease that exists nearly permanently among a particular region or population, such as the presence of malaria in African nations.[35] Epidemics, on the other hand, are the widespread occurrences of an infectious disease within a limited region, posing an ongoing threat to the international community due to their ability to harm large populations within short periods of time. An epidemic develops into a pandemic when it begins to spread across borders into a truly global crisis, such as the 2009 H1N1 swine flu virus.

A press release published by the World Health Organization in 1996 stated that "infectious diseases kill over 17 million people a year, [posing a potential] global crisis."[36] Since then, an estimated 30 new such diseases have emerged, of which many have no available treatments, cures, or vaccines. Despite overall improvements and advancements in the healthcare sector, more people have fallen victim to disease, due largely in part to the growth of the global population and the spread of globalization and interconnectivity. Recent epidemic outbreaks, such as those of the Ebola and Zika viruses, have led to countless casualties, proving that cooperation on an international scale requires further strengthening.

Despite the significant threat that pathogens pose, global efforts to prepare for epidemics have been lacklustre. Presently, it is imperative for nations to strengthen global health security, placing a special focus on the systematic prevention of the outbreak and spread of infectious diseases. Existing measures, such as the International Health Regulations (IHR), only provide a preliminary framework for future epidemic alert systems. Evidenced by the lack of progressive results, current methods of epidemic response, such as biosafety and biosecurity, must be updated and strengthened. While it may not be possible to eliminate the threat of epidemics altogether, improved efforts can be made to minimize their effects.

## Timeline

**430 BCE** — Smallpox, an airborne disease caused by the variola virus, kills more than 30,000 people in Athens, Greece, reducing the city's population by at least 20 percent.

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[35] Epidemic, Pandemic. "Mansfield." https://www.mansfieldct.org/Schools/MMS/staff/hand/immnotes.htm.

[36] World Health Organization, "The World Health Report 1996 - Fighting Disease, Fostering Development," http://www.who.int/whr/1996/media_centre/press_release/en/.

**541 CE** — The Plague of Justinian, caused by bacteria spread by rats with infected fleas, rises and falls in incidence for over 200 years, killing over 50 million people in the Middle East, Asia, and the Mediterranean basin over the span of its influence.[37]

**1334** — The Great Plague of London originates in China and spreads along trade routes from Asia to Europe, claiming the lives of over 25 million Europeans.

**1519** — Upon Hernando Cortes' arrival in Mexico, a smallpox epidemic kills approximately 8 million of the native population. Over the next century, fewer than 2 million indigenous Americans would survive the contagion brought by European explorers.[38]

**1633** — Brought by settlers from France, England, and the Netherlands, smallpox reaches Massachusetts, United States. This disease quickly spreads to the indigenous population; historians estimate 20 million people died after the Europeans landed.

**1860** — The Modern Plague emerges in China, India, and Hong Kong, claiming over 12 million lives before the discovery of a vaccine.

**1918** — Claiming approximately 500 million lives worldwide, the Spanish flu pandemic kills a third of the world's population.

**1952** — An outbreak of the communicable disease known as polio, or poliomyelitis, hits the United States. Nearly 60,000 children are affected, causing more than 3,000 deaths. Three years later, the first successful polio vaccination is developed.

**1984** — Scientists identify the human immunodeficiency virus (HIV) as the cause of the acquired immunodeficiency syndrome (AIDS).

**2003** — An outbreak of severe acute respiratory syndrome (SARS) spreads across China and the world, leading to 8,098 reported cases in 37 countries.

**2009** — The global H1N1 swine flu pandemic is thought to have killed as many as 575,000 people; however, only 18,500 deaths are confirmed.[39]

**2010** — An epidemic of cholera kills at least 10,000 people in Haiti. The United Nations would later apologize for initially denying claims that Nepalese peacekeepers brought the deadly disease to the country following the earthquake.[40]

**2012** — The largest epidemic of Ebola hemorrhagic fever emerges in West Africa, killing over 11,300 people and prompting global reactions.

**2016** — A public health emergency is declared over the Zika virus. While not deadly in the way that most epidemics are, its potential to cause microcephaly in fetuses leads to alarm.

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[37] CNN, "Deadly Diseases," http://www.cnn.com/interactive/2014/10/health/epidemics-through-history/.
[38] Ibid.
[39] Ibid.
[40] Ibid.

## Historical Analysis

### Case Studies

Although diseases have existed just as long as humans have, only a few of the most deadly, infectious, and viral pathogens from recent history are pertinent to discussion. The following diseases have revolutionized the international community's response to epidemics and pandemics. This section seeks to follow humanity's evolving response to epidemics as an illustration of our growing capacity to diagnose, treat, and cure diseases.

#### *Black Death*

Also known as the Bubonic Plague, The Black Death is considered to be the first true pandemic, killing 30–60% of the population in Asia and Europe from 1347 to 1351.[41] The Black Death manifests as a series of abdominal pains, diarrhea, fever, weakness, and a blackening of the skin, known as gangrene, and is generally transmitted by infected rodents or fleas. Due to the developments in medicine, any resurfacing cases of this illness can be easily treated in their early stages.

During medieval times, people generally had a very limited understanding of how infectious diseases, or sickness in general, worked. For a long period in time, feeble attempts were made to stop the spread of the Black Death; ineffective remedies such as vinegar and water treatments, witchcraft, and vegetarian diets were introduced as countermeasures. Nearly all of these primitive treatments did nothing to help the sick, sometimes even expediting their prognosis. However, one thing that people did discover was the solution of isolation. People discovered that isolating the sick, now known as quarantine, was an effective method to defend against the plague.

#### *Smallpox*

During the 1500s, Smallpox caused the death of nearly 90 million indigenous Americans during the European explorations. The disease is caused by two viruses, variola major and variola minor, and is incredibly contagious. The virus manifests in fevers, vomiting, and characteristic skin rashes and fluid-filled bumps. Re-emerging in the 18th century, this disease claimed another 400,000 lives in Europe before a vaccine was created. Despite this, breakouts persisted, and in the 1960s, over two million people died from smallpox worldwide.

Smallpox initiated remarkable scientific breakthroughs within the realm of microbiology. Observations were quickly made that those who were able to survive smallpox never contracted it again. This concept of inoculation—exposing an individual to small amounts of a disease in order to create immunity—was known in Africa, India, and China by the 17$^{th}$ century, gaining popularity in Europe in the early 1700s.[42] Smallpox became the first to be experimented with in this way; in 1796, Edward Jenner discovered that dairymaids rarely contracted smallpox after being sick with cowpox, a similar, but much less dangerous, virus. Jenner then injected a young boy with matter from a cowpox lesion and later inoculated him with smallpox—Jenner had performed the first "vaccination," a word derived from the Latin word "vacca," meaning cow.[43] This discovery lead to the creation of vaccinations for many diseases to come. An aggressive vaccination campaign led to the eradication of this disease in 1980, one of the hallmarks of human achievement.

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[41] Ibid.

[42] Livescience, "How Smallpox Changed the World," https://www.livescience.com/7509-smallpox-changed-world.html.

[43] Ibid.

### *Malaria*

An illness transmitted through carrier mosquitos, malaria dates back nearly 4,000 years and still exists today. Historically, epidemics of this disease broke out during both World Wars, killing millions of soldiers on the front lines. In sub-Saharan Africa, where the disease is most prevalent, 350–500 million cases are diagnosed each year.

In the 18th century, Camillo Golgi, an Italian neurophysiologist, established that there were at least two forms of the disease, one with tertian periodicity (fever every other day) and one with quartan periodicity (fever every third day).[44] His work also detailed that the two forms of malaria produced differing numbers of merozoites (new parasites) upon maturity, and that fever coincided with the rupture and release of merozoites into the bloodstream.[45] In 1906, he was awarded the Nobel Prize in Medicine for his discoveries in neurophysiology.

Malaria continues to plague many African nations today, and while treatment and prevention efforts are strong, no vaccine exists for this disease. While malaria is incredibly treatable, access to healthcare and appropriate funding is scant in many African states.

### *Influenza*

Commonly known as the Spanish Flu or the Flu of 1918, this virus was responsible for the deaths of some 500 million people worldwide. Although its epidemic concluded just a year later, it was able to quickly spread from country to country due to the return of soldiers from the First World War. In 2009, this disease grew into a pandemic, and presently, new viral strains still exist, but have not become a pressing global issue.

This disease initiated the widespread use of non-pharmaceutical interventions (NPIs). Also known as community mitigation strategies, NPIs are actions, other than getting vaccinated and taking medication, that people and communities can take to help slow the spread of illnesses like pandemic influenza.[46] Examples of NPIs include the closure of public facilities, quarantine of infected households, and bans on public gatherings. Although this method of prevention did not yield the best results, analysis of these preventative measures has shown that if they were implemented earlier and more stringently, the spread and deaths of influenza could have been reduced.[47]

### *Polio*

Suspected to have existed for thousands of years, poliomyelitis spreads through contaminated food and water, causing symptoms of paralysis by targeting the human nervous system. In the outbreaks of 1952 in the United States, 57,628 cases were reported. There is still no cure for polio, but a vaccine was quickly developed after its rapid proliferation.

However, even today, polio poses a continuous threat to global health due to its mutative nature. Although efforts have been made to research new strains of this virus, a vaccine does not exist for the newly-mutated version of polio. However, the World Health Organization's polio eradication program, which began in 1988, has been one of the greatest success stories in global health.[48] The core strategy of this program has been modelled after the

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[44] CDC, "The History of Malaria, an Ancient Disease." https://www.cdc.gov/malaria/about/history/index.html.
[45] Ibid.
[46] CDC, "Non Pharmaceutical Interventions (NPIs)," https://www.cdc.gov/nonpharmaceutical-interventions/index.html.
[47] Ibid.
[48] Vox, "A Vaccine We Don't Even Use Anymore is a Reason Polio Keeps Spreading — Yes, Really," https://www.vox.com/science-and-health/2018/7/4/17530642/polio-vaccine-outbreak-drc-who.

successful elimination of smallpox; a consistent vaccination strategy could eliminate the biggest threats of polio due to its nature of being transmitted only through humans.

### *Cholera*

After circulating around India for a number of centuries this disease spread to the rest of the world in the 19th century. Primarily transmitted through the ingestion of contaminated water or food, this disease leads to death by causing dehydration through diarrhea. Outbreaks of cholera are still occurring today, with reports of an estimated 3–5 million cases and 120,000 deaths annually. The largest and most recent cholera outbreak began in Haiti in 2010, claiming over 7,000 lives and having yet to be curbed.

Originally an ancient disease, cholera has re-emerged in many parts of the world, especially in tropical areas. *Vibrio cholerae*, the causative agent of cholera, is naturally present in the environment and autochthonous to coastal and estuarine ecosystems.[49] Changes in the density of its reservoir may result in modification of the bacterial population size in the environment; in this context, climatic and/or environmental changes will influence the emergence of cholera in human populations.[50] This disease presents a great challenge to the world—one of the contributing factors to its spread is unpredictable and cannot be controlled by humans. Due to the increasing accessibility of air travel and other recent technological developments, this disease is now easily spread, and even more difficult to control than before.

### *HIV/AIDS*

A comparatively more recently discovered disease, the human immunodeficiency virus (HIV) attacks the immune system and triggers the onset of the acquired immune deficiency syndrome (AIDS), which are the range of symptoms and illnesses that unravel during the final stages of an HIV infection. Since its rapid spread throughout the world in the 1980s, medication and therapy treatments can now alleviate symptoms and delay death for 4–12 years, however, no real cure exists. HIV/AIDS has claimed the lives of more than 25 million people and continues to spread every day.

The initial global response to HIV focused on prevention through behaviour change and vaccine research; however, it became clear that knowledge of transmission was not enough to stop the epidemic.[51] Due to its nature of transmission and the way in which the world is interconnected, HIV has developed from an endemic to almost a pandemic. As a counteractive measure, the international community has placed an increased emphasis on ensuring global access to treatment. A large reason behind why the now-international spread of disease was not adequately resisted during its first emergence is the lack of immediate governmental action and an understanding society during times of distress, due to preconceived prejudices against the infected.

## Analysis

As shown in the various case studies above, humanity's response to epidemics has adapted and evolved over the years to better protect against the spread of disease. While in medieval times treatment was incredibly lacking, curbing the spread of disease through isolation was a key step towards understanding the transmission of these

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[49] "Cholera and Climate: A Demonstrated Relationship," US National Library of Medicine., National Institutes of Health, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2744514/.
[50] Ibid.
[51] "Global Response to HIV and AIDS," https://www.avert.org/professionals/hiv-around-world/global-response.

afflictions. As well, with discoveries of penicillin, vaccines, and other treatment methods, our ability to treat infected individuals and prevent infection grew exponentially.

However, beyond just the medical realm, our social structures surrounding diseases have also shifted in order to accommodate more adaptable and useful responses to potential epidemic. Being able to quickly stop the flow of international traffic, as well as developing strong national epidemic responses, such as quarantine measures has greatly assisted in this regard.

However, as our capacity to deal with epidemics has improved, the landscape for its transmission has shifted dramatically. Rapidly-expanding intercontinental travel, coupled with improving mobility between cities and countries, makes quarantine efforts an international objective. Changing dynamics in vaccinations and disease immunity to conventional treatments have further complicated the spread of disease.

## Past UN/International Involvement

### United Nations

Since its inception, the United Nations has been actively involved in global health, avidly promoting the protection of citizens worldwide. On April 7, 1948, World Health Day was established in accordance with the ratification of the World Health Organization's constitution. It was decided that WHO's top priorities would be malaria, women's and children's health, tuberculosis, venereal disease, nutrition, and environmental pollution.[52] Today, WHO's agenda includes the aforementioned issues, combined with relatively new diseases such as HIV/AIDS, diabetes, cancer, and epidemics such as SARS, Ebola, Zika, and many more.

The World Health Organization officially took over the responsibility for the International Classification of Diseases (ICD) in 1948, establishing an international standard for the identification of reported health conditions. In 2005, WHO also instituted the International Health Regulations (IHR), with the intent of having a consolidated system to track the evolution of diseases, share expertise on pathology, alert nearby countries of possible threats, and provide immediate medical emergency responses. At present, WHO staff, including medical doctors, public health specialists, scientists, epidemiologists, and other experts, are at work on the ground in 150 countries around the world, providing assistance, treatment, and diagnoses. Despite these contributions, the 2016 WHO Report "World Health Statistics" still indicated that many countries, especially those in African and Eastern Mediterranean regions, are still far from achieving universal health outcomes.[53]

However, it would be misleading to suggest that the entire work of the United Nations system in support of global health lies solely within the World Health Organization.[54] In 2015, the United Nations adopted the 17 Sustainable Development Goals (SDGs), with a mission to drive action over the next 15 years in vital areas of international development. Numerous sections of the SDGs called for achieving universal health coverage through goals of promoting the improvement of health for all. Many health-related matters are addressed directly by the General Assembly and the Economic and Social Council (ECOSOC), as well as through the efforts of the Joint United Nations Programme on HIV/AIDS (UNAIDS), the United Nations Population Fund (UNFPA), and the health-related activities of the United Nations Children's Fund (UNICEF).[55]

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[52] United Nations, "Health," http://www.un.org/en/sections/issues-depth/health/index.html.
[53] Ibid.
[54] Ibid.
[55] Ibid.

### Non-Governmental Organizations

On a global scale, it is important to take note of three of the most prominent organizations: the International Coordinating Group on Vaccine Provision (ICG), the Global Outbreak Alert and Response Network (GOARN), and the Centers for Disease Control and Prevention (CDC), which promote global health among countless other important institutions.

Established in 1997, the International Coordinating Group on Vaccine Provision (ICG) serves as a means of providing vaccinations and antibiotics during outbreaks, bringing partners together to improve epidemic preparedness and coordination, and working on forecasting vaccine stocks, negotiating vaccine prices through networks and partners, providing emergency release vaccine stockpiles, and evaluating standard protocols for managing diseases.[56] Instrumental on the international scene for global health security, ICG has saved countless lives through its rapid responses, particularly during outbreaks of meningitis, yellow fever, and cholera.

The Global Outbreak Alert and Response Network (GOARN) is a global network of organizations pooling together their expertise and resources to identify, confirm, and respond to outbreaks.[57] Notably, GOARN created the Guiding Principles for International Outbreak Alert and Response, an articulation on field activity preparation, to activate international support, to coordinate responses in the field, and evaluate and follow up on outbreaks of international importance.[58] One of GOARN's core focuses is ensuring that "there is commitment to national and regional capacity building as a follow up to international outbreak responses to improve preparedness and reduce future vulnerability to epidemic prone diseases."

The Centers for Disease Control and Prevention (CDC) is a leading global health institution located in the United States. Established in 1946, CDC conducts and supports health promotion, prevention, and preparedness activities in the United States, with the goal of improving overall public health.[59] Although U.S.-based, CDC works to protect civilians from diseases that start at home or abroad, are chronic or acute, curable or preventable, stem from human error or deliberate attack, and affect both foreign and local populations, playing an integral role in the detection and management of public health issues globally.[60]

## Current Situation

Today, countless communicable diseases continue to threaten and claim millions of lives. Recent outbreaks of influenza (H1N1 and H5N1), SARS, and Middle East respiratory syndrome (MERS) have shown that even the most sophisticated health systems are challenged by new pathogens. Notwithstanding its devastating impact in West Africa, the Ebola virus is not the world's most virulent pathogen, proved through mathematical modelling by the Bill and Melinda Gates Foundation.[61] Data have shown that a virulent strain of an airborne influenza could spread to all major global capitals within 60 days and kill more than 33 million people within 250 days.[62] Despite this significant threat, only minimal efforts have been made to prepare for a potential pandemic. The

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[56] WHO, "International Coordinating Group (ICG) on Vaccine Provision," https://www.who.int/csr/disease/icg/qa/en/.
[57] WHO, "Strengthening health security by implementing the International Health Regulations (2005)," http://www.who.int/ihr/alert_and_response/outbreak-network/en/.
[58] WHO, "Emergencies Preparedness, Response," http://www.who.int/csr/outbreaknetwork/guidingprinciples/en/.
[59] Centers for Disease Control and Prevention, https://searchhealthit.techtarget.com/definition/Centers-for-Disease-Control-and-Prevention-CDC.
[60] Ibid.
[61] United Nations. "Protecting Humanity from Future Health Crises." http://www.un.org/News/dh/infocus/HLP/2016-02-05_Final_Report_Global_Response_to_Health_Crises.pdf.
[62] Ibid.

International Health Regulations, a global instrument designed to ensure early warning and proper pandemic response, have only been fully implemented by one-third of its 196 states parties. Similarly, only a small fraction of global investment in research and development for vaccines, therapeutics, and diagnostics is devoted to the emerging communicable diseases that primarily affect the developing world.[63]

## Vaccinations

Although one of the most successful methods to avoid the rapid transmission of potentially-fatal diseases, vaccines serve as a topic of much controversy in the international community. Along with the development of inoculations came the movement of vaccination refusal. Internationally, many nations around the world allow for legal vaccination exemptions, provided with a medical, religious, social, or philosophical reason, such as personal belief or conscience objection. Recent years have been marked by outbreaks of vaccine-preventable diseases such as measles and pertussis, sparking debate surrounding vaccination exemptions.

In 2018, research by medical anthropologist Emily Brunson revealed that more than a quarter of European residents currently identify with the so-called "anti-vaxxer" movement.[64] Especially in European countries, the rate of childhood immunizations has been observed to be alarmingly low. The anti-vaxxer movement is composed of people—in many cases, young parents—who systematically question the safety and effectiveness of childhood immunization and reject all scientific evidence associated with it.[65] They represent a growing distrust in the scientific community, which can pose incredible danger to the future of medicine.

In addition to anti-vaxxers, some refuse vaccinations due to religious beliefs. Some studies show that the number of religious exemptions has been increasing, leading, for example, to outbreaks of mumps in a Protestant Orthodox group in the Netherlands.[66] Due to these stances, many parents do not allow their children to receive necessary inoculations, putting them in direct danger as they lack the basic antibodies against active, preventable diseases. As a result, it is imperative to expand current understandings of vaccinations and to spread awareness about the importance of ensuring that infants and children are properly vaccinated and have immunity against preventable illnesses. Current measures implemented include World Immunization Week, which has proved to be successful, but more must be done to bolster these results and made initiatives accessible to those in developing nations.

## Medical Aid

Regarding the availability of medical aid to prevent communicable diseases, statistics reflect that an estimated 19.9 million infants worldwide were not reached with routine immunization services in 2017—with around 60% of these children living in Afghanistan, Angola, the Democratic Republic of the Congo, Ethiopia, India, Indonesia, Iraq, Nigeria, Pakistan and South Africa.[67]

To combat this lack of reach, data must be monitored at the subnational level, helping countries prioritize and tailor vaccination strategies and operational plans to address immunization gaps and reach every person with

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[63] Ibid.

[64] Vancouver Courier, "Global Vaccination Awareness Needs Another Shot in the Arm." https://www.vancourier.com/global-vaccination-awareness-needs-another-shot-in-the-arm-1.2344497.

[65] Ibid.

[66] "Religious Exemption for Vaccination or Religious Excuses for Avoiding Vaccination," US National Library of Medicine National Institutes of Health, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5141457/.

[67] World Health Organization, "Immunization Coverage," https://www.who.int/news-room/fact-sheets/detail/immunization-coverage.

life-saving vaccines.[68] The World Health Organization has contributed to this aim by initiating the Global Vaccine Action Plan (GVAP), designed to improve global health security through more equitable access to vaccines, cures, and antidotes by 2020. The resolution urges countries to strengthen the governance and leadership of national immunization programmes, and improve monitoring and surveillance systems to ensure up-to-date data guides policy and programmatic decisions to optimize performance and impact.[69] It also calls on countries to expand immunization services beyond infancy, mobilize domestic financing, and strengthen international cooperation to achieve GVAP goals.[70] However, recent progress towards GVAP targets has stagnated, indicating a need for further action in this sphere.

## Living Conditions

A prominent contributing factor to the spread of infectious diseases and virulent pathogens is the poor sanitation and living standards present in many nations. A number of factors work to initiate the spread of diseases that are prone to cause epidemics, such as the local water supply, sanitation facilities, food, and climate. The lack of safe water, inadequate excreta disposal facilities, poor hygiene, unsanitary living conditions, and contaminated food can all cause diarrheal diseases.[71] Moreover, climate can also act as a catalyst for the spread of communicable diseases; for example, flooding after heavy rains can result in sewage overflow and widespread water contamination. In addition, pathogens can be spread from one region to another through air streams or by wind. Statistics reflect that, in developing nations, diarrhea, pneumonia and malaria account for nearly half of all child deaths globally.[72] Poverty and poor health are inextricably linked, developing into a never-ending cycle, and marginalized groups and vulnerable individuals are often worst affected, deprived of the information, means, or access to health services that would help them prevent and treat disease.[73] Thus, in order to attack the spread of epidemics at its root, structural factors must be targeted through international supports and initiatives, fulfilling the goal of global health security for all.

Currently, the World Health Organization's response to communicable disease outbreaks is led by the Epidemic and Pandemic Alert and Response Department.[74]

## Disease Transmission

It is important to note the methods by which the most common infections are transmitted. Communicable diseases primarily spread through four modes: contact transmission, airborne transmission, common vehicle transmission, and vector transmission. Contact diseases, both direct and indirect, spread when microorganisms pass from the infected to the healthy via physical contact, blood, or body fluids, or airborne infectious droplets. In order to prevent future epidemics and pandemics, controlling the factors that help to facilitate disease transmission is crucial in containing any disease outbreak.

As seen through the history of communicable diseases, screening can be the deciding factor for whether or not an epidemic transitions into a pandemic. Past diseases such as the H1N1 virus and SARS were not adequately

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[68] Ibid.
[69] Ibid.
[70] Ibid.
[71] World Health Organization, "Environmental Health Emergencies," https://www.who.int/environmental_health_emergencies/disease_outbreaks/communicable_diseases/en/.
[72] "Poverty and Poor Health," Health Poverty Action, https://www.healthpovertyaction.org/news-events/key-facts-poverty-and-poor-health/.
[73] Ibid.
[74] Ibid.

contained, especially when it came to travellers and airports. Border screening, together with isolation of persons identified with suspected cases of disease and quarantine of their contacts, is implemented to prevent the global spread of a disease from a source country.[75] The intent of border screening is to detect possibly infectious persons at the border, either on entry or exit from a country, so that they can be placed in isolation or prevented from travelling and spreading the disease elsewhere; however, this strategy is useful only if the intended goal is successfully achieved.[76] The reasons behind the failure to contain many past pandemics is because of low identification rates and the use of exit screening—subjective measures used during the process of screening by affected countries. With current knowledge, border screening should focus on educating incoming travellers, especially groups at high risk of transmitting the disease, such as the elderly and those with underlying chronic illnesses.[77]

## Case Study: Ebola Virus Disease

**T**he 2014 Ebola outbreak caused tremendous suffering in Guinea, Sierra Leone, and Liberia, but could have been prevented if measures to halt its spread had been implemented earlier. The poor response towards this epidemic demonstrated that the world remains ill-prepared to address the threat posed toward global health security.

Locally, a lack of basic surveillance capacities in West Africa allowed for the virus to spread undetected for three months. When it was finally identified, the scale of the Ebola outbreak was largely underestimated by experts and minimized by authorities. Despite numerous warnings from groups including Médecins Sans Frontières (MSF), the governments of the three most-affected countries and the World Health Organization maintained that the outbreak would soon be under control.[78] The disease was only formally declared a Public Health Emergency of International Concern (PHEIC) by WHO after the lives of close to 2,000 people had been claimed. Once recognized as a global threat, the international community mobilized unprecedented resources and capacities; however, these efforts were unsuccessful due to a severe lack of trained and experienced personnel willing to deploy to the affected countries, inadequate financial resources, a limited understanding of effective response methods, ineffective community engagement, and poor coordination.[79] This epidemic caused an estimated USD 2.2 billion in economic losses to the most affected countries, illustrating, beyond the human toll, a renewed impetus to bolster existing disease-control measures.

## Case Study: Zika Virus

After six decades of apparent slumber, the mosquito carrying Zika virus re-emerged in 2007 in the Federated States of Micronesia on Yap Island.[80] As the years progressed, this disease slowly worked its way into the Americas, and on February 1, 2016, the World Health Organization officially declared that the association between Zika and the cluster of microcephaly cases and other neurologic disorders in Brazil and French Polynesia constituted a Public Health Emergency of International Concern (PHEIC).[81]

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[75] "Evaluation of Border Entry Screening for Infectious Diseases in Humans." US National Library of Medicine National Institutes of Health. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4313627/.
[76] Ibid.
[77] Ibid.
[78] Ibid.
[79] Ibid.
[80] World Health Organization, "Emergencies," http://www.who.int/emergencies/zika-virus/articles/one-year-outbreak/en/index1.html.
[81] Ibid.

The emergence of the Zika virus proved that the world was ill-prepared to cope with this disease; there were no vaccines and a lack of research. Apart from impeding disease investigations, the lack of reliable and widely-available diagnostic tests meant that health professionals could not easily assist locals threatened by the disease. During the first year of the outbreak, sexual transmission was documented in nine countries: Argentina, Canada, Chile, France, Italy, New Zealand, Peru, Portugal, and the United States; of these, however, only few have universal and free access to sexual health clinics and family planning services.[82] However, in less-developed regions, many cannot afford air conditioning, window screens, or even insect repellents; coupled with limited access to piped water and poor sanitation, these living situations create the ideal breeding ground for mosquitoes, a main carrier of many pathogens, including the Zika virus.

Perhaps the greatest failure in disease prevention stems from the complacency that set in after the spectacularly successful mosquito control campaigns of the 1940s and 1950s.[83] After yellow fever was vanquished in the 1960s, funding for mosquito control ceased, disease monitoring programmes were dismantled, and the number of entomologists—people studying zoology concerned with insects—began to dwindle. The response to the infectious disease threat shifted from building basic public health infrastructure and prevention capacities as the first line of defence to the use of surveillance to pick up early signals of an outbreak and mount an emergency response.[84] The weaknesses of such a stop-gap approach have been demonstrated by the dramatic resurgence of dengue, the recent emergence of chikungunya as a significant threat to health, the delayed detection and subsequent exponential spread of Ebola in West Africa, and the recent return of urban yellow fever to Africa.[85]

## Possible Solutions and Controversies

### Research and Development

The availability and swift delivery of effective medical countermeasures, such as vaccines, therapeutics, and diagnostics, is instrumental in effectively responding to outbreaks. However, investment in medical research and development for diseases that affect the impoverished is largely insufficient, and even if vaccines or cures exist, they are oftentimes too expensive for the general public to afford. Public policy intervention, including more public health funding, is required to ensure more resources are focused on developing solutions for neglected diseases in impoverished countries. The World Health Organization could potentially oversee the establishment of a fund to support the research and development of vaccines, therapeutics and diagnostics, with proper access to affordable medicines. However, this solution is one that is difficult to achieve on an international scale, as developed nations will feel hesitant to donate to a large-scale project if developing nations do not contribute as well; moreover, to economically weak countries, public health may not an area of immediate concern.

### Vaccination

While new and dangerous pathogens can emerge in any country in the world, poor living conditions mean that developing countries are particularly vulnerable to outbreaks.[86] Inadequate sanitation can accelerate disease spread, and weak public health systems severely undermine a country's capacity to respond to a widespread health crisis. Member States of the World Health Organization must work to ensure that the monitoring and

[82] Ibid.
[83] Ibid.
[84] Ibid.
[85] Ibid.
[86] United Nations, "Protecting Humanity from Future Health Crises." http://www.un.org/News/dh/infocus/HLP/2016-02-05_Final_Report_Global_Response_to_Health_Crises.pdf.

follow-up process of vaccinations create complementarity between development programmes and efforts to build healthcare systems. In addition, once developed, countries must work together in ensuring that vaccines are properly distributed locally, as immunization is key to both epidemic and pandemic prevention. However, it is important to note that vaccine controversies may lead to resistance from certain segments of the public, which must therefore be accounted for in an effective resolution.

### Public Awareness

Every country should have the capacity to respond to the endemic or epidemic before international aid is received. Research has proven that humans will react to the presence of diseases, yet rarely have these responses been systematically investigated. Nevertheless, such reactions and changes in behaviour directly resulting from the outbreak have enough of an influence to alter the progression of the infectious agent. Public awareness-prompted actions can range from quarantine to wearing protective masks, vaccination, or other variations of precautionary methods to reduce susceptibility. In most populations, whether through a centralized channel of information or through word of mouth, these previously-mentioned actions can prove effective in mitigating communicable outbreaks. However, if the behavioural response is treated as a local effect arising in the proximity of an outbreak, it can completely stop a disease from spreading, although only if the infection rate is below a certain threshold. The impact of spreading public awareness is amplified if the social network of potential infection events and the network over which individuals communicate overlap, especially so if the networks have a high level of clustering. As such, it is imperative to educate and inform the global populace of both preventative and reactive measures that can be taken to avoid and mitigate the health security impacts of epidemics.

## Bloc Positions

### Western States

Countries in this bloc include many wealthier nations that have more advanced healthcare systems. These countries should look to share their expertise with those that lack infrastructure or healthcare capacity and are in a position to lead international efforts to prevent future epidemics. Being both technologically and economically developed, nations belonging to this bloc play a critical role in guiding and contributing to the epidemic responses of other countries. Beyond simply vaccinations and medical supplies, Western nations should seek to leverage their knowledge resources to assist other nations in bolstering their own technical capacities.

However, this is not to say that these countries do not struggle with local health issues of their own. The problems they face are often different than those of developing countries, with issues such as cancer, addiction crises, and obesity epidemics. However, in comparison to the rapid spread of a virus or infectious disease, these health concerns are not a top priority on the international health agenda.

### Impoverished Areas

Nations that are currently experiencing outbreaks will be looking for aid from other countries as they do not have the resources or sufficiently-advanced technology to resolve the issue on their own. These less-developed nations are usually inexperienced in disease management and wish to seek out information and aid from both neighbouring and developed nations. However, many are adamant about upholding sovereignty, and wish to prevent unnecessary disruptions on local communities and economies.

For those not imminently struggling against the continued spread of a disease, development and restructuring of current healthcare systems and measures should be a top priority. Although not at immediate risk, these nations must implement preventative measures that will safeguard their populations in the future. Developing nations place their citizens at risk due to the poor living conditions that majority of the population faces and must focusing on eradicating these issues on a local level before proceeding to large-scale projects. This group comprises many Asian, African, and Latin American nations.

### Conflict-Ridden Regions

Many countries around the world face rampant civil war, conflict, or conquest. These states often hold their priorities elsewhere, on the basic safety of their people, over disease preparedness or infrastructural development. In the midst of conflict, there is very little free capital to allocate to healthcare, and as a result, these countries are ripe ground for an epidemic to spring up, particularly among weakened immune systems, famine, and increased movement. These countries lack the capacity to address epidemics and health issues and should be reaching out to the international community for assistance. Countries in this bloc include Yemen, Syria, Somalia, and other less-stable regimes.

### Metropolitan Centres

In densely-packed metropolitan cities, disease can travel much quicker than in a rural or expansive setting. Coupled with cold weather, incredibly fast transportation, and an aging population, the fear of epidemics in cities is very real. While many city-dwellers are often well-vaccinated and healthy, meaning natural immune systems serve as a strong barrier to the quick spread of disease, rising anti-vaccination sentiments may threaten this safeguard in the future. Nations with large metropolitan populations need to ensure that proper precautions are taken to prevent the spread of disease, particularly in public areas and airports, including initiatives to bolster sanitation, workplace safety, and general hygiene practices. So-called "megacities," with populations over 10 million people, are particularly vulnerable to these challenges.

## Discussion Questions

1. How can developed nations help those that are struggling without infringing upon their national sovereignty? How can disruption be minimized when offering aid to other countries?
2. How can the use of financial, humanitarian, or any other form of aid be regulated?
3. How can access to vaccines be improved for rural and destitute populations? How should vaccine pricing be structured?
4. How can awareness regarding epidemics be quickly spread through communities?
5. How can the issue of vaccination refusal be addressed on the national and international levels?
6. How can medical information sharing and advanced research and development be facilitated collaboratively among countries?

## Additional Resources

Four Ways Technology Can Help Fight Future Epidemics:
https://www.weforum.org/agenda/2015/06/4-ways-technology-can-help-fight-future-epidemics/

Managing the Risk and Impact of Future Epidemics: Options for Public-Private Cooperation:
https://www.weforum.org/reports/managing-risk-and-impact-future-epidemics-options-public-private-cooperation

The Neglected Dimension of Global Security — A Framework for Countering Infectious-Disease Crises:
https://www.nejm.org/doi/full/10.1056/NEJMsr1600236

The Return of Epidemics and the Politics of Local Health in India:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3093284/

HIV/AIDS Epidemic:
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