VMUN 2024

World Health Organization

BACKGROUND GUIDE

VANCOUVER MODEL UNITED NATIONS

The Twenty-Third Annual Session | January 26–28, 2024

Dear Delegates,

My name is Austin Ng and it is my distinct honour to serve as your Director for the World Health Organization at VMUN 2024. As a Grade 11 student at Richmond Christian Secondary School, this marks my third year in my Model UN journey. On behalf of your Chair, Siena McCleery, and Assistant Directors, Ezra Lee and Mahdiyah Rashid, I would like to welcome you to WHO.

Ever since stepping into the world of Model UN two years ago, this non-spectator sport has taught me more than I could ever expect. Through the sleepless nights, the fiery debates in the morning crisis, Model UN has it all. I remember the first time giving my speech at a General Assembly, feeling intimidated from over 70 faces looking back at me. Nevertheless, I walked away from that conference learning more about world politics over the course of a weekend than I had for an entire year.

At this iteration of VMUN, the World Health Organization will be discussing the issues of *Antimicrobial Resistance* and *Vaccine Distribution in Developing Countries*. Both of these complex topics will inevitably require a significant amount of research in order to properly represent your respective countries. Nevertheless, whether it is your first conference or your tenth, I hope that after this conference, you will walk away with new memories being forged, new experiences gained, and most importantly, a deeper understanding of the world politics around you.

Should you have any questions or concerns, please feel free email me at *who@vmun.com*. On behalf of the dais team, I wish you the best of luck in your preparations and look forward to meeting you all in the committee room!

Sincerely,

Austin Ng
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, although strongly recommended, are not required. However, delegates who wish to be considered for an award must submit position papers.

Formatting

Position papers should:

— Include the name of the delegate, their 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 **11:59 PM PT on January 22, 2024**. 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 "[last name] [first name] — Position Paper". Please do not add any other attachments to the email.

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 Researched award.

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

Antimicrobial Resistance

Overview

Antimicrobial resistance (AMR)—referring to the general resistance of bacteria, viruses, fungi, and parasites—has been a decades-long issue that has yet to be resolved due to a lack of awareness.[1] While similar, antibiotic resistance, which is commonly misunderstood, refers to the resistance specifically associated with bacteria.[2] The reason that antimicrobial resistance has caused many health issues is due to the ability for bacteria, viruses, fungi, and parasites to adapt and change their biological structure, rendering antibiotics useless.[3] Major factors that impact AMR include a lack of antibiotic stewardship leading to the overuse of antibiotics, lack of clean water and sanitation resulting in easier transmissions, and poor infection control resulting in viruses being spread quicker.[4]

Antibiotic stewardship refers to the proper use of antibiotics to prevent situations where the bacteria develops the ability to resist the antibiotic and becomes untreatable.[5] This issue is common in developing countries where there is often a lack of rigid medical frameworks due to forms of instability.[6] However, even in developed countries, the issue remains prevalent, due to the bacteria's ability to adapt according to its surroundings to resist antibiotic treatment.[7]

While new antibiotics have been developed to counteract AMR, new resistance mechanisms have emerged alongside them, such as the production of penicillinase involved in the inactivation of penicillin.[8] In 2015, the World Health Organization (WHO) released the Global Action Plan on Antimicrobial Resistance which has provided rigid and attainable goals for countries around the world on the distribution and quality-control of antibiotics, and the prevention and treatment of infectious diseases.[9] This establishment has allowed for countries to gain a deeper understanding about the actions needed to be taken within their country to properly protect their citizens, proving successful with 170 countries having since implemented comprehensive national action plans.[10]

With such a troubling issue, there have been an increasing number of campaigns to promote awareness such as the World Antimicrobial Awareness Week as well as surveillance programs to track the spread of the bacteria.[11] Non-governmental organizations, such as Doctors Without Borders, have also provided medical resources to

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[1] "Antimicrobial Resistance", *Cleveland Clinic*, April 27th, 2021, https://my.clevelandclinic.org/health/diseases/16142-antimicrobial-resistance.
[2] Ibid.
[3] "Antimicrobial Resistance", *World Health Organization*, November 17th, 2021, https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance
[4] Ibid.
[5] "Antimicrobial Stewardship", *Public Health Ontario*, 2023, https://www.publichealthontario.ca/en/Health-Topics/Antimicrobial-Stewardship
[6] James Ayukekbong, "The threat of antimicrobial resistance in developing countries: causes and control strategies", *BMC,* April 15th, 2015, https://aricjournal.biomedcentral.com/articles/10.1186/s13756-017-0208-x
[7] Ibid.
[8] C. Ventola, "The Antibiotic Resistance Crisis", *National Library of Medicine*, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4378521/
[9] "Global Action Plan on Antimicrobial Resistance", *World Health Organization*, May, 2015, https://www.who.int/publications/i/item/9789241509763
[10] Ibid.
[11] "World Antimicrobial Awareness Week", *World Health Organization*, 2022, https://www.who.int/campaigns/world-antimicrobial-awareness-week/2022

developing countries, helping to prevent AMR from occurring in the first place.[12] However, it is becoming evident through rising cases that there is much to be done, including the development of antibiotic capacities, the prevention and containment of infections, and increased awareness on proper antibiotic use.[13]

Timeline

1940 — The first report of antibiotic resistance is documented soon after the discovery of penicillin in a strain of *E. coli* which, through the production of penicillinase, inactivates the penicillin antibiotic.[14]

1959 — Methicillin is first introduced as an attempt to combat strains of *Staphylococcus* by disrupting certain types of penicillin but is later deemed clinically useless due to the emergence of methicillin-resistant strains of bacteria.[15]

1980s — Vancomycin is introduced as another antibiotic to combat the strains of *E. coli,* but despite presenting strong clinical trial results, causes additional medical issues once again.[16]

1998 — The European AMR Surveillance System (EARSS) is established to collect and analyze data on diseases related to AMR.[17]

May 2015 — The World Health Committee (WHO) releases the Global Action Plan on Antimicrobial Resistance, outlining five key objectives as possible solutions towards AMR.[18]

2020 — The frequent use of antibiotics in COVID-19 patients leads to an increase in antibiotic-resistant infections, highlighting the necessity for enhanced research and surveillance on the correlation between AMR and pandemics.[19]

October 2022 — The World Bank (WB) and the WHO collaborate to publish a series of case studies in a report detailing successful actions that countries have taken to implement their National Action Plans on AMR.[20]

November 2022 — The World Antimicrobial Awareness Week is established to draw attention to the issue of AMR and to encourage proper practices among the public.[21]

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[12] "Antibiotic Resistance", *Doctors Without Borders*, 2023, https://www.doctorswithoutborders.org/what-we-do/medical-issues/antibiotic-resistance
[13] "Five reasons to care about antimicrobial resistance (AMR)", *European Council*, August, 2023, https://www.consilium.europa.eu/en/infographics/antimicrobial-resistance/
[14] "Penicillins's Discovery and Antibiotic Resistance: Lessons for the Future?", *National Library of Medicine*, March 29th, 2017, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5369031/.
[15] Kara Rogers, "Methicillin", *Encyclopedia Britannica,* October 18th, 2016, https://www.britannica.com/science/methicillin.
[16] Donald Levine, "Vancomycin: A History", *Oxford Academic*, January 1st, 2006, https://academic.oup.com/cid/article/42/Supplement_1/S5/275962
[17] "European Antimicrobial Resistance Surveillance Network (EARS-Net)", *European Centre for Disease Prevention and Control*, 2023, https://www.ecdc.europa.eu/en/about-us/networks/disease-networks-and-laboratory-networks/ears-net-data.
[18] "Global Action Plan on Antimicrobial Resistance", *World Health Organization*, May, 2015, https://www.who.int/publications/i/item/9789241509763
[19] "COVID-19 & Antimicrobial Resistance", *Centers for Disease Control and Prevention*, February 25, 2022, https://www.cdc.gov/drugresistance/covid19.html
[20] "Sustaining Action Against Antimicrobial Resistance: A Case Series of Country Experiences", *World Health Organization*, October 17th, 2022, https://www.who.int/news/item/17-10-2022-sustaining-action-against-antimicrobial-resistance-a-case-series-of-country-experiences
[21] "World Antimicrobial Awareness Week", *World Health Organization*, 2022, https://www.who.int/campaigns/world-antimicrobial-awareness-week/2022

April 2023 — The European Health Union revises the pharmaceutical legislation to tackle issues of vaccine accessibility, quality, and affordability.[22]

June 2023 — The WHO releases the first global research agenda, which outlines 40 research topics on AMR to be answered before 2030.[23]

Historical Analysis

The issue of antimicrobial resistance remains prominent in societies today, and there has yet to be an adequate solution to effectively address this concern. Through the discovery of penicillin in 1928 by Alexander Fleming, a bacteriologist, the medical world would begin to realize the potential of antibiotics.[24] Unfortunately, the discovery of AMR would soon emerge alongside it in 1940, when an *E. coli* strain was reported to prevent the capabilities of penicillin, leading to a spread of penicillin-resistant cases across communities that overwhelmed hospitals.[25]

Over the next few decades, antibiotic resistant cases like penicillin would rise due to several key factors, namely incorrect prescriptions being prescribed by doctors and a subsequent over-usage of antibiotics.[26, 27] A study conducted by the University of Oxford outlined the implications of penicillin's over-the-counter availability, in that citizens could purchase it without prescription, resulting in the spread of AMR.[28] However, even when prescribed by doctors, it would often be done so incorrectly due to an assumption of the abilities of penicillin, causing the antibiotic to become ineffective with its overuse. Another key factor in the rise of AMR was the use of antibiotics in agriculture. Most notably, growing cases of AMR were found in the livestock of primarily developing countries due to factors like lower socioeconomic status leading to lower funding and a lack of available resources to mitigate the crisis.[29]

As AMR has the ability to spread from animals to humans, developing countries with lower levels of sanitation were at higher risk of transmissions. Additionally, the persistent use of nonessential antibiotics in livestock feed for growth promotion was and continues to be highly unregulated in developing nations, resulting in an increased human consumption of products harbouring antibiotic residues.[30] Other examples, such as methicillin, were developed to better treat infections such as *Staphylococcus aureus*, which had become an issue due to the ineffectiveness of penicillin.[31] However, the ability for the infection to grow and develop tactics to combat the

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[22] "Commission proposes pharmaceuticals reform for more accessible, affordable and innovative medicines", *European Health Union*, April 26th, 2023, https://ec.europa.eu/commission/presscorner/detail/en/IP_23_1843
[23] "WHO outlines 40 research priorities on antimicrobial resistance", *World Health Organization*, June 22, 2023, https://www.who.int/news/item/22-06-2023-who-outlines-40-research-priorities-on-antimicrobial-resistance
[24] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5369031/
[25] Robyn Shaffer, "The Challenge of Antibiotic-Resistant *Staphylococcus*: Lessons from Hospital Nurseries in the mid-20th Century", *National Library of Medicine*, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3670445/
[26] Ibid.
[27] Maggie Fox, "Wrong Antibiotic Prescribed Half the Time, Report Finds", *NBC News*, October 24th, 2016, https://www.nbcnews.com/health/health-news/wrong-antibiotic-prescribed-half-time-report-finds-n671881
[28] Tom Calver, "75 years of penicillin in people", *University of Oxford*, February 12th, 2016, https://www.ox.ac.uk/news/science-blog/75-years-penicillin-people
[29] Christy Manyi-Loh, "Antibiotic Use in Agriculture and Its Consequential Resistance in Environmental Sources: Potential Public Health Implications", *National Library in Medicine*, March 30th, 2018, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6017557/
[30] Ibid.
[31] Mark Enright, "The evolution history of methicillin-resistant Staphylococcus aureus (MRSA)", *PNAS*, May 21st, 2002, https://www.pnas.org/doi/10.1073/pnas.122108599

effects of the antibiotic is why the issue remains prevalent in societies today. The solutions that have been attempted in the past have had little success and will require different tactics to make a stronger effort towards combating the issue.

Case Study: Denmark

Denmark is a country that has implemented successful measures against antimicrobial resistance, leading to some of the lowest rates of AMR in the entire world.[32] This process began in 1999, when programs were implemented to better monitor trends in AMR and their affiliation to the use of specific antibiotics.[33] One beneficial program that has been implemented is the Danish Integrated AMR Monitoring and Research Programme (DANMAP), which gathers data on the presence of AMR in humans, animals, and food to better understand its correlation to the use of antimicrobials like antimicrobial growth promoters (AGPs) in the agricultural industry.[34] Other countries such as Norway and Sweden have created similar surveillance programs called NORM-VET and SVARM respectively, allowing these countries to consistently monitor and control rates of AMR.[35]

Other notable initiatives pursued by Denmark include the banning of AGPs, which used to allow for better digestion in animals but have raised questions about the ethics of livestock farming methods, as well as contributed to the rise of AMR through their excessive use.[36] Thus, by banning AGPs, Denmark has effectively contributed to the solution of AMR and eradicated discussions on ethicalities.[37] The WHO has determined that Denmark has successfully reached its goal of significantly reducing cases of AMR via the animals and produce that their citizens consume.[38]

Case Study: Methicillin-Resistant *Staphylococcus Aureus* (MRSA)

Since its discovery in 1961 in a Boston hospital, MRSA has resisted methicillin antibiotics and a variety of other antibiotics, causing it to be one of the most difficult diseases to treat.[39] Its discovery came approximately a year after penicillin was unsuccessfully used as an attempt to treat strains resistant to antibiotics.[40] Shortly after, methicillin was used as an alternative, but its efforts proved to be unsuccessful. Research conducted by UC

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[32] Tiago Oliveria, "Trends in antimicrobial resistance in OECD countries", *OECD iLibrary*, https://www.oecd-ilibrary.org/sites/9789264307599-6-en/index.html?itemId=/content/component/9789264307599-6-en
[33] A. Massow, "Antimicrobial Resistance Trends in Denmark Following the Ban on Including Antimicrobials in Livestock Feeds", *Purdue University*, https://www.extension.purdue.edu/extmedia/ID/ID-420-W.pdf
[34] Anette Hammerum, "Danish Integrated Antimicrobial Resistance Monitoring and Research Program", *National Library of Medicine*, November 13th, 2007, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3375779/
[35] A. Massow, "Antimicrobial Resistance Trends in Denmark Following the Ban on Including Antimicrobials in Livestock Feeds", *Purdue University*, https://www.extension.purdue.edu/extmedia/ID/ID-420-W.pdf
[36] "Avoiding Antibiotic Resistance: Denmark's Ban on Growth Promoting Antibiotics in Food Animals", *The PEW Charitable Trusts,* https://www.pewtrusts.org/-/media/legacy/uploadedfiles/phg/content_level_pages/issue_briefs/denmarkexperiencepdf.pdf
[37] A. Massow, "Antimicrobial Resistance Trends in Denmark Following the Ban on Including Antimicrobials in Livestock Feeds", *Purdue University*, https://www.extension.purdue.edu/extmedia/ID/ID-420-W.pdf
[38] "Avoiding Antibiotic Resistance: Denmark's Ban on Growth Promoting Antibiotics in Food Animals", *The PEW Charitable Trusts,* https://www.pewtrusts.org/-/media/legacy/uploadedfiles/phg/content_level_pages/issue_briefs/denmarkexperiencepdf.pdf
[39] "About MRSA", *Department of Health*, October 20th, 2022, https://www.health.state.mn.us/diseases/staph/mrsa/basics.html
[40] Ibid.

Berkeley has shown that MRSA is resistant towards antibiotics due to factors such as horizontal transfer.[41] This is when bacteria are able to pass DNA between each other to begin the process of natural selection, creating a virus that is extremely difficult to treat.[42] The global spread of MRSA has continued for decades, with a solution needed to counter the antimicrobial resistant bacteria and all of its various strains.[43] To treat, a week-long antibiotic plan would typically be prescribed by the doctor, but more severe cases would result in hospital treatment.[44] However, seeing as *S. aureus* infections are mostly spread through contaminated hands, the most simple prevention tactics are to ensure good medical hygiene in general.[45]

Past UN/International Involvement

United States Food and Administration (FDA)

The FDA, responsible for the protection of the general public health, has played a crucial role towards the battle of AMR since its discovery many decades ago.[46] It has worked with the National AMR Monitoring System (NARMS) which tracks ongoing data of the situation and provides the general public with information on the current rates of AMR.[47] In 2015, the FDA began approving new antibiotics that medical professionals have since been permitted to prescribe to their patients.[48] However, the FDA has also required for there to be updated regulations to ensure proper practices when handling prescriptions.[49] Similarly, they have introduced new guidelines to test the abilities of certain antibiotics in order to ensure a safer prescription process for patients when receiving different forms of the medication.[50] While these decisions have allowed for the FDA to outline their policies more clearly, it has also sought to raise public awareness through a partnership with the Centres for Disease Control and Prevention (CDC). Utilizing a variety of educational resources, the partnership seeks to teach the public about the dangers of AMR and possible prevention methods. Each of these solutions that have been conducted by the FDA will contribute positively towards the general health goals set by the World Health Organization.

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[41] Ibid.
[42] "Superbug, super-fast evolution", *Berkeley University of California,* April, 2008, https://evolution.berkeley.edu/evo-news/superbug-super-fast-evolution/
[43] Ibid.
[44] "Patient Education: Methicillin-resistant Staphylococcus aureus (MRSA) (Beyond the Basics)", *UptoDate*, https://www.uptodate.com/contents/methicillin-resistant-staphylococcus-aureus-mrsa-beyond-the-basics
[45] Ibid.
[46] "Antimicrobial Resistance Information from FDA", *U.S. Food and Drug Administration*, July 13th, 2023, https://www.fda.gov/emergency-preparedness-and-response/mcm-issues/antimicrobial-resistance-information-fda
[47] "Combating Antibiotic Resistance", *U.S. Food and Drug Administration*, October 29th, 2019, https://www.fda.gov/consumers/consumer-updates/combating-antibiotic-resistance
[48] Ibid.
[49] Ibid.
[50] Ibid.

Infection Prevention and Control

The Infection Prevention and Control (IPC) Technical and Clinical Hub team is a team that works under the WHO.[51] Their efforts against COVID-19 were crucial during the pandemic and they have developed many assets against AMR, including global guidelines, implementation plans, and educational programs, providing deeper insight into the actions that should be taken by member states.[52] As AMR thrives in hospitals, robust IPC measures—particularly the promotion of hygienic practices in healthcare facilities—are crucial in controlling its spread.[53] In 2017, the WHO released the first global guidelines on combatting AMR.[54] The implementation plan outlines how nations should be developing their healthcare systems from a national standpoint all the way down to how facilities should be run.[55] Examples of suggestions that have been made include surveillance programs and establishing connections between an IPC national program and other facilities.[56] Educational programs such as posters on the World Health Organization's (WHO) website, training tools, and webinars, have all increased awareness of this growing situation.[57] If properly implemented, these suggestions will be pivotal in the reduction of AMR cases.

Doctors Without Borders

Doctors Without Borders, a non-governmental organization (NGO), has consistently provided medical assistance to those in developing countries, showing notable progress especially through their reinforcement of IPC.[58] Their work surrounds the aspect of antibiotic resistance as opposed to AMR in general. While rather difficult to accomplish in countries with higher disease rates, the organization strives to bring good medical hygiene to healthcare facilities.[59] Established protocols as well as trained staff have aided in regions like Haiti, where patients in a specialized burn unit receive bandage changes to prevent infections. They have ensured the proper distribution of prescriptions, provided psychosocial support, and expanded access to diagnoses by providing more access to laboratory equipment.[60] Doctors Without Borders has been effective in its strategies and will seek to continue their work to aid developing countries in lowering rates of AMR.

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[51] "IPC and antimicrobial resistance (AMR)", *World Health Organization*, 2023, https://www.who.int/teams/integrated-health-services/infection-prevention-control/ipc-and-antimicrobial-resistance
[52] Ibid.
[53] Ibid.
[54] "Global action plan on antimicrobial resistance", *World Health Organization*, 2015, https://www.who.int/publications/i/item/9789241509763
[55] "IPC and antimicrobial resistance (AMR)", *World Health Organization*, 2023, https://www.who.int/teams/integrated-health-services/infection-prevention-control/ipc-and-antimicrobial-resistance
[56] Ibid.
[57] Ibid.
[58] "Antibiotic resistance", *Doctors Without Borders*, 2013, https://www.doctorswithoutborders.org/what-we-do/medical-issues/antibiotic-resistance
[59] Ibid.
[60] Ibid.

Pfizer

Pfizer is one of the world's leading biopharmaceutical companies dedicated to researching, developing, and manufacturing prescription medications.[61] Throughout the COVID-19 pandemic, Pfizer's scientific efforts have been crucial in the development and distribution of a vaccine, detection, and treatment for infected persons.[62] They have also established many guides and policies that focused their paths towards implementing proper research and surveillance programs for AMR. Through research conducted in collaboration with various different organizations, such as Becton, Dickinson, and Company (BD) and Wellcome, they have gained a deeper understanding of how to best practice and promote antibiotic stewardship.[63]

Partnering with the UK Government for the development of new antibiotics and the non-profit organization Vivli's AMR Register for surveillance, research, and testing have furthered Pfizer's goal of supporting the effort against AMR.[64] With the amount of monetary support that will be required when testing for solutions, different organizations including Pfizer will need to pool their resources together in search of effective and cost-efficient solutions.

Current Situation

AMR has yet to be resolved due to the evolving nature of bacteria, viruses, fungi, and parasites. Causing nearly 5 million deaths in 2019, it has garnered major attention from health agencies and companies all over the world.[65] According to a global survey conducted in 2021, 86% of the 163 responding countries had pre-existing national action plans, yet only 20% were actively pursuing them.[66] Seeing as the WHO released the Global Action Plan back in 2015 in hopes of countries following its suggestions, these statistics show that little action is being taken.[67] Moreover, a study conducted in 2019 found that the most crucial region requiring urgent care is sub-Saharan Africa due to factors such as lack of immunization and limited access to clean drinking water.[68] Higher case numbers of AMR in these regions are directly attributed to such conditions.[69] However, when providing resources like antibiotics to these regions, ensuring that the antibiotics can last and be properly delivered to their respective regions is key. This will lower the possible risk of infections being transferred and will gradually reduce cases of AMR.[70]

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[61] "Breakthroughs in the Fight Against Antimicrobial Resistance", *Pfizer*, 2022, https://www.pfizer.com/sites/default/files/investors/financial_reports/annual_reports/2022/story/breakthroughs-in-the-fight-against-antimicrobial-resistance/
[62] Ibid.
[63] Ibid.
[64] Ibid.
[65] "About Antimicrobial Resistance", *Centers for Disease Control and Prevention*, October 5, 2022, https://www.cdc.gov/drugresistance/about.html
[66] "More countries committing to tackling antimicrobial resistance", *World Health Organization*, November 11th, 2021, https://www.who.int/news/item/11-11-2021-more-countries-committing-to-tackling-antimicrobial-resistance
[67] "Global action plan on antimicrobial resistance", *World Health Organization*, 2015, https://www.who.int/publications/i/item/9789241509763
[68] Odion Ikhimiukor, "A bottom-up view of antimicrobial resistance transmission in developing countries", *Nature Microbiology*, May 30th, 2022, https://www.nature.com/articles/s41564-022-01124-w
[69] "Monitoring antimicrobial resistance trends to save lives", *World Health Organization*, November 23rd, 2022, https://www.afro.who.int/countries/democratic-republic-of-congo/news/monitoring-antimicrobial-resistance-trends-save-lives
[70] "Antimicrobial Resistance", *World Health Organization*, November 17th, 2021, https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance

According to an article released by the WHO in 2021, a variety of countries have only begun committing to taking more robust countermeasures against AMR.[71] For example, 54% of countries have developed some form of infection and prevention control but have not yet implemented it.[72] Moreover, only 33% of countries have published some sort of guideline on antibiotic stewardship, revealing the concerning lack of action being taken in the status quo.[73]

Antibiotic Stewardship

Citizens in the past have not been well-educated on the importance of using antibiotics properly.[74] The easy accessibility of over-the-counter antibiotics as well as doctors misprescribing them are reasons for the issue's prevalence today.[75]

A survey conducted in 2019 indicated that physicians were 26% more likely to unnecessarily prescribe antibiotics at the end of a long shift when decision-making skills were heavily impacted by cognitive overload and fatigue.[76, 77] This is especially common when the patient requests or demands for antibiotics claiming that such prescriptions had aided them with their previous illness.[78] Physicians are more likely to recall the short-term, successful results of antibiotic prescription for a patient over its long-term implications on AMR. Thus, educating doctors on how to properly prescribe antibiotics is a key factor of the solution. For example, in Minnesota, there is an Antimicrobial Stewardship Program (ASP) dedicated to promoting the accurate use of antibiotics, preventing antimicrobial resistant infections from breaking out.[79] They have created a variety of different guidelines, policies, and other resources for long-term care and acute care to benefit both patients and doctors.[80]

The US CDC has also created educational programs that allow users to learn about antibiotic stewardship from the comfort of their own homes.[81] The training programs that many countries, like Canada, offer allows for a step to be taken in promoting antibiotic stewardship to ensure effective and proper usage of antibiotics.[82] The

[71] "More countries committing to tackling antimicrobial resistance", *World Health Organization*, November 11th, 2021, https://www.who.int/news/item/11-11-2021-more-countries-committing-to-tackling-antimicrobial-resistance
[72] Ibid.
[73] Ibid.
[74] Narmeen Mallah, "Education level and misuse of antibiotics in the general population: a systematic review and dose–response meta-analysis", *National Library of Medicine,* February 3rd, 2023, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8815169/
[75] Yamini Durani, "The Danger of Antibiotic Overuse", *Kids Health*, April, 2023, https://kidshealth.org/en/parents/antibiotic-overuse.html
[76] Edward Feller, "Why do doctors overprescribe antibiotics?", *Rhode Island Medical Journal,* February, 2019, http://www.rimed.org/rimedicaljournal/2019/02/2019-02-09-feller.pdf
[77] Maggie Fox, "Wrong Antibiotic Prescribed Half the Time, Report Finds", *NBC News*, October 24th, 2016, https://www.nbcnews.com/health/health-news/wrong-antibiotic-prescribed-half-time-report-finds-n671881
[78] Ibid.
[79] "Antimicrobial Stewardship Programs (ASP)", *Department of Health*, April 18th, 2023, https://www.health.state.mn.us/diseases/antibioticresistance/hcp/asp/index.html.
[80] Ibid.
[81] "Continuing Education and Informational Resources", *Centers for Disease Control and Prevention*, April 13th, 2023, https://www.cdc.gov/antibiotic-use/training/continuing-education.html
[82] Margo Rowan, "Building Canada's Antimicrobial Stewardship Action Plan: Issues and insights from interviews with key informants", *Canadian Roundtable*, April, 2016, http://www.healthcarecan.ca/wp-content/themes/camyno/assets/document/Reports/2016/HCC/EN/Building%20Canada%27s%20Antimicrobial%20Stewardship%20Action%20Plan%20-%20FINAL.pdf

types of programs that are offered allow for citizens to gain knowledge about stewardship, risks, prevention tactics, and more.

Other tactics that have been pursued include rapid diagnostic tests which are an easy test kit that allows one to receive a diagnostic without going to a medical clinic.[83] While efficient, a common downfall of the kit is the prevalence of "false negatives," leading one to believe that they are infected when in reality, they are not.[84] This leads to a common assumption that they require antibiotics when they do not.[85] If they encounter antimicrobial resistant cases later on in their life, most antibiotics will render useless because of the overuse from previous years.[86] However, partnerships with different pharmaceutical companies such as Pfizer and Johnson & Johnson have introduced future paths on discovering how society can promote antibiotic stewardship.[87]

Case Study: United Kingdom

The United Kingdom is another example of a country that has developed a multi-faceted strategy to slow down the spread of AMR. The creation of the UK 5-Year Antimicrobial Resistance Strategy aimed to reach the goal of containing the situation by setting a smaller goal for 2024.[88] By doing so, reaching an overarching goal of containing AMR by 2040 would become more attainable.[89] They have also developed the "Start Smart - Then Focus" (SSTF) antibiotic stewardship toolkit, an evidence-based guideline for physicians to reduce the risks of AMR and increase public awareness of the actions taken by the UK.[90] It has been largely successful for doctors by strengthening existing guidelines and providing toolkits for secondary-care clinicians on diagnostic procedures. Like Denmark, the UK Health Security Agency (UKHSA) has developed a surveillance program named the English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR).[91] This development has allowed for yearly development updates, action plans, and possible solutions. It has been a crucial element for the UK to achieve their 5-year plan and their 20-year plan by 2040.[92]

Case Study: India

Given that India has the second-largest population in the entire world yet ranks in the bottom 50% in terms of their healthcare system, the issue of AMR places millions of people in high-risk health situations.[93, 94] It has been

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[83] "Rapid tests", *Medline Plus*, August 9th, 2021, https://medlineplus.gov/lab-tests/rapid-tests/
[84] Ibid.
[85] Ibid.
[86] Ibid.
[87] "Antimicrobial Resistance", *Johnson & Johnson*, 2023, https://www.jnj.com/antimicrobial-resistance
[88] Department of Health and Social Care, "UK 5-year action plan for antimicrobial resistance 2019-2024", *Gov.UK*, January 24th, 2019, https://www.gov.uk/government/publications/uk-5-year-action-plan-for-antimicrobial-resistance-2019-to-2024
[89] Ibid.
[90] UK Health Security Agency, "Antimicrobial stewardship: start smart then focus", *Gov.UK*, November 17th, 2011, https://www.gov.uk/government/publications/antimicrobial-stewardship-start-smart-then-focus
[91] UK Health Security Agency, "English surveillance programme for antimicrobial utilization and resistance (ESPAUR) report", *Gov.UK*, October 10, 2014, https://www.gov.uk/government/publications/english-surveillance-programme-antimicrobial-utilisation-and-resistance-espaur-report
[92] Department of Health and Social Care, "UK 5-year action plan for antimicrobial resistance 2019-2024", *Gov.UK*, January 24th, 2019,
[93] "Countries in the World by Population (2023)", *WorldOMeter*, July 16, 2023, https://www.worldometers.info/world-population/population-by-country/
[94] "Best Healthcare in the World 2023", *World Population Review*, 2023 https://worldpopulationreview.com/country-rankings/best-healthcare-in-the-world

projected that, by 2050, the number of deaths caused by AMR will exceed that of cancer and traffic accidents combined.[95] The cause of these deaths is due to two major factors: the environment and consumption of animals. Water samples taken from various sources show that it is not properly cleaned for drinking.[96] This results in lower levels of sanitation, and thus, a much higher risk for citizens to contract AMR related diseases—especially in areas with high poverty rates.[97] As AMR is a common case in animals, its prevalence in India is greatly attributed to the country being one of the largest producers of milk and fish in the world.[98] Actions India has taken includes developing a National Action Plan (NAP) to improve aspects of their pre-existing measures such as raising awareness, surveillance, and research and development.[99] The NAP addresses the use of resources and its effect on the environment, strengthening infection and prevention control, surveillance measures, and more.[100] However, for this plan to work, more resources will need to be allocated towards this effort, including the potential for international aid.

Possible Solutions and Controversies

The adaptive capabilities of AMR and the modern travel of people, goods, and produce calls for a necessity for international cooperation. During the COVID-19 pandemic, unprecedented global financial support and efforts at internationally coordinated research led to the rapid development of a vaccine, saving millions of lives and effectively containing the virus's spread.[101] Thus, it is imperative that countries will need to work together to solve an issue that is jeopardizing the health of millions of people.[102] Though the common goal is to slow the spread of AMR, how this is achieved differs from country to country. All countries have their own political agendas; thus, finding a common ground will be crucial in devising comprehensive, global solutions.

Promoting Research and Development

Although AMR has garnered significant international attention, there is still a vast amount of information that has yet to be discovered.[103] Conducting research on AMR has been an extremely challenging journey for scientists due to the adaptability of viruses, bacteria, fungi, and parasites.[104] Thus, nations should seek to enhance data collection on the spread of disease and resistance to determine how AMR cases can be controlled. While research and development will efficiently provide solutions, there are still key factors to consider. The timeline for research and development is unprecedented as more antimicrobial resistant strains emerge, leading to more time

[95] Neelem Taneja, "Antimicrobial resistance in the environment: The Indian scenario", *National Library of Medicine*, February, 2019, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6563737/
[96] Ibid.
[97] Ibid.
[98] Ibid.
[99] Jaya Ranjalkar, "India's National Action Plan for antimicrobial resistance – An overview of the context, status, and way ahead", *National Library of Medicine*, June, 2019, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6618210/
[100] Ibid.
[101] Oliver Watson, "Global impact of the first year of COVID-19 vaccination: a mathematical modeling study", *The Lancet Infectious Diseases*, June 23rd, 2022, https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(22)00320-6/fulltext
[102] "About Antimicrobial Resistance", *Centers for Disease Control and Prevention*, October 5, 2022, https://www.cdc.gov/drugresistance/about.html
[103] Francescsa Prestinaci, "Antimicrobial resistance: a global multifaceted phenomenon", *National Library of Medicine*, October, 2015, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4768623/
[104] Ibid.

being needed for observation processes.[105] Countries will also have to consider who is responsible for contributing funding and resources, as developing nations may require international aid to pursue this solution.[106] Seeing as approximately only 50% of countries have proper research and funding regulations in place, more discussions are needed on strategies to conduct efficient research and development.[107]

Improving Antibiotic Capacities

The majority of antibiotics have a shelf life of approximately two to three years.[108] Prolonging the shelf life of antibiotics has many long-term benefits, with the most prominent being the economic benefit for healthcare systems. A longer shelf life will allow for less frequent restocking, thus offering healthcare providers greater access to different antibiotics for a longer period of time.[109] However, the downfalls of prolonging shelf life must also be considered. For instance, having too many options for antibiotics could potentially lead to a stagnation in the market as consumers grow overwhelmed by the number of options in their local pharmacies without knowing which medicine will best fit their needs.[110] Extended shelf life also allows medical supplies to reach import nations without a time constraint. When examining this solution from an economic standpoint, a longer shelf life of antibiotics will lead to less money spent on transportation.[111] This will allow developing countries to allocate such funds towards additional solutions such as infection and prevention control. It is imperative that this solution be supported by additional research on how to prolong the antibiotic and facilitate a better distribution processes for developing countries.

Prevention of Infections

The core reason for infection is contact with a virus or bacterium. Thus, robust healthcare systems must be in place to promote stronger immune systems in citizens and build up their resilience against viruses. While developed countries may have stronger medical systems due to an established economy, most developing countries struggle with providing proper healthcare, resulting in higher risks for infections and medical issues.[112] The WHO has released many informational articles and pamphlets on how to prevent infections, the most simple solution being to remind citizens to wash their hands as lack of sanitation is the most common contributor to AMR.[113] However, individual governments may wish to consider implementing their own public service announcements for their citizens, such as posters in public washrooms on proper hygiene. In the status quo,

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[105] Samer Sakr, "Antibiotic use and resistance: an unprecedented assessment of university students' knowledge, attitude and practices (KAP) in Lebanon", *BMC Public Health*, April 19, 2020, https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-08676-8
[106] "Statistics on resource flow to developing countries", *OECD,* December 22nd, 2022, https://www.oecd.org/dac/financing-sustainable-development/development-finance-data/statisticsonresourceflowstodevelopingcountries.htm
[107] "More countries committing to tackling antimicrobial resistance", *World Health Organization*, November 11, 2021, https://www.who.int/news/item/11-11-2021-more-countries-committing-to-tackling-antimicrobial-resistance
[108] Alan Carter, "What's the Shelf Life of Amoxicillin?", *Healthline*, September 7, 2018, https://www.healthline.com/health/amoxicillin-shelf-life
[109] Steven Simoens, "Factors Affecting the Cost Effectiveness of Antibiotics", *National Library of Medicine*, February 6th 2011, ncbi.nlm.nih.gov/pmc/articles/PMC3265249/
[110] Ibid.
[111] Ibid.
[112] Bernadine Racoma, "Countries lacking proper healthcare", *DayTranslations Blog*, April 9, 2019, https://www.daytranslations.com/blog/countries-no-healthcare/
[113] "Hand hygiene and antimicrobial stewardship", *APIC*, https://apic.org/monthly_alerts/hand-hygiene-and-antimicrobial-stewardship/

many developing countries may have less rigid medical systems that decrease the possibilities of good health and hygiene.[114] Thus, developed countries may want to consider providing aid through non-governmental organizations (NGOs) to support developing nations' healthcare systems.[115] Measures implemented to improve rates of immunizations, access to clean water, and long-term economic development contribute to the sustainability of the cause. Moreover, increasing access to wellness necessities provides individuals with a healthy baseline; thus helping to prevent infection contraction and spread, and leading to both a reduction in possible AMR cases, as well as an overall improvement of general health.[116]

Education and Awareness

The WHO, as well as individual governments from around the world, has created many educational resources to enhance public awareness and understanding of AMR.[117] Besides informational articles, websites, and pamphlets, forms of campaigning such as the WHO's development of the Antimicrobial Awareness Week have also proved to be beneficial.[118] As learnable actions like the practice of good hygiene and proper use of antibiotics are crucial in reducing AMR, more funding should be invested in awareness campaigns like informational pamphlets, especially in developing countries where citizens may lack the access to such materials.[119, 120] In developed countries, where information is much more accessible, integrating AMR-related education in schooling systems will inform the younger generation on best hygiene practices to prevent infections that can lead to AMR. This could be facilitated through assemblies, professionals giving lectures, and incorporating content on AMR into existing education curricula. Educating the general public is crucial to supporting efforts towards infection prevention and the acceptance of solutions proposed by the government.

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[114] "Strengthening Health Systems in Developing Countries", *American Public Health Association*, October 28th, 2008, https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2014/07/23/09/09/strengthening-health-systems-in-developing-countries#

[115] Maria Piotrowicz, "The role of non-governmental organizations in the social and the health system", *National Library of Medicine*, 2013, https://pubmed.ncbi.nlm.nih.gov/23745379/

[116] "Antibiotic Resistance", *World Health Organization*, July 31st, 2020, https://www.who.int/news-room/fact-sheets/detail/antibiotic-resistance

[117] "IPC and Antimicrobial Resistance", *World Health Organization*, https://www.who.int/teams/integrated-health-services/infection-prevention-control/ipc-and-antimicrobial-resistance

[118] "World AMR Awareness Week", *World Health Organization*, https://www.who.int/campaigns/world-antimicrobial-awareness-week

[119] Aditya Vasan, "Medical Devices for Low-and Middle Income Countries: A Review for Directions and Development", *National Library of Medicine*, March 1st, 2020, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7164506/#

[120] "About Antimicrobial Resistance", *Centers for Disease Control and Prevention*, October 5th, 2022, https://www.cdc.gov/drugresistance/about.html#

Bloc Positions

G7 Countries

Countries in the G7 bloc generally have well-established medical systems which bolster their ability to control the rates of AMR in their respective countries.[121, 122] As AMR is a global issue that will not be resolved until cases in developing countries are eradicated as well, countries in this bloc may consider providing financial aid to nations lacking funding and resources.[123] As called upon by the International Monetary Fund (IMF), "economically strong countries have a responsibility to contribute to the funding of this support" (Georgieva, 2023).[124] Thus, countries in this bloc should continue to conduct research and development, as their past efforts against antimicrobial resistant cases have demonstrated various degrees of success, which could then be imitated in developing countries.[125] As evident in a study released by the OECD, countries in this bloc should be primarily focused on infection prevention, conserving the use of antimicrobial therapies, and continuing research.[126] While each country will have set different targets and markers, all should seek to enhance surveillance programs and engage in joint national programs as a means to achieve these goals.[127] Moreover, this bloc looks favourably upon promoting awareness and increasing international cooperation between countries of different blocs. This will allow for a better understanding of the issue from a global viewpoint as well as how to support the establishment of stronger medical frameworks in other developing nations.

BRICS (Brazil, Russia, India, China, South Africa)

The countries in this bloc will present a stance that differs from the rest of the committee due to their unique positions of economic and population growth.[128] The use of antimicrobial agents is notably high in BRIC countries due to the accessibility of medication to the general public and the practice of intensive farming to fulfill the demands of their fast-growing populations.[129] For instance, Brazil allows for antibiotics to be purchased over-the-counter, which is one of the contributing factors to the issue's prevalence in the country.[130] With a lack

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[121] "Health care in Canada: Access our universal health care system", *Government of Canada*, December 3rd, 2021, https://www.canada.ca/en/immigration-refugees-citizenship/services/new-immigrants/new-life-canada/health-care/universal-system.html
[122] "Federal Action Plan on Antimicrobial Resistance and Use in Canada: Building on the Framework for Action", *Public Health Agency of Canada*, 2015, https://healthycanadians.gc.ca/alt/pdf/publications/drugs-products-medicaments-produits/antibiotic-resistance-antibiotique/action-plan-daction-eng.pdf
[123] "Secretary-General Calls Vaccine Equity Biggest Moral Test for Global Community, as Security Council Considers Equitable Availability of Doses", *United Nations*, February 17th, 2021, https://press.un.org/en/2021/sc14438.doc.htm
[124] Kristalina Georgieva, "The Time Is Now: We Must Step Up Support For the Poorest Countries", *International Monetary Fund*, March 31st, 2023, https://www.imf.org/en/Blogs/Articles/2023/03/31/the-time-is-now-we-must-step-up-support-for-the-poorest-countries#
[125] Michele Cecchini, "ANTIMICROBIAL RESISTANCE IN G7 COUNTRIES AND BEYOND: Economic Issues, Policies and Options for Action", *OECD*, September, 2015, https://www.oecd.org/els/health-systems/Antimicrobial-Resistance-in-G7-Countries-and-Beyond.pdf
[126] Ibid.
[127] Ibid.
[128] Jochum van't Hooft, "Antimicrobial resistance in BRIC countries: what can be done with a one-health approach, a literature review", https://www.naturallivestockfarming.com/wp-content/uploads/2015/09/June-2015-Jochum-Antimicrobial-resistance-in-BRIC-countries-what-can-be-done-with-a-one-health-approach-Jochum-van-t-Hooft2.pdf
[129] Ibid.
[130] Flávia Rossi, "The Challenges of Antimicrobial Resistance in Brazil", *Oxford Academic*, May 1st, 2011, https://academic.oup.com/cid/article/52/9/1138/318176

of strong medical frameworks in place to help control the spread of AMR cases, there is much work to be done.[131] Firstly, better surveillance programs must be established, especially surrounding livestock where cases of AMR are not properly recorded.[132] Given the high usage of antimicrobials in BRICS nations, maintaining proper transportation and storage conditions should be ensured to prevent the distribution of degraded, subtherapeutic medications.[133]

Countries like India with a large population and limited space will require aid in strengthening their medical framework. This could be facilitated through exploring policies, enforcing regulations, and investing money into healthcare systems to allow for more affordable access to healthcare services.[134] Moreover, as most of these countries are struggling with strains of MRSA, more professionals should be allocated to highly-affected hospitals to mitigate the rise of AMR cases.[135] While the sub-issues will remain prominent, each of these countries are rising in economy and political stability, and thus, will be able to pursue a vast number of potential solutions.

ASEAN (Association of Southeast Asian Nations)

Countries in ASEAN have worked together to develop a rigid framework with multiple objectives by 2050.[136] Specifically, they aim to strengthen awareness, establish surveillance programs, conduct research, and strengthen inflection control. This framework provides a clear outline for each country on what needs to be done on both a national and international scale.[137] Additionally, each country in this bloc is expected to contribute in a variety of unique ways whether it is funding, establishing the framework, or setting clear goals.[138] As a result, ASEAN supports solutions such as surveillance programs, which requires the cooperation of other countries outside of this alliance. Countries in this bloc like the Philippines have fairly stable healthcare systems and may seek to continue research and development as much as possible to allow for a viable solution to be found as soon as possible. However, the primary concern of the bloc will be to complete the framework that has been written to attain their short, medium, and long term goals.[139]

African Union

Countries in this bloc will need to rework their healthcare systems by establishing better medical frameworks and enhanced prevention measures to improve access to healthcare for their citizens.[140] This could be facilitated through improving access to diverse medicines and rates of immunization to prevent cases from occurring. However, increased accessibility to medicine should be introduced alongside increased pharmaceutical

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[131] Ibid.
[132] Ibid.
[133] Ibid.
[134] Neelem Taneja, "Antimicrobial resistance in the environment: The Indian scenario", *National Library of Medicine*, February, 2019, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6563737/
[135] "Healthcare Providers: Actions to Combat Resistance", *Centers for Disease Control and Prevention*, November 22nd, 2021, https://www.cdc.gov/drugresistance/healthcare-providers.html
[136] "ASEAN Strategic Framework to Combat Antimicrobial Resistance through One Health Approach [2019-2030]", *ASEAN*, https://asean.org/wp-content/uploads/2021/10/Agd-6.2.b_ASEAN-Strategic-Framework-to-Combat-AMR_Adopted-by-AHMM.pdf
[137] Ibid.
[138] Ibid.
[139] Ibid.
[140] African Union Commission, "Africa Health Strategy", https://au.int/sites/default/files/pages/32895-file-africa_health_strategy.pdf

education for both practitioners and civilians to ensure that pharmaceuticals are used responsibly.[141] Research also suggests that only around 1% of the 50,000 medical laboratories acknowledged in AU member states are conducting bacteriology testing, with even fewer capable of testing for the presence of AMR.[142] Thus, nations in this bloc might prioritize investment in laboratory capacity, such as through increased equipment and training, microbial systems, and collaboration with grantees and national partners.[143]

In 2021, the African Union released the "African Union Framework for Antimicrobial Resistance Control 2020–2025" which outlines what is being done in the status quo, goals for the future, and how to execute them.[144] This includes partnerships with the WHO, Food and Agriculture Organization of the United Nations (FAO), and the World Organization for Animal Health (OIE) to increase laboratories for surveillance.[145] Particularly relevant to delegates of this bloc, the framework also proposes ways in which different countries can generate better national action plans and implement infection prevention programs.[146] As evident in the suggestions, there are increasing difficulties with implementing surveillance measures due to lack of frameworks in place.[147] Thus, reworking the structure of healthcare will be the top priority for countries in this bloc.

Discussion Questions

1. What resources will your nation need to acquire to combat AMR? How will your nation acquire these?
2. How will your country contribute towards international solutions??
3. What role should national pharmaceutical companies play in the battle against AMR?
4. Does your country have any surveillance programs? How could they be made more efficient?
5. How could AMR affect other diseases? Are these affected diseases prominent in your nation?
6. How can the global community help those in low and middle income countries? What frameworks need to be established or strengthened?
7. How does education affect the situation in your country? Is there a need for an increase, and how will your country accommodate it?

[141] "Findings in AMR Surveillance Data Across Africa To Shape Health Policy Reform", *African Union*, July 24th, 2023, https://africacdc.org/news-item/findings-in-amr-surveillance-data-across-africa-to-shape-health-policy-reform/#
[142] Ibid.
[143] Ibid.
[144] "African Union Framework for Antimicrobial Resistance Control 2020–2025", *African Union*, March 19th, 2021, https://africacdc.org/download/african-union-framework-for-antimicrobial-resistance-control-2020-2025/
[145] Ibid.
[146] Ibid.
[147] Ibid.

Additional Resources

Pfizer's Policy Position on Antimicrobial Resistance:
https://www.pfizer.com/sites/default/files/investors/financial_reports/annual_reports/2022/story/breakthroughs-in-the-fight-against-antimicrobial-resistance/

Understanding the treatment for MRSA:
https://www.uptodate.com/contents/methicillin-resistant-staphylococcus-aureus-mrsa-beyond-the-basics

JAC Antimicrobial Resistance - Global Partnership Collaborations:
https://academic.oup.com/jacamr/article/4/6/dlac115/6809193

WHO's Antimicrobial Stewardship Interventions: A Practical Guide:
https://apps.who.int/iris/bitstream/handle/10665/340709/9789289054980-eng.pdf \

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"World Antimicrobial Awareness Week 2022." *World Health Organization,* 2022. https://www.who.int/campaigns/world-antimicrobial-awareness-week/2022.

Vaccine Distribution in Developing Nations

Overview

For much of history, vaccine supplies have mostly been purchased and oftentimes stockpiled by developed countries, leaving developing countries struggling to locate vaccines. The unequal distribution of vaccines results in weakened medical infrastructures, prolonged health crises, and strained public resources in nations unable to secure a steady source of supply.[148] Vaccine inequity poses a myriad of challenges to developing nations by hindering their ability to mitigate and recover from the health and economic consequences of a public health emergency.[149]

Developing countries, as defined by the United Nations, refer to countries with a less developed industrial base, lower standards of living, and moderate to low Human Development Index (HDI) scores.[150] These countries often experience higher rates of poverty and illiteracy, among other factors.[151] While the repercussions of pandemics are experienced on a global scale, they are exacerbated in developing nations where access to healthcare is limited and economies often reliant on informal labour, agriculture, and tourism decline due to imposed lockdowns. Among the many significant diseases that have emerged throughout the past centuries, global pandemics like the Spanish Flu and COVID-19 have illuminated key issues in medical infrastructure during their respective times. For instance, during the first polio outbreaks, the disease's rapid transmission and high mortality rates demonstrated the need for a much more robust medical infrastructure.[152] The horrific effects of the disease led to the creation of the Global Polio Eradication Initiative (GPEI) which has had a profound impact, even against the COVID-19 pandemic.[153]

Regarding the recent COVID-19 pandemic, existing research institutions and diagnostic testing facilities allowed for vaccines to be developed at a much quicker rate, but one of the key issues was the distribution process. Reports from the New York Times in 2020 indicated that developing countries struggled to provide the first dose to their citizens while developed countries would stockpile enough vaccines to vaccinate all of their citizens several times over.[154]

With the resources and aid of international organizations such as the United Nations Children's Fund (UNICEF) and Rotary International towards this issue, increasing rates of vaccinations and immunizations in developing countries will be more achievable. However, as the issue of vaccine distribution in developing countries stretches

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[148] "UN analysis shows link between lack of vaccine equity and widening poverty gap", *United Nations*, March 28, 2022, https://news.un.org/en/story/2022/03/1114762
[149] Ibid.
[150] "What is a Developing Country", *Educational Pathways International,* https://www.educationalpathwaysinternational.org/what-is-a-developing-country/
[151] Ibid.
[152]"COVID-19 shows value of polio infrastructure to support resilient health systems", *Polio Global Eradication Initiative*, August 2, 2021, https://polioeradication.org/news-post/covid-19-shows-value-of-polio-infrastructure-to-support-resilient-health-systems/
[153] Ibid.
[154] Megan Twohey, "With first dibs on vaccines, rich countries have 'cleared the shelves'", *The New York Times*, December 15, 2020, https://www.nytimes.com/2020/12/15/us/coronavirus-vaccine-doses-reserved.html

beyond the medical world, these organizations will likely require external aid for funding towards necessities like electricity, clean running water, and hygiene.[155]

Timeline

May 9, 1974 — As a progression of the successful smallpox eradication effort, The World Health Organization (WHO) launches the Expanded Programme on Immunization (EPI) to support the distribution of vaccines to children in countries all around the world.[156]

1988 — The WHO establishes the Global Polio Eradication Initiative (GPEI) during a time when the disease paralyzes upwards of 1,000 children worldwide each day.[157]

January 29, 2000 — Originally set up as a Global Health Partnership in 2000, The Vaccine Alliance (GAVI), is launched to provide children in low-income countries with equal access to vaccines.[158] GAVI facilitates coordinated efforts between national governments, international organizations, vaccine manufacturers, and philanthropic organizations to fund and ensure equitable vaccine access.

May 23, 2005 — The WHO adopts the International Health Regulations (IHR), a legally binding code that outlines the actions a country should take in the event of an epidemic or disease outbreak.[159]

2006 — The WHO and the United Nations Children's Emergency Fund (UNICEF) develop the Global Immunization Vision and Strategy (GIVS) to set a framework for the next 9 years to ensure equal vaccine distribution to the global population.[160]

2009 — The H1N1 influenza pandemic emerges in the United States, but only a quarter of expected vaccines are distributed. By the time the vaccines are ready, the pandemic is over, resulting in a disinterest in immunization.[161]

June 9, 2009 — GAVI formally launches the Advance Market Commitment (AMC) which strives to develop vaccines that are needed in low-income countries.[162]

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[155]"11 emergencies that need more attention and support in 2023", *UNICEF,* January 1, 2023, https://www.unicef.org/emergencies/11-emergencies-need-more-support-2023

[156]"Essential Programme on Immunization", *World Health Organization*, November 24, 2023, https://www.who.int/teams/immunization-vaccines-and-biologicals/essential-programme-on-immunization

[157]"A Brief History of Vaccines", *World Health Organization*, https://www.who.int/news-room/spotlight/history-of-vaccination/a-brief-history-of-vaccination?topicsurvey=ht7j2q)&gclid=Cj0KCQjw756lBhDMARIsAEI0Agmo5OVCPz7PF9WWOwhMZ2FRjcsTEoJf0Qc3pWIUka8rk1sGpA2_msAaAjydEALw_wcB

[158]"GAVI Alliance", *World Health Organization*, https://www.who.int/europe/about-us/partnerships/partners/global-health-partnerships/gavi-alliance

[159] "International Health Regulations", *World Health Organization,* https://www.who.int/health-topics/international-health-regulations#tab=tab_1

[160] David Brown, "A Mid-term Assessment of Progress Towards the Immunization Coverage Goal of the Global Immunization Vision and Strategy (GIVS)", *Medscape,* https://www.medscape.com/viewarticle/755084_2

[161] Frances Stead Sellers, "Echoes of a pandemic: Experts fear lessons from the 2009 H1N1 vaccine drive are being ignored", November 17, 2020, https://www.washingtonpost.com/health/covid-vaccine-lessons-h1n1-vaccine/2020/11/17/b5626596-1ac1-11eb-aeec-b93bcc29a01b_story.html

[162] "Lessons Learnt on Disease and Design Choices and Processes", Tania Cernuschi, September, 2011, https://marketbookshelf.com/wp-content/uploads/2017/05/GAVI_WHITE-PAPER_Pneumo_AMC_Lessons_Learnt_Sept_2011_Cernuschi_et_al-1.pdf

May 2012 — The WHO creates the Global Vaccine Action Plan (GVAP) which outlines the goal of preventing millions of deaths by 2020 by ensuring more equitable access to vaccines for communities around the world.[163]

2015 — Vaccine Alliance, in partnership with WHO and UNICEF, develops a supply chain strategy to aid in the process of providing vaccines to developing countries through means like financial assistance, updating policies, and collaborating with manufacturers.[164]

April 2020 — The COVID-19 pandemic prompts the creation of the COVID-19 Vaccines Global Access (COVAX) Facility to distribute the vaccines equally to all corners of the world.[165]

July 2022 — The International Monetary Fund (IMF) discovers that the inequality statistics are posing great risks to global economic recovery from the COVID-19 pandemic.[166]

April 10, 2023 — A study conducted by Yale University discovers that access to vaccines are unequal among different racial groups for the monkeypox outbreak, raising concerns on the equitable distribution of vaccines.[167]

Historical Analysis

Historically, citizens of developing nations with less advanced healthcare infrastructure have faced difficulties in obtaining access to vaccines and immunizations. Unequal distribution remains the root of these issues.[168] With higher-income countries having stronger medical frameworks in place and more financial support, the majority of the limited stockpile of vaccines has often been purchased in excess by these nations, leaving little for the lower-income countries.[169]

These issues were made evident during the COVID-19 pandemic when WHO Director-General Tedros Ghebreyesus made an international statement directed at high-income countries which read, "the best way to protect you is not only to vaccinate you but vaccinate the rest of the world, share the vaccine with the rest of the world."[170] His statements further revealed that of the 832 million vaccine doses administered at the time, merely 0.2% had been distributed to low-income countries—highlighting the stark disparity caused by stockpiling amongst other factors like limited financial resources and storage and transportation facilities.[171] Aside from COVID-19, his remarks on the importance of international cooperation could be applied to the many global health crises that have remained prominent for years. Previous initiatives like the Expanded Programme on Immunization (EPI) and the Vaccine Alliance (Gavi) have improved global access to vaccines through their

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[163] "Global Vaccine Action Plan", *World Health Organization,* https://www.who.int/teams/immunization-vaccines-and-biologicals/strategies/global-vaccine-action-plan
[164] "Immunisation supply chain, *GAVI,* https://www.gavi.org/types-support/health-system-and-immunisation-strengthening/immunisation-supply
[165] "COVAX: Ensuring Global Access to COVID-19 Vaccines", *UNICEF,* https://www.unicef.ca/en/covax-ensuring-global-access-covid-19-vaccines?ea.tracking.id=20DIAQ01OTE&19DIAQ02OTE=&gad=1&gclid=Cj0KCQjwtamlBhD3ARIsAARoaEwgXgeTHTkupjHQyUurILOvRX92TYfp7361jWdiFyUcsyxrlKBAn_EaAgl-EALw_wcB
[166] "Vaccine inequity poses significant risk to the global recovery – IMF
, *EBNet*, July 25, 2022, https://www.ebnet.co.za/vaccine-inequality-poses-significant-risk-to-the-global-recovery-imf/.
[167]"Early in mpox outbreak, access to vaccines was unequal across racial groups", *Yale News,* April 10, 2023, https://news.yale.edu/2023/04/10/early-mpox-outbreak-access-vaccines-was-unequal-across-racial-groups.
[168] Ibid.
[169] Ibid.
[170]Ayhan Simsek, "WHO urges vaccines solidarity for poor countries", *AA*, February 22, 2021, https://www.aa.com.tr/en/latest-on-coronavirus-outbreak/who-urges-vaccine-solidarity-for-poor-countries/2153276.
[171] Ibid.

efforts to ensure equitable distribution.[172] However, decades of experience in mitigating global pandemics have showcased that the eradication of vaccine inequity will require the contributions of every single country in the world.[173]

Case Study: COVID-19 Pandemic

When the COVID-19 pandemic began in 2019, it was unforeseen that it would lead to the deaths of millions of people.[174] The rapid transmission and severity of the virus led research and development efforts to be of high priority throughout the international community, allowing for a vaccine to be developed at an unprecedented rate. When the first COVID-19 vaccine was approved in December 2020 for emergency uses, its distribution was greatly supported by WHO's Emergency Use Listing (EUL). This is a mechanism whose purpose is to expedite the assessment and listing of unlicensed vaccines during public health emergencies.[175] By accelerating the approval of the vaccine worldwide and facilitating international cooperation between WHO and national regulatory authorities, the EUL mechanism played a pivotal role in global vaccination efforts.[176] However, data collection from July of 2022 revealed that only 16% of people in low-income countries had received their first dose, contrary to the 80% of people in their higher-income counterparts.[177] Even recent vaccination statistics released in early of 2023 revealed that only 72.3% of people in the world were vaccinated.[178]

Vaccine hesitancy, which occurs when citizens express concerns, fears, and distrust in the development of a vaccine, is one of the leading causes for vaccine inequity.[179] In the case of the COVID-19 pandemic, developed countries like the US purchased and shipped large stockpiles of vaccines, only for many citizens to refuse them due to vaccine hesitancy.[180] As a result, there was a shortage of vaccines for developing countries, yet a wasted surplus in countries like the US.

Accessibility to vaccines is another key contributor to vaccine inequity, as people living in major cities have easier access to vaccines while those living in rural areas experience the contrary.[181] In order to retain the efficacy and quality of vaccines, pharmaceutical companies such as Pfizer often impose regulatory measures such as storage and transportation condition requirements. For example, the Pfizer-BioNTech and Moderna vaccines required a freezer transport and ultra-cold storage conditions. Stringent requirements like these raise issues of accessibility

[172] "Essential Programme on Immunization", *World Health Organization*, November 24, 2023, https://www.who.int/teams/immunization-vaccines-and-biologicals/essential-programme-on-immunization.
[173] Ibid.
[174] "WHO Coronavirus Dashboard", *World Health Organization,* November 22, 2023, https://covid19.who.int/
[175] "WHO issues its first emergency use validation for a COVID-19 vaccine and emphasises need for equitable global access", *World Health Organization,* December 31, 2020 https://www.who.int/news/item/31-12-2020-who-issues-its-first-emergency-use-validation-for-a-covid-19-vaccine-and-emphasizes-need-for-equitable-global-access.
[176] Ibid.
[177] "Immunization", *UNICEF,* July 2023, https://data.unicef.org/topic/child-health/immunization/.
[178] Josh Holder, "Tracking Coronavirus Vaccinations Around the World", *New York Times*, March 13, 2023, https://www.nytimes.com/interactive/2021/world/covid-vaccinations-tracker.html.
[179] Nicole White, "Vaccine Equity: Lessons learned from the COVID-19 Pandemic", *National Library of Medicine*, May 13, 2022, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9111905/.
[180] Ibid.
[181] Helen Branswell, "12 lessons COVID-19 taught us about developing vaccines during a pandemic", *STAT,* June 30, 2021, https://www.statnews.com/2021/06/30/12-lessons-covid-19-developing-vaccines/.

in rural areas, where geographic isolation and poor transportation infrastructure hinder the proper delivery of vaccines.[182]

Case Study: Polio

Polio is a dangerous and highly-contagious disease that has affected millions of people over the course of many decades.[183] Fortunately, since the adoption of the Global Polio Eradication Initiative (GPEI) in 1988, polio cases worldwide have been substantially reduced by 99%.[184] As of December 2023, wild poliovirus cases have been deemed endemic in only two countries: Afghanistan and Pakistan. In the early 1950s, almost 200 years after the discovery of the disease, the first effective vaccine was developed—marking a significant milestone in the battle against Polio.[185] Alongside the development of a vaccine, initiatives like the GPEI have led to the success of almost completely eradicating the virus by facilitating routine global vaccination efforts, large-scale campaigns, and close monitoring of the disease.[186] As the GPEI is a coordinated effort between international organizations, national governments, and philanthropic foundations, its effective contributions towards Polio eradication highlight the importance of collaboration across borders. In the global effort against Polio, developed nations have played a crucial role by providing financial aid, spearheading vaccine research and development, and providing logistical support such as cold-chain management to support large-scale vaccination campaigns.[187] Thus, it is crucial to consider the degree of international coordination, monetary resources, medical supplies, and logistical support that would be required to fully vaccinate billions of people from other potentially epidemic diseases.

Past UN/International Involvement

The United Nations Children's Fund (UNICEF)

In over 100 countries, UNICEF has coordinated extensive efforts with national governments, the private sector, NGOs, and other UN agencies to safely procure and distribute vaccines to children in dire need.[188] Since most vaccines require ultra-cold storage and transportation conditions, UNICEF strengthens immunization services by properly managing vaccine stocks and procuring over USD 100 million worth of cold-chain equipment each year.[189] Moreover, they have partnered with a series of international organizations such as WHO and Gavi to provide the necessary technologies, equipment, and medical supplies.[190] By leveraging their international name, UNICEF is also able to procure vaccines at the lowest prices, enabling them to sustainably pursue their immunization efforts in marginalized and underserved communities.[191] For instance, in developing countries

[182] Ibid.
[183] "History of Polio", *Polio Global Eradication Initiative,* https://polioeradication.org/polio-today/history-of-polio/.
[184] Ibid.
[185] "History of the Polio Vaccine", *World Health Organization,* https://www.who.int/news-room/spotlight/history-of-vaccination/history-of-polio-vaccination.
[186] Ibid.
[187] Ibid.
[188] "Immunization", *UNICEF,* https://www.unicef.org/immunization
[189] Ibid.
[190] Ibid.
[191] Ibid.

such as Syria and Yemen, children can now access vaccines for as low as CAD 23.80—almost CAD 33.06 less than the cost approximately a decade ago.[192] Nevertheless, it is essential to consider the amount of international and monetary aid that UNICEF will require to sustain its efforts in achieving global and equitable immunization.

Rotary International

An international organization established in 1905, Rotary International has connected 1.4 million people from all around the world with the purpose of providing humanitarian services.[193] While their projects often address challenges in areas such as the environment, education, peacekeeping, and economic development, they also strive to provide universal access to vaccines, especially in conflict-heavy zones. With a primary focus on Polio eradication, they have advocated and administered immunizations for more than 2.5 billion children in 122 different countries by investing USD 2.4 billion into supporting large-scale vaccination campaigns. Alongside their partners, Rotary International has played a pivotal role in the establishment and continued support of the Global Polio Eradication Initiative (GPEI).[194] The significant success of the GPEI has been driven by substantial amounts of funding, especially from Rotary International's partnership with the Bill & Melinda Gates Foundation. The foundation provides $2 for every dollar fundraised, resulting in over CAD 65 million being raised each year.[195] Beyond solely providing vaccinations and medical treatment, Rotary International undertakes projects that improve water and sanitation infrastructures and make nutrients like vitamin supplements widely accessible in order to prevent diseases from occurring.[196] Since launching the PolioPlus program in 1979—a program dedicated to providing polio vaccines to children worldwide—Rotary International has contributed heavily to the issue of vaccine inequity. Thus, countries may consider providing monetary funding or other forms of support to ensure that Rotary International continues its path of positive contributions.

COVAX (COVID-19 Vaccines Global Access)

During the COVID-19 pandemic, COVAX was established as a worldwide initiative by WHO, Gavi, the Coalition for Epidemic Preparedness Innovation (CEPI), and UNICEF to ensure the timely and equitable distribution of vaccines.[197] By establishing agreements with vaccine manufacturers such as the Pfizer-BioNTech partnership and AstraZeneca, COVAX has consistently secured a steady supply of vaccines. Moreover, the distribution of these doses has been guided by a fair allocation framework, which considers factors such as vulnerability to COVID-19 and population size in order to ensure equitable access. Despite their work to deliver and administer vaccines at an unprecedented rate, the gap between low-income and high-income countries was still evident as of May 2022, when only 16% of people in low-income countries had received their first dose compared to the 80% in high-income countries.[198] Thus, COVAX has encouraged countries to set specific targets, accompanied by rigid plans on how to drive progress toward achieving these goals.[199] Examples include setting

[192] Ibid
[193] "About Rotary", *Rotary,* https://www.rotary.org/en/about-rotary
[194] "Rotary International and the Rotary Foundation", *World Health Organization,* https://www.unicef.org/partnerships/rotary
[195] Ibid.
[196] "Polio Plus", *Rotary,* https://www.rotary.org/en/plus-polioplus
[197] "COVAX", *World Health Organization,* https://www.who.int/initiatives/act-accelerator/covax
[198] "COVAX calls for urgent action to close vaccine equity gap", *World Heatlh Organization,* May 20, 2022, https://www.who.int/news/item/20-05-2022-covax-calls-for-urgent-action-to-close-vaccine-equity-gap.
[199] Ibid.

national health plans that enable each nation to clearly establish what actions and resources would be required to successfully administer vaccines in their own country. Despite COVAX's significant role in overcoming the pandemic, the statistics above reveal that for future global health emergencies, more robust guidelines on the equitable distribution of vaccines and other medical resources must be adopted.

United Nations Sustainable Development Goal (SDG) 3

The UN's SDG 3 is to "ensure healthy lives and promote well-being for all at all ages."[200] While the COVID-19 pandemic disrupted medical systems around the world, it also uncovered a variety of issues rooted in vaccine inequity.[201] For instance, goals related to ensuring high immunization rates worldwide were not achieved due to the insufficient supply of vaccines distributed to developing countries. While the UN's SDG 3 has guided significant strides toward improving global health, inequalities in healthcare access still persist. As a result, childhood immunization has experienced its greatest decline within the past three decades, with deaths related to malaria and tuberculosis having surpassed their pre-pandemic numbers. In hopes of ensuring equitable healthcare provision, targets have been set regarding universal health coverage and developing vaccines that are more affordable and accessible to all.[202] However, properly addressing the issue of vaccine inequity will also require further research, funding, and development on the distribution process of vaccines. This is to accommodate developing nations whose limited transportation infrastructure and routes often hinder the successful and timely delivery of vaccines. Any proposed solutions would also have to be in order with the Doha Declaration on TRIPS and Public Health which advocates for equal access to vaccines and medicines for all citizens.[203] While this process will consume a considerable amount of time and resources, if goals are followed as they are proposed, global vaccine inequity will become a significantly more manageable problem.

Current Situation

Developing countries continue to have low vaccination rates as a result of vaccine inequity, poor medical infrastructure, and inadequate resources.[204] As a result, citizens residing in these nations are subjected to a higher risk of contracting both communicable and non-communicable diseases.[205] For instance, countries such as the Dominican Republic, Nigeria, and South Sudan rank among the lowest percentiles in terms of citizens who have received their first dose of the Diphtheria, Tetanus, and Pertussis (DTP1) vaccines.[206] As DTP1 vaccination is typically involved in the routine childhood immunization schedule, this reveals that many of the citizens in these nations have not yet been vaccinated, proving that vaccine inequity remains a prominent issue today. Distributing vaccines in developing nations will require a steady supply, efficient forms of transportation, and

[200] "Goal 3", *World Health Organization,* https://sdgs.un.org/goals/goal3
[201] Ibid.
[202]"Targets of Sustainable Develompent Goal 3", *World Health Organiation,* https://www.who.int/europe/about-us/our-work/sustainable-development-goals/targets-of-sustainable-development-goal-3
[203] Ibid.
[204] "Vaccination in Developing Countries", *Encyclopedia of Life Support Systems,* https://www.eolss.net/sample-chapters/c03/e1-14-05-06.pdf
[205] "Innovative Approaches to Increase Access to Medicines in Developing Countries", *Frontiers,* https://www.frontiersin.org/articles/10.3389/fmed.2017.00218/full#main-content
[206] "Vaccination rates by country", *World Population Review,* https://worldpopulationreview.com/country-rankings/vaccination-rates-by-country

storage facilities that are cold enough to retain the safety and efficacy of the vaccines.[207] Thus, while the focus of this topic is on developing countries, the cooperation and aid of developed countries is essential in strengthening healthcare infrastructure and improving global vaccination rates.

Healthcare Infrastructure

The recent COVID-19 pandemic highlighted unequal access to healthcare and insufficient financing for the healthcare sector as a whole. Developing countries continue to lack adequate healthcare infrastructure, including a shortage of medical professionals, equipment, and healthcare facilities, which significantly hinders their ability to increase vaccination rates.[208] Amongst other factors, improving the current cold chain framework will be crucial to increasing vaccination rates in developing countries. The cold chain refers to the process of maintaining a consistent, specified temperature range during the storage, transportation, and distribution of temperature-sensitive supplies.[209] As vaccines are sensitive to temperature fluctuations, maintaining a steady cold chain from the moment they are manufactured to when they are administered is vital. In developing countries, this has been one of the key obstacles to increasing vaccination rates.[210] In the past decade, global cold chain capacity has improved significantly, marked by a 20% growth in China, a 66% growth in Brazil, and a doubling of capacity in India. However, delivering vaccines to rural areas remains challenging, necessitating the establishment of improved transportation infrastructure or third-party logistics (3PL) to support vaccination delivery.[211] Zipline International, a health-tech drone delivery company, has utilized drones to deliver COVID-19 vaccines during the pandemic to remote regions across Ghana.[212] This was primarily used during the COVID-19 pandemic, although similar efforts could be used to distribute various vaccines to other hard-to-reach areas. Although these measures improved vaccine accessibility during the pandemic, there is ongoing discourse on the privacy concerns that arise when drone technology crosses borders.[213] Moreover, monetary support is a major issue as many companies lack funding that is not offered by the government. Thus, the demand for financial resources and concerns about crossing country borders will need to be properly addressed, whether it is through the creation of rigid frameworks or other potential solutions.

Public-Private Partnerships

A public-private partnership (PPP) is a collaboration between a government agency and a private-sector company used to finance, plan, and execute a large-scale project.[214] By combining private-sector innovation, funding, and technology with public-sector incentives, PPPs enable extensive government projects to be

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[207] Joseph Benjamin Bangura, "Barriers to Childhood immunisation in Sub-saharan Africa: a systemic review", *BMC Public Health,* July 14, 2020, https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-09169-4
[208] Dawid A. Fusiek, "A prescription for development", *European Investment Bank,* May 10, 2022, https://www.eib.org/en/stories/healthcare-development
[209] "What is a Cold Chain?", *GEP*, https://www.gep.com/knowledge-bank/glossary/what-is-cold-chain
[210] "Cold Chain Opportunities and Challenges for Developing Countries," *Products and Services,* September 1, 2020, https://qsales.com/cold-chain-opportunities-and-challenges-for-developing-countries/
[211] Ibid.
[212]"Zipline, Pfizer and BioNTech Collaboration Paves the Way for Automated, On-Demand Delivery of First mRNA COVID-19 Vaccines in Ghana", *Pfizer*, November 11, 2021, https://www.pfizer.com/news/press-release/press-release-detail/zipline-pfizer-and-biontech-collaboration-paves-way.
[213] Ibid.
[214] "Public-Private Partnerships (PPPs): How they Work, and Examples, *Investopedia,* April 28, 2022, https://www.investopedia.com/terms/p/public-private-partnerships.asp

completed in a timely and achievable manner.[215] Gavi is a successful example of a PPP focused on vaccine distribution.[216] It has partnered with many global organizations such as WHO and UNICEF as well as private corporations for funding.[217] This partnership proved to be extremely beneficial as it amplified the voices of many influential figures in the healthcare industry and successfully implemented plans with sufficient funding to support them. A study conducted by the Netherlands Ministry of Foreign Affairs argued that PPPs could be the ultimate solution to vaccine inequity if resources are properly dedicated. However, there is still much work to be done in terms of setting feasible goals, collecting information, and determining which aspects of a framework could be improved.[218]

Case Study: South Korea

Known for having one of the best healthcare systems in the world, South Korea has universal health coverage that is primarily funded through the private sector.[219] In 2009, South Korea implemented its own National Immunization Plan, which now offers free immunizations for designated diseases to children under the age of 12.[220] Moreover, South Korea manages all immunization records through a digital system—offering immediate access to an individual's immunization history for review and alerting parents when their child requires a vaccination.[221] As a result of these efforts, the proportion of infants in South Korea who have received each of the recommended vaccination series remains high at around 92%. South Korea's extremely modern and efficient medical facilities are supported through funding from a variety of external sources.[222] By taking inspiration from the Japanese health system and adjusting frameworks to fit their own country, South Korea was able to achieve universal health insurance in only 12 years.[223] Similarly, developing countries can strive to set reasonable goals targeted at improving healthcare coverage to increase immunization rates, and thus, reduce the possibility for the spread of diseases.

Case Study: India

Although India is one of the richest countries in the world, there is a significant gap between wealthy and poor populations, with many of its citizens living in poverty.[224] As a result, a large number of the population struggle with numerous health issues due to unsafe or unhygienic living conditions. While India's population has almost quadrupled since 1947, rural areas continue to lack healthcare facilities like hospitals, making proper medical

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[215] Ibid.
[216] "Public-Private Partnerships in Developing Countries", *IOB Study*, April 2013, https://www.oecd.org/dac/evaluation/IOBstudy378publicprivatepartnershipsindevelopingcountries.pdf
[217] "Our Impact", *GAVI*, https://www.gavi.org/programmes-impact/our-impact
[218] Ibid.
[219] "The top 10 healthcare systems in the world 2022", *Expatriate*, July 21st, 2022, https://www.expatriatehealthcare.com/the-top-10-healthcare-systems-in-the-world-2022/
[220] Bomi Park, "Factors influencing vaccination in Korea: findings from focus group interviews", *National Library in Medicine*, May 25, 2018, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6078915/
[221] Ibid.
[222]"Healthcare and Health Insurance in South Korea Explained", *InterNations*, https://www.internations.org/south-korea-expats/guide/healthcare
[223] Ibid.
[224] "India is a rich country with poor population facing issues like starvation, unemployment: Gadkari", *The Hindu*, September 29, 2022, https://www.thehindu.com/news/national/other-states/india-is-a-rich-country-with-poor-population-facing-issues-like-starvation-unemployment-gadkari/article65950662.ece

resources inaccessible to many of its citizens.[225] This further amplifies the existing health disparities between its rural and urban populations, leading to the persistence of many preventable diseases within the country.[226] Moreover, researchers from the Center for Disease Dynamics found that this issue extends to infants as well, with the immunization rate for infants in India reported to be approximately 76% between 2019 and 2020.[227] With India's overflowing population, improving affordability, accessibility, and quality of care are of high concern. This is especially critical for its many citizens living in rural areas who currently lack access to vaccines and basic healthcare.

Possible Solutions and Controversies

Vaccine Quality and Deliverance Improvement

This solution focuses on improving the shelf life of vaccines as well as their storage conditions. In the status quo, most vaccines must be consistently kept in refrigerators to mitigate the risk of bacterial growth. However, many countries lack the necessary infrastructure, such as reliable refrigeration systems, to maintain suitable storage environments. Developing countries, in particular, struggle with this issue as they have limited and often unstable electricity that is prioritized for basic needs as opposed to keeping vaccines stored for an indefinite amount of time.[228] Discovering cost-efficient cold chain practices will allow developing nations to extend the availability of vaccines; thus, improving accessibility, particularly in resource-limited rural areas.

Developing countries may want to consider allocating certain funding to allow for better access to vaccines in the regions that have lower rates of immunization. Funding will be a crucial step to ensuring that this is possible to achieve; however, monetary support may have to come from developed countries or sources like NGOs. Another challenge to consider is transportation, as many rural areas are situated in isolated regions, where geographical barriers hinder the timely delivery of vaccines. Noting the strong trading relations between many developed and developing countries, it would be in the interest of developed countries to invest in the enhancement of transportation infrastructure in developing countries. Improved transportation infrastructure could enhance economic and trade activities, while simultaneously increasing the accessibility of vaccines—benefiting both developing and developed nations.

As evident from the COVID-19 pandemic, there may be some controversy in terms of which regions should receive the vaccines first. Thus, it is key to establish better frameworks to allow for countries to discuss proper deliverance processes.

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[225] Aniruddha Ghossal, "India's stretched health care fails millions in rural areas", *AP News, April 13, 2023,* https://apnews.com/article/india-population-health-indigenous-rural-countryside-ea9a7bd2821e8119697754f597c8c7da

[226] "India health system review", *World Health Organization,* March 30, 2022, https://apo.who.int/publications/i/item/india-health-system-review

[227] Amit Summan, "Public health facility quality and child immunisation outcomes in rural India: A decomposition analysis", *National Library of Medicine,* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8996686/.

[228] "Taking the fridge out of the equation", *ReliefWeb,* April 26, 2014, https://reliefweb.int/report/world/taking-fridge-out-equation

Establishment of Training Programs

To ensure the proper administration of vaccines, more training programs should be established to educate medical professionals. The integration of training programs will not only enable healthcare workers to effectively administer vaccines, but to address community concerns and execute vaccination campaigns as well.[229] As NGOs could be an unstable source of aid due to funding constraints, producing well-trained medical professionals, especially in developing countries where their numbers are limited, would improve immunization rates. These training programs can also be hosted online to ensure immediate access to a variety of different educational sources.[230] It also allows for the programs to be flexible as students can fit their schedules around the course, saving time and resources. However, in places where there is an unstable source of electricity or internet access, this may prove to be extremely difficult. Thus, alternative methods will need to be discussed by the committee on how to guarantee better access.

Ensuring Vaccine Equity

With vaccine inequity being a key factor towards the low immunization rates in developing countries, this solution entails three main facets: improving medical frameworks and infrastructure; encouraging the use of PPPs and partnerships with NGOs; and fostering international cooperation. Throughout the course of history, pandemics have demonstrated the importance of rigid frameworks. Therefore, developing countries should discuss updating their frameworks to improve immunization rates, whether it is through funding, allocating resources, or providing educational resources. As a prime example of vaccine inequity, developing countries were often the last to receive vaccines during the COVID-19 pandemic, resulting in much slower immunization rates and prolonging the crisis.[231] Thus, in addition to restructuring existing frameworks, international discussions are imminent to determine the process of distributing vaccines. These discussions should also include the use of PPPs, which enable companies in the private sector to fund large-scale government projects.

Fostering international relations requires more discussions to forge better connections between countries. When medical emergencies arise, countries need to determine who receives certain resources as opposed to situations where developed countries utilize their economic leverage to purchase the stockpile of vaccines first. Developed countries need to consider the amount of resources that they will be able to contribute to aid developing countries, but this aid may be limited due to the need for some countries to maintain sovereignty.

Awareness Campaigns and Programs

The development of many global health days and weeks by WHO has strengthened community building as well as increased global awareness for many of the medical issues that remain prevalent in our society today.[232] As a result, vaccine inequity in developing countries is rarely properly addressed when considering the plethora of

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[229] Neil Pakenham-Walsh, "Information needs of health care workers in developing countries: a literature review with a focus on Africa", *National Library of Medicine*
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2680393/
[230] "The Benefits of Online Medical Training for Students", *Advanced eClinical Medical Training*, September 5, 2023, https://advclinical.org/blog/benefits-of-online-medical-training-for-students/
[231] "UN Analysis shows link between lack of vaccine equity and widening poverty gap", *United Nations*, March 28, 2022, https://news.un.org/en/story/2022/03/1114762
[232] "WHO Global Health Days", *World Health Organization,* https://www.who.int/campaigns

other pressing diseases at hand. Developed countries should discuss launching awareness campaigns that target mainstream media sources such as news outlets to properly inform citizens on the issue at hand. In developing countries, there could be further efforts to create workshops, community-building sessions, and events that will highlight the issues as well as connect people together. Partnering with different organizations to support this process can strengthen these efforts. Nevertheless, funding will need to be discussed as determining how much a country should contribute is a discussion for the international body.

Bloc Positions

Countries With Strong Medical Frameworks

Countries in this bloc, such as Canada, South Korea, and the United States, have existing robust medical systems in place.[233] As a result, they will focus more on providing resources and aid to developing countries through research and development. As their medical systems are generally well-developed, they will want to focus funding towards topics that have more of an impact on their individual countries, such as research and development for more cost-efficient vaccines as well as improving public-private partnerships. Developed countries will lean towards solutions that protect the economic and social well-being of their citizens to preserve their own interests. However, depending on their economy, some countries may be open to providing some form of economic incentives and aid to developing countries.

African Region and Developing Countries

Developing countries in Africa and around the world generally have lower rates of immunization due to weaker medical infrastructures. Thus, their top priority will be to establish better frameworks that can provide financial aid for necessities. They will look highly favourably upon different partnerships and would look for aid from other countries and NGOs. Moreover, developing countries will need to establish structured goals and require aid in enhancing transportation infrastructure, storage, training, and analytics. These goals should imitate the pre-existing goals that the World Health Organization has by setting reasonable time intervals with achievable goals. Thus, establishing better frameworks and receiving better resources will be of top priority for countries in this bloc.

Europe and Asia Region

Many countries in this bloc will have their own unique bloc stances depending on the economic, social, political, and medical situation of their country. However, they will seek better international connections to evenly allocate resources and prevent vaccine inequity. These countries will continue their paths of research and development while partnering with different organizations and governments. This will ensure that they can distribute vaccines to the developing countries as quickly as possible. Countries in this bloc will also have to determine the amount of resources their individual governments would be willing to contribute. Countries like Singapore, for example,

[233] "Ranking the Best Healthcare in the World by Country", *International Citizens Insurance,* 2021, https://www.internationalinsurance.com/health/systems/

may consider helping other countries establish better healthcare infrastructure through discussions and providing their insight because of its existing robust medical system.[234] Nevertheless, these countries will advocate for different awareness campaigns to educate their citizens and garner their support and may provide aid to developing countries. They will seek to resolve situations as diplomatically as possible, fostering good connections as opposed to racing other countries for certain resources.

Discussion Questions

1. How can current medical frameworks be restructured to allow developing countries to receive the necessary vaccines in a reasonable amount of time?
2. How significant of a role should NGOs play in offering support?
3. What are ethical concerns that may arise in the developmental phase of producing better vaccines and how can these concerns be resolved?
4. What are incentives for pharmaceutical companies in terms of researching and developing vaccines to aid developing countries?
5. What role should public-private partnerships play and how can their work be improved?
6. What frameworks can be established to determine the amount of contributions from each country?
7. What are obstacles that prevent the issue of vaccine equity from being solved in the status quo?
8. What is the most efficient way to establish better training programs for developing countries?

Additional Resources

An Analysis of How the GAVI Alliance and Low- and Middle-Income Countries Can Share Costs of New Vaccines:
https://www.linkedimmunisation.org/wp-content/uploads/2017/12/hlthaff.2011.0332.pdf

WHO Global Vaccine Action Plan:
https://apps.who.int/iris/bitstream/10665/78141/1/9789241504980_eng.pdf

Vaccine Distribution Supply Chain in Developing Countries
https://lirias.kuleuven.be/retrieve/521755

Contributions of the Polio Network to COVID-19 Response – Turning the challenge into an opportunity for polio transition
https://apps.who.int/iris/bitstream/handle/10665/336261/9789240011533-eng.pdf?sequence=1&isAllowed=y

IOB Study – Public-Private Partnerships in Developing Countries:
https://www.oecd.org/dac/evaluation/IOBstudy378publicprivatepartnershipsindevelopingcountries.pdf

[234] Ibid.

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