

**The Ethics of Global Vaccine Distribution in Public
Health Emergencies: A Case Study on Coronavirus
Disease (COVID-19)**

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2022

**A Dissertation to Auckland University of Technology in fulfillment of the
requirements for the degree of Master of Public Health**

School of Public Health and Interdisciplinary Studies

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List of Abbreviations

ADE - Antigen Dependent Enhancement

AMC- Advance Market Commitment

APA - Advance Purchase Agreement

CEPI- Coalition for Epidemic Preparedness Innovations

COVAX- COVID-19 Vaccines Global Access Facility

COVID-19 – Coronavirus Disease 2019

FPM- Fair Priority Model

HICs- High-Income Countries

HIF- Health Impact Fund

HIV-Human Immunodeficiency Virus

IPR-Intellectual Property Rights

LICs- Low-Income Countries

LMICs- Lower-Middle-Income Countries

MERS-CoV- Middle East Respiratory Syndrome Coronavirus

MICs-Middle Income Countries

PAS- Proportional Allocation System

SARS-CoV-2- Severe Acute Respiratory Syndrome Coronavirus 2

TB-Tuberculosis

TRIPS- Trade Related Aspects of Intellectual Property Rights

UK -United Kingdom

UMICs- Upper-Middle-Income Countries

UN- United Nations

UNICEF-United Nations International Children's Emergency Fund

USA – United States of America

WHO- World Health Organization

WHO'S SAGE- World Health Organization's Strategic Advisory Group of Experts on Immunization

WTO- World Trade Organization

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (Except where the explicitly defined in the Acknowledgements), nor material which to a substantial extent has been submitted for the award of any degree or diploma of a university or other institution of higher learning.

Signature:

Date: 26/12/2021

Acknowledgment

I would like to express my heartfelt gratitude to my primary supervisor, Dr. Charles Mpofu, for his valuable guidance, constant encouragement, prompt help, and advice during my dissertation. This dissertation would not have been possible without the remarkable assistance of my supervisor. He was always available whenever I asked for any help. I would like to thank him for his immense patience towards my work.

My sincere thanks also to Mithun Aravind, AUT postgraduate student. We shared knowledge and ideas and helped each other.

I would like to thank Dr. Merlyn George, my colleague who helped me during this time.

I would like to express my profound gratitude to my parents, family, and friends for motivating me during this period, as always.

Finally, I would like to thank my husband, Bibin Baby, and my daughter Feba Sara Bibin. Even though we are apart because of the uncertainty of this pandemic period, he was always with me during the up and downs, supporting and encouraging me throughout this journey.

Abstract

The COVID-19 pandemic is a considerable challenge to global public health. With the introduction of apparently reliable and effective vaccines against the novel coronavirus (SARS-CoV-2), the ethical argument has switched to how to allocate a limited quantity of vaccines in a fair and equitable manner. The distribution of vaccines between countries raises several complex and contentious problems, including distributive justice issues. The world is now witnessing an unequal distribution of COVID-19 vaccines between high-income and low-income countries because of many obstacles such as vaccine nationalism, bilateral purchase agreements, and intellectual property rights for COVID-19 vaccines. Most of the studies about vaccine distribution focused on the impacts of inequitable distribution of COVID-19 vaccines and barriers to equal distribution of vaccines. Therefore, it is critical to discuss the fundamental ethical and global justice issues related to the global distribution of COVID-19 vaccines between high-income and low-income countries.

This study aimed to uncover the ethical and public health concerns surrounding global vaccine distribution and recognize the ethical frameworks that could help guide access to a fair distribution of COVID-19 vaccines between high- and low-income countries. An ethical analysis was chosen to answer the research questions. The vaccine distribution data of high-income and low-income countries were collected from official websites and scientific journal articles. The data from the start of distribution of vaccines until 14 December 2021 were only included in this study. Low-income countries such as Ethiopia and Yemen were selected as case examples. The study identified a significant inequity in the global distribution of COVID-19 vaccines between high-income and low-income countries. The study found that most of the African low-income countries and other low-income countries had secured a few vaccines compared to high-income countries. The data had been analyzed within the cosmopolitan and nationalistic/communitarian approaches of the global justice framework. The findings elicited that most of the cosmopolitan views of global justice were violated concerning the global vaccine distribution. Furthermore, it was concluded that a considerable cosmopolitanism along with a moderate nationalism could be a moral justification for the equal distribution of vaccines between low-income and high-income countries. Based on the ethical analysis, the study also suggested alternative options to ensure equal distribution of COVID-19 vaccines between high-income and low-income countries.

Chapter 1: Introduction and Background

Introduction

The words of Margaret Harris (World Health Organization, Geneva, Switzerland) have been highly significant today amid this COVID-19 pandemic. “There is a lake of COVID-19 vaccine out there, and COVAX is receiving drops. If low-income and middle-income countries are not to be left behind, high-income countries will have to open the floodgates” (Burki, 2021). The inequity in the global distribution of COVID-19 vaccines is subsiding compared to the initial time of the vaccine distribution. However, there is still a wide gap between high-income countries (HICs) and low-income countries (LICs) regarding the vaccine distribution. It is a reality that there are distributive justice issues in the global distribution of COVID-19 vaccines. The disparities can be reduced when there was an even distribution from the start of the allocation, and it could be ethically justified.

This chapter focuses on an overview of the global distribution of COVID-19 vaccines. The first part mainly outlines the history of pandemics, the emergence and spread of coronaviruses, a briefing on COVID-19 vaccines, and details on COVAX facility. The key focus is on the rationale of the study and the summary of global distribution and access to COVID-19 vaccines. Later, it explains the research questions and the researcher’s interest in the topic. Finally, it presents the structure of the dissertation.

Background on pandemics

Pandemics are diseases that extend from one country to another, and epidemics are diseases that spread swiftly from one person to another in a specific area or city (Khan et al., 2020). Over time, infectious diseases with pandemic threats have emerged and are transmitted regularly. Indeed, there have been dozens of outbreaks in the previous 30 years alone. The major pandemic events include the first cholera pandemic (1817-1824); the influenza pandemics of 1918 (H1N1), 1957 (H2N2), 1968 (H3N2), 2009 (H1N1), the 1997 H5N1 influenza outbreak in Hong Kong; Middle East Respiratory Syndrome (MERS-CoV) in 2012; Sudden Acute Respiratory Syndrome (SARS-CoV) in 2003 and Ebola outbreak (2014-2016). The world is now confronted with the coronavirus disease (COVID-19) pandemic caused by SARS-CoV-2 (Piret & Boivin, 2021; Summers et al., 2020).

Numerous issues such as population changes, greater urbanization and modernization have exacerbated the advent and spread of zoonotic viruses. During past pandemics, public health involvements such as isolation, quarantine, and border control had helped in containing the spread of infectious illnesses and maintaining society's structure. Even today, these containment tactics are being utilized to observe the COVID-19 pandemic, along with pharmaceutical interventions like vaccines (Piret & Boivin, 2021).

Emergence and spread of coronaviruses

Coronaviruses are divided into four genera by the International Committee on the Taxonomy of Viruses (ICTV), which includes alpha coronaviruses, beta coronaviruses, gamma coronaviruses, and delta coronaviruses. Humans have been previously infected with four coronaviruses: HKU1, NL63, 229E, and OC43. The infectious bronchitis virus, which was discovered in the 1930s, and was the leading cause of respiratory diseases in homegrown hens, was the first observed coronavirus. In 1965, Tyrell and Bynoe isolated the first human coronavirus from the respiratory tract of a patient with a common cold (Jahangir, 2020). Coronaviruses primarily damage the respiratory system in humans, causing mild common cold to severe pneumonia. Later, a novel coronavirus linked to significant respiratory diseases was identified as a sudden acute respiratory syndrome-CoV (SARS-CoV) in China between 2002 and 2003. According to the reports, the genesis was most likely from bats; later, it passed through civet cats to humans. Subsequently, the Middle East Respiratory Syndrome was identified as a novel zoonotic coronavirus (MERS-CoV), a bat-borne virus that infected 2494 people, and killed 858, originated in Saudi Arabia (Algaissi et al., 2020).

On January 7th, 2020, a previously undetected human coronavirus known as severe acute respiratory syndrome-CoV-2 (SARS-CoV-2) was identified, and it was observed to have a zoonotic spread after human consumption of wild animals (Malik et al., 2020). It resulted in acute respiratory syndrome, recognized as the Coronavirus Disease 2019 (COVID-19), in Wuhan city in China. After a few days, the virus spread throughout China and later spread to over 200 countries around the world (Wang et al., 2020). As a result, the World Health Organization (WHO) announced COVID-19, a public health emergency by the end of January 2020 and a global pandemic on March 11, 2020 (WHO, 2021).

COVID-19 vaccines

Vaccines are biological products that give an active acquired immunity to a specific infectious disease. They accomplish this immunity by inducing an immune response to an antigen; a molecule presents on the pathogen (Ndwandwe & Wiysonge, 2021). COVID-19 vaccine development was initiated in an effort to create vaccines for the coronavirus strains such as SARS and MERS. The development of COVID-19 vaccines needed to consider factors like the risk of ADE (Antigen-Dependent Enhancement) and other side effects similar to those observed with SARS and MERS (Padron-Regalado, 2020). The development of the COVID-19 vaccine began in early January 2020, when the virus's genetic sequence became known, and it had progressed at a breakneck pace (Krammer, 2020). As of July 2021, 184 COVID-19 vaccine candidates were in the preclinical trial, 105 were in clinical development, and 18 vaccines were approved for emergency use (Ndwandwe & Wiysonge, 2021). Substantial COVID-19 vaccination rates were considered to decrease SARS-CoV-2 transmission in various populations by limiting the number of potential transmission sources and further decreasing the COVID-19 disease burden (Kampf, 2021). The different types of COVID-19 vaccines are inactivated, live attenuated, viral vector, subunit, and nucleic acid vaccines (WHO, 2021). The top 9 currently present vaccines include Pfizer BioNTech, Moderna, Johnson and Johnson, AstraZeneca/Covisheild, Sputnik V, Novavax, Bharat Biotech COVAXIN, and Sinovac/CoronaVac vaccine.

Table 1

Various types of vaccines

Type of vaccine	Description	Name of COVID-19 vaccine	Advantages	Disadvantages
Inactivated vaccine	Uses the full virus to make the vaccine. The virus is killed using chemicals.	Bharat Biotech COVAXIN Sinovac Sinopharm	The vaccine can be developed on a reasonable scale.	Need long production time. Need specific laboratory resources to develop the virus.

Live attenuated vaccine	Uses the weakened form of the virus.	Codagenix	Requires only one or two doses.	It is not suitable for immunocompromised people.
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Viral vector vaccine	Uses a safe virus. Viral vector vaccines give vital signals to our cells using a modified form of a different virus (a vector virus).	Johnson and Johnson AstraZeneca/ Covisheild Sputnik V	Can develop rapidly. Johnson and Johnson vaccine has an efficacy of 66.9%. AstraZeneca Vaccine has 76 % efficacy.	Chance of incorporation into the host genome, resulting in other conditions.
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Subunit vaccine	Uses only certain parts of the virus.	Novavax	Appropriate for immunocompromised people.	Immunogenicity is lower than with live attenuated vaccines.
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Nucleic acid vaccine	strengthens the immune system to combat infectious diseases by using DNA or RNA material. They provide our cells with instructions how to make a protein or a protein fragment.	Moderna (RNA) Pfizer (RNA)	Can develop quickly. Higher efficacy. Pfizer has 95% efficacy. Moderna has 94.1% efficacy.	Not developed previously. The ultra-cold chain needed for vaccine storage.
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Source: (WHO, 2021).

Table 1 above shows the different types of vaccines, their advantages, and their disadvantages.

COVAX facility and equitable distribution of COVID-19 vaccines

The most comprehensive approach to coordinating vaccine distribution is the COVID-19 Vaccines Global Access (COVAX) facility (Herlitz et al., 2021). COVAX is a global initiative that works with governments and manufacturers to ensure equitable access to COVID-19 vaccines worldwide in high-income countries (HICs) and low-income countries (LICs). COVAX is co-convened by the Coalition for Epidemic Preparedness Innovations (CEPI), Gavi, the Vaccine Alliance, and the WHO. In addition, the initiative collaborates with UNICEF, developed and developing country vaccine manufacturers, the World Bank, and others (WHO, 2021). COVAX was created to provide COVID-19 vaccines to all people in a fair and equitable manner. It was developed to reduce the risk of "vaccine nationalism" and give access to countries that do not have the economic or political capacity to establish bilateral or multilateral vaccine agreements (Sharma et al., 2021). This facility was expected to vaccinate all members, at least 20% of its population by the end of

2021 (WHO, 2021). However, the goal was not achieved in 2021. In addition, an advance market commitment was organized to support the manufacture and distribution of vaccines for low- and middle-income countries by financial support from overseas development assistance and private foundations (Sharma et al., 2021).

COVAX followed the WHO's "Proportional Allocation System" (PAS). The WHO and COVAX systems operate in two phases. Phase 1 calls for a tier-by-tier distribution of equal proportions to all COVAX countries. Every nation will be allotted sufficient doses to protect 3% of its populace, with the gradual rise in allocation until 20% of the population is protected. Once countries have acquired sufficient vaccines to protect 20% of its population, phase 2 begins with a proportional allocation substituted with a weighted distribution, depending on national risk estimates that reflect a broader variety of population risks and vulnerabilities (Emanuel et al., 2021). Moreover, the WHO recommended prioritizing healthcare professionals, the elderly, and people with comorbidities that put them at greater risk of severe disease if infected with SARS-CoV-2 and certain high-risk sociodemographic groups (Herlitz et al., 2021). However, the data on global vaccine distribution showed that these guidelines were not followed correctly, and the data has been described in the following chapters.

COVAX: achievements and shortcomings

The COVAX facility started its distribution with the promise of equity and solidarity. It functioned in two directions. The first one was the self-financing part, in which HICs were asked to pay for vaccines for their own population directly from mid-September 2020. The second part was that the vaccines for LICs would be financed through advanced market agreements. However, the plan was destroyed by the emergence of bilateral deals. By August 2020, the United States had signed up to 7 deals, while the UK had five deals (Usher, 2021). Eccleston-Turner and Upton (2021) also found that current COVAX operations have improved the development of COVID-19 vaccines, but owing to the risk of vaccine nationalism, these advantages were unlikely to reach LICs.

Furthermore, Gavi had made many press releases about the vaccine distribution to low and middle-income countries in February 2021 (only 600,000 doses to Ghana). At the same time, there was no announcement when Canada was allocated 1.62 million doses of COVID-19 vaccines earlier that month. This practice indicates that the allocation of vaccines to HICs takes place in a confidential manner (Usher, 2021). In addition, Herzog et al. (2021) had criticized the

COVAX facility for failing to respond quickly to new outbreaks in LICs and middle-income countries (MICs), claiming that it continued to distribute vaccines based on the population of the country instead of the intensity of the spread or the resilience of medical systems to manage such a rise. Another factor was that although the HICs had started donations to COVAX, these donations currently did not come close to meeting the required amount. For example, in the middle of 2021, the G7 nations pledged 870 million vaccine doses to LICs and MICs, but the WHO estimated that 11 billion vaccine doses would be required to protect 70% of the world's population (Wise, 2021).

COVAX faced yet another significant hurdle when one of its leading contracted suppliers, Serum Institute of India, fell behind the schedule and finally postponed the estimated date of shipment because of the massive increase of COVID-19 infections in India's second wave. Consequently, COVAX faced a vaccine shortfall, even though India recovered from an extreme public health crisis and attempted to manage local demands with overseas production agreements. Furthermore, Eccleston-Turner and Upton (2021) argued that the facility could not provide doses to countries in a similar manner since not every low-income country has a vaccine deployment infrastructure. For instance, the same issue happened during the 2009 H1N1 Pandemic with the lack of vaccine distribution infrastructure.

However, Acharya et al. (2021) discussed how high-income nations had aided their efforts through resources, economic assistance, and alliances with various nations. For example, the activities of the US government towards COVAX have been significant. Despite Trump's withdrawal from WHO during the COVID-19 pandemic in July 2020, the Biden administration joined COVAX and rejoined WHO. As a result, COVAX is among the better possibilities for LICs to battle the pandemic with support from these countries.

Rationale: an overview of global distribution of COVID-19 vaccines

Globally, as of middle of December 2021, there were 271,376,643 COVID-19 cases, and 5,324,969 deaths reported. A total number of 8,337,664,456 vaccine doses were administered globally by mid-December 2021 (WHO, 2021). The first vaccine against the SARS-CoV-2 was given in the United Kingdom on December 8, 2020 (Ledford, 2021). With the introduction of apparently reliable and effective vaccines against the novel coronavirus (SARS-CoV-2), the ethical argument has switched to allocating a limited supply of vaccines in an equal manner (Jecker et al., 2021). From the beginning of the pandemic, the WHO has been requesting that

vaccine stocks be shared equally, and the COVAX project was developed to aid in this effort (Tatar et al., 2021). However, the world has been unsuccessful in guaranteeing fair access to what would become a global public good (Hyder et al., 2021).

For instance, earlier in 2021, some LICs in the African continent struggled to get supplies via COVAX, but the situation improved in July (Jerving, 2021). Although there is an improvement in the supply, only about 3 percent of the African population of 1.3 billion have been fully vaccinated, compared to 52% in the US and 57% in the European Union as of September 2, 2021 (WHO Africa, 2021). Nkengasong et al. (2020) claimed that the African continent is witnessing a history of unequal vaccine distribution. For instance, the history of stockpiling HIV medicines by high-income countries during the 2009 HIV pandemic. The HICs had been blamed for storing COVID-19 vaccines to provide them to their populations as soon as possible, particularly in the early stages of vaccine distribution (Tatar et al., 2021). A study based on the COVID-19 vaccines data up to March 31, 2021, including 178 countries by Tatar et al. (2021) found a severe inequality in global COVID-19 vaccinations.

Furthermore, WHO had aimed to vaccinate 10% of every country, economy, and territory by the end of September 2021, but 56 countries had failed to do so by that date. The vast majority were in the African continent and the Middle East. Thus, the WHO launched a strategy on October 7, 2021, to achieve global COVID-19 vaccination by mid-2022. The new strategy lays out a method for meeting the WHO's goals of vaccinating 40% of the population of every nation by the end of 2021 (but it was not achieved) and 70% by the middle of 2022 by collaborating with COVAX, the African Vaccine Acquisition Trust (AVAT), and other stakeholders (WHO, 2021). The African Union established the AVAT to guarantee that COVID-19 vaccines are more widely available in Africa. In addition, the trust seeks to get vaccine doses to strengthen COVAX to achieve a 70 percent immunization rate among Africa's population (WHO, 2021).

However, despite these commitments to global equity, at the time of writing, as of October 6, 2021, in HICs, 60.93% of people had been vaccinated with at least one dose, while in LICs, it was only 3.72% (UNDP, 2021). Furthermore, LICs need to raise their health care spending by 56.6 percent to balance the expense of immunizing 70 percent of the population, but HICs must increase spending by only 0.8 percent (UNDP, 2021). Moreover, some nations are only getting their first doses, whereas others, like the US, have already had vaccines from December 2020 (Hyder et al., 2021).

Overall, it can be seen that there are some disparities around the global distribution of COVID-19 vaccines between HICs and LICs. Therefore, this dissertation will study the ethical and public health issues in this area. The dissertation will answer how the global justice framework could guide access to and equitable distribution of COVID-19 vaccines between HICs and LICs. It will analyze the cosmopolitan and nationalistic views of global justice concerning global vaccine distribution because it is a global public health problem, and this issue must be addressed irrespective of borders. The study could direct policymakers to set up effective interventions among LICs. The findings will also help expand the current approaches and recommend revisions if any are required. The research questions for this dissertation are listed below.

Research questions

1. What are the ethical and public health issues around the global distribution of COVID-19 vaccines?
2. What are the ethical frameworks or theories that can guide access to and equitable distribution of COVID-19 vaccines between high-income countries and selected low-income countries?

Researcher's interest in this topic

The topic was selected since it is a current global public health problem, and several discussions and debates are underway around this inequitable distribution of COVID-19 vaccines. This issue has to be addressed to control this pandemic and the critical need to vaccinate all people worldwide, irrespective of their income and borders.

Structure of the dissertation

Chapter 2: Literature Review: presents an overview of current relevant literature about the global distribution of COVID-19 vaccines. It explores the current views about this topic, finds the research gap, and discusses the importance of the study.

Chapter 3: The Ethical Frameworks: This chapter will exclusively focus on the ethical frameworks, such as the cosmopolitan and nationalistic/communitarian views of the global justice framework. This section will provide an understanding of the different concepts of ethical frameworks.

Chapter 4: Methodology: It discusses the methodology chosen for this study. It details the data collection and data analysis methods. Ethical analysis is used to perform data analysis.

Chapter 5: Results: It presents the collected vaccine distribution data of high-income and low-income countries. Step 1 and Step 2 of ethical analysis will be presented in this chapter.

Chapter 6: Discussion: It details steps 3, 4 and, 5 of ethical analysis. Data has been evaluated using cosmopolitan and nationalistic/communitarian views of the global justice framework. Alternative options and suggestions were made based on the ethical frameworks. Finally, it discusses the limitations of the study.

Chapter 7: Conclusion: It summarizes the main points and highlights of the study. Finally, it discusses the implications of the study and directions for further research.

Conclusion

This chapter discussed a background on pandemics, the emergence of coronaviruses, a briefing on COVID-19 vaccines, and an overview of the global distribution of COVID-19 vaccines. It also discussed the researcher's interest, the rationale of the research, and the dissertation structure. The next chapter will review the current literature regarding the global distribution of COVID-19 vaccines.

Chapter 2: Literature Review

Introduction

SARS-CoV-2 has devastated both high and low-income countries. As discussed, initiatives like COVAX facility aim for the equal distribution of COVID-19 vaccines. However, the current activities of COVAX seemed to be insufficient to address the inequities in vaccine distribution process. The low-income countries (LICs) were still waiting for their first dose, while high-income countries (HICs) had already started the administration of booster doses (Burki, 2021). A fair distribution of vaccines could address the inequities in global vaccine distribution. This fair distribution will aid in combating the virus's direct and indirect health consequences on individuals (Herlitz et al., 2021). Therefore, this chapter aims to explore and review the current relevant literature and practices in the global distribution of COVID-19 vaccines between countries. This chapter explains different ethical proposals for the allocation of COVID-19 vaccines; it also focuses on the impact of global vaccine distribution inequity, barriers to equitable distribution of vaccines, and finally, it identifies the gaps in research.

Ethical proposals for allocation of COVID-19 vaccines

There are several proposals on board for ethical vaccine distribution across countries. The WHO's Proportional Allocation System (PAS) prioritizes healthcare workers, the elderly, and the most vulnerable. This system tries to minimize COVID-19 related deaths and safeguard health systems by giving vaccines to nations based on the number of critical health care professionals, the percentage of people above 65 years, and people who are most susceptible to get the virus (Hassoun, 2020). As discussed in the previous chapter, PAS proposed that vaccine doses had been provided evenly across the nations in the first phase, and it would be assigned based on each country's needs in the second phase. A study by Northeastern University researchers showed that the estimated averted deaths for population-based allocation (PAS) were 54%, which was more significant than in the distribution based on need (44%). These data were based on certain substantial assumptions (Sharma et al., 2021). Therefore, the application of this proposal could help prevent more COVID-19 associated deaths.

However, some ethicists opposed this PAS proposal and claimed that allocation based on need would be morally justifiable over proportional allocation, since it would reduce harm and prioritize the disadvantaged (Emanuel et al., 2021). For instance, with a population of 33 million, Peru had over 1 million COVID-19 cases and 38399 deaths by mid-January 2021, while Malaysia (population 32 million) had approximately 147855 cases and 578 deaths. Although Peru had seven times more cases and more than 66 times more deaths, the PAS distributed the same number of vaccines to Malaysia and Peru (Emanuel et al., 2021). Thus, equally treating countries with different disease burdens could not be acceptable. Some ethicists opposed this form of allocation and proposed the “Fair Priority Model” (FPM). FPM allocates vaccines based on the country’s needs and aims to reduce the economic and health consequences (Hassoun, 2020). FPM is a more advanced concept. According to this system, the countries having sufficient vaccines contributes to the global distribution when their national COVID-19 transmission rates fall below one (Herlitz et al., 2021). Three essential values that define the FPM are: (1) benefiting people and minimizing harm, (2) favouring the disadvantaged, and (3) global equality of concern. This proposal suggests that vaccines should be given in the first phase, primarily to lower the number of Standard Expected Years of Life Lost (SEYLL). In phase 2, the main focus is to alleviate economic burdens and control morbidity; in phase 3, the goal is to limit community spread and re-establish normality. The FPM distributes vaccines to countries depending on the relative requirements of their citizens, promoting an equal distribution of vaccines to people in greater need as a result of COVID-19 (Emanuel et al., 2021). However, FPM could disadvantage countries with a low disease burden since it focuses on distribution based on need. This situation will be challenging since it is difficult to predict when the virus will spread faster and affect those countries with a low disease burden. Thus, both proposals would need further research.

Finally, another proposal by Vanderbilt University focuses on allocating vaccines to nations depending on their potential to deliver vaccines, their capacity to give proper treatment, and if they assisted in the testing and development of innovative interventions (Herlitz et al., 2021). The idea of this proposal is morally relevant but needs further research whether these principles would benefit or harm LICs since most of the LICs have insufficient capacity and infrastructure to rollout the vaccines.

The impact of global vaccine distribution inequity

❖ Direct and indirect health consequences

Disparities in vaccinations have had both immediate and anomalous impacts. Apart from the direct diseases and deaths from COVID-19, continuous exposure to rising cases has affected the potential of already overburdened healthcare systems to provide treatment for other health issues. In addition, the human capital required to maintain responding to COVID-19 and non-COVID-19 health problems is affected by sickness and mortality among healthcare workers (Asundi et al., 2021). A systematic review by Gholami et al. (2021) using 28 studies, including 119,883 patients, found that COVID-19 was identified in 51.7 percent of health care workers (HCWs). In the first six months of the COVID-19 pandemic, a large number of HCWs were confirmed to be infected, with a hospitalization rate of 15.1 percent and a mortality rate of 1.5 percent.

Because of the continuous transmission of COVID-19 disease, the medical service systems lacked the ability to focus on other medical services. For instance, because of postponed vaccination programs, childhood vaccination rates have plummeted in the year 2020, lagging immunization for 13.5 million in a few susceptible countries in the world. Furthermore, overburdened healthcare and surveillance systems were unlikely to trace newer and endemic infectious disease threats. For instance, 1 million people had remained undiagnosed and untreated for tuberculosis (TB) by 2020, undermining a decade of worldwide investment to combat the illness (Asundi et al., 2021).

❖ **The emergence of new variants**

The persistent transmission of SARS-CoV-2 has generated an environment favourable to the viral evolution and the emergence of new mutations. These viral variants may pose a risk to persons living in high-income countries, particularly those who have not been immunized or who are unable to build a robust adequate immunological response to vaccination (Otto et al., 2021). Matta et al. (2021) also claimed that slow vaccination rollout was one of the factors that can give time for the virus to mutate its spike protein. For instance, the emergence of new SARS-CoV-2 variants in South Africa, such as B.1.1.529, was named omicron (WHO, 2021).

❖ **Social and economic challenges**

The uneven vaccine distribution would have had a financial burden on the entire international market. Based on a RAND Europe analysis, if the globe's low-income nations will not receive the vaccine, the world economy would lose \$153 billion annually (the EU losing \$40 billion and the US losing \$16 billion). As governments worldwide struggle with the collapse of their economy, 95

million extra people have been driven into severe poverty, with a further 200 million expected to be at risk between this pandemic period till the year 2030 (Asundi et al., 2021).

COVID-19 has influenced people from all spectrums of the socio-economic status, but it had a disproportionately negative impact on individuals from lower socio-economic backgrounds. The outbreak had led to the death of key income contributors, losing essential employment, depleting of family resources, and making life more tedious for the urban poor. For instance, with around 71% of Americans unable to work remotely, the financial consequences of limitations and closed firms would have been enormous in the long term (Hyder et al., 2021).

Barriers to equitable distribution of vaccines at the global level

Underlying barriers are primary hindrances that could prevent a person from receiving vaccines. Changing the structure and funding aspects of the health care systems, as well as the organizations that provide it, can help overcome these difficulties. The following paragraphs will discuss some major obstacles in relation to the global distribution of COVID-19 vaccines.

❖ Bilateral legal agreements and pricing

Law and order might be both a facilitator and hindrance to the global wellbeing, value, and equity. The impact of lawful factors of well-being on the COVID-19 pandemic is apparent when the law is utilized as a vehicle to facilitate or halt overall comparable admittance to COVID-19 vaccine distribution. COVAX is not the only way that countries could access vaccines, as they could also make bilateral deals with manufacturers (Jecker et al., 2021). Wealthy nations all across the world have acquired nearly 2 billion doses of potential future vaccines in the initial time through Advance Purchase Agreements (APAs). APAs are legally binding arrangements in which a government gains preferred access to anticipated future vaccines by pledging to acquire a specific number or percentage of vaccines from a vaccine producer at a predetermined price (Jecker et al., 2021). APAs are a gamble that erodes international cooperation. Importantly, bilateral legal agreements like this are expected to exacerbate inequality and possibly lengthen the pandemic's duration. For instance, over half (51%) of the anticipated doses of key COVID-19 vaccine candidates have already been taken by wealthy nations in 2020 (Oxfam, 2020). Hence, there should be a monitoring body on vaccine procurement by limiting vaccine stockpiling through bilateral deals of HICs.

The same scenario happened in the 2009 influenza A H1N1 pandemic, where several HICs used APAs and made procurement difficult for other countries (Phelan et al., 2020). In addition, a case study by Turner (2016) showed that during the 2009 influenza pandemic, 56% of WHO surveyed vaccine manufacturers could not guarantee at least 10% committed vaccines to UN agencies because of preexisting obligations of APAs with HICs. Thus, APAs appear to act as a barrier to the equal distribution of vaccines. A scoping review by Peacocke et al. (2021) from 45 peer-reviewed articles identified that these bilateral legal agreements influenced the equitable distribution of vaccines in low- and middle-income countries.

Furthermore, LICs sometimes have to pay more prices for vaccines than high-income countries due to lack of transparency and integrity in vaccine contracts. For instance, although the purchase agreements are confidential, minimal available knowledge indicates price variation and high price signals. The Pfizer/BioNTech vaccine is expected to cost \$19.50 in the United States and \$18.90 in the European Union per dosage. The Oxford/AstraZeneca vaccine was priced at \$4 per dosage, while the Moderna vaccine cost \$37 per dose in the United States. The explanation for Israel's speedy scale-up of its immunization programs had been mentioned as its readiness to pay a premium price for the Pfizer/BioNTech vaccine, approximately \$30 per dose (Guzman et al., 2021). Therefore, agreements' confidentiality reduced the bargaining strength of low- and middle-income nations, which already have restricted purchasing power.

However, to facilitate fair access to COVID-19 vaccines, the United States offered an extra 500 million doses of Pfizer vaccine to be given through COVAX to LICs and LMICs in September 2021. These vaccines are in addition to the 500 million Pfizer doses announced in June and around 90 million excess doses provided through COVAX, increasing the total amount of US doses to approximately 1.1 billion. These extra doses could have been accessible in January 2022, following the supplies of already promised doses (WHO, 2021).

Meanwhile, APAs can also be used by global health agencies as part of the Advanced Market Commitments (AMCs) to acquire vaccines for LICs and LMICs. Gavi, the Vaccine Alliance, and other international health agencies had used donor-funded AMCs to enter into APAs with vaccine makers to stockpile a certain number of vaccines for nations with inadequate financial markets. In this manner, AMCs were employed for childhood pneumococcal vaccines and Ebola vaccines (Phelan et al., 2020). The AMC was first used in 1999 to create a late-stage pneumococcal vaccine to reduce the time it took for a vaccine to reach LICs and LMICs (Peacocke et al., 2021). For instance, LICs could now access lifesaving pneumococcal vaccines for US\$2. The new price

is 43% less than the US\$3.2 at the start of AMCs (UNICEF, 2021). Likewise, AMCs could help to acquire vaccines for LICs and LMICs.

❖ **Intellectual property rights**

Intellectual property rights (IPR) refer to "the legal rights given to the inventor or creator to protect his invention or creation for a certain period" (Saha & Bhattacharya, 2011). A well-functioning intellectual property framework would ultimately simplify technology transfer through foreign direct investments, collaborations, and licensing. Typically, protection is offered for a specific duration (usually 20 years for patents) (WTO, 2021). IP rights, including patents, copyright, trademarks, and trade secrets, can apply to vaccines (Durell, 2016). Patent law and its sound effects are responsible for a significant part of the obstacles to access to medicine. The TRIPS (Trade-Related Aspects of Intellectual Property Rights) agreement demands members of the World Trade Organization (WTO) to take steps to preserve intellectual property rights, which means that any patented item must be manufactured, imported, marketed, or used with the patent owner's consent. This includes medicine; hence each medicine's manufacture starts with a market monopoly at the greatest reasonable cost (Ahmadiani & Nikfar, 2016).

In the case of COVID-19 vaccines, South Africa and India submitted a proposal to the WTO in October 2020 to temporarily remove some TRIPS criteria for COVID-19 health products and technology (Okereke, 2021). The proposal claimed that IP rights might obstruct the supply of COVID-19 medications and vaccines. The TRIPS waiver is significant because it allows WTO member states to conduct vaccine research, manufacture, and distribution (Erfani et al., 2021). Thereby, it could improve access to COVID-19 vaccines.

Even though over 100 nations support the proposed IP waiver, some HICs, including the United Kingdom, Germany, and Japan, have opposed the proposal (Erfani et al., 2021). Waiver opponents claimed that the underlying obstacle to global manufacturing is low- and middle-income countries' poor ability to make COVID-19 vaccines, not intellectual property. However, several low- and middle-income countries have the technical and production facility to manufacture complex COVID-19 vaccines. For instance, India, Egypt, and Thailand currently produce viral vector or mRNA-based COVID-19 vaccines. Also, vaccine production plants in many low- and middle-income countries developed within months, providing a significant advantage. In addition, complex pneumococcal and hepatitis B recombinant vaccines have already been manufactured in India and China and proved their ability in vaccine production (Erfani et al., 2021).

These data illustrated that the IP waiver could help LICs in vaccine manufacturing. According to Padmanabhan et al. (2010) vaccine production in low and middle-income countries could also help lower the cost of vaccines and increase access. Manufacturers in India, Cuba, China, and Brazil have proven their ability to create low-cost vaccines that fulfill international quality requirements during the last decade. These countries provide 64% of UNICEF-purchased children vaccines and 43% of GAVI2-purchased vaccines.

The next-generation COVID-19 vaccines include many patent-protected technologies, varying from the modified adenoviral vectors to the lipid nanoparticles employed to deliver mRNA and the development of a stabilized SARS-CoV-2 spike protein that acts as the essential antigen for various vaccines. Using a TRIPS waiver to ease intellectual property rules around such innovations could make the basic technology available for usage on a global scale. Supporters mentioned that the Treatment Action Campaign and the TRIPS waiver granted for antiretroviral medicines during the HIV pandemic in the global south is an example of how this strategy might dramatically improve access to COVID-19 vaccines (Asundi et al., 2021). In addition, a study by Ahmadiani and Nikfar (2016) regarding the use of TRIPS flexibilities from 2001 to 2016 identified that, after 2003, the number of TRIPS flexibility instances increased, and the utilization of these flexibilities aided in lowering the cost of HIV medications and increased access to these medications.

Moreover, some researchers argue that legal constraints may not be the primary barrier to worldwide vaccination equality, as various vaccine manufacturers actively sought license deals or decided not to pursue patent rights for COVID-19 vaccines. In this scenario, liberalizing patent laws could be the primary move towards more justice. In addition, there are barriers to technology transfer and administrative efficiencies, like the strength of vaccine production knowhow in HICs and the scarcity of competent workforce in LICs and MICs. The absence of research and development facilities and staff in LICs is a substantial barrier to vaccine technology transfer, highlighting the importance of global funding in research capacity and upgrading to address existing and future threats (Asundi et al., 2021; Jecker & Atuire, 2021).

On the contrary, Moderna has decided to offer free access to the necessary IP throughout the COVID-19 period and out-license the IP after the pandemic. Unlimited access to the COVID-19 vaccine's IP benefits several countries that have already begun producing vaccines, such as India, the Republic of Korea, Brazil, Indonesia, and South Africa. However, because of a lack of indigenous vaccine production capability, LICs are unable to use all of this and must rely on HICs

or their vaccine-development organizations. As a result, although these countries have been granted a license, it will not solve the vaccine manufacturing issues (Acharya et al., 2021).

Last but not least, in May 2021, the United States announced its intention to support WTO's proposal by temporarily waiving intellectual property rights only for COVID-19 vaccines (Krishtel & Malpani, 2021). Following the Biden administration's support for a waiver, China, and Russia, had stated that they could encourage a WTO waiver. However, it is uncertain how other competitors would respond, as this waiver requires 164 WTO members to concur (Zarocostas, 2021).

❖ **Vaccine Nationalism**

The emergence of COVID-19 vaccine nationalism started in 2020, after the United States pre-purchased vaccines to acquire favoured access to 100 million doses from a Sanofi-GSK alliance for the now-famous 'Operation Warp Speed' (However, the Sanofi-GSK candidate vaccine was only pushed into phase 3 trials in May 2021, due to delays.). The United Kingdom started to compete for vaccines with the United States by spending early in the Oxford University vaccination program. Because of these investment agreements, the United States, the European Union, the United Kingdom, and Japan would have had access to about 1.3 billion possible COVID-19 vaccine doses by August 2020. Canada was also criticized for its vaccine nationalism, having purchased the most vaccines to population needs. However, Canada's vaccine distribution was delayed, and the country withdrew its dose commitment to COVAX (Sabahelzain et al., 2021).

❖ **Other Factors**

- Lack of cold chain infrastructures

COVID-19 vaccines must be transported and stored in refrigerators at freezing temperatures. For example, the Oxford-AstraZeneca COVID-19 vaccine and the Pfizer vaccine require feasible storage conditions at 2–8 °C and -70 °C, respectively. However, new studies showed that the Pfizer vaccine could be stored at temperatures ranging from -15 to -25 °C for two weeks. Even after moving these vaccines to the refrigerator, extra caution and care are required to maintain their integrity. The efficiency, potency, and durability of vaccines are all dependent on strict temperature controls. The cold chain is needed for vaccine storage, delivery, and transport (Acharya et al., 2021). However, most low-income countries do not have sufficient ultra-cold chain

infrastructures. For example, a study by Oyadiran et al. (2021) found that Nigeria presently has a 201m² cold chain capacity and requires a total capacity of 672m² to satisfy demand. Thus, the lack of a cold chain is a significant obstacle in LICs, leading to inadequate immunization.

➤ Vaccine hesitancy

In addition, because of the wide array of data from effectiveness trials for the same product, vaccine hesitation has increased in many nations. For example, Sinovac, a Chinese manufacturer, had shown 50–91 percent efficacy. Furthermore, there appears to be a concern about whether the vaccines created and manufactured by the researchers, after a year of testing, would be effective against new viral strains. In this situation, it becomes strenuous for a developing country to determine whether to pay a significant amount of money on outdated vaccines or expect an alternative future treatment that would work against new virus variants (Acharya et al., 2021). A scoping review by Biswas et al. (2021) from 82 studies identified, vaccine efficacy as a potential determinant for vaccine hesitancy. Therefore, vaccine hesitancy is also a barrier to the distribution of vaccines.

Research Gap

Most of the studies about vaccine distribution focused on the impacts of unequal vaccine distribution and the barriers to the distribution of vaccines. Only a few studies have concentrated on the moral justification of the global distribution of COVID-19 vaccines. It has been discussed in the literature review, and insights have been given regarding WHO's Proportional Allocation System and Fair Priority Model for vaccine allocation. Therefore, it is necessary to conduct an ethical analysis about vaccine distribution between countries based on global justice frameworks, which provides an insight into dealing with a fair vaccine allocation in future pandemics. Since it is a global public health problem, it has to be addressed, irrespective of the border. In addition, all countries have the responsibility to deal with the issues of their population. Therefore, this study plans to explore the cosmopolitan and nationalistic aspects of the global justice framework concerning vaccine distribution. Thus, this study could bridge the gap between high-income countries and low-income countries and thereby provide a fair deal of vaccine distribution between countries.

Conclusion

This chapter showcased the vaccine distribution inequity that exists between countries. This chapter also discussed the different proposals for allocation of vaccines, direct and indirect impacts of inequitable vaccine distribution, and barriers to equal distribution of vaccines. Finally, this chapter explained the research gap. Based on this review, an in-depth analysis will be required to study the ethical aspects of vaccine distribution. However, before the ethical analysis section, this dissertation paper will present a general overview of ethical frameworks used to conduct the ethical analysis.

Chapter 3: Ethical Frameworks

Introduction

COVID-19 vaccine distribution inequities are currently hampering an effective worldwide response to the outbreak. Respect for human rights is required as part of global health justice. It is an advocacy for inexpensive, accessible, and high-quality immunization and treatment for everyone because health inequities and cross-border challenges are morally and ethically disturbing. This debate will focus on global justice, which comes under distributive justice. Different viewpoints on global justice will be addressed, including cosmopolitan and nationalistic/communitarian approaches. The chapter will exclusively discuss a general overview of ethical frameworks, which will be used later in the ethical analysis section and will assess the vaccine distribution, based on these frameworks.

Global justice frameworks

Global justice is a philosophical viewpoint that addresses the issue of fair distribution of benefits and expenses throughout the world, as well as the long-term viability of the systems required to maintain such equitable distribution (Choudhary, 2018). Theorists of global justice pierce the state shell to question what justice among human beings entails. Individual human beings are the focus of global justice questions, which aim to explain what fairness among such actors involves (Brock, 2015). As per Beauchamp and Childress (2001) distributive justice concepts determine how advantages and costs might be dispersed most fairly, equitably, and adequately within the societal norms that emerge from the prevailing system of social cooperation within a specific society. According to this description, concerns for properly allocating healthcare resources should engage complex ethical systems (Hick et al., 2020). Utilitarianism, for instance, seeks to maximize public utility by considering many factors and prioritizing social welfare demands. Egalitarian views of justice provide a substitute to utilitarianism by arguing that any advantages judged desirable by competent members of a particular community should be accessible to everyone. Within the context of public health ethics, an egalitarian philosophy of justice could connect healthcare with resources or services and endeavor to ensure that, it would be fairly allocated between all people who require it during an outbreak (Beauchamp & Childress, 2001). Based on this egalitarian concept, ensuring an equitable vaccine distribution between countries is also a part of global distributive justice.

Some theorists, such as Charles Beitz and Thomas Pogge, argue for comprehensive global distributive strategies. Others, such as Charles Jones and David Miller, clearly oppose the concept that egalitarian principles of justice should be implemented globally, arguing that national communities' core responsibility is to assist other countries to meet the significant needs of their citizens. Nearly all participants in the global justice debate realize that they have distributive justice duties towards people from other countries. The concern is how firm those obligations are, and if national borders may impact the allocation of resources between people of different nations (Kataria & Qu, 2021). Therefore, it is necessary to assess whether the egalitarian concept is justified in the current COVID-19 vaccine distribution, irrespective of borders.

Different principles of distributive justice

The various principles of distributive justice are strict egalitarianism, the difference principle, welfare-based principles, and libertarian principles. Strict egalitarianism is a basic distributive justice theory that asks for the distribution of equal goods to all individuals. As proposed by John Rawls, the difference principle allows for deviation from pure equality as long as the disparities in question render the least advantaged in society considerably better off than they would be with strict equality. The difference principle adequately reflects the moral significance of chance and obligation. Welfare-based principles (utilitarianism is the most prominent) argue that material resources and systems are not the main distributive priority. This principle contends that resources and services have no inherent worth and are only helpful because they improve welfare. As a result, they suggest that distributive rules should be created and evaluated regarding how they impact welfare, either in terms of maximization or distribution. In contrast to the above three principles, proponents of libertarian principles often critique any distributive ideal that demands the pursuit of definite 'patterns,' such as the maximization or equality of welfare or resources (Lamont, 2017).

The cosmopolitan global justice

The foundation of cosmopolitan global justice resides in the concern of individual human beings as the main focus of attention, in which jurisdictional boundaries do not entail any restraint on the execution of justice. The concept of global justice is founded on the philosophy of cosmopolitanism, which is described as a moral ideal that stresses tolerance for differences and anticipates an equal world order. According to cosmopolitan philosophy, our responsibility to share resources with others does not cease at state borders. The concept is that humans'

responsibility to their fellow humans would not be confined to compatriots. Individuals have the same moral value regardless of citizenship (Cabrera, 2004, p.1). Stoic philosophy is considered the forerunner of cosmopolitanism. The primary idea behind stoic philosophy is that no human being should be considered "alien" to another (Cicero, 1887). The stoic idea is based on the principle that one must be "a citizen of the world" (Aurelius, 2006, p. 65; Sherman, 2007, p.16). Therefore, it is a responsibility to morally consider all human beings regardless of their borders in terms of resource allocation.

Theorists such as Thomas Pogge (1989, 1994), Charles Beitz (1999), and Kok-Chor (2004) have all written on cosmopolitan notions of distributive justice as part of a wider institutional framework of enquiry. Charles Beitz and Thomas Pogge are philosophers who believe that the concepts of justice established at the state level could apply to the entire world. These philosophers claim that such a concept is also the renowned John Rawls' difference principle of justice, which demands social structures to be organized in a manner that socioeconomic disparities "are to be to the greatest benefit of society's least-advantaged members" (Rawls, 2001, p. 43).

According to Tan (2004, p. 1) "from a cosmopolitan standpoint, concepts of justice should surpass nationality and citizenship, and should equally apply to all persons of the globe as a whole." Tan argues that factors like a person's nationality and citizenship should be morally arbitrary too, which is similar to how Rawls views a person's colour, gender, abilities, money, and other natural and social particularities to be arbitrary from a moral point of view (John, 1971).

Pogge's cosmopolitan views on global justice

Thomas Pogge's cosmopolitanism views are inspired by his opinion that wealthier nations are harming the world's poor. He emphasized how the global economic system's institutional structure, particularly the World Trade Organization's intellectual property rights legislation, has exacerbated the disparity between high-income and low-income countries and hampered low-income countries' access to the best patent items (Pogge, 2013). Thomas Pogge contends that international organizations have a biased and unfair rule-making entity. For example, the TRIPS (Trade-Related Intellectual Property Rights) agreement guarantees patent holders a 20-year monopoly on the research of new medicines and offers them the exclusive right to market the treatments at a price set by the patent holders. He felt it appropriate, to exclude the world's poor from the range of healthcare options, medical services, and facilities (Hestermeyer, 2007). Pogge was a firm supporter in designing a framework of institutional adjustments to minimize the

disproportionate cost of inequality in order to activate social commitment. He proposed that the Health Impact Fund (HIF) be strategically developed to reduce the burden of communicable illnesses in underdeveloped nations by increasing access to pharmaceutical treatments (Kataria & Qu, 2021). Pogge (2008) claims that the HIF would be sufficient to abolish pharmaceutical corporations' monopoly pricing structure in return for an incentive for new medical discoveries. After registering a drug with the HIF, a company pledges to sell their product internationally for no higher cost. In return, the company gains incentive payments depending on the product's estimated global health impact for a specific period. A HIF-registered drug may be patented anywhere but should be sold worldwide throughout the incentive period at the set price. This will be an effective option for COVID-19 vaccine access to low-income countries as many of them could not afford the price.

According to Pogge (2008) all cosmopolitan perspectives have three important characteristics. The first one is individualism, which holds that human beings, or individuals, are the basic units of moral concern instead of familial lines, tribes, ethnic, cultural, or religious groupings, nations, or states. However, in this COVID-19 vaccine distribution, whether it is justified or not for low-income countries is a question to ponder upon. The next is universality, which emphasizes that the position of a fundamental unit of concern is shared by all live human beings, not only specific subgroups like males, aristocrats, whites, or Muslims. The third characteristic is generality, which stresses that the distinctive status recognized has global ramifications. Persons are the ultimate elements of moral concern for everyone in this context (Obi, 2014).

Rawls' cosmopolitan views on global justice

Rawls was interested in distributive justice. According to him, "the justice of distributive share rests on the correct selection of a basic framework of society, its fundamental rights and obligations." To determine the best approach to make such a 'right decision,' Rawls reintroduced the concept of the social contract in opposition to the mainstream theories of utilitarianism and intuitionism at the time. Utilitarianism, in his opinion, sacrificed individual freedom for the sake of the collective good. Also, to him, intuitionism was a poor theory since it allowed little room for human judgment informed by reason (Rawls, 1999). Rawls' philosophical discourse created a critique of the utilitarian concept of maximizing marginal utility based on the calculation of solving the moral dilemma based on the consequences it caused. According to Rawls (2020) "the core issue of justice is the underlying structure of society, which is concerned with how social

institutions distribute fundamental rights and obligations and determine the distribution of benefits from social cooperation." The basic goal of distributive justice is to assist the idea of a well-ordered society defined by the concept of equal opportunity and difference, according to the moral logic of limiting the desire for ego-driven rewards and moving towards the humanitarian context of social justice (Rawls, 2020). Rawls' justice principles, which include the idea governing social and economic equality, "must extend amongst persons throughout societies, not only inside the boundaries of a single society" (Rawls, 2020).

According to the concept of the law of peoples, rich liberal cultures should bear the moral obligation of benefiting disadvantaged nations based on the philosophical justification of distributive justice in order to reduce global inequities (Rawls, 1999). Only with the restructuring of the rules establishing agendas, international organizations should commit to the equitable sharing of duties and benefits (Rawls, 1993). Likewise, there is a need to discuss whether the high-income countries helped low-income countries during this pandemic by sharing resources such as vaccines.

The nationalistic and communitarian approach of global justice framework

The contrasting assertions to globalism about the extent of justice are referred to as 'statism' and 'nationalism.' "Statism is the belief that the extent of justice is limited to inside state lines; nationalism, on the other hand, is the belief that the scope of justice is limited to within national boundaries." Statists and nationalists reject that justice has a worldwide reach; instead, they aim to confine justice to inside the country or state." In practice, if justice has a global reach, relative discrepancies in resource distribution are a reason for concern and might be unfair (Kime, 2010).

Cosmopolitan globalists consider the existing uneven global distribution of resources as unfair. However, statists and nationalists find it completely wrong if it implies that certain persons fall below some preset absolute standard of wellbeing, or if it has formed as a result of some unfair action. For statists and nationalists, global inequality is only an issue because of its consequences on the relative wellbeing of people; it is not an issue in and of itself. Cosmopolitan globalists disagree, stating that global inequality may be unfair in and of itself (Held & Maffettone, 2017).

Nationalists or proponents of state sovereignty and self-determination (Buchanan, 2007; Miller, 1995) believe that the nation establishes a unique bond between individuals that generate responsibilities to one another. Moral responsibilities differ for individuals inside and outside the

country, and distributive justice is a state-specific issue rather than a universal one. While humanitarian efforts in the form of generosity for the world's poorest people are commendable, they feel that the obligation we owe to outsiders is far less important than the duty we owe to our own countrymen. As a result, justice is 'bounded' to and by inhabitants of a particular nation, and society is 'bounded' by state sovereignty (O'Neill, 2000). Thus, the nationalists will claim to prioritize vaccines for citizens.

The communitarian global justice ideas of justice occur in communities that share moral guidelines based on shared meaning and behaviours (Walzer, 1983). Different cultures and communities have common values, and those values help inform moral judgements inside, but not across societies. According to Walzer (1983) "a given society is fair if its substantive existence is lived in a specific way, that is, in a sort of manner true to the members' common understandings." Moral norms differ between nations and communities. There are no universal, worldwide moral standards, and hence no concept of global justice in communitarian view (Ruger, 2012).

Michael Walzer's communitarian perspective is that global justice is not feasible because we lack the kinds of global social interactions on a global level that make domestic justice possible. He argues that distributive justice is relevant to social values. Only domestic communities can discover the shared actions and understandings that define what justice is and contribute to the social unity and feeling of common purpose required to uphold the sacrifices and demands of justice. According to his viewpoint, distributive justice "relies on the assumption of a circumscribed reality within which distribution may occur: a community of individuals dedicated to dividing, distributing and sharing resources, first and foremost among themselves." He emphasizes that, in various types of distributions, prioritizing compatriots over non-compatriots (Garcia, 2009).

Conclusion

This chapter discussed the different aspects of global distributive justice. According to cosmopolitans, the allocation of resources should be global, irrespective of the boundaries, and it should be morally justified instead of depending on countries' income levels. At the same time, the communitarian or nationalistic frameworks are state-centric and only focus on the health of their population. This chapter gave an idea of ethical frameworks concerning resource allocation. These ethical frameworks will be used to perform the ethical analysis and later will assess whether

these ethical concepts are justified in vaccine distribution or not. The next chapter will discuss the methodology employed in this research.

Chapter 4: Methodology

Introduction

Public health has been frequently confronted with complex ethical challenges, such as allocating limited resources, persuading individuals to alter their behavior, and restricting the freedom to reduce the spread of infections. However, unlike medical ethics, there is no universally accepted framework for assessing these issues (Roberts & Reich, 2002). As discussed in the literature review, the COVID-19 vaccine distribution inequities still exist in the world, and at the same time, some countries are on the safe side, having enough vaccines to protect their population. This chapter aims to discuss the research methods, data collection methods, and data analysis methods used to address the research questions.

Research Methodology

A research paradigm is a world view about how to conduct research. The research paradigm informs the researcher on selection of procedures and study designs. A paradigm is defined as “a collection of shared views and agreements among experts regarding how problems should be understood and treated” (Thomas, 1962). The paradigm approach chosen for this research (ethical analysis) was interpretivism because, in interpretivism, one interpretation is not chosen or preferred over others as the “correct” one. Instead, multiple pieces of knowledge are acknowledged to recognize that different researchers bring different perspectives to the same issue. The purpose of interpretative research is not to uncover universal, context, and value-free knowledge and truth, but to try to comprehend perceptions of the social realities with which they engage (Grix, 2018). This research was an ethical analysis, where the collected data was interpreted based on ethical frameworks.

Ontology is the theory of reality, in which reality can be seen in multiple views (Abdul Rehman & Alharthi, 2016). Nevertheless, this research analyzed the ethical issues based on vaccine distribution, and the different perceptions of the reality were seen with different ethical frameworks. The ontological view of interpretivism is relativism (Scotland, 2012). The idea of relativism is subjective, and it varies from person to person (Gray, 2021). Similarly, this research analyzed the global vaccine distribution and access based on different ethical frameworks, and the views vary from ethicist to ethicist. This study has used cosmopolitan and nationalistic views of the global justice framework. The view of global justice is different for a cosmopolitan and

nationalistic ethicist. This depends upon the position of the ethicist. Every ethicist interprets the data based on their perspective.

Epistemology refers to “the branch of philosophy that studies the nature of knowledge and the process by which knowledge is acquired and validated” (Irwin, 1996). Epistemology used in this research is subjectivism which is based on real-world phenomena. Subjectivism seeks to understand other people’s perceptions of its actions (Scotland, 2012). In this research, the researcher tried to understand the ethical issues of global vaccine distribution and the various aspects of the issue based on the ethical frameworks by a different ethicist.

Research methods

The method of study used in this research was an ethical analysis within the global justice framework. Ethical analysis is a “method that could establish the groundwork for resolution of complex resource conflicts” (Gritten et al., 2009). In an ethical analysis, existing frameworks could aid in evaluating the issues and assess whether the framework could form a basis of a practical framework for the ethical analysis of public health involvements (Carter, 2014; Menard, 2010). The ethical analysis allows the researcher to cut through the myriad of perspectives to get to the centre of the problem and present it in a way that helps to move on to the next step of the process, which is a solution (Menard, 2010). Newer methods to public health ethical analysis focus on social ideals such as justice and solidarity, yet these newer approaches are frequently challenging to implement (Lee, 2012). A systematic ethical analysis may frequently lead to innovative alternatives that overcome or lessen ethical difficulties, as well as conclusions that are acceptable to the majority or majority of actors (Ortmann et al., 2016).

Various scholars have explained the ethical analysis in different sectors like business, public health, medical ethics, and education at a different level. However, each sector has a common factor: every area evaluates some ethical issue. The ethical analysis that comes under the domain of public health comprises of five steps and these steps have been explained in this research. The first step identified the problem and gathered relevant data to understand the issue. This step recognized the nature of the issue and identified the stakeholders involved and those affected by this problem. The second step identified the ethical frameworks and principles that underpinned this issue. The third step identified and analyzed the problem based on the ethical principles or frameworks. Step four was based on selecting and implementing the best alternative options that aligned with these ethical theories. The last step evaluated the implemented option and examined

the pros and cons of the option recommended (Canada, 2021; Gritten et al., 2009; Kizza, 2017). Steps 1 and 2 of ethical analysis were covered in the next chapter (Chapter 5; Results). Steps 3 to 5 were discussed in Chapter 6: Discussion.

As this research addressed the ethical and public health issues of global vaccine distribution, it followed a qualitative approach. Researchers could use qualitative research methods to study societal issues connected to public health that are not possible to investigate using quantitative approaches. In addition, studies utilizing qualitative methods could help us better understand several complicated public health topics (Isaacs, 2014).

Data collection methods

The data was collected from reports of major international bodies like the WHO, country-specific ministries of health, the Africa WHO coordinating bodies, UNICEF, Multilateral Leaders Task Force on COVID-19, United Nations Ethiopia, and also from scientific journal articles reporting data on the global COVID-19 vaccine distribution between high-income countries and low-income countries. The Multilateral Leaders COVID-19 Task Force is “a joint initiative from the International Monetary Fund, World Bank Group, World Health Organization, and World Trade Organization to accelerate access to COVID-19 vaccines, therapeutics, and diagnostics by leveraging multilateral finance and trade solutions, particularly for low- and middle-income countries.” (Multilateral Leaders Task Force on COVID-19, 2021). Therefore, the Multilateral Leaders COVID-19 Task force could provide an array of credible data from the different official organizations. In addition, the above-mentioned websites tend to have the latest data on vaccination status. The key search words used were “data on secured or expected COVID-19 vaccine doses,” “data on delivered doses of COVID-19 vaccines,” “global COVID-19 vaccine access data,” “COVID-19 vaccine distribution in Africa,” COVID-19 vaccine distribution in Ethiopia,” and “COVID-19 vaccine distribution in Yemen.”

The included data was mainly secured or expected vaccine supply (as % of the population) and delivered and administered doses (as % of the population) in low-income and high-income countries. The vaccine data of mid-November 2021 had been presented in bar charts and line graphs, as the study was conducted during this period and to get recent updates. However, the previous vaccine distribution data were also checked to compare the data from the beginning of the vaccine distribution. The data from the start of distribution of vaccines until 14 December 2021 were only included in this study as the data kept on changing and was difficult to keep a track on

the data. Nevertheless, the data collected over a constant period was helpful to the researcher to interpret the data. In the meantime, the number of COVID-19 cases and mortality reports were also collected from those selected countries to understand the situation of vaccine distribution and the COVID-19 cases. It also included the vaccine distribution scenario of high-income countries and African countries in general and provided two case examples from low-income countries. Newspapers, social media reports, and data from unofficial websites were excluded because of their potential bias. In addition, reports not published in English were also excluded.

Data Analysis

The collected data were analyzed by an ethical analysis within the global justice framework. An ethical framework is a tool or strategy for dealing with ethical issues in a practical way that frequently involves a step-by-step process (Ortmann et al., 2016). A similar type of ethical analysis was performed by Yuk Chiu Yip (2021) to analyze the health care resource allocation during the COVID-19 pandemic using the distributive justice framework. The research was analyzed within egalitarian, utilitarian, and prioritarian approaches. In addition, another similar ethical analysis was performed by Sterckx (2004) to analyze the ethics of patents and access to drugs in developing countries. In that study, the researcher attempted to construct a moral justification of the patent system and access to drugs based on three grounds: natural rights, distributive justice, and utilitarian arguments.

In this study, the global COVID-19 vaccine distribution data was presented first. Followed by the vaccine distribution data from the low-income countries (LICs), lower-middle-income countries (LMICs), upper-middle-income countries (UMICs), and high-income countries (HICs) were presented. Later, two countries were selected as case examples from the low-income countries. The data analysis was done by making ethical comments about the vaccine distribution scenarios in HICs, LICs, and selected LICs. Ethical frameworks were used to assess if the status quo can be morally justified within a global/distributive justice framework. Finally, the study suggested some recommendations consistent with the ethical frameworks to tackle vaccine inequity between low-income and high-income countries.

Ethics

The research did not require ethical approval as it does not involve any interviews or personal disclosures.

Resource and Budget

No perceived cost was needed as this research was conducted with the help of online articles and literature. However, unexpected costs that were incurred were met by the researcher.

Location

All data collection was conducted online.

Conclusion

This chapter discussed the research methodology and data analysis methods of this study. It detailed the ethical analysis steps and justified the selection of this research method. This ethical analysis method with an interpretive approach would be appropriate enough to explore the different ethical perspectives of COVID-19 vaccine distribution. The interpretation of the data would be based on the various global justice frameworks mentioned above. The results generated will be given in the next chapter.

Chapter 5: Results

Introduction

This chapter aims to present the collected data on COVID-19 vaccine distribution and to identify the significance of the problem. Steps 1 and 2 of ethical analysis have been discussed in this chapter. Firstly, this chapter discusses the COVID-19 vaccine distribution scenario of high-income, low-income, lower-middle-income, and upper-middle-income countries. Secondly, it discusses an overview of COVID-19 vaccine distribution in African countries and HICs in general. Then, drawing from the data, two LICs were selected as case examples. Later, this chapter discusses the vaccine distribution gaps and the COVID-19 situation in both selected countries. Finally, the chapter identifies the frameworks for ethical analysis.

Step 1 of Ethical Analysis: Identifying the problem and gathering relevant data

A CASE STUDY ANALYSIS OF DATA FROM MULTILATERAL LEADERS TASKFORCE ON COVID-19

As discussed in the literature review, there are various problems with global distribution and access to COVID-19 vaccines between high-income and low-income countries. The following data obtained are the recent data of secured or expected vaccine supply at the global level as of mid-November 2021. It should be noted that the term “Secured and/or Expected Vaccine Supply” denotes the doses that governments and regions had committed to purchasing through contracts with producers. Because of production timeline problems and local absorption capacity limits, these doses had been made accessible to nations across a variety of time frames. However, based on current production schedules and production capacity projections, experts predicted that nations and territories would have to wait until 2022 or later to obtain these doses (Multilateral Leaders Task Force on COVID-19, 2021). The data on the fully vaccinated population, administered doses and delivered doses in low-income countries (LICs), lower-middle-income countries (LMICs), upper-middle-income countries (UMICs), and high-income countries (HICs)

are presented using tabular columns, bar charts, and line graphs below. The researcher made line graphs and bar charts based on vaccine distribution data in mid-November 2021.

Table 2

Global status of COVID-19 Vaccine Distribution as of Mid-November 2021

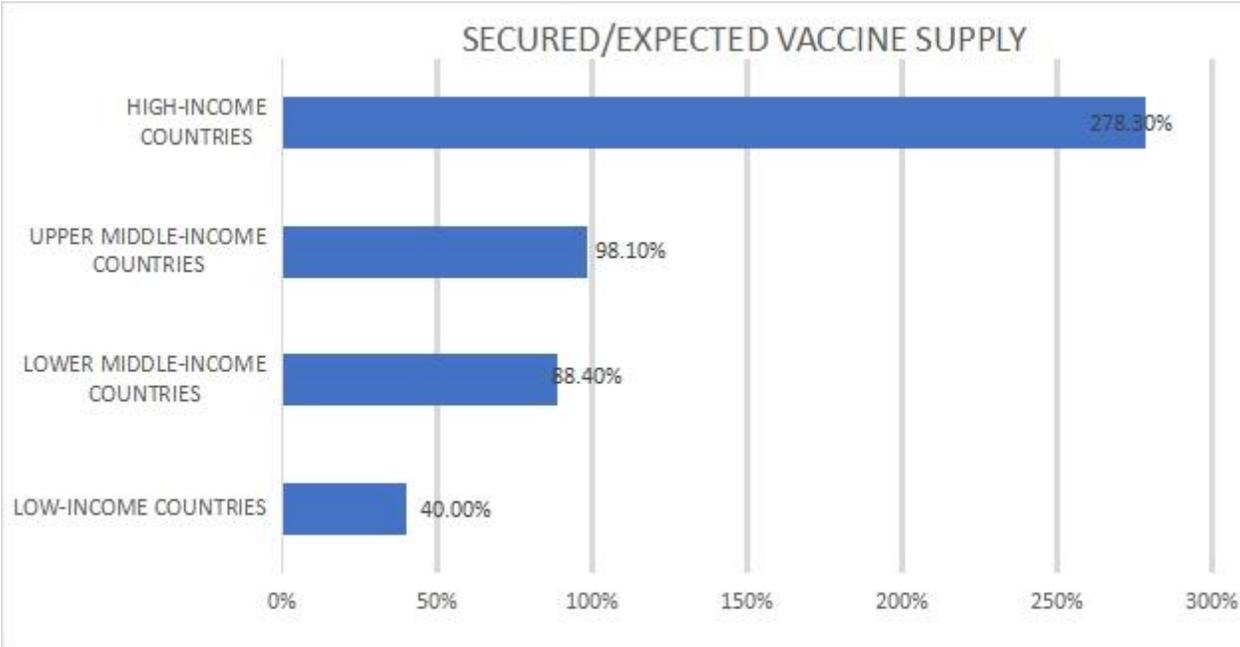
Fully vaccinated population	40.4%
Secured/expected vaccine supply	115.5%
Delivered doses	52.8%
Administered doses	46.9%

Source: (Multilateral Leaders Task Force on COVID-19, 2021).

Table 2 shows the global data on vaccine distribution. The data presented that the secured/expected vaccine supply was 115.5%, and the fully vaccinated global population was 40.4%. The delivered and administered doses were 52.8% and 46.9%, respectively.

Figure 1

Secured/Expected COVID-19 Vaccine Supply as of Mid-November 2021

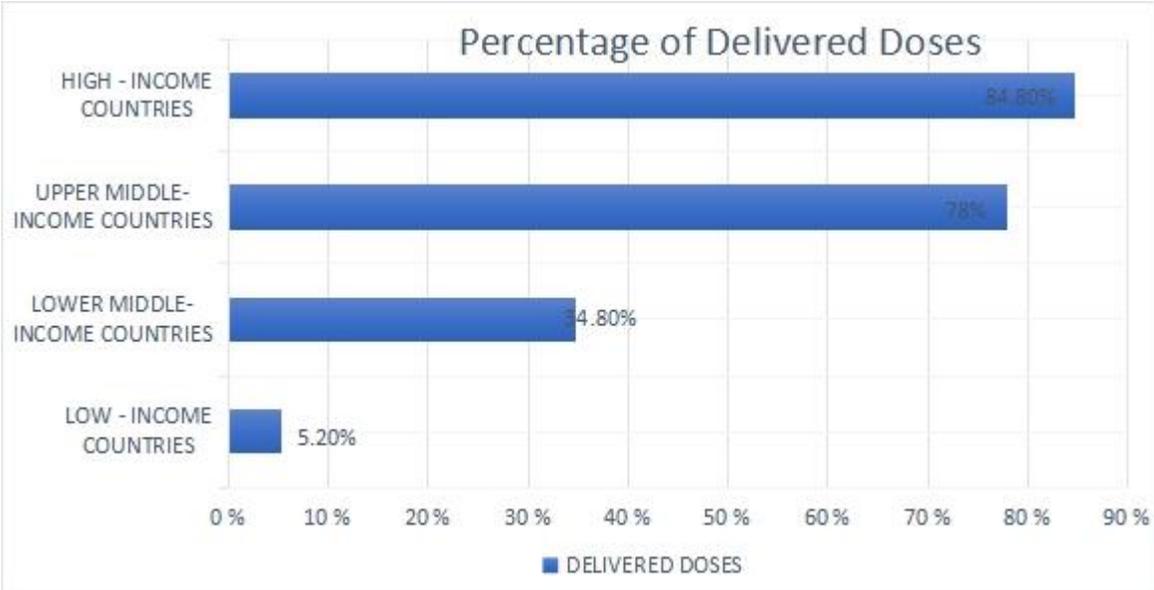


Source: (Multilateral Leaders Task Force on COVID-19, 2021).

It has been observed from the above bar chart that the highest vaccine that has been secured by the HICs was around 278.3%. However, LICs have secured only 40% of vaccines while LMICs were 88.4%, followed by the UMICs, 98.1%. Therefore, it was evident that LICs had fewer vaccines than HICs and other country groups.

Figure 2

Percentage of delivered doses of COVID-19 Vaccines as of mid -November 2021

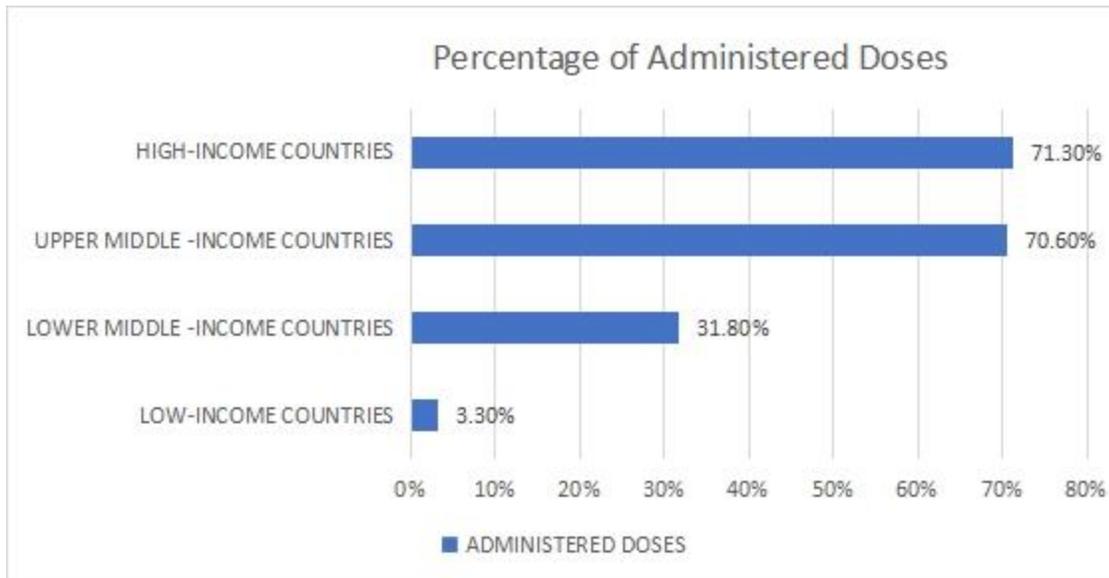


Source: (Multilateral Leaders Task Force on COVID-19, 2021).

Figure 2 shows the percentage of delivered doses for each country, respectively. It can be observed that the LICs had delivered the least number of doses which was only 5.2%, compared to the LMICs, which was 34.8%, followed by 78% for UMICs and 84.8% for HICs. Thus, it can be concluded that LICs were far behind in terms of “delivered doses.”

Figure 3

Percentage of Administered doses of COVID-19 vaccines based on country income level as of mid-November 2021

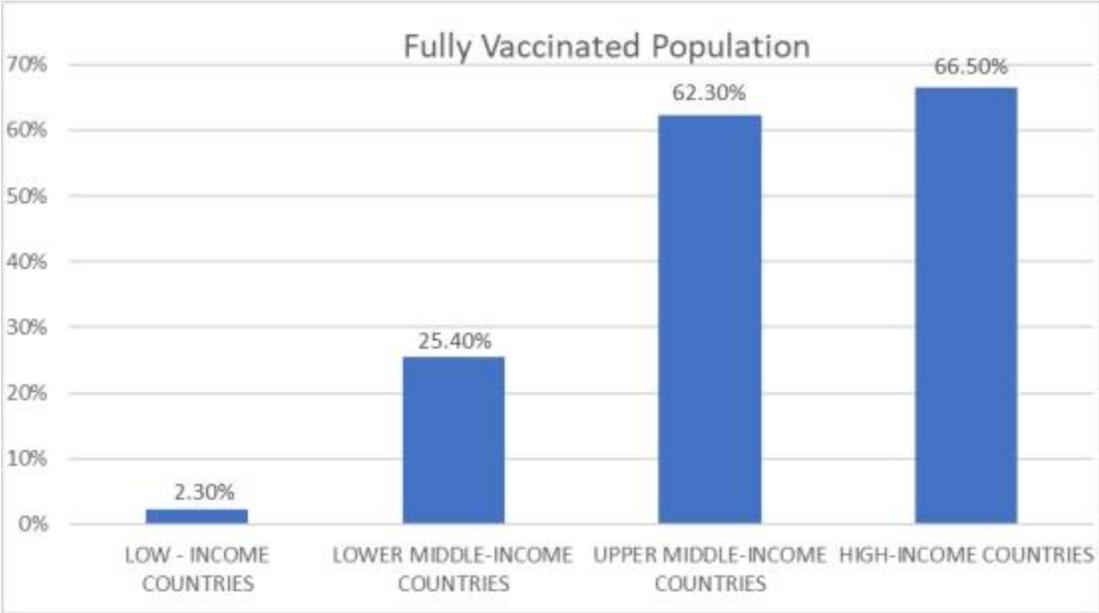


Source: (Multilateral Leaders Task Force on COVID-19, 2021).

Figure 3 shows the percentage of administered doses for each country. It can be observed that the LICs had administered the least number of vaccines, which was only 3.3%, compared to the LMICs, which was 31.8%, followed by 70.6% for UMICs and 71.3% for HICs. Thus, it can be concluded that low-income countries were far behind in terms of administered doses of COVID-19 vaccines.

Figure 4

Percentage of fully vaccinated population based on country income level as of mid-November 2021



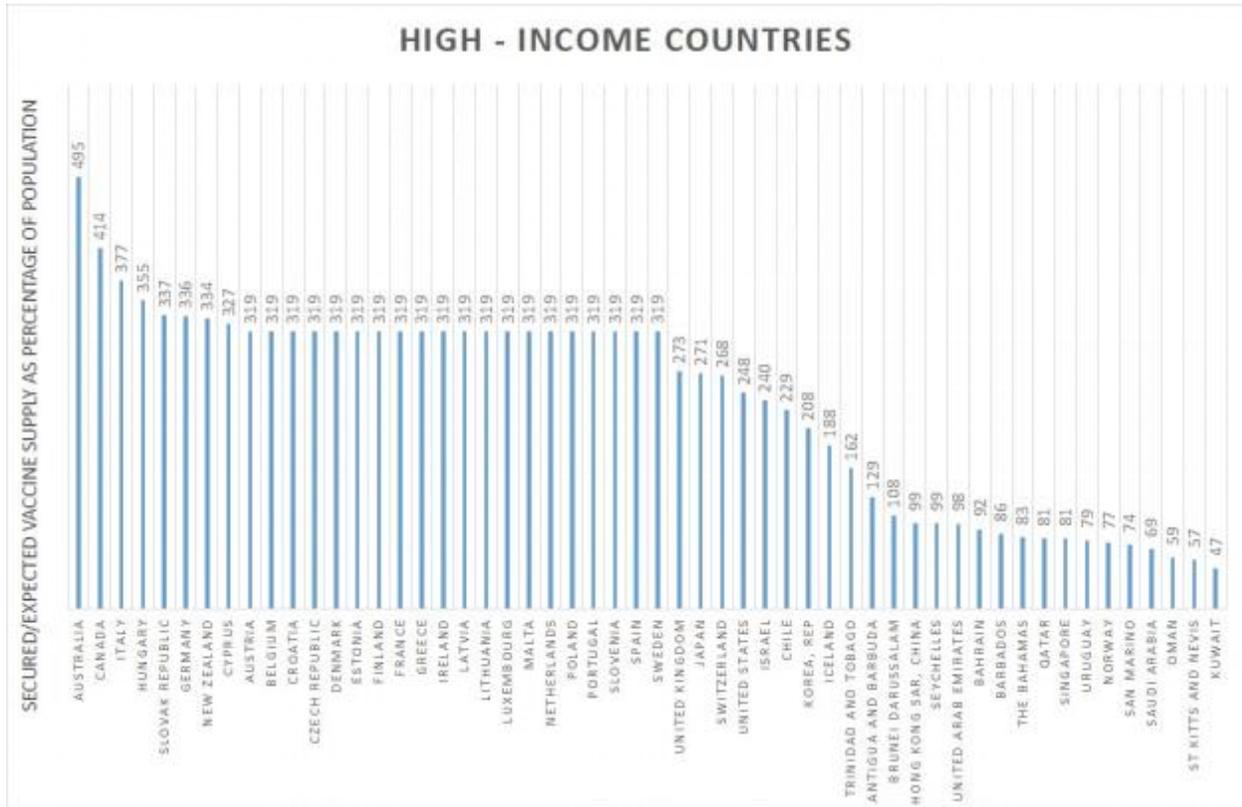
Source: (Multilateral Leaders Task Force on COVID-19, 2021).

Figure 4 shows the data on the fully vaccinated population of each country, respectively. It can be observed that 66.5% of people had been fully vaccinated in HICs, while 62.3%, 25.40%, and 2.30% in UMICs, LMICs, and LICs, respectively.

Detailed research regarding each country's secured or expected vaccine supply is represented in the line graph below. In addition, the line graph below represents the vaccine distribution data in all high-income countries and low-income countries separately.

Figure 5

Secured/Expected vaccine supply: High-income countries as of Mid- November 2021

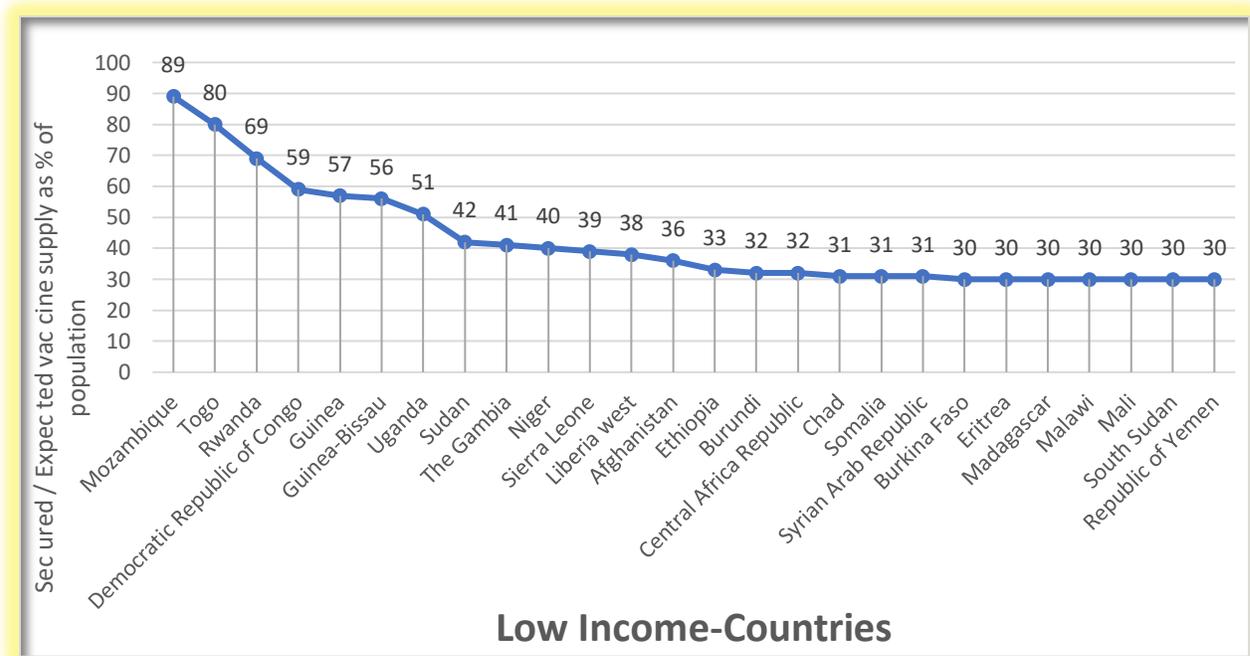


Source: (Multilateral Leaders Task Force on COVID-19, 2021).

It can be observed from the line graph that there were 54 high-income countries, and most of them secured excess doses. Only seven countries had less than 80% secured doses. However, all countries had secured a reasonable number of vaccines.

Figure 6

Secured/Expected vaccine supply: Low-income countries as of Mid- November 2021



Source: (Multilateral Leaders Task Force on COVID-19, 2021).

From Figure 6, it can be observed that 26 countries come under the low-income group. Of these 26 countries, 23 were in the African continent, two from the middle east and one from Asia. As a part of this study, two countries were selected as case examples. One from Africa and another from the Middle east. The countries identified were Ethiopia and Yemen. The situation in each country was discussed separately. The reason for the selection of these countries was justified in the section on each country. However, a general overview of vaccine distribution of high-income countries and African countries was discussed initially before discussing each country's situation separately in their respective section.

High-income countries: an overview of COVID-19 vaccine distribution

As discussed, 66.5% of people have been fully vaccinated in HICs while 2.3% in LICs as of mid-November 2021. HICs with a smaller populace and fewer COVID-19 infections received a more significant proportion of the reserved doses. For example, Japan, Canada, and Australia have reserved 1 billion doses despite contributing to just 1% of COVID-19 infections globally and having a combined population of less than 200 million (Kuehn, 2021). Furthermore, Israel and other countries started booster dosages. Also, from August 13, 133 million people in America have received their third COVID-19 vaccine dose. There have even been claims that the US arranged for unauthorized booster dosages.

Furthermore, numerous nations, including the United States, Canada, Israel, and the United Kingdom, had been discarding vaccines that were expired or were about to expire (Burki, 2021; Chagla & Pai, 2021). Finally, to support African countries, high-income countries stepped up dose donations. However, most vaccines reached their respective countries with little shelf life. For instance, a few African countries lost over 450,000 expired doses because they could not deliver them quickly (Jerving, 2021).

Africa: an overview of COVID-19 vaccine distribution

Africa had the lowest percentage of completely vaccinated people, which was around 7%, compared to other continents, as of December 13, 2021 (Adepoju, 2021). According to a study released by WHO Africa (2021) on November 25, just 27% of African health professionals had been completely vaccinated against COVID-19, leaving the majority of the staff on the frontlines vulnerable to the pandemic. Only one in every four African health professionals was properly vaccinated against COVID-19 infection. In contrast, a recent WHO worldwide assessment of 22 predominantly high-income nations found that over 80% of health care personnel were completely immunized. Furthermore, Africa had a severe and widespread lack of health professionals, with just one nation in the continent possessing the needed number of health workers (10.9 per 1000 people) to provide vital health services. Sixteen of the region's nations have less than one health worker per 1000 people. Any disruption in critical health services, as well as any infected healthcare practitioner, would have magnified the pandemic's impact. Therefore, it is critical for health personnel to have high vaccination coverage, not only for their safety but also for the patient's safety, and to guarantee that healthcare organizations remain operational during times of great need. Over 227 million vaccine doses had been delivered throughout Africa as of

November 25, 2021. In addition, 3.9 million doses were administered to health professionals in the 39 countries that reported data (WHO Africa, 2021).

The African continent faces problems with vaccine production. For instance, Africa currently produces only 1% of vaccines (Irwin, 2021). Moreover, African nations confronted various problems regarding vaccine rollouts, such as inadequate cold-chain storage and handling to resource scarcity (Adepoju, 2021). This vaccine storage is particularly problematic in Sub-Saharan Africa, where just 28% of healthcare facilities have stable power (Peacocke et al., 2021). Moreover, the rise of variants such as omicron would have exacerbated the vaccine distribution inequity in African and other low-income countries since high-income countries were planning for considerable booster dose programs concerning the emergence of this variant (UN, 2021).

In addition, according to the Global Fund (2021) assessment, COVID-19 has significantly impacted health services for HIV, TB, and malaria across the continent since access had been restricted owing to COVID-19 linked mobility restrictions. HIV testing was decreased by 41% overall, TB reference and screenings by 28% to 29%, and 50% of health centres reported COVID-19 infections in health care workers (Massinga Loembe & Nkengasong, 2021). Moreover, as per UNICEF, disruptions in immunization programs would have left 80 million children below the age of one unvaccinated (Massinga Loembe & Nkengasong, 2021).

Ethiopia: an overview of COVID-19 vaccine distribution

As discussed above, the LICs in Africa had a low number of doses of COVID-19 vaccines when compared to HICs. Ethiopia reported the first COVID-19 case in March 2020 (Tolu et al., 2020). Ethiopia was in the fourth position among African countries based on COVID-19 cases. Ethiopia was the low-income country, with the highest COVID-19 cases in Africa (WHO, 2021). Although the number of confirmed cases was modest at first, in late July 2020, the number of confirmed cases had surpassed 15,000, with more than 200 deaths. The situation is projected to have a great impact on low-income nations with inadequate health systems, such as Ethiopia. In addition, the COVID-19 outbreak has been predicted to put women, girls, young people, and socially vulnerable groups, including people living with HIV, at-risk (UN Ethiopia, 2020). As of December 2, 2021, Ethiopia had recorded 371,946 COVID-19 cases and 6787 deaths (WHO, 2021).

Ethiopia, an East African developing country, has a very low health care workforce density of about 0.96 per 1000 population. The country is confronted with a shortage of hospitals,

widespread use of public transportation, lack of sanitation materials including water, concealment of suspected cases, lack of personal protective equipment for health care providers, presence of immune-compromised people, and presence of a considerable number of homeless people. These were the major driving factors that made Ethiopia one of the most challenged developing countries during COVID-19 (Ayenew & Pandey, 2020). In addition, over 160 million people had been expected to be at risk due to a lack of access to the COVID-19 vaccine in Yemen, Syria, South Sudan, and Ethiopia (Acharya et al., 2021).

Ethiopia received its first 2.184 million doses of the Astra Zeneca COVID-19 vaccine via the COVAX Facility on March 7, 2021 (WHO Africa, 2021). The data from the multilateral leaders task force on COVID-19 as of December 2 showed that Ethiopia was far behind in vaccine distribution. The secured or expected vaccine supply as percentage of population was only 33%. Moreover, the gap between secured or expected doses needed to vaccinate 40% of the population was 16,502,672 and for 70% was 86.6 million. The gap between the current secured and indicative target of 70% of population was 37.63% of the total population. Therefore, it was impossible to guarantee that Ethiopia could vaccinate 70% of its population by mid-2022. As of December 2, 2021, the percentage of people fully vaccinated was 1.23%, and the percentage of the population who received at least one dose was 6.67% (Multilateral Leaders Task Force on COVID-19, 2021).

Yemen: an overview of COVID-19 vaccine distribution

Yemen has been devastated and nearly destroyed by its catastrophic civil war, and it is now dealing with the outbreak of coronavirus along with other countries. Yemen was not only fighting COVID-19 amid a devastating conflict, but it was also dealing with other illnesses such as cholera, diphtheria, and measles. Even before the COVID-19 epidemic, Yemenis were forced to depend on themselves and faced several challenges such as poverty, continuous conflict, infections, illnesses, and a lack of equipment (Alsabri et al., 2021). Only around half of the hospitals and healthcare institutions are fully operational, and even those that are not performing at their total capacity, healthcare personnel, and facilities are under-funded in terms of both equipment and funds (Alsabri et al., 2021). Approximately 18% of the country's 333 districts already lack physicians. There were ten healthcare personnel for every 10,000 people, which was less than half of the World Health Organization's standard (Looi, 2020). The above factors indicated a chance of worsening the situation when there was an increase in cases and deaths.

Yemen's first COVID-19 case was reported in the southern province of Hadhramaut on April 10, 2020. Aden, Taiz, and Sanaa provinces had reported cases and fatalities by the end of May (Koum Besson et al., 2021). As of December 2, 2021, Yemen recorded 10006 cases and 1950 deaths (WHO, 2021). Koum Besson et al. (2021) conducted satellite photography for population mortality estimation. The study found that across the Aden governorate in Yemen, approximately 1500 excess burials happened up to July 6, and 2120 up to September 19, corresponding to a peak weekly increase of 230% from the counterfactual. These data suggested a significant increase in mortality in this Yemeni region in the first wave of the COVID-19 outbreak, which peaked in September 2020 and then faded.

Yemen received its first set of vaccine doses (360,000 COVID-19 vaccine doses) on March 31, 2021, shipped via the COVAX Facility (UNICEF, 2021). The data from the multilateral task force as of December 2, 2021, showed that Yemen is far behind in vaccine distribution. The secured or expected vaccine supply as percentage of the population is only 30%. Moreover, the gap between secured or expected doses needed to vaccinate 40% of population is 6,098,128 and for 70% was 24.4 million. Therefore, the gap between the current secured and indicative target of 70% of population is 40% of the total population. Thus, it was hard to predict whether Yemen could vaccinate its 70% population by mid-2022. As of December 2, 2021, the percentage of people fully vaccinated was 1.19%, and the percentage of the population who received at least one dose was 1.8% (Multilateral Leaders Task Force on COVID-19, 2021). These numbers showed that Yemen has far to go to reach its targets.

Step2 of Ethical Analysis: Identifying ethical frameworks/theories and principles underpins this issue

The study was analyzed this topic based on the global justice frameworks. These ethical frameworks were covered in chapter 3. Different perspectives of the global justice framework, such as the cosmopolitan approach of global justice (Rawls' and Pogge's views), Nationalistic/communitarian approach of global justice, were used to analyze this data. The global justice framework was selected since the current global COVID-19 vaccine distribution has distributive justice issues. For example, LICs secured fewer vaccines than HICs. The cosmopolitan ideal emphasized the welfare and health of people irrespective of borders. Thus, this approach had been suitable to analyze this issue since COVID-19 is a global public health problem and there is need to address this issue regardless of boundaries. Furthermore, Rawls'

and Pogge's views for disadvantaged populations were very significant as their theories gave importance to equality and stress HICs duties towards LICs. In addition, nationalistic and communitarian approaches would be used to analyze the data to assess the duties of a country towards its own population. Therefore, these approaches would be suitable to assess the current global COVID-19 vaccine distribution issues.

To summarize, this chapter explained step 1 and step 2 of ethical analysis. The problem and ethical framework had been identified. This chapter also clearly showed the disparities in vaccine distribution between HICs and LICs, especially in the African low-income countries. The situation in the high-income countries, the African continent, Ethiopia, and Yemen had been explained separately. These data would be analyzed in the next chapter using an ethical analysis.

Chapter 6: Discussion

The data analysis was performed in this chapter. An ethical analysis method was used to analyze the data. As discussed, the data related to vaccine distribution was analyzed based on the cosmopolitan and nationalistic approach of the global justice framework. The first section presents the ethical analysis, and the second section provides recommendations or alternative options based on the ethical theories. The final section discusses the limitations of the study.

Step 3 of Ethical Analysis: Identify and analyze the issue based on ethical frameworks/theories.

The cosmopolitan approach of the global justice framework

According to cosmopolitanism, the responsibility to allocate resources to others is not limited to state borders (Cabrera, 2004). The concept considers all individuals as citizens of the world (Sherman, 2007). Moral cosmopolitanism tends to achieve a base from various justice concepts such as sufficitarian justice, prioritarian justice, welfarist justice, and egalitarian justice (Jecker et al., 2021). These several justice ideas unite on the belief that individuals in high-income countries (HICs) owe enormous responsibilities to those residing in low-income countries (LICs). Each vow to the norms of cosmopolitanism and opposes the extreme kinds of nationalism. In addition, each sets a high value on people's responsibility to aid those in need, regardless of citizenship.

Based on the above cosmopolitan argument, HICs have the inherent responsibility to share resources with LICs like Ethiopia and Yemen. As discussed in the results chapter, most low-income African countries have secured a low number of vaccines and have low vaccinations rates compared to other country income groups. HICs had announced vaccine donations to LICs. However, it was only after securing sufficient doses for their own population. It is considered a good sign that, dose donations to Africa have been increased, and it shows the responsibility and generosity of HICs towards LICs. However, most vaccines often have a short shelf-life; as previously mentioned, several African countries have lost almost 450,000 expired doses due to a lack of capacity to rapidly administer them. This action has created a challenging situation for countries to prepare for vaccination programs. This practice is not morally justified in providing quality doses to own population and supplying expired doses for non-compatriots, leading to the violation of cosmopolitan global justice concept.

Another instance discussed in the results chapter is that HICs had destroyed a bulk of vaccines because of the undue expiry associated with them. These practices of HICs are not justifiable when LICs have a lower share of secured vaccines. HICs could have donated these doses to the countries reported to have a lower number of vaccines before the expiry date. It shows that the HICs prioritized and showed preferential toward their own people and did not consider all people as citizens of the world, and even ignored sharing the resources with others irrespective of the outlined borders. Apart from these observations, on August 4, 2021, the WHO Director-General advocated for a freeze on booster shots, stating, "We cannot allow nations that have already used up the majority of the global supply of vaccines utilizing even more of it, while the world's most vulnerable people remain unprotected." At the time of his speech, persons in high-income and upper-middle-income countries had stocked up more than 80% of the doses of COVID-19 vaccinations, which had been distributed globally. Most of the government authorities chose to disregard Tedros' recommendation. White House spokesperson Jen Psaki called the concept of the US having to choose between booster injections for its own people and sending vaccinations to other countries a "false choice" (Burki, 2021). Thus, these scenarios hint that those HICs care about their population without realizing that no one would be safe unless everyone is. The cosmopolitan argument is not parallel with the above-discussed scenarios. However, all these situations are stream aligned with the nationalistic view of justice; hence, it showed the responsibility of a country towards its people.

Rawls' cosmopolitan view on global justice

The cosmopolitan perspective by Rawls in his law of people principle also emphasized that, in terms of distributive justice, the HICs have the moral obligation to help disadvantaged countries to reduce health disparities. Rawls' difference principle also necessitates agreements for the benefit of the least advantaged nations or peoples, and HICs should help LICs in a variety of ways (Van Parijs, 2007). However, did high-income countries follow this principle? The countries discussed in the previous observations mainly belonged to socially and economically disadvantaged populations. As discussed, most LICs do not have enough healthcare facilities and healthcare personnel. Only 27% of healthcare workers in Africa had been fully vaccinated. Moreover, these countries tend to acquire other communicable diseases and could come across conflicts along with this pandemic. For instance, people with other communicable diseases like HIV had missed their routine clinical checkups and treatment in Ethiopia. This situation will affect the well-being of the people and accelerate the risk for COVID-19 (Chilot et al., 2021). The

researcher is not arguing that HICs do not support low-income African countries. However, this health disparity in terms of vaccine distribution is evident. It could be illustrated on the basis that the current global vaccine distribution is not in line with Rawls' principles, as HICs could have helped these disadvantaged populations from the start of the vaccine distribution and have reasonably addressed this inequity.

Furthermore, Rawls' justice principles also argued that equalities must be extended beyond nations and must not be confined to the boundaries of a single nation. COVAX's proportional allocation system and the World Health Organization's Strategic Advisory Group of Experts on immunization allocation framework both consider the entire world as a view. However, obstacles like bilateral deals and Advance Purchase Agreements (APAs) grant favour to HICs which leads to a reduction in the influx of vaccines to COVAX facilities. This situation will finally affect the LICs with a low number of vaccines. For instance, as discussed in the results chapter, nineteen low-income countries had below 50% of secured or expected vaccine supply, while only one HIC belonged under this category. Also, most of the HICs had secured twice or thrice doses of vaccines than required. These current gaps in vaccinations between high-income and low-income African and other countries will pave the way to think in-depth about whether Rawls' justice principles were completely fulfilled. However, the researcher also agrees that other factors like lack of vaccine deployment facilities and vaccine hesitancy could also play a role in decreased vaccination rates in LICs.

Pogge's cosmopolitan view on global justice

From the cosmopolitan justice perspective, Thomas Pogge emphasizes individualism, that is, individuals will be the fundamental moral priority irrespective of nations or states (Obi, 2014). Therefore, when it comes to the distribution of COVID-19 vaccines, the focus should be on individuals irrespective of its place of origin. However, the current vaccine distribution trend mostly focused on HICs rather than on an individual level. Access to COVID-19 vaccine remains a right for all individuals, whether they belong to a high-income country or a low-income country. All people deserve to benefit from the COVID-19 vaccine in an equal manner. Therefore, no country should be placed behind in the distribution of vaccines.

Egalitarianism and global justice

In addition, Gu (2019) argued that egalitarianism in the national setting requires equitable rights for all individuals, but egalitarianism in the global perspective requires full equality of all nations or peoples. Therefore, it is necessary to discuss whether the egalitarian perspective of distributive justice is fulfilled in vaccine distribution between LICs and HICs. Klumpp et al. (2021) researched public opinion on vaccine distribution in the United States and Germany as a representative of HICs with strong redistribution capacity based on distributive justice theories. The study indicated that most of the people in the US and Germany preferred utilitarian and egalitarian vaccination distribution theories over the predominant libertarian or meritocratic ones.

Was there equity in the global vaccine distribution? Despite continued appeals for more fairness in the worldwide distribution of COVID-19 vaccinations, there is still a significant gap between high- and low-income countries. There is an uneven distribution of vaccines, even though the WHO requested equity for the same. As discussed, countries like Ethiopia and Yemen face vaccine scarcity, while high-income countries like Turkey and the United States have commenced the administration of booster doses. The COVAX initiative has been developed for equal distribution and access to vaccines in LICs. However, as discussed, as of mid-November 2021, the HICs secured about 278.3% of vaccines, which is quite a sizeable portion compared to LICs, which is 40% (Multilateral Lateral Leaders Task Force on COVID-19, 2021). Therefore, this scenario hinted that equality is not achieved. Furthermore, COVAX aimed to deliver 2 billion doses by 2021, but it has shipped only over 600 million doses as of 12 December 2021 at the time of writing and lacked more than half of the targeted doses (GAVI, 2021). In addition, the aim of vaccinating 40% of all countries by the end of 2021 was not achieved. For instance, based on a WHO report from December 23, 2021, around 98 countries have not reached this target (WHO, 2021).

Moreover, the egalitarian's primary concern is equal justice. Luck egalitarianism supported the concept of health equity. Luck egalitarianism implies society should treat persons equally who are subjected to unchosen disadvantages (Jecker et al., 2021). For instance, it is unjust for low-income countries like Ethiopia and Yemen to be not treated equally by the vaccine allocation systems without any faults or decisions of their own. As discussed, they secured only 33% and 30% of the vaccines as percentage of the population. At the same time, HICs like Australia and Canada secured 495% and 414 %, respectively.

The nationalistic and communitarian approach of the global justice framework

Nationalistic frameworks argue that the reach of distributive justice is limited within the boundaries (Kime, 2010). Vaccine nationalists generally believe in moral nationalism, the philosophical belief that people have a special obligation to their fellow citizens (Jecker et al., 2021). From a communitarian perspective, Garcia (2009) also supports this state-focused concept by focusing on citizens over non-compatriots in different distributions. Current vaccine distributions lean toward these concepts even though proportional allocation systems are in place. For instance, based on present study data, the HICs secured extra doses for their citizens while LICs did not have enough doses. Nationalists had some initial justifications regarding global vaccine distribution in HICs. For instance, HICs like the US and Italy were initially severely affected by the virus. Hence, the vaccine rollout has prioritized these countries, focusing on people most at risk of death and serious sickness. The researcher agrees with this practice that, based on nationalistic and communitarian justice, all countries have commitments toward their people, and each nation has to prioritize their people in an emergency. However, based on the observation, the high-income countries' continued stockpiling of vaccines is hard to justify because vaccines had already been administered to the most vulnerable individuals in those countries, and now it is the turn for the rest of the people.

The ethical analysis highlighted that most of the cosmopolitan global justice theories are violated concerning this global distribution of COVID-19 vaccines. Most of the vaccine distribution practices leaned toward nationalism and were not mirrored with cosmopolitan theories. Therefore, this issue has to be addressed since this vaccine inequity could favour the emergence of new variants of SARS-CoV-2 and prolong the pandemic duration.

Step 4 and 5 of ethical analysis: suggesting and evaluating alternative options in line with the ethical theories/frameworks.

Ethical analysis has been conducted in the above section. Based on this ethical analysis, it is identified that access to and fair distribution of COVID-19 vaccines between HICs and selected LICs could be guided by cosmopolitan global justice frameworks. The following paragraphs highlight some recommendations in line with these ethical frameworks.

❖ Formation of an independent Health Organization

Individuals from LICs and HICs have equal rights to get the COVID-19 vaccines. The study identified a substantial disparity in vaccine distribution between HICs and LICs. As discussed, COVAX was created to ensure equitable distribution of COVID-19 vaccines. However, the proper functioning of the system was hampered by many external factors.

Therefore, it would be better to form an independent health organization with all supreme power and moral credentials to allocate COVID-19 vaccines to all countries. The researcher proposed an independent body because if the WHO and the UN had sufficient authority to manage vaccine stockpiling, the world's vaccine distribution disparity would not have worsened as it is witnessed today. As a result, the researcher proposes a unique approach that is in line with the cosmopolitan global justice framework by offering all countries an equal opportunity.

All developed and developing countries should be under this health organization. This organization will decide how vaccines should allocate equally to each country based on the severity and risk of COVID-19. In addition, this organization should identify vaccine distribution constraints at the national level, such as lack of facilities to administer vaccines and should provide facilities, to overcome these barriers, along with the allocation of vaccines.

The organization should not encourage any forms of governmental and political pressures in allocating vaccines and should not get influenced from vaccine manufacturers and purchase agreements. However, there must be chances of objections from governments and vaccine manufacturers. The vaccine allocation should be performed only under this autonomous health body. The allocation must be irrespective of countries income level. This system should consider all individuals equally. The development of this type of organization could help in other public health emergencies. Moreover, the initiatives like this could fulfill the cosmopolitan global justice responsibilities.

❖ **Dose donations to low-income countries**

The study identified that many people in LICs, even healthcare workers, had not been vaccinated even with a single dose. High-income countries could have helped LICs by donating the doses to countries where the vaccines are scarce; thereby, gaps in vaccine inequity could be filled. Additionally, the beginning of booster programs in HICs concerning the emergence of the omicron variant could persist the vaccine inequity (WHO, 2021). According to Matta et al. (2021) a low-vaccination rate could create an environment for the virus to mutate. Therefore, it would be better

to complete the first-round vaccination in all countries as soon as possible to prevent the emergence of new variants, which will help both HICs and LICs. In addition, this action would help to fulfill the cosmopolitan global justice theories.

❖ **Priority to least advantaged and vulnerable population**

As discussed in the results chapter, LICs like Ethiopia and Yemen are disadvantaged in terms of lack of healthcare facilities, few healthcare workers, and confronting other communicable diseases and conflicts. It is anticipatory to prioritize these countries for vaccine allocation as the study identified that these countries are at most risk of developing COVID-19 infections. The vaccine allocation system should help identify these countries and provide sufficient vaccines along with all the facilities needed for vaccine administration. For instance, a country with fewer healthcare workers could temporarily use healthcare workers from neighboring countries to implement vaccination programs and fill the gaps in vaccine distribution inequity. However, this suggestion needs further assessment as it cannot be predicted whether it is practical or not.

Thus, based on this ethical analysis it can be summarized that these suggestions could help to ensure access to equitable distribution of vaccines between HICs and LICs. Incorporating these suggestions into the current vaccine allocation systems could aid in the equal distribution of vaccines. It is identified that cosmopolitan theories of global justice, Rawls' difference principle, Rawls' law of people principle, Pogge's individualism, and egalitarian theory of global justice could guide access to a fair distribution of COVID-19 vaccines between high-income and low-income countries. However, most of these global justice theories had been violated in this vaccine distribution. Therefore, the researcher prefers cosmopolitanism and a moderate nationalism to achieve global justice in vaccine distribution between HICs and LICs.

Limitations of this study

There might be certain possible limitations in the study. The first is that the shifts in collected vaccine data, like secured and administered doses, could change daily, as the vaccine distribution is a continuous process. This study mainly used the vaccine distribution data in mid-November 2021, as the data collection was done during this period. The line graphs and bar graphs were prepared based on the data. In addition, all the data on COVID-19 cases and vaccine distribution data included were within the period of December 14, 2021, only. No relevant data have been

collected after this time as the researcher had to finish this case study in a limited time frame and also check if the WHO's aim of vaccinating 40% of each country had been achieved or not in 2021. Therefore, the interpretations and alternative options were based on the same. There might be chances of increased secured doses of vaccines due to new dose donation pledges following the emergence of the omicron variant. However, the gap between high-income and low-income countries regarding vaccine distribution is evident from the beginning of vaccine distribution.

Another limitation is the researcher's personal biases. For instance, an ethical analysis was conducted, but the researcher is not an expert in this field, and the study was performed within the researcher's knowledge in this area. In addition, the scope and strength of discussions in this study had been compromised in various stages compared to the studies of expert researchers.

Apart from these limitations, this study still significant concerning the ethics of the global distribution of COVID-19 vaccines between countries. The study identified the ethical frameworks that can guide access to equitable distribution of COVID-19 vaccines between high-income and low-income countries.

Conclusion

This chapter explained steps 3,4, and 5 of ethical analysis. The ethical analysis was conducted using the cosmopolitan and nationalistic global justice framework. Based on the analysis, alternative options and recommendations were made. The limitations of the study were also discussed. The next chapter will summarize this research by incorporating the main points and will discuss the implications and directions for future study.

Chapter 7: Conclusion

Summary and findings of the study

The purpose of this dissertation was to identify ethical and public health issues concerned with vaccine distribution and recognize the ethical frameworks that could guide access to equitable distribution of COVID-19 vaccine between HICs and LICs. The COVID-19 vaccine distribution data of HICs and LICs were collected and later performed an ethical analysis within the global justice framework to answer the research questions.

The vaccine distribution data were analyzed within cosmopolitan global justice, Rawls' and Pogge's cosmopolitan views on global justice, egalitarian views of global justice, and nationalistic and communitarian views of global justice frameworks. The study identified that most of the global justice theories do not support the current vaccine distribution. Nationalism was predominant over cosmopolitan views of global justice concerning COVID-19 vaccine distribution, since the HICs were given importance to their own population than non-compatriots. The study identified that HICs secured most of the available vaccines than LICs. It has indicated an inequitable distribution of vaccines between HICs and LICs.

The study identified that African and other LICs such as Yemen and Ethiopia were more vulnerable to COVID-19 infection. In addition, the principle of priority to the disadvantaged population was violated in this scenario since most of these countries did not have enough health care facilities, confronted with other communicable diseases and conflicts.

The study found that cosmopolitan global justice, Rawls', and Pogge's cosmopolitan view on global justice could enable access to the fair distribution of vaccines between HICs and LICs. Since these theories consider all individuals as citizens of the world and prioritize disadvantaged populations. Therefore, these ethical frameworks could bridge the gaps in vaccine distribution inequity. However, the researcher identified that cosmopolitanism and a moderate nationalism would offer a moral justification for the equal distribution of vaccines. It could be explained that countries have a responsibility to allocate vaccines to people in other countries; also, a country may be ethically justified in providing a limited population preference to its own people.

The current gaps in vaccine distribution could be addressed in line with these ethical frameworks. The suggestions include dose donations, priority to disadvantaged populations, and the formation of an autonomous health organization with all supreme power in equal distribution of vaccines.

Implications of the study and directions for further study

The results of this study could be used as a guide when revising and reassessing the current ethical vaccine allocation systems. In addition, the study could guide in making ethical proposals for equitable distribution of vaccines in future pandemics. The findings will contribute to building the body of knowledge in this growing and important area of health research. From a public health point of view, the study findings are critical for policy makers.

As the study was performed in a short period, the researcher used limited data. This study can be broadened in many ways, such as it could be designed as a quantitative study involving a large sample. Vaccine procurement data and the population of each high-income country could be collected and further statistically analyzed to evaluate whether the vaccine procurement has been based on the countries' population and COVID-19 burden or vice versa. This study could provide robust results and adds to the body of knowledge in this area of research.

Conclusion

The inequity in the global distribution of COVID-19 vaccines is a growing concern in the current world. This research identified that the pandemic cannot be contained if high-income countries have stockpiles of the vaccines whilst others do not have access to them. The study reflects that a considerable cosmopolitan global justice approach could be a solution for equal distribution of vaccines across countries. However, a moderate nationalistic and communitarian approach could fulfill the vaccine rights for compatriots since each country has a moral obligation to its own people. In conclusion, the researcher suggests that there should be a fair distribution of vaccines between countries irrespective of borders and country income level and solely be based on COVID-19 burden and risk.

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