

Exacerbated Global Health Inequity Amidst the COVID-19 Pandemic

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Abstract

The COVID-19 pandemic has starkly exposed and exacerbated existing global health inequities, particularly in the realm of vaccine distribution. This article, based on a systematic literature review, identifies and analyzes the key barriers to equitable vaccine distribution and explores their implications for global health governance. It highlights significant disparities in vaccine access between high-income countries (HICs) and low- and middle-income countries (LMICs), driven by supply chain disruptions, vaccine hesitancy, and geopolitical tensions. HICs have benefited from advanced healthcare infrastructure, enabling early and extensive vaccine access, including booster doses. In contrast, LMICs have encountered delayed vaccine rollouts, inadequate cold chain logistics, and heavy dependence on global health initiatives like COVAX. These disparities have prolonged the pandemic, increased the risk of new variants, and intensified health disparities. To address these challenges, this article proposes actionable strategies including strengthening global cooperation, reforming intellectual property laws to support local vaccine production, improving cold chain infrastructure in resource-limited settings, and conducting tailored education campaigns to reduce vaccine hesitancy. By reimagining global health governance and prioritizing equity, these measures can help build a more resilient, inclusive, and prepared global health system for future pandemics.

Keywords: COVID-19, Vaccine distribution, Equity, Equality, Global health inequities

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Introduction

COVID-19 pandemic has been one of the most significant global health crises in recent history, disrupting societies, economies, and healthcare systems worldwide. While the rapid development of vaccines was a scientific triumph, the pandemic has also laid bare the deep-seated inequities in global health. As the virus spread, it quickly became apparent that the burden of disease was not evenly distributed, with low-income and vulnerable populations disproportionately affected by both the health and socio-economic impacts of the pandemic.¹⁻³

These inequities stem from several factors, including disparities in national wealth, inadequate healthcare infrastructure in low-income countries, and geopolitical dynamics that influence global vaccine distribution.⁴ For example, high-income countries (HICs) were able to secure the majority of vaccine supplies early, vaccinating a significant proportion of

their populations.⁵ In contrast, low- and middle-income countries (LMICs), such as Burundi and South Sudan, faced delays in accessing vaccines and struggled with distribution due to limited resources and infrastructure.⁶ This stark contrast highlights the broader global health inequities that the pandemic has both exposed and exacerbated, directly opposing the goals outlined in the United Nations Sustainable Development Goal (SDG) 10: Reduced Inequalities.⁷

Existing literature has extensively documented the disparities in vaccine access between HICs and LMICs, emphasizing the disproportionate impact of the pandemic on vulnerable populations. These disparities have highlighted the urgent need for more effective global health governance and have raised critical questions about the roles of public-private partnerships, intellectual property rights, and the balance between nationalism and globalism in global health.^{2, 10-12}

Despite the wealth of research on these topics, there remains a crucial gap in understanding the real-world implications of these disparities, particularly from the perspectives of those on the front lines of the pandemic response.¹³ Public health officers and healthcare workers in different income countries have unique insights into the challenges of vaccine distribution, the impact of these challenges on public health outcomes, and the broader implications for global health equity.¹³ It is essential to examine the challenges and barriers that have contributed to these inequities, as well as to explore potential solutions that can lead to a more equitable and resilient global health system.

The aim of this article was to identify and analyze key barriers to equitable vaccine distribution and explore their implications for global health governance. By addressing these barriers, this article seeks to contribute to the discourse on improving global health equity for future pandemic responses. The synthesis of professional perspectives and evidence underscores the need for a more effective and equitable international response mechanism to ensure no country is left vulnerable in future pandemics.

COVID-19 Vaccine Distribution

This article was based on a systematic literature review aimed at identifying relevant studies and reports addressing disparities in vaccine distribution and their impact on global health equity.

Systematic Search for Literature Review

A targeted literature review was conducted to identify relevant studies and reports addressing disparities in vaccine distribution and their impact on global health equity. The review process followed a systematic search strategy guided by the PICO (Population, Intervention, Comparison, Outcome) framework,¹⁴ Boolean operators,¹⁵ and specific inclusion and exclusion criteria.

1) PICO Criteria: The PICO framework guided the search to ensure precision in identifying relevant studies:

- **P (Population):** Public health officers and healthcare workers from various income settings.
- **I (Intervention/Exposure):** Vaccine distribution and accessibility challenges.
- **C (Comparison):** Equitable vs inequitable distribution outcomes.
- **O (Outcome):** Impacts on global health equity and governance.

2) Search Strategy Using Boolean Operators: Boolean operators were used to construct focused search strings for each database. The following is an example search string applied:

- **Search String:** ("COVID-19" OR "Coronavirus" OR "SARS-CoV-2") AND ("Vaccine distribution" OR "Access to vaccines" OR "Vaccine inequity") AND ("Global health" OR "Health disparities" OR "Public health response") AND ("Low-income countries" OR "LMIC*" OR "Global equity").

This search strategy was applied across multiple databases, including PubMed, Scopus, and Google Scholar, ensuring extensive coverage of relevant literature.

3) Inclusion and Exclusion Criteria: To ensure the relevance and quality of the selected studies, the following inclusion and exclusion criteria were applied:

- **Inclusion Criteria:**
 - o Studies published between 2020 and 2024.
 - o Articles addressing vaccine equity, distribution disparities, or public health responses.
 - o Publications focused on global health or healthcare disparities.
 - o English-language studies.
 - o Systematic reviews, meta-analyses, observational studies, and policy analyses.
- **Exclusion Criteria:**
 - o Articles not related to COVID-19 vaccine distribution or global health equity.
 - o Studies published in languages other than English.
 - o Opinion pieces, editorials, or commentaries without substantial evidence or data.
 - o Studies focusing solely on HICs without addressing global implications.

4) Search Process and Results: The initial search yielded a broad range of studies. Abstracts were reviewed to identify studies meeting the PICO criteria, followed by a full-text review of selected articles. This method ensured comprehensive coverage of the literature related to vaccine distribution inequities between HICs and LMICs.

Synthesis of Perspectives and Evidence

The findings from the literature underscore the significant challenges of vaccine distribution, particularly highlighting the disparities between HICs and LMICs. HICs often benefitted from robust systems ensuring early vaccine access and booster coverage, while LMICs experienced delays, inadequate infrastructure, and heavy reliance on global initiatives like COVAX. Based on these insights, this review proposes actionable strategies including strengthening global cooperation, reforming intellectual property laws, enhancing cold chain logistics, and developing tailored education campaigns to mitigate vaccine hesitancy.

Global Health Equity and the Continuing Impact of COVID-19 Challenges to Global Health Equity in the COVID-19 Era

The public health crisis of the COVID-19 pandemic has not only been a threat to people's lives and health but has also widened the existing gaps of health inequity.² Alarming inequities are globally present across the continuum of healthcare—from access to testing and timely diagnosis, to access to critical care, and to access to vaccines. These threats endanger global health security with over 700 million confirmed cases and

approximately 7 million deaths globally, with estimates that the real deaths may be 3 times higher.^{4, 8, 9, 12, 17}

Even though COVID-19 is no longer categorized as a Public Health Emergency of International Concern (PHEIC) announced on 5 May 2023 by the World Health Organization (WHO),^{3, 18} the virus continues to have various negative effects worldwide. In fact, COVID-19 still claims a life every 3 minutes. Thousands of people globally are continuously fighting for their lives in intensive care units, and millions more continue to live with the debilitating effects of long-term health consequences.

Despite progress in vaccine development that could be launched within a year of the pandemic when scientists, health professionals and leaders work together to face a threat to global health security, many countries still face challenges in accessing vaccines, contributing to global vaccine inequity.¹⁹ Unequal access to vaccines, in turn, prolonged the pandemic and increased the risk of new variants emerging as well as exacerbating disparities in health outcomes between different countries and populations.¹⁹

Key Barriers to Equitable Vaccine Distribution

- 1) Supply chain and infrastructure: many LMICs struggle with inadequate cold chain infrastructure and healthcare capacity, which severely limits their ability to store and administer vaccines effectively.^{20, 21}
- 2) Economic and geopolitical constraints: economic disparities prevented LMICs from competing for vaccines on the global market. Geopolitical dynamics, including vaccine nationalism, further exacerbate these disparities as HICs stockpiled vaccines, leaving fewer resources available for LMICs.^{20, 22}
- 3) Dependence on international aid: heavy reliance on COVAX and other international aid initiatives has not met the demand in LMICs, leading to delays and inadequate coverage.²²

The following table illustrates the disparities in COVID-19 vaccine distribution between HICs and LMICs, highlighting specific examples to demonstrate the extent of these inequities (Table 1).

Table 1. Inequity in COVID-19 Vaccine Distribution Between Developed and Developing Nations		
Category	Developed Countries (HICs)	Developing Countries (LMICs)
Definition	Countries with a GNI per capita above US \$13 205 (World Bank classification). These countries have robust healthcare systems and substantial resources for vaccine procurement). ²⁰	Countries with a GNI per capita below US \$4255 (World Bank classification). These countries often face resource constraints, fragile health systems, and high dependence on external aid). ²⁰
COVID-19 vaccine coverage	In HICs, a large proportion of the population has access to COVID-19 vaccines, with countries like the USA reporting over 90% of the population received at least one dose as of November 2023. ⁶	In LMICs, vaccine coverage was significantly lower, often due to delayed vaccine rollouts and logistical challenges. Example: Burundi – reported less than 0.3% of the population vaccinated by October 2023. ⁶
Vaccine availability	Ample supplies with multiple options, including Pfizer, Moderna, AstraZeneca, and Johnson & Johnson. ²¹	Limited to donations from COVAX or bilateral agreements, often receiving vaccines with shorter shelf lives. Example: Chad – relied almost entirely on COVAX shipments. ²²

Table 1. Inequity in COVID-19 Vaccine Distribution Between Developed and Developing Nations (Continued)

Category	Developed Countries (HICs)	Developing Countries (LMICs)
Timing of vaccine rollout	Early access to vaccines, with countries like Germany beginning mass vaccination campaigns in December 2020. ²³	Delayed access, with vaccinations starting months later. Example: Afghanistan – received its first significant vaccine shipments in mid-2021. ²⁴
Cost to individuals	Vaccines provided free or at minimal cost through government programs. ²³	Often free under programs like COVAX, but logistical costs (eg, transport to clinics) can be a barrier. Example: Haiti – many rural populations struggled to reach vaccination centers. ²⁵
Cold chain infrastructure	Well-established systems capable of storing mRNA vaccines at ultra-low temperatures. Example: Japan – deployed advanced refrigeration units nationwide. ²⁶	Limited or absent in many regions, restricting access to vaccines like Pfizer and Moderna. Example: Sudan – faced challenges maintaining cold chains in remote areas, affecting vaccine distribution. ²⁷
Health system capacity	High capacity for mass vaccination campaigns, including mobile units and community outreach. Example: Australia – vaccinated rural populations using advanced logistics systems. ²⁸	Weak infrastructure with few vaccination sites. Example: Democratic Republic of Congo – health centers overwhelmed by demand, leading to slow rollouts. ²⁹
Dependence on COVAX	Minimal, with countries procuring vaccines directly from manufacturers. Example: Canada – pre-purchased large quantities of vaccines. ³⁰	In LMICs, a significant portion of vaccine doses are obtained through COVAX. Example: 53.3% of total doses in some LMICs were obtained via COVAX. ²²
Booster coverage	Widespread booster campaigns to address variants like Omicron. Example: UK – provided third and fourth doses to vulnerable populations by mid-2022. ³	Minimal booster coverage due to limited supply. Example: Yemen – Struggled to vaccinate even high-risk groups with primary doses, let alone boosters. ³²
Vaccine hesitancy	Moderate levels, influenced by misinformation but addressed through public campaigns. Example: France – implemented mass media campaigns to reduce hesitancy. ³³	High levels, compounded by misinformation, distrust of governments, and cultural beliefs. Example: South Sudan – vaccine uptake hindered by rumors and lack of public awareness. ²⁷

Abbreviations: GNI, gross national income; HICs, high-income countries; LMICs, low- and middle-income countries.

Implications for Global Health Governance

These barriers underscore the urgent need for global health governance reform to ensure equitable access to vaccines. The pandemic has highlighted critical areas requiring immediate attention.

1) Strengthening Global Cooperation:

- Enhance partnerships and coordination among nations to improve vaccine distribution logistics and coverage.²⁸⁻³⁰
- Develop international agreements that commit nations to share vaccine doses beyond their immediate needs, ensuring equitable distribution, especially during acute phases of pandemics.²⁸⁻³⁰
- Foster multi-lateral dialogues that facilitate rapid response mechanisms when new health threats emerge, ensuring that logistics and resources are aligned and ready to deploy.²⁸⁻³⁰

2) Reforming Intellectual Property Laws:

- Temporarily relax patent laws during global health emergencies to allow for broader manufacturing of vaccines and treatments. This could be achieved through mechanisms like the WHO's COVID-19 Technology Access Pool (C-TAP), which promotes sharing of knowledge, data, and intellectual property to expand manufacturing of COVID-19 related health products.³⁴
- Implement compulsory licensing agreements under international health emergency guidelines, enabling LMICs to produce patented pharmaceuticals without the consent of the patent holder, subject to certain conditions.³⁴

3) Addressing Vaccine Hesitancy:

- Invest in local community engagement initiatives to understand the root causes of vaccine hesitancy in different cultures and communities.^{27, 33}
- Develop targeted, culturally sensitive education campaigns that involve local leaders and trusted figures to disseminate accurate and relevant information about vaccines.^{27, 33}
- Monitor misinformation trends online and on social media platforms to quickly address false information with factual responses, using a variety of media accessible to diverse populations.^{27, 33}

Continued Global Challenges and Strategic Needs

Despite initiatives like COVAX, challenges such as supply chain disruptions, vaccine hesitancy, and geopolitical factors continue to impede equitable vaccine distribution. In 2024, the unchanged rate of vaccine distribution highlighted a persistent gap in global health equity.³⁵ This pandemic has underscored the need for a reimagined approach to global health governance that genuinely prioritizes equity, accommodating both nationalism and globalism in a balanced manner. With public-private partnerships now at the forefront of global health response, the extensive investments from the public sector during the pandemic should encourage a rethink of the role of the private sector, especially concerning the sharing of risks and rewards. The patent system, often a barrier to timely access to essential medicines, must be adapted to better serve global public health needs rather than just commercial interests.³⁶

Looking Ahead

While nations have the sovereign responsibility to protect their populations, HICs must also act with a global perspective, especially given their capabilities and resources. Exceptional global health crises require exceptional measures; thus, international agreements like the Trade-Related Aspects of Intellectual Property Rights (TRIPS) should be flexible enough to allow for emergency actions that prioritize human life over intellectual property rights.³ As the COVID-19 pandemic continues to affect lives worldwide, it is crucial to maintain efforts to increase vaccine coverage, especially among high-priority groups. Addressing vaccine inequity both within and between countries is essential not only for controlling the pandemic but also for building stronger, more resilient global health systems.³⁶ High-income nations, which have achieved widespread vaccine coverage, must work collaboratively with LMICs facing significant delays due to logistical and systemic challenges.³⁶ These efforts must focus on building infrastructure, sharing resources, and enhancing the capabilities of every country to manage current and future health crises effectively.

Conclusions

This article has highlighted the persistent global health inequities exacerbated by COVID-19, particularly the disparities in vaccine distribution between HICs and LMICs. HICs have benefited from extensive vaccine access due to advanced healthcare systems, whereas LMICs face ongoing challenges like inadequate supply chains and cold chain infrastructure, which hinder effective vaccine delivery and uptake. Addressing these disparities requires strengthening international cooperation, reforming intellectual property laws to enhance local vaccine production, and improving both the physical and informational infrastructure in LMICs to ensure equitable global health security and preparedness for future pandemics.

Additional Information

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