

Equal access to vaccines: lessons learned and future perspectives

Acesso equitativo a vacinas: lições aprendidas e perspectivas futuras

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Abstract

Vaccination is an essential component of primary health care and coping with health emergencies. However, despite the progress from the last decades, important barriers persist resulting in lower access and disparities between the countries in the access to new vaccines. In this scenario, the World Health Organization (WHO) launched, in 2020, the Immunization Agenda for the 2021-2030 decade (AI2030). This article aims to discuss the main factors that affect access to vaccines and strategies to promote equity in access to them at global and national levels. These factors are multi-sectoral and need to be considered in both levels, with emphasis on financial and geographic barriers, infrastructure challenges, socioeconomic and cultural factors, public policies, and governance. The text points the need to remodel the global architecture of production chains and research and innovation centers, creating and/or strengthening existing ones in low- and middle-income countries. In addition, establishing new mechanisms and models for the production and commercialization of vaccines is necessary. The strategies adopted for accessing vaccines and other health technologies are at the center of the global health agenda debate. **Keywords:** Equity; Vaccine; Access to essential medicines and health technologies; Global health.

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Resumo

A vacinação é um componente essencial da atenção primária à saúde e do enfrentamento de emergências em saúde. No entanto, apesar do progresso ocorrido nas últimas décadas, persistem importantes barreiras que resultam na queda de coberturas e disparidades entre os países no acesso a novas vacinas. Neste cenário, a Organização Mundial da Saúde (OMS) lançou, em 2020, a Agenda de Imunização para o decênio 2021-2030 (IA2030). Este artigo tem o objetivo de debater os principais fatores que afetam o acesso às vacinas e as estratégias para promoção da equidade no acesso a elas a nível global e nacional. Tais fatores são multissetoriais e precisam ser considerados em ambos os níveis, destacando-se as barreiras financeiras e geográficas, os desafios de infraestrutura, fatores socioeconômicos e culturais, políticas públicas e governança. O texto aponta a necessidade de remodelação da arquitetura global das cadeias produtivas e dos centros de pesquisa e inovação, criando e/ou fortalecendo as existentes em países de baixa e média renda. Além disso, é necessário estabelecer novos mecanismos e modelos de produção e comercialização de vacinas. As estratégias adotadas para acesso a vacinas e outras tecnologias em saúde estão no centro do debate da agenda de saúde global.

Palavras-chave: Equidade; Vacina; Acesso a fármacos essenciais e tecnologias de saúde; Saúde Global.

Introduction

Vaccines are considered one of the most cost-effective health technologies in public health. They save millions of lives every year and help reduce the risk of infections and the worsening of vaccine-preventable diseases (WHO, 2022b). Vaccines are also an essential component of primary healthcare and an indisputable human right. They also play an important role in Public Health Emergency of International Concern (PHEIC), such as COVID-19, for disease control or mitigation of its impact (Olliaro; Torreale, 2022; van der Graaf; Browne; Baidjoe, 2022).

Despite the immense progress achieved in recent decades in developing and expanding access to new vaccines, there are still major barriers. Among them, we highlight: (1) the concentration of vaccine and raw material production in a few countries; (2) problems related to logistics and infrastructure; (3) financing; (4) socio-economic and cultural issues; and (5) the lack of governance mechanisms at national and global levels. Among the consequences of these barriers, we are witnessing the decrease of vaccination coverage and disparities between countries in access to new vaccines (Olliaro; Torreale, 2022; van der Graaf; Browne; Baidjoe, 2022).

In 2020, considering this complex scenario regarding vaccines and immunization, the World Health Organization (WHO) launched the Immunization Agenda 2030 (IA2030), established at the 73rd World Health Assembly. This agenda aims to maintain the hard-won gains of the Expanded Programme on Immunization, recover from the disruptions caused by COVID-19, and achieve more—leaving no one behind, in any situation or at any stage of life. The IA2030 comprises seven strategic objectives, which covers relevant and urgent topics such as disease prevention, building strong national immunization programs, and promoting equity in vaccine access (WHO, 2022b).

The COVID-19 pandemic and other public health emergencies have given visibility to the dynamics

of the international vaccine market and shown that some challenges remain to be addressed to ensure equitable access to vaccines, and it is important to assess how this normally complex scenario is aggravated in emergency situations (Hotez et al., 2021).

Thus, considering the relevance of this topic, this article aimed to discuss the main factors affecting access to vaccines and the strategies for promoting equitable access to vaccines at a global and national level.

Understanding the problem: the dynamics of the vaccine market and complexity in pandemic scenarios

The global vaccine market has undergone major changes and advancements over the past two decades. Investments in research, development, and innovation have resulted in the discovery of new vaccines to control diseases of public health importance, as well as the expansion of production and the number of manufacturers. The implementation and development of new mechanisms and initiatives to facilitate the procurement of vaccines, such as the Pan American Health Organization (PAHO) revolving fund, have allowed an increase in access for the populations of low-income countries (WHO, 2023c).

The vaccine market is extremely lucrative. Data from the latest report on the global vaccine market organized by the WHO estimated that, in 2021, approximately 16 billion doses were supplied (an increase of 5.8 billion compared to 2019), amounting to 141 billion dollars. This represents around 10% of the global pharmaceutical market. Currently, about 94 vaccine manufacturers are listed in the report as the main providers for WHO Member States (WHO, 2023c).

The Western Pacific and European regions have the highest concentration of vaccine manufacturers, with China (23 manufacturers) and India (7 manufacturers) being the main producing countries, accounting for 31% of all manufacturers in these regions. The Americas region, especially the United States, and Europe

account for the largest number of manufacturers, if we exclude COVID-19 vaccine producers. Among the largest manufacturers, according to market value highlighted by the report, are large pharmaceutical companies such as MSD, GSK, Sanofi, and Pfizer (WHO, 2023c).

The report also emphasizes the lack of equity in vaccines access. Despite the 2021 data showing an improvement compared to 2019, access to several vaccines of public health interest is still insufficient in low- and middle-income countries (LMICs), including those for human papillomavirus prevention and the pneumococcal conjugate vaccine. Regarding COVID-19 vaccines during the pandemic, a great disparity in access was observed among LMICs when compared to high-income countries (HICs). The report highlights that this disparity in access can be understood precisely by the fact that the HICs have the largest concentration of vaccine producers and the greatest purchasing power in this market (WHO, 2023c).

Moreover, the report draws important conclusions about the need for measures to promote equitable access to vaccines, including restructuring the global architecture of production chains, research and innovation centers by creating and/or strengthening those in LMICs. It also emphasizes that maintaining a global vaccine market that minimally guarantees equity in epidemic situations and public health emergencies requires creating production and procurement mechanisms and models, given the possibility of a sudden increase in demand and that the actual size of the market may vary depending on the context of each country (WHO, 2023c).

This last reflection in the report can be corroborated by the lack of access to vaccines experienced by the PHEIC declaration for Ebola, COVID-19, and Mpox (Monkeypox). During the Ebola PHEIC, the development of a vaccine was accelerated mainly when the disease became a threat to the health security of the HICs. Vaccines have been developed by major pharmaceutical companies and registered by American and European regulatory agencies. However, little progress has been made in guaranteeing their access and technologies to African countries,

where the disease is, in fact, more prevalent and epidemics continue to emerge (Tusabe et al., 2022).

The lack of equitable access to vaccines against COVID-19 is still visible. Despite the great international cooperation for the development—in record time—of new vaccines and treatments for the disease, which has led to profound changes in techniques, knowledge, and regulatory and clinical research processes that will contribute to the development of new vaccines, the same effort and solidarity has not occurred, to the same extent, regarding access. As soon as the first vaccines against the disease were released for emergency use, the HICs controlled the purchase demand, creating a movement of “nationalism” towards them. In response, some global initiatives such as the COVAX facility have been implemented, but they remain insufficient, as expressed by the data in the aforementioned report (Sparke; Levy, 2022)

The widespread epidemic of Mpox (monkeypox) was the last PHEIC declared by the WHO, in 2022. Although important outbreaks have been recorded on the African continent in recent years, the disease has gained prominence on the global stage following the significant increase in cases, with sustained transmission on other continents, associated with a new variant (clade IIB). After that, the development of vaccines for the disease (derived from the one used for human smallpox) became accelerated. Currently, only one vaccine has been developed by the US government. However, similar to the Ebola situation, access to this vaccine has been limited due to high demand from HICs, and current production capacity cannot meet the needs of LMICs where the disease is endemic (Tusabe et al., 2022)¹.

Factors that affect access to vaccines are multi-sectoral and must be considered at national and global levels. These factors comprise financial and geographic barriers, infrastructure challenges, and socio-economic and cultural factors (Figure 1) (WHO, 2022b; van der, 2022).

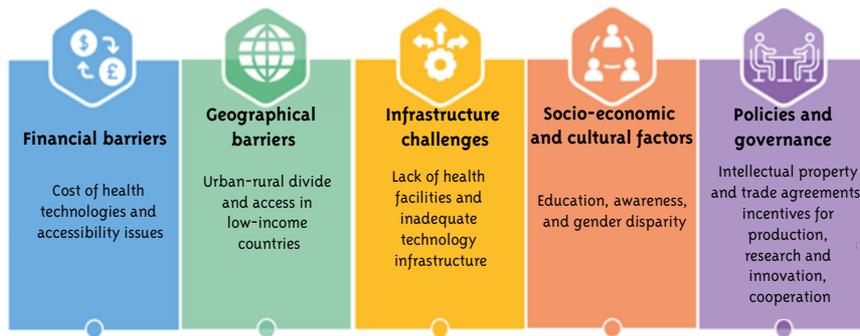
We must also remember the barriers due to: (1) lack of governance mechanisms, as well as national and supranational policies aimed at improving international cooperation to facilitate agreements for vaccine procurement and essential health supplies; (2) lack of legislation and treaties that establish intellectual property regulations, such as the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement; and (3) lack of coordination between policies aimed at enhancing a sustainable research, development, and innovation ecosystem for vaccines LMICs (WHO, 2023c; Wilson; Thornton; Gandhi, 2023; van der Graaf, Browne, Baidjoe, 2022).

It is also essential to guarantee mechanisms for financing the entire vaccine production and supply chain infrastructure. For example, the existing traditional procurement mechanisms related to the Global Vaccine Alliance, the United Nations Children’s Fund, and the PAHO Revolving Fund are still linked to the largest vaccine producers that compose the so-called Big Pharma. This highlights the need for incentives and new strategies to facilitate and encourage purchases between national manufacturers in LMICs and to ensure regional demand and market mechanisms (WHO, 2022b, 2023c; van der Graaf; Browne; Baidjoe, 2022; Buss; Burger, 2023).

In turn, the infrastructure challenges are reflected in the complex logistic of the vaccine value chain, which goes beyond the implementation of mature production plants that follow good manufacturing practices. Initiatives that encourage research, development, and innovation must be based on an agenda that is supported by national priorities and that can be adapted (nationally or regionally) to meet global demands when necessary, and to guide the deployment of technological platforms. Resources are also needed to strengthen regulatory agencies and clinical research centers, so that they can easily adapt to the dynamism of this complex process (WHO, 2022a, 2022b; van der Graaf; Browne; Baidjoe, 2022; Buss; Burger, 2023; Wilson; Thornton; Gandhi, 2023).

¹ Document to be published: SCHAEFER, G. O. et al. Equitable global allocation of monkeypox vaccines. *Vaccine*, 2023. DOI: 10.1016/j.vaccine.2023.07.021

Figure 1 – Key factors affecting equitable access to vaccines



Geographic barriers also must be considered. Investment is needed in technologies so that vaccines can be preserved in less complex cold chains, allowing them to reach regions of difficult access while maintaining suitable usage conditions. From a global point of view, vaccine procurement and production mechanisms that boost access to vaccines in LMICs are indispensable (Peacocke, 2021; WHO, 2022a, 2022b).

Socio-economic and cultural factors should be considered when designing health education strategies, which should serve as a tool for community engagement, offering information on the role of vaccines and seeking to achieve broad acceptance by the population. These strategies should form the basis of documents that serve as instruments for the education and training of human resources who will work both in production and within the health system itself (Peacocke et al., 2021; WHO, 2022b).

The proper organization of health services is also relevant to ensure access. Extending opening hours, policies that encourage companies to allow their employees and their dependents to be immunized, and the use of drive-thru systems can all be important initiatives in this regard. It is also necessary to consider the inequalities in access caused by gender issues that can be reinforced by cultural and social aspects of different communities (Peacocke et al., 2021; WHO, 2022b).

All these factors can increase their relevance in public health emergency scenarios. The evolution dynamics in these cases can result in a rapid increase in demand for vaccines and

basic health supplies globally and the consequent competition to acquire them. This can cause disruptions and lead to substantial price hikes for products or services associated with the supply and production chain of fundamental health necessities, compromising or limiting national and international production. Trade barriers and restrictions on the movement of goods and people between countries are frequently imposed during these occasions. As a result, there are widening disparities between countries and their health systems in their ability to cope with these scenarios (Peacocke et al., 2021; Hotez et al., 2021).

In Brazil, the barriers to achieve equity in access to vaccines still persist, despite the progress made by the Brazilian National Immunization Program (NIP) since its creation in 1973. The NIP is one of the largest and most successful immunization programs in the world. However, its intricacy presents various challenges, including logistics for the acquisition, distribution, and vaccination, the lack of adequately skilled professionals specializing exclusively in these activities, and the difficulty in instituting an integrated information system that allows total vaccine traceability until the time of vaccination (Buss; Burger, 2023; Gadelha, 2022; Castro-Nunes; Ribeiro, 2022).

Brazil is a country with a large population, of continental dimensions, and regions that are difficult to access, which hinders the creation and maintenance of a cold chain and organized healthcare services for vaccination activities in remote regions. These factors are added to the complex socio-cultural issues in relation to

gender that exist in the territory, which reinforce the need for multi-sectoral and multidisciplinary strategies to promote equity in access to vaccines in the country (Buss, Burger, 2023; Gadelha, 2022; Castro-Nunes; Ribeiro, 2022; Gauto, 2022).

The results of a recent vaccination coverage survey sponsored by the Brazilian Ministry of Health showed that, for the years 2017 and 2018, less than 1% of children did not receive routine vaccination, according to the national immunization schedule. However, complete coverage was less than 75% in all of the country's capitals and in the Federal District, despite the fact that they have good coverage of the basic health services network. Vaccines with more than one dose scheme have progressively lost coverage and there are significant differences between socio-economic strata—favorable to the highest in some cities and the lowest in others (Barata et al., 2023)

Despite its history of vaccine production with important contributions from public laboratories, Brazil still needs to make significant progress in order to achieve a sustainable ecosystem for research, development, and innovation that will allow it to possess the necessary technology for sustainable self-sufficiency in producing national immunobiologicals and basic health supplies. Notwithstanding the progress made in recent years in governance and the development of public policies aimed at creating and strengthening the Health Economic-Industrial Complex (HEIC), the country still has challenges to overcome (Gadelha, 2022; Castro-Nunes; Ribeiro, 2022; Gauto, 2022).

In Brazil, the Productive Development Policy (2008) was created to seek synergy between technological industrial development and the national productive sector, with a focus on increasing the population's access to medicines, vaccines, and equipment (Gadelha, 2022). However, the very dynamics of implementing this public policy ended up accentuating the country's dependence on the international market, which became evident during the COVID-19 emergency (Gadelha, 2022; Castro-Nunes; Ribeiro, 2022; Gauto, 2022).

The COVID-19 emergency has highlighted the need for regulatory agencies to adapt to health crisis situations, as well as the establishment of new funding mechanisms aimed not only at strengthening research, development, and innovation in the country, but also at acquiring vaccines and health supplies (Gadelha, 2022; Castro-Nunes; Ribeiro, 2022; Gauto, 2023).

Strategies for equitable access to vaccines: collaboration and governance at the heart of the debate

The lessons learned in recent health emergencies and the experience accumulated by countries and international organizations have resulted in global initiatives, such as the Global Vaccine Action Plan (GVAP) and IA2030, which reinforce the need to implement strategies that promote equity in access to vaccines and other health technologies (WHO, 2022b).

Some of these strategies are represented by the seven IA2030 objectives themselves: (1) Immunization programs for primary health care and universal health coverage; (2) commitment and demand; (3) coverage and equity; (4) life-course and integration; (5) outbreaks and emergencies; (6) supply and sustainability; and (7) research and innovation (WHO, 2022b). The goals established from these objectives are interrelated and allow them to be adapted to the reality of each country, regardless of its income level, and aim to strengthen the conditions of countries for the planning and implementation of sustainable and successful immunization programs (WHO, 2022b).

IA2030 also stresses that, in order for the listed objectives to be met, governance strategies and cooperation at national and global levels must be strengthened. It also encourages the participation of civil society in adapting the targets set by countries by using consultative engagement strategies. Regional initiatives between countries can also be used to exchange experience and build new cooperation mechanisms and partnerships that allow giving voice and focus to specific realities (WHO, 2022b).

The COVID-19 emergency has prompted greater attention and a new debate regarding countries' preparedness and response to future public health emergencies. Equitable access to vaccines and other health technologies are a key component in this debate, which is linked to guaranteeing countries' health security. As a result, initiatives such as the reformulation of the International Health Regulations (IHR) and the development of a new normative instrument among WHO Member States for pandemic prevention, preparedness, and response are currently being debated on the global health agenda² (WHO, 2023a, 2023b).

For this purpose, an intergovernmental negotiating group was created, in which Brazil participates as the representative of the Americas, as it is already working on the construction of the instrument that will be presented and voted on by the countries at the next World Health Assembly in 2024 (WHO, 2023a).

The discussions among representatives of countries developing the new normative instrument, commonly referred to as the International Pandemic Treaty (WHO CA+), emphasize that the world has sufficient trained personnel to manage emerging risks of public health crises, more effectively than the response to COVID-19 (WHO, 2023b). Moreover, these discussions highlight that there are necessary proposals, scientific expertise, technological resources, corporate and civil society capabilities, and financial mechanisms.

Notably, future strategies addressing public health emergency preparedness and response must prioritize responsibility, governance, and collaboration among countries and stakeholders on the global health agenda, in order to ensure that these strategies are implemented equitably, promoting solidarity and action at national and international levels, and multilateralism (WHO, 2023a, 2023b).

Some of the initiatives developed to promote access to vaccines during the COVID-19 PHEIC need to be reconsidered and adapted to guarantee the sustainability of actions to deal with potential emergencies in the future. Initiatives to promote technology transfer and the strengthening of vaccine-producing laboratories in LMICs—such as the mRNA Technology Transfer Programme, derived from the COVAX facility initiative—should seek cooperation between countries to establish regional hubs for research, development, innovation, and vaccine production, considering each country's capacity (WHO, [2022c]).

Some aspects of the strategies adopted for access to vaccines and other health technologies are at the center of the debate on the global health agenda. Common ground is being sought for future initiatives aimed at investing in global public goods. There is a need to coordinate an “end-to-end” approach³ between different actors on this agenda, so that equitable access to vaccines and other health technologies can be designed for both routine health systems and potential emergency scenarios (WHO, 2022a).

This “end-to-end” approach refers to the need to address all stages, involving continuous evaluations and research ranging from the initial pathogen detection, research, and development to the manufacturing, distribution, and delivery strategies of vaccines to the population. This proactive approach requires a pre-negotiated national and international system with well-defined roles and responsibilities based on a common global vision, ensuring that funding and governance arrangements prioritize the public interest and adhere to principles of equity, transparency, collaboration, and regional resilience to promote a sustainable healthcare ecosystem (WHO, 2022a).

Currently, the main points debated on the global agenda for promoting contexts favorable to equity in access to vaccines are: (1) the need for

2 Information can be found at: World Health Organization. *Intergovernmental Negotiating Body (INB)*. Available from: <<https://inb.who.int/>>. Access in: June 26, 2023

3 An “end-to-end” approach involves a management strategy that integrates sustainability into all aspects of a vaccine value chain, ranging from the initial research and product design to the commercialization, distribution, and monitoring phases.

global governance to ensure strong coordination for future initiatives, with adequate financial support and informed by multisectoral policies and expected results; (2) Promotion of resilient national health systems, focused on enhancing minimum conditions for attaining comprehensive healthcare coverage and global preparedness and responsiveness to pandemics; (3) Development of a global health surveillance and research network capable of aiding in the timely response of health systems and enhancement of their coordination and adaptation components; and (4) Strengthening of tools, production, and access to health technologies that decrease response times during emergencies and establish fairness in global access to diverse health technologies (WHO, 2022b, 2022a; Lal et al., 2022; Kumraj et al., 2022).

The priority given to this debate on the global public health agenda has created a favorable environment for building regional capacities, including regional research and development centers for clinical trial networks and the production of vaccines and basic health supplies. Involving countries in the global debate, considering their distinct realities, and allowing regions to organize local appropriate solutions must be a necessary aspect of building a future ecosystem that promotes equal access to vaccines and other health technologies. Investment from national governments and regional banks will be essential, along with global funding (WHO, 2022a, 2022b; Lal et al., 2022; Kumraj et al., 2022).

In this context, Brazil has an opportunity to position itself at the forefront of the global debate. Brazil's participation as a representative in the Intergovernmental Negotiating Body for the International Pandemic Treaty and in other global cooperation initiatives, such as the mRNA Technology Transfer Programme, allows it to play a central role in sharing experiences and proposing governance and cooperation (WHO, [2022c]).

Brazil's participation in the 75th World Health Assembly, reinforced by the health minister's speech, strengthens the commitment and organization of the national health agenda to

achieve equitable access to vaccines and other technologies (Gadelha, 2022; Em discurso..., 2023). Despite the many obstacles the country still faces, the Brazilian government's current proposal to open multi-sectoral cooperation and strengthen HEIC is in line with the strategies proposed by the Global Health Agenda and could promote a sustainable future environment for access to health technologies for citizens.

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Authors' contribution

Abreu was responsible for the conception of the study and the initial writing of the article. Sato and Waldman were responsible for the critical revision of the text. Abreu, Sato, and Waldman were responsible for reviewing and approving the final version of the manuscript.

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