Clinical Epidemiology and Global Health 22 (2023) 101313

Contents lists available at ScienceDirect

Clinical Epidemiology and Global Health

journal homepage: www.elsevier.com/locate/cegh

Monkeypox vaccination in the global south: Fighting a war without a weapon

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ARTICLE INFO

Keywords:
Global south
Global north
Mpox
Vaccines
Infection
Health systems

ABSTRACT

Background: The Mpox outbreak awakened countries worldwide to renew efforts in epidemiological surveillance and vaccination of susceptible populations. In terms of Mpox vaccination, various challenges exist in the global south, which impede adequate vaccine coverage, especially in Africa. This paper reviewed the situation of Mpox vaccination in the global south and potential ameliorative approaches.

Methods: A review of online literature from PubMed and Google Scholar concerning Mpox vaccination in countries belonging to the 'global south' category was done between August and September, 2022. The major focus areas included inequity in global vaccine distribution, challenges impeding vaccine coverage in the global south, and potential strategies for bridging the gap in vaccine equity. The papers that met the inclusion criteria were collated and narratively discussed.

Results: Our analysis revealed that, while the high-income countries secured large supplies of the Mpox vaccines, the low- and middle-income countries were unable to independently access substantial quantities of the vaccine and had to rely on vaccine donations from high-income countries, as was the case during the COVID-19 pandemic. The challenges in the global south particularly revolved around inadequate vaccine production capacity due to lack of qualified personnel and specialized infrastructure for full vaccine development and manufacturing, limited cold chain equipment for vaccine distribution, and consistent vaccine hesitancy.

Conclusion: To tackle the trend of vaccine inequity in the global south, African governments and international stakeholders must invest properly in adequate production and dissemination of Mpox vaccines in low- and middle-income countries.

1. Introduction

The Global North, also known as high-income countries, is known for political and socio-economic prosperity. The Global South, on the other hand, which consists of Africa, Latin America, the Caribbean, the Pacific Islands, and developing Asian countries, are distinguished as third-world countries due to their low- and middle-income status, mostly involving disease-endemic tropical areas.[1] The recent monkeypox (Mpox) outbreak further threatens the health systems of these already fragile countries. The Mpox is a viral disease caused by the Mpox virus, which is endemic to many African countries. The Mpox outbreak began in May 2022, when confirmed cases were reported by the World Health

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https://doi.org/10.1016/j.cegh.2023.101313
Received 6 March 2023; Received in revised form 1 May 2023; Accepted 10 May 2023
Available online 19 May 2023

Organization (WHO) in 12 Mpox non-endemic countries from the Global North.[2] The growing number of cases therefore, led the WHO to declare the outbreak a public health emergency of international concern on 23 July 2022.

Although the possibility of airborne transmission is still being investigated, Mpox can be transmitted to healthy individuals through direct contact with the lesions, respiratory secretions, contaminated objects, and body fluids of an infected person.[3] As of 9 January 2023, over 84,415 Mpox Virus cases had been confirmed globally, and one out of every five deaths occurred in Africa.[4] The Global South are often being faced with the challenge of inequality in access to vaccines. This has became more evident during the distribution of COVID-19 vaccines where countries in Africa and Latin America struggled to receive vaccines for their population while the high-income countries (HICs) had made large scale purchases of the vaccines for their citizens.[5] The same challenge of vaccine inequity also appears to play out in the case of Mpox. Therefore, this article discusses the challenges of Mpox vaccination in the Global South and proffered recommendations to tackling the menace.

2. Mpox vaccination

Mpox has been a problem in the Global South, particularly in Africa. Although it has been prevalent for decades, the global health community has given less attention to the problem of Mpox in Africa.[6] As of June 2022, the current Mpox epidemic, an alien occurrence in the Global North, accounted for about 96.6% of laboratory-confirmed cases as reported by the WHO.[2] The current outbreak is reported as the most extensive in history, prompting the WHO to classify it as a global public health threat.[7] Because many nations are still recovering from the impact of the continuing COVID-19 pandemic, the risk of Mpox escalating into another pandemic has become a growing concern.[8]

Although vaccination is one of the significant strategies, the Center for Disease Control and Prevention (CDC) has advised countries to limit Mpox transmissions,[9] as vaccine against the disease is yet to be developed. Smallpox vaccine however, has been shown to be 85% effective against the Mpox due to its genetic similarity to the smallpox virus,[10] and the three available vaccines recommended by WHO to offer protection against Mpox include; the LC16m8 vaccine, ACAM2000®, and JYNNEOSTM vaccines.[11] The availability of these vaccines are however limited as there is limited possibility of scaling up the production of the LC16m8 outside Japan, where it is manufactured.[12] The ACAM2000® – with about 100 million doses currently available and which is recommended by the CDC to offer protection against Mpox, has generated concerns over its adverse effects, especially among immunocompromised persons.[13] The production of the JYNNEOSTM vaccine (approved by the U.S. Food and Drugs Agency and European Medicines Agency) has also experienced a setback when its only manufacturer, Bavarian Nordic, halted its production, though there are expectations that manufacturing may resume.[14]

3. Global vaccine distribution inequity

The current dilemma with Mpox vaccine production and distribution is another example of the flaws in global health strategy that rely heavily on HICs to fight and treat illnesses. As evidenced by AIDS cases, COVID-19, and now Mpox, it is apparent that most enhanced global health measures to battle disease outbreaks generally come into play when the global north is affected, which causes more harm than benefit.[15] According to the WHO, there is a race for Mpox vaccines, with 35 countries fighting for access to the 16.4 million currently available doses, with a possible risk that low-income countries may lose out.[16] Unfortunately, with history repeating itself, this risk appears to be a reality today, as most countries on the African continent where Mpox has been endemic for decades do not have a single dose of the vaccine.[17] This was made known by a report from the Africa Centre for Disease Control in July 2022, stating that the continent, with a population of over 1.2 billion people, had no access to Mpox vaccines.[18]

Asides the obvious challenge of a lack of supplies, equal and fair distribution among impacted countries should be a top priority. But unfortunately, wealthier countries have acquired most of the available doses, leaving little for other affected countries particularly those in Africa to scramble upon,[15] as experienced with the COVID-19 vaccine.[19] In terms of the vaccine access gap, the United States (US) appears to be on the frontline, with approximately 1.1 million vials of Bavarian Nordic's Jynneos Mpox vaccine reported to have been allocated or available for distribution within its jurisdictions, and this is in addition to approximately 100 million doses of ACAM2000.[20] It was similarly reported that the European Union (EU) has obtained about 160,000 doses of Mpox vaccines for its member countries.[21] Britain alone purchased 100,000 doses of vaccine for its vulnerable population in July 20, 22[15]. This is in addition to the earlier batch of 50,000 doses, which adequately covered the first immunisation dosage of over 30,000 patients in the country.[15,17] Canada had also deployed up to 99,000 doses of Bavarian Nordic's Imvamune vaccine to its territories and provinces in order to target critical groups at risk,[22] while Peru and Brazil were said to be anticipating about 9000 and 50,000 doses of the vaccine by September and October, respectively.[23] Other countries like Spain, France and Denmark have followed suit. The Pan American Health Organization (PAHO) has agreed to supply 100,000 doses of the Mpox vaccine to countries in Latin America and the Caribbean. However, Africa is yet to receive any vaccine donation, leaving vulnerable populations at a higher risk of worsening outbreak.[24] These inequities in Mpox vaccine supply have raised concerns that some countries and key populations may lose out – a near-exact replica of the HIV medication and COVID-19 vaccine crises.[15]

4. Challenges in the global south

Mitigating the spread of Mpox remains an important focus for health systems worldwide. However, significant challenges in the global south may impede the eradication of Mpox through vaccination.

4.1. Inadequate vaccine production capacity

Global vaccine production is largely operated by countries in the Global North, with many vaccine production facilities centered in the United States, Japan, and Europe. Thus, the reliance of low-income countries on the supply of vaccines from the Global North, exacerbated by inadequate domestic production, creates a significant inequity in global vaccine coverage, especially in Africa.[18] This challenge was accentuated in 2021, when less than 10% of the African population was vaccinated against COVID-19, with about 99% of its vaccine supply coming from high-income countries.[24] Despite about 12 vaccine production facilities have been established by foreign pharmaceutical industries across Africa, primarily in six African countries - South Africa, Egypt, Algeria, Senegal, Rwanda, and Morocco,[25] Africa still produces less than 1% of all vaccines used in the continent.[26] This is due to the emphasis of the vaccine production facilities on increasing fill-and-finish capacity at the expense of vaccine-substance manufacturing, as well as a trend of unwillingness on the part of globally licensed pharmaceutical companies to relinquish their intellectual property and technology rights.[26]

Other contributing factors include a lack of qualified personnel and specialized infrastructure necessary for vaccine development and manufacturing.[27] This is further compounded by inadequate training, ineffective awareness campaigns, and an inability to collect and process critical immunisation data.[28] Even if these issues are resolved, unstable electricity supply and insufficient cold chain facilities could severely limit comprehensive vaccine manufacturing in Africa.[29] Reparatory measures such as governmental and private sector investments in industrial vaccine infrastructure and capacity building will enable

pharmaceutical industries and governments in Africa to negotiate the release of vaccine-related patents with global vaccine makers (28). Until such approaches are employed, the supposed implementation of vaccine manufacturing in Africa does not directly equate to improved vaccine distribution on the continent. This highlights the need for African countries to invest more in research and development, as well as legal, financial, and technical infrastructure that will increase vaccine production beyond their current capacity to combat Mpox and other emerging infectious diseases.[30]

4.2. Vaccine hesitancy

Another important challenge that may affect the distribution of the Mpox vaccine in the Global South is vaccine hesitancy. The WHO recognises vaccine hesitancy as one of the top ten challenges in global health that needs to be addressed.[31] Despite the availability of the Mpox vaccine, people living in the Global South may be hesitant towards the vaccine. This could be due to inadequate knowledge about its effectiveness in preventing the spread of the disease. However, the acceptance of Mpox vaccination may not be as low as that of the COVID-19 vaccine because the smallpox vaccine had been successfully used in Africa to eradicate smallpox.[32] In addition, the recent generations of the smallpox vaccine are said to be more effective, safer, and offer longer protection against Mpox.[33] Also, unlike the COVID-19 vaccine, the Mpox vaccine does not require mass vaccination because ring vaccination (the vaccination of close contacts of confirmed Mpox cases) has been recommended, and is considered a more efficient and cost-effective strategy for Mpox eradication.[34] Nevertheless, healthcare workers in the Global South are required to promote the acceptance of the vaccine and eliminate any form of hesitancy among its populace.[35]

5. Lessons from COVID-19

To tackle the threats posed by Mpox and other emerging infectious diseases, international health stakeholders need to invest more in pharmaceutical firms in the Global South. This will lessen the region's dependency on the Global North for vaccinations. Global vaccine initiatives like the COVID-19 Vaccines Global Access (COVAX) and Global Alliance for Vaccines and Immunisations (GAVI) should be further strengthened to ensure equitable vaccine distribution. The world needs to pay close attention to infectious diseases of pandemic potential that are endemic to a particular region, like Mpox in Africa. As healthcare providers in various fields have been affected by the COVID-19 pandemic,[36] the provision of sufficient equipment for early infection containment, prompt diagnosis, and the availability of therapies and management indicators will better equip healthcare providers with the tools needed to face the current Mpox epidemic and possible future pandemics.[37] Early diagnosis would enable easier management of the cases at home, especially in the early phases of contamination.

Just like COVID-19, the Mpox outbreak is a global public health challenge that would cause great harm to societies if left unchecked.[38] There is a need to have adequate information on the transmission routes and potential reservoir hosts, a skilled and experienced health workforce, and a public health intervention strategy to stop the re-emergence of Mpox, especially in endemic regions of developing countries.[39] Therefore, the success of such strategies depends on policies governing existing health systems, level of coordination and funding availability across all levels. Those policies should also consider vulnerable communities who can potentially spread the disease.[24] Public health organisations, governments, and the populace should communicate more to educate the people on the significance of vaccination, social responsibility, and the necessity of proper personal and communal hygiene and to address concerns that can cause vaccine hesitancy. As individuals, having a sense of social responsibility is essential to slowing down disease transmission. Prevention measures such as good hand hygiene, use of face masks, social distancing and seeking early medical attention will help to curb the transmission of the disease.

6. Conclusion

Despite being odd in the Global North, Mpox is endemic in the Global South. Due to the prevalence of poor infrastructure and financial resources, the Global South finds it challenging to acquire the Mpox vaccine, highlighting the heavy reliance on the Global North for vaccines and resulting in vaccine distribution inequity. Through international collaborations, the vaccine production capacity in the Global South could be improved and measures towards ensuring vaccine equity can be implemented.

Funding source

No funding was received for the preparation of this manuscript.

Authors' contributions

Ogunkola I.O was responsible for the manuscript conception and design. Abiodun O.E, Bale B.I, Umeh I.C, and Tom-James M contributed extensively to literature search and drafting of the manuscript. Elebesunu E.E and Ujam S.B carried out language edits and structural formatting of the manuscript draft. Shuaibu S.S, Manirambona E, Salvador B. Eand Lucero-Prisno D.E reviewed the work for intellectual contributions and validation. All authors approved the final version of the manuscript and take responsibility for it.

Declaration of competing interest

The authors declare no competing interests.

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