

Towards the Equitable Distribution of COVID-19 Vaccines in Africa

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ABSTRACT

Infections caused by the virus responsible for the COVID-19 pandemic have delivered a decisive blow to health systems across the world and resulted in drastic economic hardships. COVID-19 vaccines have proven to reduce the risk of mortality and morbidity against the virus responsible for the COVID-19 pandemic and hence the vaccine must be distributed equitably among the global community. The comparatively low rate of vaccination in many of the low and middle income African countries, risks prolonging the pandemic and the emergence of new and dangerous variants of COVID-19. The vaccine supply chain has been also chiefly directed towards high-income countries, while African countries continue to distribute the COVID-19

vaccine by using traditional procedures of routine immunisation and erstwhile vaccination programmes. These have not been able to fulfil the current demand for the vaccine and instead, have adversely hindered the vaccines' effective distribution. African countries must accelerate vaccine distribution by implementing innovative measures conducive to optimal distribution at the local and the national level, while also redirecting a sizable portion of vaccines from manufacturers and countries which have purchased a surplus.

SCIENCE ⇒ POLICY

The rate of COVID-19 vaccination in African countries is comparatively far lower than their closest counterparts. This threatens to prolong the virus' outbreak and the mutation of new and dangerous variants. International cooperation and procedural innovation must be utilised for the establishment of a vaccine supply chain for the optimal distribution of COVID-19 vaccines down to the grassroots level, along with community mobilisation to overcome vaccine hesitancy.

Key Words

Africa, coronavirus, vaccine distribution, global supply chain, COVID-19, pandemic

Background

The global toll of the COVID-19 pandemic on healthcare and economy has been devastating in Africa, with over 12 million reported cases and more than 257,000 COVID-19-related deaths as of November 2022 [1]. Low and middle income countries (LMICs) in Africa have had to resort to multiple lockdowns and consequently bear the brunt of rising inflation, social unrest and unemployment [2]. The International Monetary Fund (IMF) had predicted the average economic growth of countries in the Sub-Saharan region as 3.6% in 2022, which is the slowest growth rate in comparison to other countries and even lower than the region's economic growth in 2021 of 4.7%. The combined impact of the death toll and economic downturns has pushed African economies backwards on various platforms of global competition [3]. Essential food prices in several African economies have inflated by as much as 50% while the public debt of Sub-Saharan economies has amounted to almost 60% of their respective GDP [4].

Vaccination has served as an effective tool for protection against infectious diseases [5]. In a study conducted in 185 countries and territories between 8th December 2020 and

8th December 2021, it was found that COVID-19 vaccines prevented more than 14 million deaths in the areas of study [6].

The current pace of COVID-19 vaccinations in Africa demands a much longer time for completion in comparison to other countries, which could prolong the pandemic and result in the mutation of the virus into dangerous variants [7]. From among the variants of concern listed by the World Health Organisation (WHO), both the Beta (B.1.351) and the Omicron (B.1.1.529) variants were first detected in South Africa and quickly spread across the world. It can therefore be deduced that the longer the pandemic is prolonged, the higher the chances are of the emergence of further mutated variants.

As seen in Figure 1, just over one-quarter of the continent's populace has been fully vaccinated as of March 2023 while less than two-fifths of its citizens have received at least one dose. For a continent whose members amount to just over 17% of the world population, Africa is far behind its closest counterpart Europe, in terms of the distribution of COVID-19 vaccines, and where more than three-fifths of people have received at least two doses of the vaccine [8]. The disparity in figures among the countries

within Africa is also of grave concern. While countries like Morocco and Seychelles have vaccinated over 67% and 87% of their respective populations, countries such as Cameroon, Burundi and the Democratic Republic of Congo have not even crossed the 15% mark [9].

Policy Challenges

Absence of a Regulated Global Supply Chain. The enormous effort required for the conceptualisation, production and distribution of the COVID-19 vaccine demands the existence of a regulated supply chain. There is also considerable pressure on the existing supply chains for the swift production and delivery of vials, needles, syringes and other medical equipment because of the high demand for the COVID-19 vaccine. The virus responsible for the COVID-19 pandemic, along with the large number of cases and deaths during the pandemic, came as an exogenous shock to healthcare systems around the world [10], resulting in countries devising ways to vaccinate themselves at the earliest. In a phenomenon that has come to be dubbed ‘vaccine nationalism’, many high-income countries (HICs) struck bilateral deals with vaccine manufacturers to acquire as many vaccines as possible instead of prioritising global equity [11]. The absence of a regulated vaccine supply chain has the

potential to adversely hinder optimum vaccine distribution in African nations and prolong the pandemic further [7].

Vaccine hoarding. The COVID-19 Vaccine Global Access (COVAX) Facility was created in April 2020 in joint coordination with the Coalition for Epidemic Preparedness Innovations (CEPI), Global Alliance for Vaccines and Immunisation (Gavi) and WHO to ensure global equitable access to the vaccines by securing them at lower prices for LMICs. While COVAX had distributed over 38 million doses in 100 countries by April 2021, the UK alone had acquired roughly the same amount for itself in a bilateral deal with Johnson & Johnson at the same time. Canada, Japan, the UK, the EU and the USA had already placed early orders for 4 billion doses of vaccines by September 2020 even though the vaccines were not even past the trial stage at the time [12]. By December 2021, the UK and the USA had accumulated enough vaccines to vaccinate their respective citizens over 4 times while the number in Canada was over 6 times [13]. With most of the vaccine supply being directed towards a fraction of the world’s economies, the supply of vaccines to countries in Africa must be ramped up to meet the targeted COVID-19 vaccination rates of the respective African nations.

Gaps in Healthcare Infrastructure. There is a considerable vacuum in the

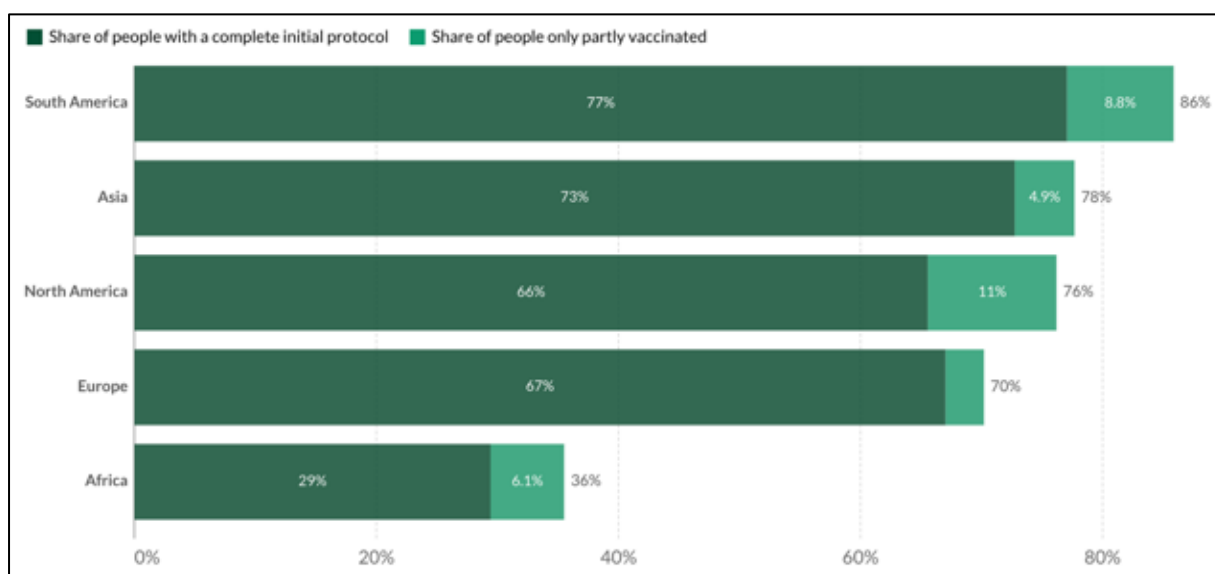


Figure 1. Share of people vaccinated against COVID-19 (adapted from [8])

availability of healthcare equipment and infrastructure in LMICs of Africa which is critical to ensuring swift delivery of the COVID-19 vaccine while preventing vaccine wastage. Two of the most widely distributed vaccines developed by Moderna and Pfizer-BioNTech respectively must be stored at temperatures far below zero degrees Celsius before being distributed, requiring the establishment of a “cold supply chain” to maintain the necessary conditions for their shelf life. Although several Sub-Saharan African countries had set up infrastructure such as freezers in 2013-14 for the distribution of the Ebola vaccine, the small scale of the infrastructural set up is not equipped to accommodate the capacity required for the distribution of COVID-19 vaccines [7].

Need for Community Engagement and Mobilisation. Vaccine distribution at the final stage is met with the challenge of mobilising people willing to get the vaccine, informing the local populace and overcoming vaccine hesitancy. Vaccine hesitancy results from several causes including confusion among resource-constrained populaces about who bears the vaccination cost, misinformation on social media and common misperceptions about the dangers of the COVID-19 disease [14]. Vaccination centres are also hindered in remote and developing areas from mobilising people due to vaccine hesitancy and gaps in communication. The logistics of ensuring the maintenance of the cold supply chain are severely hampered by the paucity of time while the difficulties of generating meaningful community engagement have not allowed vaccination rates to reach their optimum potential. This has led to vaccine wastage. In November 2021 almost a million doses of the AstraZeneca vaccine which had been supplied by COVAX expired before usage in Nigeria [15].

Shortcomings of COVAX. The twin goals of COVAX to secure 2 billion doses for African citizens [13] and immunize at least 20% of the population of 92 LMICs by 2021 [11] did not reach completion by the estimated deadline. Currently, only 1.083

billion doses of the COVID-19 vaccine or just over half of the targeted number of doses have been administered to African citizens [16]. COVAX has been severely limited in its ability to fulfil its role. For instance, of the targeted \$38 billion COVAX had aimed to raise for funding, not even a third of that amount had been collected by June 2021 [13]. Institutional intervention is of paramount importance in such dire straits but in case of circumstances which transgress international borders, participating nations must be actively willing to be steered in the right direction due to the limited legal enforcement powers of institutional directives [17]. Bilateral dealmaking between HICs and vaccine manufacturers has not only undermined COVAX’s integrity, but also limited its ability to purchase vaccines because of the bottleneck in supply.

Policy Recommendations

Increasing Vaccine Donation and Diversity. States which are currently in possession of a vaccine surplus should donate a substantial amount of their holdings to LMICs in Africa. The current bottleneck in supply is a result of vaccine hoarding, for which bilateral dealmaking countries must take moral responsibility and ramp up donations to African economies [18]. To counter many African healthcare systems’ limited availability of infrastructure for storing vaccines at the required cold temperatures and maintain a cold supply chain, the supply of vaccines needs to be diversified to those vaccines which can be maintained with the existing infrastructure. Countries should add vaccines such as the ones manufactured by Johnson & Johnson and AstraZeneca which can survive in “regular fridge conditions” for up to 3 months and 6 months respectively [11]. This would be pivotal in preventing vaccine wastage.

Collaborative Vaccine Production. African countries should equip themselves for vaccine production to end their dependency on irregular foreign supply. Loembé and Nkengasong (2021) advocate for the transfer of intellectual property from

vaccine producers to African LMICs so that they can begin production immediately [11]. Algeria negotiated with Russia to allow the transfer of Russian vaccine-making technology to start local production in Algeria by September 2021 [19]. Similarly, Egypt made an agreement with China allowing the manufacture of the ingredients required for the Sinovac vaccine in the country [20]. Collaborative partnerships are the key to making African countries self-sufficient in vaccine production.

Improving Community Engagement. The national governments of African countries should reach out to their respective citizens directly to increase participation. They should utilise the strong sense of community guided by the Ubuntu philosophy [21] that prevails throughout the continent to address misinformation and dispel vaccine hesitancy by bringing in community organisers, religious leaders and influential persons into the fold. Mobile phone interventions involving SMS and voice call reminders have resulted in a 10.5 % increase in neonatal vaccination in rural Ghana [22] and a higher than previously recorded percentage of child immunisation in Kenya [23]. African governments should use mobile messaging to send vaccination information and reminders to encourage participation.

Government Incentivisation. African governments should offer monetary and social incentives to encourage vaccination. Providing direct cash transfers to parents for vaccinating their children has been shown to improve vaccination rates by 16% for the BCG vaccine, 21% for the Penta 1 vaccine and 14% for the measles vaccine in Northwest Nigeria [24]. For a region in which more than 40% of the population live below the poverty line [25], monetary incentives should be introduced for people receiving the COVID-19 vaccine to increase participation. Governments should also establish temporary vaccination centres in existing public enterprises [11] and close to residential areas to broaden their outreach.

Optimising Vaccine Distribution. LMICs in Africa are bound to utilise the

infrastructure which was built for routine immunisation procedures such as storage facilities and distribution networks for the purpose of COVID-19 vaccine distribution, since they cannot be expected to heavily invest in new infrastructure due to financial constraints. Therefore, they must use optimal methods which reduce transportation costs and utilise the existing infrastructure in a manner which guarantees equitable access. Yang, Bidkhor and Rajgopal (2020) have proposed an algorithm that maps local areas using mixed integer programming to calculate the optimal distribution routes and the use of storage units according to their capacity to ensure maximum distribution within a short time [26]. Governments should utilise such methods to vaccinate their respective citizens as quickly as possible.

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