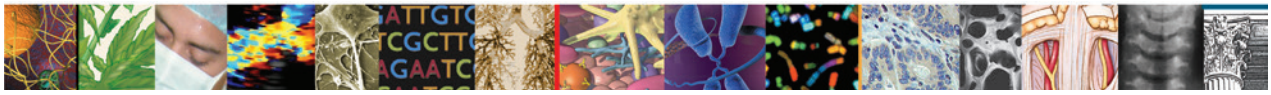

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Perspective

Scaling Up Covid-19 Vaccination in Africa — Lessons from the HIV Pandemic

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Concerns regarding access to Covid-19 vaccines in Africa are reminiscent of concerns raised about responding to the HIV pandemic in the mid-1990s and early 2000s, when highly active antiretroviral treatment (ART) was accessible in high-income countries but had limited availability in African countries — a disparity that resulted in many preventable deaths in these high-burden settings.[1] Funding for scaling up ART throughout Africa was not available until 2002, when the United Nations Global Fund against AIDS, Tuberculosis, and Malaria and the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) began to provide it. During the Covid-19 pandemic, these programs provided a model for the World Health Organization (WHO) and global partners to rapidly establish the COVID-19 Vaccines Global Access (COVAX) initiative to bridge the vaccine gap and ensure rapid and equitable access to vaccines in both high-income countries and low- and middle-income countries.[1]

The HIV pandemic taught us that ART provision alone was insufficient to achieve global disease control. It highlighted the need to scale up health infrastructure for multiple purposes: to procure drugs, promote ART adherence and retention in care, identify key populations at risk, overcome stigma inhibiting access to care, and develop community support for HIV prevention and treatment. Another key need was obtaining robust data for efficacious HIV treatment in vulnerable populations, including children and pregnant women (see table).

In addition to access to Covid-19 vaccines and therapies, countries require sufficient infrastructure to receive and administer these interventions, which may be logistically challenging in rural and remote areas. Local resources for addressing these requirements, especially for vaccines, vary among urban and rural settings in the various African subregions. The current mRNA-based Covid-19 vaccines (developed by Moderna and Pfizer–BioNTech) require a continuous cold chain for distribution: Moderna's vaccine needs –20°C for shipping and storage before dilution, and Pfizer's vaccine must be kept at –70°C, a much greater challenge in Africa. Many health care centers in African countries lack the personnel, equipment, and stable electrical power for low-temperature vaccine storage. Innovative solutions for storage and transport are needed, such as the high-tech, insulated, reusable

Lessons from HIV Pandemic Response Applicable to Covid-19 Vaccine Scale-Up.

Area of Need	Lessons from HIV Response	Potential Applications in Covid-19 Pandemic
Health infrastructure and supply needs	Global Fund and PEPFAR funding were critical for HIV clinical care and local capacity building. Educating and training health care providers in HIV care and ART was essential. Community health and lay workers were indispensable for enhancing HIV testing, ART adherence, and retention in care in hard-to-reach communities.	Appropriate vaccine storage and transport Protective equipment for health care workers in clinic settings Adequate numbers of trained health care workers to safely provide injections and address patient concerns Engagement and compensation of community health workers Tracking systems for vaccines requiring multiple doses to ensure vaccine series completion
Key populations and local epidemiology	Targeted programs were needed to identify groups at highest risk for HIV. Testing, treatment, and prevention had to be provided to difficult-to-reach populations.	Targeting limited vaccine supply toward populations at greatest risk Tailoring response according to geographic region, infrastructure, and culture Conducting surveillance to identify and reach high-risk populations (WHO Expanded Program on Immunization)
Prevention and treatment reluctance	Sustained and improved risk communication and education from trusted persons and institutions helped overcome fear and stigma surrounding contagion and ART side effects. Misconception that there is no reason for treatment if there are no symptoms had to be corrected. Convenience and side-effect profiles of ART regimens had to be improved. Misinformation, including from political leaders and media, had to be corrected.	Reducing stigma and fear of disease, isolation, and adverse effects of vaccines Eliminating misconception that there is no reason for isolation if there are no symptoms Addressing misinformation and disinformation about vaccines, including from political leaders, media, and social media Recognizing the importance of risk communication by trusted voices in the community
Communication and community involvement and engagement	Mobile testing units, community health workers (CHWs), community-based care, and efficient drug provision for treatment and prevention were implemented.	Tailoring education and risk communication to needs of local communities Understanding community structures for vaccine communication and distribution. Involving CHWs for rapid, wide-scale, effective, and equitable vaccination
Prevention and treatment in pregnant women and children	Years-long delays for inclusion in HIV drug studies and in access could have been minimized. Social determinants of health had to be identified.	Conducting timely trials of Covid-19 vaccines in pregnant women and children Social determinants of infection disease and of vaccine acceptance and access will be important to identify and address.

container developed to keep Ebola vaccines at ultracold temperatures for up to a week. The mRNA vaccines are administered as two doses separated by 3 to 4 weeks, which presents the challenge of retaining patients long enough to complete the full series. The Johnson and Johnson adenovirus-vector vaccine, which recently received emergency use authorization from the Food and Drug Administration, offers advantages for rollout in Africa, including single-dose administration and no need for ultracold storage. The Oxford–AstraZeneca vaccine can be stored and transported at normal refrigeration temperatures (2 to 8°C) for at least 6 months.

The identification of populations at high risk for HIV and the development of tailored strategies to engage them in HIV prevention and treatment has been critical for the success of national HIV control programs. Given the limited supply of Covid-19 vaccines and the surges in new cases and deaths throughout Africa, it will be crucial to vaccinate populations at greatest risk for infection and severe disease. These related challenges will vary among subregions and countries, given differences in demographic structure, prevalence of underlying conditions, and numbers of essential workers. Addressing the challenges of equitable vaccine distribution will require careful planning and global cooperation; computational models can be used for prioritization and rollout strategies.

Furthermore, we learned that denial, stigma, and misinformation about HIV and its treatment were barriers to ART acceptance in Africa. Covid-19 vaccine acceptance is reportedly only moderate in some high-income countries,

such as the United States; some African countries are similarly reporting low acceptance. A 56% vaccine acceptance rate was reported among more than 4000 adults in the Democratic Republic of Congo. Disturbingly, being a health care worker was a risk factor for low acceptance in this setting.[2] Public health institutions and government officials, private companies, civil society stakeholders, and community opinion leaders must develop an evidence-based, strategic communication plan to debunk misinformation being disseminated on multiple platforms, including social media. Covid-19 vaccine messaging should leverage existing community structures and use lessons learned from past vaccine-hesitancy challenges (e.g., for polio and measles). The availability of thousands of trained health workers who have been involved in implementing HIV programs provides additional resources for scaling up Covid-19 vaccination in Africa.

One persistent problem in the HIV pandemic response has been delays in the evaluation of drugs in pregnant women and children. Although women, mostly of reproductive age, constitute 51% of adults living with HIV globally, pregnancy has generally been an exclusion criterion in ART trials. Safety and pharmacokinetic data for pregnant patients became available only years after initial regulatory approval, which meant long delays in improved treatment for pregnant patients with HIV.[3,4] Data on Covid-19 in pregnant African women are also limited. Reports from high-resource settings indicate that SARS-CoV-2 infection in pregnant women, as compared with nonpregnant women in the same age range, is associated with increased risk for admission to the intensive care unit, need for invasive ventilation or extracorporeal membrane oxygenation, and death.[4] Nevertheless, pregnancy was an exclusion criterion for Covid-19 treatment trials and the first vaccine trials. After approval of the Pfizer–BioNTech and Moderna Covid-19 vaccines, the WHO initially recommended that the vaccines not be given to pregnant women, despite this group's higher risk of severe illness and death from Covid-19. This recommendation was subsequently modified to permit use in pregnant women at "high risk of exposure" to SARS-CoV-2, such as health workers, who were to be vaccinated "in consultation with their healthcare provider." A phase 2–3 clinical trial of the Pfizer–BioNTech vaccine in women during the third trimester of pregnancy has just begun.

Similarly, studies of ART in children living with HIV generally did not begin until after therapies had gained initial regulatory approval for adults, with development and approval of pediatric formulations lagging 8 to 10 years behind. Since children with Covid-19 are often asymptomatic or mildly symptomatic, they are less likely to present for health care or to undergo SARS-CoV-2 testing, which results in underestimation of the burden of pediatric infection. Children can become infected with SARS-CoV-2, transmit the virus to others, and develop severe complications. In a large cohort of children with Covid-19 in South Africa, approximately one third required hospitalization.[5] Data on Covid-19 in children from other African countries are limited. The evidence gap observed for new interventions for pediatric HIV treatment and prevention is echoed in Covid-19 research: children have been excluded from clinical trials of new Covid-19 therapies, despite their potential to have severe disease. Trials of the Pfizer–BioNTech, Moderna, and Oxford–AstraZeneca Covid-19 vaccines were initiated in older children (12 to 17 years of age) and younger children (6 months to 11 years of age) in late 2020 and early 2021, but results are not expected until mid to late 2021.

As we have learned from the HIV pandemic, biomedical advances alone are insufficient to sustainably control a pandemic. Considerations related to health infrastructure, local epidemiology, and responsiveness to local concerns and beliefs are critical for ending the Covid-19 pandemic — not only in Africa, but also globally. Each country will have its own unique challenges in vaccine distribution, which should be addressed with careful planning, including leveraging computational models of prioritization and rollout strategies, and applying methods from implementation science to maximize local impact. Addressing these differences is essential if we are to control current and future pandemics.

Disclosure forms provided by the authors are available at NEJM.org.

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