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Inequity has plagued the responses to harmful pathogens. Take COVID-19: An unprecedented 12.45 billion vaccine doses have been administered worldwide in the last 18 months, helping many countries turn the tide on the pandemic. Yet three-quarters of people in Africa have not received one dose. As long as this gap exists, we can't protect the world against new virus variants and end the acute stage of this pandemic.

Thanks to groundbreaking innovation, effective vaccines were developed in record time. However, at the outset, a concentration of vaccine and other health technology production was seen in a few, mostly rich, countries. Poorer nations ended up at the back of the queue. The situation has since changed, with global supply exceeding global demand.

The international community, led through the ACT-Accelerator and its COVAX facility, has played a crucial role, confirming that the response to scourges like COVID-19 requires ample preparedness and new ways of working in order to protect public health.

Now, the central challenges are how to ensure that vaccines remain effective, boost the capacities of national public health systems to administer doses and increase vaccine uptake, and counter the pervasive winds of misinformation that fan vaccine hesitancy.

COVID lesson: Boost local vaccine production

An obvious lesson of this pandemic is that we must expand the local and regional production of vaccines and other essential health products in low- and middle-income countries. This will allow for both direct access to vaccines as well as the development of local ecosystems of vaccine production. It will make supply in the event of the next crisis more reliable and more equitable, as long as global supply chains are not interrupted.

The World Health Organization (WHO), the African Union, the European Union, the governments of South Africa, Rwanda, Senegal, Germany and France, and partners, are working to help industry and partners scale up local vaccine production and improve global and regional collaboration to prevent and respond to future

pandemics. Investing collectively to ensure all regions of the world have state-of-the-art production infrastructure, trained personnel and institutional and regulatory arrangements is a valuable asset for our common health security.

WHO is supporting a multilateral effort to create and spread mRNA technology in developing countries.

A year ago, WHO, South Africa and the Medicines Patent Pool established a technology transfer hub for mRNA vaccines in Cape Town, supported by EU, France, Germany and other local and international partners. The hub's goal is to spread this technology to developing countries by training and licensing manufacturers to produce their own vaccines for national and regional use.

With donor support, the hub is already producing results:

- ▶ Scientists have designed a new mRNA vaccine based on publicly available information.
- ▶ Local manufacturers from Africa, Latin America, Asia and Europe have been selected to receive the technology. Partners at the Medicines Patent Pool are ready to help license technologies.
- ▶ A new initiative of the African Development Bank, the African Pharmaceutical Technology Foundation, may also contribute.
- ▶ Parts of the private sector are also stepping up. The recent groundbreaking ceremony in Rwanda of the first mRNA production facility in Africa, built by the German company BioNTech, is another example of the efforts by African countries to work with partners to become more resilient in the face of pandemics. Similar facilities are planned in Senegal, collaborating with Ghana for fill-and-finish services.

How to ensure vaccine adaptability

The mRNA technology is not just for fighting COVID-19. We're hopeful it can be adapted to tackle other diseases, such as HIV, tuberculosis, malaria and leishmaniasis, putting countries in the driver's seat to produce the tools required to meet their health needs.

At a recent summit in the Rwanda capital of Kigali, BioNTech committed to completing its malaria vaccine program and manufacture any licensed product in

Africa. The WHO mRNA hub program in South Africa already has its eyes on developing a broad suite of vaccines and other products to tackle disease threats, such as insulin to treat diabetes, cancer medicines and, potentially, vaccines for other priority diseases.

Building a vaccine production facility is hard, but ensuring its sustainability is even harder:

► There is the need to strengthen workforce capacity by providing dedicated training for staff at these facilities. WHO is addressing this gap through a biomanufacturing training hub in South Korea, operating under the framework of the WHO Academy, based in Lyon, France, to help developing countries produce not just vaccines but also insulin, monoclonal antibodies and cancer treatments. Rwanda has recently launched the Africa Biomanufacturing Institute, an innovative structure bringing together industry training providers and universities to train the local workforce.

► Producing health products requires strong regulatory capacities to ensure quality standards and approve final products. WHO and partners are investing in strengthening regulatory bodies across Africa and beyond. The Africa Centers for Disease Control and Prevention and the African Union Development Agency have been working with regulators on the continent, and in high-income countries, to increase their capacity. And the African Medicines Agency, to be headquartered in Rwanda, will become Africa's continental medicines regulator. Stronger regulatory agencies in developing countries will also enhance confidence in locally produced products, counter misinformation and cut down on unsafe counterfeit medicines.

► New production facilities will rely heavily on a sustainable, and competitive, market environment where suppliers of vaccines and other new pharmaceutical products will be ready to purchase these lifesaving tools. Market-shaping strategies at regional and continental level, as outlined by the Partnership for African Vaccine Manufacturing, can ensure the sustainability of ongoing efforts, with leading market-shaping agencies and partners, such as Unitaaid, standing ready to support. Leaders of the Group of Seven major industrial nations have also taken up this issue and asked relevant international actors to work on a joint market-shaping strategy.

At the recent World Health Assembly, there was consensus that building strong and sustainable manufacturing capacity in developing countries is essential for a safer world.

Preparing for the next outbreak

WHO member states also discussed the need for a new pandemic accord, because an interconnected world requires globally agreed norms and mechanisms to ensure strong coordination during times of acute health crisis.

And critically, governments recognized that additional funding is urgently needed for making essential investments in pandemic preparedness and response capacities in countries, regions and globally. In this regard, we welcome the newly established financial intermediary fund for Pandemic Prevention, Preparedness and Response, housed at the World Bank, with WHO playing the central technical leadership role.

We know the next outbreak is a question of when, not if. Time is of the essence to intensify collaboration and boost local manufacturing and build confidence in locally made products, so that we are better prepared next time.

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