



Are Our Supply Chains Ready for the Next Global Health Crisis?

We need resilient healthcare supply chains to prepare for the next global health emergency. Here's how to do it.

Over the past two and a half years, we've seen unparalleled innovation and private-public collaboration in the global fight against Covid-19. The rapid development and roll-out of new vaccines, diagnostic tests and therapeutics have saved millions of lives.

However, these developments have not benefited everyone equally. Although more than **67 percent of the global population** has received at least one dose of the Covid-19 vaccine, disparities between the higher and lower income countries are wide. As of May, 72 percent of people in high-income countries have received one dose, compared to 18 percent in low-income countries, according to the UNDP's **Global Dashboard for Vaccine Equity**.

This disparity is a pattern that extends across the three most critical medical countermeasures against the pandemic: vaccines, tests and therapeutics. While high-income countries have conducted 42 tests for every 1,000 people per day in May, low-income countries have conducted just 1.95 tests for every 1,000 people, according to the **Global Covid-19 Access Tracker**. The use of therapeutics, while limited across the globe, is almost non-existent in poorer countries.

In fact, equity is not just a moral imperative; it safeguards our collective global health. The

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emergence of the Delta and Omicron variants saw the virus running unabated in low-income countries and quickly spreading to the rest of the world. Unless we take bold steps to change how we produce and allocate these life-saving tools on a global scale, we risk repeating the same mistakes in the future.

Rethinking health supply chains

Meanwhile, the markets for vaccines, tests and therapeutics are fragile; the emergence of a new disease or variant in one area of the world can upend demand and supply in another. In order to be more prepared for the next global health emergency, we must design supply chains that are built to cope with demand uncertainty and balance effectiveness with equity.

In May, the United States co-hosted the **second Global Covid-19 Summit** to increase global access to vaccines, tests and treatments while building preparedness for future health emergencies. The summit yielded US\$3.2 billion in financial commitments from public, private and nonprofit organisations and contributed to the **new pandemic financing fund**. This week, at the **75th World Health Assembly**, creating a “new architecture for health emergency preparedness, response and resilience” is one of the five priorities to achieve “health for

peace, peace for health”.

However, financial pledges and aspirational goals aren't enough. Vaccines, tests and therapeutics require hundreds of inputs produced in countries across the globe. Therefore, we need a global governance structure to oversee the flow of these critical medical supplies. But coordination is easier said than done.

Now, we must get three components of the supply chain right: better sharing of market risks across public and private actors; flexibility in manufacturing to allow timely change in product mix; and geographical diversity of production facilities for global supply resilience.

Better sharing of market risks

Typically, vaccines, therapeutics and diagnostic tests are developed by private companies with private capital and government funding for upstream research. **Setting up large production plants**, however, requires additional investments which may not be as forthcoming when demand is highly uncertain. Incentives between private companies, governments and international organisations have to be aligned to maximise production and ensure sustainable supply. To put it simply: private companies are unlikely to produce billions of medical supplies when demand can change any moment.

Therefore, governments and multilateral organisations must pay producers to take on risks for the benefit of all. How? Through advance purchase agreements that guarantee a minimum order over a defined time period, regardless of market demand.

While some governments implemented advance contracts for vaccines, they had not done so with diagnostics and therapeutics. For example, last fall in the US, as hopes soared for a return to “normal life”, mass testing and vaccinations sites closed. But when Omicron hit, self-test kits went out of stock and test centre appointments were filled to capacity. When President Joe Biden announced that the government would purchase one billion rapid tests to distribute for free to Americans, **manufacturers could not ramp up production fast enough**. Similarly, the demand and supply for the oral antivirals Paxlovid and Molnupiravir have been **volatile**, alternating between low supply or sufficient supply but limited demand.

This mismatch between supply and demand could have been avoided had the government shared the risks of demand uncertainty. This problem is amplified in lower-income countries that lack the financial reserves for advance purchase contracts

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with a diversity of manufacturers. When demand surged, they found themselves at the end of the queue.

Ultimately, we cannot ignore how market mechanisms work: Supply is allocated to larger markets with paying power, not necessarily markets with the greatest need. Therefore, like COVAX's advance vaccines contracts for low-income countries, we need similar risk-sharing structures for diagnostics and therapeutics.

Sustainable production decisions: product-mix and location

While there is significant interest in establishing new manufacturing facilities in Africa and regions where the production of vaccines, diagnostics and therapeutics is currently limited, we must design new production sites for long-term sustainability.

The “build and decay” problem has plagued many public-private investments in lower-income countries. Unfortunately, it is a common story in development finance: a production plant that's heralded to revolutionise local industry lies empty or **risks closure** years later.

Because it takes two to five years to build new manufacturing plants with the relevant technologies, market conditions would have changed by the time production begins. If designs are not future-proofed to pivot as needed, millions of dollars risk being wasted – which makes it less likely that investors will finance similar projects in the future. As a result, the world is not any better prepared for the next health emergency.

The good news is that we can avoid this grim trajectory by changing how we make production decisions in a global health context. The two crucial and interconnected questions are: Which products should we make? And where?

Building flexibility based on the known unknowns

New manufacturing plants cannot focus solely on the current market needs for Covid-19 medical supplies, but must also increase world resilience. The best path for emergency preparedness is to build plants for maximum production flexibility in anticipation of future needs – like vaccines for SARS viruses, influenza, or unknown endemic diseases. This requires agile decision making as well as choosing a plant and equipment that are highly flexible.

To determine the **degree of flexibility required** – for example, should a plant manufacture mRNA, protein subunit vaccine or both – producers must

identify where the most uncertainty lies in the market. An optimal product mix protects against these unknowns.

However, flexibility is neither infinite nor cheap. Building a plant with the flexibility to pivot production to manufacture different products requires around 25 percent more capital and operating costs than one with fixed products. The design of the production facility should build in the maximum flexibility that investors can afford.

The optimal plant location is equally critical. Our **models** reveal that plants in countries with small populations and good logistics – like Senegal and Singapore – will increase global emergency preparedness. Flexible production plants in countries like these can manufacture for domestic markets and also export the surplus when global demand spikes.

Invest in resilience

Thankfully, we are seeing progress. In **Senegal**, the Institute Pasteur de Dakar is building a US\$200-million **regional hub for vaccine manufacturing**, parts of which will become operational in the latter half of 2022. The plant will not only produce Covid-19 vaccines but is designed to manufacture a range of vaccines and biological products depending on market needs. This is made possible with modular and flexible manufacturing equipment.

Sceptics may argue that production based in Senegal cannot be as large or efficient as those based in low-cost India or China. They are right. Technical talent and ecosystems are only starting to emerge, so input costs can be up to 25 percent higher than in other regions.

But it is worth it.

This increased cost – which I call a “resilience premium” – benefits all of us. It is a sound investment for multilateral organisations and high-income countries because resources can be redirected to fit-for-purpose products that match market needs across the globe in an equitable way. It will also make our overall system resilient against localised epidemics or global pandemics.

The best time for building a sustainable supply chain for life-savings tools against health emergencies is between pandemics. Although Covid-19 is still simmering, we are no longer in acute crisis mode. The time to build is now.

Prashant Yadav is an Affiliate Professor of Technology and Operations Management at INSEAD and the Academic Director of the **INSEAD Africa**

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Initiative. His work focuses on improving healthcare supply chains and designing better supply chains for products with social benefits.

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