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POLICY BRIEF

Sustainable Investment in the African Pharmaceutical Industry

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EXECUTIVE SUMMARY

- Africa's **growing demand for vaccines is predicted to triple,** rising to 2.7 billion doses annually by 2040.
- Africa has limited vaccine production facilities and weak health infrastructure for mass distribution
- The COVID-19 pandemic illustrated the consequences of Africa's lacking pharmaceutical manufacturing capability as countries that managed to contain initial COVID surges struggled through subsequent waves due to the **lack of a robust immunization program.**

- Despite country differences, shared problems across regions include limited health infrastructures, dependence on foreign drug imports, inequitable access to vaccines, and negative economic outcomes.
- **The Partnership of African Vaccine Manufacturing (PAVM) plans to increase productionto meet 60% of predicted African demand** by enhancing domestic production by 2040.

We recommend four strategies to strengthen pharmaceutical infra- structure and investment on the continent:

- **Streamlined Regulation,**
- **Skilled Workforce Improvements**
- **R&D Infrastructure Investments, and**
- **Sustainable Financing Schemes.**

PROBLEM CONTEXT

The COVID-19 pandemic revealed weaknesses in Africa's health infrastructure, emphasizing the urgent need to prepare the continent to handle future global health crises. Supply chain challenges during the pandemic highlighted the vital role of health infrastructure investment; specifically, adequate local production of vaccines, pharmaceutical goods, and other medical supplies. In 2020, there were zero vaccine development facilities that could manufacture and distribute mRNA vaccines from start to finish on the African continent; three years later in 2023, there are still no functional end-to-end vaccine factories.[1]

Africa, like the rest of the world, faced unprecedented challenges, exposing limitations in existing health systems. A dependence on external sources for vaccines and pharmaceuticals worsened the situation due to disruptions in global supply chains and delayed distribution.[2] There has still not been adequate preparation for the next pandemic through vaccine production and pharmaceutical investment on the African continent.[3]

mRNA vaccine production will offer high efficacy against targeted diseases with a rapid timeline. Africa should bolster existing pharmaceutical manufacturing capacity while also investing in mRNA productionon the continent in the years to come. Our proposed solutions focus on strategic investments, sustainablepartnerships, and increased local capacity to ensure a resilient response to future pandemics, which will promote Africa's self-reliance and equitable access to healthcare.

STREAMLINED REGULATION

The Need for Streamlined Regulation:

Currently, new drugs developed by foreign pharmaceutical companies must go through complex processes to gain commercial approval in each African country as every country has a unique set of regulatory requirements. As a result of this complexity, some pharmaceutical companies have avoided filing for market access in Africa as a whole, leaving the continent with a paucity of novel drugs.[4] Africa must work toward a streamlined regulatory environment as a first step toward bolstering pharmaceutical availability and manufacturing, with the African Development Bank bolstering calls for harmonized pharmaceutical regulation in its policy initiatives. The EMA may serve as a model for adapting to needs on the African continent. India's positive regulatory environment for pharmaceutical development, for example, stems from regulatory, financial, and patent policy in the 1970s.

African Medicines Agency:

African Union member states should hasten the ratification of the African Medicines Agency, which is the African counterpart of the European Medicines Agency. The EMA helps unify and accelerate pharmaceutical approvals in Europe. Thus, an approval by the Agency unlocks market availability in over 30 different European countries simultaneously. Similarly, the African Medicines Agency would serve as the overall regulatory body by accelerating approvals for new medicines throughout the whole continent, therefore promoting access to critical drugs. The Treaty for the Establishment of the African Medicines Agency was adopted in 2019, but national governments must ratify the treaty for the Agency to take effect.[5] The treaty struggled to gain support after its adoption, but the establishment of a Special Envoy by the African Union has recently helped quicken ratification. Twenty-one out of 55 countries have ratified and deposited the treaty.[6] The African Development Bank should work alongside the Special Envoy to contact elected officials of national governments and encourage ratification from all member states. By communicating the urgency of drug access and offering subsidizations, the African Development Bank can hasten local legislative bodies to ratify the African Development Bank.

Establishing a Schedule for Vaccination:

National governments should create vaccination routine schedules for children and adults. Gavi, the largest international provider of childhood vaccines, is currently focusing on reaching children who have not received a single dose of vaccines. The African Development Bank should partner with national governments and Gavi to devise comprehensive, country-specific plans. By some estimates, 12.7 million African children missed one or more vaccinations over the last three years. [7] As a result, the WHO and UNICEF are aiming to vaccinate 33 million children who missed vaccinations during the pandemic, labeling it the "Big Catch-Up".[8] The African Development Bank can aid these efforts by encouraging cooperation from national governments. Adhering to a vaccine schedule will enable the continent to prepare its population for future outbreaks while also generating a steady flow of demand for continent vaccine manufacturers.

The Serum Institute of India produces the vast majority of routine childhood vaccines consumed in Africa and other regions of the world.

Case Study: India Atmanirbhar Bharat Strategy

India has streamlined their regulatory environment to emerge as the "Pharmacy of the Global South." India's pharmaceutical industry ranks third in terms of volume of medicines produced and accounts for 20 percent of global generic medicine exports by volume, supplying over 50 percent of global demand for vaccines.[24] Additionally, the Serum Institute of India is now the world's largest vaccine manufacturer by number of doses produced and sold globally, producing more than 1.5 billion vaccine doses that are accredited by the WHO for use in 145 countries.[25] These gains would not have been possible without a beneficial regulatory climate and political prioritization of the biotechnology sector. The government's strategy of "Atmanirbhar Bharat," or "self-sufficient India," created an enabling environment for the domestic Indian pharmaceutical industry to grow by encouraging de-risked, sustainable investment in the sector.[26]

Several key landmark policies facilitated the Indian transition from a major importer to a global exporter. Legislation like the Indian Patents Act of 1970, the Drug Policy Act of 1978, and the Price Control Order of 1979 reduced dependence on imports and encouraged local industry by incentivizing companies to formulate drugs from locally-sourced components.[24] Economic reforms in 1991 integrated the Indian pharmaceutical industry with the global economy by ending the licensing regime and allowing domestic players to operate freely.

The regulatory environment resulting from beneficial patent, sourcing, and pricing policies have allowed India to create a biotechnology and pharmaceutical development market that is competitive on the global stage. African nations can similarly bolster their domestic manufacturing capacity should they adopt similar policies and incentives.

SKILLED WORKFORCE

The current state of Africa's Pharmaceutical Workforce:

Alongside regulatory and R&D challenges, another bottleneck to Africa's pharmaceutical industry is the lack of a skilled workforce. According to the Partnerships for African Vaccine Manufacturing Framework (PAVM), there are currently an estimated 3,000 Full Time Equivalents (FTEs) in R&D and manufacturing positions, of which 1,325 are in R&D and 1,600 in manufacturing. In order to meet the Framework's target level of production volume, this number of full time employees has to grow to 12,500 by 2040 [9]. However, scaling up is hindered by a scarcity of local talent development initiatives and "brain drain," or the emigration of domestic skilled professionals.

Africa's insufficient offerings of specialized university and on-the-job training programs in pharmaceutical-specific fields (such as biotechnology, pharmaceutical and process engineering, and others) limits the pool of

competent workers. Even within this small talent pool, vaccine manufacturing companies in Africa employ 85 percent of the total workforce in operations and only 6 percent in R&D.[9] This insufficient R&D sector restricts these companies' ability to engage in the more lucrative activities of drug substance development – the main source of revenue in the pharmaceutical business. The few African professionals who acquire the necessary expertise tend to look to higher income countries for employment opportunities as most domestic companies don't provide competitive salaries and incentives for local professionals to stay. This 'brain drain' phenomenon causes a scarcity of local staff and disincentivizes investment into local training programs, further reducing the available talent pool.

A sustainable solution to a dearth of skilled workers must take an ecosystem-wide approach, addressing both the supply (providing better training programs) and demand (providing better employment packages) of African talent for its pharmaceutical industry. The African Development Bank should leverage its network of partners to facilitate more investment into Africa's pharmaceutical-specific training initiatives and strategically incentivize manufacturers to hire more local staff. Rwanda serves as an exemplary model of this comprehensive approach.

Case Study Rwanda: BioNTech, Regional Center of Excellence, and Cooper Pharma

Over the last two decades, Rwanda has distinguished itself among African nations as a leader in the pharmaceutical industry. It hosts the AMA's headquarters and recently secured an mRNA production partnership with BioNTech. Rwanda's investment in its workforce builds upon post-COVID momentum to strengthen Africa's pharmaceutical sector.

Two major initiatives stand out: (1) Rwanda's establishment of the University of Rwanda Regional Center of Excellence in Biomedical Engineering and e-Health, and (2) Rwanda's manufacturing collaboration with BioNTech. 3The University of Rwanda, Regional Center of Excellence in Biomedical Engineering and e-Health (UR-CE-BE) is a novel partnership between the Government of Rwanda and the African Development Bank. Its mission is to "to build a critical mass of a qualified and transferable workforce to sustainably boost the Biomedical sector with competent technical support skills, innovation and R&D capabilities".[10] The program's focus on the biomedical sector in Africa will ensure that African students supported through the program will no longer need to travel abroad, at immense cost, to gain adequate training in biomedical engineering or associated fields, lowering barriers to entry.

South African vaccine-producing firm Biovac received support from European Investment Bank and other partners.

Additionally, the collaboration with BioNTech will facilitate tech transfer and provide competitive employment opportunities for African pharmaceutical professionals. The BioNTech Rwanda facility comprises two fully functional vaccine production units (a.k.a BioNTainers) shipped from Germany to Rwanda, where they will be used to manufacture COVID-19 vaccines and other mRNA products for the African market and beyond.[11] As such, it will be a site for human capital development, with BioNTech's engineers and experts transferring their knowledge to local staff through on-the-job training collaborations. These local professionals can then share, adapt, and innovate this expertise to other local projects. Through its earmarked jobs for local staff, the facility will limit brain drain by offering competitive job offers, similar to what they would find abroad. Coupled with other local and multinational manufacturers in Rwanda (such as Cooper Pharma Kigali), BioNTech Rwanda is part of a growing list of companies offering appealing employment opportunities to African professionals to stay and work on the continent.

In conclusion, we recommend Rwanda's comprehensive approach to upskilling its workforce as a reproducible strategy for other African nations:

- Establishing industry-specific programs like the UR-CE-BE will ensure a stable and vetted pool of biomedical personnel whose skills can be adapted to the pharmaceutical sector's various needs.

- Innovative collaborations like the one with BioNTech and other locally based manufacturers will provide enticing job opportunities and prevent brain drain.

R&D INFRASTRUCTURE

Pre-Pandemic Vaccine Manufacturing in Africa:

Before the COVID-19 pandemic, Africa had just 10 manufacturers spread across 5 countries that were capable of producing vaccines.[12] The majority of these were "fill and finish" facilities that relied on shipments of active vaccine drug substances from external suppliers. Only one plant, the Institut Pasteur in Senegal, produced vaccines from end-to-end. Their yellow fever vaccine was the only WHO-prequalified vaccine produced on the continent before the pandemic. Though Africa produces only about 1 percent of the world's vaccines, it accounts for nearly 25 percent of global demand. Most of the vaccines used on the continent are part of a routine childhood immunization program implemented in 40 African countries by Gavi in partnership with national governments.[13] The over reliance on international vaccine donations and drug substance shipments from HICs causes substantial supply bottlenecks with vast implications for African health security. Improving pharmaceutical manufacturing in Africa will require a dynamic, multifaceted approach that capitalizes on opportunities for partnership, while charting paths towards independent domestic manufacturing. To accomplish this end, we recommend:

- Developing mRNA capacity and pursuing antigen manufacturing
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  - Retaining foundational fill and finish capabilities
- Focusing on pharmaceuticals with the most impact in Africa
- Building new regional manufacturing hubs across AfricaRetaining foundational fill and finish capabilities
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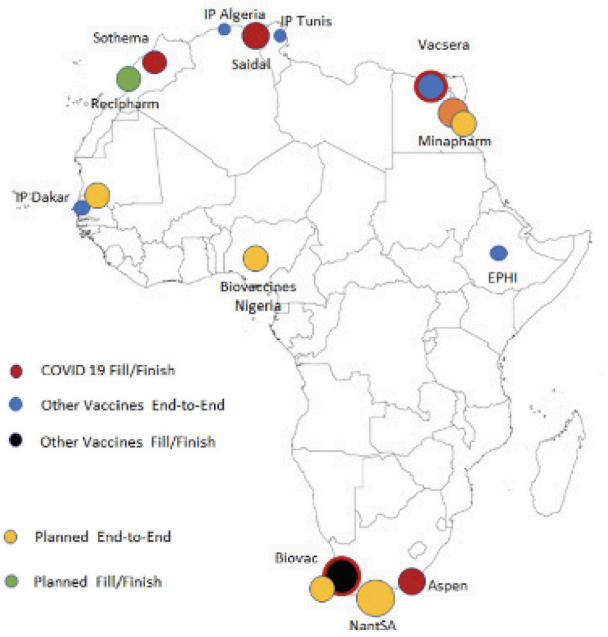


Capacity and capabilities in the African vaccine manufacturing industry, current and planned as of May 2022 (Source: PATH

Post-Pandemic Developments:

After the COVID pandemic, several pharmaceutical giants such as BioNTech spearheaded projects to bring mRNA vaccine technology to Africa, alongside skilled manufacturing staff to train African pharmaceutical professionals. A WHO-backed mRNA technology transfer with Afrigen Biologics in Cape Town, South Africa and BioNTech shipments of modular mRNA manufacturing "BioNTainers" to Kigali, Rwanda have the potential to transform technical manufacturing capacity on the continent. BioNTech has announced plans for additional mRNA hubs in Senegal and Kenya following the successful implementation of its pilot in Rwanda. Although mRNA technology promises an exciting pharmaceutical future with potential vaccines for endemic diseases like HIV, TB, malaria and even cancer, it also faces significant roadblocks for its implementation. mRNA vaccines rely upon ultra cold-chain shipment, which is impossible in regions of Africa that lack access to reliable electricity. mRNA vaccines are often also protected by layers of patents that make their manufacturing costly and dependent on exclusive technical know-how.[14,15] These bottlenecks promote reliance on HICs and their pharmaceutical good-will, which could prove catastrophic if the next pandemic arrives before Africa has a chance to absorb and scale up mRNA technology.

BioNTainer, a modular mRNA vaccine technology donated to Kigali, Rwanda through the BioNTech knowledge transfer and manufacturing capacity bolstering initiatives.

Recommendations for Future Growth:

Given a dynamic and rapidly-evolving pharmaceutical landscape in Africa, we recommend a model of a strategic multi-alliance to ramp up vaccine manufacturing capacity on the continent. The African Union and African Development Bank should promote partnerships with international pharmaceutical companies to introduce mRNA manufacturing to the continent. Alliances with international pharmaceutical strongholds could yield mutual economic and social benefits through the creation of new markets and the upskilling of domestic professionals. In parallel, Africa should retain a stronghold in fill and finish and animal vaccines, and pursue new pharmaceutical ventures that allow it to capture the largest market share. Whenever possible, manufacturers should explore vaccines with lowor no-patent barriers, like the Oxford-AstraZeneca and Corbevax vaccines, which are already being manufactured in LMICs at lower cost relative to mRNA vaccines.[16-18] Africa should also focus on scaling up manufacturing for routine and endemic disease vaccines, which have large domestic markets. New infrastructure should be targeted in countries that already have a proven track record and favorable political conditions. These manufacturers must cover a large regional scope across the continent. We recommend targeting investment in South Africa, Rwanda, Senegal, and Morocco, initially, with potential to subsequently scale up in other locations.

SUSTAINABLE FINANCING

Public Investment:

The public sector can play a pivotal role in pandemic preparedness by strengthening primary healthcare systems to take on future communicable disease burden via novel, sustainable financing mechanisms. Four types of investments can be prioritized by the public sector: effective, accessible primary healthcare infrastructure for vulnerable populations, diagnostic infrastructure, R&D, and connectivity or digital infrastructure. According to the African Development Bank's 2022 Strategy for Quality Health Infrastructure in Africa, the continent requires $26 billion of annual investment to support sustainable healthcare systems.[19] Public actors should explore alternative financing schemes to sustainably invest in robust primary healthcare infrastructure that is accessible to all Africans.

In addition to the public sector, the World Bank's Pandemic Fund provides a template for multilateral and sustained public investment in Africa's healthcare systems. The Pandemic Fund has solicited proposals to finance pandemic prevention, preparedness, and response (PPR) capacities at national, regional, and global levels, with a focus on LMICs.[22]The Fund has already approved proposals from the African Development Bank in its first round.[22] The African Development Bank should continue to serve as a convener for national governments to strengthen continent-wide pandemic resilient health systems.

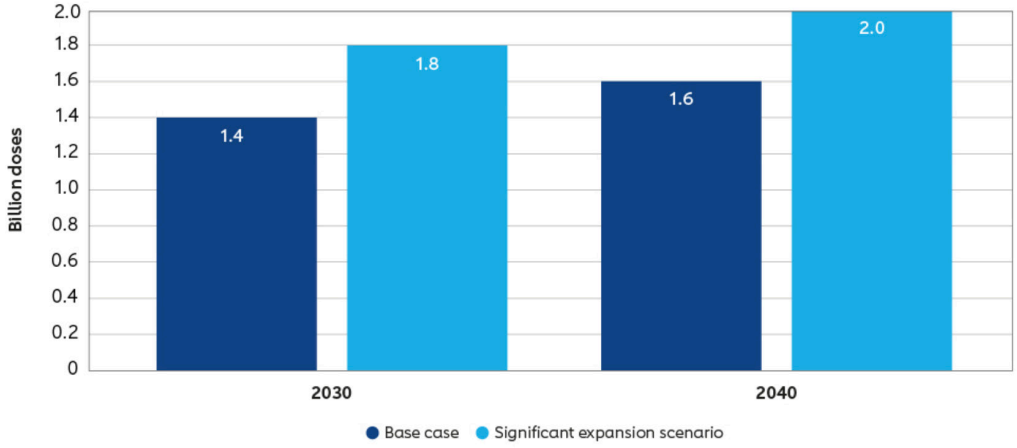
Alternative financing mechanisms can revolutionize the African healthcare sector. Funding and implementing key interventions at the community level by working with local, trusted stakeholders with expertise in region-specific health priorities can address challenges with government-directed public health spending.[20]

Novel sustainable financing mechanisms like pool funds and diaspora bonds have shown moderate success in financing public healthcare infrastructure in LMICs. The Liberia Health Sector Pool Fund allowed the Ministry of Health to de-risk pooled funds from foreign direct investments and streamline investments towards community resources.[20] The Ministry of Health's stewardship has increased the efficiency of national healthcare services and expanded the delivery network from 36 percent of facilities to 82 percent in just two years. Increased accountability and ownership by LMIC governments can bolster pandemic preparedness and strengthen health systems. These health financing mechanisms serve to supplement bolstering pharmaceutical regulatory capacity through value-added mechanisms at the national level. The African Development Bank can partner with national ministries of health to steward similar pooled funding and pharmaceutical regulation mechanisms.

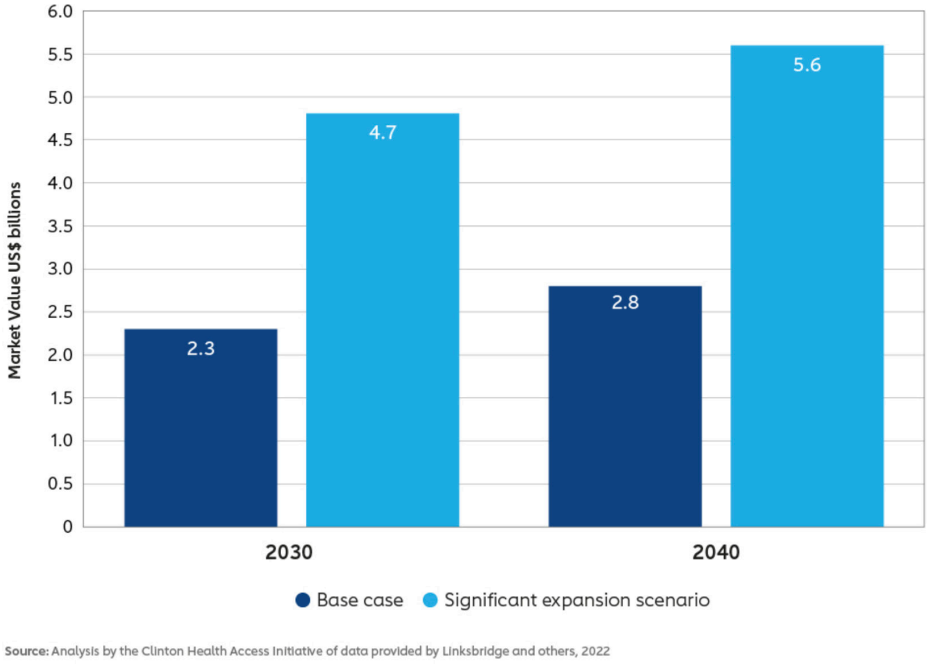
Another financing mechanism, diaspora bonds, utilize foreign direct investment via regional diasporas to establish top private hospitals within nations. They also act as social bonds to pay out to investors on the basis of social impact.[19] African governments can leverage a similar model to receive foreign equity participation from diaspora investors to construct new hospitals, diagnostic centers, and pharmaceutical facilities. The African Development Bank should facilitate and mediate diaspora bonds between national governments and diaspora populations to work toward pandemic preparedness by improving access to essential medicines and expanding pharmaceutical capacity.

Private Investment:

Although there is a strong legacy of private entities exploiting Africa for its natural resources, the recent uptick in private sector interest in Africa's healthcare and pharmaceutical industries might tell a different story. Private investments have the opportunity to accelerate the rate of healthcare system improvement and drug manufacturing capabilities in the region. Further, investments in Africa's private companies will be the best way to drastically improve drug manufacturing and pharmaceutical capacity on the continent. To attract private investments, local stakeholders have worked to shift the narrative around African healthcare from a cause for non-profits and aid workers into an opportunity for business-minded individuals. As electricity shortages and other logistical challenges that create cost barriers to drug manufacturing within Africa alleviate, investors are focusing on the signs that indicate African healthcare is a potentially lucrative investment. Trends such as Africa's growing population, rising incomes, and increased NCD incidence rate, as well as the disproportionate concentration of malaria, HIV, and TB cases, all indicate that more drug manufacturers are needed on the continent.[28] This builds the business case for private entities. Each private dollar that flows into Africa's pharmaceutical



Source: Analysis by the Clinton Health Access Initiative of data provided by Linksbridge and others, 2022



Source: Analysis by the Clinton Health Access Initiative of data provided by Linksbridge and others, 2022

Projected growth in Estimated Public Market Value of the African vaccine market, 2030-2040 (in US$billions) (Source: The Clinton Health Access Initiative)

infrastructure has the chance to greatly improve the state of health in the region over the coming years, while also providing an enjoyable return on investment for investors.

Leading the pharmaceutical investment charge are a series of international financing institutions including the European Investment Bank, the African Development Bank, and the World Bank. While these institutions are not profit driven, their charters mandate that all investments be fiscally sound with sensible loan repayment plans and schedules. For example, the European Investment Bank has recently launched a pharmaceutical investment initiative in Africa, and the International Finance Corporation (IFC), through the World Bank, has made investments in a series of private pharmaceutical companies in Nigeria, South Africa, Rwanda, and Senegal [29, 30]. The South African firm Biovac's deal with the IFC and other development banks has funded an expansion of their existing vaccine manufacturing plant capacity and enabled them to produce Pfizer-BioNTech's COVID-19 vaccine at a time when Africa's vaccine needs were being overlooked.[31] Nigeria's Fidson Healthcare has used IFC funding to develop a capacity to make active pharmaceutical ingredients (APIs).[32] The recent uptick in pharmaceutical investments by these three institutions has signaled to other private entities that Africa's pharmaceutical sector is "open for business" and can facilitate financial gain.

Private Equity deal flow around African pharmaceutical companies has also increased greatly in the past couple of years. With the right marketing and access to more potential investors, small pharmaceutical companies can leverage their presence in and knowledge of this key marketplace to receive funding and expand their manufacturing capabilities. In April, Marcyrl Pharmaceuticals, a generics manufacturer based out of Cairo, closed a deal with Paris-based PE firm Amethis to rapidly expand their manufacturing and distribution capabilities. Amethis is one of many private investors to identify the business opportunity in Africa's pharmaceutical industry as they estimate there is over $18 billion worth of packaged pharmaceutical demand in Africa each year with less than 40 percent of those drugs being produced on the continent.[33] With PE activity in Africa reaching a five year record high in 2022, there is sure to be more dollars available to aid African companies in improving their drug manufacturing capabilities.[34] We suggest that African governments encourage this increased flow of investment by creating incentives for private capital providers. Given the African Development Bank's experience in coordinating public and private funders within the continent, we believe companies and governments

should look to the AfDB to provide strategic guidance and help facilitate partnerships with the private sector.

Among the plethora of private investors interested in Africa's pharmaceutical capabilities is a subset called impact investors. Improving the conditions of the region in which one invests is baked into the investment philosophy of impact investors, unlike many PE firms. Some groups like the Investment Funds for Health in Africa and CrossBoundary are already putting their dollars behind Africa's pharmaceutical infrastructure [35, 36]. Pointing more impact investors in this direction through education and advocacy will aid in the push to locate more pharmaceutical financing for the continent. CrossBoundary's advisory business, wherein they utilize connections with local experts to counsel investors on the most impactful and profitable business opportunities in different sectors and regions, can be reproduced with a focus on African pharmaceuticals.

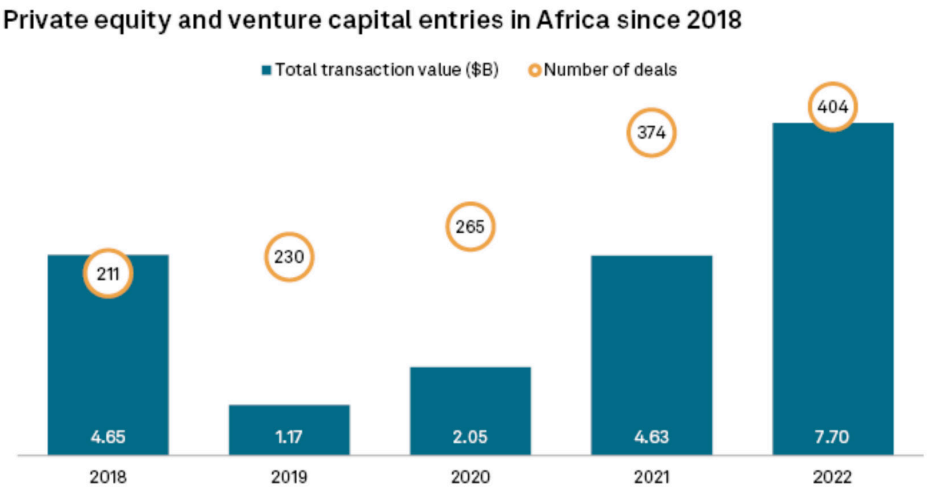
The African Development Bank stated in a recent report that the continent has 50-60 important firms that are involved in the drug manufacturing value chain.[3] Private investments have the opportunity to accelerate these companies' scales of production, hence improving domestic health system resilience. In forming innovative financing mechanisms and attracting new entrants within the private sector, Africa can form long-lasting, sustainable partnerships that bankroll a speedy pharmaceutical infrastructure build-up.

LIMITATIONS AND FUTURE DIRECTIONS

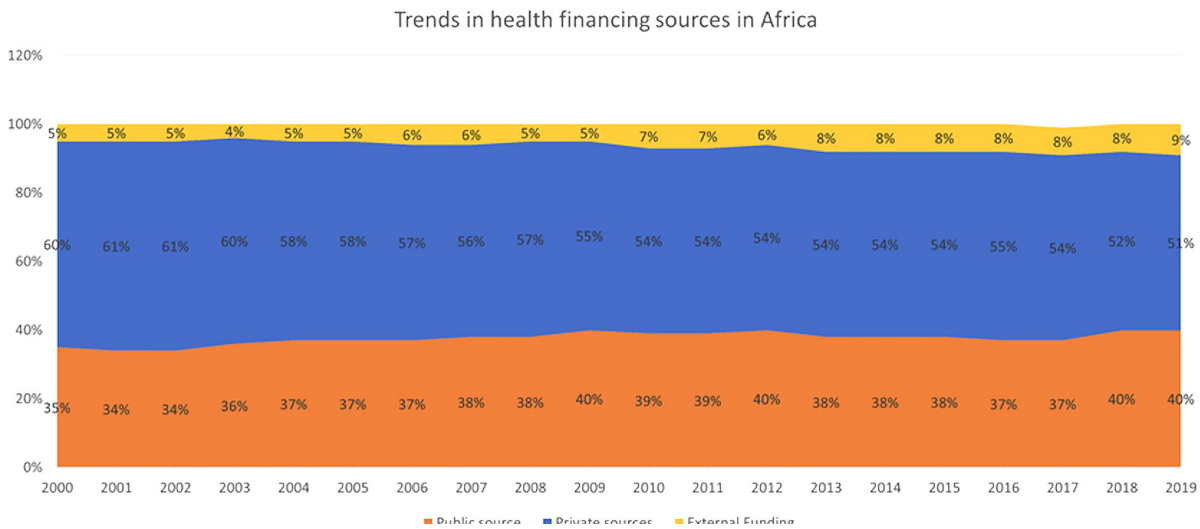
Here, we outline some limitations to implementing our recommendations, including the possibility of corruption and the unintended concentration of resource flow to a handful of countries and organizations, and also present some ways to address these issues should they arise.

• In many instances, funds earmarked for improving healthcare infrastructure and bolstering pharmaceutical capabilities are siphoned off through corrupt practices, hindering the intended progress. To mitigate such corruption, the African Development Bank should codify a vetting process for local partners. Furthermore, the African Development Bank can aim to minimize the number of intermediaries between the source of aid and the intended recipient, reducing the risk of fund mismanagement.This can also include partnering with organizations like Transparency International to ensure non-corrupt funding trails.

• International organizations prefer to work with governments and companies they are already familiar with, which may lead to only a handful of actors benefitting from the inflow of aid we have suggested in our policy brief. Countries like Rwanda and South Africa already serve as international hubs for Africa and will receive more funds while other nations will remain without aid. Over decades, this could widen the wealth gap between African countries and perpetuate, if not worsen, existing inequalities. To address this, the African Development Bank should facilitate new investment opportunities in riskier countries with impact investors in the future to ensure an equitable distribution of pharmaceutical capacity across the continent. It can even explore the



Private Equity and Venture Captial investments in Africa reached a 5 year high both in number of deals and transaction value in 2022.



Private sources tend to dominate health financing sources in Africa, but have steadily decreased from 60%to 51% as public sources increased health financing between 2000 and 2019.

possibility of a special mandate to ensure the timely distribution of funds to lower-resourced countries to supplement the aforementioned regional scale-up.

CONCLUSION

We identified four pillars of approach for pharmaceutical and vaccine investment in Africa that will simultaneously ensure domestic production resilience and aid in pandemic preparedness: (1) streamlined regulation, (2) upskilled workforce, (3) R&D infrastructure investments, and (4) sustainable financing. By prioritizing these four strategies, African nations can build and sustain the regulatory and economic conditions for a resilient pharmaceutical industry. As aforementioned, the continent of Africa struggled to contain various waves of COVID-19 mainly due to the lack of a robust immunization program and no sole regulatory agencies on the continent. This was accentuated by shared challenges, including weak health infrastructures, dependence on external sources, inequitable access to vaccines, and negative economic outcomes for many domestic governments and enterprises [9]. Moving forward, it is imperative to ensure domestic vaccine and pharmaceutical manufacturing capabilities to ensure the continent's resilience in the face of future pandemics. Additionally, Africa's demand for all vaccines is expected to triple by 2040 due to population growth. As highlighted under the pillar of streamlined regulation, the continent of Africa would benefit from a sole regulator of medical quality and harmonization, such as a more involved African Medicines Agency, increasing its involvement with domestic health ministries. This would allow for vaccines and medical commodities to become available in multiple countries simultaneously and increase the efficiency of the pharmaceutical market. Africa also needs to invest in upskilling and retaining the pharmaceutical workforce through investments in university and pharmaceutical training programs, combating brain drain. R&D investments should focus on regional upscale that covers the entire continent of Africa, focusing initially on the countries of South Africa, Rwanda, Senegal, and Morocco, following the aforementioned scalable model of Indian biotechnology development. Ideally, phasing in mRNA vaccine technology will complement the current fill/finish infrastructure toward pharmaceutical security. Finally, sourcing investments from public and private entities is imperative to sustainable financing. These various sources include multilateral development bank organization funds, diaspora bonds, pooled funds, private equity and venture capital, impact investors, and pharmaceutical collaborations.

POLICY RECOMMENDATIONS

Streamlined Regulation:

African Union member states should hasten the ratification of the African Medicines Agency. The African Development Bank should work alongside the Special Envoy to contact elected officials of national governments and encourage ratification by all member states. The creation of a single regulatory agency can create routine vaccination schedules for children and adults.

Upskilled Workforce:

The scarcity of skilled local staff and infrastructure disincentivizes investment into local training programs, which in turn reduces the number of local staff. Here, the African Development Bank should leverage its network of partners to facilitate more investment into Africa's pharmaceutical-specific training initiatives and strategically incentivize local manufacturers to hire more local staff, working with local universities and private organizations.

R&D Infrastructure Investments:

Africa had a dearth of vaccine manufacturers before the COVID-19 pandemic with most capacity siloed in fill and finish. The African Union and African Development Bank should promote partnerships with international pharmaceutical companies to introduce mRNA and active pharmaceutical ingredient manufacturing to the continent. We recommend targeting investment in South Africa, Rwanda, Senegal, and Morocco initially, with subsequent scale up in other locations.

Sustainable Financing:

A surge in recent investments in Africa's pharmaceutical industry signals the sector's attractiveness for public and private partnerships. The African Development Bank, with its expertise in coordinating public and private funders, can offer strategic guidance and facilitate partnerships.

How to Cite

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