Stimulating and sustaining drug and vaccine research and development in Africa

Policy Brief

Key Messages

- Drug and vaccine nationalism provoked by the COVID-19 pandemic has re-ignited the call for Africa to achieve self-reliance in drugs, vaccines and other medical products.
- Africa still imports over 80% of her pharmaceutical requirements despite the introduction of policies to incentivise the drug and vaccine manufacturing (DVM) sector.
- Low DVM capacity in Africa is largely due to poor infrastructure, lack of skilled human resources, an unconducive business environment, limitations in cross-border trade and weak regulatory structures, and
- To enhance synergies and competitiveness of local DVM companies, African governments must i) radically amplify their investment in R&D infrastructure and expertise; ii) adopt policies that protect and incentivise investors in the local DVM sector; iii) strengthen ethics and other R&D regulatory structures, and iv) harmonise DVM-related policies at regional and continental levels.

Background

170,000 deaths in Africa and over five million deaths globally (1) are attributed to the COVID-19 pandemic – an impact that is unprecedented in recent history. While control measures such as physical distancing, wearing of masks and stringent handwashing have contributed to slowing down the pandemic, it is the rolling out of vaccines that has had the most substantial effect on the pandemic (2,3). But optimism that the vaccine can quickly end the pandemic is tempered by a huge disparity in access to the vaccines and other medical products globally. High income countries (HIC), which account for 20% of the world's adult population, have secured over 50% of all available vaccine doses. Correspondingly, less than 2% of the African population is fully vaccinated against COVID-19 compared to 50% of the population in HIC (4).

This inequity has served as a serious wakeup call for African countries to revive their ambition to become self-sufficient in drugs and vaccines (5). Although frameworks, such as the 2012 Pharmaceutical Manufacturing Plan for Africa (PMPA), were introduced to stimulate growth in the local DVM sector (6), the continent still imports over 90% of her drug and vaccine requirements. This policy brief is based on a rapid evidence review, commissioned by the African Academy of Sciences. The purpose is to evaluate and collate evidence to reinforce efforts to create a thriving DVM sector in Africa.

Methods

This brief summarises the status of and recommendations for strengthening capacity for drug and vaccine research and development, the manufacturing environment, and regulatory frameworks for DVM in Africa. The data was gathered 1) through a "tele convening" of African and international researchers, policymakers, senior African health ministry officials and other stakeholders. The group discussed coordination and surveillance mechanisms for vaccine and drug development and how these mechanisms can be integrated in the development and rollout of COVID-19 vaccines in Africa, and 2) by a rapid review (7) of published and grey literature on the subject. The literature review searched PubMed and Google Scholar for English-language peer-reviewed articles published as of 5 August 2021; grey literature was obtained from COVID-19 repositories, clinical trial registries and other online resources accessible through the websites of the World Health Organisation (WHO), the African Academy of Sciences and Our World in Data. A narrative synthesis (8) was adopted to analyse

capacity, regulatory frameworks and coordination mechanisms for vaccine and drug development in Africa.

Results

Eighty-nine participants (scientists, Ministry of Health officials, public health and other stakeholders) participated in the tele convening. For the rapid review, 31 articles were selected from among the 2,909 identified through search.

1. Current status of drug and vaccine research capacity in Africa

Clinical trials in Africa represent only 2% of all trials registered in the WHO Clinical Trials Registry (9). The majority are in Egypt and South Africa, and only Uganda, Kenya, Nigeria and Ghana join them in having more than 100 trials registered. By November 2020, only 17 of 300 global trials on COVID-19 were ongoing in 12 African countries, seven of which were in South Africa, and two each in Kenya and Ghana (9).

The main challenge is the lack of investment in research infrastructure and human resources. Most clinical trials in Africa are externally funded. No sub-Saharan country has allocated even 1% of its GDP to research (10). External funding that does exist is concentrated in East and Southern Africa; none is in Central Africa or the Sahel countries (10). HIV, tuberculosis and malaria research is favoured over research on other high-burden diseases on the continent (11). Few universities offer graduate programmes in clinical trial management in Africa (11) which limits Africa's capacity to own and lead local clinical trials (12).

Box 1: Recommendations

- African governments must revisit and honour their pledge to allocate up to 2% of GDP to STI. Building sustainable R&D capacity requires investing not just in research hardware but also in operational software such as institutional research management systems.
- To upgrade the role of African scientists in trials from technical support to leadership, more African universities, in collaboration with research institutions, must develop context-specific courses in drug and vaccine development that incorporate clinical trials training among other expertise (12).
- Public-private partnerships must support the efforts of African public institutions to navigate the lengthy and costly pharmaceutical product development process and to meet strict regulatory requirements (13). An Academia-Industry-Government model in which stakeholders in pharmaceutical development collaborate will enhance the success of the drug and vaccine development chain.

2. Current status of drug and vaccine manufacturing capacity

Africa has roughly 375, mainly small, locally owned private drug manufacturing companies clustered mostly in North Africa and nine Sub-Saharan countries. This compares to China and India with 5,000 and 10,500 drug manufacturers, respectively (14). Only seven African countries have companies operating across the vaccine-manufacturing value chain and only Institute Pasteur in Dakar, Senegal exports a WHO pre-qualified vaccine. No company is engaged in research and development (15). The African pharmaceutics industry is valued at $65 billion and is projected to grow by about a 6% annually (15), fuelled by population and economic growth. The African vaccine market, estimated at $1.3 billion, is expected to reach a value of up to $2.35 billion by 2030 (16).

A combination of lack of local expertise, unreliable energy supplies, fragile logistics and storage capacity, high transport and distribution costs and long lead times for international procurement create significant cost disadvantages for manufacturers in Africa. The lack of regional harmonisation and coordination for DVM and marketing impede cross-border trading and limits the market for local manufacturers (17). Additionally, imported cheap generic drugs, a weak regulatory environment and poor pharmacovigilance allow cheap, substandard and falsified medical products to flood the market (18), exposing local companies to unfair competition. Together, these challenges tend to render the DVM sector in Africa unattractive to private investors (13).

Beyond the local challenges, African DVM companies must also contend with global systemic disadvantages occasioned by asymmetrical trade and intellectual property treaties that inherently advantage HIC. Ironically, the treaties do not grant protection to traditional knowledge, thus facilitating biopiracy and cultural imperialism in the name of bioprospecting (12).

Box 2: Recommendations

- African governments must create a DVM ecosystem that integrates infrastructure at the highest standards, locally grown expertise and a business-friendly environment that attracts investors and incentivises local manufacturers (31). These could include prioritising local manufacturers in public procurement, financial incentives such as soft loans, subsidies and tax breaks, establishment of special economic zones, and talent- and skill-building programs (14);
- There is need to stimulate cross-border trade and enable local manufacturers to expand their scope to countries without adequate capacity. The establishment of cohesive policy frameworks, strengthening of regulatory authorities and harmonisation of registration and medical patents are necessary to integrate continental and regional markets (14, 19);
- Countries must promote partnerships between pharmaceutical manufacturers and public institutions and assert African oversight of cross-border coordination and equitable supply of vaccines and drugs to non-producer countries (18).
- Collaboration between African pharmaceutical producers and the upstream suppliers of active pharmaceutical ingredients (APIs) can jumpstart the growth of African DVM by facilitating local production of generics and creating capacity by scaffold-hopping to build capacity across the drug and vaccine development chain (20), and
- To tackle global trade asymmetries, African interests must advocate for trade policies and treaties that balance social-economic needs with business incentives that recognise the role of medicines for human wellbeing and not just as a commercial product. (13)

3. Ethics and regulatory structures for drug research and development

An early attempt to harmonise regulatory and ethics agencies in Africa was the African Vaccine Regulatory Forum (AVAREF), established in 2006 by the WHO (21). More recently, the African Medicines Regulatory Harmonization (AMRH), built on the PMPA framework, was established by the African Union to promote an enabling regulatory environment for local medicine production by strengthening regulatory capacity, harmonising regulatory requirements and expediting access to good quality, safe and effective drugs (22). Similarly,

the Economic Community of West African States (ECOWAS), the Intergovernmental Authority on Development (IGAD), the Economic Community of Central African States (ECCAS) and the East African Community (EAC) (23) all seek to replicate these efforts on a regional level.

In a 2016 survey, 29 SSA countries reported some form of national ethics guidance, but only 17 included guidelines on ethical collection of human blood samples (HBS), a key component of most clinical trials. Even among the ten countries that accounted for most of the active clinical trials involving the collection of HBS, only seven had guidelines related to HBS specifically (23). Similar data were gathered digitally through the Mapping African Research Ethics Review Capacity (MARC) project portal where 27 countries had indicated having some level of research ethics committee (25) as of 2016.

Regionally, the East Africa Research Council identified 69 research ethics committees (RECs) across the countries of East Africa, largely funded through user fees. Capacity varied across the RECs with only 60% able to review both local and international research projects. Most of the RECs had an education policy but fewer than half had members with training in ethics (26).

Many African countries have National Pharmacovigilance (PV) systems, but fewer than half have a national policy related to medicine safety or a medicine safety advisory committee. PVs are challenged to gather and generate a formal, evidence-based, transparent process of active drug or vaccine safety efficacy and monitoring information (28). Although 74% have spontaneous adverse event reporting systems, fewer than 50% monitor product quality, medication errors, or treatment failures through existing systems (27).

Box 3: Recommendations

African countries must develop strategic plans to incorporate approaches to both passive and active monitoring, coordinate all stakeholders, and strengthen risk management and communication, which will improve patient safety and health outcomes in Africa (27). Key policy focus should include:

- Harmonisation of policy frameworks and tools.
- Institutionalisation of regional joint review mechanisms.
- Standardisation of training and capacity strengthening, and
- Review of the REC operational and financing models.

Summary and policy implications

The call for Africa to achieve self-reliance in drug, vaccine and other medical product manufacturing is urgent; its near absence has been felt acutely as Africa faces COVID. Unfortunately, it is unlikely that COVID-19 is going to be the last pandemic; Africa must be better prepared for the next one. Major obstacles have prevented self-reliance in drug and vaccine manufacturing in Africa, but they are not insurmountable if capacity to secure the health of citizens is viewed as a fundamental right, a public good and a matter of national security, rather than as a source of short-term economic returns. A large and sustained commitment to investment in vaccine Research & Development, creation of a supportive regulatory environment and building a manufacturing infrastructure are required to create a vibrant African DVM sector. Figure 1 depicts these steps. The development of R&D infrastructure and human capital must be coordinated with the establishment of a conducive business environment for local manufacturers and investors and the creation of effective and facilitative ethics review and regulatory structures. To build the competitive muscle required to

break into the global pharmaceutical market, African countries must coordinate effective ethical, regulatory, and pharmacovigilance systems to harness synergies within African countries and across the continent.

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[2]Nuffield Department of Medicine, Oxford University, UK
[3]Africa Research and Impact Network
[4]Alliance for Accelerating Excellence in Science in Africa (AESA)

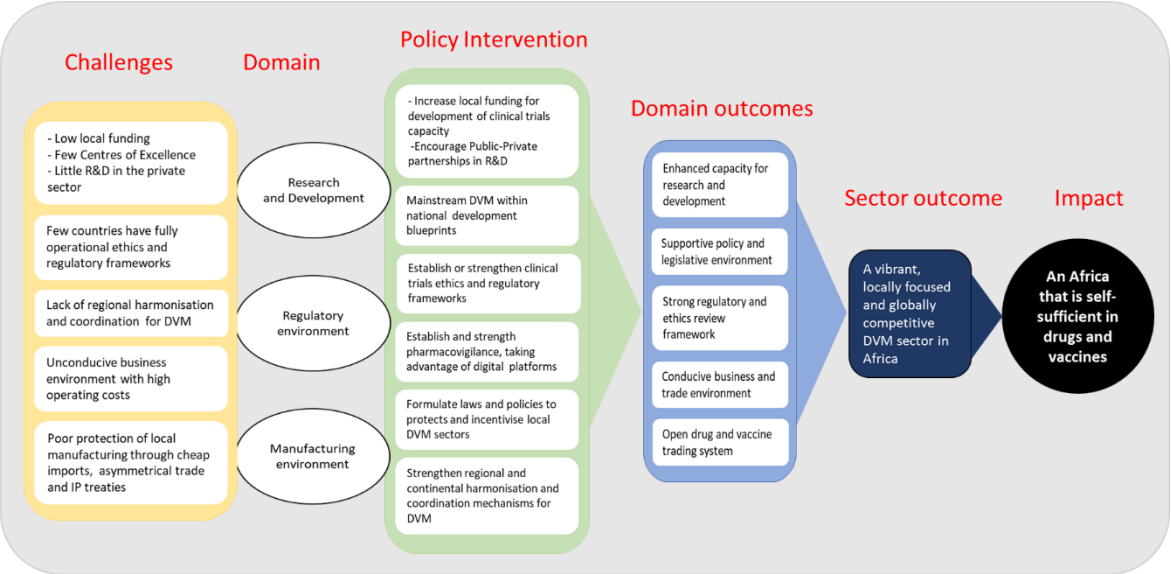

Figure 1: A Framework to guide the reigniting of drug and vaccine research and development in Africa:

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