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Developing a Medical Sector in Africa: Taking Africa into the 21st Century

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Developing a Medical Sector in Africa: Taking Africa into the 21st Century

The economic and health impacts of the COVID-19 pandemic shocked the world. Although European countries slowly began to ease lockdown measures in brave attempts to return to 'normal life', governments across the world contend with difficult choices between 'flattening the curve' to save lives, and allowing their domestic economy to resume its full range of activities to save jobs. COVID-19 disrupted the supply side of many economies by crippling production and logistics networks. The loss of consumer and investor confidence will inevitably contribute to rising inequality via income suppression or job losses.[1] As countries open up, a second wave of COVID-19 infections is likely. This would further exacerbate economic challenges and strain health services in the affected countries. Such an outcome potentially leads to intermittent lockdown phases for the foreseeable future.

This policy brief discusses the opportunity to create a medical sector across Africa. It identifies the current constraints facing Africa's healthcare capacities in light of COVID-19, the short-term opportunities that the private sector and governments can capitalise on immediately and without excess effort, and the longer-term requirements that will require comprehensive planning, policy implementation and public-private sector collaboration.

What does COVID-19 mean for Africa's health sector and economy?

Most projections of COVID-19's impact on global trade and debt levels are dire. Shocks from COVID-19 are likely to trigger recession in some countries and drive global annual growth below 2.5%.[2] Many developing countries, already facing deteriorating debt levels, have insufficient reserves to cushion a severe, even if temporary, impact on their real economies.[3] Global reliance on China as a global manufacturing hub has meant that disruptions to China's output currently affect global and regional value chains (GVCs / RVCs).[4]

African countries are fortunate that the COVID-19 wave arrived much later than in Europe and Asia. This allowed governments and their healthcare sectors time to prepare. Unfortunately, sub-Saharan Africa (SSA) is highly susceptible to pandemic. Most of the SSA urban population lives in overcrowded conditions, and only 34% have access to basic handwashing facilities.[5] Similarly, 71% of Africa's workforce is informally employed.[6] Lockdown measures by African governments led to the loss of daily income from informal wages, which increased levels of household food insecurity and poverty.

The health systems of African countries are weak in comparison to global levels, with lower ratios of hospital beds, intensive care units and health professionals relative to their population.[7]

Containing the COVID-19 pandemic presents a three-fold challenge to African states:

1. **Shortages in international supply of medical devices and Personal Protective Equipment (PPE**). WHO estimates that responding to the pandemic will require 89 million medical masks, 76 million examination gloves and 1.6 million medical goggles per month.[8] Africa is heavily dependent on imported PPE and medical products. African governments may find it difficult to procure the quantities of PPE needed to protect their healthcare workers and populations.

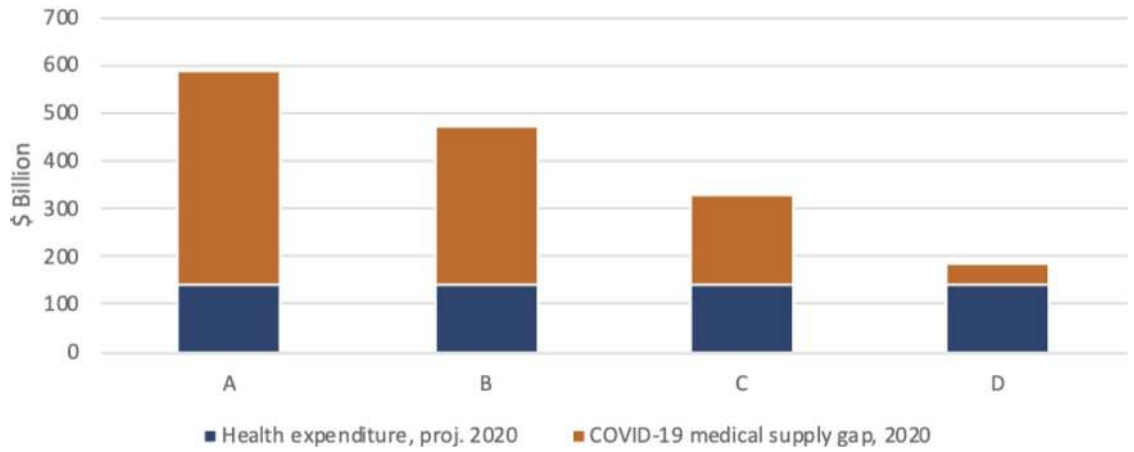
2. **A shortage of financial and human resources to cope with rising infections**. Fighting the spread of COVID-19 demands mobilising funds for emergency health care and social safety nets. United Nations Economic Commission for Africa's (UNECA) projects costs across Africa to test, procure PPE for, and treat all who need hospitalization and intensive care treatment at

US$44 billion. This reflects a best-case scenario with intense suppression plus early physical distancing interventions. [9]

3. **The economic fallout from reduced economic activity, rising poverty levels, and greater human insecurity.** UNECA projections indicate that vulnerable households face an increased probability of moving into transient poverty. They are also now more likely to remain at the poverty threshold for a decade or longer.[10] Left untreated, the COVID-19 medical supply gap across Africa would reach approximately US$446 billion, and many countries would not be able to treat even a fraction of their population that required medical treatments.[11]

Figure 1 below identifies four possible scenarios, in which the outcomes of this crisis depend on the actions taken by African governments. Scenario A identifies the worst-case scenario without intervention; in comparison, Scenario D is the best-case scenario based on intense suppression and early social distancing.

Figure 1 – Four Scenarios for COVID-19 medical supply response (gap) above baseline projected health expenditure for Africa, 2020[12]



Source: United Nations Economic Commission for Africa (UNECA), *COVID-19 Protecting Lives in Africa and Economies*, April 2020. Addis Ababa: UNECA.

Note: Owing to the lack of data on health expenditure for the period (2017–2020), ECA projections assume 6% growth per year in health expenditures as advised by WHO 2019

These challenges raise important issues regarding Africa's capability to meet its immediate healthcare needs. The region must also address longer-term issues regarding the utilisation of scarce regional and continental resources to develop the shared industrial capacities and value chains needed to meet future needs in a similar crisis. African leaders must balance their desire for domestic production of the PPE, medicines, and medical equipment needed to combat COVID-19, versus the reality of the limited current capacities of their manufacturing sectors. Important questions surround the political willingness and capabilities of African countries to create a pan-African medical industry, and the role the private sector can play in helping develop domestic capacities.

The following sections of this policy brief focus on three key topics:

- Understanding the constraints facing African countries in medical devices and PPE access, and the current methods utilized by governments to overcome shortfalls in meeting their medical needs.

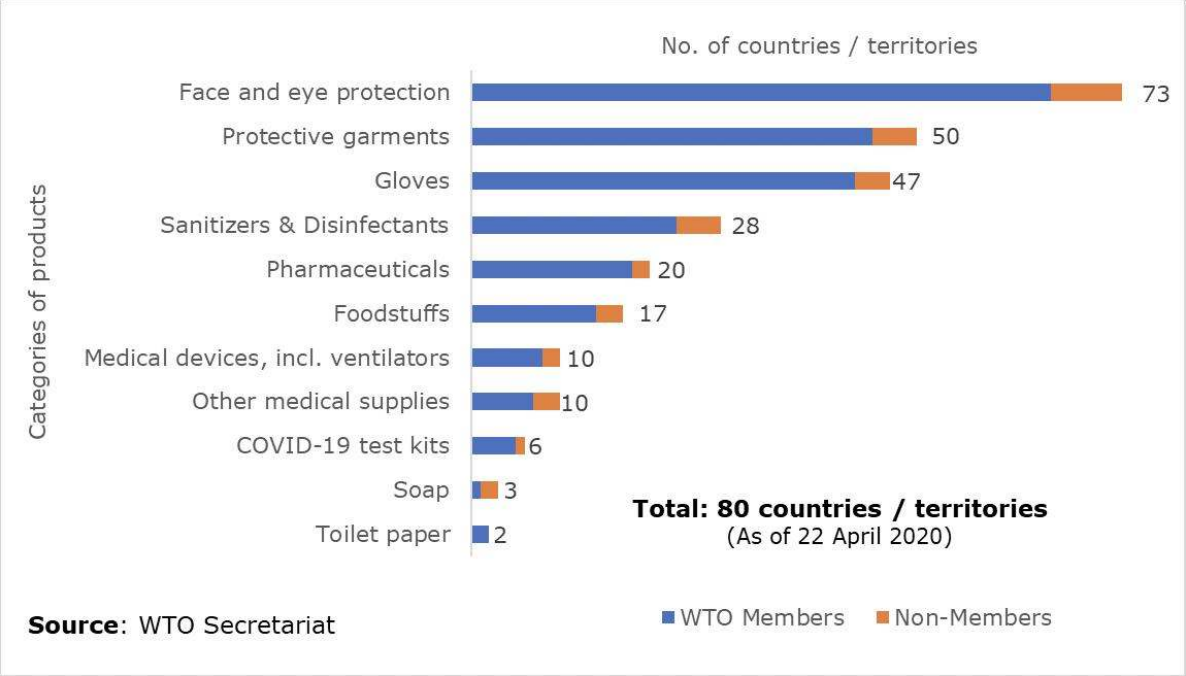
- Identifying existing opportunities and challenges for governments across the continent, as they seek to build and develop a medical industry. What role can the private sector play in building domestic capacities?

- Lastly, the brief examines the longer-term potential for developing medical industries and medical RVCs, and how existing policy initiatives such as the African Continental Free Trade Area (AfCFTA) can be leveraged to support development of an Africa-wide medical device, pharmaceutical and PPE industry.

Africa's position in a global PPE and medical devices supply chain

African countries are particularly vulnerable to international shortages in the supply of medical devices and PPE products. As of April 2020, data from the World Trade Organisation (WTO) shows that 80 WTO-membered states, and 8 non-WTO membered banned exports of medical products and supplies, including PPE, to ensure domestic supply sufficient to meet their own healthcare needs.[13] While most of these measures may be temporary, they highlight the absence of transparency in the multilateral trading system; which is understood as the "publication" of a measure in the domestic system and its "notification" to the WTO Secretariat."[14]

Figure 2 – Number of countries and separate customs territory introducing export prohibitions and restrictions as a result of COVID-19, by categories of products[15]



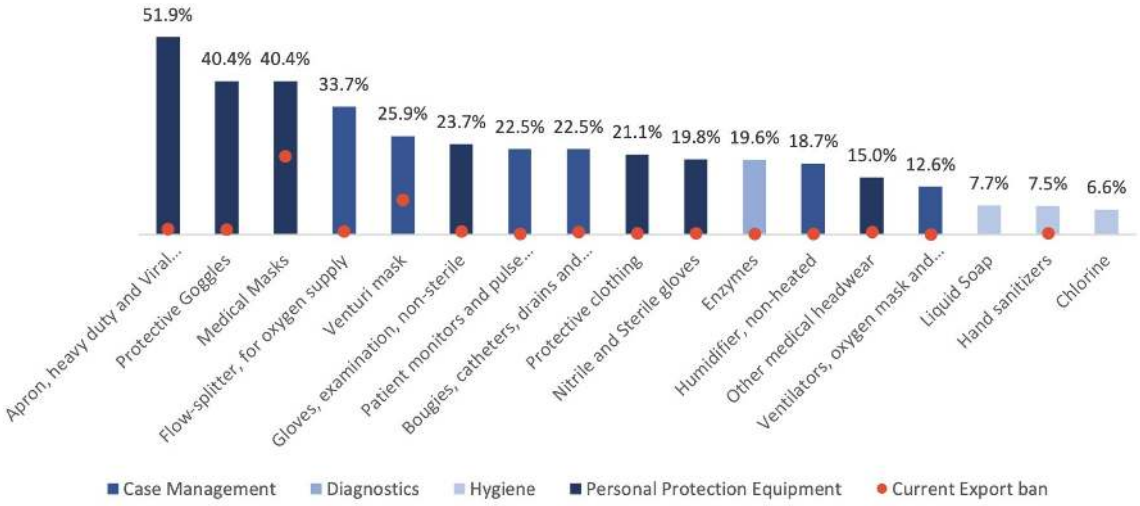
African countries are also likely to experience supply chain disruptions: About half (51%) of Africa's exports go to markets highly impacted by COVID-19, while 53% of its imports originate from highly

impacted countries such as China and some European Union member states.[16] Quarantines and movement restrictions may further frustrate global supply chains. Although inventory decumulation can support supply for a period of time, the duration and magnitude of COVID-19 is likely to exhaust inventory stocks.[17] Exports of both manufactured final goods and of commodity inputs will begin to weaken sharply, further affecting earnings and employment.[18]. These disruptions will flow through their economies to impact tourism, construction, transportation and many other industries.

Disruptions to supply chains and export restrictions have a knock-on effect on price increases, causing further export restrictions and increasing price hikes for PPE and medical products.[19] Estimates from the World Bank show that the impact of current export restrictions could increase prices of medical masks by 20.5% and venturi masks by 9.1%, while the prices of PPE are estimated to increase between 1% and 2% due to the current restrictions.[20] Other significant economic effects that could occur during the pandemic include:

- Application of export restrictions for other sectors, such as agricultural commodities, probably out of fear of shortages;
- Erosion of confidence in global value chains, resulting in higher prices and less efficient supply chains; and
- Erection of higher tariff and non-tariff barriers to trade by countries wanting to build up their domestic industries of essential products to shield themselves from international competition.[21]

Figure 3 – Impact of export restrictions on prices (current policies and escalation)[22]

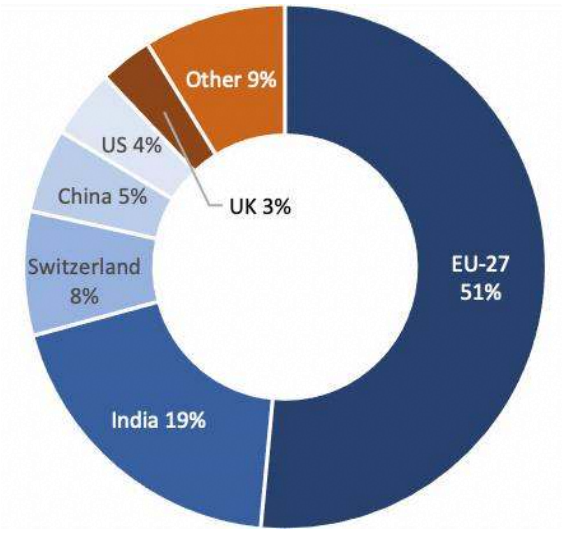


Unfortunately, African countries are likely to find themselves at the back of a very long queue for procurement of PPE supplies. All African states are net importers of pharmaceutical and medicinal products. The continent imports 94% of its pharmaceuticals, and COVID-19 heavily disrupted many of Africa's main providers.[23] Current global shortages place African countries in a perilous position for accessing essential supplies, including ventilators, testing kits and specific drugs.[24]

In the past three years, Africa spent US$99m in ventilators, mostly from the EU, followed by China and the United States. African countries also imported US$151m in textile face masks and face masks with

mechanical parts primarily from the EU, China and the United States.[25] The tariffs levied by African governments on products needed to combat the pandemic (such as protective garments, disinfectants and soaps, medical consumables such as syringes and intubation kits) can range from 9% to 50%, which constrains their affordability.[26]

Figure 4 – Africa's import sources of medicinal and pharmaceutical products, 2016-2018[27]



Many regional efforts to mitigate the health impacts from the pandemic are underway. For example, the African Centre for Disease Control and Prevention's (Africa CDC) new Partnership on Accelerated COVID-19 Testing (PACT) aims to test 10 million people in six months. This data will assist in knowledge-based pandemic treatment across the continent.[28] The African Development Bank's (AfDB) Rapid Response Facility made US$ 10 billion available to help regional member countries and their private sector enterprises respond to the crisis. This aid includes procurement of medical supplies to combat the pandemic, among other resources.[29] AfDB financial support is essential in the short-term. However, the crisis is also an opportunity to consider how Africa can develop local capabilities to combat similar crises in the future. This raises questions about how to respond to future regional medical crises. What are the low-hanging fruits and opportunities for African countries, and what can African countries do to build domestic capacity for a regional medical industry?

Low-hanging fruits and opportunities for African countries: how can government and private sector team up to build domestic capacity for a medical industry?

Meeting Africa's future healthcare needs will require collaboration among a diverse set of stakeholders. They will need a comprehensive view of demand and supply issues. Planning starts from a review of the shortages of medicines, medical devices and PPE products faced by domestic suppliers. The next step is identification of potential alliances among industry associations, private companies, public sector agencies, and policymakers to build domestic capabilities and capacities. Developing a regional medical devices industry will require technical know-how, skilled managers, and policymakers that support value chain and cluster development. It also requires a triple helix approach, i.e. strong participation by the private sector, research and development (R&D) for new products, and policymakers. These stakeholders will work together to identify global gaps, develop competitive niche products, and build up this new regional industry across the African continent.

Sourcing financial resources and skilled personnel can be a challenge on the continent. In the short-term, countries can approach low-hanging fruits, such as facilitating production of PPE goods to combat COVID-19. These efforts include building private sector participation in the medical industry, developing public-private partnerships (PPPs), and focusing on those policy and regulatory reforms that lead to the future growth and development of the sector.

Mechanisms that facilitate information sharing will encourage private sector participation.

1. **Pooling and sharing resources and information will expedite testing and safety approval for new medical equipment production in Africa.** Device safety is an essential building block for a collective response to health crises.[30] Resource sharing can contribute to development of skills and manufacturing expertise. It can deepen collaboration networks among African stakeholders in the medical sector. These networks are essential for the longer-term goal of creating and sustaining regional medical industries. Initiatives such as the Southern African Development Community (SADC) processes for procurement collaboration are an important step forward. These tools, supported by the SADC Pharmaceutical Business Plan, provide member states access to a database of suppliers, transparency in the price of medication, and improved access to and influence on pricing of medicines in the region.

2. **Implementation of an 'Informed Buying' procurement model**. As outlined in the SADC 'Pooled Procurement of Essential Medicines and Health Commodities' strategy, this model is based on the rationale that quality essential pharmaceutical products should be available in the market at lower costs. The development and implementation of regional standards and procedures will lead to increased efficiency and more rapid procurement cycles. These will increase availability and reduce costs. [31]

3. **Enabling private sector representation via industry associations and creating regional forums where the private sector can share learning and best practices**. This is an important step forward in the pooling and sharing of resources and developing regional-wide capacities. For example, in partnership with the Jack Ma Foundation, the Africa CDC hosts webinars to enable medical experts from Africa, China and across the world to share knowledge, experience and best practices for treating COVID-19 patients.[32] Thus far, this platform brought together thousands of medical staff across Ethiopia, Ghana, Rwanda, South Africa and Zimbabwe to consult and share best practices. The next step should be to mobilise private sector producers to enable an industry-wide approach to development of a medical cluster and domestic capacities across the continent.

Developing domestic capacities to improve local manufacturing capacities is an important step toward increasing private sector participation. A logical first step is to form a team to assess local production capacities and the products they can produce. Consultations with producers and industry level associations will provide a shared understanding of the potential for existing manufacturers and producers to re-fit their factories to support production of essential medical devices and PPE.

Governments must create a conducive environment that encourages private sector participation and industry development. An internationally competitive domestic industry requires reliable infrastructure and simplified and streamlined regulatory and certification processes to facilitate compliance with local and international standards. Regular working group consultations with medical associations and industry representatives would enable public and private stakeholders to address many operational constraints and address barriers to industry development.

The first low-hanging fruit is to engage local producers to manufacture easily produced PPE products. In sectors such as textile factories that produce facemasks and gloves, or alcohol factories that produce sanitizers, shifting production is relatively simple. Such efforts are already underway:

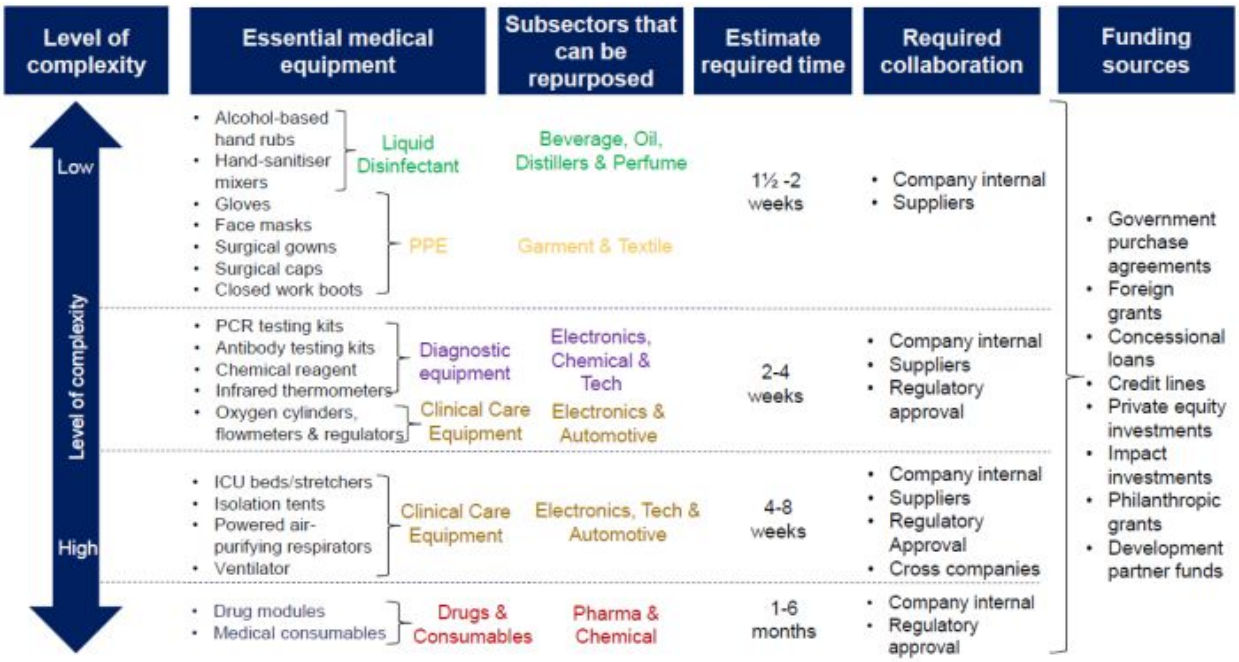
- In South Africa, companies are repurposing production capacity from protective masks for mining and agricultural use to making medical respirator masks.

- Ethiopia is repurposing its textile industry to produce masks and the Ethiopian government has already engaged Sansheng Pharmaceuticals (a Chinese outfit in Ethiopia) to produce hand sanitizer.[33]

- Similarly, the Kenyan government has announced that textile equipment will manufacture facemasks and PPE products, while in Nigeria, a military facility produces oxygen supplies for hospitals and isolation centres, and also manufactures ventilators.[34]

Figure 5 below identifies examples of repurposing of existing factories by African governments to help meet the COVID-19 demand for PPE products and other related medical equipment. It is important to remember that industry responses to the pandemic must remain agile and that skillsets can be utilised in different ways to help control the spread of the virus. In addition, re-purposing of suitable factories helps retain jobs and supports the economy at a time during which many African countries remain under lockdown.

Figure 5 – Examples of how African governments can repurpose existing factories[35]



Private sector partnerships at local and regional levels will facilitate the growth of a domestic medical industry. Partnerships with international organisations will develop those local capacities and technical skills needed by domestic manufacturers to build participation in export markets. Examples include the WHO certification programme in Nigeria to support production by local manufacturers and the Kenyan government's 2018 programme to strengthen its pharmaceutical industry in partnership with UNIDO.[36]

The UN agencies WHO and UNCTAD recently joined hands on a three-year (2020 to 2023) project to help build a domestic pharmaceutical sector across the East Africa Community.[37]

The private sector can play a stronger role in moving the local sector up the medical devices value chain in countries with better-developed manufacturing capabilities. Countries such as South Africa, Kenya, Ethiopia, Morocco, Ghana and Nigeria are relatively well developed. Local manufacturers and industry associations in these countries can play an important role in the production, marketing and exports of higher-end medical devices and pharmaceuticals (see Table 1 for an overview of production capacities in selected African countries).

Table 1 – Africa's capacity for domestic production of essential medical products, companies and businesses by area of manufacturing and country[38]

	Medicine	Medicine and PPE	PPE (incl. equipment and device producers	Other (hygiene, oxygen, textile)	Total
Western subregion					**234**
Nigeria	37	7	63	39	146
Ghana	20	3	4	1	28
Burkina Faso	4	7	7		18
Senegal	10				10
Mali		8		2	10
Sierra Leone				2	2
Benin				4	4
Guinea				4	4
Liberia				4	4
Côte d'Ivoire	1		1	6	8
Central subregion					**15**
Gabon	2	0	4	5	11
Congo			2	2	4
Southern subregion					**74**
South Africa	15		18	28	61
Malawi	2				2
Mozambique	1				1
Zimbabwe	2	1			3
Zambia	0	0	1	6	7
Eastern subregion					**89**
Kenya	16	11	1	12	40
Ethiopia	15		10		25
Uganda	15			5	20
Sudan	1				1
UR of Tanzania	3				3
Northern subregion					**119**
Egypt	15		21	10	46
Morocco	11		10	10	31
Algeria	8		7		15
Tunisia	10		7	10	27
Total	188	37	156	150	531

Source: ECA and Afreximbank compilation.

These organisations can mobilize the public/private sector PPPs needed to meet the healthcare needs of African citizens. However, PPP interventions require well-developed PPP frameworks to strengthen and better govern collaboration at national and regional levels. PPPs can foster closer working relations

between the public and private sectors, and act as regional hubs and conduits for development of more technologically advanced products in African countries. Such products would increase the competitiveness of this emerging industry at a global level. More importantly, these efforts could also help bridge many of the healthcare gap facing the continent.

Nigeria is home to 115 pharmaceutical companies. They produce medicines for the local market and for export to neighbouring countries.[39] Similarly, South Africa is Africa's largest exporter of medical goods and equipment. Its National Ventilator Project targeted production of 10,000 ventilators by June 2020, which would help offset shortages of ventilators across Southern Africa.[40] Such efforts confirm the potential to kickstart Africa's medical devices and products industry, given adequate resources, desire for public and private sector collaboration, and political will.

Meaningful private sector participation in rapidly growing regional economies requires overcoming local challenges. These include regulatory and bureaucratic barriers, poor R&D, insufficient funding, weak infrastructure, and dated industry practices. In Nigeria, nearly all local drug manufacturers purchase active pharmaceutical ingredients from other manufacturers. They are responsible only to formulate these into finished drugs, then repackage them.[41] Despite best efforts, South Africa's National Ventilator Project is off to a slow start, with recent reports indicating that the Department of Trade, Industry and Competition (dtic) is yet to finalise the shortlist for ventilators.[42] The project manager reports that delays are due to the need for regulatory approval of the non-invasive ventilator design that mixes pure oxygen with air for delivery to patient's lungs at higher than ambient pressure. He said the project is still on track to manufacture these ventilators.[43]

Progress is forthcoming in other areas. The Central Bank of Nigeria announced a Naira 1.1 trillion intervention fund to support manufacturers in health-related sectors. This support is coupled with credit provisions for small businesses and pharmaceutical firms. These are important steps forward.[44] However, the road to a sustainable medical devices and pharmaceuticals manufacturing industry across the continent is long, and will require much more effort.

Investment incentives are essential to develop this infant industry and stimulate local production. For example, the Ethiopian government allows a preferential margin of up to 25% on bids from local producers. This policy also facilitates the business-to-business linkages among local producers and foreign investors needed to support local production.[45]

Lastly, the private sector can play a critical role in collaborating with R&D institutions to promote innovation and new product development. Senegal's locally developed rapid coronavirus testing kit stems from a partnership between a local R&D institute (Institut Pasteur de Dakar) and the global private sector (British biotech firm Mologic). Test kit manufacturing will take place at the custom-built new DiaTropix facility for epidemics-related innovation in Dakar.[46] Tech start-ups In Senegal and Ethiopia use 3D printing to produce face shields and ventilator valves.[47] The pan-African finance institution Shelter Afrique provided financing to Kenya Medical Research Institute to develop a range of COVID-19 response products, including rapid testing kits.[48] Such alliances help develop local capabilities. They may also facilitate foreign direct investment (FDI). These FDI links can fund the growth of local manufacturing and R&D capacities across the continent.

Creating medical products and devices RVCs in Africa: the long road ahead

Recovering from COVID-19 will require regional cooperation and integration at far deeper levels. These will also help African countries meet longer-term domestic healthcare needs. Current efforts to fight the pandemic can provide a sound base for cooperative development of production and supply chains. Putting these systems in place requires reducing trade and non-tariff barriers, fostering mutual

recognition agreements (MRAs) and deepening trade relations among regional economic communities (RECs).[49]

WTO data reveals that regional trade agreements enabled WTO members to liberalise the majority (84%) of products such as medical equipment, supplies, PPE and medicines by 2020.[50] The average Most Favoured Nation (MFN) and preferential rates in developing and least-developed countries are higher, especially for medical supplies and PPE products.[51] Continuing to deepen integration efforts and keeping trade channels (such as border crossings) open are essential to enabling cross border sale of surplus medical and PPE goods.

MRAs should establish clear commitments by member states to expand production, and mutual export exchange agreements. This means Africa's RECs must set up joint reporting mechanisms on the availability of supplies and production facilities.[52] Morocco, South Africa, Tunisia, Egypt and Mauritius have medical supply capacity and could respond to deeper collaborative efforts.

Medical devices and PPE products are typically subject to stringent standards on design, production and market placement. These are intended to protect consumer safety and public health. To enable countries to domestically produce PPE goods, the EU made its basic standards for certain PPE and medical devices freely available. This facilitates faster conversion of production lines, in compliance with quality and safety requirements.[53] Currently, South Africa is the only country that implemented a framework that recognises medical devices as a unique category. This gap will pose challenges to implementation of a harmonised set of standards across the continent. To address these standards issues, African countries should:

1. **Adopt existing and publicly available basic standards**. Manufacturers and policymakers can fast track a new national standards regime by adopting existing frameworks. EU standards and South Africa's frameworks and international standards are examples. This will ensure that products intended for cross-border or export markets meet the relevant standards. Registration of medicines is a related issue. Even essential medicines face registration delays in most member states, which hinders patient access. The five-year, "Harmonization of Medicines Registration in the SADC Region" programme falls under the African Medicines Regulatory Harmonization Initiative (AMRH). This initiative enables development and implementation of legislation, standardized guidelines, registration processes, and procedures. These measures will facilitate registration of medicines across SADC and enable intensified market surveillance. Regulatory harmonisation and mutual recognition of registration status across the region will improve access to medicines. Access to a broader market will incentivise suppliers to register their products. Registration will improve patient access to priority products with small sales volumes.[54]

2. **Facilitate peer-to-peer learning and knowledge sharing among health-related regulatory bodies across the continent**. For example, the Southern African Health Products Regulatory Authority (SAHPRA) assists in developing regulations for medical products and devices. SAHPRA can also facilitate skills development and knowledge sharing among peer bodies in neighbouring countries, to help them build regional capabilities.

3. **National regulatory authorities need to monitor the transparency of information shared** among regional partners. This information includes production capacities, envisaged shortages and goods that are surplus to local requirements but can be distributed regionally. Facilitating the development of a regional medical cluster value chain demands strong working relations, regional harmonisation, and transparency.

It is essential to align these measures to the emerging role of the AfCFTA and the African Union's Agenda 2063. As a continent-wide framework for trade, the AfCFTA can spur the development of RVCs along two specific trajectories essential for viable PPE and medical devices production and supply chains across the continent:

1. **Identifying the harmonisation and standardization requirements relevant to developing medical devices industries**.[55] The AfCFTA Secretariat can develop a standards framework for medical supplies, such as medical devices, goods and locally produced pharmaceuticals. This could draw on the expertise of the African Organisation for Standardization, and build on efforts by the African Medicines Regulatory Harmonization programme to coordinate efforts among national standards bodies and develop a standards framework for medical supplies.

2. The AfCFTA can **provide 'trade corridors' or 'green lanes'** to expedite the flow of essential commodities. These are essential to mitigate the impact of any large-scale crisis.[56] China and the EU used green lanes to speed customs clearance of medical supplies in their COVID-19 responses. China's use of green lanes facilitated quick inspection and rapid release of disease prevention and control-related goods such as pharmaceuticals, PPE supplies, and treatment equipment. AfCFTA provides for creation of a Sub-Committee on Trade Facilitation, Customs Cooperation and Transit, which could oversee implementation and facilitate coordination of customs processes, including expedited delivery of essential products across the continent.[57]

Lastly, value chain development must remain forward thinking, accounting for new opportunities. African industries have an opportunity to build domestic capacities that lead to the growth of a globally competitive industry. Although this remains a very long-term goal, with current efforts in their infant stages, it is important to recognise the key elements required for the sustainable growth if an Africa-wide medical devices industry. To remain competitive in global medical value chains, they must root their collective efforts in strong technological developments and be able to respond to the evolving needs of the market.

Conclusion

Even though the road ahead will be long, African countries have a strong and positive potential to focus their efforts on industrialising priority sectors in the medical industry. The COVID-19 pandemic highlights the fragility of international supply chains, but also the very long neglect of public healthcare systems across the world, for which we now must pay the price. African countries now have the potential to cooperatively develop key value chains within this essential industry. This journey must begin with careful consideration of each country's interests, skills and capabilities.

However, navigating this path will not be easy, and will require close collaboration and sustainable connections. Building the systems needed across Africa for process harmonization, information sharing, and common standards involves efforts at the REC level, where the AfCFTA can play a major role by spurring development of medical RVCs.

Meeting this challenge will require a whole of government approach. Policymakers must formulate and implement policies that facilitate new industry development. These policies must stimulate private sector participation and FDI inflows. The fledging industry will need both. Such policies must not impose burdensome regulatory or compliance requirements. A sustainable regulatory ecosystem aligned to changing and growing long-term private sector interests is an essential pre-requisite.

Both political will and private sector participation are essential to kick starting this emerging sector. Entry into a competitive global industry will be a challenge for local companies, and they will need assistance

to succeed. PPPs can facilitate cooperation among public and private sector actors, enable partnering opportunities for local R&D institutions, and ensure the smart use of Africa's resources.

The private sector must be open to building trust and transparency across the sector and with their public partners. This will ensure the growth and sustainability of a regional medical industry for the African continent. Collaboration among actors in the private sector across the region is essential for building up capacities that can feed into the many different supply points across the value chain.

The private sector can play a vital role in spearheading the R&D component needed to update medical value chains across African countries. This is also vital for building the capability to produce niche medical products needed to enhance African countries' competitiveness at a global level. R&D can contribute towards the long-term sustainability and growth of the industry.

Lastly, regional bodies will have a vital role in the development of soft infrastructure such as standards and harmonisation of quality requirements. Regional bodies will also be responsible for supporting the private sector, coalescing public-private sector collaborations, and maintaining communications and transparency across the industry. Although the journey may at times be bumpy, many great opportunities lie ahead along the path to development of a continent-wide medical industry.

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[9] UNECA, op. cit.

[10] Ibid.

[11] UNECA, op. cit.

[12] The scenarios in Figure 1 can be understood as:

- A: Unmitigated (worst case) - no intervention
- B: Mitigation using moderate social distancing - Optimal outcome when epidemic is mitigated through interventions to limit contacts in general population including social distancing (45% reduction in contact rate)
- C: Suppression using intense social distancing (1.6) - Introduce intense social distancing measures that reduce the contact rate in the general population by 75% once 1.6 deaths per million per week trigger is reached
- D: Suppression using early intense social distancing (0.2) - Introduce intense social distancing measures that reduce the contact rate in the general population by 75% once 0.2 deaths per million per week trigger is reached

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