Africa's Response to COVID-19: What roles for trade, manufacturing and intellectual property?

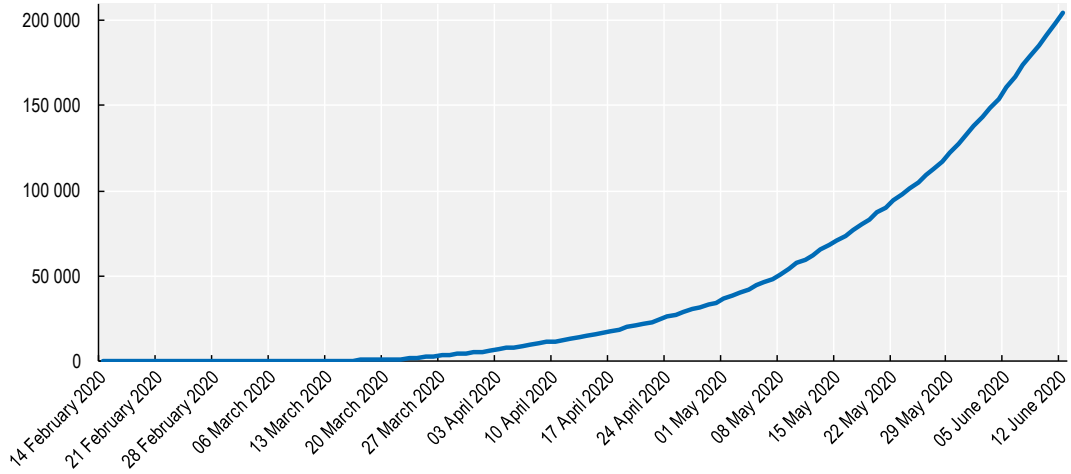
23 June 2020

COVID-19 is taking its toll on Africa. This note discusses how policies on trade, manufacturing and intellectual property can speed up Africa's response, focusing on enabling access to medical devices and drugs in four critical areas: testing, protecting, treating and curing (TPTC). For each area, the note provides a snapshot of the global situation, a zoom on trends in Africa, and examples of solutions implemented by the public and the private sectors. The note identifies five priority actions for Africa to respond effectively to COVID-19 and accelerate structural transformation and development across the continent.

Introduction

COVID-19 is taking its toll on Africa. Despite rapid responses to control movements of people and goods, and encourage social distancing, the pandemic is inevitably spreading across the continent, albeit with a significant variation in the number of cases by country. Five countries together account for 56% of the confirmed cases: South Africa (19%), Egypt (15.5%), Algeria (9%), Morocco (7%) and Nigeria (6%). Africa has more than 200 000 confirmed cases across its 54 countries and 5 600 reported deaths (estimated data as of 12 June 2020) (Figure 1). According to the World Health Organization (WHO), one of the biggest challenges in Africa continues to be the availability of essential medical supplies, particularly test kits.

Figure 1. Number of confirmed COVID-19 cases in Africa (as of 12 June 2020)



Source: WHO coronavirus disease (COVID-19) dashboard. Geneva: World Health Organization, 2020. Available online: https://covid19.who.int/ (last cited: 12 June 2020).

Defeating COVID-19 in the developing world should be a global priority. As Ethiopia's Prime Minister put it "if COVID-19 is not beaten in Africa it will return to haunt us all".

Well-known vulnerabilities make African societies and economies highly exposed to the pandemic and its consequences (OECD, 2020[1]; AUC/OECD, 2019[2]). Some of these weaknesses are of particular concern. On the one hand, poor quality of healthcare, coverage and access, availability of medical personnel, especially in remote areas, and the prevalence of other diseases raise concerns about the response capacity on the health front. On the other hand, the persistent structural weaknesses of the continent overexpose African countries to the economic consequences of COVID-19. These include high dependency on imports in areas such as food, drugs, machinery and equipment, weak local production systems, limited quality and coverage of digital connectivity, and prevalence of informality and micro firms, among others. Even if some factors may reduce Africa's exposure to the pandemic, such as its youth population and a certain level of preparedness to pandemics owing to previous outbreaks including the 2004 Ebola crisis, the continent is at high risk (WHO, 2020[3]).

Africa is at an earlier stage of the epidemiology curve than Europe, the United States and Latin America, which at present is the most hit among the developing regions. Responding and combating a significant spread of the contagion is still possible. Nevertheless, it requires **immediate action on multiple fronts**. The experiences of other countries imply that preventing and slowing diffusion, identifying infected people, isolating and treating them and tracing their contacts are essential.

Learning from the experiences of Europe, the United States and Canada between mid-February and mid-May 2020, and taking into account the specificities of the African continent, this note contributes to the debate on COVID-19 and development. It analyses the channels through which trade and industrial policies can improve the response of the continent's healthcare systems and, at the same time, ignite a growth recovery founded on increased continental integration and industrialisation. The note provides a taxonomy of a variety of scientific, technological and industrial solutions needed to effectively identify and treat affected patients by identifying four areas in which governments, firms, researchers and the international community will need to address major gaps: **testing, protecting, treating and curing (TPTC)**. The first section discusses the challenges of containing the spread of the pandemic in Africa, considering the quality and coverage of the local healthcare systems. It also looks at the challenges linked to implementing measures like social distancing and lockdowns, taking into account the specificities of the continent. The second section presents a taxonomy of technological, trade and industrial solutions to confront the pandemic in the four TPTC areas. For each area, the section presents a snapshot of latest developments, public policies and private responses, namely highlighting initiatives in Africa. The conclusions identify five priority actions for Africa to effectively respond to COVID-19 and specify that this response requires action by leaders in Africa and from the international community. The analysis presented in this note also reveals that responding to this emergency, by mobilising trade and industrial policies, also has the potential to accelerate development in Africa, unlocking industrialisation, modernisation and continental integration.

"One size does not fit all": the challenges of social distancing and lockdowns to fight COVID-19 in Africa

In early May, the World Health Organization (WHO) projected that 83 000 to 190 000 people in Africa could die of COVID-19, and 29 million to 44 million could get infected in the first year of the pandemic if containment measures were to fail (WHO, 2020[3]). Containing the spread of the virus is essential, but the experience of severely affected countries such as Italy, Spain and the United States shows that limiting contagion is difficult and takes time, even when extremely strict measures, such as a full lockdown, are implemented. COVID-19 is highly virulent: people with COVID-19 infect, on average, 2 to 2.5 other people, compared to 1.3 in the case of a seasonal flu (WHO, 2020[4]). An effective strategy for identifying and treating patients is vital. Early in the diffusion stage, the high speed and breadth of infection can generate a shortage in medical devices (from protective masks to ventilators), exposing people, including medical and sanitary personnel to contagion, which in turn can saturate hospital systems' capacity, forming a vicious spiral.

Slowing down the spread of the virus through social distancing and lockdowns – the prevailing measures taken so far to limit contagion worldwide – promises to come at a high price for Africa, both economically and socially. The United Nations Economic Commission for Africa (ECA) projects that a one-month full lockdown across Africa will cost the continent about 2.5% of its annual GDP (USD 65 billion). Implementing these measures is particularly problematic in Africa due to high levels of poverty and informality. One in three Africans (441 million people) live below the global poverty line at USD 1.9 a day (World Bank, 2020[5]). In most African countries, the majority of the workforce is self-employed in the informal sector and may not be able to afford to self-isolate. Moreover, limited fiscal resources reduce room for deploying income-support measures and counter-cyclical policies to protect people and firms. Shifting to remote working, while possible for some enclaves in the most outward oriented and advanced economies, is not a reality applicable universally across the continent. For example, evidence from survey data from about 2 000 residents living under lockdown in five slums in Nairobi indicates that over 75% left their homes three times on average in 24 hours, 81% suffered complete or partial loss of income, and 70% reported skipping meals due to COVID-19 (Population Council, 2020[6]).

African governments reacted faster than elsewhere to impose travel restrictions and close borders to minimise contagion. Most African governments suspended international travel in mid-March, at the same time as most European countries. At the time Europe had already suffered close to 1 751 deaths, while Africa had reported just six. They also enacted social distancing and lockdown measures at an earlier stage in the epidemiology curve than many countries in Europe. South Africa, for example, introduced an articulated response, comprising eight overlapping stages, including a strict lockdown and major economic mitigation measures, amounting to approximately 10% of GDP, to assist the affected population (South African Government, 2020[7]).

Yet Africa is set to enter its first recession in 25 years this year, social unrest is brewing, and severe hardship is kicking in as food security becomes strained (WFP, 2020[8]). In light of this, African governments, as other countries across the globe, are starting to ease restrictions and get business going again. Fast-tracking testing and being ready to treat patients are thus of growing importance. However, there are obstacles on all fronts, even for the most advanced countries in the continent: testing and pharmaceutical treatments are simply not yet available with the reliability and safety needed. Hospitals, even in major global cities like New York and Milan, saturated quickly due to the unprecedented upsurge in demand. As the virus spreads, medical personnel quickly becomes scarce. Medical equipment is not available in the quantity needed. As countries are hit almost simultaneously, supply chains are being interrupted and imports limited, as governments invoke national emergencies and give preference to supplying the domestic market.

Moreover, Africa's relatively weak healthcare systems, limited medical supplies and shortfall in medical personnel put the continent at high risk. Most African countries lack adequate healthcare facilities and access even under normal circumstances (the number of hospital beds per 1 000 people is 1.2 in Africa and 3.8 in OECD countries) (World Bank, 2020[9]). The WHO estimates 3.6 million–5.5 million COVID-19 hospitalisations, of which 82 000-167 000 severe cases requiring oxygen, and 52 000-107 000 critical cases requiring breathing support. The WHO also emphasises that the predicted number of cases requiring hospitalisation would overwhelm available medical capacity in most of Africa (WHO, 2020[3]). All African countries are net importers of medicinal and pharmaceutical products. ECA estimates that the continent covers 94% of its pharmaceutical needs through imports. Many of the countries providing these pharmaceuticals are heavily disrupted by COVID-19. Moreover, at least 94 countries in the world have now also restricted exports of medical supplies as part of their response to COVID-19 (ITC, 2020[10]). This puts Africa in a perilous position in accessing essential supplies. On the research side, Africa also lags behind, investing negligible resources in medical and pharmaceutical R&D and participating little in global research consortia. Furthermore, the diagnostic techniques most commonly used are not yet tailored to the African continent. To be effective, the most appropriate testing solution should be quick, affordable, implemented in a decentralised way and should not need to rely on high skilled personnel.

Technological, trade and industrial solutions to face the pandemic

An effective strategy to confront the pandemic requires adequate, accessible, affordable, safe and timely supply of medical devices, drugs and skilled personnel across four areas:

- **Testing:** the mechanisms and protocols for screening the population and identifying those affected by the virus.
- **Protecting**: the range of protective devices (masks, gloves, etc.), hygiene measures and protocols to prevent contagion of doctors and healthcare personnel, patients and the overall population.
- **Treating**: drugs and medical devices to assist hospitalised patients. So far, based on the experience of countries ahead in their epidemiology curve, the main treating device on shortage of supply when a major outbreak occurred were pulmonary ventilators and their replaceable components.

- **Curing**: drugs and treatments to treat the infection, and vaccines to immunise the population.

These areas have been identified by taking into account the challenges that countries face in fighting COVID-19 and the diverse technological, industrial and trade solutions that can be deployed to address them. These areas differ according to scientific content, research and development (R&D) intensity and manufacturing complexity. They also share a common critical requirement: the solutions provided need to be timely, affordable, safe and comply with approved standards (Table 1). In the case of COVID-19, the required effort in R&D and the reliance on scientific research are higher for the solutions linked to testing and curing. Manufacturing involves relatively simpler processes for personal protective equipment (PPE) than for respiration machines, making industrial reconversions a relatively simpler option to secure local access for PPE, even though the management of the specific supply chains is highly complex in all areas. For access to drugs and vaccines, standards, trade facilitation and tailored intellectual property (IP) management are of primary importance.

Table 1. A taxonomy of technological, trade and industrial solutions to face the pandemic

	TESTING	PROTECTING	TREATING	CURING
OBJECTIVE	Enabling massive screening ASAP	Minimising contagion through protective devices (for medical and sanitary personnel, patients and citizens)	Assisting hospitalised patients (providing drugs and assisted breathing to critical patients)	Developing a COVID-19 vaccine and/or drug treatment
CHALLENGES	Inadequate diagnostic equipment (too slow, too capacity-intensive, too expensive and requiring laboratory testing) Lack of universally validated protocol	Global supply shortages	Global supply shortages and few global players capable of producing them Availability of replaceable components (e.g. valves) Required know-how for using sophisticated/new devices High unitary cost	Uncertainty of research outcomes Timing for clinical trials and approbations Affordability
TECHNOLOGICAL, TRADE AND INDUSTRIAL SOLUTIONS	Partnerships for research and technology transfer Fast-tracking testing and clinical trials Enabling global approval based on first national approval Fostering technology transfer and enabling local manufacturing	Enabling local manufacturing by: 1) scaling up local production; 2) reconverting industrial plants (e.g. textiles, printing, beverages and cosmetics) Facilitating imports and exports Co-ordinating donations to target the most vulnerable	Scaling up production of current producers Enabling industrial reconversions (e.g. automakers) Fast tracking imports and exports Bridging capital, competences and technologies to foster innovation	Testing for second-use of existing drug treatments Vaccine research & development Drug and vaccine manufacturing
CRITICAL REQUIREMENTS	MEDICAL SUPPLY NEEDS TO BE: ADEQUATE ACCESSIBLE AFFORDABLE SAFE TIMELY INVOLVING RAPID SCALING UP OF HOSPITAL CAPACITIES & OVERCOMING THE SHORTAGES IN MEDICAL PERSONNEL			

Source: Authors' elaboration.

In terms of critical requirements, whether for testing, protecting, treating or curing, medical supplies need to be adequate and safe (i.e. certified and in line with approved standards), accessible (i.e. available when and where needed), affordable (i.e. price should not exceed domestic purchasing capacity), and timely (i.e. available on time). For Africa, a critical basic requirement is also scaling up hospital capacity and availability of medical personnel, which are extremely weak even in ordinary times.

Testing: in search of reliable methods for decentralised implementation

The WHO's call for "Testing, testing, testing" has ramped up the race for identifying mechanisms to screen and identify people that carry the virus, or that have developed immunity to it, in the fastest, most accurate and least expensive way possible. At present, no unique global protocol for screening citizens is available – which is also a factor explaining large variations in the reporting of national data. The most frequently used method for testing has been the in-lab molecular type, which typically requires a long time for diagnosis, sophisticated equipment and well trained medical personnel. A second method identifies antibodies through serology tests. This approach enables the assessment of whether a person is positive and if she is immune to the virus (although it is yet unclear for how long immunity lasts). Even though the diagnosis for potentially affected patients needs to come from molecular testing, from an epidemiological point of view, the advantages of the serology-based methods could offer manifold advantages: they are cheaper, faster and do not require a high level of skills to be implemented correctly, and ultimately could be used for self-diagnosis (Financial Times, 2020[11]).

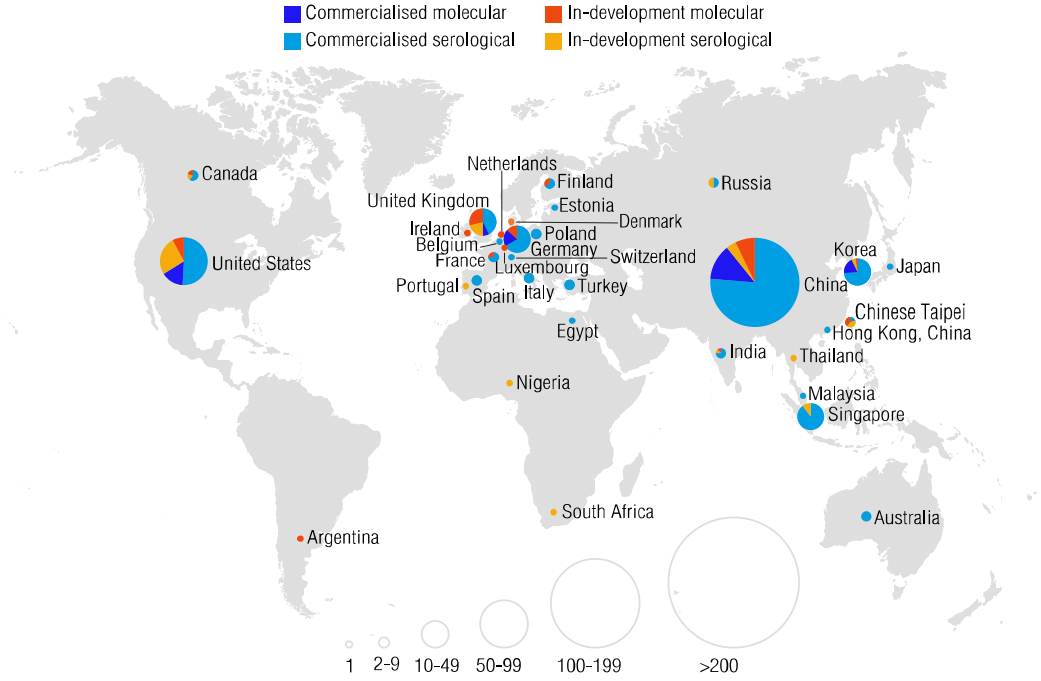
Generalised testing is becoming the shared goal for all countries under lockdown to safely ease restrictions, restore trust and gradually reopen economies. For Africa, and for all developing countries where social distancing is hard to implement and will make the most vulnerable pay the highest price, access to safe, affordable and adequate serology test kits is crucial. They can be deployed in decentralised settings, quickly and without the need of highly skilled paramedical personnel. A major challenge is the reliability of existing testing techniques, especially if they will need to be used for widespread screening (WHO, 2020[12]).

The race to develop and manufacture testing kits is open and intensifying. As of 18 May, companies' self-reported data to the Foundation for Innovative New Diagnostics (FIND) show that 540 different testing kits are available for commercialisation – up 76% compared to 7 April – and 90 more are currently in development. A third of all tests (35%) have been commercialised by Chinese companies, followed by the United States (13%) and Korea (12%). Companies in the United States account for 26% of in-development tests, of which the majority are serological tests that have the potential to deliver mass testing (Figure 2). In Africa, two private firms from Egypt have commercialised one test each, and companies in Ghana, Kenya, Nigeria, Senegal, South Africa and Uganda have tests in development (FIND, 2020[13]; ECA, 2020[14]). In Latin America, four Brazilian firms have commercialised a test each and a company from Argentina is involved in developing one (FIND, 2020[13]).

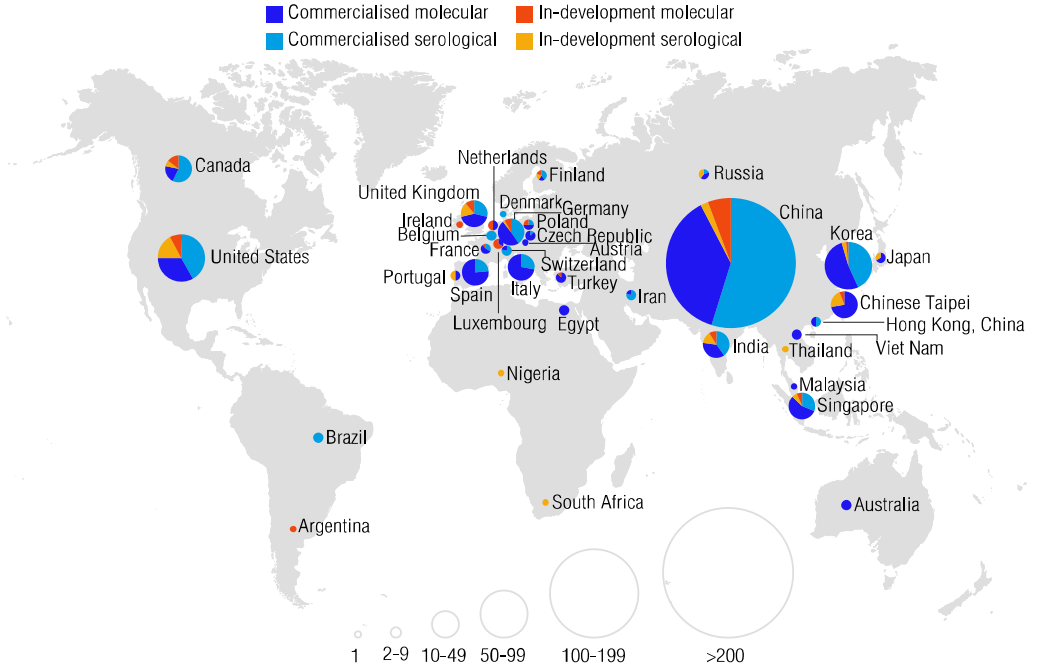
Figure 2. Number of commercialised or in-development tests for COVID-19, 2020

Numbers by country of origin and testing technology

Panel A. 7 April 2020



Panel B. 18 May 2020



Note: The data on FIND are self-reported and the authors have not checked the reliability of the information.
Source: Authors' elaboration based on FIND (2020), SARS-COV-2 Diagnostic pipeline, https://www.finddx.org/covid-19/pipeline/?section=molecular-assays#diag_tab

The scientific, technological and industrial challenges linked to developing and commercialising testing kits deployable on a large scale are multiple. The principle challenges are the time needed and the reliability of the processes to develop, prototype, test and approve them for commercialisation. The research efforts for developing reliable and affordable tests involve a variety of players, including big pharmaceutical companies and co-operation between specialised laboratories and firms. Co-operative projects are often international and merge competences of different players (researchers, doctors and hospital personnel, and biotechnology firms). Table 2 presents some examples of ongoing actions in this area.

Table 2. Ongoing efforts in research for testing methods: selected examples

Big pharma are among the first-movers in COVID-19 testing technologies
Switzerland: Roche was one of the first to develop a diagnostic test for COVID-19, relying on the expertise gained by providing tests for SARS. (Reuters, 2020[15]).
Governments are stepping in to finance the development of new testing kits
Canada: The government announced 1 billion Canadian (USD 700 million) dollars for medical research for COVID-19 (Prime Minister's Office, 2020[16]). Most of these resources are earmarked for vaccine development. Federal agencies are also channelling investments to existing and new research projects to rapidly detect, manage, and reduce the transmission of COVID-19. By April the total public investment for diagnostics research amounted to approx. USD 7 million for 13 projects (Canadian Institutes of Health Research, 2020[17])
Research partnership and technology transfer for diagnostic kit development
Senegal, United Kingdom and France: Diatropix, a specialised platform for quick diagnosis of African pandemics set up in Dakar, Senegal in 2018, is working with Mologic (a UK biotechnology company, partner of the French Institute Pasteur) to prototype a pocket-sized kit, which will cost less than one US dollar (Financial Times, 2020[18]). The partnership could produce 4 million kits, by adapting the auto-diagnostic kit developed to test Ebola. Diatropix consists of a collaborative team of five, enabled by a partnership with the Development Research Institute (IRD), the Senegal Office of the Institute Pasteur, the Merieux Foundation and two technology transfer partners: Mologic and BioMerieux.
Local and foreign entrepreneurs and venture capitalists are stepping up to boost local testing capacities
Nigeria: To address Nigeria's alarmingly low number of tests (South Africa has tested 100 times more people than Nigeria), a one-year-old genomics research start-up, 54gene, launched a USD 500 000 fund to boost local testing capacity. Venture capitalists are also stepping in to fund innovative solutions. Ventures Platform, a Lagos VC firm, partnered with the local science and research agency to find and fund innovative tech-based solutions for coronavirus-related issues (Quartz Africa, 2020[19]).
Multilateral actions are supporting countries without diagnostic capacities
Africa: The Africa Task Force for Coronavirus (AFTCOR) established in the framework of the Africa Union Commission response to COVID-19, is working with existing supply chain systems to step up functioning regional lab referral networks to help countries without diagnostic capacity find a suitable, timely option for testing (AU and Africa-CDC, 2020[20]).
New technologies are tackling logistical challenges in testing deliveries
Ghana: Zipline, an American medical product delivery company headquartered in Silicon Valley but with distributions centres in Rwanda and Ghana, is deploying drones to help transport kits from remote clinics to testing centres. The drones can carry 15 000 tests a day with 300 flights (Time, 2020[21]). A diagnostics company also partnered with the Kwame Nkrumah University of Science and Technology to develop a simple-to-use COVID-19 testing kit that gives results in 15 to 20 minutes. The kit is now awaiting approval from the Ghana Food and Drugs Authority.
Simple swab-based solutions to tackle COVID-19
Uganda: Researchers at Makerere University have developed a swab tube dipstick test for COVID-19 that can reportedly give results within minutes at the cost of just one US dollar.
Kenya: The Kenya Medical Research Institute has started manufacturing a simple swab-based COVID-19 rapid testing kit.