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**Economic Commission for Africa**  
**United Nations Global Geospatial Information Management**  
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## **COVID-19: strategies for a geospatial response in Africa**

### **Regional Committee of United Nations Global Geospatial Information Management for Africa**

#### **Executive summary**

Since its emergence in China, coronavirus disease (COVID-19) has retained its grip on the world. “Business as usual” is no longer possible. Our ways of doing things have changed deeply. Starting as a health crisis, the COVID-19 pandemic has become a social and economic crisis with negative repercussions for industry and trade, and leaving as yet undetermined psychological scars. The World Health Organization (WHO), estimates that, at last count, there were over 21 million positive COVID-19 cases worldwide. Although transmission rates seem to have slowed slightly, that number is growing by the day as new cases are detected and reported around the world. To date, the death toll stands at 4 per cent of reported COVID-19 cases. With no medical cure in sight, the world is struggling to find better ways to cope with the pandemic. Countries worldwide have taken a set of broadly similar measures to deal with the pandemic, including the implementation of social distancing rules, travel restrictions across continents, countries, cities and sometimes within cities, border closures and the mandatory wearing of personal protective equipment, including masks. Governments and health authorities are harnessing the power of technology to identify solutions to the crisis. In that respect, contact tracing based on geolocation information has been extensively used around the world, particularly in developed countries.

Like over continents, Africa has not been spared. On 16 August 2020, there were 945,165 confirmed cases of COVID-19 in Africa, accounting for 4 per cent of the global total. By that date, South Africa had confirmed 583,653 positive cases, equivalent to over half of all COVID-19 cases in Africa. The African death toll was equivalent to only 2 per cent of total reported deaths worldwide, however, and dire predictions of millions of deaths across the continent and overwhelmed health facilities turned out to be inaccurate. Some observers believe that that “success” is due to the speedy ways in which African countries reacted to the COVID-19 pandemic. In fact, they were among the first countries to adopt containment measures. Other explanations put forward include the continent’s experience in addressing other diseases, including Ebola, HIV/AIDS and malaria. Others credit the low death rate to the fact that the population of Africa is relatively young compared with the populations of Europe or the Americas. Whatever the explanation, from an epidemiological perspective, Africa has fared better than other continents. However, Africa suffers from a number of vulnerabilities and weaknesses that puts the continent at higher risk when it comes to the impact of the pandemic. Indeed, as stated by the



Organization for Economic Cooperation and Development (OECD), “Well-known vulnerabilities make African societies and economies highly exposed to the pandemic and its consequences. Some of these weaknesses are of particular concern. On the one hand, poor quality of health care, 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 [the] prevalence of informality and micro firms...”.<sup>1</sup> Moreover, a large percentage of the African population live in hard-to-reach rural areas. Slum dwellers make up a large number of urban citizens. Those populations often have no or very limited access to basic sanitation and cannot afford expensive health-care services. The repercussions of the pandemic are therefore expected to be worse in Africa than elsewhere. According to the African Development Bank (AfDB), African economies are expected to contract by 1.7 per cent and could even contract by some 3.4 per cent in 2020.<sup>2</sup> Furthermore, according to the Committee for the Coordination of Statistical Activities (CCSA), over 23 million Africans will fall into extreme poverty and be forced to survive on less than \$2 per day, while transit poverty, namely poverty over a limited period of time, is expected to increase by 17 per cent.<sup>3</sup>

Those challenges call for a swift response from African decision makers. In that regard, African countries’ response to the pandemic has not been very different from the response of other global regions. Travel restrictions and social distancing measures have been implemented while borders and businesses have been closed. At the continental level, the Africa Joint Continental Strategy for COVID-19 Outbreak was unveiled by the Africa Centres for Disease Control and Prevention and the African Union in March 2020.<sup>4</sup> Implementation of that strategy is being overseen by the Africa Task Force for Novel Coronavirus and, as part of its Incident Management System, the Africa Centres for Disease Control and Prevention has launched the Event-based Surveillance Framework. Continent-wide public health initiatives are, moreover, being implemented by the Africa Centres for Disease Control and Prevention through its Regional Collaborating Centers, located in each of the five African regional economic communities. Those initiatives include the Partnership to Accelerate COVID-19 Testing: Trace, Test and Track.

Unlike in other global regions, however, contact tracing has not been a popular containment measure in Africa, inter alia because of the high cost and poor quality of connectivity. The limited use or absence of contact tracing in the fight against COVID-19 is, in many ways, a missed opportunity to make optimal use of geospatial information and geographic information systems (GIS) to combat the transmission of the virus and mitigate its impact. It is critical, therefore, to identify strategies to facilitate a geospatial response to the COVID-19 pandemic. The following key

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<sup>1</sup> OECD, *Tackling Coronavirus (COVID-19), Contribution to a global effort. Africa’s Response to COVID-19: What roles for trade, manufacturing and intellectual property?* (June 2020). Available at: [www.oecd.org/coronavirus/policy-responses/africa-s-response-to-covid-19-what-roles-for-trade-manufacturing-and-intellectual-property-73d0dfaf/](http://www.oecd.org/coronavirus/policy-responses/africa-s-response-to-covid-19-what-roles-for-trade-manufacturing-and-intellectual-property-73d0dfaf/) (accessed on 24 November 2020);

<sup>2</sup> AfDB, *East Africa Economic Outlook 2020: Coping with the COVID-19 Pandemic* (8 July 2020). Available at: [www.afdb.org/en/documents/east-africa-economic-outlook-2020-coping-covid-19-pandemic](http://www.afdb.org/en/documents/east-africa-economic-outlook-2020-coping-covid-19-pandemic); AfDB, *West Africa Economic Outlook 2020: Coping with the COVID-19 Pandemic* (8 July 2020) Available at: [www.afdb.org/en/documents/west-africa-economic-outlook-2020-coping-covid-19-pandemic](http://www.afdb.org/en/documents/west-africa-economic-outlook-2020-coping-covid-19-pandemic) (both reports accessed on 4 January 2021).

<sup>3</sup> CCSA, *How COVID-19 is changing the world: a statistical perspective* (2020). Available at: [unstats.un.org/unsd/ccsa/documents/covid19-report-ccsa.pdf](http://unstats.un.org/unsd/ccsa/documents/covid19-report-ccsa.pdf) (accessed on 4 January 2021).

<sup>4</sup> The Strategy is available at: [africacdc.org/download/africa-joint-continental-strategy-for-covid-19-outbreak/](http://africacdc.org/download/africa-joint-continental-strategy-for-covid-19-outbreak/) (accessed on 5 January 2021).

considerations should be taken into consideration in the design of African geospatial response strategies:

1. They should be part of and support the implementation of the Africa Joint Continental Strategy for COVID-19 Outbreak. In that respect, they should support the achievement to the main goal of the Strategy, namely to “limit transmission and minimize harm”;
2. Their guiding principles should draw upon the four focus areas of the African Action Plan on Global Geospatial Information Management 2016–2030, also known as “Geospatial Information for Sustainable Development in Africa”;
3. The common framework and tools supporting geospatial response strategies should be based on the principles enshrined in the 2030 Agenda for Sustainable Development and Agenda 2063 of the African Union to facilitate the harmonization of standards and norms, and promote adoption and adaptation at the national level;
4. Capacity development and knowledge transfer should be central to all geospatial response strategies. Specifically, expertise in geospatial modelling, which will allow for the effective application of statistical analysis techniques, and the use of geospatial data visualisation and mapping tools must be made focus areas;
5. They should promote international coordination and cooperation so as to address regional and global needs, including, first and foremost, the needs identified by WHO and the Africa Centres for Disease Control and Prevention relating to the provision of timely and accurate health-related geoinformation data;
6. They should be in line with the United Nations Initiative on Global Geospatial Information Management (UN-GGIM). In that regard, it should be noted that, in its resolution 2016/27, entitled “Strengthening institutional arrangements on geospatial information management”, the Economic and Social Council stressed “the need to strengthen the coordination and coherence of global geospatial information management, in capacity-building, norm-setting, data collection, data dissemination and data sharing, among others, through appropriate coordination mechanisms, including in the broader United Nations system, building on the work of the Committee of Experts”;<sup>5</sup>
7. They should also be in line with the Integrated Geospatial Information Framework, which provides a basis and guide for developing, integrating, strengthening and leveraging geospatial information management and relevant resources in all countries. The Framework is designed to help countries bridge the geospatial digital divide, secure socioeconomic prosperity, and leave no one behind;<sup>6</sup>
8. They should reflect the Data Strategy of the Secretary-General for Action by Everyone, Everywhere with Insight, Impact and Integrity,<sup>7</sup> adopted with the aim, inter alia, of establishing a United Nations data

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<sup>5</sup> The resolution is available at: [ggim.un.org/knowledgebase/KnowledgebaseArticle51574.aspx](http://ggim.un.org/knowledgebase/KnowledgebaseArticle51574.aspx) (accessed on 18 November 2020).

<sup>6</sup> The Framework is available at: [ggim.un.org/meetings/GGIM-committee/8th-Session/documents/Part%201-IGIF-Overarching-Strategic-Framework-24July2018.pdf](http://ggim.un.org/meetings/GGIM-committee/8th-Session/documents/Part%201-IGIF-Overarching-Strategic-Framework-24July2018.pdf) (accessed on 18 November 2020).

<sup>7</sup> The Strategy is available at: [www.un.org/en/content/datastrategy/images/pdf/UN\\_SG\\_Data-Strategy.pdf](http://www.un.org/en/content/datastrategy/images/pdf/UN_SG_Data-Strategy.pdf) (accessed on 18 November 2020).

ecosystem and delivering “stronger support to people and planet in the moments that matter most.” As an integral part of the data ecosystem, geospatial information is critical in efforts to understand and act upon events and phenomena;

9. They should reflect the Secretary-General’s Strategy on New Technologies,<sup>8</sup> which sets forth strategic principles on the use of technology. In the Strategy, the Secretary-General draws attention to the importance of partnerships, underscores that building on existing capabilities and mandates can provide critical support to the work of the Organization, and emphasizes the need to develop internal United Nations capacities and make effective use of new technologies;
10. Finally, they should uphold the mandates and values enshrined in the Charter of the United Nations, the Universal Declaration of Human Rights and international law.

African geospatial response strategies should foster synergies within geospatial information systems at the United Nations Secretariat, and should foster collaboration with the wider geospatial and data community of the United Nations system. They should improve information flows, and facilitate coordinated crisis responses, information sharing and collaboration among information providers and analytical entities across the Secretariat, as called for by the Secretary-General.

African geospatial response strategies should comprise four building blocks. The first building block consists of mapping African geospatial expertise with a view to providing fact-based decision-making tools to health-care authorities, governments and front-line workers.

The second building block consists of using GIS to strengthen African health-care systems through the use of geospatial data infrastructure, including data warehouses. Doing so will ensure that data are collected, disaggregated and stored in formats that are easily usable in real time and can be used to enhance the provision of health-care services, address system equity gaps, deepen understanding of trends in COVID-19 transmission, and more accurately identify and understand vulnerabilities.

The third building block consists of building geospatial infrastructure to support the implementation of geospatial responses. This is anchored around four pillars, namely: developing spatial data infrastructure to ensure harmonization and interoperability; sourcing key health-related data and complementary economic and social data; building health-oriented datasets; and developing spatial models and spatial modelling expertise to forecast and analyse COVID-19 trends using a combination of statistical analysis and GIS visualization tools.

The fourth building block consists of efforts to improve response strategy oversight and depends on the effective leadership of the Economic Commission for Africa (ECA) and the protection of individuals’ privacy. The governance of response strategies should be implemented through the African Action Plan on Global Geospatial Information Management, with ECA as the lead organization. Owing to its leadership in continental geospatial initiatives, ECA leadership would have a number of advantages. Firstly, it will avoid such pitfalls as the duplication of efforts and the inefficient use of resources, enhance coordination with stakeholders, promote the use of common tools and standards and ensure the interoperability and accessibility of datasets. Secondly, it will foster cooperation with national mapping agencies and national statistical offices with which the Commission is already working with a view to developing national statistical spatial frameworks and regional spatial data infrastructure. Thirdly, its collaboration and coordination with the Africa Centres for Disease Control and Prevention and its representation at the

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<sup>8</sup> Available at: [www.un.org/en/newtechnologies/](http://www.un.org/en/newtechnologies/) (accessed on 18 November 2020).

level of the regional economic communities will be enhanced. African geospatial strategies to address the COVID-19 pandemic must provide for the protection of data so as to uphold the privacy of individuals. Experience from other parts of the world shows that, without adequate legal protections and privacy safeguards in place, contact tracing apps can cause great harm to citizens by violating their privacy. To protect African citizens against such harm, geospatial strategies should be firmly anchored in a robust legal and policy framework for geospatial information utilization in Africa.

Implementation of geospatial response strategies should be coordinated through the United Nations resident coordinator system, which encompasses all United Nations entities dealing with operational activities for development, regardless of whether their formal presence in a country is deemed necessary. The resident coordinator system aims to improve the efficiency and effectiveness of operational activities at the country level. It comprises a series of global, regional and country-level working mechanisms that provide guidance and support the work of United Nations resident coordinators in Africa and beyond.<sup>9</sup>

As for funding, the primary funding source for geospatial strategies is the fund of almost \$155 million that has been made available under the African Action Plan on Global Geospatial Information Management 2016-2030. Since funding under the Plan is already committed, using that funding has the advantage of speeding up the implementation of the strategies in addition to fully integrating them into ongoing initiatives such as regional spatial data infrastructure and national statistical spatial frameworks. AfDB could take advantage of its triple-A bond rating in international markets to secure additional funding for the long-term sustainability geospatial response strategies. Strategy implementation will therefore be aligned with the African Action Plan on Global Geospatial Information Management 2016-2030.

Foreseeable challenges that may hinder the successful implementation of geospatial response strategies include insufficient buy-in from other stakeholders for ECA leadership, challenges related to mapping African geospatial expertise and infrastructure, limited digital connectivity and poor connection quality, insufficient funding and the lack of indigenous geospatial modelling expertise. None of those challenges are, however, serious enough to prevent the success of geospatial response strategies in combating the COVID-19 pandemic.

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<sup>9</sup> For further information, see: [unsdg.un.org/sites/default/files/QCPR-Info-Brief-2-UN-RC-System-UN-DOCO-Nov-2016.pdf](https://unsdg.un.org/sites/default/files/QCPR-Info-Brief-2-UN-RC-System-UN-DOCO-Nov-2016.pdf) (accessed on 19 November 2020)

# 1. Introduction: current epidemiological state of COVID-19 and rationale for an African response strategy

## 1.1 Current epidemiological state in the world

As illustrated in table 1, WHO reported over 21 million positive cases of COVID-19 worldwide as of 16 August 2020. The Americas led the way with almost 11.5 million positive cases, equivalent to 54 per cent of all reported cases. This is about 3.5 times more than the number of cases in Europe and about 4 times more than in South-East Asia, where there were 3,754,649 and 3,040,148 positive cases, respectively. Together, those three regions accounted for 86 per cent of all reported positive cases. Infection rates were considerably lower in Africa and the Western Pacific region, which accounted for 945,165 and 409,589 cases, respectively. As such, Africa accounted for 4 per cent of cases worldwide while the Western Pacific region accounted for 2 per cent of cases.

On a daily basis, 267,291 new positive cases were reported globally on 16 August 2020. The Americas reported 149,647 cases on that date, equivalent to 56 per cent of the total, while Europe reported 19,888 cases and the South-East Asia region reported 69,064 cases, 3.5 times more than the figure for Europe, indicating that European countries were more successfully combating the pandemic than countries in South East Asia.

Of the reported 21,294,845 positive cases worldwide, 761,779 individuals, equivalent to some 4 per cent of all infected persons, had died. Again, the Americas led the way, accounting for 414,326 or 54 per cent of all reported deaths. Europe came in a distant second with 214,092 deaths, and South-East Asia followed with 59,875 reported deaths. Africa reported a total of 18,476 deaths and the Western Pacific region reported 9,293 fatalities, accounting for 2 per cent and 1 per cent of all reported deaths, respectively. The Americas reported the largest number of new deaths on 16 August 2020, namely 3,843 fatalities, equivalent to 64 per cent all reported cases that day. The South-East Asia region recorded 1,031 fatalities, some three times more than the 410 fatalities recorded in Europe. Africa reported 190 deaths on 16 August 2020 while the Western Pacific region reported 168 deaths.

Thus, from an epidemiological perspective, three regions, namely, the Americas, Europe and South-East Asia have suffered the most from the COVID-19 pandemic, both in terms of the number of positive cases and the number of deaths. This is true irrespective of the global or daily reported numbers. Africa and the Western Pacific region are faring much better in terms of the number of positive cases reported and the number of deaths.

Table 1

**Total numbers of COVID-19 cases and deaths as of 16 August 2020 and numbers of new COVID-19 cases and deaths reported in the 24 hours prior to that date**

<b>Situation in numbers (by WHO Region)</b>		
Total (new cases in last 24 hours)		
Globally	21 294 845 cases (267 291)	761 779 deaths (5 985)
Africa	945 165 cases (9 103)	18 476 deaths (190)
Americas	11 420 860 cases (149 645)	414 326 deaths (3 843)
Eastern Mediterranean	1 723 673 cases (13 401)	45 704 deaths (343)
Europe	3 754 649 cases (19 888)	214 092 deaths (410)
South-East Asia	3 040 168 cases (69 064)	59 875 deaths (1 031)
Western Pacific	409 589 cases (6 190)	9 293 deaths (168)

Source: WHO, *Coronavirus Disease (COVID-19) - Situation Report (16 August 2020)*.

## 1.2 Epidemiological state of COVID-19 in Africa

Table 2 shows that African countries have been diversely impacted by the COVID-19 pandemic. Indeed, of the 945,165 confirmed cases on the continent on 16 August 2020, South Africa accounted for 583,653 cases, that is to say, more than half of the total. This is more than 10 times the number of cases in Nigeria, the second most effected country, which reported only 48,770 cases. This was followed by Ghana, with 42,210 cases and Algeria with 38,133 cases. Those four countries accounted for some three quarters of reported cases in Africa. If one takes into account Kenya, Ethiopia, Cameroon and Côte d'Ivoire, which reported 29,849, 28,894, 18,469 and 16,993 cases, respectively, it is clear that 85 per cent of COVID-19 infections in Africa occur in only eight countries. For comparison, it should be noted that Burundi and the Comoros reported only 413 and 405 cases, respectively.

South Africa, Ethiopia, Kenya and Algeria accounted for the bulk of new cases on 16 August 2020, with South Africa leading the pack with 4,513 out of the 9,103 newly reported cases, equivalent to 50 per cent of the total. Ethiopia was second with 1,652 new cases, followed by Kenya with 515 cases and Algeria with 469 cases. Nigeria and Ghana both reported fewer new cases than previously, (325 and 147 cases, respectively), suggesting a slowing transmission rate in those two countries.

South Africa reported a total of 11,677 COVID-19 related deaths by 16 August 2020, accounting for 63 per cent of all reported deaths for the continent. Algeria was a distant second with 1,360 reported deaths. That was higher than both Nigeria (974 deaths) and Ghana (231 deaths). Ghana is faring better on that front than many other countries, including Kenya (515 deaths), Algeria (469 deaths) and Cameroon (401 deaths). This may indicate that Ghana has been more successful than other countries in treating infected individuals.

Table 2

**Epidemiological status of COVID-19 in African countries as of 16 August 2020**

Table 1. Countries, territories or areas with reported laboratory-confirmed<sup>a</sup> COVID-19 cases and deaths, by WHO region. Data as of 10 AM CEST, 16 August 2020\*\*

Reporting Country/Territory/Area	Total confirmed <sup>a</sup> cases	Total confirmed <sup>a</sup> new cases	Total deaths	Total new deaths	Transmission classification <sup>1</sup>	Days since last reported case
<b>Africa</b>						
South Africa	583 653	4 513	11 677	121	Community transmission	0
Nigeria	48 770	325	974	1	Community transmission	0
Ghana	42 210	147	231	0	Community transmission	0
Algeria	38 133	469	1 360	9	Community transmission	0
Kenya	29 849	515	472	7	Community transmission	0
Ethiopia	28 894	1 652	509	17	Community transmission	0
Cameroon	18 469	0	401	0	Community transmission	2
Côte d'Ivoire	16 993	58	108	0	Community transmission	0
Madagascar	13 724	81	166	2	Community transmission	0
Senegal	12 032	160	251	2	Community transmission	0
Democratic Republic of the Congo	9 637	33	239	1	Community transmission	0
Zambia	9 186	165	260	4	Community transmission	0
Guinea	8 343	83	50	0	Community transmission	0
Gabon	8 225	0	51	0	Community transmission	1
Mauritania	6 693	40	157	0	Community transmission	0
Zimbabwe	5 176	104	130	2	Clusters of cases	0
Malawi	5 026	38	157	1	Community transmission	0
Equatorial Guinea	4 821	0	83	0	Community transmission	15
Central African Republic	4 652	0	61	0	Community transmission	3
Namibia	3 907	181	35	4	Clusters of cases	0
Congo	3 831	86	76	16	Community transmission	0

Reporting Country/Territory/Area	Total confirmed <sup>a</sup> cases	Total confirmed <sup>a</sup> new cases	Total deaths	Total new deaths	Transmission classification <sup>1</sup>	Days since last reported case
Eswatini	3 745	75	69	1	Community transmission	0
Cabo Verde	3 163	27	34	1	Clusters of cases	0
Mozambique	2 791	83	19	0	Community transmission	0
Mali	2 614	9	125	0	Community transmission	0
South Sudan	2 489	1	47	0	Community transmission	0
Rwanda	2 352	152	8	0	Clusters of cases	0
Guinea-Bissau	2 117	0	33	0	Community transmission	1
Benin	2 063	49	39	1	Community transmission	0
Sierra Leone	1 954	7	69	0	Community transmission	0
Angola	1 879	27	86	0	Clusters of cases	0
Gambia	1 689	0	54	0	Sporadic cases	1
Uganda	1 385	0	12	0	Clusters of cases	1
Liberia	1 257	3	82	0	Community transmission	0
Burkina Faso	1 240	2	54	0	Community transmission	0
Botswana	1 214	0	3	0	Clusters of cases	2
Niger	1 165	0	69	0	Community transmission	1
Togo	1 092	0	26	0	Community transmission	2
Chad	952	1	76	0	Community transmission	0
Lesotho	903	0	25	0	Clusters of cases	1
Sao Tome and Principe	885	0	15	0	Clusters of cases	1
United Republic of Tanzania	509	0	21	0	Community transmission	100
Burundi	413	1	1	0	Clusters of cases	0
Comoros	405	2	7	0	Community transmission	0

Source: WHO, *Coronavirus Disease (COVID-19) - Situation Report (16 August 2020)*.

### 1.3 Rationale for African geospatial response strategies to combat COVID-19

From an epidemiological perspective, Africa has fared much better than was predicted: it has fewer reported COVID-19 cases than other regions, with those cases accounting for only 4 per cent of worldwide infections. As of 16 August 2020, Africa accounted for a mere 4 per cent of total COVID-19 deaths. On that date, the continent also reported fewer new cases, namely 9,103 of the 267,291 cases reported worldwide

or 3 per cent of the global total. The same holds true for newly reported deaths, with Africa accounting for only 190 of 5,985 deaths reported on 16 August 2020. However, Africa has a number of vulnerabilities that put it more at risk than other continents. For example, up to 94 per cent of the continent's pharmaceutical requirements are met through imports.<sup>10</sup> This undoubtedly increases the continent's vulnerability by diminishing its capacity to contain the pandemic. As a result, Africa is much more at risk from the social, economic, technological and other repercussions of the pandemic. Hence, the need for a multi-faceted strategic response that goes beyond strengthening health systems and involves the identification of innovative solutions that can effectively mitigate the impact of the pandemic.<sup>11</sup>

Examining how geospatial technologies can and should be part of that integrated continental response strategy is the main objective of the present study. To that end, the report includes an overview of the economic and social impact of the pandemic on the continent, including its impact on trade and industry. It then looks at measures currently being taken by African countries to combat the pandemic. The report then considers the geospatial strategies that can be adopted in response to the pandemic and focuses on geospatial management mechanisms. The report then considers ways to fund geospatial response strategies, summarizes potential challenges that may impede successful geospatial responses and sets forth potential steps to address those challenges. A number of concluding observations are made at the end of the report.

## 2. The impact of COVID-19 in Africa

The COVID-19 pandemic, unlike other pandemics in recent memory, is not only a health crisis but also an economic crisis and it will certainly have political and social consequences that have yet to be fully assessed. Africa is particularly at risk given its high poverty levels and the fact that many political systems and institutions on the continent are weak and can be undermined by social unrest and conflict. Thus, while from an epidemiological perspective, Africa has suffered less from the COVID-19 pandemic than other continents, a number of weaknesses make it more exposed than other continents to the economic and social repercussions of the virus. Those weaknesses include: (a) the fragility of the continent's health-care systems, both in terms of the quality and the quantity of health-care infrastructure and personnel; (b) Africans' limited access to health-care services, particularly in rural and remote areas; and (c) the prevalence of other diseases, including malaria and HIV/AIDS, which already place considerable strain on African health-care systems and consume a large proportion of the very limited resources that African countries are able to allocate to those systems.<sup>12</sup> Those challenges are compounded by the structural weaknesses of African economic and production systems, which have resulted in the emergence of a large informal sector, economies that are highly dependent on imports of food, drugs and equipment, and significant technological barriers, particularly with regard

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<sup>10</sup> OECD, *Tackling Coronavirus (COVID-19), Contribution to a global effort. Africa's Response to COVID-19*; ECA and African Trade Policy Centre (ATPC), *Trade Policies for Africa to Tackle COVID-19* (March 2020). Available at: [www.uneca.org/sites/default/files/PublicationFiles/briefing\\_paper\\_on\\_trade\\_policies\\_for\\_africa\\_to\\_tackle\\_covid-19\\_290820.pdf](http://www.uneca.org/sites/default/files/PublicationFiles/briefing_paper_on_trade_policies_for_africa_to_tackle_covid-19_290820.pdf) (accessed on 25 November 2020)

<sup>11</sup> ECA, *Ideas for a prosperous Africa: COVID-19 lockdown exit strategies for Africa* (4 May 2020). Available at: [www.uneca.org/sites/default/files/COVID-19/COVID-19-lockdown-exit-strategies/ecarprt\\_covidexitstrategis\\_eng\\_9may.pdf](http://www.uneca.org/sites/default/files/COVID-19/COVID-19-lockdown-exit-strategies/ecarprt_covidexitstrategis_eng_9may.pdf) (accessed on 4 January 2021).

<sup>12</sup> OECD, *Tackling Coronavirus (COVID-19), Contribution to a global effort. Africa's Response to COVID-19*;

to digital connectivity.<sup>13</sup> The negative economic, social, trade, technological and industrial repercussions of the pandemic on the continent are thus likely to be severe.

## 2.1 Economic repercussions

The COVID-19 pandemic is affecting the economies of sub-Saharan Africa in several ways. Firstly, countries have adopted lockdown measures that have severely disrupted production systems and led to a sharp increase in unemployment. Many workers have fallen ill, further decreasing the labour supply. In addition, due to its large dependence on external trade and external financial systems, disruptions to the trade and financial systems of the continent's traditional trading partners has amplified the impact of the pandemic at the local level. Those disruptions have been compounded by falling commodity prices, on which many economies in the region depend.<sup>14</sup> Although earlier forecasts predicted that African economies would grow by an average of 3.9 per cent in 2020, AfDB now predicts that African economies will contract by some 1.7 per cent this year. If the pandemic continues into 2021, as now seems likely, African economies could contract by a further 3.4 per cent.

The economic impact of the pandemic will be felt in numerous ways throughout the continent. For example, as illustrated in figure I, economic growth in sub-Saharan Africa is predicted to fall to -2.1 per cent in 2020, down from 2.4 per cent in 2019, and could further shrink to a dismal -5.1 per cent.<sup>15</sup> The worst-case scenario sees real output in Africa contracting by as much as 4.3 per cent, particularly if the pandemic becomes more severe and continues until the end of 2020. However, the East Africa subregion, while still experiencing a deep decrease in economic growth, is still expected to achieve growth of 1.2 per cent in 2020, or 0.2 per cent in the worst-case scenario. In the latter scenario, fiscal deficits in the region will reach 6.8 per cent of gross domestic product (GDP), as opposed to 6.1 per cent in the COVID-19 base-line scenario.<sup>16</sup>

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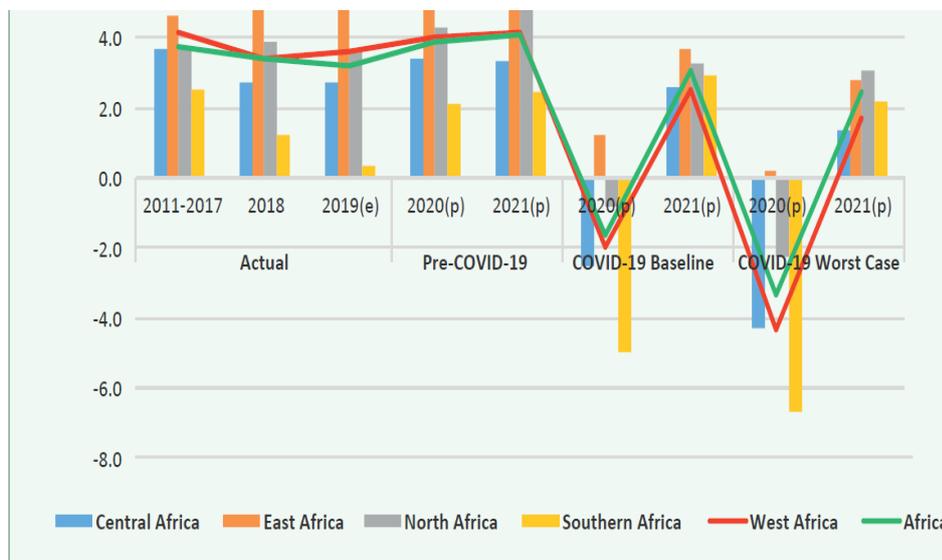
<sup>13</sup>ECA and African Trade Policy Centre (ATPC), *Trade Policies for Africa to Tackle COVID-19*; OECD, *Tackling Coronavirus (COVID-19), Contribution to a global effort. Africa's Response to COVID-19*.

<sup>14</sup>International Monetary Fund (IMF), *Regional Economic Outlook, Sub-Saharan Africa – COVID-19: An Unprecedented Threat to Development* (2020). Available at: [www.tralac.org/documents/resources/covid-19/3289-regional-economic-outlook-sub-saharan-africa-imf-april-2020/file.html](http://www.tralac.org/documents/resources/covid-19/3289-regional-economic-outlook-sub-saharan-africa-imf-april-2020/file.html); Res4Africa Foundation and others, *The Impact of Covid-19 on Africa's energy sector and the role of RE to empower a long term and sustainable recovery* (24 June 2020). Available at: [www.tralac.org/documents/resources/covid-19/regional/3943-the-impact-of-covid-19-on-africas-energy-sector-res4africa-june-2020/file.html](http://www.tralac.org/documents/resources/covid-19/regional/3943-the-impact-of-covid-19-on-africas-energy-sector-res4africa-june-2020/file.html) (accessed on 4 January 2021)

<sup>15</sup>Eugene Nyantakyi and Lamin Drammeh, "Covid-19 Pandemic: Potential Risks for Trade and Trade Finance in Africa", Africa Economic Brief, Issue 11 (6) (African Development Bank, 2020).

<sup>16</sup>AfDB, *East Africa Economic Outlook 2020: Coping with the COVID-19 Pandemic*

Figure I  
**Recorded real GDP growth rates in the different African subregions and growth rate forecasts under various scenarios, 2011–2021 (per cent)**



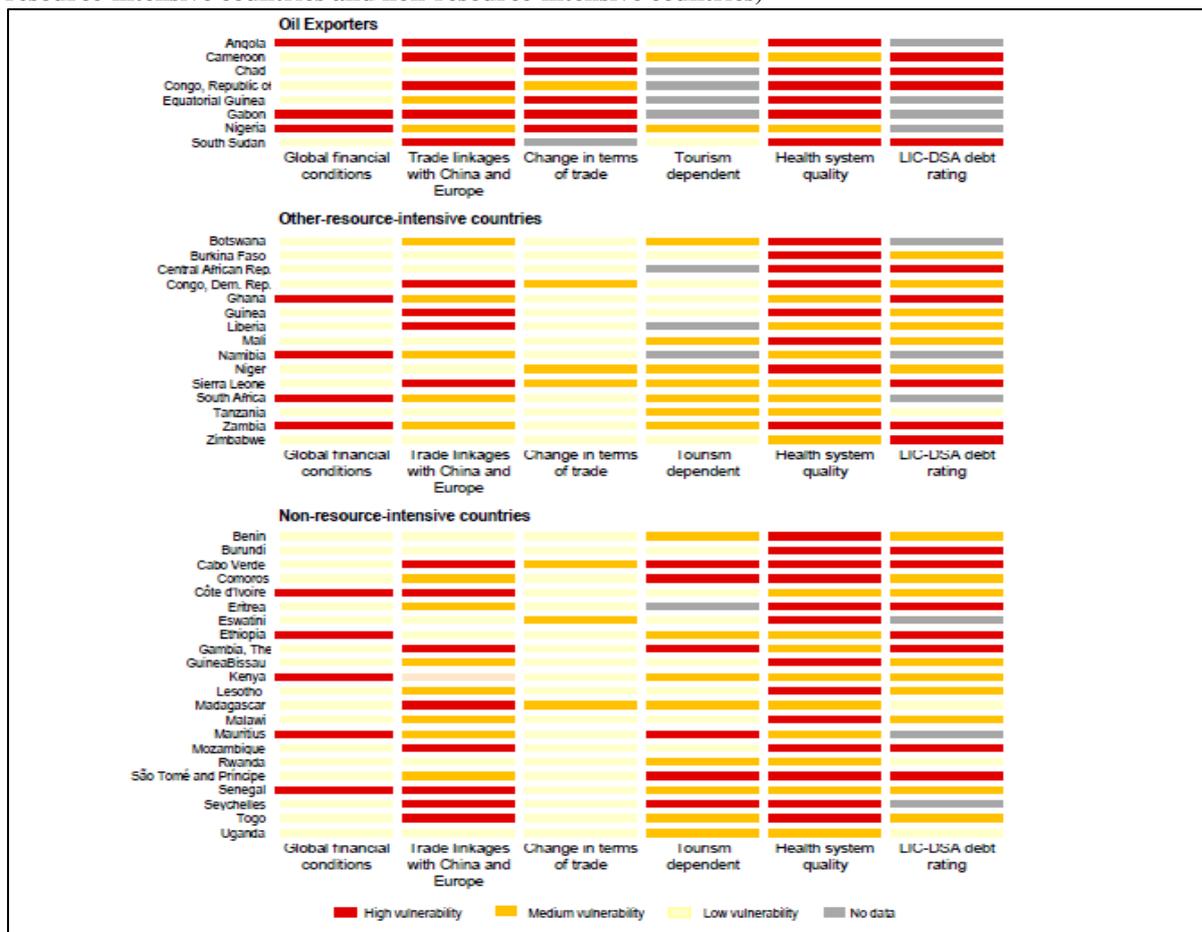
Source: Eugene Nyantakyi and Lamin Drammeh, “Covid-19 Pandemic: Potential Risks for Trade and Trade Finance in Africa”, Africa Economic Brief, Issue 11 (6) (AfDB, 2020).

Further analysis reveals that the COVID-19 pandemic will affect the economies of countries in sub-Saharan Africa to different degrees, depending on whether they are oil-exporters, other-resource-intensive countries or non-resource-intensive countries. According to the International Monetary Fund (IMF), the economies of oil-exporting countries are expected to contract by 2.8 per cent in 2020, down from growth of 1.8 per cent in 2019 and a far cry from the 5.3 reported in the October 2019 outlook. Growth in other resource-intensive countries is expected to contract from 2.3 per cent to -2.7 per cent, while non-resource-intensive countries will see economic growth decline from 6.2 per cent to 2.0 per cent.<sup>17</sup>

Figure II illustrates that the pandemic will have a more negative impact on trade in oil exporting countries than in other countries. Indeed, 88 per cent of oil exporting countries in sub-Saharan Africa are expected to experience a contraction in trade, whereas trade is expected to decline in only 53 per cent of other resource-intensive countries and 59 per cent of non-resource-intensive countries. Furthermore, many non-resource-intensive countries that are dependent on tourism will be severely affected. They will also be more severely affected if they have strong trade links with China and Europe. Half of the oil exporting countries in sub-Saharan Africa are likely to see their credit ratings downgraded compared to a third of other-resource intensive countries and a third of non-resource-intensive countries. Surprisingly, only three oil exporting countries in sub-Saharan Africa, namely Angola, Gabon and Nigeria, are likely to see their overall financial situations worsen as a consequence of the pandemic. Among other-resource-intensive countries, Ghana, Namibia, South Africa and Zambia are expected to experience worsening financial conditions. Among non-resource-intensive countries, Côte d’Ivoire, Ethiopia, Kenya, Mauritius and Senegal will also experience worsening financial conditions.

<sup>17</sup> IMF, *Regional Economic Outlook, Sub-Saharan Africa – COVID-19: An Unprecedented Threat to Development*.

Figure II  
**Vulnerability of sub-Saharan economies to COVID-19 related shocks (oil exporters, other resource-intensive countries and non-resource-intensive countries)**



Source: IMF, *Regional Economic Outlook, sub-Saharan Africa – COVID-19: An Unprecedented Threat to Development*.

## 2.2 Social repercussions

According to the Committee for Coordination of Statistical Activities, some 23 million Africans are likely to fall into extreme poverty as a consequence of the COVID-19 pandemic.<sup>18</sup> ECA makes a similar prediction, namely that between 5 and 29 million Africans will fall below the extreme poverty line of \$1.90 per day.<sup>19</sup> Transit poverty, defined as poverty for a limited time span, is expected to increase by 17 per cent among vulnerable families, and just over 4 per cent of vulnerable families will be forced into poverty for at least a decade. Furthermore, for low-income households, the probability of falling into extreme poverty will increase as access to health care becomes costly and therefore unaffordable.<sup>20</sup> Those negative repercussions will be compounded by the fact that over 90 per cent of COVID-19 cases in Africa are in urban areas, and particularly among poorer members of society, who often live in crowded areas where social distancing is difficult to maintain and

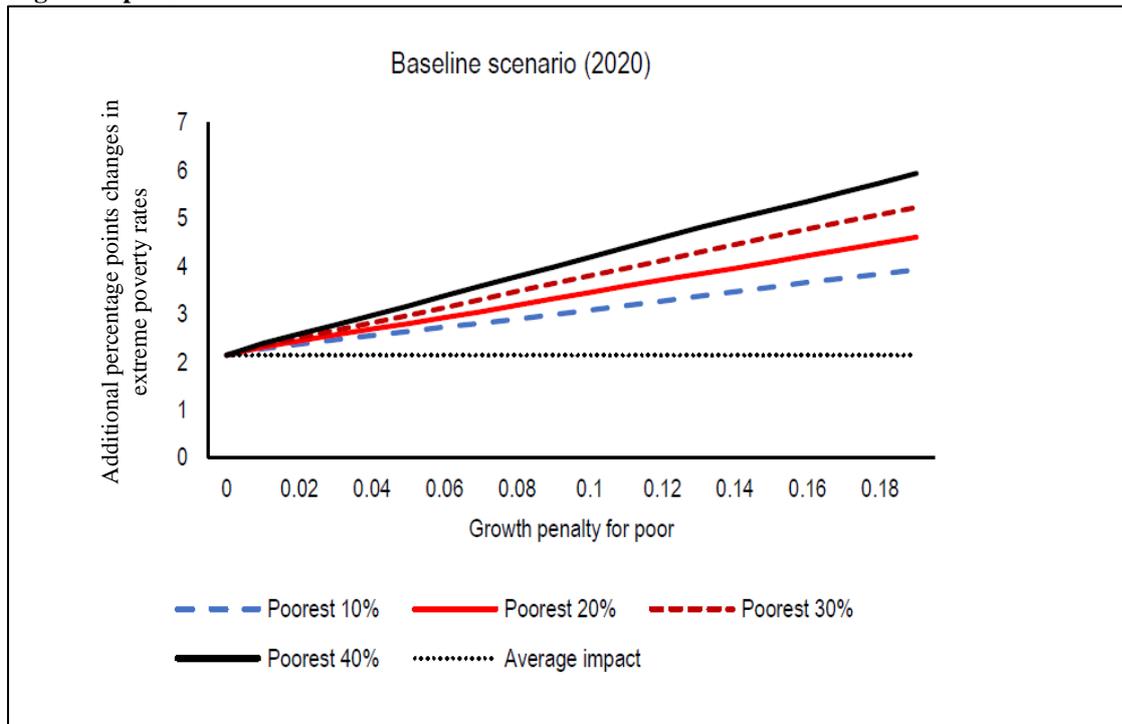
<sup>18</sup> CCSA, *How COVID-19 is changing the world: a statistical perspective*.

<sup>19</sup> ECA, *COVID-19 in Africa: Protecting Lives and Economies* (15 April 2020). Available at: [www.uneca.org/covid-19-africa-protecting-lives-and-economies](http://www.uneca.org/covid-19-africa-protecting-lives-and-economies) (accessed on 5 January 2020).

<sup>20</sup> Ibid.

lockdown measures are rarely observed.<sup>21</sup> Those challenges, coupled with slower economic growth, limited access to public safety mechanisms and the loss of income suffered by many workers in both the formal and the informal sectors, will likely result in undernutrition and other dietary deficiencies for many Africans. As illustrated in figure III, the “growth penalty” of the pandemic will be greatest for the poorest members of society, and particularly for the poorest 40 per cent of Africans.

Figure III  
**Impact of the COVID-19 pandemic on the poorest segments of African societies under a range of growth penalties**



Source: Hanan Morsy, Adeleke Salami and Adamon Mukasa, “Opportunities amid Covid-19: Advancing intra-African food integration”, Africa Economic Brief, Issue 11 (4) (AfDB, 2020).

It is also expected that, like many other children worldwide, African children will be particularly affected as schools close and they miss life-saving vaccinations and become more exposed to violence.<sup>22</sup> Likewise, political and social unrest on the continent and potential forced displacements of people will compound the social hardships stemming from the pandemic. Displaced populations in camps and other shelters are not only now stranded due to travel and other restrictions on movement imposed by governments, but are also more exposed and vulnerable to the pandemic as COVID-19 control measures are likely to be ineffective in such environments.

Furthermore, the social impact of the pandemic in Africa will be exacerbated by disruptions to the agricultural sector, which directly or indirectly employs over 80 per cent of Africans.<sup>23</sup> Indeed, both agricultural markets and demand for agricultural

<sup>21</sup> United Nations Human Settlements Programme (UN-Habitat) and others, *COVID-19 in African Cities: impacts, responses and policies* (2020). Available at: [www.uncdf.org/article/5732/covid-19-in-africa-cities-impacts-responses-and-policies](http://www.uncdf.org/article/5732/covid-19-in-africa-cities-impacts-responses-and-policies) (accessed on 25 November 2020); ECA, *COVID-19 in Africa: Protecting Lives and Economies*.

<sup>22</sup> CCSA, *How COVID-19 is changing the world: a statistical perspective*.

<sup>23</sup> Hanan Morsy, Adeleke Salami and Adamon Mukasa, “Opportunities amid Covid-19: Advancing intra-African food integration”, Africa Economic Brief, Issue 11 (4) (AfDB, 2020). Available at: [allafrica.com/download/resource/main/main/idatcs/00130111:e9ade047d339185cc5c5bec44f699a67.pdf](http://allafrica.com/download/resource/main/main/idatcs/00130111:e9ade047d339185cc5c5bec44f699a67.pdf) (accessed on 5 January 2021).

products will be disrupted due to containment measures, including physical distancing and the closure of businesses and borders. Moreover, given the importance of agricultural employment in Africa, any disruption to the agricultural sector may lead to mass unemployment. That in turn may lead to significant further disruptions in food value chains, including food price increases and disruptions to food distribution mechanisms, potentially leading to severe food insecurity for the poorest members of society and the unemployed. It should also be noted, that given the continent's increasingly outward-looking economies, disruptions in demand for agricultural products in customer countries, including European Union countries, will have significant negative consequences for exporters of African agricultural products. Finally, agricultural activities in Africa are social in nature, in addition to being very labor intensive. They thus bring many people to work together in close proximity at any time. In such settings, social distancing measures may be difficult to impose and may not be effective.<sup>24</sup>

### **2.3 Impact of the COVID-19 pandemic on trade, technology and industry**

Undoubtedly, trade is a major channel through which the pandemic will affect Africa. Repercussions of the pandemic on trade are expected to be greater in Africa than in other parts of the world. This is mainly because of the export-orientation of the continent's production systems and its dependence on imports. Indeed, as shown in figures IV and V, Africa exports almost \$140 billion of goods to the European Union alone. Imports from the European Union exceed \$160 billion. African economies are therefore highly vulnerable to any European economic shocks. The situation becomes even more concerning when one also takes into consideration imports and exports to China and the United States of America. As illustrated in figures VI and VII, those three partners account for almost half of the continent's imports and exports.

According to the African Trade Policy Centre (ATPC), the negative trade impact of the pandemic derives from three factors, namely reduced demand for African exports, falling prices and disrupted supply chains. The fall in demand for African exports will occur because the continent's main trade partners, namely, the European Union, China and the United States of America, have been deeply affected by the pandemic. As a consequence, exports of African raw materials to those countries is certain to fall as the need for inputs for manufacturing activities diminishes. Falling prices will affect mainly oil-exporting countries, which are some of the leading economies on the continent. This will significantly increase their vulnerability as it will put downward pressure on government revenues, foreign exchange reserves and domestic demand. Disruption in supply chains will stem from the fact that 51 per cent of African exports are to countries that have been severely affected by the pandemic, namely, European Union countries, China and the United States of America. As illustrated in figures IV and V, fifty three per cent of the continent's total imports originate from those same countries. Such negative repercussions are likely to be further worsened by quarantine measures and restrictions on the movement of individuals.<sup>25</sup>

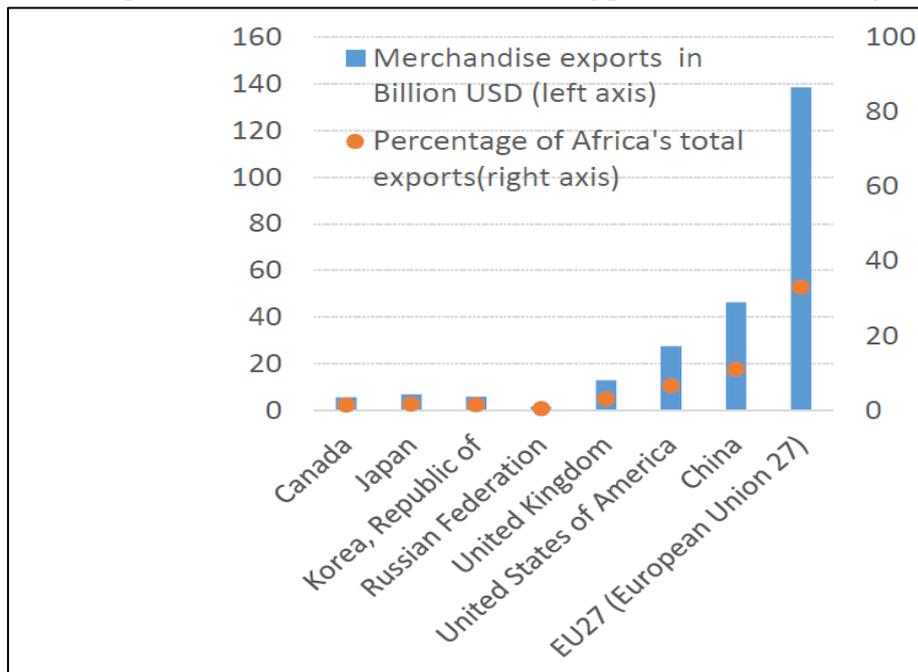
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<sup>24</sup> Ibid.

<sup>25</sup> ECA and ATPC, *Trade Policies for Africa to Tackle COVID-19* (March 2020). Available at: [www.uneca.org/sites/default/files/PublicationFiles/briefing\\_paper\\_on\\_trade\\_policies\\_for\\_africa\\_to\\_tackle\\_covid-19\\_290820.pdf](http://www.uneca.org/sites/default/files/PublicationFiles/briefing_paper_on_trade_policies_for_africa_to_tackle_covid-19_290820.pdf) (accessed on 25 November 2020)

Figure IV

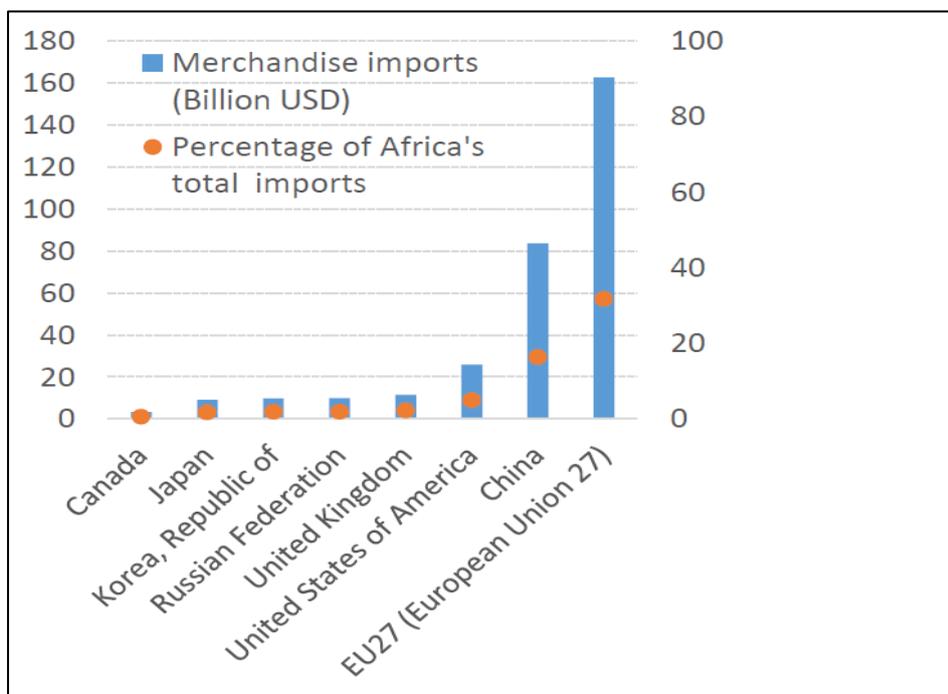
**African export flows to the continent's main trading partners, annual average, 2016–18**



Sources: ECA and ATPC on the basis of data provided by the United Nations Conference on Trade and Development (UNCTAD), 2020.

Figure V

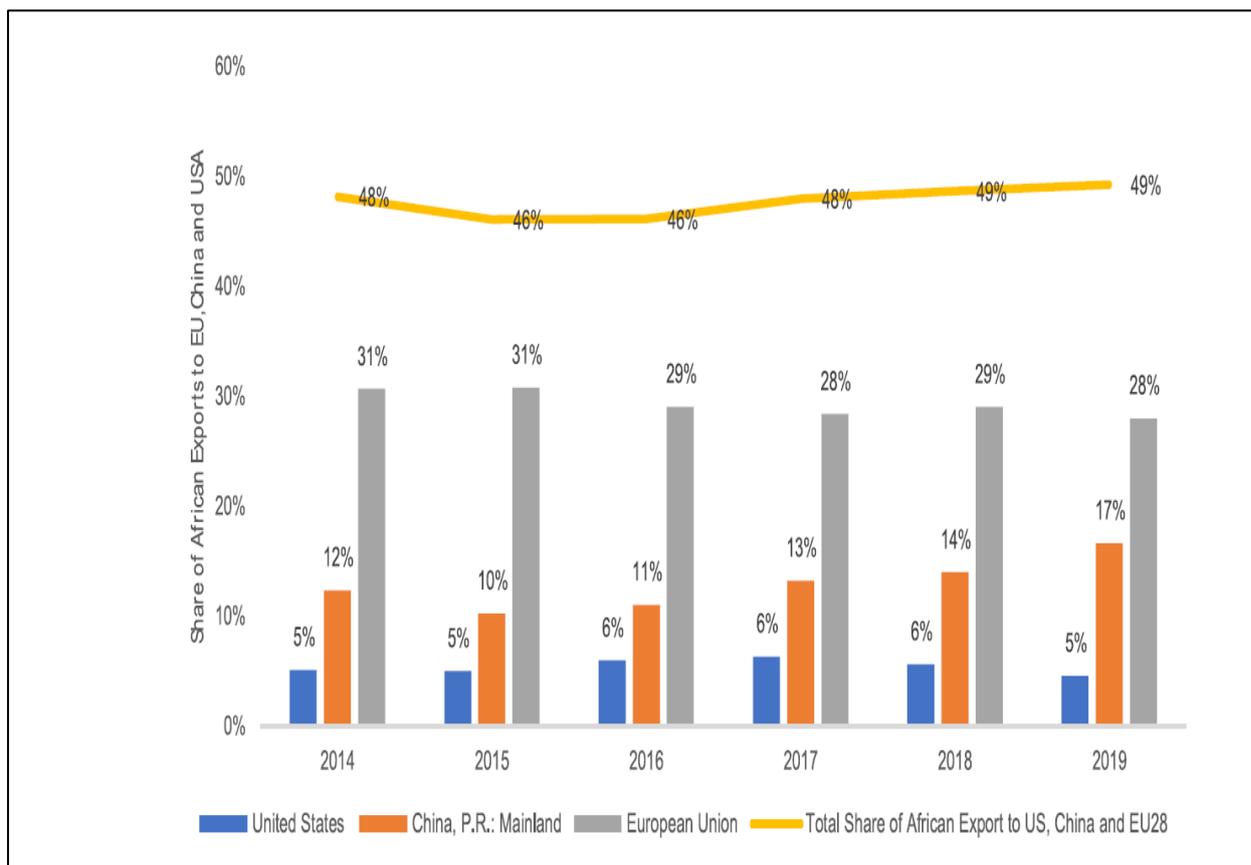
**African import flows to the continent's main trading partners, annual average, 2016–18**



Sources: ECA and ATPC on the basis of data provided by UNCTAD, 2020.

Figure VI

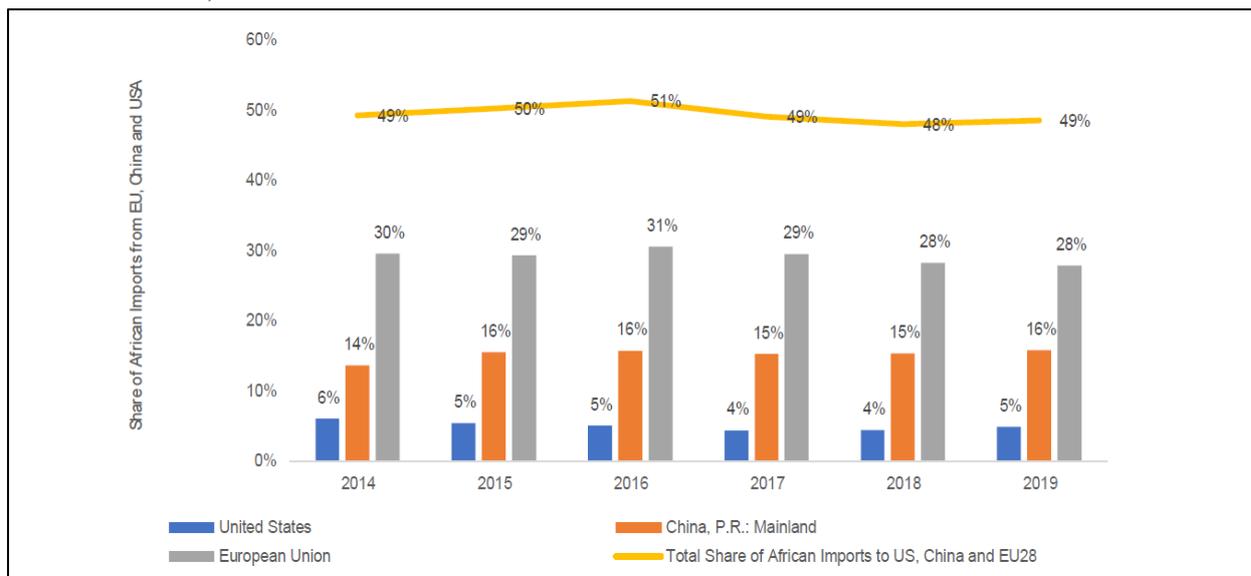
**Share of African trade (exports and imports) to China, the European Union and the United States of America, 2014–2019**



Source: IMF, *Direction of Trade Statistics*.

Figure VII

**Evolution of the share of African imports from the European Union, China and the United States of America, 2014–2019**



Source: IMF, *Direction of Trade Statistics*.

Further negative trade repercussions are likely to stem from the continent’s high dependence on imports of medicinal and pharmaceutical products. ECA

estimates that the continent imports some 94 per cent of its medicinal and pharmaceutical requirements. As countries restrict exports of those products with a view to ensuring that their domestic needs are met, Africa may run short of the essential products it needs to combat the pandemic effectively.

## **2.4 Impact of the COVID-19 pandemic on national mapping agencies**

By means of a survey developed by the African Centre for Statistics Geospatial Information Management Section, ECA has sought to assess the impact of the pandemic on the activities of national mapping agencies and the challenges they face. The outcome of that survey was based on 431 responses to 17 fully completed questionnaires, with each respondent representing a national mapping agency operating in one of the 54 countries in Africa. The analysis was based on answers provided by some 30 per cent of respondents, as only 17 out of 54 countries responded to the questionnaire. It is the intention of ECA to collect further data from the remaining 70 per cent of countries in order to have a complete picture of the impact of the COVID-19 crisis on African national mapping agencies.

The pandemic has adversely affected national mapping agencies in all 17 countries, and social distancing measures have, in some cases, resulted in the closure of national mapping agency offices. Mapping activities have been delayed, including as a result of flexible working schedules or shifts for employees. Eleven of the 17 respondents had either postponed or cancelled activities related to the production of fundamental and thematic datasets. Ten of the 17 respondents felt that they were not ready with COVID-19 related spatial data. Only two respondents indicated that they were on schedule with regard to the production of geospatial data and had the capacity to make optimal use of available data. Eleven of 17 respondents indicated they had been requested to provide spatial data in order to fight the COVID-19 pandemic. Ten countries had provided the data requested while five respondents had not received requests for the provision of spatial data to be used in efforts to combat the pandemic. Eight respondents indicated they required geospatial fundamental datasets, particularly hypsography and land management unit datasets, in order to track the spread of the COVID-19 pandemic.

During the COVID-19 crisis countries will need support in developing: a common framework and tools; capacity development and knowledge transfer mechanisms; collaboration and cooperation; legal frameworks; mechanisms for the institutionalization and integration of geospatial information and statistics; and governance and coordination mechanisms. Most national mapping agencies have had their budgets cut by between 30 and 40 per cent. The notable exception is Gabon, which has increased the resources allocated by some 70 per cent in order to update its geodetic reference frame.

## **2.5 Impact of the COVID-19 pandemic on Africa national statistical office operations**

In April 2020, ECA launched a survey of Africa national statistical offices (NSOs).<sup>26</sup> The survey was conducted with a view to sharing mitigation strategies being used by NSOs in Africa and deepening understanding of the impact of the COVID-19 pandemic on the activities of those offices and national statistical systems. The survey, which comprised seven questions, was sent to the NSOs of all

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<sup>26</sup> ECA, *Quick assessment of the impact of the Covid-19 pandemic on Africa NSO operations* (April 2020). Available at: [repository.uneca.org/handle/10855/43785](https://repository.uneca.org/handle/10855/43785) (accessed on 5 January 2021).

54 member States. Thirty-seven NSOs completed the questionnaire, equivalent to a 69 per cent response rate.

Not surprising, a key finding was that data collection activities had been negatively affected by the pandemic. For example, due to restrictions on movement, a quarter of the 168 surveys planned by the respondents had been either suspended or cancelled, while 48 surveys had been postponed. The survey also revealed a rise in non-response rates and low sample coverage for ongoing NSO surveys. These will undoubtedly negatively affect the quality of the data collected. Furthermore, NSOs in Africa had been forced to make methodological adjustments. For example, face-to-face interviews were being replaced with phone interviews. Many shops and markets had closed, making it difficult to collect data to inform key living standard indicators, such as the consumer price index.

As expected, African NSOs reported being overwhelmed by increasing data and statistical information demands in the context of countries' responses to the pandemic. In some cases, such as in Namibia and South Africa, NSOs also support COVID-19 mapping activities. Adjustments in working conditions have also become necessary. These include reduced working hours, limited staff numbers in the office, remote working and methodological adjustments. According to the respondents, additional pressures came from (a) inadequate financial resources to deal with growing demands for data and the reallocation or diversion of public funds previously earmarked for statistical activities; and (b) the need to train staff in new survey methodologies, including phone and computer-assisted personal interviewing.

## 2.6 Other repercussions

According to OECD, “beyond the immediate impacts on health, jobs and incomes, the epidemic is increasing people’s anxiety and worry, affecting their social relations, their trust in other people and in institutions, their personal security and sense of belonging.”<sup>27</sup> Those repercussions will be particularly severe for those who are financially insecure or living in overcrowded housing. Given the high levels of poverty in Africa, which have been exacerbated by movement restrictions and border closures, low wages, curtailed incomes and mass unemployment, one would expect the negative mental and psychological impact of the pandemic to be severe on the continent. Indeed, as stated earlier, over 23 million Africans are expected to fall into extreme poverty and transit poverty is anticipated to increase by 17 per cent<sup>28</sup> and this will doubtless exacerbate anxiety among Africans, particularly in poor urban neighbourhoods.<sup>29</sup>

## 3. Response of Africa to COVID-19

### 3.1 Global approach to the COVID-19 pandemic

Globalization and the cross-continental movement of people means that no continent has been spared by the COVID-19 pandemic. Thus, the fight against the pandemic is global in scope and requires collaboration among all countries and continents. As the pandemic has unfolded, the global strategy has focused on dealing with the health crisis and its repercussions. Two main response strategies have been adopted, namely (a) containment, in order to stop the spread of the disease and limiting the duration of outbreaks by identifying and isolating cases as early as possible, identifying all close contacts, and limiting transmission; and (b) delay and

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<sup>27</sup> OECD, *Tackling Coronavirus (COVID-19), Contribution to a global effort. Africa’s Response to COVID-19*.

<sup>28</sup> CCSA, *How COVID-19 is changing the world: a statistical perspective*.

<sup>29</sup> UN-Habitat and others, *COVID-19 in African Cities: impacts, responses and policies*.

mitigation measures with a view to slowing transmission, reducing the burden on health services and addressing the socioeconomic repercussions of the disease. Increasingly, response strategies are including exit strategies, particularly as countries come to understand that a cure may take some time to be found. That extended strategy revolves around four main pillars, namely people first, fiscal policy, international solidarity and monetary policy. Those pillars have been articulated by the IMF as follows:

- “• **People first.** The immediate priority is for countries to do whatever it takes to ramp up public health expenditures to contain the virus outbreak, regardless of fiscal space and debt positions.
- **Fiscal policy.** Sizable, timely and temporary fiscal support is crucial to protect the most affected people and firms, including those in the informal sector ...
- **International solidarity.** The ability of countries to mount the required fiscal response is highly contingent on ample external financing, on grant and concessional terms, being made available from the international financial community ...
- **Monetary policy.** A more supportive monetary stance and injection of liquidity can also play an important role in sustaining firms and jobs by supporting demand ...”<sup>30</sup>

## 3.2 Strategy adopted by Africa to respond to the pandemic

### 3.2.1. Containment and mitigation measures

As has been the case in other parts of the world, various strategies have been adopted by African countries in the fight against the pandemic. While their extent and scope vary according to resources and local conditions, Africa COVID-19 response strategies have been similar to those in other countries and have included containment and mitigation measures. Key measures taken in response to the pandemic have aimed to (a) limit transmission, and (b) minimize harm, be it social, economic, health-related or psychological. To achieve the former, countries have sought to prevent the pandemic from spreading too quickly and to limit its duration by isolating infected people and identifying all close contacts of those individuals. To achieve the latter, countries have sought to test, protect, treat and cure all individuals testing positive for COVID-19. Countries have sought to reduce the burdens on their health-care systems, mitigate the impact of COVID-19 and, to some extent, slow transmission despite the high number of cases. The continent’s reaction to the pandemic and its strategic responses have not, therefore, been very different from those adopted by countries outside Africa.

In effectively preparing, preventing, detecting and responding to any health emergency, including pandemics, it is critically important for decision-makers and health authorities to put in place robust health measures and surveillance mechanisms.<sup>31</sup> For the most part, African countries have reacted faster than other countries by taking measures to monitor and slow the speed of transmission of the COVID-19 virus and contain outbreaks. At the national level, measures have included the closure of borders and the imposition of travel restrictions, social distancing regimes and lockdowns. At the regional level, a number of actions were taken at an early stage, including the establishment by the Africa Centres for Disease Control and Prevention of the Africa Task Force for Novel Coronavirus and the Event-based Surveillance Framework. Continent-wide public health initiatives are, moreover,

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<sup>30</sup> IMF, *Regional Economic Outlook, Sub-Saharan Africa – COVID-19: An Unprecedented Threat to Development*.

<sup>31</sup> CCSA, *How COVID-19 is changing the world: a statistical perspective*.

being implemented by the Africa Centres for Disease Control and Prevention through its Regional Collaborating Centers, located in each of the five African regional economic communities. Those initiatives include the Partnership to Accelerate COVID-19 Testing: Trace, Test and Track. The aim of that initiative is to provide countries without testing capacity with testing options by making use of existing supply chains and establishing regional laboratories and referral networks. The ultimate goal of the initiative is three-fold: firstly, to establish warehouses and distribution centres across the continent; secondly, to pool diagnosis and medical tools and supplies and distribute them to countries; and thirdly, to establish standardized technology platforms that can support reliable testing and data management and facilitate the design of fact-based forecasting models and techniques.<sup>32</sup>

At the political level, African ministers of finance met on 22 March 2020 to discuss the consequences of the pandemic on African economies. This gave impetus to the launch of the Africa Joint Continental Strategy for COVID-19 Outbreak. The two main goals of the Strategy are to prevent severe illness and death from COVID-19 in African States and to minimize social and economic turmoil resulting from the pandemic. Consequently, a key objective of the Strategy is one of coordination, not only among States, but also with African Union agencies, WHO and other multilateral partners with the ultimate goal of enhancing synergy and minimizing duplication of efforts. The African Union is tasked with ensuring high-level political coordination, leadership and collaboration throughout the continent. At the multilateral level, the Strategy promotes synergy and complementarity among actors, including member States, WHO, multilateral institutions and regional organizations. Partnerships are to be established between the Africa Centres for Disease Control and Prevention and the regional economic communities to facilitate implementation and follow-up. The Strategy also promotes collaboration with the private sector to ensure effective passenger screening at airports and the delivery of essential equipment and medicine. Donors, foundations and other stakeholders are invited to help strengthen countries' public health response capacities and technical assistance is to be provided to member States to strengthen their efforts to combat the COVID-19 pandemic.

The Africa Joint Continental Strategy for COVID-19 Outbreak will also promote evidence-based public health practices in areas such as disease surveillance, prevention, diagnosis, treatment and control. That will require: the collection, analysis and dissemination of accurate data in a timely manner to States; high-quality testing and in-depth studies; further efforts by States to implement evidence-based interventions with a view to combating the pandemic; establishing and maintaining supply chains for key medical supplies and resources; putting in place and enacting emergency preparedness measures; and assessing and managing special issues in collaboration with member States, including issues related to the situation of refugees and displaced populations; ethical and legal issues and other contingency plans for continued health care service delivery.

### **3.2.2. Partnership building**

In collaboration with WHO and leading universities, the African Centres for Disease Control and Prevention publishes daily statistics on the pandemic in African member States. This is an invaluable resource as it provides a clear idea at the continental, subregional and national levels of the extent to which the pandemic is affecting the continent. ECA, AFDB and the African Union Commission are conducting studies on the social, economic, health and trade impact of the pandemic in Africa. Furthermore, ECA and the African Union Commission are promoting institutional partnerships with numerous organizations and authorities, including the United Nations Human Settlements Programme (UN-Habitat), United Cities and Local Governments-Africa and the United Nations Capital Development Fund. Those

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<sup>32</sup> OECD, *Tackling Coronavirus (COVID-19), Contribution to a global effort. Africa's Response to COVID-19*.

include (a) technical and technological partnerships for developing software and other technical solutions, (such as partnerships with the Environmental Systems Research Institute and the Digital Impact Alliance); (b) mining data partnerships (such as those with Data Campus; conducting evidence-based analysis in support of decision-making such as a partnership with Arizona State University; and (c) social partnerships to facilitate the achievement of the Sustainable Development Goals.<sup>33</sup> The African private sector and research institutions are also supporting the pandemic response. For example, companies in Egypt, Ghana, Kenya, Nigeria, Senegal, South Africa and Uganda are developing COVID-19 tests, developing their COVID-19 testing capacity and strengthening delivery systems with new technologies, including drones. Examples of those partnerships are provided in figure VIII.

Figure VIII

**Selected partnerships established with a view to combatting the COVID-19 pandemic**

<p><b>Research partnership and technology transfer for diagnostic kit development</b></p> <p><b>Senegal, United Kingdom and France:</b> 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<sub>[18]</sub>). 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.</p>
<p><b>Local and foreign entrepreneurs and venture capitalists are stepping up to boost local testing capacities</b></p> <p><b>Nigeria:</b> 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<sub>[19]</sub>).</p>
<p><b>Multilateral actions are supporting countries without diagnostic capacities</b></p> <p><b>Africa:</b> 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<sub>[20]</sub>).</p>
<p><b>New technologies are tackling logistical challenges in testing deliveries</b></p> <p><b>Ghana:</b> 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<sub>[21]</sub>). 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.</p>
<p><b>Simple swab-based solutions to tackle COVID-19</b></p> <p><b>Uganda:</b> 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.</p> <p><b>Kenya:</b> The Kenya Medical Research Institute has started manufacturing a simple swab-based COVID-19 rapid testing kit.</p>

Source: OECD, *Tackling Coronavirus (COVID-19), Contribution to a global effort. Africa's Response to COVID-19: What roles for trade, manufacturing and intellectual property?*

### 3.3 The African Development Bank: the main source of funding to combat COVID-19

Time constraints and the limited scope of the present study means that it is not possible to examine funding schemes at the national level in response to COVID-19. A non-exhaustive online study reveals, however, that AfDB has been the main source of funding for African countries' response to the pandemic. Its strategy revolves, primarily, around the \$10 billion COVID-19 Response Facility, established with a view to supporting national, regional, international and private-sector initiatives. A

<sup>33</sup> ECA and Global Partnership for Sustainable Development Data, *Data for Now: Building Africa's Resilience to COVID-19* (April 2020).

little over half of the Facility, (\$5.5 billion) is being used to support sovereign operations in African countries, while \$3.1 billion has been earmarked to support national and regional organizations. The remaining \$1.35 billion will support private-sector initiatives.

As illustrated in table 3, seven regional organizations or groups of countries have received financial assistance totalling \$532 million from AfDB. Of those countries, Burkina Faso, Chad, Mali, Mauritania and the Niger (the so-called G5 countries) were the largest regional recipients, receiving \$285 million in financial aid. At the country level, 29 African countries received some form of financial assistance, either in the form of a grant or a loan. In total, those countries received almost \$3 billion in financial aid. Morocco is the largest recipient, having been allocated \$317 million. Six other countries have each received more than \$200 million, (receiving some \$1.5 billion in total). South Africa leads that group of countries, having received \$288 million, and is closely followed by Nigeria and Egypt, which have received \$285.5 million and \$270.5 million, respectively. An additional five countries have received more than \$100 million of assistance. Ethiopia is the largest recipient in that group, having received \$165 million in aid. It is also worth noting that recipients are from all the five African Union regions, indicative of the overarching financial assistance strategy that has been adopted by AfDB.

Furthermore, AfDB has approved a \$2 million grant for WHO to support its efforts to combat the pandemic on the continent. The Bank has also issued the \$3 billion Fight COVID-19 social bond, the largest ever of its kind made available on international financial markets, and has also approved a \$10 million equity investment in the Razonite Healthcare Africa Fund 1 in support of improving health-care infrastructure delivery on the continent.

At the country level, much has been done to support financially vulnerable populations and industries. For example, Côte d’Ivoire has earmarked 150 billion Central African francs to support small and medium-sized enterprises and small and medium industries. Meanwhile, Kenya has approved the REACT Kenya Relief Fund, a \$2 million initiative to support struggling businesses. The Fund provides emergency grants of between \$50,000 and \$200,000 to cover short-term working capital needs. The South African Industrial Development Corporation, in coordination with the Department of Trade and Industry, has approved a package of more than 3 billion rand to support vulnerable firms and to fast-track financing for firms’ critical efforts to fight COVID-19 and mitigate the economic repercussions of the pandemic.<sup>34</sup> The African Export-Import Bank has created the \$3 billion Pandemic Trade Impact Mitigation Facility to help African countries to adjust to the financial, economic and health service impacts of the COVID-19 pandemic, in addition to scaling up the manufacture of COVID-19 requirements that can be produced in Africa and sent across borders. The World Bank has deployed \$160 billion in financing support, \$50 billion of which is in the form of new International Development Association grants and concessional loans to 76 of the world’s poorest countries, 39 of which are in Africa.

Table 3  
**Funding provided by the African Development Bank as of 22 August 2020 to support efforts to combat and mitigate the effects of COVID-19 in Africa**

Recipient country/organization	Amount of grant/loan (millions of US dollars)
<b>COVID-19 Response Facility</b>	<b>10 000.00</b>
<b>Fight COVID-19 (three-year bond)</b>	<b>3 000.00</b>
Morocco	316.80
South Africa	288.00
Nigeria	285.50
G5 (Burkina, Chad, Mali, Mauritania, Niger)	285.00

<sup>34</sup> OECD, *Tackling Coronavirus (COVID-19), Contribution to a global effort. Africa’s Response to COVID-19*.

Recipient country/organization	Amount of grant/loan (millions of US dollars)
Egypt	270.50
Kenya	225.60
Mauritius	225.60
Tunisia	216.00
Ethiopia	165.00
Madagascar, Malawi, Mozambique, Sao Tome and Principe	140.00
Gabon	121.00
Rwanda	117.60
Senegal	105.60
Côte d'Ivoire	90.00
Cameroon	88.00
Benin	72.00
Ghana	69.00
Gambia, Liberia, Sierra Leone	53.25
Malawi	45.70
Djibouti	41.00
Cabo Verde	36.00
Uganda	31.60
Somalia	25.00
Selected members of the Economic Community of West Africa States (ECOWAS) (Gambia, Mali, Niger)	22.40
Central African Republic	14.00
Zimbabwe	13.7
Central African Economic and Monetary Community (CEMAC)	13.00
Seychelles	10.00
Razonite Health Africa Fund 1	10.00
East Africa, Horn of Africa and Comoros	9.50
Southern African Development Community (SADC)	8.90
South Sudan	4.00
Togo	3.00
Madagascar	2.13
WHO (Emergency assistance to African countries)	2.00
Angola	1.04
Sao Tome and Principe	0.683
Libya	0.50

Source: Author's tabulation.

### 3.4 Potential Role of the African Continental Free Trade Area in combatting COVID-19

While the focus is currently on dealing with the COVID-19 health emergency and curtailing the socioeconomic and other repercussions of the pandemic, a long-term response strategy is needed. In that regard, the African Continental Free Trade Area can facilitate the long-term response to the pandemic. In doing so, the Area offers a unique opportunity to promote intra-African trade, thereby enhancing the continent's recovery from the pandemic.<sup>35</sup> To achieve that objective, however, it is vital to start to establish the Area on 1 January 2021, as provided in the Agreement Establishing the African Continental Free Trade Area, in order to create and develop regional value chains and provide businesses with opportunities to reach beyond national borders. That will also entail rethinking and adapting the original configuration of the Agreement with a view to integrating not only the COVID-19 response strategy but also measures to address pandemic-related external shocks. For example, national tariff schedules should be set so as to facilitate the production and transportation across borders of medical supplies, personal protective equipment and food. Measures should also be taken to find ways to pool resources to increase the quality of digital connectivity so as to harness its potential for promoting online business opportunities and the intercontinental flow of goods. National regulatory

<sup>35</sup> Hanan Morsy, Adeleke Salami and Adamon Mukasa, "Opportunities amid Covid-19: Advancing intra-African food integration",

policies and frameworks need to be developed accordingly. Strong intellectual property rights and competition policies should be enacted to stimulate innovation, intra-African commerce in non-physical goods and the transfer and utilization of African indigenous knowledge.<sup>36</sup>

The African Continental Free Trade Area offers another opportunity for the African continent, namely for it to be an active actor in e-commerce. In fact, one of the unintended impacts of the COVID-19 pandemic has been an acceleration in the adoption of new technology. That trend is bound to continue and accelerate as both industry and governments alike try to protect themselves against future unforeseeable health crises. For example, e-commerce is bound to increase and the pace of digitization to accelerate. The African Continental Free Trade Area offers the continent a unique opportunity to take advantage of both those phenomena. To that end, African countries need to play a leading role in setting international trade rules, including those adopted by the World Trade Organization (WTO).<sup>37</sup> Indeed, many countries have restricted exports of key medical supplies on which the continent is highly dependent. That has sometimes prevented African countries from implementing quick and effective responses to the pandemic. Since protectionist trends are likely to be reflected in new international trade rules, it is critically important that the African continent voices its concerns and advocates strongly for less restrictive trade rules. That will require constant engagement at the discussion table and for Africa to play an active role in shaping discussions about those rules.

## **4. Geospatial strategies to combat the COVID-19 pandemic and mitigate its impact**

### **4.1 Key characteristics**

Pandemics come and go. They may be different in terms of the nature of the virus causing them, but have a number of common features. Firstly, they are often worldwide in scope. Secondly, their repercussions are far-reaching and may be long lasting. Those include major economic and social disruptions that can leave psychological scars on society. Thirdly, they may give rise to structural changes as trade and industry are negatively affected and as society tries to fight back by imposing measures to curtail transmission. COVID-19 is a clear example of such a pandemic. Strategies developed to respond to COVID-19, or to any pandemic for that matter, should not, therefore, be conceived as single-use tool-kits but should be flexible and forward looking so that they can be used in other health crises. Those strategies should be fact-based to ensure that decisions that flow from them help contain the pandemic and reduce its impact. African strategies for a geospatial response to COVID-19 should satisfy those criteria. Consequently, they should be effective in containing the pandemic and dealing with its impact. A key question should thus be asked, namely how can geospatial information be managed so as to achieve those objectives?

Furthermore, African geospatial strategies should be part of and support the Africa Joint Continental Strategy for COVID-19 Outbreak. In that respect, they should adhere to the main goal of the Strategy, namely to limit transmission and minimize harm stemming from the pandemic. In addition, they should not be

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<sup>36</sup> OECD, *Tackling Coronavirus (COVID-19), Contribution to a global effort. Africa's Response to COVID-19*.

<sup>37</sup> Annalisa Primi and others, "Accelerating the response to COVID-19: what does Africa need?" OECD Development Matters, 1 May 2020. Available at: [oecd-development-matters.org/2020/05/01/accelerating-the-response-to-covid-19-what-does-africa-need/comment-page-1/](https://oecd-development-matters.org/2020/05/01/accelerating-the-response-to-covid-19-what-does-africa-need/comment-page-1/); OECD, *Tackling Coronavirus (COVID-19), Contribution to a global effort. Africa's Response to COVID-19*.

conceived as stand-alone strategies. Their guiding principles should draw upon the four focus areas of the African Action Plan on Global Geospatial Information Management, also known as “Geospatial Information for Sustainable Development in Africa”.<sup>38</sup> In other words, the governance of and policies stemming from those strategies should be in line with those of the Action Plan and enhance the coordination of geospatial information management at the national, regional economic community, regional and global levels. Moreover, the common framework and tools supporting geospatial response strategies should be based on the principles enshrined in the 2030 Agenda for Sustainable Development and Agenda 2063 of the African Union in order to facilitate the harmonization of standards and norms and promote adoption and adaptation at the national level. It is also crucial that capacity development and knowledge transfer are central to all COVID-19 geospatial response strategies and that those strategies promote international coordination and cooperation so as to address regional and global needs, including, first and foremost, the needs identified by WHO and the Africa Centres for Disease Control and Prevention relating to the provision of timely and accurate health-related geoinformation data.

The following section of the present report focuses on how the geospatial strategies can support implementation of the Africa Joint Continental Strategy for COVID-19 Outbreak. African geospatial response strategies should comprise four building blocks. The first building block consists of mapping African geospatial expertise so that gaps are identified and can be addressed. The second building block consists of using GIS to strengthen African health-care systems through the use of geospatial data infrastructure, including data warehouses. Doing so will ensure that data are collected, disaggregated and stored in formats that are easily usable in real time. That will require governance and institutional collaboration anchored around policies, capacity-building and development. A strategy for sourcing and updating data is central to the success of that process. To ensure the long-term success of that process, a sustainable funding mechanism should be established. In this manner, geospatial response strategies will be in line with the key objective of the Africa Joint Continental Strategy for COVID-19 Outbreak, namely to limit transmission and minimize harm.

## 4.2 The role of geospatial information in combatting COVID-19 in Africa

As stated earlier, Africa suffers from a number of vulnerabilities that put the continent at higher risk than other continents when it comes to the impact of the pandemic. Those vulnerabilities include the high number of refugees and internally displaced persons on the continent. Indeed, according to the Office of the United Nations High Commissioner for Refugees (UNHCR), the number of refugees almost tripled, from 2.3 million to over 6.3 million, between 2008 and 2018. In 2020, there are approximately one million refugees and four million internally displaced persons in Cameroon, the Central African Republic, Mali and Nigeria alone. Mali and Nigeria account for a little over 400,000 refugees and some three million internally displaced persons, while Cameroon and the Central African Republic host over half a million refugees and around 800,000 internally displaced persons.<sup>39</sup> According to another

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<sup>38</sup> ECA, *Geospatial information for sustainable development in Africa: African Action Plan on Global Geospatial Information Management 2016–2030* (2017). Available at: [www.uneca.org/sites/default/files/PublicationFiles/un-ggim\\_-\\_geospatial\\_information\\_for\\_sustainable\\_development\\_in\\_africa-20171115.pdf](http://www.uneca.org/sites/default/files/PublicationFiles/un-ggim_-_geospatial_information_for_sustainable_development_in_africa-20171115.pdf) (accessed on 26 November 2020).

<sup>39</sup> Office of the United Nations High Commissioner for Refugees (UNHCR), *Regional summaries: Africa* (2018). Available at: [reporting.unhcr.org/sites/default/files/gr2018/pdf/03\\_Africa.pdf](http://reporting.unhcr.org/sites/default/files/gr2018/pdf/03_Africa.pdf) (accessed on 26 November 2020); UNHCR, *Regional summaries: West and Central Africa* (2020).

study, between 1960 and 2020, the number of slum dwellers in Africa increased from 53 million to 588 million between 1960 and 2020, and now accounts for some 47 per cent of urban populations on the continent. Seventy-one per cent of slum dwellers are employed in the informal sector and have very limited access to basic sanitation and health-care services.<sup>40</sup>

In the light of the above, it is crucial that African geospatial response strategies to the COVID-19 pandemic focus on curtailing the impact of the pandemic. To date, a number of key measures have been taken both in Africa and globally, to slow the diffusion of the virus, identify infected individuals, isolate and treat those individuals and trace the people they have come into contact with. African countries have, inter alia, imposed travel restrictions, mandated the wearing of personal protective equipment, including masks, encouraged regular handwashing and imposed social distancing measures. There has, however, been limited use of contact tracing in Africa, primarily due to the fact that many Africans enjoy only limited access to the Internet, while smart phone ownership rates and digitization in Africa remain low. Indeed, a recent study found that only 17.8 per cent of Africans had access to the Internet at home, compared with 86.5 per cent of Europeans and 50.9 per cent of residents of countries in Asia and the Pacific. Similarly, only 10.7 per cent of African households owned a computer compared with 76 per cent of households in Europe and 43.4 per cent of households in the Asia and Pacific region.<sup>41</sup> Another study revealed that, while mobile phone ownership in Africa is high, very few individuals own smartphones with the exception of South Africa where 51 per cent of individuals own a smartphone. That situation is likely to change rapidly, however, and, as illustrated in figure IX, the Global System for Mobile Communications Association estimates that more than 600 million African will have a subscription to mobile telephony services by 2025, an increase of 167 million from the 456 million individuals with a subscription in 2018.<sup>42</sup> As shown in figure X, this will result in a penetration rate of 50 per cent, meaning that half of the population of sub-Saharan Africa will have a subscription to a mobile telephony service by 2025. Nigeria and Ethiopia will lead the way in that regard, and are likely to witness penetration rates increase by 19 and 11 per cent, respectively.

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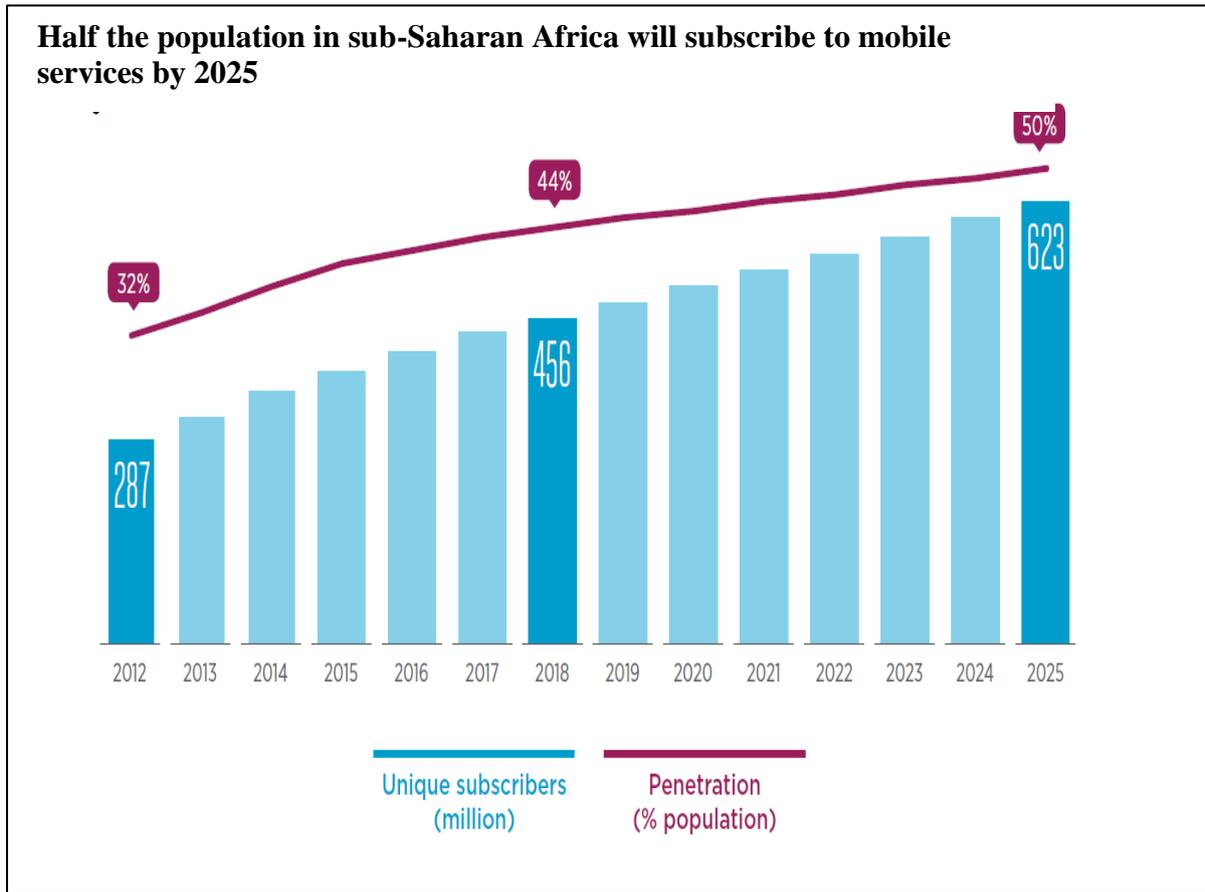
<sup>40</sup> UN-Habitat and others, *COVID-19 in African Cities: impacts, responses and policies*.

<sup>41</sup> CCSA, *How COVID-19 is changing the world: a statistical perspective*.

<sup>42</sup> Global System for Mobile Communications Association, *The Mobile Economy Sub-Saharan Africa* (2019). Available at: [www.gsma.com/subsaharanafrica/resources/the-mobile-economy-sub-saharan-africa-2019](http://www.gsma.com/subsaharanafrica/resources/the-mobile-economy-sub-saharan-africa-2019) (accessed on 25 November 2020).

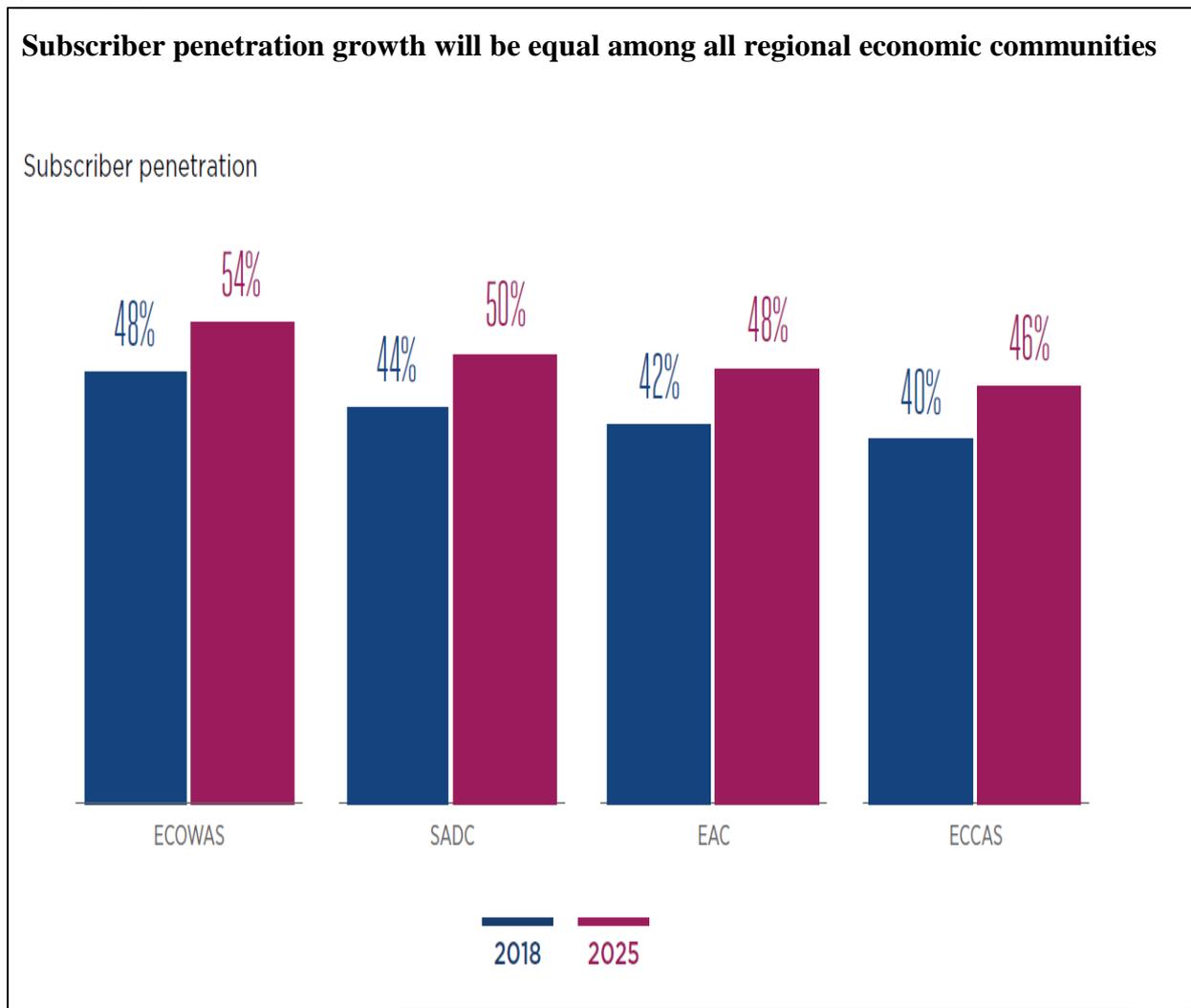
Figure IX

Actual and projected growth in mobile telephony service subscriptions in sub-Saharan Africa, 2012–2025



Source: Global System for Mobile Communications Association, 2019.

Figure X  
**Projected mobile telephony service penetration growth in selected African regional economic communities**



*Abbreviations:* ECOWAS, Economic Community of West African States; SADC, Southern African Development Community; EAC, East African Community; ECCAS, Economic Community of Central African States.

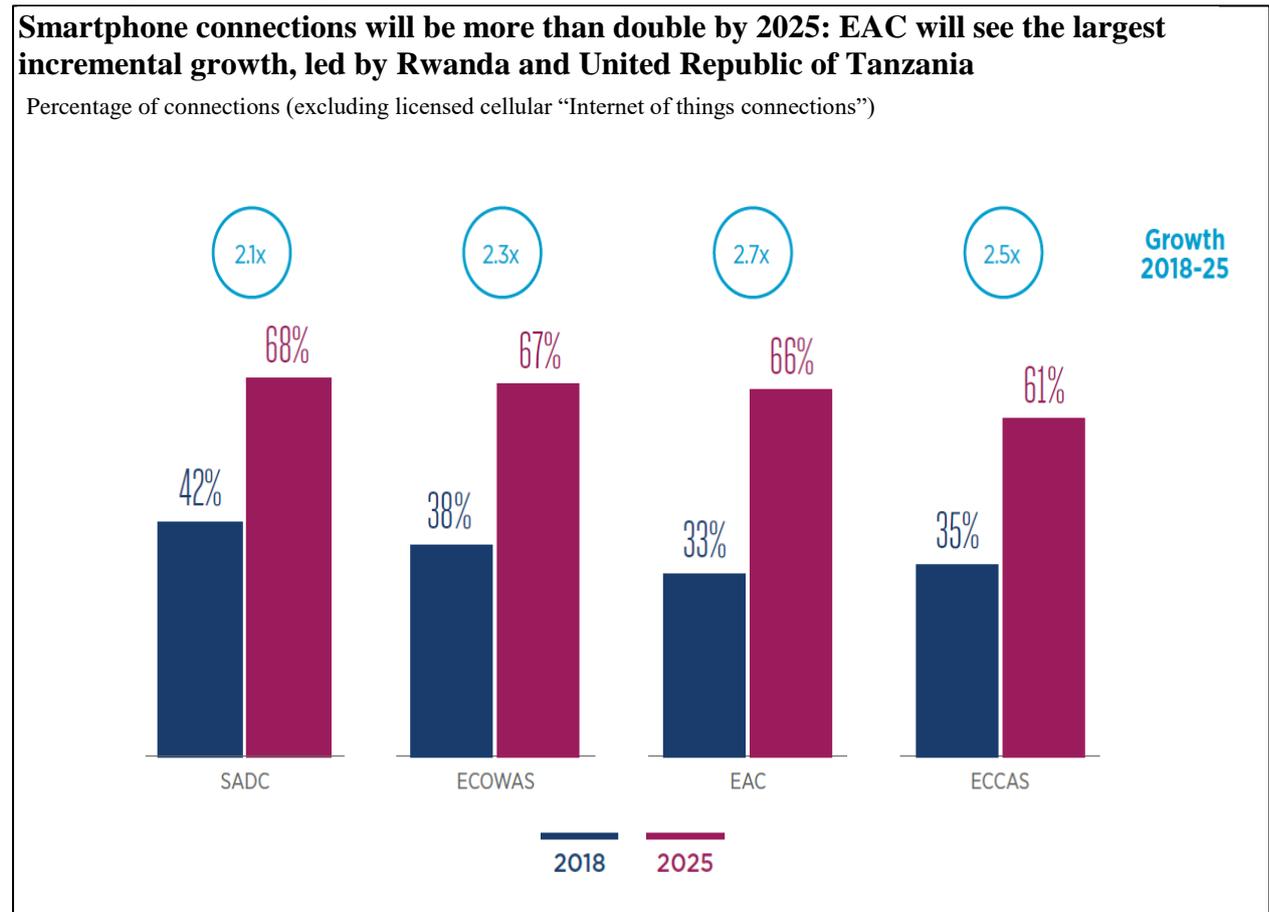
*Source:* Global System for Mobile Communications Association, 2019.

At the regional economic community level, ECOWAS leads the way with a 48 per cent penetration rate, followed by SADC with a penetration rate of 44 per cent, EAC with a 42 per cent penetration rate and ECCAS with a 40 per cent penetration rate. As illustrated in figure XI, all regional economic communities in Africa are expected to contribute to projected growth in mobile telephony service penetration. By and large, growth in mobile telephony service use will be fuelled by the continent’s large population of young people becoming adult consumers and subscribers.<sup>43</sup> Growth in penetration rates will also be fostered by the declining cost of handsets and data, faster data transmission speeds and the increasing use of social media, content-rich mobile phone applications and video content. More importantly, the number of smartphone connections is projected to rise from 302 million in 2018 to some 700 million by 2025 (a 66 per cent increase). As illustrated in figure XI, the most significant growth is predicted to occur in EAC countries, which are likely to

<sup>43</sup> Ibid.

witness a 2.7-fold increase, followed by ECCAS countries, with a 2.5-fold increase, ECOWAS countries, with a 2.3-fold increase and SADC countries, with a 2.1-fold increase. Additionally, mobile data usage is expected to grow four-fold, from 1.6 gigabytes to 7.3 gigabytes per month between 2018 and 2024.<sup>44</sup> As a result, geolocation and spatial movement tracking will be possible throughout the continent within a few years, helping researchers and decision makers understand population movements over time. If those spatial data are combined with data from satellites, health data and socioeconomic data, it will be possible to assess the health outcomes of government interventions, improve pandemic preparedness, better understand mobility patterns and trends and model the impact of pandemics.<sup>45</sup>

Figure XI  
Projected growth in smart phone connections, 2018-2025



Source: Global System for Mobile Communications Association, 2019 and 2020.

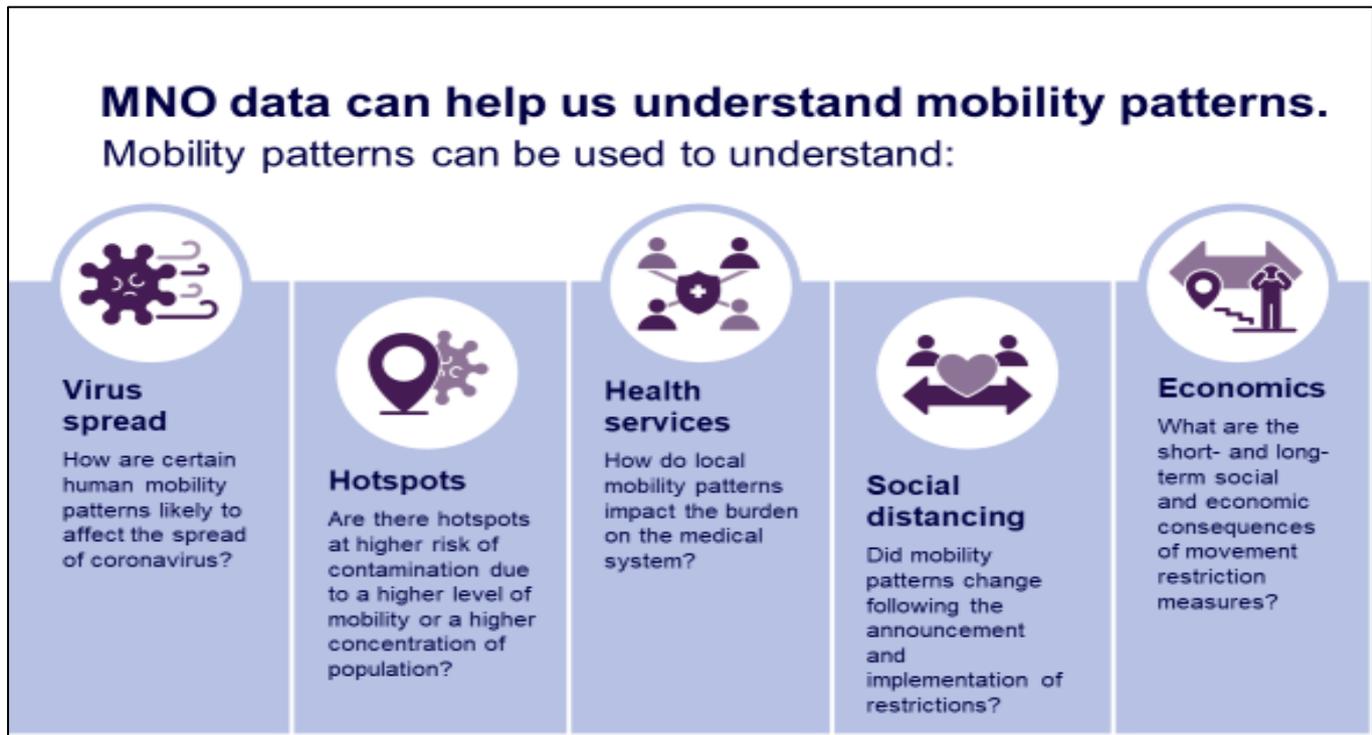
African geospatial responses must take those facts into consideration and work with industry to develop smart applications that use geolocation and spatial movement data. Partnerships with major telecommunications companies will also be necessary so that decision makers can access geospatial data in a timely and affordable manner. This will be useful in the containment process as it allows “proximity tracing”, whereby geolocation and spatial movement data are used to identify persons that have been in the proximity of an individual infected with COVID-19. The process of contact tracing will thus become more efficient and allow persons who have been in touch with a positive case to be more easily identified,

<sup>44</sup> Ibid.

<sup>45</sup> Rachel Sibande, *Using mobile network operator data for COVID-19 response*, (Digital Impact Alliance, 2020). Available at: [digitalimpactalliance.org/using-mobile-network-operator-data-for-covid-19-response/](https://digitalimpactalliance.org/using-mobile-network-operator-data-for-covid-19-response/) (accessed on 26 November 2020)

located, registered, informed of their contact case status and given instructions regarding the actions they should take. The efficient use of geospatial information will also facilitate the identification of symptomatic individuals who might otherwise be missed by traditional contact tracing methods. As illustrated in figure XII, mobility data can provide useful insights into the ways in which COVID-19 is transmitted, help identify infection hotspots resulting from higher than average mobility patterns or population densities, reveal whether restrictions such as social distancing measures are being complied with, and provide insights into the impact of the pandemic on businesses and evolving trends in mobile telephony service usage.

Figure XII  
**Examples of how mobile network operator (MNO) data can be used to combat the spread of COVID-19**



Source: Rachel Sibande, *Using mobile network operator data for COVID-19 response*, (Digital Impact Alliance, 2020).

### 4.3 The building blocks of the geo-spatial response strategies

To be effective, geospatial response strategies to address COVID-19 should be built around (a) mapping the continent’s geospatial expertise and health-care infrastructure; (b) sound data infrastructure and warehouses; (c) robust governance mechanisms; and (d) viable funding mechanisms.

#### 4.3.1 Mapping African geospatial expertise and health-care infrastructure

To our knowledge, no comprehensive study has been carried out to examine geospatial information and expertise on the continent, and there is no comprehensive georeferenced inventory of health-care facilities. With regard to geospatial expertise, ECA has established a number of “geofocus” areas, namely policy development, capacity development, technicalities development, geographical statistics development (GeoStats) and partnership development. In addition to coordinating activities at both the global and African levels, ECA is working with regional entities including ECOWAS, EAC and the Intergovernmental Authority on Development to develop regional space policies and strategies.

At their Twenty-Sixth Ordinary Session, held in Addis Ababa on 31 January 2016, African Union Heads of State and Government adopted the African Space Policy and Strategy as the first of a series of concrete steps towards realizing the African Outer Space Programme and Strategy, one of the flagship programmes established pursuant to Agenda 2063 of the African Union. The African Space Policy and Strategy outline the ambitious high-level goal of mobilizing the continent to develop necessary institutions and capacities to harness the four pillars of space technology, namely earth observation, navigation and positioning, satellite communication and space science and astronomy, with a view to promoting socioeconomic well-being, improving the quality of lives and creating wealth for Africans, in accordance with the objectives set out in Agenda 2063. The African Union Commission then conducted a number of fact-gathering activities. These included: (a) a comprehensive survey of earth observation and geospatial and related technologies in the private sector in Africa; (b) a survey and gap analysis of navigation and positioning, and (c) a baseline study on satellite communication.

While such actions are critical when establishing an appropriate policy landscape at both the continental and regional level and gathering baseline data, fully harnessing the geospatial potential of Africa to enhance African States' capacity to address pandemics will require a fact-based approach starting with the mapping of the relevant expertise and infrastructure at the continental level. That will provide ECA, the African Union Commission and other stakeholders with valuable data on the nature and the geographical distribution of African geospatial expertise.

To facilitate implementation of the Africa Joint Continental Strategy for COVID-19 Outbreak, efforts are needed to map African geospatial health infrastructure. That map should provide details of all health-related infrastructure on the continent, including facilities' geocoordinates, the countries in which they are located, their areas of expertise, their treatment capacity, including their staffing levels and number of beds, and their areas of coverage, (including whether they cover rural or urban areas). Data on health-care infrastructure can be collected from population censuses and surveys but that data must be updated. That map will undoubtedly help governments and other health programme managers in a number of ways. Firstly, it will provide them with key information, including about distribution networks and the location of facilities that can be used to bolster efficiency. Secondly, it will address equity issues as they relate to locating and serving vulnerable groups including refugees, forcibly displaced persons, and people living in inaccessible areas, including slum dwellers and residents of certain rural areas. Thirdly, it may help policy makers understand epidemic trends and more effectively monitor health programmes. Lastly, a geospatial health infrastructure map can help deepen understanding of vulnerabilities in the area of health and better serve vulnerable populations.

A geospatial expertise map, together with a map of geospatial infrastructure are critical prerequisites for the successful leveraging of indigenous African geospatial knowledge with a view to crafting robust geospatial responses to address the COVID-19 pandemic. Those two maps provide the basis for a sound geographic and geospatial information-based decision-making process that is both rational and evidence-based. Indeed, they facilitate the management of health information systems in the areas of testing, protecting, treating and curing individuals during the pandemic. They can, for example, be used to physically track people and assess their risk of exposure to the virus. Consequently, resources can be more efficiently allocated. The pandemic can also be tracked and infection rates forecast as the data they provide can be used to reveal movement patterns among populations and assess the effectiveness of lockdowns and other containment measures. Knowledge of the geolocation of health facilities from the maps will greatly improve the decision-making process by facilitating the management of limited medical personnel and resources. It will also facilitate what are often daunting resource allocation logistics. In Africa, this is critically important in time of major health crises, particularly as

many Africans live in urban slums or in inaccessible rural areas where they cannot effectively apply social distancing measures or are at a higher than average risk of contamination. It is also important to provide disaggregated demographic data in African countries and map that data against those countries' existing health-care facilities.

More importantly, those two maps can significantly improve implementation of the Partnership to Accelerate COVID-19 Testing: Trace, Test and Track and the establishment of regional referral laboratories. Thus, they are an important prerequisite for structured and comprehensive data management mechanisms that provide consistent and comparable data. They will enable ECA to support the African Action Plan on Global Geospatial Information Management, also known as "Geospatial Information for Sustainable Development in Africa", the implementation tool of the United Nations Initiative on Global Geospatial Information Management: Africa.

Naturally, a methodology for collecting geospatial data at the national, subregional and continental levels needs to be developed, tested and validated, possibly through a pilot project in selected subregions. That methodology should be developed with a view to achieving a number of key objectives, including the following:

- (a) Identifying at the continental, subregional and country levels all the stakeholders involved in developing geospatial products, services and applications;
- (b) Developing a framework for the collection of data on those products, services and applications;
- (c) Developing a taxonomy of these services, products and applications to serve as the basis for purposed-oriented comparable and reliable datasets, including health-care-related information and expertise;
- (d) Developing value-chains for geospatial products, services and applications to promote their development and use to serve as a basis for building viable health-related geospatial information management systems;
- (e) Assessing the economic and social impact of the pandemic in Africa.

#### **Expected outputs**

- (a) A framework that can be used to collect data on geospatial expertise and infrastructure in all African countries;
- (b) A reliable database that can be replicated in all African countries to collect data for assessing the economic and social impact of the COVID-19 pandemic in Africa;
- (c) The increased capacity of ECA and other continental and subregional institutions to assess and measure progress in the response to the pandemic;
- (d) A reliable foundation for the collection of purpose-oriented and comparable geospatial datasets at the local, national, subregional and continental levels that can be used to strengthen health-care systems on the continent;
- (e) A reliable basis for the establishment of communities of health sector practitioners and for inter-African collaboration.

#### **4.3.2 Strengthening African health-care systems through the use of geospatial information**

When COVID-19 started spreading globally, a major shared-concern was the inability of Africa to respond effectively to the pandemic. Large number of people were expected to die from the pandemic. Those dire epidemiological predictions were inaccurate. Given the vulnerabilities of the continent's health-care systems, however, namely the low quality and limited availability of health-care services and insufficient

numbers of health-care personnel,<sup>46</sup> it is imperative that African geospatial strategies formulated to address the pandemic include the generation, management and use of geospatial information. Indeed, elsewhere in the world, geospatial technologies, combined with big data technologies and applications, have been effective in combating the COVID-19 pandemic. In Africa, GIS have proven to be an effective tool in combating diseases. For example, it was used to facilitate the coordination of the Ebola response in West Africa in 2014 and 2015,<sup>47</sup> while in the United Republic of Tanzania, district health managers and implementing partners have used GIS to help scale up HIV/AIDS prevention and treatment services.<sup>48</sup> In western Uganda, GIS have been used to identify gaps in obstetric care and prioritize facilities for programme support.<sup>49</sup>

GIS can be used to synthesize and combine many types of data from a wide range of sources and they provide the continent with a unique opportunity to strengthen its weak and under-resourced health-care systems. With the short-term purpose of supporting the implementation of the Africa Joint Continental Strategy for COVID-19 Outbreak and the long-term goal of strengthening the continent's health-care systems, Africa's geospatial response strategies to the COVID-19 pandemic should be designed to achieve the following key objectives:

(a) **The provision of more efficient health-care services.** Enhancing health-care service delivery is possible by using GIS to identify areas of overlapping services and review the adequacy of services provided to populations. Because GIS provide a wealth of data to field specialists, it greatly facilitates spatial analysis and can support faster decision-making.<sup>50</sup> Many health-care systems in Africa are understaffed and under-equipped, and geolocation information regarding health-care facilities can be used to improve the allocation of resources, the development of location-specific programmes, and the planning, monitoring and evaluation of health-care programmes and policies.<sup>51</sup> Communities earmarked for priority intervention may thus be quickly identified and necessary intervention measures put in place. In the ongoing fight against COVID-19, collaboration among specialists from multiple disciplines has become a must and is being facilitated by mapping complementary expertise. The use of GIS has thus promoted the more efficient use of limited resources by facilitating, supporting and bringing together cross-disciplinary working groups to share relevant know-how. In addition, because it provides a map of georeferenced expertise, GIS can be used to identify local partners and others who can engage in the COVID-19 outbreak response, track the spread of the outbreak against that response, and support efforts to coordinate responses. When experts work

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<sup>46</sup> ECA, *COVID-19 in Africa: Protecting Lives and Economies*

<sup>47</sup> Nic Corbett, "From Vaccinations to Vitamins: Ensuring West Africans Get Critical Care Amid Ebola Crisis", United States Agency for International Development (USAID), 18 April 2015. Available at: [blog.usaid.gov/2015/04/from-vaccinations-to-vitamins-ensuring-west-africans-get-critical-care-amid-ebola-crisis/](http://blog.usaid.gov/2015/04/from-vaccinations-to-vitamins-ensuring-west-africans-get-critical-care-amid-ebola-crisis/)

<sup>48</sup> Hally Mahler and others, "Covering the Last Kilometer: Using GIS to Scale-Up Voluntary Medical Male Circumcision Services in Iringa and Njombe Regions, Tanzania", *Global Health Science and Practice* 3(3): 503–515 (September 2015). Available at: [reprolineplus.org/resources/covering-last-kilometer-using-gis-scale-voluntary-medical-male-circumcision-services](http://reprolineplus.org/resources/covering-last-kilometer-using-gis-scale-voluntary-medical-male-circumcision-services) (accessed on 5 January 2021).

<sup>49</sup> Serbanescu, "Saving Mothers Giving Life Initiative: Experiences with Mapping Maternal Deaths Uganda", paper presented at Maternal Mortality Mapping Workshop, Washington, D.C., 2014.

<sup>50</sup> Environmental Systems Research Institute, *GIS for Africa: ESRI Brings International Communities Together* (2002). Available at: [www.esri.com/library/brochures/pdfs/gis-for-africa.pdf](http://www.esri.com/library/brochures/pdfs/gis-for-africa.pdf) (accessed on 26 November 2020).

<sup>51</sup> Marc Cunningham, "Using Geographic Information Systems to Meet Global Health Challenges", SR-15-126, (MEASURE Evaluation and USAID, December 2015). Available at: [www.measureevaluation.org/resources/publications/sr-15-126](http://www.measureevaluation.org/resources/publications/sr-15-126) (accessed on 5 January 2021).

together, they can easily update and share valuable data and information,<sup>52</sup> thereby creating an environment conducive to collaborative preparation, response, and recovery during the COVID-19 pandemic. This is undoubtedly conducive to the creation of an efficient health workforce capable of planning and executing health programmes effectively.

(b) **The reduction of equity gaps in health-care systems.** In Africa, more often than not, slum dwellers and inhabitants of rural areas enjoy limited access to health-care services. GIS systems may help deal with inequities in access to health-care services by identifying those gaps, producing analysis using available geographic data to locate health services and designing policies that can address inequality by ensuring that populations in need can be reached.<sup>53</sup> This helps to communicate geographic patterns of the COVID-19 pandemic to health-care professionals, front-line workers and even to the community at large. By making it possible to communicate with diverse audiences, both within health-care systems and beyond, GIS builds trust into the response system and fosters greater community engagement, a key requisite in the fight against the pandemic in Africa. GIS is therefore an invaluable tool for managing and balancing the supply and demand of medical resources for the benefit of under-served or vulnerable Africans, in addition to serving as an effective outreach mechanism.

(c) **Improved understanding of COVID-19 transmission trends.** Thanks to big data technologies and applications supporting GIS, it is possible to map COVID-19 cases and transmission patterns. The information obtained can then be used to identify areas where mortality or infection rates are high or services are inadequate. Indeed, GIS is a very rich source of information that allows for the rapid visualization of epidemic information, spatial tracking of COVID-19 cases, predictions regarding regional transmission, the identification of spatial risk factors, and the selection of control populations.<sup>54</sup> In Africa, this is critically important as health-care systems are often significantly under-staffed and under-equipped. In fact, one study revealed that, on average, there are only 23 health-care professionals for every 10,000 Africans. The ratio is even lower for 13 extremely vulnerable African countries, where there are fewer than five health-care professionals for every 10,000 citizens. On average, there are 1.8 hospital beds per 1,000 Africans. In addition, Africa has lower ratios of hospital beds and intensive care units than other regions of the world.<sup>55</sup> Building community resilience in Africa is therefore paramount to the success of any efforts to control the spread of COVID-19. That may be achieved by using maps to visualize and monitor how people interact with each other and move, and to monitor whether populations are complying with social distancing and other containment measures. That information may then be used to make decisions to support population needs and promote safety in specific locations, particularly for high-risk populations.

(d) **The more accurate identification of vulnerabilities.** Using GIS, it is possible to synthesize and link data from a range of sources, including household and demographic surveys, health surveys, data provided by health information systems and census data. One may also gather additional information that can be used to improve understanding of how populations and individuals access health-care

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<sup>52</sup> Sheng Gao and others, "Online GIS services for mapping and sharing disease information", *International Journal of Health Geographics* 7(1) (2008). Available at: [orbit.dtu.dk/files/10629294/1476\\_072X\\_7\\_8.pdf](http://orbit.dtu.dk/files/10629294/1476_072X_7_8.pdf) (accessed on 6 January 2021).

<sup>53</sup> Geospatial Commission, *Unlocking the power of location: The UK's Geospatial Strategy, 2020 to 2025* (2020). Available at: [www.gov.uk/government/publications/unlocking-the-power-of-locationthe-uks-geospatial-strategy](http://www.gov.uk/government/publications/unlocking-the-power-of-locationthe-uks-geospatial-strategy) (accessed on 26 November 2020).

<sup>54</sup> Chenghu Zhou and others, "COVID-19: Challenges to GIS with Big Data", in *Geography and Sustainability*, Vol. 1(1) pp. 77–87 (March, 2020). Available at: [www.sciencedirect.com/science/article/pii/S2666683920300092?via%3Dihub](http://www.sciencedirect.com/science/article/pii/S2666683920300092?via%3Dihub) (accessed on 26 November 2020).

<sup>55</sup> UN-Habitat and others, *COVID-19 in African Cities: impacts, responses and policies*.

facilities, including information on the geographic distances they travel, travel times to health service locations, and the modes of transports they use in each area. Such information is not only invaluable when planning optimal travel routes for field workers in identified vulnerable areas, but also when mapping demographic and socioeconomic trends, and identifying emergency financial and health-care needs. Because spatial information from GIS provides information regarding the distribution of health services, growing disparities can be detected and eliminated. Besides, health-care professionals can easily identify challenges and disparities in connection with accessibility to health-care services and take action to prevent the diffusion of COVID-19 and mitigate its impact. Furthermore, “risk maps” can be developed to assess risk, vulnerability and resilience by mapping poverty, under-equipped health-care systems and other key factors in vulnerable areas. It is also possible to develop “vulnerability assessment maps” based on information about household size, access to sanitation and clean drinking water and levels of poverty. Together with population estimates, that information can help health programme designers and managers build resilience, provide contexts for responses, and support work to fight COVID-19 and rebuild countries’ health-care services.<sup>56</sup>

### 4.3.3 Building geospatial infrastructure to respond to COVID-19

Building geospatial infrastructure to respond to the COVID-19 pandemic necessitates the establishment of spatial data infrastructure, the development of health-oriented datasets, the development of spatial models and spatial modelling expertise, and the identification of relevant health-related data.

#### (a) Establishing spatial data infrastructure

African geospatial response strategies to combat the COVID-19 pandemic cannot be effective if they are not based on robust spatial data infrastructure, defined as “the relevant base collection of technologies, policies and institutional arrangements that facilitate the availability of, and access to, spatial data”. Spatial data infrastructure provides ECA and other stakeholders involved in efforts to fight COVID-19 with a legal and institutional framework that promotes the harmonization of data collection standards and ensures interoperability, and also guarantees that those data are made available to users in a timely and affordable manner. Spatial data infrastructure thus plays a critically important role in improving the organization, use and sharing of data and establishes basic conditions for data access and multiple use at all levels during the pandemic.<sup>57</sup> COVID-19 has caught the world community and health organizations off guard, not only because of the speed at which it has spread throughout the world, but also because of the lack of readily available data to accurately assess how it is being transmitted.<sup>58</sup> As a consequence, it has been very

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<sup>56</sup> Yeeun Kim, Young-Ji Byon and Hwasoo Yeo, “Enhancing healthcare accessibility measurements using GIS: A case study in Seoul, Korea”, *PLoS ONE* 13(2): e0193013 (2018). Available at: [journals.plos.org/plosone/article?id=10.1371/journal.pone.0193013](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0193013) (accessed on 6 January 2021); Fatemeh Salehi and Leila Ahmadian, “The application of geographic information systems (GIS) in identifying the priority areas for maternal care and services”. *BMC Health Services Research* (2017) 17:482. Available at: [bmchealthservres.biomedcentral.com/track/pdf/10.1186/s12913-017-2423-9.pdf](https://bmchealthservres.biomedcentral.com/track/pdf/10.1186/s12913-017-2423-9.pdf) (accessed on 6 January 2021).

<sup>57</sup> El-Sayed Ewis Omran, “Spatial data sharing: from theory to practice”, PhD dissertation, Wageningen University & Research, The Netherlands, 2007; ECA, Global Spatial Data Infrastructure Association and EIS-Africa, *SDI Africa: An implementation guide* (2003). Available at: [www.gsdiassociation.org/images/publications/cookbooks/SDI\\_Africa\\_Guide\\_full\\_text.pdf](http://www.gsdiassociation.org/images/publications/cookbooks/SDI_Africa_Guide_full_text.pdf) (accessed on 26 November 2020).

<sup>58</sup> Poliana Moreira de Medeiros Carvalho and others, “The psychiatric impact of the novel coronavirus outbreak”, *Psychiatry Research*, 286: 112902 (April 2020). Available at: [www.ncbi.nlm.nih.gov/pmc/articles/PMC7133679/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7133679/); Gregory Giuliani and others, “Enabling Discovery of African Geospatial Resources” in *South-Eastern European Journal of Earth Observation and Geomatics*, Issue Vol. 4, No. 1S, pp. 1–16 (2015); Boipuso Nkwae and Sue Nichols, “Spatial Data Infrastructures: African Experiences”, paper presented at the FIG XXII International Congress, Washington, D.C. (19–26

difficult to gain sufficient knowledge, both in Africa and beyond, to prevent the COVID-19 pandemic from spiralling out of control. In Africa, efforts to establish spatial data infrastructure should build on ongoing initiatives by ECA and the experience it has gained over many years through projects and initiatives such as the African Regional Spatial Data Infrastructure initiative and the African Geodetic Reference Frame project, and through its partnership building activities at the regional and international levels. Efforts should, moreover, be made to ensure that those efforts are in line with the African Action Plan on Global Geospatial Information Management 2016-2030, the African Space Policy and Strategy and other relevant strategies and initiatives. In establishing viable spatial data infrastructure in Africa, stakeholders should draw on experience gained in the implementation of relevant regional geospatial initiatives, including, the ECOWAS geospatial data infrastructure policy and the ECOWAS cartographic strategy. Insights could also be gained from the experience of the numerous African countries that have striven to establish national data infrastructure.<sup>59</sup>

(b) **Developing health-oriented databases**

The development of health-oriented datasets must be elevated to the same status as other key initiatives, such as the TIGER initiative: water resources management in Africa, or the SERVIR-Africa initiative, formulated with a view to monitoring and forecasting ecological change and responding to natural disasters.<sup>60</sup> Together with maps generated using GIS, those datasets will help health experts and authorities provide governments with critical scientific and technical support so that they can make fact-based decisions to combat the pandemic. They will also help governments reassure the public and improve communication and outreach, which are both of critical importance as governments strive to reduce infection rates. Those datasets can also be used by front-line workers to identify patterns of COVID-19 transmission, design spatial prevention and control techniques, ensure the efficient spatial allocation of resources and construct robust risk assessment models.<sup>61</sup> To ensure that data are used effectively, African health authorities, in collaboration with the Africa Centres for Disease Control and Prevention, WHO, regional economic communities, ECA and the African Union Commission, must give impetus to the development of spatial data infrastructure in Africa and health-oriented datasets while bearing in mind the following critical considerations: firstly, that the quality and quantity of the data infrastructure and architecture are vitally important in data harmonization and storage efforts; secondly, that pathways, dissemination mechanisms and the speed at which information is made available will determine how rapidly fact-based decisions can be made; thirdly, that the development and roll out of end-user tools in the form of platforms and user-friendly applications along with tools for use by front-line interveners that can be used in rapid diagnosis and remote care will ensure the effectiveness of intervention and control measures.<sup>62</sup>

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April 2002). Available at:

[www.fig.net/resources/proceedings/fig\\_proceedings/fig\\_2002/Js10/JS10\\_nkwae\\_nichols\\_fin.pdf](http://www.fig.net/resources/proceedings/fig_proceedings/fig_2002/Js10/JS10_nkwae_nichols_fin.pdf)  
(accessed on 26 November 2020).

<sup>59</sup> ECA and the Global Partnership for Sustainable Development Data, *Data for Now: Building Africa's Resilience to COVID-19*.

<sup>60</sup> Gregory Giuliani and others, "Enabling Discovery of African Geospatial Resources".

<sup>61</sup> Javier Nogueras-Iso and others, "OGC Catalog Services: a key element for the development of Spatial Data Infrastructures" *Computer & Geosciences*, Vol. 31, No. 2, pp. 199–209. (March 2005). Available at: [www.sciencedirect.com/science/article/pii/S0098300404001955](http://www.sciencedirect.com/science/article/pii/S0098300404001955) (accessed on 6 January 2021).

<sup>62</sup> Poliana Moreira de Medeiros Carvalho and others, "The psychiatric impact of the novel coronavirus outbreak"; Collins Mwangi, Galcano Mulaku and David Siriba, "Technology Trends for Spatial Data Infrastructure in Africa", in *Civil Engineering and Architecture* 6(4): pp. 189–204 (2018). Available at: [www.hrpub.org/journals/article\\_info.php?aid=7218](http://www.hrpub.org/journals/article_info.php?aid=7218) (accessed on 26 November 2020).

(c) **Developing spatial models and spatial modelling expertise**

To establish effective spatial data infrastructure that can support the continent's efforts to combat COVID-19, it is crucial to involve data providers, experts in analytics, big data experts and statisticians. These include indigenous African specialists with expertise in modelling and forecasting. Such modelling activities are crucial during a pandemic because it is rarely possible to conduct controlled experiments and clinical trials. Nonetheless, it is crucial to provide decision makers with facts that allow them to make sound decisions, and models provide a science-based tool that can guide decision-making processes.<sup>63</sup> Indeed, spatial modelling activities have proven to be very effective in fighting COVID-19, particularly as they can be applied in cities, specific neighborhoods or particular districts. They may also be used to analyse and forecast COVID-19 infection rates based on mobility among different areas. Regional connectivity, mobility and demographic patterns may also be integrated into spatial models with a view to identifying vulnerable populations.<sup>64</sup> The inherent flexibility of spatial models is another advantage of using them in the fight against COVID-19, particularly in Africa. At the micro level, infection rates and the diffusion of the virus can be predicted simply by taking into consideration individuals' behavior and actions in the analysis, whereas at the macro level, aggregate models using such techniques as the Monte-Carlo simulation may be used to predict COVID-19 transmission patterns at national, regional and even continental levels.

The geospatial response strategies to the pandemic in Africa should explicitly combine available spatial information and statistical data. That will enhance those strategies in a number of ways. Firstly, it will transform statistical data into georeferenced data that can be used in geolocalization services, which are particularly important in efforts to prevent transmission of the virus. Second, by mapping statistical data about COVID-19 and using visualization tools, geospatial information can enhance and expand statistical information as a fact-based decision-making tool by providing clear and concise overviews of the pandemic. Thirdly, it will facilitate collaboration among national statistical agencies and national mapping agencies by harmonizing data collection and storage standards, thereby enhancing data interoperability and facilitating the development of purpose-oriented datasets, including health-oriented databases. Fourthly, it will facilitate efforts by ECA to support member States in the development of their national spatial data infrastructure and national statistical spatial frameworks and support the development of African regional spatial data infrastructure and the continent's regional statistical spatial framework.<sup>65</sup> Finally, by combining geospatial and statistics data, geospatial response strategies may, in the long term, help Africa implement the 2030 Agenda for Sustainable Development and Agenda 2063 of the African Union.<sup>66</sup>

(d) **Sourcing data**

In under-resourced and under-equipped health-care systems, like many in Africa, during any pandemic, data are key to the response process. In combating the pandemic, it has become clear how important data are for tracking and stopping the

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<sup>63</sup> Alessandro Vespignani and others, *Modelling COVID-19*. Nature Reviews Physics, Vol. 2, (May 2020).

<sup>64</sup> Chenghu Zhou and others, "COVID-19: Challenges to GIS with Big Data".

<sup>65</sup> ECA, *Geospatial information for sustainable development in Africa: African Action Plan on Global Geospatial Information Management 2016–2030*; ECA, *Determination of Fundamental Datasets for Africa: Geoinformation in Socio-Economic Development* (2007). Available at: [www.uneca.org/sites/default/files/PublicationFiles/geoinformation\\_socio\\_economic\\_dev-en.pdf](http://www.uneca.org/sites/default/files/PublicationFiles/geoinformation_socio_economic_dev-en.pdf) (accessed on 26 November 2020).

<sup>66</sup> ECA and Global Partnership for Sustainable Development Data, *Data for Now: Building Africa's Resilience to COVID-19* (April 2020); ECA, *Geospatial information for sustainable development in Africa: African Action Plan on Global Geospatial Information Management 2016–2030*.

spread of COVID-19. Not only do they serve as input for spatial models that guide decision-making processes, they can also be used to monitor the effectiveness of government interventions.<sup>67</sup> Every data point provides critical information. Georeferenced data provide location information. Epidemiological data provide information about specific characteristics of the pandemic, including modes and rates of transmission and mortality rates. Socioeconomic data provide information about socioeconomic conditions, including poverty, household characteristics and income. Mobility data provide insights into populations' compliance with control measures, such as movement and travel restrictions and social distancing mandates. When all those data points are combined into GIS databases and analysed, they provide critical insights into ways to combat the pandemic. The quality of data is therefore of critical importance. Indeed, realistic models require accurate data while making accurate assessments and evaluating the effectiveness of government control measures and policies during the COVID-19 pandemic requires accurate data in a wide range of fields.<sup>68</sup>

The availability of and easy access to data are equally important, particularly in Africa. Indeed, as pandemics and other health crises become more frequent as a result of globalization and the international movement of people, the collective vulnerability of humanity is almost certain to increase. Public health authorities and other decision-making bodies without easy access to robust and accurate data will undoubtedly lack the means to prepare and combat COVID-19 effectively, as they will not have the insights needed to implement appropriate control measures, nor will they have the capacity to coordinate their actions with other relevant stakeholders.<sup>69</sup>

The harmonization of data to ensure interoperability is key in building African health-oriented datasets to support the strategies for a spatial response to COVID-19. This is because many data providers and sources will need to take part in activities to collect necessary data, which include official statistics generated by national statistics offices and other government agencies, government health system data, satellite imagery, mobile phone data and data from ordinary citizens using open-data platforms and social media. As illustrated in figure XIII, data will need to be collected in four key areas, namely population, virus tracking and forecasting, health infrastructure, and economic impacts. To ensure that resources are allocated appropriately, data from the population should include location information and information regarding levels of vulnerability. Virus tracking and forecasting data can provide insights into control measures, contact tracing, testing and diagnosis. Health infrastructure data should include information on the location and capacity of health-care facilities and on the challenges impeding access to those facilities. Economic data should include data on business closures, disruptions in trade and other economic activities.<sup>70</sup> Such data are likely to be collected in different formats using different standards, thereby limiting their interoperability and their usefulness in efforts to combat the pandemic. It is therefore of paramount importance that data are harmonized in accordance with the global standards and norms identified by ECA.

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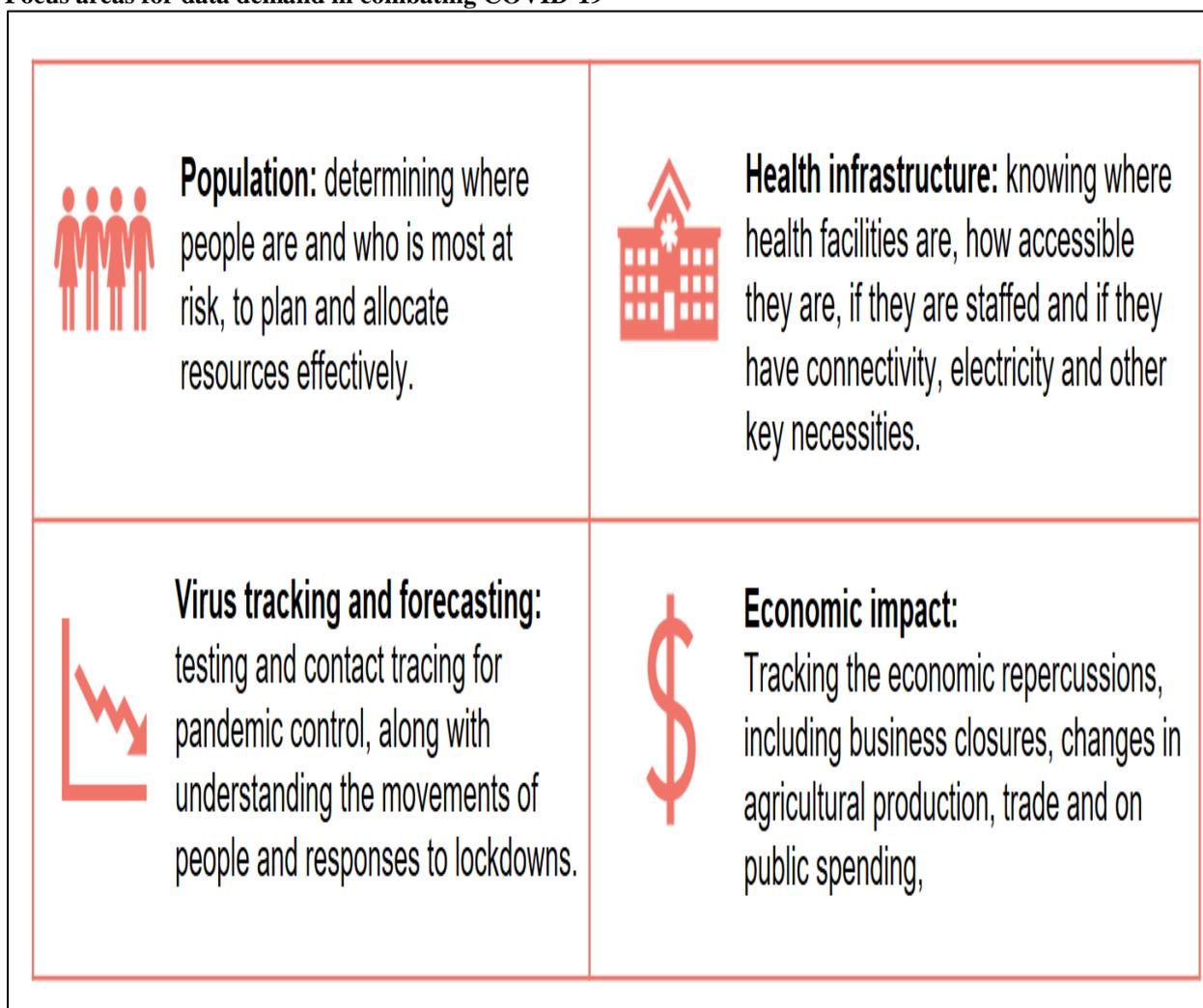
<sup>67</sup> Alessandro Vespignani and others, *Modelling COVID-19*.

<sup>68</sup> *Ibid.*

<sup>69</sup> Poliana Moreira de Medeiros Carvalho and others, "The psychiatric impact of the novel coronavirus outbreak".

<sup>70</sup> ECA and the Global Partnership for Sustainable Development Data, *Data for Now: Building Africa's Resilience to COVID-19*.

Figure XIII  
**Focus areas for data demand in combating COVID-19**



Source: ECA and the Global Partnership for Sustainable Development Data, *Data for Now: Building Africa's Resilience to COVID-19* (April 2020).

#### 4.3.4 Governance of the Strategy

To be successful, geospatial strategies to combat the COVID-19 pandemic should be formulated around a clear vision of governance during health crises. In the following section, the present report focuses on the need for strong leadership from ECA and the privacy concerns that stem from the collection of sensitive data from individuals.

##### (a) **The importance of strong leadership by ECA**

From a governance perspective, African strategies for a geospatial response to the COVID-19 pandemic should not be designed as one-time-one-occasion tools to deal with this specific pandemic alone. Nor should they be conceived as stand-alone toolkits that have little in common with other actions being undertaken to enhance the management of geospatial information at the national, subregional and continental levels. Instead, those strategies should serve in the short term to control the pandemic and mitigate its impact while, in the long term, they should provide a blueprint on how countries should combat pandemics. African strategies for a geospatial response to the COVID-19 pandemic should therefore be designed and implemented as an integral part of efforts to implement the African Action Plan on Global Geospatial Information Management 2016-2030. In that respect, they should adhere fully to the vision articulated in the Action Plan, namely to advance the sustainable development

agenda of Africa through sound geospatial information management and to ensure that Africa produces and uses authoritative and evidence-based geospatial information for the attainment of the Sustainable Development Goals and the objectives of Agenda 2063 of the African Union. As is the case with the African Action Plan on Global Geospatial Information Management, ECA should oversee implementation of African strategies for a geospatial response to the COVID-19 pandemic. Leadership by ECA will have a number of advantages. It will, for example, help avoid pitfalls such as duplication of efforts and the resulting waste of resources, it will promote coordination with a wide range of stakeholders and encourage the use of common tools and standards, and it will ensure the interoperability of datasets and database accessibility. Indeed, insofar as much available information and data are currently not managed in ways that make them accessible or useful to decision makers, there are major challenges in building health-oriented datasets. Such challenges impede the sharing of health data and efforts to understand and respond to the COVID-19 pandemic.<sup>71</sup> Indeed, geospatial data are fragmented across multiple systems and databases, and linkages are often lacking.<sup>72</sup> This undermines efforts to update data, ensure their accuracy, and to use them in practical ways.

ECA leadership is also likely to accelerate the implementation of geospatial strategies, because the Commission will be able to draw on its long experience in leading related continental initiatives, including Digital Earth Africa and the African Geodetic Reference Frame. ECA will promote the cooperative management of geospatial information on the basis of common regional standards, frameworks and tools.<sup>73</sup> This will undoubtedly ensure collaboration with national mapping agencies and national statistical offices. Collaboration and coordination with the Africa Centres for Disease Control and Prevention and its representatives at the level of the regional economic communities will also be facilitated thanks to ongoing partnerships between ECA and the regional economic communities. In turn, this will not only stimulate collaboration with WHO at the global level, but will also help identify health data needs and gaps, and facilitate the formulation of rules and standards related to data collection and storage. ECA leadership will also ensure that georesponse strategies are in line with and linked to the Sustainable Development Goals and will support efforts to achieve the goals of the African Action Plan on Global Geospatial Information Management and Agenda 2063 of the African Union.

(b) **Privacy issues in the fight against the COVID-19 pandemic**

Efforts to combat COVID-19 have necessitated close cooperation and collaboration among governments, public health providers and technology developers. Considerable effort has been made to develop and roll out smartphone contact tracing apps. It is estimated that more than 50 countries around the world are using those apps, of which there are now more than 100.<sup>74</sup> Contact tracing apps are extremely useful for health authorities, individuals and other stakeholders. Firstly, they can provide accurate information to individuals regarding the pandemic, offer self-assessment questionnaires and provide guidance on actions that should be taken by individuals who test positive for COVID-19. Some provide platforms for patients and health-care specialists to communicate with each other. For health authorities,

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<sup>71</sup> Sheng Gao and others, “Online GIS services for mapping and sharing disease information”.

<sup>72</sup> El-Sayed Ewis Omran, “Spatial data sharing: from theory to practice”.

<sup>73</sup> ECA, *Policy Brief: Financing clean and digital technology firms alongside sustainable infrastructure in Africa* (2019). Available at: [repository.uneca.org/ds2/stream/?#/documents/08fcc411-7077-5d20-b4ae-8c029a576606/page/1](https://repository.uneca.org/ds2/stream/?#/documents/08fcc411-7077-5d20-b4ae-8c029a576606/page/1) (accessed on 26 November 2020).

<sup>74</sup> Roxanna Ologeanu-Taddei, “Privacy, perceptions and effectiveness: the challenges of developing coronavirus contact-tracing apps”, *The Conversation*, 21 July 2020. Available at: [theconversation.com/privacy-perceptions-and-effectiveness-the-challenges-of-developing-coronavirus-contact-tracing-apps-143118](https://theconversation.com/privacy-perceptions-and-effectiveness-the-challenges-of-developing-coronavirus-contact-tracing-apps-143118)

they can help identify risk areas and help health-care professionals plan the distribution of public health resources.

According to the European Commission, there are two main types of COVID-19 apps, namely, Bluetooth-based apps and geolocation-based apps. The former use Bluetooth to alert people who have been in the proximity of an infected person for a certain time, including those that the alerted individual may not notice or remember. Alerts can be sent out without tracking the user's location. Those apps may be used in conjunction with other measures to limit the spread of COVID-19, including questionnaires. They are more accurate and are less likely to give rise to concerns regarding the privacy of app users. In contrast, geolocation based apps collect real time data on the precise location and movements of people, together with information about their health. Those apps are now giving rise to significant privacy concerns.<sup>75</sup>

Regardless of whether they are Bluetooth- or geolocation-based, contact tracing apps rely on location data provided by individuals. Three main types of data are collected, namely general data on population movements, data on the proximity of app users to individuals who have tested positive for COVID-19, and data from patients that can be used in statistical analysis.<sup>76</sup> Those data are extremely sensitive as they may reveal individuals' health conditions, the types and locations of activities that they may be involved in, where they live, who they visit or come into contact with and a wide range of other details. It is therefore imperative to protect those data and prevent them from being shared indiscriminately. Adding to the complexity of that issue is the fact that those data need to be georeferenced if they are to be useful in combating the pandemic. Georeferenced data provide insights into the effectiveness of, and compliance with, control measures and can be used to identify the location of vulnerable population clusters. Apart from asking who should be given access to that data, how it will be used and what will be done with that data once the pandemic is over, the designers of African geospatial responses must also ask themselves how lifesaving data can be collected while also safeguarding individuals' privacy.

While contact tracing has not been widely used in Africa to combat the spread of COVID-19 because of low digital connectivity rates and low rates of smartphone ownership, it is important that African geospatial response strategies include provisions on the protection of citizens' privacy. As mentioned earlier, GIS has proven to be extremely effective in numerous health crises in Africa, including in efforts to combat Ebola and HIV/AIDS.<sup>77</sup> GIS will undoubtedly continue to be extremely useful in the future as States battle other pandemics. Furthermore, digitization and smartphone ownership rates are expected to increase sharply as the number of African "digital natives" increases.<sup>78</sup> Consequently, the use of contact tracing apps in Africa, whether in the fight against COVID-19 or in future health crises, cannot be overlooked. However, experience outside Africa has shown that, without adequate legal protections and privacy safeguards, contact tracing apps can cause significant harm to citizens by violating their privacy. In extreme cases, they

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<sup>75</sup> European Union Commission eHealth Network, *Mobile applications to support contact tracing in the EU's fight against COVID-19: Common EU Toolbox for Member States*. (2020). Available at: [ec.europa.eu/health/sites/health/files/ehealth/docs/covid-19\\_apps\\_en.pdf](https://ec.europa.eu/health/sites/health/files/ehealth/docs/covid-19_apps_en.pdf) (accessed on 26 November 2020).

<sup>76</sup> David Grout, Richard Weaver and John Doyle, "The Security and Privacy Implications of COVID-19 Location Data Apps" in *FireEye Blogs* (May 2020). Available at: [www.fireeye.com/blog/executive-perspective/2020/05/security-privacy-implications-of-covid-19-location-data-apps.html](http://www.fireeye.com/blog/executive-perspective/2020/05/security-privacy-implications-of-covid-19-location-data-apps.html)

<sup>77</sup> Marc Cunningham, Yohana Mapala and Jackie Patrick, "Using Geospatial Analysis to Improve Resource Allocation for HIV Programs in Iringa Region, Tanzania", SR-14-107, (MEASURE Evaluation, August 2014). Available at: [www.measureevaluation.org/resources/publications/sr-14-107](http://www.measureevaluation.org/resources/publications/sr-14-107) (accessed on 6 January 2021).

<sup>78</sup> Global System for Mobile Communications Association, *The Mobile Economy Sub-Saharan Africa*.

may even facilitate efforts by authoritarian governments to violate the human rights of their citizens and harm marginalized populations.<sup>79</sup> To protect citizens, African geospatial strategies should be formulated pursuant to the proposed legal and policy framework for geospatial information utilization in Africa, which will prescribe the principles, rules and considerations to follow in developing a national legal and policy framework for geospatial information use. African geospatial strategies could also be based on successful strategies adopted by countries outside Africa, which provide, inter alia, for the collection of anonymized and aggregate data with a view to preventing the identification of individual data providers, rules governing the collection, use and storage of data collected and the maximum period that data can be retained, the use of decentralized storage mechanisms with a view to impeding unauthorized access to personal information about data providers, and the use of open source software that allows outside experts to assess data security.<sup>80</sup> Such actions should be taken in tandem with outreach initiatives to promote transparency and trust. In that respect, it is important to establish a clear communication framework that ensures that information communicated is accurate and accessible and is made available in a timely manner. That information should be used to inform public debate and foster interactions among all relevant stakeholders. As for app developers, clear guidance is also in order. In that regard, the relevant guidelines developed by the European Union, the key features of which are explained in figure XIV below, could also inform the work of those implementing African COVID-19 geospatial response strategies.

Figure XIV

**Key features of the common European Union toolkit for member States to guide the development and use of mobile applications in support of contact tracing**

- National health authorities should approve apps and be accountable for compliance with European Union personal data protection rules;
- Users should remain in full control of their personal data;
- App installation should be voluntary and apps should be discontinued as soon as they are no longer needed;
- Limits should be placed on the use of personal data: only data relevant to the purpose in question should be used;
- Strict limits on data storage should be set: personal data should be kept for no longer than necessary;
- Security of data: data should be stored on an individual’s personal device and encrypted;
- Interoperability: apps should be usable across all European Union member States;
- National data protection authorities should be fully consulted and involved in the process to develop and use apps.

Source: European Union Commission, eHealth Network, 2020. *Mobile applications to support contact tracing in the EU’s fight against COVID-19: Common EU Toolbox for Member States.*

<sup>79</sup> Aída Ponce Del Castillo, “Covid-19 contact-tracing apps: how to prevent privacy from becoming the next victim” in *Policy Brief - European Economic, Employment and Social Policy No. 5/2020* (European Trade Union Institute May 2020). Available at: [lsts.research.vub.be/en/contact-tracing-apps](https://lsts.research.vub.be/en/contact-tracing-apps) (accessed on 26 November 2020).

<sup>80</sup> European Union Commission eHealth Network, *Mobile applications to support contact tracing in the EU’s fight against COVID-19: Common EU Toolbox for Member States.*

## 5. Funding geospatial response strategies

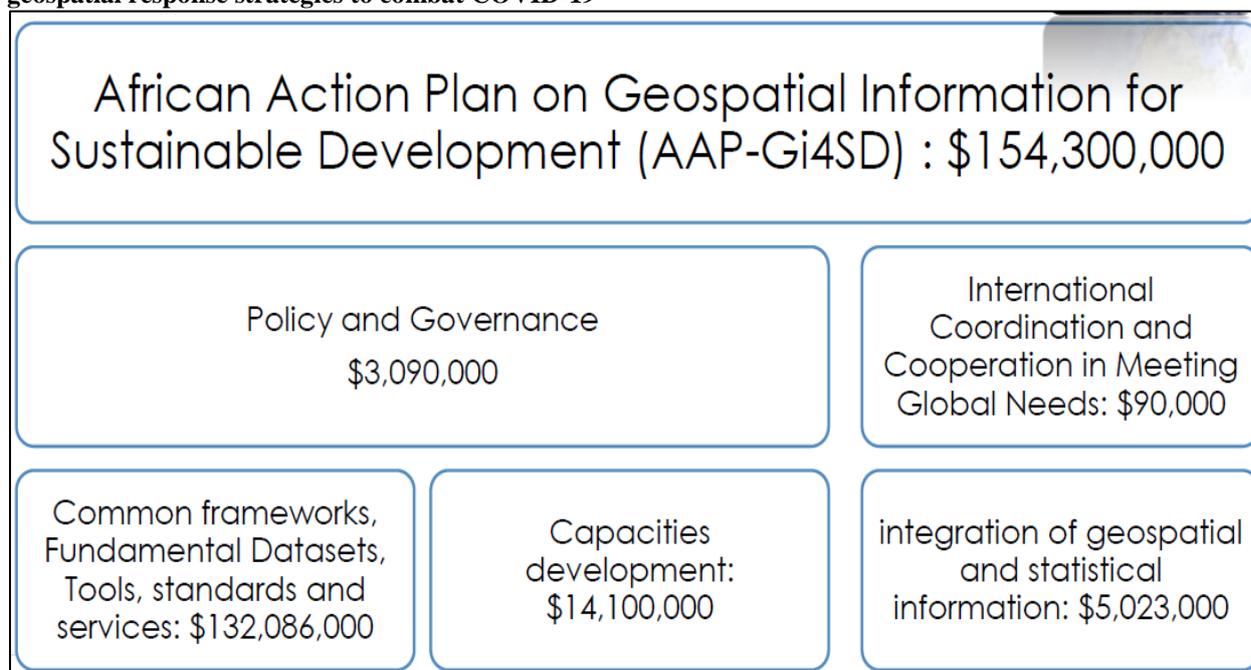
Geospatial response strategies should be funded, primarily, with financial resources allocated under the African Action Plan on Global Geospatial Information Management 2016–2030. Long-term financial support from AfDB will also be required.

### 5.1 Funding geospatial responses through the African Action Plan on Global Geospatial Information Management 2016–2030

The long-term viability of geospatial strategies is dependent on the establishment of robust funding mechanisms. As stated earlier, geospatial response strategies to the COVID-19 pandemic should be considered an integral part of the African Action Plan on Global Geospatial Information Management 2016–2030, also known as “Geospatial Information for Sustainable Development in Africa”. As illustrated in figure XV, total funding earmarked under the Action Plan is more than \$154 million. Key components of geospatial response strategies, including mapping geospatial expertise and establishing health-oriented datasets, fall under “Common frameworks, fundamental datasets, tools, standards and services” the largest source of funding under the Action Plan, while strengthening geospatial modeling capacity falls under “Capacity development.” Using this funding scheme has the advantage of speeding up the implementation of geospatial strategies and ensuring their full integration into ongoing initiatives, including initiatives to establish regional spatial data infrastructure and national statistical spatial frameworks. It will also facilitate efforts by ECA, in its capacity as the lead organization in the implementation of geospatial strategies, to leverage its numerous partnerships in Africa and beyond in support of those strategies and to access additional funds, if necessary.

Figure XV

**Leveraging the African Action Plan on Global Geospatial Information Management in support of geospatial response strategies to combat COVID-19**



Source: André Nonguierma. “Holistic geospatial information for Africa” (Presentation given on Digital Earth Day, Nairobi, 12 August 2019).

## 5.2 Long-term African Development Bank funding

While using funding under the Action Plan is critical in the short and medium term, in the long term, geospatial response strategies for combatting the COVID-19 pandemic in Africa should guide efforts to address future health crises and pandemics. It is therefore crucial to ensure the sustainability of funding for geospatial response strategies in Africa and the ongoing mobilization of resources that will allow stakeholders to sustain those strategies and their related products and services. In that regard, the financial support of African governments, international financing institutions and donor countries is likely to be extremely important.<sup>81</sup> Geospatial response strategies should, however, be funded, primarily by Africans so as to ensure the true sustainability of those strategies and their control by Africans. In that regard, AfDB with its triple-AAA rating in international financial markets could mobilize long-term financial support for African geospatial response strategies. In that connection, the Bank recently issued a \$3 billion Fight COVID-19 social bond, the largest ever of its kind made available on international financial markets and has launched the \$10 billion AfDB COVID-19 Response Facility to help African Governments combat the pandemic.

## 6. Challenges that could impede the successful implementation of geospatial response strategies

A number of challenges could impede the successful implementation of geospatial response strategies. Those challenges, together with proposed solutions, are outlined in table 4.

Table 4

**Challenges that could impede the successful implementation of geospatial response strategies for combating the COVID-19 pandemic and potential solutions**

Potential challenge	Proposed solutions
Reluctance of stakeholders to agree to ECA leadership	<ul style="list-style-type: none"> <li>(a) Ensure that geospatial response strategies are in line with the legal framework established for the African Action Plan on Global Geospatial Information Management 2016–2030;</li> <li>(b) Emphasize ECA experience in leading other continental initiatives.</li> </ul>
Difficulties in mapping African geospatial expertise	<ul style="list-style-type: none"> <li>(a) Use resources made available under UN-GGIM to launch data collection initiatives;</li> <li>(b) Use information made available by national mapping agencies.</li> </ul>
Difficulties in compiling health-oriented datasets	<ul style="list-style-type: none"> <li>(a) Obtain user data from national telecom companies in accordance with relevant legal frameworks;</li> <li>(b) Work with industry and telecom companies to create user-friendly platforms for mobile users that provide geolocalization data;</li> <li>(c) Use social media to conduct outreach campaigns, primarily among, young “digital natives”;</li> <li>(d) Work with telecom companies to provide incentives to individuals providing data, such as offers of automatic internet access passes;</li> <li>(e) Work in close collaboration with national health authorities.</li> </ul>
Limited internet connectivity and poor connection quality	<ul style="list-style-type: none"> <li>(a) Encourage collaboration between the geospatial community and the statistical community with a view to integrating statistical and geospatial</li> </ul>

<sup>81</sup> United Nations, *Policy Brief: Impact of COVID-19 in Africa* (20 May 2020). Available at: [in.one.un.org/wp-content/uploads/2020/06/sg\\_policy\\_brief\\_on\\_covid-19\\_impact\\_on\\_africa\\_may\\_2020.pdf](https://in.one.un.org/wp-content/uploads/2020/06/sg_policy_brief_on_covid-19_impact_on_africa_may_2020.pdf) (accessed on 6 January 2021).

	<p>information made available by regional spatial data infrastructure initiatives and national statistical spatial frameworks;</p> <p>(b) Make extensive use of satellite imaging and collaborate closely with satellite data producers.</p>
Insufficient financial resources made available to fund geospatial response strategies	<p>(a) Make use of resources made available under UN-GGIM, bearing in mind that geospatial response strategies will facilitate implementation of the African Action Plan on Global Geospatial Information Management;</p> <p>(b) Appeal to African countries to provide relevant health-data;</p> <p>(c) Appeal to countries to contribute a percentage of the resources allocated to their national geospatial mapping agencies to a continental geospatial response fund;</p> <p>(d) Incentivize private-sector stakeholders to address financing gaps.</p>
Lack of indigenous modeling expertise	<p>(a) Work with academic institutions with expertise in geoinformation with a view to developing geospatial curricula;</p> <p>(b) Work with the Pan African University to establish geospatial training programmes</p>

## 7. Concluding remarks

From an epidemiological perspective, Africa has fared better than other global regions during the COVID-19 pandemic and accounts for only 4 per cent of all positive COVID-19 cases and 2 per cent of reported COVID-19-related deaths. Nevertheless, Africa suffers from a number of vulnerabilities and weaknesses that puts the continent at high risk when it comes to the impact of the pandemic. Those weaknesses include: (a) the fragility of the continent’s health-care systems, which are often under-staffed and under-equipped; (b) the high percentage of Africans who live in vulnerable situations, including slums dwellers, individuals living in remote rural inhabitants and forcibly displaced persons; (c) weak production systems; (d) the continent’s dependence of trade with countries that have been severely affected by the pandemic, including European Union countries, China and the United States of America; and (e) the fact that up to 94 per cent of the continent’s pharmaceutical requirements are met through imports. Those vulnerabilities are expected to exacerbate the contraction in African economies, with African GDP expected to contract by between 1.7 and 3.4 per cent in 2020.

African countries’ response to the pandemic has not been very different from the response of other global regions. Travel restrictions and social distancing measures have been implemented while borders and businesses have been closed. African countries have also mandated the wearing of personal protective equipment, including masks and encouraged regular handwashing.

While national financial support to combat the pandemic should not be overlooked, AfDB has been the financial backbone of the continental response strategy and has launched the \$10 billion COVID-19 Response Facility to support efforts to combat the pandemic at the national, subregional and regional levels. The Bank has also issued the \$3 billion Fight COVID-19 social bond, the largest ever of its kind made available on international financial markets

Unlike in other global regions, GIS-based contact tracing has not been a popular containment measure in Africa, inter alia because of the high cost and poor quality of internet access and because smartphone ownership rates and digitization in Africa remain low. Several countries in Africa have, however, made an effort to harness the power of geospatial technology and are developing national dashboards with which they will be able to track and monitor the COVID-19 pandemic in real time. Those efforts are very encouraging and need to be further strengthened through an articulated strategy at both national and local levels.

Robust African geospatial response strategies to address the COVID-19 pandemic are therefore needed. Key considerations in the development of those strategies are as follows:

(a) They should be part of and support the implementation of the Africa Joint Continental Strategy for COVID-19 Outbreak. In that respect, they should support the achievement to the main goal of the Strategy, namely to “limit transmission and minimize harm”;

(b) Their guiding principles should draw upon the four focus areas of the African Action Plan on Global Geospatial Information Management 2016–2030, also known as “Geospatial Information for Sustainable Development in Africa”;

(c) The common framework and tools supporting geospatial response strategies should be based on the principles enshrined in the 2030 Agenda for Sustainable Development and Agenda 2063 of the African Union to facilitate the harmonization of standards and norms, and promote adoption and adaptation at the national level;

(d) Capacity development and knowledge transfer should be central to all geospatial response strategies. Specifically, expertise in geospatial modelling, which will allow for the effective application of statistical analysis techniques, and the use of geospatial data visualisation and mapping tools must be made focus areas;

(e) They should promote international coordination and cooperation so as to address regional and global needs, including, first and foremost, the needs identified by WHO and the Africa Centres for Disease Control and Prevention relating to the provision of timely and accurate health-related geoinformation data.

African geospatial response strategies should comprise four building blocks. The first building block consists of mapping African geospatial expertise with a view to providing fact-based decision tools to health-care authorities, governments and front-line workers. The second building block consists of using GIS to strengthen African health-care systems through the use of geospatial data infrastructure, including data warehouses. The third building block consists of building geospatial infrastructure to support the implementation of geospatial responses. The fourth building block consists of efforts to improve response strategy oversight and will require leadership to be exercised by ECA and the protection of individuals’ privacy. ECA leadership will have a number of advantages. It will avoid such pitfalls as the duplication of efforts and the inefficient use of resources, enhance coordination with stakeholders, promote the use of common tools and standards and ensure the interoperability and accessibility of datasets. To protect African citizens from violations of their privacy, geospatial strategies should be firmly anchored in a robust legal and policy framework for geospatial information utilization in Africa.

African stakeholders should also endeavour to draw on global best practices and relevant instruments that have been developed by States outside Africa, including the common European Union toolkit, which was formulated to guide the development and use of mobile applications in support of contact tracing.

Geospatial response strategies should be funded, primarily with financial resources allocated under the African Action Plan on Global Geospatial Information Management. Furthermore, AfDB, with its triple-AAA rating in international financial markets, could mobilize long-term financial support for African geospatial response strategies.

A number of challenges could impede the successful implementation of geospatial response strategies: stakeholders could be reluctant to agree to ECA leadership, difficulties may be encountered in mapping African geospatial expertise and infrastructure, internet connectivity in Africa is often limited, only limited financial resources may be available to formulate and implement geospatial response strategies, and there is a significant deficit in indigenous modelling expertise in Africa. Solutions have been identified to all those challenges, however, and they are

unlikely to prevent the formulation and roll out of successful geospatial response strategies that can help African countries combat the COVID-19 pandemic.

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