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Insights From Africa's Covid-19 Response: Tech Innovations

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Contents

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Summary

As governments around the world try to harness the power of technology to improve pandemic response, a number of African countries are emerging as leaders in the Covid-19 tech revolution. Cross-sector partnerships are facilitating the rapid development of innovative tech-enabled solutions that are making a difference in governments' abilities to contain the pandemic, from informing evidence-based policy to protecting indispensable frontline workers and enhancing public-service delivery. These tech innovations have profound implications for the continent beyond the global pandemic.

Technology and the Pandemic Response in Africa

When it comes to employing technology in the fight against Covid-19, a number of African countries are leading the way. Governments in crisis-response mode are converging with emerging innovation hubs across the continent to develop potent technology-based solutions for controlling the spread of the virus. According to a WHO Africa study, 12.8 per cent of technologies developed globally in response to the pandemic are in Africa.

The multiplicity of tech-enabled solutions in the region is in part motivated by the need to close gaps in existing health-system infrastructure. Many countries on the continent have recent experiences responding to public-health emergencies. Hard lessons have been learned from the decades-long HIV/AIDS epidemic, the Ebola virus outbreak in West Africa between 2014 and 2016 and in the Democratic Republic of the Congo since 2018, and the ongoing battle to eliminate malaria, among other health crises. These lessons have contributed to improvements in health-system resilience. Yet, they have also exposed enduring weaknesses that continue to negatively impact morbidity and mortality on the continent, in turn holding back economic growth. The tech sector has been evolving rapidly to address these challenges, leading the WHO to point out that the sub-Saharan African region has the most economies punching above their weight on tech-driven Covid-19 responses relative to level of development. [1]

Governments are teaming up with private firms and non-profits to modify existing technology or develop entirely new tools in order to better inform policy, support frontline workers and protect populations. Of the African innovations, 58 per cent are ICT-driven, 25 per cent are based on 3D printing, and 11 per cent are robotics. [2] From mobile apps for monitoring quarantine and solar-powered handwashing stations to information-providing drones, these home-grown technologies are being deployed at rapid speed and making a difference in governments' abilities to effectively respond to the pandemic. Sierra Leone, Rwanda and South Africa are among the African countries leading the Covid-19 tech revolution.

Case Study: App Building in Sierra Leone

The Directorate of Science, Technology and Innovation (DSTI) has introduced an array of tech-based solutions to fight Covid-19 and improve service delivery in Sierra Leone, some of which have been leveraged from the country's experience containing Ebola. A leading private-sector partner in the Covid-19 response, Niche Technologies is run by a former Director of Planning and Strategy in Sierra Leone's National Ebola Response Center. Together, Niche Technologies and the government of Sierra Leone have collaborated on utilising technology in Covid-19 response efforts, including digitising the end-to-end laboratory management system to respond to changing needs and introducing an electronic pass system that essential businesses can use in order to safely continue operating during strict lockdown periods. [3] With partners Grid3, Flowminder, and MIT GOV/LAB, the DSTI has aggregated clinical data repositories to produce mobility indicators that report population redistribution, epidemic modelling, areas with high population mix, and morbidity patterns. Analysis of mobility data is supporting the government's evidence-based response. Sierra Leone was among the first countries in the region to reopen its international airport in late July thanks to the rapid development and deployment of a travel portal – this time with local private-sector partner Fix Solution – that tracks passengers and facilitates contact tracing; processes travel authorisation, payments for and booking of Covid-19 tests; and answers frequent questions about the new travel rules. A similar portal system has since been replicated in Ghana.

Another Sierra Leone tech success story has been the launch of its Quarantine App, created to improve the National Covid-19 Emergency Response Centre's (NaCOVERC) ability to track quarantine services. The app, developed in partnership with technology-for-social-impact entity Dimagi, tracks isolation periods for quarantined persons, food delivery, and psychosocial support needs, among other features. Whereas this information used to be logged on paper before being manually inputted into a software system and then sent electronically to a central system in Freetown, now these data are tracked in real-time, allowing for more efficient and accurate decision-making.

When the government transitioned from designated, supervised quarantine facilities to a quarantine-at-home policy, the app allowed NaCOVERC to continue monitoring contacts, ensure needed services were delivered, and, critically, geotagging quarantine locations to verify that supervisory visits were taking place. [4] To ensure effective implementation of the app, more than 350 staff were trained in each district over the course of 13 weeks on how to monitor live quarantine compliance. The app was officially launched in July, and since that time, the improved monitoring and supervision has led to a reduction in complaints made by people in quarantine. [5] As of 8 December, 12,211 people had been discharged through the quarantine process. [6]

Case Study: Robots and Drones in Rwanda

In Rwanda, frontline workers attribute the government's highly tech-oriented approach to effectively controlling the spread of the virus. [7] Five human-sized robots were introduced in May to support medical staff at two Covid-19 treatment centres in Kigali. The robots perform numerous frontline tasks such as temperature screening, reading vitals, disinfecting, instructing people who are not wearing masks to put them on, playing pandemic awareness videos, and delivering food and medications to patients. [8]

The robots were deployed to reduce the risk of health-care workers contracting the virus by minimising their contact with potential positive Covid-19 patients. There are 0.1 physicians and 1.2 nurses per 1,000 people in Rwanda, so protecting health workers is vital. [9], [10] WHO Africa reports that from May to July, patient-health-worker visits were reduced from three or four to two per day with the introduction of the robots at the treatment centres. [11] The robots are also credited with speeding up the work of screening possible cases and reducing the workload of health-care providers. [12] Since May, one of the robots has been deployed in Kigali International Airport, where it screens up to 150 people per minute.

Rwanda has also led the way in using innovative technology to communicate with traditionally hard-to-reach communities. At the start of its initial lockdown in March, the country found that low compliance with key directives – such as staying home or wearing a mask – was due to limited penetration of awareness-messaging teams in densely populated and high-risk zones as well as rural areas. To access these communities, the government deployed drones to communicate messages by air. The drones allowed the government to critically increase its reach in order to reduce the spread of infections and continue to support the government's ability to enforce lockdowns in targeted outbreak areas. [13] Rwanda's tech-based application of containment policies has been hailed as a world-leading example: On 20 October, WHO Director-General Tedros Adhanom Ghebreyesus tweeted praise for the country's pandemic response, highlighting its "use of technology in the service of public health". [14]

Case Study: Chatbots in South Africa

After the first case of Covid-19 was identified in South Africa on 5 March, the government initially set up phone hotlines to answer questions directly from the public. But the volume of calls was too high to manage, and misinformation was spreading alongside the virus. To solve the problem, South Africa's National Department of Health partnered with Praekelt, a South African mobile-tech-focused non-profit, and the Facebook-owned social media platform WhatsApp to launch an interactive chatbot that responds to questions about Covid-19. By texting "hi" to the WhatsApp number, the chatbot engages with the user to answer common queries regarding symptoms, treatment and latest statistics, and can also counter myths about the disease. [15] Within the first ten days, more than 3.5 million users had engaged with the chatbot, which caters to a diverse user base by providing responses in five different local languages. [16] After the first seven weeks of implementation, 211 million messages had been exchanged with 6.2 million users, averaging 750,000 users per day and accounting for 780,000 health checks. [17] The chatbot is cited as empowering citizens and officials with accurate information in order to take appropriate measures during the crisis. [18]

The service was so successful in South Africa that the WHO adopted the technology for its own global helpline initiative. [19] Collaborating with the same development partners (Praekelt and WhatsApp), the WHO launched its HealthAlert service in late March, designed to serve people and governments globally with the latest information and situation reports 24 hours a day. [20] According to Praekelt, in the first eight weeks of the service, 12.2 million unique users exchanged 117 million messages. [21] Now available in 15 languages, the service is considered to have the potential to reach more than 2 billion people. [22]

Conclusion

The effective tech solutions being deployed across the continent to fight Covid-19 share several key success factors. First, many tech solutions are being locally driven. Instead of replicating tools developed elsewhere, these innovations are home-grown, shaped by local actors searching for solutions in the local context. Context-oriented originations are best positioned to build on embedded strengths and close gaps more precisely, resulting in improved technology design and uptake. Second, tech solutions have been the result of collaborative efforts across the public, private, non-profit and academic sectors. The government-led, private-sector-enabled tech responses, enhanced by the contributions of public-interest groups and innovative research institutes, demonstrate the potential of multi-stakeholder, cross-sector partnerships. Third, tech solutions are being applied to challenges big and small. From communicating a simple message to hard-to-reach communities to revolutionising entire health-service delivery systems, technological innovations have a role to play in achieving public-service objectives – such as ending a pandemic – at the individual and societal levels.

The global pandemic is accelerating the pace of technological innovation, not least of all in Africa. Nascent tech industries are being galvanised by public demand to respond to the myriad challenges presented by Covid-19. Yet, the effective development and implementation of new and adapted technologies to respond to the current health crisis have significant implications beyond pandemic. Tech-for-health innovations that are today tailored to the pandemic response can be adapted to positively impact African health systems more broadly in the near future. Improvements in evidence-based decision-making and service delivery are just two examples of technology's potential that extend beyond health – countries that join in the tech revolution will experience rapid transformation and the growth that comes with it.

Footnotes

1. ^ https://www.afro.who.int/news/covid-19-spurs-health-innovation-africa
2. ^ https://www.afro.who.int/news/covid-19-spurs-health-innovation-africa
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