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COVID-19 research and science infrastructure in South Africa

Significance:

Biomedical laboratory and field scientists, as well as social scientists, in South Africa and elsewhere on the continent, responded to the challenges of COVID-19 with speed. African-wide experience with infectious disease, and the networks and infrastructure to conduct new research and implement field trials, were part of the global effort to contain the pandemic. But in order to contribute, scientists necessarily set aside ongoing research, including on some of the most persistent infections – HIV, TB, malaria. This situation highlights the precarity of science research programmes and the challenges of sustaining research capacity when agendas, funds and acknowledgements reinforce global inequalities.

It has been more than 3 years since the first cases of COVID-19 in South Africa, and over a third of the population has been fully vaccinated and transmission has slowed. It continues to do so, offering us time to draw breath and to reflect on how, as a country, we have navigated the pandemic and stalled the worst economic impacts at household level for many South Africans. Since then, there has been growing awareness of the costs of preventive interventions to contain the pandemic for those most vulnerable to infections, and the economic repercussions of these interventions.[1-4] At the same time, we now have the opportunity to reflect on how, by utilising existing strengths in science infrastructure, resources, networks and skills, South Africans played a major role in curbing the spread of infection. In this Commentary, we discuss policies and early public health interventions across Africa in response to the pandemic, then turn to the role of scientists in developing biomedical interventions. In doing so, we draw attention to the importance of science capacity, and the distribution of power in research as well as policy.

The epidemiological picture of the pandemic, here and elsewhere on the continent, remains somewhat unclear, the consequence of varied capacity within and between countries to case find, maintain records, and report administrative data. The limits of information on cases reflect people's reluctance to present for diagnosis among populations with poor access to medical care, due to distance from services and lack of right to receive care, the latter particularly for people without IDs or marginalised from society for structural reasons. Counter directives to shelter in place and avoid social interactions, such as queuing, that might increase transmission of COVID-19, also discouraged people from presenting to clinics. In addition, the relative youth and low density of populations in some countries and local areas likely reduced infection rates, severe morbidity and mortality.

The rapid response of governments across the continent to implement non-pharmaceutical interventions to slow transmission and to introduce fiscal measures to minimise the economic costs of the pandemic was less predictable. South Africa was one of many countries that used existing grant mechanisms and additional cash transfers to support people who might be harshly affected otherwise, as social interventions forced people out of work and the economy contracted. In Kenya, Uganda, Nigeria, and elsewhere, governments likewise supplemented existing social protection funds and introduced cash transfer programmes, despite challenges in administrating the programmes, and facilitating registration and access.[5] In Uganda, various monetary policies were introduced to mitigate the harsh social and economic constraints designed to limit transmission, although these policies did not include funds to help support households.[6] Elsewhere, some households received food or financial aid.[7] The swift implementation of mechanisms of control by African governments illustrates country capacity to respond to health emergencies, at least as well as other countries across the globe, and capacity to plan for future pandemics and other threats to personal, community and national security, lives and livelihoods.

These apparent successes contradict conventional accounts of pandemics, such as Ebola in 2014–2016, which suggest a lack of preparedness within health systems, and little capacity to manage exponential infection without input from outside – from WHO, other multilateral agencies, and scientists from the Global North.[8] But while there were problems in responding to the Ebola pandemic in Sierra Leone, Liberia and Guinea, Senegal's success in averting infection spread suggests that this was not inevitable.[9] Moreover, considerable work had been conducted in the preceding decade on pandemic preparedness. In particular, responses to the H1N1 pandemic in 2009 led to continent-wide summits and the subsequent development of pandemic preparedness plans in 39 countries.[10] Whether and how this anticipatory work informed national action as COVID-19 spread has yet to be documented. While COVID-19 might have captured imagination in the Global North as the first major pandemic since the Spanish Flu, South Africans were already long familiar with pandemics and their chronicity and endemicity, HIV/AIDS and TB among others. While devastating, people were prepared for a measure of pandemic compliance, unseen in countries like the USA.

At the same time as urgent pragmatic actions were implemented by governments to contain COVID-19, scientists across disciplines also responded with speed. Many were able to draw on the social and intellectual capital and infrastructures of nearly four decades of science research and policy responses to HIV, and the long history of research across disciplines on TB and neglected diseases of poverty. This corps of highly trained researchers, and its resources and experiences, was quickly deployed to work on the virology, immunology and vaccinology of SARS-CoV-2.[11,12] Those of us with an eye on scientific developments on the continent, sensitive to the ways in which science agendas are made elsewhere, must celebrate the role of African scientists in conducting critical research on COVID-19, and appreciate how it came about.

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In a series of manuscripts on which we are working[13], we illustrate how the J&J trial, which was administered from the Masiphumelele Research Site in Cape Town from September 2020, was possible precisely because of the sustained work of its scientists on TB and HIV. Because of their day-to-day, year-to-year work on these pernicious endemic diseases, these scientists were able to quickly mount a clinical trial of the candidate vaccine for SARS-CoV-2. Money flowed to facilitate the collaboration of scientists across the USA, Latin America and India and to ensure the infrastructure, technical networks, and systems of patient recruitment and monitoring, so enabling the rapid development and roll out of the trial and the verification of results. The ready availability of resources in part reflected US presidential hubris; there was limited acknowledgement that this work was possible only because of decades of laboratory and population research on other diseases. In contrast to the work on COVID-19, this earlier research was often poorly funded, and research teams would wait to year end for advice on new funding and to learn if staff could be retained.

Other population-based research infrastructures in South Africa, including the Africa Research Institute in KwaZulu-Natal and the MRC/Wits Agincourt Research Unit in Mpumalanga, likewise drew on systems and structures for population data collection, community engagement, and data management systems, developed over several decades, to initiate epidemiological and other studies on COVID-19.[14,15] This was also true elsewhere on the continent (e.g. for Kenya[16] and Senegal[17]), with numerous institutes and networks of scientists pivoting from other research to COVID-19. Intellectual and material infrastructure across Africa explains how innovations and basic and applied science projects were up and running so early in the pandemic, even as scientists grappled with shortcomings.

In speaking at a web-based Inkundla, held by the international network Future Earth prior to the Sustainability Research and Innovation Congress (SRI) (online and in Pretoria, 20–24 June 2022), Uzma Alam (Africa Institute for Health Policy, Kenya) argued the value of using COVID-19 as a case study of the flexibility and adaptability that characterise science on the continent. Others speaking in this webinar, such as Tom Achoki (University of Pretoria, South Africa) and Richard Wamai (Northeastern University, USA), made the same point, reiterating the value of governance frameworks such as the African Union's Science, Technology and Innovation Strategy for Africa 2024 to ensure scientific competitiveness and economic transformation. They noted too the deftness of African-based biomedical and social scientists, in laboratories and in the field, to enable focused responses to the pandemic.

But despite South African participation in this work, agendas are still set largely in the Global North, and funds flow accordingly. The tilt of agenda setting impacts profoundly on the capacity of scientists in South Africa and across the continent to maintain research programmes in areas in which they were trained, to maintain scientific and institutional competitiveness, and to contribute to reducing economic costs and social suffering of a wide range of diseases. Wider disparities in funding severely limit the competitiveness of African-based scientists, as Julie Livingston[18] and Marissa Mika[19] have illustrated for oncology. In the excitement of new funding calls and increased resources, scientists across disciplines run the risk that important work, including basic, translational, implementation and social science research, is diverted when funds follow the shifting agendas set elsewhere.

Recognition of the politics of research, including in relation to funding, the flow of data, the appropriation of knowledge, and the acknowledgement of the work, varies across disciplines. While social scientists have argued the need for a 'theory of the south', even much of this discourse has been generated from scholars in the Global North, with limited acknowledgement of the empirical and theoretical work produced in 'the South'. As scientists on the continent worked to temper the transmission of COVID-19, so the ongoing challenges of effective vaccines, improved treatments, and adherence to the management of other infections largely slipped from sight. But the continued transmission of HIV and other endemic diseases requires sustained and well-supported research, including the training of new researchers and maintenance of laboratories and community study settings. The risk with the diversion of effort, and consequent slides in funding to and distraction from core research, is that, as scientists, we might lose our intellectual edge as we struggle to have it recognised.

Competing interests

We have no competing interests to declare.

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