Understanding COVID-19 in Africa

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The coronavirus disease 2019 (COVID-19) pandemic has spread to all 55 countries in Africa. The prevalence is highly heterogeneous, and the majority of cases are asymptomatic. Several factors are thought to explain heterogeneity of COVID-19 in Africa, including the level of containment measures, demographic aspects, climate and environmental factors, host genetics and immune factors. Here, we discuss the prevalence of COVID-19 in Africa, the status of serological studies, COVID-19 and comorbidities, as well as the spread of SARS-CoV-2 variants and the status of vaccine roll-outs in Africa.

Since the first case of coronavirus disease 2019 (COVID-19) in Africa was reported on 14th February 2020, more than 5.1 million cases and 136,000 deaths have been reported (as of June 2021), representing 3% of global cases. Contrary to initial models and forecasts, the reported data reflect a markedly less severe epidemiological picture of COVID-19 in Africa. Current data suggest a low proportion of patients with severe outcomes and death, and more than 80% of cases appear to be asymptomatic in some countries. Of the reported cases, 43% and 30% are from Southern and Northern Africa regions, respectively, and 5 of the 55 African countries — South Africa, Morocco, Tunisia, Ethiopia and Egypt — account for more than half of the total cases of confirmed COVID-19 in Africa. South Africa, Egypt and Tunisia account for more than two-thirds of all reported deaths from COVID-19 in Africa[1]. The underlying cause for the significant epidemiological heterogeneity of COVID-19 amongst different countries in Africa remains unknown. Several explanations have been proposed, including the timing of introduction of the SARS-CoV-2 virus, different preparedness and response measures, experience with previous pandemics, differences in the capacity of the health systems for testing and contact tracing, demographic factors, climate and environmental factors, host genetics and social factors that determine adherence to public policies.

Testing and surveillance capacity for COVID-19 is highly variable across countries in Africa, and it is plausible that the overall burden in the continent is significantly underestimated. It is therefore important to conduct high-quality and large-scale seroprevalence studies to estimate the true burden of COVID-19 in order to understand the dynamics and nature of immune response to SARS-CoV-2 infection in the African epidemiological context.

Current status of serological studies

As of May 2021, 27 studies have been published that examined the seroprevalence of antibodies against SARS-CoV-2 in blood donors, the general population, health-care workers, pregnant or parturient women and in residual sera from routine testing as a proxy[2]. These studies reported a seroprevalence ranging from 0.4% in the Republic of Cape Verde in June–July 2020 (REF.[3]) to more than 49% in antenatal care clinics in Kenya in December 2020 (REF.[4]). Only six of these studies were carried out on the national level, highlighting the urgent need for large-scale studies in representative sample populations. So far, the reported prevalence of SARS-CoV-2-specific antibodies is several orders of magnitude higher than would be expected from the reported cases. These findings may be due to the selection of study populations (for example, high-risk groups such as health-care workers), sampling strategies (such as convenience or random sampling), the timing of the study, the accuracy of the serological method and differences in the interpretation of the results.

High-quality serosurveys can only provide accurate data if the challenges of conducting, analysing and interpreting the data are overcome. An accurate estimate of the prevalence of SARS-CoV-2 in a population requires carefully designed studies with representative sampling of the population; validated and standardized laboratory assays; and analytical approaches that account for antibody kinetics. The Africa Centres for Disease Control and Prevention (Africa CDC) is currently providing technical and logistic support and developed a protocol to standardize sampling designs and harmonize detection methods for nationally representative, age- and gender-stratified serosurveys[5]. The Regional Integrated Surveillance and Laboratory Network (RISLNET) of the Africa CDC can be leveraged to create a network of immunology laboratories and serosurveillance that can generate and provide data for public health decision-making and investigate the biological mechanisms of immune responses to SARS-CoV-2 and other pathogens.

COVID-19 and comorbidities in Africa

Evidence from the global outbreak of SARS-CoV-2 has clearly demonstrated that noncommunicable diseases (NCDs) — such as cardiovascular diseases, obesity and

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type 2 diabetes — are known risk factors for severe COVID-19 and death. However, the African context is unique, with the triple burden of emerging, endemic and non-communicable diseases. Infectious diseases such as HIV, tuberculosis and malaria as well as helminth infections are highly prevalent in Africa and are known to influence immune function and activation, which may, in turn, affect the immune response to COVID-19. There is little information on whether, or how, these infections affect the immune response to SARS-CoV-2.

Epidemiological studies have indicated a lower incidence of COVID-19 in malaria-endemic areas[6,7]; however, the reasons for this are yet to be investigated, and potential effects on prognosis are unknown. A large population-based observational study in South Africa showed that an HIV-positive status doubles the odds of death due to COVID-19 (REF.[8]). Similarly, another study from South Africa demonstrated an up to twofold increase in COVID-19 mortality that was associated with prior or current tuberculosis (TB)[9]. Similar data on the epidemiological relationships and immunological interactions of SARS-CoV-2 infection with TB, HIV, TB/HIV and other infectious diseases remain scarce in most African countries. Therefore, systematic studies on the biological and immunological interactions of COVID-19, TB, HIV, malaria and other high-burden endemic diseases in Africa are urgently needed.

SARS-CoV-2 variants in Africa

Since December 2020, SARS-CoV-2 variants with multiple substitutions in the spike protein that confer enhanced transmissibility have emerged in the United Kingdom (B.1.1.7, also called Alpha), South Africa (B.1.351, also called Beta), Brazil (B.1.1.28, also called P1 or Gamma), United States (B.1.427/B.1.429, also called Epsilon) and India (B.1.617, also called Delta). All but B.1.1.28 have been reported in Africa. In addition, the B.1.351, B.1.1.28 and B.1.617 have been associated with reduced neutralization by convalescent and post-vaccination sera. As COVID-19 vaccines are being rolled out and variants of concern spread across Africa, serosurveys will continue to be of great interest to understand population-level immunity and to differentiate resurgence due to the waning of protective immunity or the circulation of immune or vaccine escape viral variants.

The Africa CDC, through the Africa Pathogen Genomics Initiative, is currently supporting Member States and ten regional sequencing hubs to accelerate SARS-CoV-2 sequencing for the detection and monitoring of variants. As of May 2021, more than 9,000 specimens from 30 Member States have been referred to this network, and 21 countries reported one or more of the variants of concern or variants of interest through this network. However, numerous challenges remain to be addressed. These include the lack of routine genomic surveillance; limited sequencing and bioinformatics capacity; inadequate human resources; long turnaround time; and logistical challenges of the sample referral process. Establishing a decentralized and coordinated continental network is key to strengthening sequencing capacity to enable rapid detection and response to the current pandemic and prepare the continent for future outbreaks.

COVID-19 vaccine roll-out in Africa

With 49 countries now rolling out COVID-19 vaccines and more than 28 million doses administered, Africa is well below the global average (20 versus 227 doses per 1,000 people). The coverage of vaccination is highly heterogeneous in Africa, ranging from 0% (in six countries) to 66% in the Seychelles, the most vaccinated nation in Africa. As of May 2021, more than 30 countries have less than 1% coverage with a continental average of only 2.5%. In order to address this gap and supplement the COVAX facility, the African Union developed a continental vaccine strategy and established the African Vaccine Acquisition Task Team (AVATT), which, so far, secured more than 270 million doses of COVID-19 vaccines. Amid the scramble for vaccines and the inequitable distribution between rich and poor countries, the Africa CDC continues to coordinate and mobilize resources to increase vaccine supply, address the challenges of vaccine hesitancy and advocate for increased local production of COVID-19 and other vaccines.

Conclusion

The African Union through its technical agency — the Africa CDC — and governments across Africa implemented timely and strict interventions to mitigate the first wave of the COVID-19 pandemic. However, the majority of African countries had a more severe second wave[10] and are facing challenges in their efforts to estimate the true burden of COVID-19. The immunological mechanisms by which protective immunity is achieved or immunopathology is mediated, in the context of co-infections and comorbidities in Africa, are largely unknown. Response measures attempting to address the public health challenges of COVID-19 must also address the critical gap in serological and immunological studies, workforce development and strengthen laboratory infrastructure in Africa.

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Competing interests
The authors declare no competing interests.