Seroprevalence of SARS-CoV-2 in Africa

Policy Brief

Key Messages

- Seroprevalence studies reveal that the spread of SARS-COV-2 is greater than reported through confirmed cases. This shows a need for better communication between heath policy authorities and researchers;
- We found an overall seroprevalence of 14% (CI: 11-16), significantly more than the official statistics of cumulative cases, which hugely underestimate the spread of the virus;
- Seroprevalence varies by region of Africa: 29% in Southern Africa, 23% in Central Africa, 12% in Northern Africa, 13% in Western Africa and 13% in Eastern Africa. To address this geographic disparity, governments and researchers must improve collaboration to design effective control programmes;
- The quality of seroprevalence studies must be improved: 79% of studies were determined to be associated with a high or moderate concern about their quality. Samples are not consistently representative, and there is a need for longitudinal, spatiotemporal studies, and
- The literature reports on only 24 countries in Africa – more than half of African countries have generated a worrisome dearth of data, at least in the academic literature. This suggests insufficient research capacity and the need for open data and collaboration among countries.

Background

Identification of COVID-19 infections is key to developing evidence-based health policy responses. In Africa, most data on COVID-19 infections are from PCR tests (1) conducted on suspected cases and their contacts, or on persons seeking clearance for international travel. However, 18% to 80% of SARS-CoV-2 infections are asymptomatic (2), hence are missed by existing testing regimes. Additionally, PCR tests detect the virus, and therefore do not capture previous infections and possibly infections that are in the convalescent phase. These lead to underestimation of disease prevalence.

Seroprevalence studies are an important complement to (PCR) tests and give a better picture of the true burden of disease, as well as identify hotspots (1). Seroprevalence studies also guide vaccine deployment and are used to monitor vaccine response and effectiveness (3).

We examined peer-reviewed studies and pre-prints of SARS-CoV-2 seroprevalence studies to comprehensively evaluate their design, methods, quality, and estimates of SARS-CoV-2 prevalence in Africa at the continental, regional, national and subnational levels.

Review Methodology

We searched three databases for seroprevalence studies of SARS-COV-2 focused on Africa: PUBMED, Epistemonikos and the Cochrane Covid-19 Register. Search included studies published between 2020 and 2021 and indexed by these databases by 21 July 2021. Additional searches identified previous reviews on Africa specifically for seroprevalence studies of SARS-

COV-2 up to 1 August 2021. We found one systematic review by Chisale et al. (4) that was published during the course of this research, and which included studies up to April 2021. We collected the references used in this study and contacted the authors for detailed data, which they kindly provided. We also identified the database Setrotracker.com, which is a global repository of SARS-COV-2 seroprevalence data by Brovrovitz et al. (5). It seeks to collect all seroprevalence studies being produced through a living systematic review and uses a modified Joanna Briggs Institute (JBI) guideline for assessment of risk of bias.

Our inclusion criteria were serosurveys of SARS-COV-2 in humans published between 2020 and 2021 (21 July 2021) that reported sample size, date of sampling, geographical focus, and seroprevalence estimate. A serosurvey is defined for purposes of this study as, "the serological testing of a defined population over a specified time period to estimate the prevalence of SARS-CoV-2 antibodies" (5). Studies that reported information on different geographical units, populations or periods, and did not provide a pooled calculation of seroprevalence, were considered separate. For example, if a study reports seroprevalence for four regions in a country but does not provide pooled calculations of seroprevalence, each region is a record in the database. DC and JS assessed risk of bias using the modified JBI checklist for diagnostic test accuracy developed by Bobrovitz et al. (5), resolving disagreements jointly.

Descriptive statistics were performed to analyse publications in the review, as well as their risk of bias. In addition, we calculated the average time from serosurvey collection to publication, given the unfolding pandemic and the importance of updated information for policymaking. We also performed meta-analysis to estimate seroprevalence of SARS-COV-2 in African countries by different variables and the exploration of sources of heterogeneity. We calculated a weighted-pooled seroprevalence based on a random effects model, and assessed heterogeneity through the I^2 statistic, where values above 75% are considered high, as well as τ^2 and *Q* statistics, as did Chisale et al. (4). We explored scope, type of publication, sample size, sensitivity, specificity, African region, type of test, type of publication and risk of bias as potential sources of heterogeneity.

Policy relevant findings

Our research used 57 studies, analysing a total of 86,684 individuals. Studies covered 24 African countries: Egypt (n = 9, 16%), Ethiopia (n = 7, 12%), Kenya (n = 7, 12%), Nigeria (n = 5, 9%), Zambia (n = 4, 7%), Democratic Republic of the Congo (n = 4, 7%), South Africa (n = 3, 5%), Cameroon (n = 2, 3%), Libya (n = 2, 3%), Mauritania (n = 1, 2%), South Sudan (n = 1, 2%), Sierra Leone (n = 1, 2%), Ivory Coast (n = 1, 2%), Ghana (n = 1, 2%), Angola (n = 1, 2%), Cape Verde (n = 1, 2%), Zimbabwe (n = 1, 2%), Gabon (n = 1, 2%), Congo Brazzaville (n = 1, 2%), Togo (n = 1, 2%), Malawi (n = 1, 2%), Guinea-Bissau (n = 1, 2%), and Mali (n = 1, 2%). The other half of countries in Africa do not have academic seroprevalence studies available online.

The overall seroprevalence across the studies was 14% (CI: 11-16), and the regional distribution was 29% in Southern Africa, 23% in Central Africa, 12% in Northern Africa, 13% in Western Africa, and 13% in Eastern Africa. Studies concluded consistently that official statistics underestimate SARS-COV-2 infections, suggesting that the prevalence rate of the disease is higher than reported and the mortality rate is lower than estimated.

Our quality assessment showed that 49% of studies had a high risk of bias and 30% a moderate risk. The main reasons for bias were associated with non-probability sampling,

sensitivity and insufficient specificity of the tests, and flawed analysis such as not adjusting for population and test performance. Study authors call for better study design, especially on the representativity of samples, and for longitudinal, spatiotemporal analysis of seroprevalence.

Our analysis showed that the average time between research and publication is ~eight months: ~ten months for peer-reviewed articles and ~six months for working papers. Given the lag between research and publication, and the absence of studies on half of African countries, we believe that open data practices and infrastructure, and collection and analysis of updated and relevant data, must be prioritised for policy-making.

Policy Recommendations

1. *Improve communication between research and policy-making:* Studies consistently indicate that SARS-COV-2 prevalence is underestimated by official statistics. Mechanisms for policy uptake of seroprevalence research is necessary to develop informed and effective pandemic control strategies;
2. *Foster research capacity:* Half of African countries are not represented in the academic literature on SARS-COV-2 seroprevelance. This may correlate with research capacity, which must improve in all countries in Africa, especially those that are not producing academic research.
3. *Improve the quality of seroprevalence research:* Our assessment of risk of bias shows research design, implementation and reporting is weak. Robust research on seroprevalence should be a priority for research policy, given its importance to planning and monitoring the spread of the virus and the effectiveness of pharmaceutical and non-pharmaceutical interventions.
4. *Support open data infrastructure and collaboration*: Our review relied on the efforts of other research teams to identify the literature that is spread across many information services. Supporting open data infrastructure and fostering intra- and international collaboration in the African Union is of utmost importance to overcome the data barriers and provide updated and policy-relevant information, and
5. *Establish a research agenda for the African Union.* Researchers agree that there are data challenges and also an urgent need to conduct longitudinal, spatiotemporal analyses of seroprevalence, as well as to explore new areas of research including on waning antibodies. Establishment of a common research agenda by the African Union will improve coordination of individual efforts to achieve impact at the continental level.

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