

Understanding varying COVID-19 mortality rates reported in Africa compared to Europe, Americas and Asia

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Summary

The SARS-CoV-2 infection, which causes the COVID-19 disease, has impacted every nation on the globe, albeit disproportionately. African countries have seen lower infection and mortality rates than most countries in the Americas Europe and Asia. In this commentary, we explore some of the factors purported to be responsible for the low COVID-19 infection and case fatality rates in Africa: low testing rate, poor documentation of cause of death, younger age population, good vitamin D status as a result of exposure to sunlight, cross-immunity from other viruses including coronaviruses, and lessons learnt from other infectious diseases such as HIV and Ebola. With the advent of a new variant of COVID-19 and inadequate roll-out of vaccines, an innovative and efficient response is needed to ramp up testing, contact tracing and accurate reporting of infection rates and cause of death in order to mitigate the spread of the infection.

keywords COVID-19, Africa, testing capacity, SARS-CoV-2 virus, pandemic

Sustainable Development Goals: Good Health & Well-being; Reduced Inequalities

The severe acute respiratory syndrome coronavirus (SARS-CoV-2) infection, which causes the coronavirus disease of 2019 (COVID-19), is a serious threat to global health, economy and security. The Americas, Europe and Asia have greater burdens of COVID-19-confirmed cases and higher mortality rates than the African continent [1]. As of 19 January 2021[1], Africa had reported 3 309 919 cases and 80 939 COVID-19-related deaths vs. 954 545 deaths in Americas, 666 237 in Europe and 191 196 in Asia [2]. Several factors such as socio-demographic characteristics and comorbidity have been correlated with COVID-19 hospitalisation and death globally [3–5]. Because Africa bears a huge burden of HIV, tuberculosis and non-communicable diseases, in the backdrop of socioeconomic determinants of poor health and deplorable healthcare systems, increased death from COVID-19 infection was anticipated.

However, in several African countries, infection rates and case fatalities have not matched expectations, particularly considering the continent's generally fragile healthcare systems. Several hypotheses are currently being explored to explain why Africa seems to have

comparatively lower COVID-19 infection and case fatality rates [6–9]. The testing rate in the African continent of 1.3 billion inhabitants is among the lowest in the world [8, 9], and most infected individuals never get tested due to poor access to healthcare and testing services. COVID-19 testing differs from country to country based on several criteria. In most African countries, only travellers into the country who present with COVID-19 symptoms, individuals with direct contact with positive cases, and inhabitants of high-incidence areas are targeted for testing. COVID-19 testing is less common than in other regions, which may be masking its true spread [9]. South Africa is the only African country that has conducted over 7 million COVID-19 tests [10]. In Nigeria, just over one million samples had been tested by January 2021 – a country of more than 200 million inhabitants [10]. In Cameroon, only 781,000 tests had been done as of 31 December 2020 [11]. Ghana had tested only 710,137 as of January 2021 [10]. In some African countries, there are insufficient or no data available on testing to know the actual number [9], indicating that little effort and few resources are directed towards COVID-19

testing. It is obvious that there is underreporting of the total burden of COVID-19 in Africa. When there is an outbreak, even on a small scale, hospitals are overwhelmed.

An estimate of the true human life impact of COVID-19 requires the reporting of COVID-19-related deaths. Vital statistics such as death registration and the processing of administrative data are a big challenge in Africa. Findings from a recent survey conducted by the Economic Commission of Africa (ECA) indicate that only one in three deaths is captured by official registration systems, and of the 54 African countries, only 18 countries record and report annual deaths [12]. Worse still, only four countries document the cause of death and have a level of death registration coverage that meets international standards [13]. South Africa is one of the few African nations that is generating vital statistics from the civil registration system [14]. A report by the South African Medical Research Council shows an excess death of 125 744 between May 2020 and January 2021, indicating that the number of people who have died from COVID-19 could have been underestimated [15]. In Nigeria and most other African countries, death registration is rare [12, 13, 16], leading to the underestimation of death rates. A recent systematic review of the performance and challenges of death registration in Nigeria indicates that only 10% of deaths were registered in 2017 [16]. No mortality data were reported for Nigeria in the WHO database between 2008 and 2017 [16]. In June 2020, unusual deaths were reported in the northern part of the country without establishing their cause. The Nigerian Minister of Health indicated that half of these deaths were most likely due to COVID-19 [17]. Recent systematic post-mortem surveillance among 364 deceased individuals in Zambia shows that 19.2% were infected with COVID-19 and had died prior to reaching hospital without being tested [18]. COVID-19 tracking and reporting systems are conspicuously absent in Africa.

Africa's young population has been highlighted as one of the foremost reasons for the lower-than-expected COVID-19 mortality rates [8, 9]. The median age is 19.4 years; 62% of the population are under the age of 25 years and only 3% are 65 years or older, whereas in the USA and Europe 18% are 65 or older and 28% are under 25. In South Africa, adults aged 30-39 have the largest number of cases of COVID-19 [19]; in Nigeria, it is adults aged 31-40 [20]. Most individuals with COVID-19 in Nigeria are asymptomatic [21], resulting in a low case fatality rate. Since the majority of the African population are youth, there might be more infections but they will mostly be mild or asymptomatic and most likely go undetected.

COVID-19 is more commonly fatal in the elderly and those with comorbidities [3–5,22], in the African region and in the Americas, Europe and Asia [3, 5, 23]. Surprisingly, there was less transmission of COVID-19 among the elderly in African countries [24, 25]. Life expectancy is much lower in Africa – 62 years for men and 65 years for women – than in the USA, Europe and Asia, where life expectancy is 71-77 years for men and 75-82 years for women [26]. Africa's life expectancy is less than the mean age of COVID-19 fatalities in Italy in Europe; so it may not have the most vulnerable age group for COVID-19 to exert its effects to the fullest. However, the Africa Center for Disease Control indicates that 20 of 55 countries have case fatality rates higher than the global average of 2.2% as of January 2021 [9], thus revealing that case fatality rates have risen since the first wave of the pandemic [9].

People who had severe COVID-19 disease and poor outcomes were lacking vitamin D and zinc [27, 28]. Recent studies have shown that sunlight, a major source of vitamin D, influences COVID-19 infection and mortality rates [29–31]. Thus, the strong exposure to sunlight in African countries may also contribute to lower case fatalities compared to countries in other continents.

Lessons learned from the public health response to other deadly infectious diseases such as Ebola haemorrhagic fever, Lassa fever and HIV epidemics may have helped to mitigate the spread of COVID-19 in Africa. Furthermore, cross-immunity from other coronaviruses has been proposed as one of the reasons for the low case fatality rates [9] and relatively mild effects of the COVID-19 pandemic in Africa. It is noteworthy that the presence of antibodies in the blood of patients infected with different types of human coronaviruses has not been extensively studied. However, subjects who had COVID-19 infection developed antibodies to endemic human coronaviruses [32], and the blood of recovered COVID-19 patients contained neutralising antibodies that inhibit the entry of SARS-CoV-2 in cells *in vitro* [33]. Hence, cross-reactive antibodies generated as a result of infections from other human coronaviruses might play a protective role in a population affected by COVID-19. However, we strongly believe that several other biological and environmental factors also contribute significantly to this process.

Despite donations from the International Monetary Fund, Bill and Melinda Gates Foundation and several international organisations to support low- and middle-income countries, access to COVID-19 test kits remains insufficient [7], which means that in Africa the spread of the COVID-19 cannot be effectively tracked. This is a risk because of the recently detected highly transmissible variant. Currently, several African countries are seeing an increase in cases due to super spreader gatherings during

the December holidays and other festive occasions [9]. Another risk is that very little vaccine is available in Africa, while the USA, Europe and some of Asia have secured vaccines for their populations.

Most African countries face difficult choices regarding disease mitigation strategies. Even though they have shown an impressive level of responsiveness to the COVID-19 pandemic during the first wave [34], effective management of the pandemic remains a cause for concern given the limited resources, fragile health systems, insufficient testing, poor contact tracing and the existing burden of disease [22, 34, 35]. With the new variant of COVID-19, slow roll-out of vaccine and curative treatment for COVID-19, a focus on testing and improved reporting systems including proper documentation of the cause of death is needed. Innovative strategies for improving routine data information systems could enable a more accurate understanding of the actual infection and mortality rate in Africa to help mitigate the spread and mortality of COVID-19. Further comprehensive studies are needed to elucidate the factors influencing the low infection and mortality rate of COVID-19 in Africa.

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