

# Data to support African 'resistance' to COVID-19 hypothesis are not available

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## ABSTRACT

More than two years since the first case was reported in Africa, COVID-19 still lurks on the African continent, shattering the hopes and livelihoods of millions of people. Although Africans are accustomed to infectious disease outbreaks, COVID-19 seems unique in its aetiology and impacts. Assertions that Africans were 'resistant' to COVID-19 in the first wave were put forward, but data to support the accuracy of these claims are not available. More research data are required to explain COVID-19 prevalence and interventions in African settings. Control of COVID-19 should not just be left to medical doctors. All experts, working in multi-disciplinary, inter-disciplinary, intra-disciplinary and trans-disciplinary (MIIT) teams, should be involved in finding solutions to COVID-19 in Africa. We urge all our readers and contributors to get vaccinated against COVID-19.

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## 1 Introduction

North Africa reported the first case of coronavirus disease 2019 (COVID-19) on 14 February 2020 (in Egypt), and Sub-Saharan Africa reported the first case of COVID-19 on the 27 February 2020; in Nigeria (Ihekweazu and Agogo, 2020). More than two years later, Africa is still in the middle of the COVID-19 pandemic. As elsewhere, the COVID-19 storm is pitiless in Africa, and the 1.2 billion inhabitants are still at tremendous risk. Amid lockdowns, there have been reports of schools being shut, hospitals running out of beds and oxygen, and economies spinning into recessions. African countries are being stretched to the limit as COVID-19 wreaks havoc in a continent whose containment measures succumb to the pressures of time, limited resources, and increased rates of infections (Ihekweazu and Agogo, 2020).

Wadvalla (2020) warned that many countries in Africa lack the capacity to test, isolate confirmed or suspected cases, trace contacts, and treat those with severe COVID-19 illness. In April 2020, the World Health Organization (WHO) reported that there were just 2,000 ventilators in 41 African countries and 5,000 intensive care beds in 43 countries. This dire scenario is exacerbated by the fact that Sub-Saharan Africa spends less money on healthcare, 5.17% of its total GDP, compared to countries in the Organization for Economic Co-operation and Development (OECD) that spend 9.89% of their GDP (Salyer *et al.*, 2021). On top of COVID-19, Sub-Saharan Africa still has to grapple with outbreaks of other infectious diseases; the top causes of outbreaks from 2016 to 2018 were cholera, measles, and viral hemorrhagic diseases such as Ebola virus disease, yellow fever, dengue fever, Lassa fever, and Rift Valley fever (Ihekweazu and Agogo, 2020).

Many variables are unknown in the equation for COVID-19 mortality in Africa. However, the rate of mortality due to COVID-19 increases with age. The majority of COVID-19-associated deaths occur in older people (Mbow

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*et al.*, 2020). Statistics show that Africa has a comparatively younger population, with a median population age of 20 years, versus 38.6 years for the United States of America (Mbow *et al.*, 2020). Africa is the youngest continent in the world as only 4% of her population is older than 65, compared to 37% in Asia and 29% in Europe and North America (Lone and Ahmad, 2020); 11% in China, 15% in the USA, 18% in the UK, and 23% in Italy (Dyer, 2020). Less than 0.5% of the African population is aged at least 80 years, and about 89% is aged less than 50 years (Ataguba, 2020). These figures show that age is on the side of Africa. Due to Africa's predominantly younger population, the continent may have 'escaped' the full brunt of the impacts of the first wave of COVID-19.

More than four months after the first COVID-19 cases in Africa were detected, prevalence and mortality remained low (Mbow *et al.*, 2020). It was not really clear whether Africa was under-reporting or spared, but differences in reliable reporting and death registration, lockdown stringency, demography, sociocultural aspects, environmental exposures, genetics, and the immune system were touted as some of the variables that may have differentiated the epidemiology of COVID-19 in Africa (Mbow *et al.*, 2020). As elsewhere, most COVID-19 deaths in Africa are in older people with non-communicable diseases such as cardiovascular diseases, obesity, and type 2 diabetes: these are risk factors for severe COVID-19 (Mbow *et al.*, 2020).

## **2 Data to support African 'resistance' to COVID-19 hypothesis are not available**

In the first year of the COVID-19 pandemic, there were differences in opinion about whether the pattern of SARS-CoV-2 spread was different in Africa compared to that in the USA and Europe. Despite a paucity of data, some commentators argued that COVID-19 may be spreading differently, with an attenuated outcome in Africa (Mbow *et al.*, 2020). We do not know for sure whether this is true. What we do know is that these assertions were based on differences in the activation, pro-inflammatory, and memory profiles of the immune cells not only in Africans versus Europeans, but also among Africans with high and low exposure to microorganisms and parasites (Mbow *et al.*, 2014).

Here, we urge that the veracity of these claims should be tested through further research. One hypothesis that should be tested is whether these variations in immunological profiles segregate the outcome of COVID-19 in Africa. Already, four immunological postulations have been advanced to help buoy claims of why Africa had lower mortality due to COVID-19 (Mbow *et al.*, 2020), now termed the African 'resistance' to COVID-19 (ARC) hypothesis, as explained by the following determinants:

- Trained immunity and immunological learning: This involves the reprogramming of innate cells that on secondary encounter with a pathogen elicit a stronger response. In trained immunity, there is continuous environmental education of the immune system to protect against invading pathogens both specifically and non-specifically.
- The presence of expanded clones of virtual memory T cells due to cytokines such as helminth-induced interleukin-4. It has been argued that virtual memory T cells are more prevalent in people in Africa owing to the higher exposure to pathogens. This may contribute to the attenuation of SARS-CoV-2.
- Benefits from the hygiene hypothesis, that early and chronic exposure to pathogens may lead to relentless immune cell activation in harsh African environments, and this may induce a strong regulatory immune response to counteract excessive inflammation in Africans.
- Monocyte and macrophage inflammatory cytokines such as IL-6 are a marker of severe COVID-19, and myeloid cells are thus likely to be associated with hyper-inflammation. Monocytes from African individuals

with high exposure to pathogens are less pro-inflammatory. Thus, their recruitment into the lungs may prevent high cytokine production and therefore lead to better outcomes of COVID-19 in African patients.

Again, we are not endorsing that these four assertions are correct or accurate. What we urge is that researchers must conduct more studies to shed more light on the African 'resistance' to COVID-19 (ARC) hypothesis, because at the moment, we do not know whether this hypothesis should be accepted or rejected. The danger of assertions such as ARC is that Africans may think they are invincible and invulnerable to COVID-19. We have not come across any data that show that Africans are safe from COVID-19. Therefore, unless there are data to support it, the idea of ARC should be treated with extra caution and scepticism.

It would seem that the limitations of the ARC hypothesis are many, and its claims may have applied only to the first wave of the COVID-19 pandemic. Indeed, according to Salyer *et al.* (2021), the first wave of the COVID-19 pandemic progressed more slowly in Africa than the rest of the world, but by December 2020, the second wave appeared to be much more aggressive with many more cases (mean of 23,790 new cases per day) than at the peak of the first wave in July 2020 when the mean daily number of new cases was 18,273 (Salyer *et al.*, 2021). There is an urgent need for more disaggregated data on the heterogeneity of the COVID-19 pandemic in Africa if a clear and accurate narrative of the burden is to emerge.

### 3 Mathematical models

Mbuvha and Marwala (2020) contend that despite limited data, there is need to perform accurate epidemiological model parameter inference for localised trajectory predictions. Accordingly, they performed Bayesian parameter inference using Markov Chain Monte Carlo methods on the susceptible-infected-recovered (SIR) and susceptible-exposed-infected-recovered (SEIR) epidemiological models with time-varying spreading rates for South Africa.

Their results elucidated two fundamental decline points in the rate of spread of COVID-19: the first decline point coincided with enactment of a travel ban and the resultant containment of imported infections. Government action that included travel bans, school closures and stay-at-home measures induced a mean decline of 80% in the COVID-19 spreading rate. The second decline point was credited to mass screening and testing programmes.

This study demonstrates the power of big data and mathematical modelling in driving government decisions and interventions for COVID-19. It is important to understand that COVID-19 should not just be left to medical doctors. All experts, working in multi-disciplinary, inter-disciplinary, intra-disciplinary and trans-disciplinary (MIIT) teams should be involved in finding solutions to COVID-19.

### 4 Conclusion

During the past year, COVID-19 exacted a heavy toll on all of us in Namibia and around the world. Colleagues, friends and family are lost to the pandemic. Data to support African 'resistance' to COVID-19 hypothesis are not available. In the midst of COVID-19, we are happy to publish this issue of the International Science and Technology Journal of Namibia (ISTJN). We thank the authors and all our stakeholders at the University of Namibia (UNAM) and the University of Cape Town (UCT) for their continued support. We remain hopeful that together, we shall win the war against COVID-19. We urge all our readers and contributors to get vaccinated against COVID-19.

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