Journal of Multidisciplinary Healthcare

Dovepress
open access to scientific and medical research

Open Access Full Text Article

HYPOTHESIS

Possible Reasons Why Sub-Saharan Africa Experienced a Less Severe COVID-19 Pandemic in 2020

Journal of Multidisciplinary Healthcare downloaded from https://www.dovepress.com/
For personal use only.

Obinna O Oleribe[1]
Ahmed AA Suliman[2,3]
Simon D Taylor-Robinson[4]
Tumani Corrah[5]

[1]Office of the Director General, Nigerian Institute of Medical Research, Yabba, Lagos, Nigeria; [2]Department of Medicine, Faculty of Medicine, University of Khartoum, Khartoum, Sudan; [3]Department of Cardiology, Shab Teaching Hospital, Khartoum, Sudan; [4]Department of Surgery and Cancer, Imperial College London, St Mary's Hospital Campus, London, UK; [5]Africa Research Excellence Fund, c/o MRC the Gambia Unit @ LSHTM, Fajara, The Gambia

Abstract: Both scientific authorities and governments of nations worldwide were found lacking in their COVID-19 response and management, resulting in significant distrust by the general public in 2020. Scientific and medical bodies often failed to give the right counsel on the appropriate course of action on COVID-19, because proven steps were not known, while many governments around the world took ineffective, late or inappropriate COVID-19 control and containment strategies. If the 2020 COVID-19 incidence rates are to be believed, much of sub-Saharan Africa had a lower disease prevalence than expected. We put forward six factors peculiar to much of sub-Saharan Africa that may have accounted for the pandemic landscape there in 2020. We also discuss why the situation has become more serious in 2021.

Keywords: COVID-19, Africa, public health, multidisciplinary care, pandemic

The COVID-19 pandemic response across much of sub-Saharan Africa has been uncoordinated - some governments have denied the infectivity and seriousness of the problem (eg, Tanzania),[1,2] and others have refused to implement global prevention strategies, but rather have promoted local cures and home remedies, while conducting business as usual (for example, Zambia and Madagascar).[3–5] Tanzania even refused COVID-19 vaccines, as the health minister announced that the country "has no plans in place to accept COVID-19 vaccines" following President John Magufuli expressing doubt about vaccines sourced abroad, without offering evidence.[6]

Despite the various missteps and the fact that Africa, as a whole, accounts for 25% of the global burden of diseases, the epidemic seems to have spared many sub-Saharan African countries to some degree in 2020, if the WHO case reporting is to be believed. At the time of writing, the African continent has had a lower COVID-19 prevalence, compared to the Americas and Europe.[7] Although the situation is more serious in 2021 in Africa, as of July 6, 2021, of the 183,934,913 confirmed cases of COVID worldwide, only 4,224,102 (2.3%) have been reported in the continent; and of the 3,985,022 documented COVID-19 related deaths, only 98,718 (2.5%) have been reported in Africa[7] – despite it being the second most populous continent after Asia, and despite having been negatively impacted by civil wars, hunger, diseases such as HIV-AIDS, tuberculosis and, in recent years, Ebola virus disease

Correspondence: Simon D Taylor-Robinson
Email str338333@gmail.com

Received: 30 July 2021
Accepted: 9 November 2021
Published: 25 November 2021

© 2021 Oleribe et al. This work is published by Dove Medical Press Limited, and licensed under a Creative Commons Attribution License. The full terms of the License are available at http://creativecommons.org/licenses/by/4.0/. The license permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

(EVD).[7,8] This low COVID-19 prevalence across much of the continent is despite the fact that mathematical models projected large COVID-19 epidemics as many African countries ostensibly had fewer means to suppress transmission and manage cases.[8]

It is of note that some African nations developed or swiftly reactivated some basic infrastructure like diagnostic testing facilities, intensive care units, surveillance, and systems for reporting emergencies to fight the COVID-19 pandemic; activated political and financial tools to combat the pandemic; and enjoyed a level of technical support from the Africa Centers for Disease Control and global development partners. However, the overall response was poorly coordinated and funded.[8] In reality, the relative low reported impact of COVID-19 in the African continent in 2020 was not actually a result of an excellent, coordinated or thought-out response on behalf of governments or medical authorities in the African continent.[3,9,10] Although the situation is changing rapidly in 2021, the WHO recorded low case rates across the continent in 2020; we would hypothesise that the low reported COVID-19 rates in a swathe of sub-Saharan African countries in 2020 could be linked to:

1. **Sub-Saharan African Disease Patterns:** Although a majority of sub-Saharan African nations are battling with the triple burden of diseases – communicable, non-communicable and trauma/injuries, seasonal influenza is not common in across much of the continent.[11–15] Colds and catarrhal ailments may be seen during the dry seasons, but these do not normally translate into an epidemic in most sub-Saharan African nations, unlike in Europe and the Americas where influenza results in deaths of thousands of people annually.[16,17] Several environmental factors, such as the climate and the population distribution may negate the establishment and spread of influenza viruses. Such factors may have helped mitigate the extent of the COVID-19 pandemic in sub-Saharan Africa in 2020. Although there is increasing prevalence of COVID-19 in four different waves, the African continent still has the lowest number of documented cases at the time of writing.[7]
2. **Sub-Saharan African Herd Immunity:** Communicable diseases, including malaria, typhoid, and viral haemorrhagic fevers are still very common across the continent. In addition, a lack of adequate sanitation, a growing population of vectors, such as flies and mosquitoes, and a scarcity of drinkable water may expose the immune system of the average African to viral, bacterial, fungal, helminthic and protozoal agents that may stimulate the immune system without necessarily producing overt clinical disease.[18] Repeated exposure over the years may help Africans to build active defences against common protozoal, bacterial and viral diseases, resulting in herd immunity and cross-immunity that may have protected a large proportion of the population from emerging and reemerging disease agents such as SARS-CoV-2.[18] It has been argued that because people with malaria develop anti-GPI antibodies that may recognise SARS-CoV-2 glycoproteins, repeated malarial exposure may be protective against COVID-19 or bring about a milder disease pattern.[19]

Furthermore, with nearly 13% of the world population living in extreme poverty, the continent has the largest share of poor people worldwide.[20] Accompanying this level of poverty in sub-Saharan Africa, people frequently live in slums, shared space with multiple families in a single-family house, and many living in a classical congregate setting in proximity (although it could be argued that the same applies to parts of India). Beyond sharing space, people also share food, water, amenities, utensils and their diseases, resulting in diverse cross-immunity. The culture of shared space makes social distancing difficult, if not impossible. Close interaction, which was feared to have worsened the epidemic in America and Europe, rather that worsening the pandemic in sub-Saharan Africa, may have brought about low-level contemporaneous exposure to a number of infectious agents including SARS-CoV-2, resulting in cross-immunity against several infections, including against COVID-19.[20] It is, therefore, possible that space sharing, congregate living conditions and economic poverty may have contributed to a better pandemic outcome for sub-Saharan Africans with high-level herd immunity against multiple infections, which may have contributed significantly to the lower documented cases of COVID-19, as well as deaths associated with COVID-19 across much of the African continent in 2020.[7]

3. **African Population Dynamics:** Africa is the world's second-largest and second-most populous continent, accounting for about 16% of the world's population.[21] The African population explosion was so rapid over the past century that it consequently

exhibits a disproportionately large youth population.[22] A low life expectancy of below 50 years in some sub-Saharan African countries further enhances the largely very youthful population in the African continent.[23] This makes the proportion of those above 65 years of age in Africa less than 10% across most African nations, minimizing the impact of COVID-19, as SARS-CoV-2 most severely affects those of 65 years of age and above. As the elderly population is small and widely dispersed in Africa, we would hypothesise that it potentially resulted in fewer infections and deaths. Also, because the elderly in much of Africa are long-term beneficiaries of herd immunity from prolonged exposure to communicable diseases, possible enhanced immunity from rural hard labour, such as in agricultural work, the use and misuse of local herbs to treat wounds and illnesses, and the impact of harsh environments in farming communities, their susceptibility to COVID-19 may have been limited in the initial stages of the pandemic.

4. **Sub-Saharan African Weather Conditions and Lifestyle:** This region of the world is mostly tropical, with countries across both sides of the Equator. Much of the continent experiences hot, windless conditions for the majority of the year. Such weather conditions may hinder the transmission of viruses, including SARS CoV-2, as most of the continent is not prone to seasonal changes in climatic conditions, unlike Europe and the Americas, where viral illnesses are commoner in colder months.[24,25] The hot weather conditions necessitate people to spend most of their time outdoors, unlike in Europe and the Americas, where the majority spend most of their days indoors, except during summer. We would hypothesise that outdoor lifestyles, sleeping outside at night in hot weather, an absence of air conditioning (which can spread viral infections), while making life uncomfortable for Africans, may indirectly protect them from diseases like COVID-19 and other flu-like illnesses. Although cities in California and Texas in the USA may have similar temperature conditions, by contrast, the availability of air conditioners facilitates indoor activities, thus augmenting the spread of diseases.
5. **Sub-Saharan African COVID-19 Testing Patterns:** Unlike the rest of the world where COVID-19 testing has been readily and widely available, if not universally available and accessible by all who desired or needed to be tested, in most sub-Saharan African nations, the availability of testing kits has been erratic, and almost non-existent in some countries.[26,27] This is fuelled by governments and national leaders who have not seen this as a priority.[6] The low prevalence rates reported to the WHO, in part has to be related to the lack of diagnostic equipment, resulting in considerable underdiagnoses.[26,27] When test kits are available, they have been highly limited and thus have been primarily used to test international travellers departing from or arriving into the continent – governmental authorities not necessarily believing that indigenous populations themselves can be the source of COVID-19 outbreaks.[6] Where cases were diagnosed in travellers, their contacts were also traced and tested. This highly focused and tailored testing, concentrating on international travellers has resulted in high test positivity rates in isolated clusters, which have not reflected the population prevalence at any time of the pandemic.[26,27] We would venture that this may have contributed to the low confirmed case numbers reported to the WHO, but may not completely negate any of the other factors we have discussed. However, another factor which may lead to COVID-19 under-diagnosis is the similarity in symptoms between malaria and COVID-19, leading many to be treated for assumed malaria, a condition which itself carries a high mortality.[19]
6. **Poor Public Health Guidance:** With COVID-19 came a number of public health measures, such as social distancing, hand washing, use of masks, stay-at-home policies and the use of hand-sanitizers that were adopted by sub-Saharan African countries (scientists and leaders) without thought as to their applicability.[28–30] The commercial sector was closed in North America and in Europe, but their governments gave financial assistance and food allowances to those laid off work, while sustaining businesses through grants, such as the CARES Fund and American Rescue Fund. By contrast, most African governments shut down the business sector in 2020 without any viable social support, resulting in more deaths from hunger and mental health issues, including suicide and intimate partner violence than from the COVID-19 pandemic itself in 2020. COVID-19 control measures in African countries led to

economic challenges,[31] increased cases of other communicable and non-communicable diseases,[32] low hospital appointment uptake and higher cancellation rates for urgent procedures.[33] Owing to fear of contracting COVID-19, African healthcare workers sometimes abandoned their posts, leaving some to die from other illnesses such as malaria, cardiovascular disease and stroke, as they had no easy access to treatment. Thus, we would suggest that a proportion of the excess deaths during the pandemic were not directly related to COVID-19, but in part, to medical neglect and mismanagement.[33]

While death rates are now rising in 2021 across the African continent to levels not seen in 2020, this may be related to the emergence of new viral variants which have reduced the natural resistance of communities across the continent, such as the delta variant and/or to the lack of COVID-19 vaccination throughout Africa.[7]

We should be mindful that the COVID-19 pandemic has completely changed the way the world functions, how businesses are managed (with remote working), patients are cared for (with tele-health) and meetings are held (through video-conferencing). However, we will not reach an equilibrium until COVID-19 vaccination is widespread around the world. The potential for new viral variants to occur in unvaccinated populations is too great and currently, sub-Saharan Africa being a source of concern in this regard.[34] In sub-Saharan Africa, vaccination is going to become the next hurdle as vaccines are not widely available. As of July 12 2021, 3.44 billion doses have been delivered worldwide, but less than 0.5% of the total has been in the continent.[35] Where COVID-19 vaccines are available, such as in the Republic of South Africa, uptake is poor owing to vaccine hesitancy, skepticism, mistrust of the system, and poor/ineffective public health dissemination policies.[36] Public healthcare policies need to be directed towards education of the general public with respect to improving vaccine uptake and reducing vaccine skepticism.[37–40]

While there is not a one-size-fits-all policy for the continent and this is apparent when focusing on countries such as the Republic of South Africa, which was harder hit by the pandemic,[41] we believe that it will be good to review the current COVID pandemic comprehensively to document the mistakes made, the lessons learned, and to develop a global pandemic response protocol that will prepare governments, scientists and healthcare professionals for appropriate action in any future pandemics. Such lessons need to be reviewed in a multidisciplinary way (and not just from a medical perspective), as factors such as atmospheric stability, wind speed and environmental pollution all have had an impact on COVID-19 transmission and given that weather patterns are frequently predictable, such data should be added into public health models of disease transmission to more accurately forecast future trends across the continent, both in the current pandemic and in future potential disease outbreaks.[42]

Acknowledgments

SDT-R is grateful to the British National Institute for Healthcare Research Biomedical Facility at Imperial College London for infrastructure support. SDT-R was funded by Wellcome ISSF at Imperial College London. We thank Professor Marsha Morgan for philosophical, linguistic and syntactical comments on the manuscript.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Buguzi S. COVID-19: counting the cost of denial in Tanzania. *BMJ*. 2021;373:n1052.
2. Nakkazi E. Obstacles to COVID-19 control in East Africa. *Lancet Infect Dis*. 2020;20:660. doi:10.1016/S1473-3099(20)30382-0
3. Umviligihozo G, Mupfumi L, Sonela N, et al. Sub-Saharan Africa preparedness and response to the COVID-19 pandemic: a perspective of early career African scientists. *Wellcome Open Res*. 2020;5:163.
4. Atabong AB. How Pan-African media helped Madagascar advance its claim of a COVID-19 'miracle cure' as a form of medical diplomacy. africaportal.org; 2020. Available from: https://www.africaportal.org/publications/how-pan-african-media-helped-madagascar-advance-its-claim-covid-19-miracle-cure-form-medical-diplomacy/. Accessed July 6, 2021.
5. Orisakwe OE, Orish CN, Nwanaforo EO. Coronavirus disease (COVID-19) and Africa: acclaimed home remedies. *Sci Afr*. 2020; e00620. doi:10.1016/j.sciaf.2020.e00620
6. Makoni M. Tanzania refuses COVID-19 vaccines. *Lancet*. 2021;397:566. doi:10.1016/S0140-6736(21)00362-7
7. WHO. WHO Coronavirus (COVID-19) Dashboard. Available from: https://covid19.who.int/. Accessed July 6, 2021.
8. Dzinamarira T, Dzobo M, Chitungo I. COVID-19: a perspective on Africa's capacity and response. *J Med Virol*. 2020;92:2465–2472. doi:10.1002/jmv.26159
9. Van Zandvoort K, Jarvis CI, Pearson CA, et al. Response strategies for COVID-19 epidemics in African settings: a mathematical modelling study. *BMC Med*. 2020;18:1–19. doi:10.1186/s12916-020-01789-2
10. Haider N, Osman AY, Gadzekpo A, et al. Lockdown measures in response to COVID-19 in nine sub-Saharan African countries. *BMJ Global Health*. 2020;5:e003319. doi:10.1136/bmjgh-2020-003319
11. Cooper RS, Osotimehin B, Kaufman JS, Forrester T. Disease burden in sub-Saharan Africa: what should we conclude in the absence of data? *Lancet*. 1998;351:208–210. doi:10.1016/S0140-6736(97)06512-4
12. Boum Y, Mburu Y. Burden of disease in Francophone Africa 1990–2017: the triple penalty? *Lancet Global Health*. 2020;8:e306–e307. doi:10.1016/S2214-109X(20)30040-1
13. Labadarios D, Steyn NP. Nutritional disorders in Africa: the triple burden. *Nutrition*. 2005;21:2. doi:10.1016/j.nut.2004.09.002

14. Norman R, Matzopoulos R, Groenewald P, Bradshaw D. The high burden of injuries in South Africa. *Bull World Health Organ*. 2007;85:695–702. doi:10.2471/BLT.06.037184
15. Agyei-Mensah S, Aikins ADG. Epidemiological transition and the double burden of disease in Accra, Ghana. *J Urban Health*. 2010;87:879–897. doi:10.1007/s11524-010-9492-y
16. Beveridge WI. The chronicle of influenza epidemics. *Hist Philos Life Sci*. 1991;13(2):223-234.
17. Bloom-Feshbach K, Alonso WJ, Charu V, et al. Latitudinal variations in seasonal activity of influenza and respiratory syncytial virus (RSV): a global comparative review. *PLoS One*. 2013;8:e54445. doi:10.1371/journal.pone.0054445
18. Sotgiu S, Angius A, Embry A, Rosati G, Musumeci S. Hygiene hypothesis: innate immunity, malaria and multiple sclerosis. *Med Hypotheses*. 2008;70::819–825. doi:10.1016/j.mehy.2006.10.069
19. Hussein MIH, Albashir AAD, Elawad OAMA, et al. Malaria and COVID-19: unmasking their ties. *Malar J*. 2020;19:457. doi:10.1186/s12936-020-03541-w
20. Statista. *African Countries with the Highest Share of Global Population Living Below the Extreme Poverty Line in 2021*; 2021.
21. Wikipedia. Africa. Available from: https://en.wikipedia.org/wiki/Africa. Accessed July 12 2021.
22. Zinkina J, Korotayev A. Explosive Population Growth in Tropical Africa: crucial Omission in Development Forecasts (Emerging Risks and Way Out). *World Futures*. 2014;70/2:120–139. doi:10.1080/02604027.2014.894868
23. CIA World Factbook. Available from: https://www.cia.gov/the-world-factbook/. Accessed July 6 2021.
24. Neuzil KM, Hohlbein C, Zhu Y. Illness among schoolchildren during influenza season: effect on school absenteeism, parental absenteeism from work, and secondary illness in families. *Arch Pedi Adolesc Med*. 2002;156:986–991. doi:10.1001/archpedi.156.10.986
25. Smith S, Morbey R, Pebody RG, et al. Retrospective observational study of atypical winter respiratory illness season using real-time syndromic surveillance, England, 2014–15. *Emerg Infect Dis*. 2017;23:1834. doi:10.3201/eid2311.161632
26. Mulu A, Bekele A, Abdissa A, et al. The challenges of COVID-19 testing in Africa: the Ethiopian experience. *Pan Afr Med J*. 2021;38. doi:10.11604/pamj.2021.38.6.26902
27. Kobia F, Gitaka J. COVID-19: Are Africa's diagnostic challenges blunting response effectiveness? *AAS Open Res*. 2020;3:4.
28. Oleribe OO, Oskouipour P, Nwanyanwu O, Taylor-Robinson SD. The COVID-19 era: the view from Nigeria. *QJM*. 2021;114:13–15. doi:10.1093/qjmed/hcaa297
29. Oleribe OO, Osita-Oleribe P, Salako BL, Ishola TA, Fertleman M, Taylor-Robinson SD. COVID-19 experience: taking the right steps at the right time to prevent avoidable morbidity and mortality in Nigeria and other nations of the world. *Int J Gen Med*. 2020;13:491. doi:10.2147/IJGM.S261256
30. Oleribe O, Ezechi O, Osita-Oleribe P, et al. Public perception of COVID-19 management and response in Nigeria: a cross-sectional survey. *BMJ Open*. 2020;10:e041936. doi:10.1136/bmjopen-2020-041936
31. Ozili PK, Arun T. Spillover of COVID-19: Impact on the Global Economy. Available from: https://ssrn.com/abstract=3562570. Accessed November 16, 2021.
32. Oni T, Micklesfield LK, Wadende P, et al. Implications of COVID-19 control measures for diet and physical activity, and lessons for addressing other pandemics facing rapidly urbanising countries. *Glob Health Action*. 2020;13:1810415. doi:10.1080/16549716.2020.1810415
33. Spalletta G, Porcari DE, Banaj N, Ciullo V, Palmer K. Effects of COVID-19 infection control measures on appointment cancelation in an Italian outpatient memory clinic. *Front Psychiatry*. 2020;11:1335. doi:10.3389/fpsyt.2020.599844
34. Conti P, Caraffa A, Gallenga CE, et al. The British variant of the new coronavirus-19 (SARS-Cov-2) should not create a vaccine problem. *J Biol Regul Homeost Agents*. 2021;35:1–4.
35. Our World in Data. Coronavirus (COVID-19) Vaccinations.Available from: https://ourworldindata.org/covid-vaccinations. Accessed July 12 2021.
36. Zhu J, Yan W, Zhu L, Liu J. COVID-19 pandemic in BRICS countries and its association with socio-economic and demographic characteristics, health vulnerability, resources, and policy response. *Infect Dis Poverty*. 2021;10:97. PMID: 34238368; PMCID: PMC8264992. doi:10.1186/s40249-021-00881-w
37. Echoru I, Ajambo PD, Keirania E, Bukenya EEM. Sociodemographic factors associated with acceptance of COVID-19 vaccine and clinical trials in Uganda: a cross-sectional study in western Uganda. *BMC Publ Health*. 2021;21:1106. PMID: 34112143; PMCID: PMC8190743. doi:10.1186/s12889-021-11197-7
38. Coccia M. Preparedness of countries to face COVID-19 pandemic crisis: strategic positioning and underlying structural factors to support strategies of prevention of pandemic threats. *Environ Res*. 2021;203:111678. PMID: 34280421; PMCID: PMC8284056. doi:10.1016/j.envres.2021.111678
39. Frederiksen L, Zhang Y, Foged C, Thakur A. The long road toward COVID-19 herd immunity: vaccine platform technologies and mass immunization strategies. *Front Immunol*. 2020;11:1817. PMID: 32793245; PMCID: PMC7385234. doi:10.3389/fimmu.2020.01817
40. Kanyike AM, Olum R, Kajjimu J, et al. Acceptance of the coronavirus disease-2019 vaccine among medical students in Uganda. *Trop Med Health*. 2021;49(1):37. doi:10.1186/s41182-021-00331-1
41. Broadbent A, Combrink H, Smart B. COVID-19 in South Africa. *Global Epidemiol*. 2020;2020:100034. doi:10.1016/j.gloepi.2020.100034
42. Coccia M. The effects of atmospheric stability with low wind speed and of air pollution on the accelerated transmission dynamics of COVID-19. *Int J Environ Stud*. 2021;78(1):1–27. doi:10.1080/00207233.2020.1802937

Journal of Multidisciplinary Healthcare Dovepress

Publish your work in this journal

The Journal of Multidisciplinary Healthcare is an international, peer-reviewed open-access journal that aims to represent and publish research in healthcare areas delivered by practitioners of different disciplines. This includes studies and reviews conducted by multi-disciplinary teams as well as research which evaluates the results or conduct of such teams or healthcare processes in general. The journal covers a very wide range of areas and welcomes submissions from practitioners at all levels, from all over the world. The manuscript management system is completely online and includes a very quick and fair peer-review system. Visit http://www.dovepress.com/testimonials.php to read real quotes from published authors.

Submit your manuscript here: https://www.dovepress.com/journal-of-inflammation-research-journal