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Addressing the Risk Factors Contributing to High COVID-19 Infection Rates in Africa

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Abstract

This article argues that, to contain COVID-19 in Africa, a number of risk factors must be more seriously addressed in the fight against the disease, namely, understanding the interrelationships between population density and mass gatherings, sanitation and contaminated water, poverty, climate change, insufficient disease-tracking data, leadership style and ability, and corruption. All the above factors are intertwined and they need to be addressed in a holistic manner if the continent is to contain not only COVID-19, but also future pandemics. Regardless of other factors, as can already be seen from the experience of countries such as New Zealand, strong leadership will be critical to addressing the identified risks.

Keywords

COVID-19, Africa, infection rates, poverty, sanitation, corruption, leadership

1. Introduction

Since COVID-19 was first detected in December 2019 in Wuhan Province in China, it has spread to almost 190 countries in all regions of the world. During the last six months, the approaches to containing the COVID-19 pandemic have varied from one country to another. This article explores some of the risk factors which have enabled the spread of the novel coronavirus in Africa, namely, population density and mass gatherings, sanitation and contaminated water, poverty, climate change, insufficient data, the role of political leadership, and corruption.

2. Risk Factors

2.1 Population Density and Mass Gatherings

It was thought initially that COVID-19 infections would be more concentrated in densely populated

areas of the world. This, however, has not always been the case. While some analysts, such as Barr and Tassier (2020), argue that putting too much emphasis on urban density is a mistake, others insist on this correlation. Thus, Žmuk and Jošić (2020), in their study of COVID-19 infection in 209 countries, conclude that, in some regions of Italy, France and the United Kingdom of Great Britain and Northern Ireland, there is a correlation between population density and the spread of COVID-19. Similarly, some studies of the spread of higher infection rates in major US cities, compared with outlying residential areas, indicate a relationship with congested subways in cities like New York. However, Hamidi et al. (2020) find that in many densely populated areas, especially major cities like New York, Los Angeles and Chicago, higher infection rates have not occurred. In fact, according to Hamidi et al. (2020), the death rates are lower in densely populated counties than in less densely populated counties. They contend that densely populated counties in the USA have greater access to healthcare facilities and social distancing interventions are better managed (Hamidi et al., 2020). A further contributing factor to the apparent anomaly, as noted by Florida (2020), could be that small communities and towns in the USA are often characterised by a higher proportion of nursing homes, institutions whose residents are more susceptible to the virus due to their age and health.

The correlation between population density and COVID-19 infection rates has been much clearer in developing countries. For example, Bagcchi (2020) notes that the American findings contradict those of India and other developing countries. In India, the highest mortality rates have been in densely populated slums of the major cities of Mumbai, Delhi and Chennai, and not in the small urban centres. Florida (2020) confirms that this applies also in Africa, where infection rates are higher in densely populated countries, including Algeria, Egypt, Ethiopia, Morocco and Nigeria, and in certain metropolitan centres, such as Abidjan, Cairo, Johannesburg, Kinshasa and Lagos, but notes that, as population densities in Africa are lower than in other parts of the world, the incidence of COVID-19 is also lower. This is the case in Kenya. Ayah (2020) notes that the densely populated cities of Nairobi and Mombasa have had the highest mortality rates in Kenya since the COVID-19 outbreak. Within those cities, the worst affected areas are the overcrowded slums. This also is the case in the informal settlements (townships) of South Africa.

Mass gatherings of people, including religious services, weddings and funerals, political gatherings and open markets, attract greater risks of coronavirus transmission. An exemplary handling of containing such transmission comes from the Republic of Korea, where the government demanded that the Shincheonji church turn over its full membership list to enable the Ministry of Health to screen the worshippers for COVID-19. All the members identified as positive were ordered to self-isolate. In the city of Daegu, everyone was tested for the virus and individuals with the most serious cases of COVID-19 were hospitalized, while those with milder cases were checked into isolation centres (Thompson, 2020). Thompson confirmed that the initial Korean outbreak was contained within one

month.

An example of poor management of potential transmission is a biotechnology leadership conference held in Boston, USA, in February 2020, attended by 175 executives from all over the world (Aschwanden, 2020). During the two days, participants shook hands, did not maintain social distancing protocols, and shared meals. Thereafter, a number of people were infected with COVID-19 (Aschwanden, 2020). Similar examples abound and make it clear that proper protocols as recommended by the World Health Organization (WHO) should be respected.

In should be remembered that WHO (2015) recommends that whenever there are disease outbreaks in crowded areas, the responsible governments should address the problem through the use of risk assessment approaches.

2.2 Sanitation and Contaminated Water

Another contributing factor to COVID-19 infection rates is provided by polluted water, poor hygiene, and lack of sanitation. Before COVID-19, regular hand-washing practices were not observed by many people, especially in rural areas and urban slums in Africa and other developing countries. Most poor neighbourhoods within major cities in developing countries lack clean water and adequate sanitation. People cannot afford to wash their hands regularly and, in most cases, they share toilets and washing areas, which are environmentally sub-standard. Poor hygiene increases the risk of contracting gastroenteritis, food poisoning, hepatitis A, influenza, the common cold, giardiasis, roundworm and threadworm. In short, improved sanitation could help many slum dwellers to avoid the possible risks associated with poor hygiene and polluted water and provide access to running water to enable regular hand-washing.

The importance of hygiene and the need for water has increased since the outbreak of COVID-19. For example, since March 2020, NGOs, charity organizations and the county government of Nairobi have been helping slum communities with clean potable water. Even so, Yusuf (2020) describes a slum where a landslide destroyed the single water pipe, making frequent hand washing for coronavirus prevention a challenge.

Unfortunately, people living in informal settlements and slums of major cities in Africa and elsewhere have little means to access affordable clean water. According to *UN News* (2020), it is recommended that African governments and partners should provide subsidized water for the duration of the COVID-19 crisis to people who are poverty stricken and those affected by economic hardship.

2.3 Poverty

Most people who are classified as being of low socioeconomic status live in overcrowded conditions. Crowded living conditions reduce compliance with social distancing requirements. Poverty is one of the risk factors for lower respiratory tract infections. Many poor people lack medical insurance and suffer from underlying illnesses such as diabetes, obesity, hypertension, and cardiovascular diseases.

Studies such as those in the USA indicate that poor and working poor Americans are most vulnerable to COVID-19 (Rogers, 2020). This is because they work in jobs with high exposure risks, such as home health aides, grocery clerks, and housekeepers, which put them in close contact with the public.

In Africa, the poor are the ones who have been hardest hit by the pandemic. Protests have occurred in some African countries. For example, in the Sudan, people protested over the measures implemented to contain the spread of the coronavirus which left people with a choice between death by virus or death by starvation (Ostergard, 2020). This was also the case in Morocco. According to Ostergard (2020), in impoverished South African townships, the government had to use the military and police to enforce pandemic policies. Levison (2020) stated that by 22 June 2020, the Cape Town area, the country's second-most populated city, was the epicentre of the COVID-19 outbreak, with about 53% of the national cumulative cases, followed by Gauteng (Johannesburg and Pretoria) at 21%. One of the lessons from COVID-19 is that the South African government now plans to reduce the density of the poverty-stricken overcrowded informal settlements. Nonetheless, for the proposed measures to work, they should be implemented with the support of communities in those areas.

2.4 Climate Change

There is a direct relationship between climate change and coronavirus infections. For instance, WHO (2015) maintains that climate change affects the social and environmental determinants of health, namely clean air, safe drinking water, sufficient food and secure shelter. Lustgarten (2020) argues that climate change is demolishing the natural defence systems that have kept many viruses away from people. Climate change is also a factor in the catastrophic loss of biodiversity caused by reckless deforestation and aggressive conversion of wildland for economic development, which, in turn, is pushing farms and people closer to the wild and opening the doors for the spread of disease. In this context, climate change therefore affects disease transmission by shifting the vectors' geographical range and by shortening the pathogens' incubation period. The consequences of climate change can thus fuel the spread of the coronavirus. For example, it is the poorest people who have suffered the most loss and damage resulting from climate change, including coping with the coronavirus disease pandemic during the recent floods of the Nile in the Sudan. The two crises, floods and coronavirus, are interdependent. There are concerns also that changing climate will bring more viral disease outbreaks. On the other hand, some people contend that although outbreaks of viral diseases may become more frequent, science may well be in a better position to deal with them (Kingsland, 2020).

According to Lone and Ahmad (2020), the high burden of infectious diseases and the arrival of the winter flu season in southern Africa were some of the major factors which rendered the continent particularly vulnerable to the pandemic. They further point out that non-communicable diseases, such as cardiovascular conditions, cancers, chronic respiratory diseases and diabetes, are common in Africa and these conditions, in turn, compromise the body's immune system and affect the severity of the

effects of COVID-19. Indeed, the majority of COVID-19 infections in Africa and other developing countries are found in combination with the above diseases.

Onyango (2020) holds that the evidence linking COVID-19 to climate change is still in the initial stages, but there is consensus that respiratory viruses such as influenza are influenced by temperature and humidity and can survive longer at lower temperatures and low humidity. Accordingly, it can be argued that climate change may influence the spread of a novel viral disease such as COVID-19.

Regardless of the differing perspectives on the role of climate change and the spread of the coronavirus, COVID-19 has taken the world by surprise and we should be prepared to face possible pandemics in the future that could be triggered by climate change (Momaneh, 2020).

2.5 Insufficient Data for Tracking COVID-19

Having credible data remains critical to the containment of COVID-19. According to Houreld and Lewis (2020), a month after the coronavirus emerged in Tanzania in April, President Magufuli declared the country free of COVID-19. Since then, there has been no update or data on the spread of the disease in Tanzania (Houreld & Lewis, 2020). Inadequate data in many African countries make it difficult to determine the extent and impact of the disease. As explained by Houreld and Lewis (2020), some African governments do not wish to publicize the poor state of their health services or accept that they face epidemics. There is no question that sharing information has several advantages including for planning and management purposes, and mobilizing funding, among others.

Some governments have gone to great lengths to prevent information about the status of infections from becoming known, even if that has meant them missing out on donor funding (Houreld & Lewis, 2020). In Africa, a lack of credible coronavirus data raises fears of a “silent epidemic” (Houreld & Lewis, 2020). BBC reporter Ann Soy, quoting the African Union’s Africa Centres for Disease Control and Prevention (Africa CDC), confirmed that, as at 27 May 2020, in a continent of 1.3 billion people, only 1.3 million had been tested.

Based on the data available, it also appears that there are huge differences in actual cases of people affected by COVID-19 and other determinants among African countries. For example, the majority of the tested and confirmed cases in Eswatini, Malawi, Nigeria and South Africa are people in their 30s (Olamijuwon et al., 2020). Moreover, a significant number of the people tested and confirmed positive in South Africa are women, while more men have tested positive in Nigeria and Kenya.

There is a lack of complete and quality registration and statistics, in particular on the causes of death of people. This is a big limitation for many African countries. Many high-income countries can at least quantify the actual number of deaths from COVID-19 (Olamijuwon et al., 2020). African countries need to standardize and detail the data collected as part of their national COVID-19 containment strategy.

2.6 Lack of Leadership

Based on the available information, leadership style can pose another risk to the containment of COVID-19. For example, some leaders have successfully taken in hand their country's entire containment process, such as Prime Minister Jacinda Ardern of New Zealand and Chancellor Angela Merkel of Germany. As the coronavirus disease spread all over Africa, Pierre Nkurunziza, the late President of Burundi, refused to apply lockdown and continued with business as usual. Furthermore, he expelled the WHO representative and three experts on the subject. He insisted that the country would be spared through the Christian faith (Solomon, 2020). His sudden death just before the end of his presidency is widely attributed to COVID-19, offering a salutary lesson to other COVID-deniers. The Tanzanian President decided to take a different approach, criticizing the public health experts and international community, thereby shutting off debate and discussion about the disease.

In contrast, the Africa countries that have made progress with COVID-19 are the ones where the leaders have been proactive in instituting testing and contact tracing, such as Ghana, Kenya, Senegal and South Africa (Solomon, 2020). In Uganda, President Museveni, echoing what his scientists had learned from dealing with Ebola and AIDS, said that dealing with the most common means of transmission was the key and declared that everyone should wear masks in public as part of the fight against COVID-19 (Solomon, 2020).

In the opinion of Johnson-Sirleaf (2020), credit should be given to some African women who have outdone themselves in fighting the coronavirus. For example, the mayor of Freetown, Yvonne Aki-Sawyer, has been mobilizing support across the city of Freetown to deliver behaviour change messages, such as the importance of wearing masks for all citizens. In Rwanda, Clare Akamanzi, working under the direct leadership of the President, has coordinated a massive Ministry of Health effort to combat the COVID-19 pandemic through organized isolation centres, the sourcing of personal protective equipment (PPE) and testing kits, and by developing plans for the post-virus recovery of the economy (Johnson-Sirleaf, 2020).

In short, there are a few things which African leaders could still do concerning COVID-19:

(a) During the current outbreak, African Presidents or Prime Ministers should help to organize the national response and not leave citizens to struggle on their own. Moreover, for government to respond adequately to the crisis, there should be clear guidance from the national leadership and the process should not be politicized as has happened in such countries as Brazil, Burundi, the USA, Mexico, and Tanzania, with unfortunate consequences.

(b) Ideally, African leaders should fight the COVID-19 pandemic collectively rather than as individual countries. It is necessary for all stakeholders to join hands together in order to successfully fight the pandemic.

2.7 Corruption

Since the COVID-19 outbreak began in March 2020, a significant challenge faced by some African countries has been the procurement of high-quality PPE and other essential medical equipment at affordable prices. Almost all African countries were unprepared for the pandemic, and there was competition among them and other countries, including those from Europe, to procure PPE. Given the financial challenges faced by most African countries, a number of their development partners and donors have come to their aid. Unfortunately, the procurement of COVID-19 medical supplies has been marred by corruption in many African countries. In particular, Igunza (2020) notes that the Kenya Medical Supplies Authority (KEMSA) misused US$ 7.8 million destined for the purchase of emergency PPE for hospitals and health workers throughout Kenya. The Kenya Anti-Corruption Commission discovered that procurement laws had been broken by KEMSA officials to award tenders to their friends or influential people. The investigation is ongoing, and chances are that those concerned will be arrested. Every Kenyan has condemned KEMSA and the parent Ministry of Health for allowing the misappropriation of funds donated to fight COVID-19. In fact, WHO (2020) has described corruption in the procurement of COVID-19 PPE as unacceptable and likened it to murder (Omboki, 2020).

Other examples include South Africa, whose COVID-19 response has also been marred by allegations of corruption surrounding its historic US$ 26 billion economic relief package (Magome, 2020). President Ramaphosa has launched an investigation targeting unscrupulous officials and private companies which have been involved in looting the government coffers. Interestingly, PPE was being offered for sale at four times the regular price and sanitizers were being charged at US$ 5 for a half-litre bottle, almost twice the original price (Magome, 2020). In Zimbabwe, the Heath Minister was sacked in July for unlawfully procuring medical equipment valued at US$ 75 million (Africa Briefing, 2020). Ministers have been implicated for embezzling COVID-19 funds in Malawi and the Democratic Republic of the Congo (Africa Briefing, 2020). COVID-19 scandals also have caused government officials to lose their jobs in Botswana, Somalia and Uganda.

Allegations of mismanagement of COVID-19 funds do not centre on Africa only; other countries have also fallen foul in this regard, such as Poland, whose Health Minister was forced to step down in August (Africa Briefing, 2020). The Africa Briefing (2020) article goes on to quote Liz David-Barrett of the University of Sussex, who notes that “The difficult part about a crisis, is that it is much harder to differentiate corrupt behaviour from the results of genuine mistakes and rushed decisions”.

Whatever the case, the entrenched African culture will not change overnight, health crisis or no health crisis.

3. Summary

Clearly, there are no simple solutions to tackling the risks discussed above that can exacerbate the spread and severity of COVID-19. As noted, in some countries, residents of densely populated areas or cities appear to be at less risk from COVID-19 than people living in less densely populated areas. This is not the case in Africa, however. The report of the Africa Centres for Strategic Studies of April 2020 acknowledged that densely populated slums or informal settlements created conditions where coronavirus could spread quickly and undetected. African governments should, therefore, in the medium to long term, upgrade and modernize the slums in their major urban areas in order to prevent future pandemics. African governments should also consider de-urbanization, or at least encourage the expansion of smaller towns, especially in countries which have invested in devolution.

Very large crowds, such as those which gather in churches, political gatherings, open markets, weddings and funerals, create greater risks of transmission. The WHO (2015) recommends that all countries should use risk assessments and risk management to guide the planning and facilitation of mass gatherings. For now, large crowds should be avoided, or certainly discouraged, until African countries are able to contain COVID-19.

The issues of clean water and sanitation have been neglected across Africa, particularly in the densely populated urban slums. As part of a sustainable response to COVID-19, Ndaw (2020) maintains that African governments should prioritize water supply, sanitation, and hygiene services. The lessons to date from COVID-19 indicate that investment in the water and sanitation sector has been dismal.

As regards poverty, Rodriguez (2020) convincingly demonstrates the vicious circle created by disease outbreaks and poverty, resulting in a widespread decline in economic status which, in turn, leads to more disease and more poverty. Epidemics worsen inequality and this, in turn, raises the cost of living, making it difficult for ordinary people to survive.

Climate change has been identified as a “pandemic enabler, a pandemic accelerant and a multi-pathway crisis engine” (Cadham, 2020). Therefore, countries should invest in the mitigation of climate change.

Another factor further exacerbating the risks of COVID-19 is the lack of data and information on the virus and its transmission pathways. An enormous amount of research undoubtedly has been undertaken on the novel coronavirus, but unfortunately this lacks consistency across different African countries, greatly limiting its usefulness (Henderson, 2020). Moreover, as Vestal (2020) notes, in some countries where very little testing is available, few cases are reported. Consequently, this may make people believe that they are not at risk, when in fact they are. The Director of the Africa CDC, John Nkengasong, warns that, even with good intentions, collecting quality data from African countries is not easy because experts are already stretched so thin; when this constraint is compounded by the additional burden imposed by COVID-19, their task becomes even more difficult. Much still remains unknown about this pandemic.

By and large, the pandemic has shown that Africa is able to solve its own problems. The region has resolved to produce its own PPE and other related medical supplies, rather than remain dependent on outside sources. According to Devermont (2020), many of the region's leaders have listened to their health professionals, communicated effectively and frequently with their public, and drawn on best practices from the campaigns against Ebola, HIV/AIDS and tuberculosis.

The COVID-19 pandemic provides an opportunity for African countries to strengthen their anti-corruption programmes and to integrate them into the fibre of society as part of improving governance effectiveness. This, in turn, will ensure that the limited funds are not stolen or misused.

In short, all these risks are intertwined, and they need to be addressed together in a holistic manner with regard not just to COVID-19, but also to future pandemics. Africa has been lucky so far: many experts, including the BBC news reporter Andrew Harding, had predicted that by now many people in Africa would have died from COVID-19. This has not been the case. Lessons from Europe, the Americas and other regions indicate that there is a need for regionally coordinated strategies that are highly responsive to the specific requirements of individual nations.

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References

Africa Briefing. (2020). COVID-19 corruption spurs political upheaval across Africa. *Africa Briefing*, 4 September 2020. Retrieved September 20, 2020, from https://africabriefing.org/2020/09/covid-19-corruption-spurs-political-upheaval-across-africa/

Africa Center for Strategic Studies. (2020). *Mapping risk factors for the spread of COVID-19 in Africa*. Retrieved September 18, 2020, from https://africacenter.org/spotlight/mapping-risk-factors-spread-covid-19-africa/

Aschwanden, C. (2020). How "superspreading" events drive most COVID-19 spread. *Scientific American*, 23 June 2020. Retrieved September 20, 2020, from https://www.scientificamerican.com/article/how-superspreading-events-drive-most-covid-19-spread1/

Ayah, R. (2020). Two counties with highest population density have two highest COViD-19 rates. *University of Nairobi* blog. Retrieved July 16, 2020, from https://uonresearch.org/blog/two-counties-with-highest-population-density-have-two-highest-covid-19-rates/#:~:text=Two%20Counties%20with%20highest%20Population%20Density%20have%20two%20highest%20Covid%2D19%20Rates,-July%2016%2C%202020&text=Two%20counties

%2C%20Nairobi%20County%20and,19%20cases%20diagnosed%20to%20date

Barr, J., & Tassier, T. (2020). Are crowded cities the reason for the COVID-19 pandemic? *Scientific American*, 17 April 2020. Retrieved September 18, 2020, from https://blogs.scientificamerican.com/observations/are-crowded-cities-the-reason-for-the-covid-19-pandemic/

Cadham, J. (2020). COVID-19 and climate change. *Relief Web*. 24 August 2020. From *Centre for International Governance Innovation*. Retrieved September 18, 2020, from https://reliefweb.int/report/world/covid-19-and-climate-change

COVID-19 Spread in India. (2020). *Inter Press News Agency*, 8 July 2020. Retrieved September 12, 2020, from http://www.ipsnews.net/2020/07/population-density-linked-covid-19-spread-india/

Florida, R. (2020). The geography of coronavirus. *Bloomberg CityLab*. Retrieved September 3, 2020, from https://www.bloomberg.com/news/articles/2020-04-03/what-we-know-about-density-and-covid-19-s-spread

Hamidi, S., Sabouri, S., & Ewing, R. (2020). Does density aggravate the COVID pandemic? Early findings and lessons for planners. *Journal of the American Planning Association*. Retrieved August 18, 2020, from https://www.tandfonline.com/doi/full/10.1080/01944363.2020.1777891

Henderson, E. (2020). Lack of consistency in COVID-19 related data could harm prevention efforts. *News-medical.net*, 20 August 2020. Retrieved September 24, 2020, from https://www.news-medical.net/news/20200820/Lack-of-consistency-in-COVID-19-related-data-could-harm-prevention-efforts.aspx

Houreld, K., & Lewis, D. (2020). In Africa lack of coronavirus data raises fears of "silent epidemic". *Reuters*, 8 July 2020. Retrieved September 21, from https://www.reuters.com/article/us-health-coronavirus-africa-data-insigh-idUSKBN24910L.

Igunza, E. (2020). Coronavirus corruption in Kenya: officials and business people targeted. *BBC News*, 24 September 2020, from https://www.bbc.com/news/world-africa-54278417

Johnson-Sirleaf, E. (2020). Opinion: African women are leading the fight against COVID-19. *DEVEX Global Views*, 3 September 2020. Retrieved September 24, 2020, from https://www.devex.com/news/opinion-african-women-are-leading-the-fight-against-covid-19-97980

Kingsland, J. (2020). How might climate change affect the spread of viruses? *Medical News Today*. Retrieved September 17, 2020, from https://www.medicalnewstoday.com/articles/how-might-global-warming-influence-the-spread-of-viruses

Levison, M. E. (2020). Commentary—COVID-19 challenges in developing countries. *MSD*

Manual-consumer version. Retrieved September 11, 2020, from https://www.msdmanuals.com/home/news/editorial/2020/07/08/20/55/covid-19-challenges-in-the-developing-world

Lone, S. A., & Ahmad, A. (2020). COVID-19 Pandemic—an African perspective. *Journal of Emerging Microbes and Infections*, *9*(1). Retrieved from https://www.tandfonline.com/doi/full/10.1080/22221751.2020.1775132

Lustgarten, A. (2020). How climate change is contributing to skyrocketing rates of infectious disease. *Pro Publica*, 7 May 20. Retrieved September 20, 2020, from https://www.propublica.org/article/climate-infectious-diseases

Magome, M. (2020). South Africa warns COVID-19 corruption puts lives at risk. *AP News*, 26 July 2020. Retrieved September 21, 2020, from https://apnews.com/article/ap-top-news-understanding-the-outbreak-health-cyril-ramaphosa-africa-ba586b6bebf961e999046a9dd28ab6fd

Momaneh, S. (2020). Will climate change trigger a new pandemic? *Friedrich Ebert Stiftung* (FES), 23 April 2020. Retrieved September 24, 2020, from https://www.fes-mena.org/press/e/will-climate-change-trigger-a-new-pandemic/

Ndaw, F. (2020). COVID-19: Solving Africa's water crisis is more urgent than ever. 30 April 2020. Retrieved September 20, 2020, from https://blogs.worldbank.org/nasikiliza/covid-19-solving-africas-water-crisis-more-urgent-ever

Olamijuwon, E., Dake, F. A. A., & Somefum, O. D. (2020). Flaws in the collection of African population statistics block COVID-19 insights. *The Conversation*. 3 August 2020. Retrieved September 20, 2020, from https://theconversation.com/flaws-in-the-collection-of-african-population-statistics-block-covid-19-insights-142669

Omboki, A. (2020). Africa: Corruption in purchase of COVID-19 PPEs is murder, WHO boss says. *Florida Star—Daily News*, 29 August 2020. Retrieved September 27, 2020, from https://www.newsbreak.com/news/2050199481756/africa-corruption-in-purchase-of-covid-19-ppes-is-murder-who-boss-says

Onyango, E. (2020). Rethinking climate change and its impact on health in Eastern African in light of the COVID-19 pandemic: Part 1. *IGAD Climate Prediction & Applications Centre* (ICPAC), 8 May 2020. Retrieved September 14, 2020, from https://www.icpac.net/news/rethinking-climate-change-and-its-impacts-health-eastern-africa-light-covid-19-pandemic-part-1/

Ostergard, Jr. R. L. (2020). Africa's COVID-19 exceptionalism? Same problems, different locations. *E-International Relations*, 2 June 2020. Retrieved September 11, 2020, from

https://www.e-ir.info/2020/06/26/africas-covid-19-exceptionalism-same-problems-different-locations/

Rodriguez, L. (2020). 5 reasons COVID-19 will impact the fight to end extreme poverty. *Global Citizen*, 7 April 2020. Retrieved September 14, 2020, from https://www.globalcitizen.org/en/content/how-covid-19-impacts-fight-to-end-extreme-poverty/

Rogers, A. (2020). How does a virus spread in cities? It's a problem of scale. *Wired*. Retrieved September 19, 2020, from https://www.wired.com/story/how-does-a-virus-spread-in-cities-its-a-problem-of-scale/

Solomon, S. (2020). Coronavirus poses leadership test for Africa's Heads of State. *VOA News*, 11 June 2020. Retrieved September 26, 2020, from https://www.voanews.com/covid-19-pandemic/coronavirus-poses-leadership-test-africas-heads-state

Soy, A. (2020). Lack of COVID-19 testing undermines Africa's "success". *BBC News*, 27 May 2020. Retrieved September 19, 2020, from https://www.bbc.com/news/world-africa-52801190

Thompson, D. (2020). South Korea's COVID-19 Exceptionalism. *The Atlantic Daily*, 6 May 2020. Retrieved September 17, 2020, from https://www.theatlantic.com/newsletters/archive/2020/05/south-koreas-covid-19-exceptionalism/611296/

UN News. (2020). Water access critical to beating back COVID-19 in spread in slum areas. *United Nations*, 23 March 2020. Retrieved September 14, 2020, from https://news.un.org/en/story/2020/03/1060042

Vestal, C. (2020). Lack of public data hampers COVID-19 fight. *Stateline*, PEW, 3 August 2020. Retrieved September 20, 2020, from https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2020/08/03/lack-of-public-data-hampers-covid-19-fight

WHO. (2015). *Public health for mass gatherings: Key considerations*. Geneva, Switzerland. Retrieved September 21, 2020, from https://www.who.int/publications/i/item/public-health-for-mass-gatherings-key-considerations

Yusuf, M. (2020). Kenyan capital's water shortage raises COVID-19 risk. *VOA*, 2 June 2020. Retrieved September 15, 2020, from https://www.voanews.com/covid-19-pandemic/kenyan-capitals-water-shortage-raises-covid-19-risk

Žmuk, B., & Jošić, H. (2020). *Does high population density catalyze the spread of COVID 19*? (Unpublished paper).