

# Disparities in COVID-19 death rates between sub-Saharan Africa and the Western world: a Pathologist's perspective

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## Abstract

The COVID 19 infection was first reported in Wuhan China in December 2019. It has become a global pandemic affecting almost all countries of the world. The virus is an enveloped RNA virus which is a member of the Coronaviridae family with 4 major structural proteins: spike surface glycoprotein, small envelope protein, matrix protein and nucleocapsid protein. The spread of the virus appears more rapid across Europe and the western world with more profound manifestations and increased death rates compared with sub-Saharan Africa. The reasons for these disparities are not clearly understood. A few factors have been suggested to be contributory to the disparities. These include obvious factors such as inadequate testing and reporting of cases in SSA. Other suggested factors including lower life expectancy in SSA, increased maternal mortality reducing many cases of congenital abnormalities, enhanced immunity in SSA due to repeated exposure to infectious agents, mutations with differing severity of infections and effect of the tropical weather on the pandemic. These suggested factors should generate research questions for further investigation as the pandemic rages on.

**Keywords:** COVID 19, pandemic, coronaviridae, manifestation.

## Résumé

L'infection au COVID 19 a été signalée pour la première fois à Wuhan en Chine en décembre 2019. Elle est devenue une pandémie mondiale affectant presque tous les pays du monde. Le virus est un virus à ARN enveloppé qui appartient à la famille des Coronaviridae avec 4 protéines structurales majeures: la glycoprotéine de surface du pic, la protéine de la petite enveloppe, la protéine de la matrice et la protéine de la nucléocapside. La propagation du virus semble plus rapide à travers l'Europe et le monde occidental avec des manifestations plus profondes et des taux de mortalité accrus par rapport à l'Afrique subsaharienne. Les raisons de ces disparités ne sont pas clairement comprises. Il a été suggéré que quelques facteurs contribuent aux disparités. Ceux-

ci incluent des facteurs évidents tels que des tests et des rapports inadéquats des cas en ASS. D'autres facteurs suggérés, notamment une espérance de vie plus faible en ASS, une mortalité maternelle accrue réduisant de nombreux cas d'anomalies congénitales, une immunité renforcée en ASS en raison d'une exposition répétée à des agents infectieux, des mutations avec une gravité différente des infections et l'effet du climat tropical sur la pandémie. Ces facteurs suggérés devraient générer des questions de recherche à approfondir alors que la pandémie fait rage.

**Mots-clés:** Covid 19, pandémie, manifestation de coronaviridae

## Introduction

COVID-19 cases were first reported in Wuhan China in December 2019 [1]. It has become a global pandemic spreading to 205+ countries [2]. The virus is an enveloped RNA virus which is a member of the Coronaviridae family with 4 major structural proteins: spike surface glycoprotein, small envelope protein, matrix protein and nucleocapsid protein. The spike protein binds to cells via receptor binding domains of angiotensin converting enzyme [3].

On December 31, 2019: Chinese Health officials informed the World Health Organization (WHO) about a cluster of 41 patients with a mysterious pneumonia. Most were connected to the Huanan Seafood Wholesale Market, a wet market in the city of Wuhan. Though the first 41 cases were reported on December 31, scientists determined that the virus could have started spreading from person to person as early as late November 2019.

Case studies of how the virus had spread showed that the large gathering of people at the live animal market might have "boosted" the transmission of the virus among more people. Researchers thought the new coronavirus originated in bats, then jumped to an intermediary species most likely pangolins, pigs, or civets that passed it to people [4]. It can be spread among humans via respiratory droplets within six feet. The viruses can also survive for days on many surfaces. The virus' pneumonia-like symptoms include fever and difficulty breathing.

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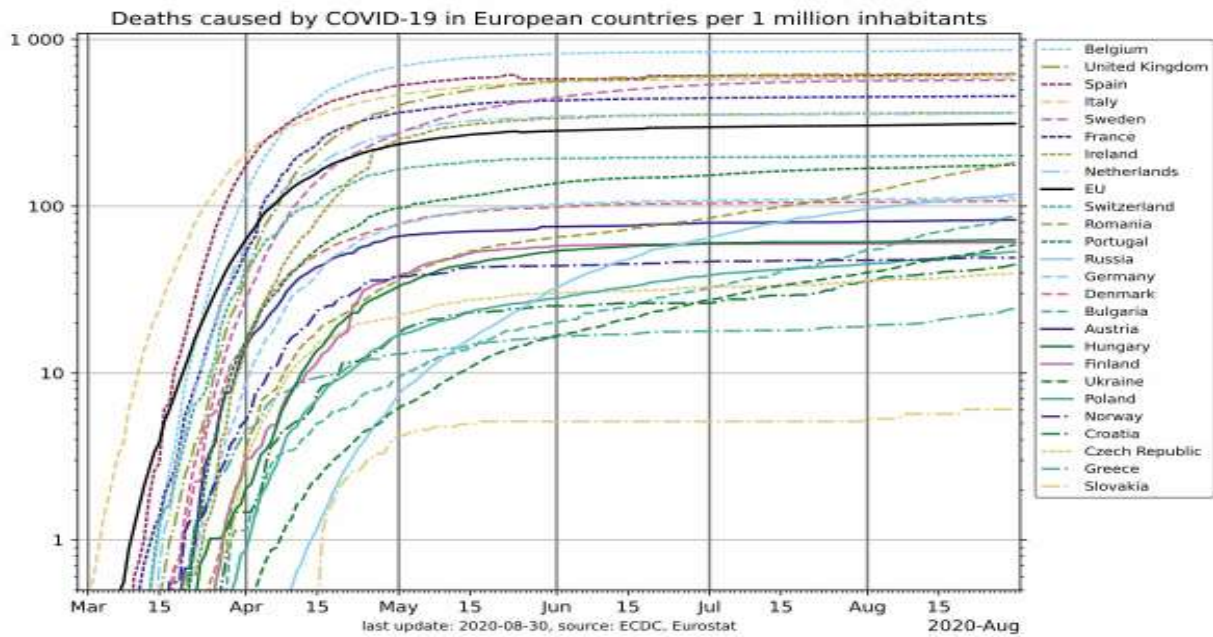


Figure 1

**COVID -19 Cases in Europe**

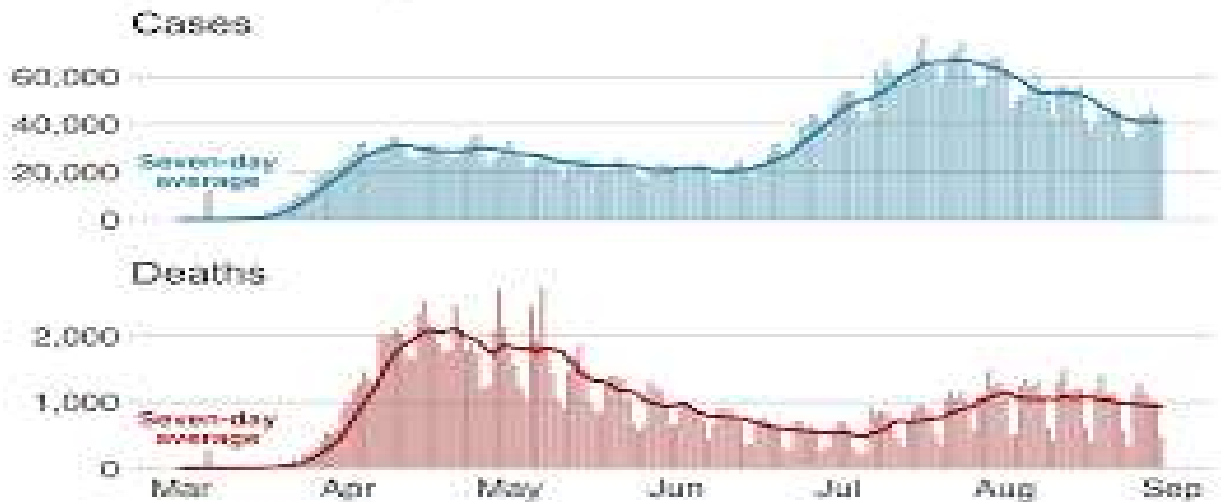
As of 13th March 2020, when the number of new cases became greater than those in China, WHO began to consider Europe the active center of the COVID-19 pandemic.

Cases by country across Europe had doubled over periods of typically 3 to 4 days, with some countries (mostly those at earlier stages of detection) showing doubling every 2 days. As of 17<sup>th</sup> March 2020, all countries within Europe had at least a confirmed case of COVID-19,

with Montenegro being the last European country to report at least one case. As of 18th March 2020, more than 250 million people were in lockdown in Europe. This is depicted in Figure 1.

The actual total death toll from COVID-19 is likely to be higher than the number of confirmed deaths; this is due to limited testing and problems in the attribution of the cause of death. The difference between reported confirmed deaths and total deaths vary by country. How COVID-19 deaths are recorded may differ between countries (e.g. some

**Number of daily cases and deaths in the US**



Source: COVID Tracking Project

13/3/21

Figure 2

countries may only count hospital deaths, whilst others have started to include deaths in homes). The reported death figures on a given date does not necessarily show the number of new deaths on that day: this is due to delays in reporting [5].

### COVID 19 deaths in the US

As of August 30, 2020, the number of both confirmed and presumptive positive cases of the COVID-19 disease reported in the United States had reached almost 6 million with almost 182 thousand deaths reported among these cases. This is depicted in figure 2.

Though the US has an overall higher cases fatality of all countries, its death rate from Covid 19 is still much better compared to other western countries with lower populations.

### COVID-19 in Africa

The first confirmed case was in Egypt, and the first confirmed case in sub-Saharan Africa (SSA) was in Nigeria. The COVID-19 pandemic was confirmed to have spread to Africa on 14 February, 2020. Most of the identified imported cases had arrived from Europe and the United States rather than from China. It is believed that there is widespread under-reporting in many African countries with less developed healthcare systems.

Experts have worried about COVID-19 spreading to Africa, because many of the healthcare systems on the continent are inadequate, having problems such as lack of equipment, lack of funding, insufficient training of healthcare workers, and inefficient data transmission. It was feared that the pandemic could be difficult to keep under control in Africa and could cause huge human losses and economic problems if it spread widely. This assertion has turned out not to be true so far.

It is obvious that more people have died from Covid 19 infection in the USA compared with Nigeria within a comparable frame of time. While the death rate in the USA since onset of the infection in the country stands at over 182,000, the death rate in Nigeria was about 1000 as at the 24<sup>th</sup> August 2020. What could account for the low death rate in Nigeria compared to the high death rate in the USA. This critical review seeks to explore various plausible reasons for this disparity. Nigeria here will sub serve for SSA while the USA will sub serve for the advanced or western world.

The reasons will range from the simple obvious facts to less obvious and probable more subtle facts. The following points are the researcher's thoughts and hypothesis.

#### 1. *Inadequate Testing in Sub-Saharan Africa.*

It is obvious that the testing for Covid 19 in SSA is extremely limited because of limited resources for testing, therefore there is a gross under reporting of covid 19 cases and as a result, under valuation of deaths from covid 19 infection. The relatively low number of coronavirus cases in Africa so far "have raised hopes that African countries may be spared the worst of the pandemic", in the words of the UN. But at the same time, it urges caution.

Of course, there are wide variations in testing policy across the more than 50 countries involved in SSA, but cases could be going undetected, epidemiologists say. The early apparent successes in combatting the spread of the virus were notable, and the number of cases has not risen as quickly as elsewhere.

#### 2. *Increased Infant and Childhood Mortality in Sub-Saharan Africa*

Infants and children with congenital or childhood diseases including cancers succumb more easily in SSA due to poor socio-economic status, poor healthcare seeking habits and poor healthcare resources [6]. This subset of the population is significantly diminished in SSA; however, a comparable subset survives into adulthood in the western world. The western subset is unfortunately more vulnerable to death from the covid 19 pandemic. This may explain the vulnerabilities and more deaths in the western world than in SSA. The highest rates of child mortality are still in SSA—where every 1 in 9 children die before age five, more than 16 times the average for developed regions (1 in 152). (USAIDS 2019).

SSA continues to be the region with the highest under-five mortality rate in the world; 78 deaths per 1,000 live births. In 2018, 1 in 13 children in SSA died before reaching her or his fifth birthday—15 times higher than the risk for children born in high-income countries: UNICEF Data 2019.

#### 3. *Low life expectancy in SSA*

It is obvious that most countries in SSA have a lower life expectancy than exists in the western world. It is also well documented that mortality of covid 19 is more common in the elderly population. The population of the elderly in SSA is much smaller than in the western world. This gives the picture of more deaths in the western world. Eight out of 10 deaths reported in the US

have been in adults 65 years old and older. As we age, our lung tissue becomes stiffer and this is a phenomenon that SARS- CoV-2 may be exploiting. Caroline Uhler et al [7] outline their hypothesis; thus, the new coronavirus strikes both young and old, but the more severe cases and the higher rates of death are among the elderly. The reason for this is yet unknown. Some scientists suspect that this may be related to the weakening of the immune system in the elderly, indeed, senior citizens are known to be more susceptible to many infectious diseases.

4. *Increased numbers of people living with background morbidities in the Western World*  
Aging of the western population inevitably results in an increase in age-related health challenges such as hypertension, coronary artery disease, diabetes mellitus, COPD, cancer and other noncommunicable diseases. Persons with these background morbidities are more vulnerable to death from covid 19 infection. The reduced life expectancy in SSA has reduced the number of aged people and aging related diseases in the region. This invariably also reduces the number of persons who die of Covid-19 in SSA. Note however that the small percentage of SSA population with similar age related morbidities such as hypertension also succumb easily to Covid 19 infection [8]
5. *Enhanced immunity in SSA population*  
Interestingly, the repeated exposure of persons in SSA to multiple bacterial, viral and other microbial infections such as malaria, typhoid fever, tuberculosis, cholera, Lassa fever and several other infections in these countries, has primed the immune system of such persons to fight more robustly any in-coming viral infections including covid 19 infection. Their counterparts in the western world whose immune systems are largely naïve are more vulnerable. The broad-based immunity of the SSA population due to the extensive microbial load and general exposure to a variety of pathogens, particularly, the three main killers of Tuberculosis, HIV and Malaria have plagued India, Africa and several countries in the Southern hemisphere, initiating a robust innate and adaptive immunity against infectious agents and that could include the COVID-19 virus. [9]

6. *COVID -19 Viral Mutations with differing Severity of Infections*

Studies have shown that a few mutant strains of the covid 19 viral genome have been sequenced [10]. This raises the question of a differing severity of infections in different populations resulting in different disease outcome patterns across the globe in Covid 19 infections. Like with other influenza/ SARS 2 viral infections, different sub strains and mutant forms have been found which also present with differing ranges of severity of symptoms and signs. The death rate is a direct correlation. Is it possible that the less virulent sub-strain of the Covid 19 virus is found in sub-Saharan Africa?

7. *Environmental Factors particularly Warm Weather Effect on Covid 19 Virus*

It has been postulated by several researchers that the hot tropical climate of SSA may rapidly kill the virus and so reduce the rate of transmissibility of the virus and thus reduce the infection rate and consequently death rate. The coronavirus may be heat sensitive, and once the spring arrives the number of cases should plummet accordingly. We do not yet know enough about this strain of coronavirus to know if warm weather creates sub-optimal replication [11] and confers an advantage on SSA

8. *Survival of the Fittest in Sub-Saharan Africans*

It may be postulated that by a combination of genetic, microbial exposure, socioeconomic and environmental factors as discussed, the SSA population has evolved a natural selection which has conferred on them a survival advantage over populations in the western world ; the so-called survival of the fittest phenomenon.

### **Concluding Thoughts**

The eight points listed above should give the scientific community a food for thought and a serious research question. The factors that have conferred survival advantage on the SSA population are worthy of investigation. The novel corona virus has surprised the medical and scientific community and has turned our body of knowledge about influenza viruses on its head. It is pertinent that we admit our limitation of knowledge and approach research into these novel covid 19 viruses with a keen interest to learn more about the virus, improve treatment options, preventive measures, and survival rates in this global pandemic. One death too many has already occurred.

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Received = 7th September 2020

Accepted = 19th October 2020