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Research Article

# The Disproportionate Impact of COVID-19 on Various Communities in the United States: A Data Analytics Perspective

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#### Abstract

Pandemics and infectious diseases are supposed to be equitable as they indiscriminately affect and impact everyone globally – rich, poor, men, women, powerful, or disenfranchised. However, a preliminary data analysis of the coronavirus disease 2019 (CO-VID-19) indicates that this pandemic has exacerbated the disparity among various demographics and communities as it appears that it has widened the socioeconomic inequities globally, and notably in the United States. In this paper, we analyze the data collected from March of 2020 through December 2020 to examine the impact of this pandemic among various communities. It is observed that COVID-19 has disproportionately impacted and increased the health inequities among various communities of color and other racial and ethnic minorities in the United States. The percentage of new cases, as well as the death rates, are much higher for these communities versus the rest of the population.

Keywords: Data Analytics; Coronavirus (COVID-19); Pandemic; Health Inequities; Racial Disparities

## Introduction

The novel coronavirus disease 2019 (COVID-19) has created an unprecedented global health crisis and a human catastrophe in the modern times. This outbreak started in December 2019 in Wuhan City of Hubei province, China [1,2] and within weeks spread globally. The World Health Organization (WHO) officially declared this outbreak as a global pandemic early in 2020 [3,4]. At the time of this writing, this pandemic has infected over 100 million people worldwide, and over two million people have died from it in more than 190 countries (Table 1, Figure 1-3) [5,6].

As Table 1 and figures 1-3 illustrate, though the United States has the highest number of cases and deaths, many other countries

are also experiencing severe cases of this pandemic. This disease is particularly hitting developing countries in Africa, Asia, and South America the hardest as a large percentage of the population lives in poverty.

## The origin of COVID-19

According to the Centers for Disease Control and Prevention (CDC), SARS -CoV-2 is part of a family of zoonotic coronaviruses that have been detected in people and many different species of animals, such as camels, cattle, cats, and bats [7]. In the past, only a few types of respiratory diseases caused by coronaviruses, such as Middle East Respiratory Syndrome (MERS-CoV), Severe Acute Respiratory Syndrome (SARS-CoV), and now COVID-19, have infected

**Table 1:** The total number of cases by countries – top 12 – as ofFebruary 1, 2021 (source: WHO COVID-19 Dashboard).

**Figure 1:** The total cases worldwide as of December 2020, with the U.S. at the top, followed by India and Brazil (source: WHO dataset).

people in great numbers and spread widely, causing major pandemics, and public health crises [7]. The COVID-19 has infected over 25 million people in the U.S. and over 450,000 persons have died from it (Figure 4,5) [5,6]. Figure 3: The daily confirmed new cases worldwide – 7-day moving average. (source: New Cases of COVID-19 In World Countries - Johns Hopkins Coronavirus Resource Center (jhu.edu)).

Figure 2: The number of new cases and deaths worldwide as of December 2020 (source: WHO dataset).

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Analyses of the COVID-19 outbreak indicate that before this pandemic is fully understood and contained, millions more will be infected, and hundreds of thousands more may die from this disease worldwide during the current pandemic period. It is expected that these numbers will rise sharply before the pandemic is contained. By the time that this article is published, it is possible that COVID-19 may have killed more than a half million people in the U. S. (Figure 6,7) [6]. In addition, other reports have indicated

**Figure 4:** The total number of cases among various states in the U.S. as of December 2020 (source: CDC dataset).

Figure 5: The total number of Cases and deaths in the U.S. as of December 2020 (source: CDC dataset).

that the increase in the rate of infection will inevitably lead to severe shortages of critical health care resources, such as Intensive Care Unit (ICU) capacity [8,9].

Figure 6: The daily COVID-19 spread trends in the U.S. from January 2020 to January 2021. (source: CDC dataset).



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Figure 7: The daily COVID-19 deaths in the U.S. from January 2020 to January 2021. (source: CDC dataset).

Recent development and approval of various vaccines have created a glimmer of hope to curb and potentially contain this pandemic [10-12]. However, the distribution of vaccines to all sectors of the population worldwide may take more than a year [10-12]. It is not yet fully understood as to how the vaccines would curb the sharp rise in the spread of this deadly virus, its potential variants, and contain this pandemic [10-12]. Currently, only the Pfizer-BioNTech and Moderna vaccines are authorized to be administered throughout the U.S.

Despite the introduction of the vaccines, the numbers of CO-VID-19 infected patients and deaths in the United States have risen sharply in the latest wave that began in the fall of 2020 [7]. Recent reports indicate that the U.S. is experiencing increased community spread. According to the U.S. federal government as well as various state governments, the pace of the coronavirus pandemic is accelerating and may last at least through 2021, leading to increased infection and mortality rates as well as severe shortages of critical public health resources and capacity [9].

#### Impact of COVID-19 on various communities in the U.S.

The COVID-19 pandemic has impacted the U.S. population more than any other country in the world (Table 1). Currently, there are more than 20 million total cases and over 450,000 deaths reported in the U.S. [13].

However, early studies of the impact of this pandemic on various demographics and racial and ethnic minorities point to a disproportionate impact on various communities [14-26]. The COVID Tracking Project [14] reports that black people are 1.5 times more likely to die of COVID-19 than white people - more than 60,000 so far. Similar disproportionate impacts have been reported for other communities of color and minorities (Figure 8).



Moreover, according to Dr. Vickers [16], in some states, the rate of death among the black community is much higher than their portion of the states' populations. For example, in Michigan and Illinois, more than 40% of deaths are among African Americans, whereas in Louisiana, African Americans represent 70% of deaths. These communities represent 14% and 15% of the populations in Michigan and Illinois, respectively, and account for only 33% of Louisiana's population.

Bambino., *et al.* [17] have also indicated that this is not unique to the black community as the coronavirus disease 2019 (COVID-19) pandemic has also disproportionately affected all racial and ethnic minority groups, with high rates of death among Native American and Latinx/Hispanic communities as well.

#### **Study Results**

To examine such reports of the disproportionate impact of the COVID-19 on various communities, we have collected and analyzed the data reported by the Center for Disease Control and Prevention (CDC) [7]. The datasets obtained contain reports from March Of 2020 to December 2020 for the total population as well as various communities in the U.S. A variety of analytical tools and platforms such as Tableau as well as the Python programming language were utilized to analyze the data. tables 2 and figure 9 provide a summary of the findings of this study.

D /					
Kace/		COVID-	Tatal	Death Rate per 100,000	
Ethnicity -	Population	10	Iotal		
Population <sup>*</sup>	06	19	Number		
(US Population	70	Cases %	of Death		
328,239,523)					
Hispanic/	18.5	21.1	28.029	46.2	
Latinx - 60,724,312			-,		
American Indian/					
Alaska	1.3	1.3	2,042	47.9	
Native - 4,267,114					
Asian Non-Hispanic	FO	2 5	0.010	46.1	
- 19,366,132	3.9	5.5	0,910		
Black Non-Hispanic	12.4	12.2	33,915	77.1	
- 43,984,096	13.4	12.3			
Native					
Hawaiian/Other					
Pacific					
Islander -	0.2	0.4	461	69.8	
656,479					
White					
(Non-	60.4	55.5	129,216	65.5	
- Hispanic) -	60.1				
197,271,953					
Multiple/Other					
Non-					
Hispanic -					
9,190,707	2.8	5.8	8,638	94.9	
Other communities					
of color and racial/					
ethnic minorities					

1.1

**Table 2:** Summary of COVID-19 Impact on the U.S. Communities(March 2020 to December 2020).

#### Source: U.S. Census Bureau QuickFacts: United States 2019

- White. A person having origins in any of the original peoples of Europe, the Middle East, or North Africa. It includes people who indicate their race as "White" or report entries such as Irish, German, Italian, Lebanese, Arab, Moroccan, or Caucasian.
- Black or African American. A person having origins in any of the Black racial groups of Africa. It includes people who indicate their race as "Black or African American," or report entries such as African American, Kenyan, Nigerian, or Haitian.
- American Indian and Alaska Native. A person having origins in any of the original peoples of North and South America (including Central America) and who maintains tribal affiliation or community attachment.

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This category includes people who indicate their.

- Asian. A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam. This
- Native Hawaiian and Other Pacific Islander. A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands. It includes people who reported their race as "Fijian," "Guamanian or Chamorro," "Marshallese," "Native Hawaiian.

As the results above indicate, the percentage of cases as well as the death rate are not the same across all communities. The disproportionate impact is very notable among the Black/African American community as well as other communities of color and racial/ ethnic minorities, with the death rate per 100,000 being much higher than other communities. This observation is consistent with the overall disparities and health inequalities these communities have been experiencing across all the continuum of the healthcare system [23, 24].

Previous studies have indicated that there are notable racial disparities in health at every level of society related to the differences

Figure 9: The total number of cases and death among various communities in the U.S. (source: CDC dataset).

in socioeconomic status [25]. Table 3 presents the life expectancy at birth for Blacks and Whites of both sexes from 1900 to 2015 [26]. As this table indicates, Black life expectancy has persistently lagged that of the non-Hispanic Whites throughout the recorded history of this country. These studies also point that mortality data are more accurate for Blacks and Whites than for Latinx/Hispanics, Asians and Native Americans. There appears to be a significant misclassification of non-trivial proportions of mortality data for other communities of color, and racial/ethnic minorities [27]. Members of such communities are often reported as white on death certificates [27]. This misclassification leads to an undercount in the death rates for these groups, and underestimates their actual death rates [27].

Recent studies have indicated that COVID-19 has further increased the gap in the life expectancy between Whites and Blacks. According to the researchers at the National Center for Health Statistics, in the first six months of 2020, the average life expectancy in the United States dropped by a full year due to the COVID-19 pandemic [28]. However, the same study found that life expectancy for the non Hispanic black population declined the most and was the lowest since 2001. While the life expectancy dropped 0.8 year for Whites, it dropped 2.7 years for Blacks.

The disparity in health among the communities of color and other racial/ethnic minorities is not limited to the mortality rate. The Commission on Social Determinants of Health (CSDH) has reported that significant health inequity exists across the continuum of healthcare systems, globally as well in the U.S. [29]. According to CSDH, addressing health inequity requires actions on several factors: improve the circumstances in which people are born, grow, live, work, and age [29-31]. As a result, socioeconomic disparity is a significant contributor to health inequity.

Moreover, lack of diversity and inclusion across the continuum of healthcare processes, starting from basic education, insights, research, clinical trials of new medications or vaccines, as well as access to healthcare resources and coverage, has led to the institutionalization of health inequity. The FDA reports that only five percent of clinical trial participants are Black, fewer than two percent are Asian, and fewer than one percent are Latinx or Hispanic [32]. This puts minorities at a disadvantage as people of different ages, races, and ethnicities may react differently to medications and other medical products. This gross underrepresentation in clinical research means that current treatments may not be equally safe and effective for all populations. This trend has continued despite the current COVID-19 pandemic as for example, the Moderna/Pfizer vaccine trials were initially done with all white cohorts [32].

The health disparity has also been observed during the CO-VID-19 vaccine distribution as data shows that the shares of vaccinations among Black and Latinx/Hispanic people are lower compared to their shares of the total population in most reporting states [32]. In contrast, the White people are getting vaccinated at a higher rate than their share of the total population in most states [32]. As of this writing, the vaccines are not broadly available to the public; hence it is too early to interpret these data. However, over time, this will be an important metric to monitor and track, as it will be another factor potentially contributing to the continued disparity in health among various communities.

## **Concluding Remarks**

The preliminary data analysis of the novel coronavirus disease 2019 (COVID-19) indicates that this pandemic has exposed and exacerbated the health inequity as well as the socioeconomic disparity among various communities of color and other racial/ethnic minorities, in the United State. The findings of this study indicates that the Blacks/African Americans as well as other communities of color and racial/ethnic minorities have a higher probability of getting infected as well as dying from this disease. In some state in the U.S., the mortality rate among Blacks are twice as high as Whites. The disproportionate impact of COVID-19 is consistent with the existing health disparity among various communities and stems from the persistent inequity across the continuum of the healthcare system that has been institutionalized over time. The disproportionate impact of the pandemic is also related to the socioeconomic status of the communities of color and other racial/ethnic minorities.

		White		Black or African American			
Specified age and year	Both sexes	Male	Female	Both sexes	Male	Female	
At birth	Life expectancy in years			Life expectancy in years			
1900	47.6	46.6	48.7	33.0	32.5	33.5	
1950	69.1	66.5	72.2	60.8	59.1	62.9	
1960	70.6	67.4	74.1	63.6	61.1	66.3	
1970	71.7	68.0	75.6	64.1	60.0	68.3	
1975	73.4	69.5	77.3	66.8	62.4	71.3	
1980	74.4	70.7	78.1	68.1	63.8	72.5	
1990	76.1	72.7	79.4	69.1	64.5	73.6	
1995	76.5	73.4	79.6	69.6	65.2	73.9	
2000	77.3	74.7	79.9	71.8	68.2	75.1	
2001	77.5	74.9	80.0	72.0	68.5	75.3	
2002	77.5	74.9	80.1	72.2	68.7	75.4	
2003	77.7	75.1	80.2	72.4	68.9	75.7	
2004	78.1	75.5	80.5	72.9	69.4	76.1	
2005	78.0	75.5	80.5	73.0	69.5	76.2	
2006	78.3	75.8	80.7	73.4	69.9	76.7	
2007	78.5	76.0	80.9	73.8	70.3	77.0	
2008	78.5	76.1	80.9	74.3	70.9	77.3	
2009	78.8	76.4	81.2	74.7	71.4	77.7	
2010	78.9	76.5	81.3	75.1	71.8	78.0	
2012	79.1	76.7	81.4	75.5	72.3	78.4	
2013	79.0	76.7	81.4	75.5	72.3	78.4	
2014	79.1	76.7	81.4	75.6	72.5	78.5	
2015	78.9	76.6	81.3	75.5	72.2	78.5	

Table 3: Life expectancy at birth, by sex, race: United States, selected years 1900-2015. (Source: CDC [26]).

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