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## Original article

# COVID-19 disparity among racial and ethnic minorities in the US: A cross sectional analysis



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## ABSTRACT

**Aim:** To analyze racial disparities in Coronavirus disease (COVID-19) cases in the United States of America and discuss possible reasons behind this inequality.

**Subject and methods:** We obtained estimated case counts of African-American, Caucasian, Native American, Asian and Hispanic individuals with coronavirus disease (COVID-19) infection through May 5, 2020, from publicly available data on state departments of health websites. We calculated race-specific fractions as the percentage of the total population and analyzed the reasons behind this disparity.

**Results:** The incident rates of COVID-19 were higher among African Americans and among Latinos disproportionately higher than their representation in 14 states and 9 states, respectively. A similar observation was also reported for New York city. The percentage of deaths reported among African Americans was disproportionately higher than their represented share in the population in 23 out of 35 states. It was reported that 22.4% of COVID-19 deaths in the USA were African American, even though black people make up 13.4% of the USA population.

**Conclusions:** The analysis shows the disparity of coronavirus disease outcomes by ethnicity and race. Additional research is needed to determine the factors behind this inequality.

## 1. Introduction

The first case of Coronavirus disease (COVID-19) was detected in Wuhan Province of China in December 2019 [1]. The disease has since then spread rapidly across the globe and was declared a pandemic on March 11, 2020, by the WHO [2]. While many recover without the need for any specialized care, the disease is known to severely impact the elderly and those with co-morbidities like obesity, hypertension, diabetes, and other chronic illnesses. As of June 4, 2020, the global disease burden stands at 6.4 million cases and 382 867 deaths worldwide with gradually escalating numbers [3]. As the world puts its resources together in fighting this pandemic, it has become increasingly clear that the disease has not affected everyone equally. Publicly shared

information on the racial and ethnic patterns of COVID-19 so far paints an alarming portrait. An article published in the New England Journal of Medicine (NEJM) on May 6, 2020, showed that in the US, African-Americans, Hispanics, and Native American minorities have a disproportionately higher number of cases and deaths as a direct consequence of COVID-19 [4]. In this paper, we consolidate the available data, calculate the statistics on racial and ethnic minorities and subsequently highlight the racial disparities in 16 States and New York City by analyzing publicly available information from their respective health departments, and Centers for Disease Control and Prevention (CDC) as of May 5, 2020. We also discuss the possible reasons for this inequity.

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## 2. Methods

We used publicly available data for COVID-19 incidence rates in the US among sixteen states and New York City to evaluate racial and ethnic variation in COVID-19 incidence (Table 1).

We obtained actual case counts of African-American, Caucasian, Asian, and Hispanic populations with COVID-19 infection from the COVID-19 surveillance data reported by state departments of health through May 5, 2020. Denominators used here are the 2018 US Census Bureau race-specific population estimates for the sixteen states and New York City [5]. New York state bears the brunt of COVID-19 infections in the US. However, all pertinent metrics of New York state data were not publicly available at the time of authoring this article and hence, publicly available New York City data was instead used in our study as the majority of cases from NY state was from the city. It was difficult to obtain specific latest data due to the ongoing census in 2020. We acknowledge that this is a possible limitation of the current study. In our analysis, we measured state-level race-specific fractions as the percentage of the given race and ethnicity (Table 1).

To evaluate death rates among African American and Latino populations, the dataset was downloaded from Data. CDC.gov [6]. The dataset reported the percentage of deaths from COVID-19 infection for each race or ethnicity. Death rate by race and ethnicity was compared

with racial and ethnic composition of the general population for 39 states, reported through May 13, 2020.

## 3. Results

We observed racial/ethnic disparities in COVID-19 incidence (Table 1). The differences were highly significant in the Z-test ( $p < 0.00001$ ) for African American and Latino populations. The most profound disparities are the following: Black Michiganders are five times more likely to be infected with COVID-19 (998 per 100 000 population) than white Michiganders (200 per 100 000 population). Latino population is 5.1 times more likely to be infected (2526 per 100 000 population) than whites in Rhode Island (494 per 100 000 population). Meanwhile, the COVID-19 incidence rate is lower among Asian and Caucasian populations.

The incident rates of COVID-19 were higher among African Americans than their representation in 14 states and New York City out of 16 states and New York City (Fig. 1). The incidence rate among Latinos was disproportionately higher than their share in the population in 10 out of 11 states and New York City (Fig. 2). The data was available for 35 states for the death rate among the African-American population (Fig. 3). The number of COVID-19 related deaths was available for the Native American population in three states only (Fig. 4), and the death rate in

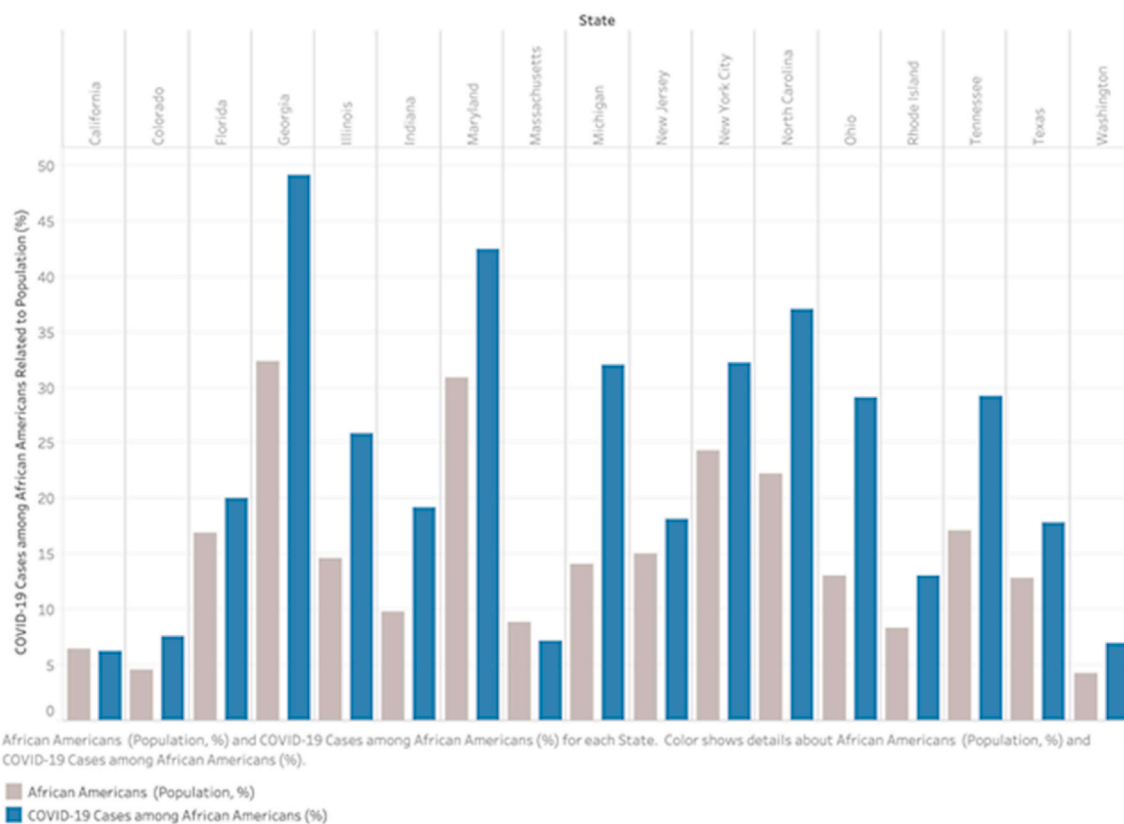
**Table 1**  
Descriptive statistics, observed rates, and observed incidence rate ratios (IRRs) for sixteen states and New York city.

State	Caucasian			African American		
	Cases, No. (%)	Population, No. (%)	Observed Prevalence Rate <sup>b</sup>	Cases, No. (%) <sup>a</sup>	Population, No. (%)	Observed Prevalence Rate <sup>b</sup>
New York City	20 198 (30.6)	2 695 998 (32.1)	749	21 238 (32.2)	2 040 896 (24.3)	1041
New Jersey	19 736 (35)	4 890 777 (54.9)	404	10 239 (18.2)	1 336 278 (15)	766
Massachusetts	15 959 (23.1)	4 948 841 (71.7)	322	4974 (7.2)	614 291 (8.9)	810
Michigan	14 943 (34)	7 486 940 (74.9)	200	14 064 (32)	1 409 424 (14.1)	998
California	9607 (26)	14 556 993 (36.8)	66	2330 (6.3)	2 571 208 (6.5)	91
Illinois	13 825 (28.8)	7 772 059 (61)	178	12 438 (25.9)	1 860 198 (14.6)	669
Florida	5145 (37.8)	11 395 139 (53.5)	45	2711 (20)	3 599 586 (16.9)	75
Georgia	9102 (41.2)	5 512 205 (52.4)	165	10 864 (49.2)	3 408 310 (32.4)	319
Maryland	5873 (27.3)	3 051 573 (50.5)	192	9147 (42.5)	1 867 200 (30.9)	490
Washington	4661 (47)	5 124 202 (68)	91	708 (7)	324 030 (4.3)	218
Indiana	9290 (59.4)	5 279 892 (78.9)	176	3014 (19.2)	655 804 (9.8)	460
Ohio	10 832 (58.4)	9 199 591 (78.7)	118	5401 (29.1)	1 519 627 (13)	355
Colorado	<sup>c</sup> (48)	3 867 288 (67.9)	<sup>c</sup>	<sup>c</sup> (7.6)	261 996 (4.6)	<sup>c</sup>
Tennessee	5507 (58)	4 989 497 (73.7)	110	2770 (29.2)	1 157 672 (17.1)	239
North Carolina	4769 (52)	6 520 913 (62.8)	73	3359 (37)	2 305 164 (22.2)	146
Rhode Island	3764 (39)	761 267 (72)	494	1255 (13)	88 814 (8.4)	1413
Texas	4356 (33.7)	11 911 266 (41.5)	37	2301 (17.8)	3 673 836 (12.8)	63
	Asian			Hispanic		
State	Cases, No. (%) <sup>a</sup>	Population, No. (%)	Observed Prevalence Rate <sup>b</sup>	Cases, No. (%) <sup>a</sup>	Population, No. (%)	Observed Prevalence Rate <sup>b</sup>
New York City	4976 (7.5)	1 167 426 (13.9)	426	18 916 (28.7)	2 444 036 (29.1)	774
New Jersey	2750 (4.9)	890 852 (10)	309	16 323 (29)	1 835 155 (20.6)	889
Massachusetts	1036 (1.5)	490 053 (7.1)	211	8705 (12.6)	848 964 (12.3)	1025
Michigan	879 (2)	339 861 (3.4)	259	<sup>c</sup>	519 788 (5.2)	<sup>c</sup>
California	4320 (12)	6 052 228 (15)	71	17 716 (48)	15 545 919 (39.3)	114
Illinois	2047 (4.3)	751 724 (5.9)	272	15 026 (31.3)	2 216 948 (17.4)	678
Florida	<sup>c</sup>	638 980 (3)	<sup>c</sup>	5640 (41.5)	5 559 124 (26.1)	101
Georgia	439 (2)	452 337 (4.3)	97	2952 (7)	1 030 909 (9.8)	286
Maryland	547 (2.6)	404 862 (6.7)	135	4892 (22.8)	628 443 (10.4)	778
Washington	931 (9)	700 810 (9.3)	133	3051 (31)	972 091 (12.9)	314
Indiana	308 (2)	167 297 (2.5)	184	<sup>c</sup>	475 123 (7.1)	<sup>c</sup>
Ohio	330 (1.8)	292 236 (2.5)	113	977 (7)	455 888 (3.9)	214
Colorado	<sup>c</sup> (2.7)	199 345 (3.5)	<sup>c</sup>	<sup>c</sup> (38.3)	1 235 937 (21.7)	<sup>c</sup>
Tennessee	311 (3.3)	128 630 (1.9)	242	1299 (7)	379 121 (5.6)	343
North Carolina	220 (2)	332 276 (3.2)	66	1669 (7)	996 828 (9.6)	167
Rhode Island	<sup>c</sup>	38 063 (3.6)	<sup>c</sup>	4247 (44)	168 113 (15.9)	2526
Texas	543 (4.2)	1 492 496 (5.2)	36	5623 (43.5)	11 365 931 (39.6)	49

<sup>a</sup> COVID-19 infection reporting since March 2020 until May 5, 2020.

<sup>b</sup> Incidence rate per 100 000.

<sup>c</sup> No enough data for the population.



**Fig. 1.** COVID-19 Cases among African Americans African Americans (Population, %) and COVID-19 cases among African Americans (%) for each state. Color shows details about Americans (Population, %) and cases among African Americans (%). (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

the Hispanic population is presented in Fig. 5 for 24 states where data was reported.

Provisional Death Count for COVID-19 among African Americans, Native Americans, and Hispanics is shown in Figs. 3–5, respectively. For 23 out of 35 states, we observed a significant discrepancy between the expected number of deaths associated with COVID-19 and the actual percentage of the deaths among African-Americans.

In the District of Columbia, 77% of deaths associated with COVID-19 were among African Americans, whereas they comprise only 45% of the population. The data shows that African-American people are also disproportionately affected in Delaware, Louisiana, South Carolina, Michigan.

Only three states report data for Native Americans. New Mexico has about 8.9% of the total population as Native Americans, but they accounted for 38.1% of deaths due to COVID-19 (Fig. 4).

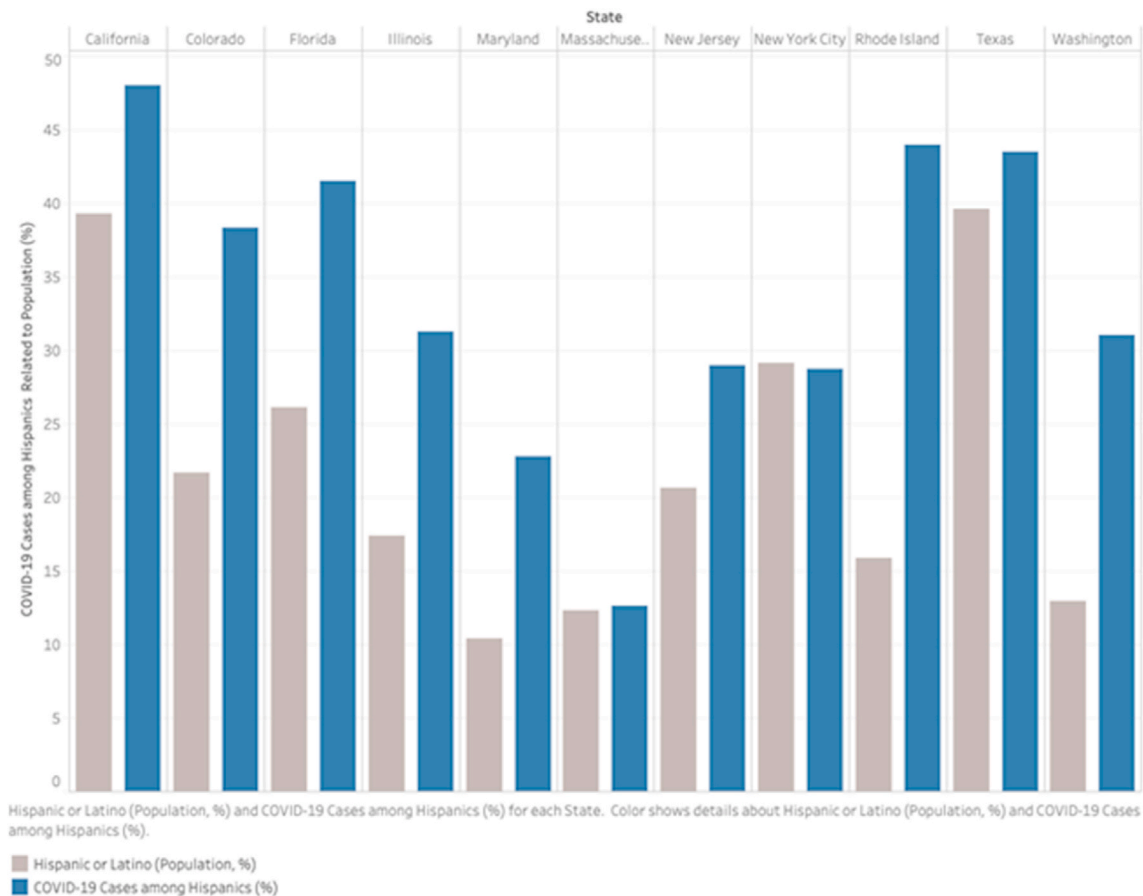
According to CDC.gov, the data weighted distribution of the Hispanic population was 26.8% in the USA, the distribution of COVID-19 deaths among Hispanics was 16.6%, as shown in Fig. 5. The weighted distribution of the Asian population was 11.5% in the USA, and the distribution of COVID-19 deaths among Asians was 5.8%. So, the death rate among Hispanics and Asians are lower than their representation in the overall national population.

#### 4. Discussion

Racial and ethnic information is available for only about 35% of the total deaths in the US [7]. Yet, it is clear from the data that historically disadvantaged groups like African-Americans and Latinos are represented disproportionately higher, not only in the total number of cases but also total deaths. One of the reasons behind this is the higher incidence of co-morbidities like - diabetes, cardiovascular disease, asthma,

HIV, morbid obesity, liver disease, and kidney disease - among racial and ethnic minorities [8]. In a retrospective cohort study, in Louisiana between March 1 and April 11, researchers found that African-American patients had a higher prevalence of obesity, diabetes, hypertension, and chronic kidney disease compared to patients of Caucasian descent [9]. They also report that 76.9% of the total COVID-19 cases were African-American. African-Americans also accounted for 70.6% of the total deaths, which is an alarming figure because the African-American community comprises only 31% of the total population. There is also a growing concern about the African American community being exposed to constant mental stress due to various social and environmental determinants leading to a process of “weathering” in turn leading to an increase in co-morbid conditions. However, we believe that focusing only on this higher incidence of co-morbidities does not give the complete picture. A study found that in large cities of Texas, access to coronavirus testing depends on which zip code an individual lives in, and is hence not equitable [10]. In Dallas, recent research by the University of Texas, School of Public Health identified parts of South Dallas as being higher for COVID-19 hospitalization. These were predominantly minority neighborhoods that also coincided with having a lack of testing sites.

Data from the CDC shows there is an overrepresentation of African-American persons among hospitalized patients [11]. It also emphasizes that racial and ethnic minorities are more likely to live in densely populated areas. People living in densely populated areas may find it more difficult to practice prevention measures such as social distancing with little choice to do so. Racial and ethnic minorities also often live in neighborhoods that have fewer well-stocked grocery stores and medical facilities. This makes it more difficult to receive care when they fall sick and impairs their ability to stock up on supplies that would allow them to stay home. In all age groups, African-Americans are more likely than



**Fig. 2.** COVID-19 Cases among Hispanics (Population, %) and COVID-19 cases among Hispanics (%) for each state. Color shows details about Hispanics (Population, %) and cases among Hispanics (%). (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

Caucasians to report not being able to see a doctor in the past year because of healthcare costs and as a result, have a higher prevalence of chronic conditions. Racial minorities in the US are more likely to be uninsured, and have notably fewer visits to the hospital compared to Whites [19]. Institutional racism and systemic inequities undermine the prevention efforts taken by public health agencies. According to an analysis by National Equity Atlas, only 6.5% of Caucasian households do not have access to a car [12]. This is compared to 19.7% of Black households, 12% Latino households, and 13.6% Native American households who do not own one. Overall people of color are much less likely to be able to drive to grocery stores, medical centers, testing facilities, etc. Many forms of public transportation, due to low utilization in the pandemic, have faced funding cuts, and their use invariably leads to a higher risk of contracting COVID-19 than driving a private car.

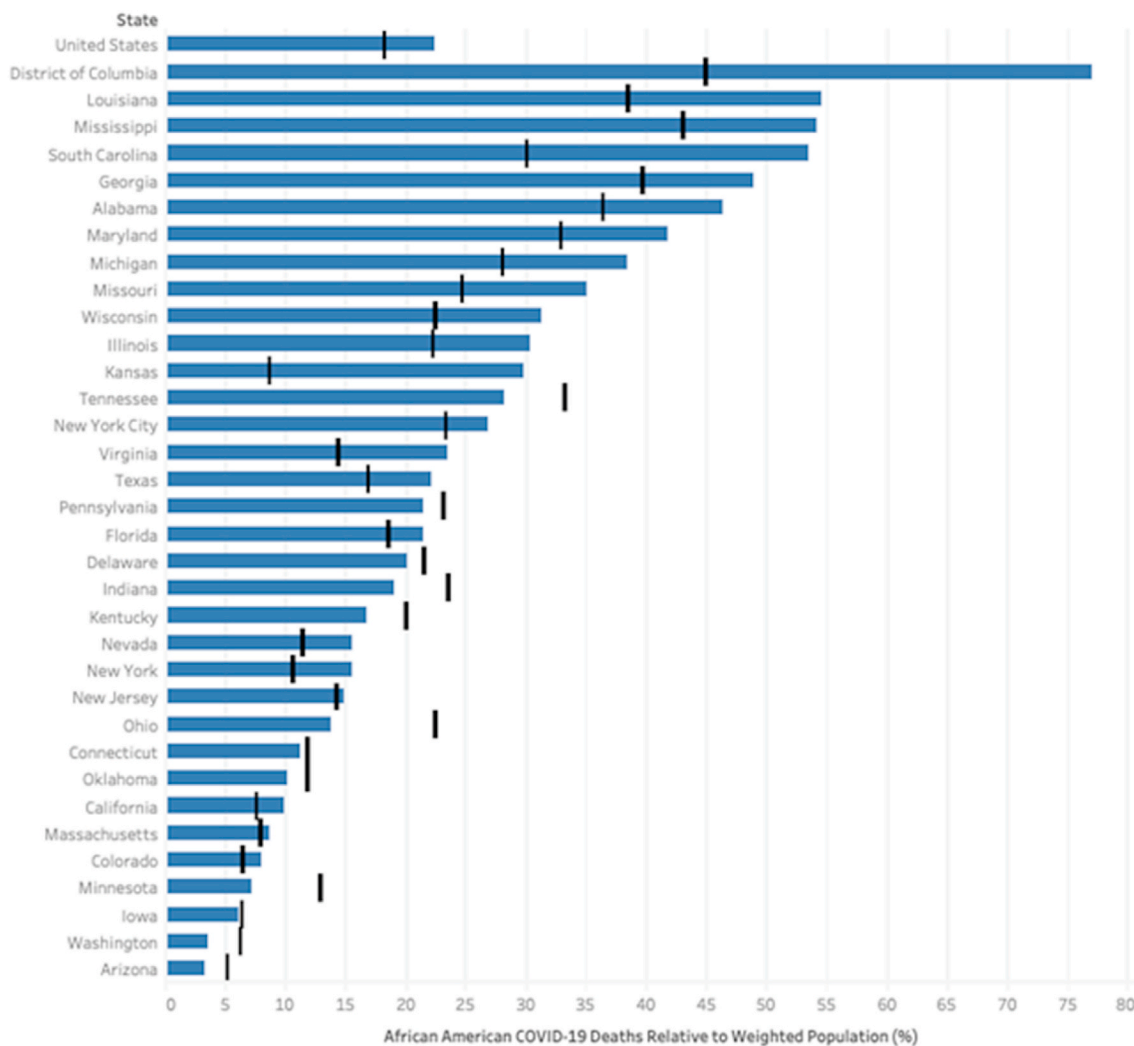
CDC also reports that racial and ethnic minority families are more likely to live in multi-generational households, thus increasing the odds of contracting the highly infectious disease for vulnerable age groups. Racial and ethnic minority groups are also overrepresented in jails, prisons, and detention centers [20] - where close proximity between inmates can lead to the rapid spread of the virus. Compared to Caucasians, African Americans are almost twice as likely to be uninsured & Hispanics are almost three times as likely. In a recent piece published by the American Medical Association [13], it was reported that more than 28% of people diagnosed with COVID-19 in the US are Hispanic. Hispanics only account for 16.7% of the total US population. Many Hispanic communities usually congregate in Church where they discuss recent events. Now with stay-at-home orders in multiple states, this community is at a disadvantage with respect to the dissemination of information [13]. This has especially affected the elderly in the Latino community, as

they not only lost a vital source of acquiring new information but are also harder hit by COVID-19, whose mortality increases with age.

Racial disparities in health outcomes are not limited to African-Americans and Hispanics. American Indian reservations have also reported higher COVID-19 cases compared to the general population [14]. Another far less talked about problem is the categorization of data. American Indian and Alaska Native (AIAN) individuals are being incorrectly categorized as African-American or Hispanic based on surnames or appearance in certain state counties. In places, they are simply classified as “other”.

Hand hygiene is vital to prevent the spread of infection. Racial and ethnic minorities continue to face a lack of indoor plumbing [15]. Indigenous peoples, African-American, and Hispanics are much more likely than Caucasian households to lack access to complete plumbing, electricity, & sanitation among other essential amenities. These differences exist even when taking into account other characteristics like household size, age, and income. They are also more likely to be employed in occupations requiring public contact that impairs their ability to exercise social distancing.8 Many of them serve as essential workers and their jobs do not easily translate to a “work from home” model (meat processing, assembly lines, cleaning, delivery personnel, etc) [13]. This has led to confusion and reservations about the ongoing stay-at-home orders across the country. Many have continued to show up at their jobs for fear of layoffs, and to financially support their families, at great expense and risk to personal health.

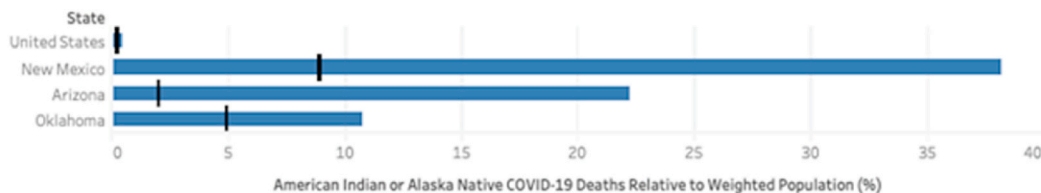
Another group that has continuously showed up for work is frontline healthcare workers, many of whom are immigrants. Over 2.6 million health care workers in the US are foreign born. They have experienced a sharp increase in racist verbal abuse and physical attacks during the



The black lines represent the percentage of African Americans in the population.  
The blue bars represent the percentage of African Americans in the population and COVID-19 cases among African Americans.

**Fig. 3.** Provisional Death Counts for Coronavirus Disease (COVID-19) among African American

The black lines represent the percentage of African Americans in the population.  
The blue bars represent the percentage of African Americans in the population and COVID-19 cases among African Americans. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)



The blue bars represent the percentage of American Indians in the population and COVID-19 cases among American Indians.  
The black lines represent the percentage of American Indians in the population.

**Fig. 4.** Provisional Death Counts for Coronavirus Disease (COVID-19) among American Indians

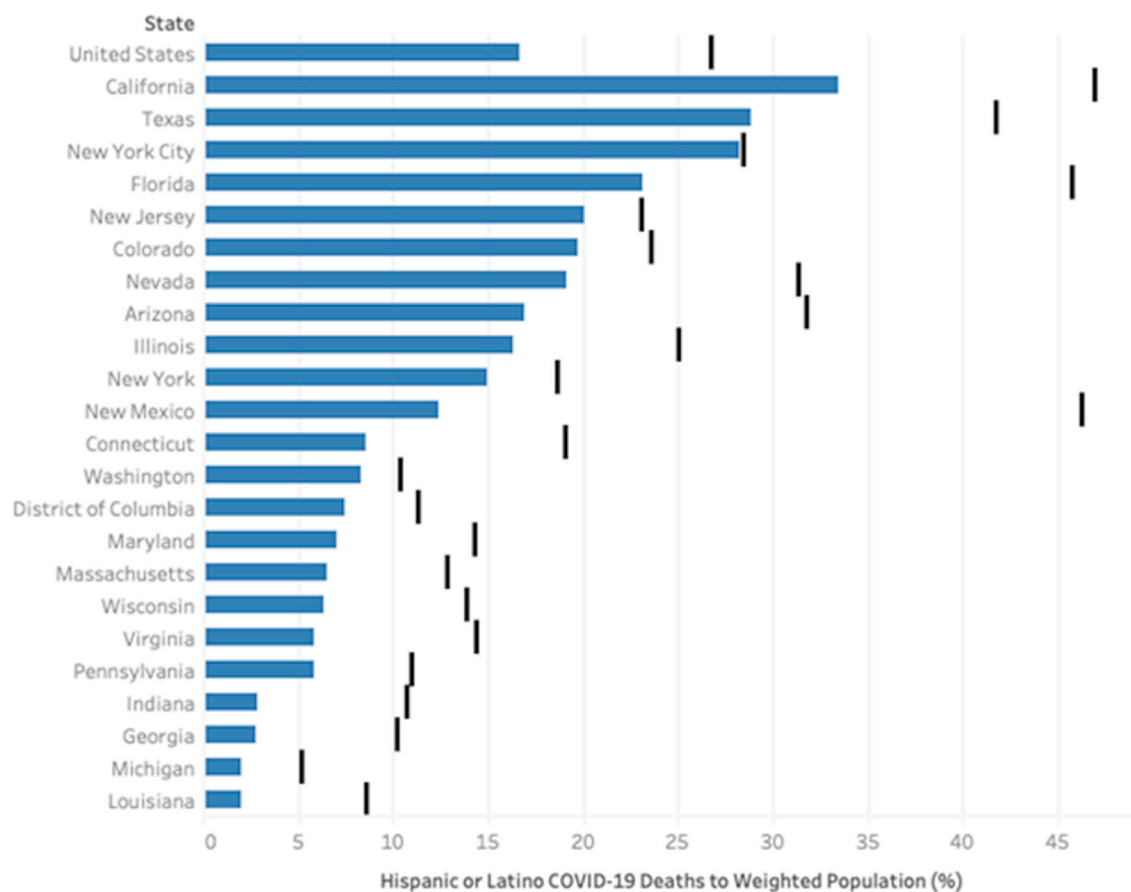
The black lines represent the percentage of American Indians in the population.  
The blue bars represent the percentage of American Indians in the population and COVID-19 cases among American Indians. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

pandemic. This has especially affected the immigrants from China and other South-East Asian countries [16,17]. The FBI’s warning of a potential surge in hate crimes against immigrants sends a chilling message to those on the frontlines [21]. The impact of such discrimination on our health system and health care workers needs further investigation and

study in the future.

The racial and ethnic minorities in the U.S. are at a higher risk for COVID-19 infection than the general population. It is becoming increasingly apparent that COVID-19 has not created, but only widened the existing gaps in our current public health system. We encourage the





The black lines represent the percentage of Hispanics in the population.

The blue bars represent the percentage of Hispanics in the population and COVID-19 cases among Hispanics.

**Fig. 5.** Provisional Death Counts for Coronavirus Disease (COVID-19) among Hispanics

The black lines represent the percentage of Hispanics in the population.

The blue bars represent the percentage of Hispanics in the population and COVID-19 cases among Hispanics. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

U.S. Department of Health and Human Services, its sub agencies, state and local health departments, health care institutions, and laboratories to standardize, collect and immediately make publicly available, existing race and ethnicity data so that adequate planning to prioritize equity and measures to effectively manage this pandemic can be initiated. Data needs to be disaggregated to a granular level with a breakdown of who receives tests, who tests positive, who is hospitalized, who dies, and, once developed, who receives treatment and a vaccine, along with who participated in clinical trials. This is as important, if not more, as having data stratified by age, which has been readily available from the CDC and Johns Hopkins Coronavirus Resource Center. Additionally, an effort should be made to ensure public service announcements (PSAs) are provided in multiple languages [18]. Only when these communities fully understand how to correctly implement social distancing, access testing, and health care services, and are made aware of harms from misinformation, can we effectively bring the pandemic under control.

## 5. Conclusions

A strong case can be made for the collection and reporting of COVID-19 cases and outcomes stratified by race/ethnicity, sex, socioeconomic status, and community health status in all states [18]. The granular racial and ethnic data will help us better understand the full extent of the pandemic, ensure equitable access to testing, treatment, as well as other resources in the present. It will also inform future emergency

preparedness and response. A better understanding of the facts and greater public awareness will mount pressure on public authorities to mobilize more resources to underserved communities. We urge public health agencies to be cognizant of these findings during policymaking. More research is required to understand and document all the reasons why minorities have been affected at a disproportionately higher rate. Any effective plan to contain the spread of COVID-19 must factor in the impact amongst colored, and marginalized communities in society. If we ignore these factual inequities, we will ultimately be unsuccessful in quelling the burden of disease not only for minorities but for everyone.

## Ethical approval

This study did not involve human, animal subjects or tissue.

## Other relationships

We declare that there are no other relationships or activities that could appear to have influenced the submitted work.

## CRediT authorship contribution statement

**Raghavendra Tirupathi:** Conceptualization, Methodology, Writing - original draft, Writing - review & editing, Visualization, Supervision.  
**Valeriia Muradova:** Software, Validation, Formal analysis, Resources.

**Raj Shekhar:** Writing - original draft, Resources, Data curation. **Sohail Abdul Salim:** Investigation, Writing - review & editing. **Jaffar A. Al-Tawfiq:** Formal analysis, Data curation, Supervision. **Venkataraman Palabindala:** Writing - review & editing, Supervision, Project administration.

#### Declaration of competing interest

The authors declare no conflict of interest.

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