Measuring Disparities in the Social Determinants of Health in Relation to the COVID-19 Pandemic in New York State

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Foreword

In April 2020, as evidence mounted that the COVID-19 pandemic was having a devastatingly disproportionate impact on New York's Black and Hispanic communities, Governor Andrew M. Cuomo commissioned the University at Albany (UAlbany) to closely examine the nature and causes of this unfolding public health crisis.

The resulting interdisciplinary research program at UAlbany has showcased the best of what the State University of New York System (SUNY) can be, drawing on its existing academic and research strengths in minority health disparities, emergency preparedness, public health, social welfare, and public policy, as well as on expertise from related disciplines in the arts and sciences and education. The full complement of work generated by UAlbany's interdisciplinary research teams will be released in the coming months, including work that reflects partnerships with SUNY Upstate Medical University and SUNY Downstate Health Sciences University.

The Rockefeller Institute of Government further leverages SUNY's capacity in this area, bridging expertise in data analysis and public policy to examine the nature and causes of COVID-19's disproportionate impacts on communities of color.

We are pleased to announce the release of two research briefs prepared by UAlbany and the Rockefeller Institute, which document the earliest phase of UAlbany's research. These reports reiterate a key point that permeates this research: preexisting disparities in education, employment, income, and poverty, while not the result of COVID-19, have been exacerbated by this pandemic and brought to the forefront, locally and nationally.

Independently constructed from data collected and analyzed about nine months apart, the two briefs tell much the same story about the starkly disparate impact of COVID-19 on communities of color, in contrast to white New Yorkers. Estimates based on both datasets suggest important and nuanced differences in the way these disparities manifest themselves for Black, Hispanic, and white residents at different stages of the disease—from exposure to hospitalization to recovery or death.

This work also substantiates decades of research on the socioeconomic impacts of disasters, which clearly show that highly vulnerable (e.g., low-income, high-poverty, residing in high-risk areas) communities disproportionately suffer the impacts

of disasters and have much more difficulty in recovering from their devastating consequences; the impacts of COVID-19 on communities of color are no different.

A key finding of the UAlbany brief suggests the need for targeted intervention strategies to mitigate these disparities in different groups. The Rockefeller Institute's work, which examines how existing differences in social determinants among racial and ethnic groups appear to correlate with disproportionate health outcomes, adds critical context and texture to the early UAlbany statistical analysis. For example, the Rockefeller Institute brief helps explain why Hispanic New Yorkers' higher death rates might have more to do with living in denser housing with someone who has a high-risk job than underlying health conditions.

From a policy perspective, these two reports suggest the need to understand why social determinants of health differ among racial and ethnic groups, and how they contribute to disparities at each point in the disease continuum. For example, UAlbany is examining the effects of urban public transit networks, neighborhood ethnicity and housing patterns, segregation and poverty, heavy metals in the environment, limited language proficiency within immigrant communities, and a historically justified distrust of the medical community and government.

Anticipating effective responses to future health crises also requires a deeper understanding of the disproportionate effects of pandemic-related economic and social consequences on communities of color. To that end, we are examining factors such as food insecurity, mental health, employment, healthcare policies, and access to technology skills and equipment.

Finally, as we continue to embark on these research initiatives and disseminate their outcomes, it is imperative that we develop a deeper understanding of systemic discrimination, segregation, and institutional racism—and address their profound impact on communities of color in terms of response and recovery from COVID-19 and other crises and disasters.

As we mark the one-year anniversary of the pandemic's heartbreaking toll across our state and our nation, we are reassured that New York is leveraging its considerable academic and research resources to prevent a repeat of the public health disaster that has so adversely impacted communities of color. Further, we are extremely proud that SUNY generally, and UAlbany and the Rockefeller Institute specifically, have played a pivotal role in these efforts.

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Measuring Disparities in the Social Determinants of Health in Relation to the COVID-19 Pandemic in New York State

Introduction

Racial and ethnic disparities in health outcomes and healthcare access have proven extremely persistent in the US and have generated substantial research and policy interest in improving health and healthcare.[1, 2, 3] The severity and unequal death toll of the COVID-19 pandemic has bolstered calls to address the systemic and pervasive health disparities that routinely confront Americans of color. People of color in the US, particularly Black and Hispanic Americans, have lower life expectancy and higher rates of chronic disease and premature death.[4] While some health gaps have begun to close over time, others including gaps in HIV infection, infant mortality, diabetes, and obesity have remained substantial.[5]

Strategies to address health inequalities are complicated. It is impossible to disentangle racial and ethnic inequalities in health outcomes from other forms of social inequality—most notably income and education—that persist in the US due to a history of discriminatory laws, norms, and systemic racism that influenced where people of color could work, live, and learn. Health is not only highly correlated with race and ethnicity but also with both education[6] and income. Wealthier and more highly educated individuals both report better health and having a longer life expectancy. Health and life expectancy also differ over fairly small geographies.[7]

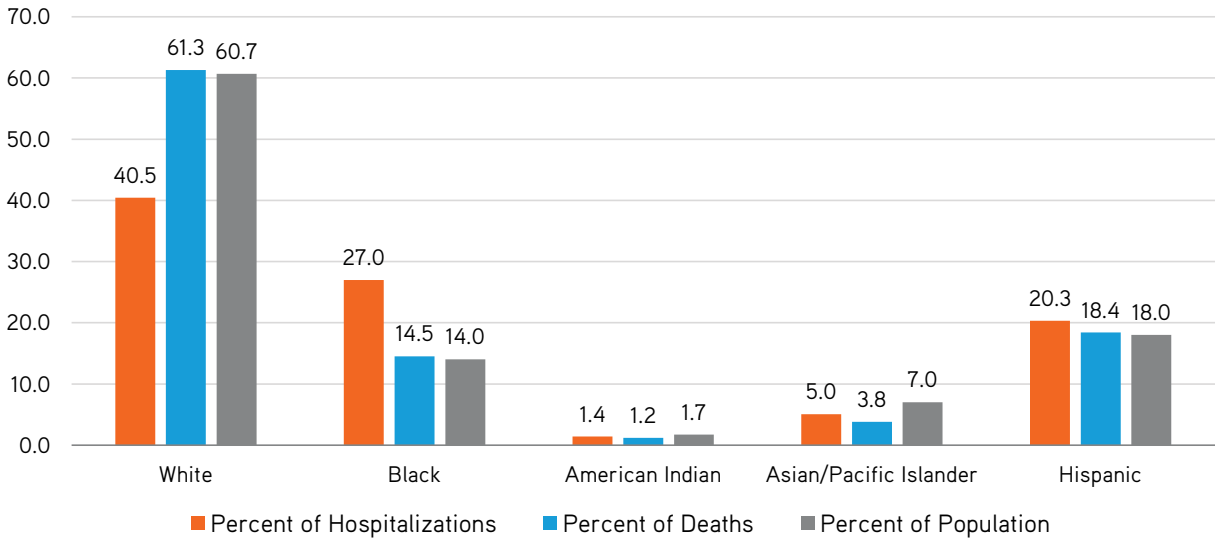
The goal of this data brief is to document a set of racial and ethnic disparities in health and the social determinants of health that existed in New York State before the COVID-19 pandemic was first confirmed in March of 2020. To do so, we bring together a variety of data sources including the Integrated Public Use Microdata Series (IPUMS) harmonized Current Population Survey, Decennial Census, American Community Surveys, the Behavioral Risk Factor Surveillance System, the Centers for Disease Control (CDC) and Prevention Mortality data, and O*Net job characteristics database, as well as COVID-19 hospitalization and mortality data from the CDC, New York State, and New York City.

First, we give an overview of racial and ethnic differences in COVID-19 cases, hospitalizations, and deaths for the nation as a whole and for New York State and New York City specifically. We follow that with a brief discussion of the CDC's recognized social determinants of health and then provide specific statistics on household characteristics, neighborhood characteristics, education, job characteristics, and health conditions and healthcare access that may have contributed to racial and ethnic disparities in the impact of COVID-19 in New York.

National and State Overview

The COVID-19 pandemic has disproportionately affected people of color in the US, with Black and Hispanic Americans both more likely to die from the pandemic and more likely to be hospitalized with serious illness as seen in Figure 1. According to the US Census Bureau, Black Americans are 14 percent of the US population and Hispanic Americans are 18 percent of the population.[8] However, those two groups account for 27 percent and 20 percent of COVID-19 hospitalizations[9] and 14.5 percent and 18.5 percent of deaths respectively.[10]

FIGURE 1. **National COVID-19 Hospitalizations and Deaths by Race and Ethnicity**



SOURCE: "Deaths involved coronavirus disease 2019 (COVID-19) by race and Hispanic origin group and age, by state," US Centers for Disease Control and Prevention, accessed January 29, 2021, https://data.cdc.gov/NCHS/Deaths-involving-coronavirus-disease-2019-COVID-19/ks3g-spdg and "Laboratory Confirmed COVID-19-Associated Hospitalizations," COVID-NET: COVID-19-Associated Hospitalization Surveillance Network, US Centers for Disease Control and Prevention, accessed January 29, 2021, https://gis.cdc.gov/grasp/COVIDNet/COVID19_5.html.

The numbers in New York, presented in Figure 2, are similarly stark. According to the New York COVID-19 tracker[11] data as of January 29, 34 percent of COVID-19 deaths in New York City (NYC) were Hispanic New Yorkers and 28 percent were Black New Yorkers, which is above the 29 percent and 22 percent of the NYC population that these two groups make up. Hispanic deaths are not overrepresented compared to the

population outside of NYC but Black deaths remain disproportionately high, accounting for 13 percent of deaths outside NYC when Black people only account for 9 percent of the population.

FIGURE 2A. **NYC COVID-19 Deaths By Race and Ethnicity**

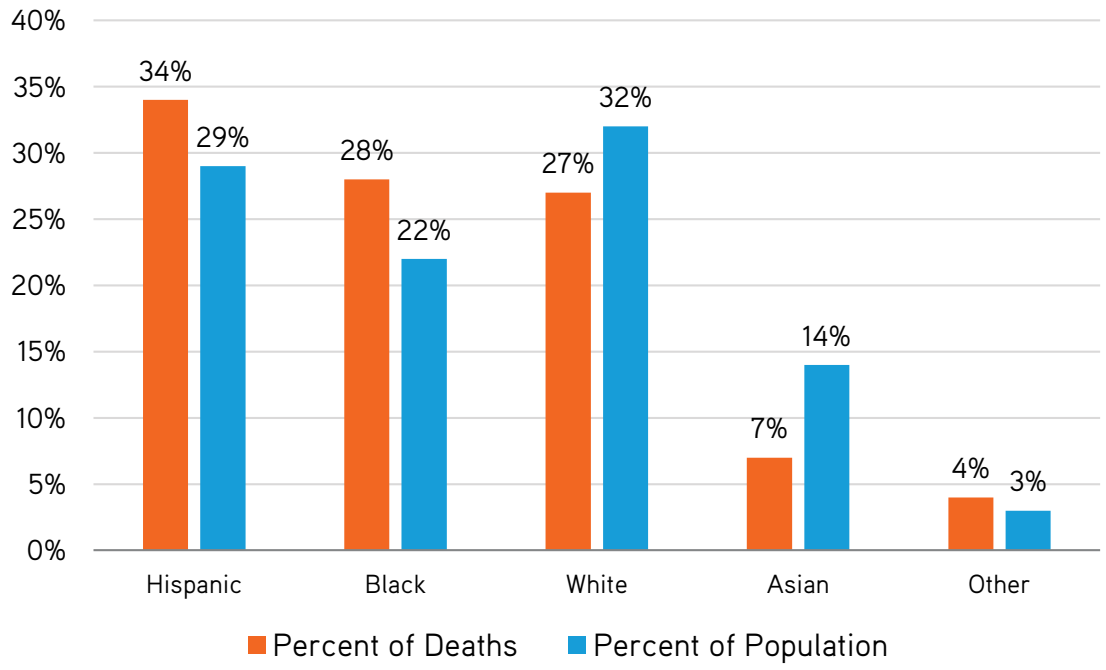
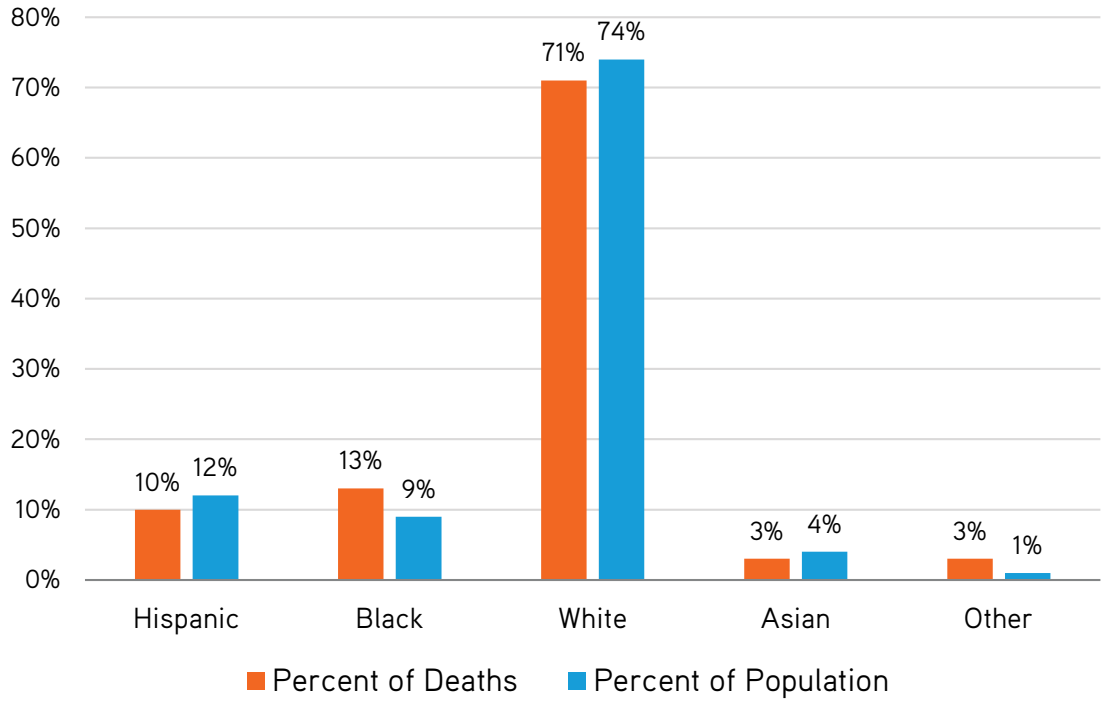


FIGURE 2B. **Rest of State COVID-19 Deaths by Race and Ethnicity**

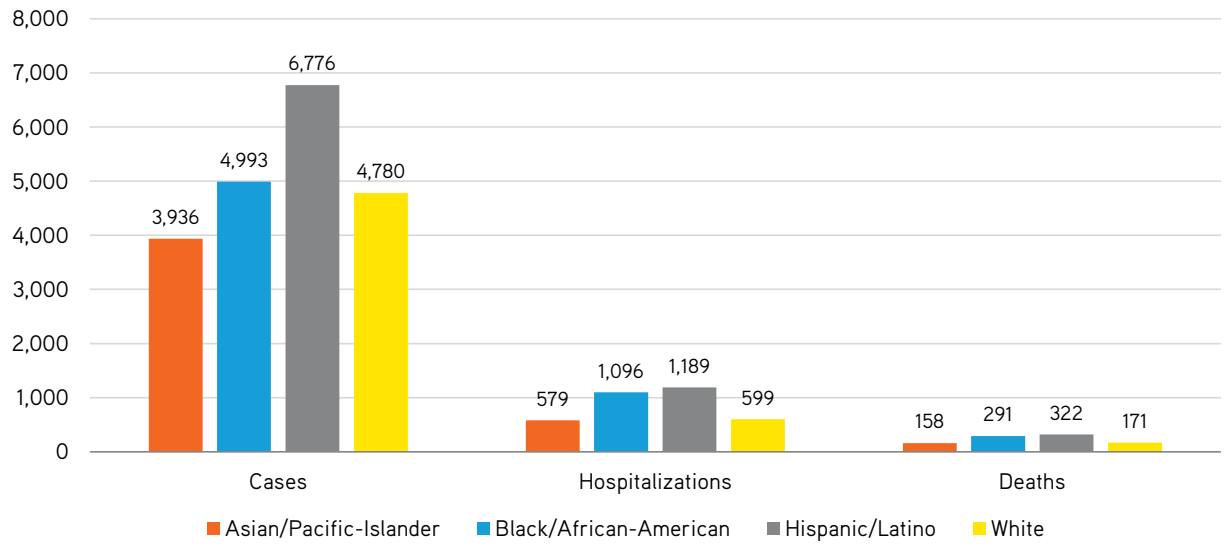


SOURCE: "Fatalities," New York State Department of Health, accessed March 2, 2021, https://covid19tracker.health.ny.gov/views/NYS-COVID19-Tracker/NYSDOHCOVID-19Tracker-Fatalities?%3Aembed=yes&%3Atoolbar=no&%3Atabs=n.

While aggregated statewide hospitalization data for New York State is not yet publicly available by race and ethnicity, NYC has published numbers on case, hospitalization, and death rates.[12] The number of cases per 100,000 residents for Black NYC residents is slightly higher than white NYC residents at 4,993 and 4,780 respectively but the rate for Hispanic and Latino New Yorkers is much higher at 6,776 (Figure 3). Hospitalizations, signaling a more severe case of COVID-19, is where the numbers substantially diverge in NYC. Black residents are nearly twice as likely to be hospitalized compared to white residents and Hispanic residents are more than twice as likely to be hospitalized. They also have higher death rates—281 for Black residents and 322 for Hispanic residents, compared to only 171 for white residents.

On average, Black, Hispanic, and Asian New Yorkers have jobs that require them to be in higher physical proximity to others compared to white New Yorkers. They also work in jobs that have a higher exposure to disease score.

FIGURE 3. **NYC Age Adjusted COVID-19 Rates per 100,000**

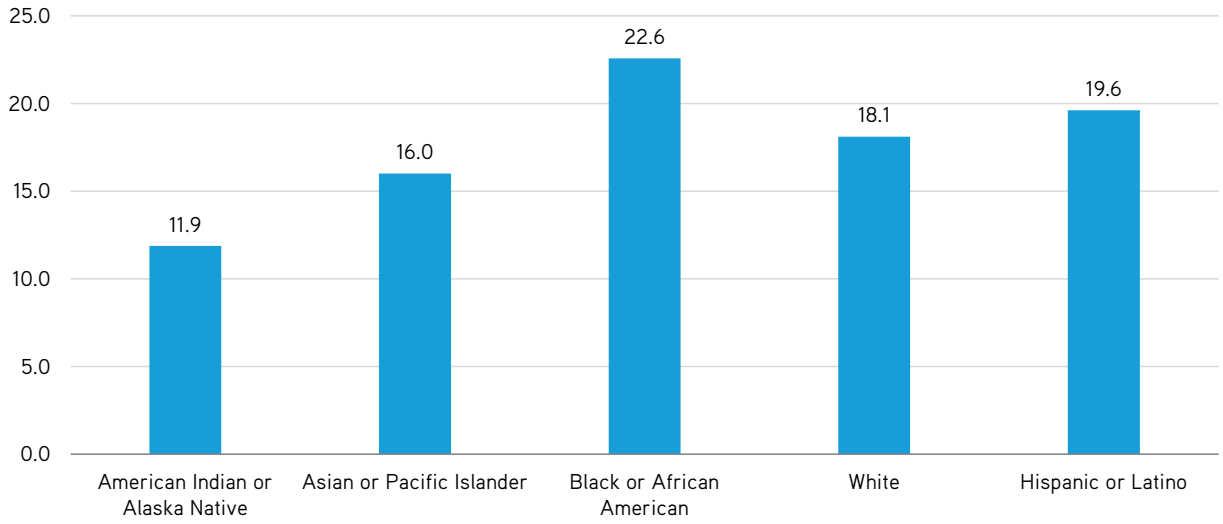


SOURCE: "nychealth/coronavirus data," Github.com, accessed March 3, 2021, https://github.com/nychealth/coronavirus-data/blob/master/totals/by-race.csv.

Social Determinants of Health

COVID-19 is not the first health crisis to hit people of color harder than their white neighbors; nor is it the first respiratory illness to do so. The CDC mortality data for the past 10 years in New York State shows that, controlling for age, Black and Hispanic New Yorkers have been more likely to die of the flu than their white peers (Figure 4). On average, 22.6 in every 100,000 Black New Yorkers and 19.6 in every 100,000 Hispanic New Yorkers dies from the flu yearly compared to 18 in every 100,000 white New Yorkers.

FIGURE 4. **New York State Age Adjusted Flu Mortality Rate per 100,000**



SOURCE: "National Center for Health Statistics Mortality Data on CDC WONDER," CDC WONDER, US Centers for Disease Control and Prevention, accessed March 2, 2021, https://wonder.cdc.gov/mcd.html.

The severity and intensity of the COVID-19 pandemic has called attention to how underlying racial and ethnic disparities in health and healthcare contributes to inequalities in infectious disease outcomes in a way that previous illnesses, like influenza, have been unable to do. The CDC identifies five social determinants of health including economic stability, education quality and access, healthcare access and quality, neighborhood and built environment, and social and community context.[13] While we will not present a full and complete analysis of how the social determinants of health affect COVID-19 in New York, the variables that we examine generally fall into one or more of the five categories and they provide a scaffold for thinking about how a variety of factors influence health disparities across groups.

TABLE 1. **Social Determinants of Health**

Determinant	CDC Description	Indicators
Healthcare Access and Quality	The connection between people's access to and understanding of health services and their own health.	health insurance, chronic conditions, poverty
Education Access and Quality	The connection of education to health and wellbeing	high school attainment, college attainment
Social and Community Context	The connection between characteristics of the contexts in which people live, work, and play and their health and wellbeing.	job characteristics, industry, household structure
Economic Stability	The connection between the financial resources people have - income, cost of living, and socioeconomic status and their health.	poverty, job characteristics, household characteristics
Neighborhood and Built Environment	The connection between where a person lives—housing, neighborhood and environment—and their health and wellbeing.	household characteristics, neighborhood characteristics

These five social determinants of health are inherently interrelated. Household income, education, and the environment in which people live all contribute to each other. People with higher education and earnings will have more options in where to live and may be able to avoid pollution and environmental contaminants that contribute to negative health outcomes or may be able to live closer to high quality medical care and afford to pay for it. The history of legal racial segregation, segregation induced by biased mortgage lending policies (redlining), and racial and ethnic discrimination in education and employment has substantially contributed to inequalities in the social determinants of health and health outcomes based on the neighborhoods in which people live,[14] the jobs they have,[15] and the schools they attend.[16]

The differences in COVID-19 cases, hospitalizations, and mortality across racial and ethnic groups is driven in part by differences in these social determinants of health that predated the pandemic. As such, in this piece we document some of the preexisting differences that are most directly relevant to COVID-19 transmission and severity in New York. The rest of the brief will discuss differences in household characteristics, neighborhood characteristics, education, job characteristics, and finally healthcare access and preexisting chronic conditions.

Household Characteristics

Household characteristics fall into two of the five social determinants of health—social and community context and neighborhood and built environment. COVID-19 spreads more rapidly in crowded spaces where people are forced to interact closely with each other[17] and is likely to be more deadly for older people.[18] Using the Current Population survey harmonized by IPUMS (IPUMS-CPS), we found that New York households differ substantially across race and ethnicity in household characteristics that may increase the risk of COVID-19 transmission and serious illness as seen in Table 2.

People of color in New York are more likely to live in environments with both the potential to spread COVID-19 in the household and to spread it to vulnerable family members. In New York State, 57 percent of Black people and 62 percent of Hispanic people live in buildings with more than two apartments compared to only 25 percent of white New Yorkers. The numbers are even higher in NYC with 62 percent of Black and 66 percent of Hispanic households in buildings with more than two units compared to only 37 percent of white residents. For Black and Hispanic New Yorkers, those buildings are also more likely to be in the central city as defined by the CPS—76 percent of Black and 73 percent of Hispanic New Yorkers live in central city locations compared to only 30 percent of white New Yorkers. Even in the New York City Metropolitan Statistical Area (MSA), which includes NYC, Long Island, and parts of the Lower and Mid-Hudson Valley, less than 50 percent of white residents live in a central city area compared to 80 percent of Black and 76 percent of Hispanic residents. Multiunit buildings are more likely to force residents into close quarters to others outside of their household through the sharing of lobbies, stairwells, elevators, mailrooms, and laundry rooms. Similarly, residents of central cities are more likely to rely on public transportation and to be unable to maintain social distance on busy sidewalks or in smaller stores.

TABLE 2. Household Characteristics by Race and Ethnicity in New York

Panel A: New York State						
	Population	White	Black	Hispanic	American Indian	Asian
Household in Structure with >2 Apartments	38.2%	25.1%	57.1%***	62.0%***	39.8%*	49.5%***
Household Located in Central City	48.2%	29.7%	76.1%***	72.5%***	39.0%**	74.6%***
Average Number of Household Members	3.3	3.1	3.4***	3.8***	3.3	3.7***
Household Includes at Least 3 Generations	7.8%	4.4%	13.8%***	12.2%***	5.3%	11.0%***
Household Member Over 65	23.9%	25.6%	22.7%***	19.1%***	13.3%***	24.7%
Household Member Over 80	6.6%	7.5%	5.6%***	4.2%***	3.4%***	6.4%***
Household Member Under 5	18.4%	16.0%	19.9%***	25.2%***	21.7%*	19.9%***
Household Member Is School Age	38.1%	32.6%	46.5%***	50.0%***	41.7%**	39.6%***

Panel B: New York City MSA (New York State Only)						
	Population	White	Black	Hispanic	American Indian	Asian
Household in Structure with >2 Apartments	49.5%	36.8%	62.3%***	65.7%***	57.7%**	52.5%***
Household Located in Central City	63.8%	47.1%	80.0%***	76.4%***	68.6%***	79.5%***
Average Number of Household Members	3.4	3.2	3.4***	3.7***	3.2***	3.7***
Household Includes at Least 3 Generations	9.0%	4.4%	14.7%***	12.3%***	4.0%***	11.2%***
Household Member Over 65	24.6%	26.2%	24.8%	19.9%***	11.2%***	26.0%
Household Member Over 80	6.8%	8.1%	6.0%***	4.5%***	3.0%**	6.8%***
Household Member Is School Age	39.1%	32.0%	45.6%***	49.3%***	40.5%	39.0%***

Panel C: Rest of State						
	Population	White	Black	Hispanic	American Indian	Asian
Household in Structure with >2 Apartments	14.8%	11.9%	30.5%***	27.2%***	22.6%***	25.7%***
Household Located in Central City	15.9%	9.9%	56.3%***	35.9%***	10.4%	34.3%***
Average Number of Household Members	3.1	3.0	3.4***	4.0***	3.4***	3.7***
Household Includes at Least 3 Generations	5.3%	4.4%	9.4%***	11.2%***	6.5%	9.9%***
Household Member Over 65	22.6%	24.8%	12.1%***	11.0%***	15.3%***	13.5%***
Household Member Over 80	6.2%	6.8%	3.3%***	2.0%***	3.8%**	3.4%***
Household Member is School Age	36.1%	33.3%	50.7%***	55.7%***	42.8%***	44.2%***

*** = average is statistically different from non-Hispanic white at 1% level; ** = 5% level; * = 10% level

SOURCE: IPUMS-CPS, University of Minnesota, https://ipums.org/.

The composition of the household itself also differs across racial and ethnic groups. Black, Hispanic, and Asian families live in households with more people than their white neighbors. Families of color are also more likely to live in households that contain at least three generations—14 percent of Black New Yorkers and 12 percent of Hispanic New Yorkers live in multigenerational households compared to only 4 percent of white New Yorkers. Those differences are fairly consistent for both the state as a whole and NYC specifically. Multigenerational households can provide both COVID protections and COVID risks. Older retired family members may be able to engage in childcare while schools are closed, allowing parents to work and limiting contact with out-of-household care providers. However, multigenerational households also present risks to older vulnerable household members. If someone works outside of the home or a child attends school, they could bring a COVID-19 infection back to the home. While Black and Hispanic New Yorkers are less likely to live in households with a member above 65 or above 80, they are much more likely to have school-aged children in the home. Forty-seven percent of Black New Yorkers and 50 percent of Hispanic New Yorkers live in a home with a school-aged child compared to only 33 percent of white New Yorkers.

Neighborhood Characteristics

In the above section, we discussed that Black and Hispanic New Yorkers are more likely to live in multiunit buildings located in central cities with slightly more household members than white New Yorkers. Using US Census Bureau data from the 2010 Decennial Census and five-year estimates from the 2014-18 American Community Surveys (ACS), we have found that Black and Hispanic New Yorkers are much more likely to live in neighborhoods with dense housing—more people per square mile—and more crowded housing—more people per room in a dwelling (Table 3). The population density of NYC, in particular, has been credited as one of the reasons COVID-19 spread there so rapidly in the initial stages of the pandemic.[19]

According to the 2014-18 ACS, the average Black New Yorker lives in a census tract with 40,812 people per square mile and a Hispanic New Yorker lives in a census tract with 50,816 people per square mile compared to white New Yorkers who live in census tracts with only 17,072 people per square mile. In New York, Black people live in neighborhoods that are 2.4 times as dense as the neighborhoods white people live in and Hispanic people live in neighborhoods 3.0 times as dense. The same patterns are found in the 2010 Decennial Census.

TABLE 3. **New York Neighborhood Characteristics by Census Tract**

Panel A: New York State						
	Population	White	Black	Hispanic	American Indian	Asian/ Pacific Islander
Average Census Tract Density Per Square Mile	29,337	17,072	40,812	50,816	21,574	42,980
Average Percent Crowded (>1 Person/ Room) Housing Units	5.64%	3.25%	7.41%	9.91%	4.78%	8.85%
Group Quarters per 1000 Tract Residents	30	31	34	25	30	29
Panel B: New York City MSA (New York State Only)						
	Population	White	Black	Hispanic	American Indian	Asian/ Pacific Islander
Average Census Tract Density Per Square Mile	44,053	32,923	48,911	57,054	45,745	48,140
Average Percent Crowded (>1 Person/ Room) Housing Units	7.79%	5.06%	8.56%	10.87%	8.53%	9.76%
Group Quarters per 1000 Tract Residents	22	22	24	20	23	21
Panel C: Rest of State						
	Population	White	Black	Hispanic	American Indian	Asian/ Pacific Islander
Average Census Tract Density Per Square Mile ROS	2,409	1,881	5,691	3,993	2,037	4,275
Average Percent Crowded (>1 Person/ Room) Housing Units	1.68%	1.52%	2.39%	2.67%	1.74%	1.97%
Group Quarters per 1000 Tract Residents	44	39	74	63	35	93

SOURCE: "Planning Database with 2010 Census and 2014-18 American Community Survey Data," US Census Bureau, 2020, https://www.census.gov/topics/research/guidance/planning-databases.html.

A forthcoming geographic study of COVID-19 infection in New York City, using similar ACS data, finds that these neighborhood factors, among others, are linked to COVID-19 infection rates.[20] They find that on average, stay-at-home orders increased time spent at home by 20 percent but that behavioral change did not reduce infection equally for all New Yorkers. NYC census tracts with more crowded housing, larger household size, higher poverty, and a higher share of people over the age of 60 have higher infection and death rates. These census tracts also have higher concentrations of people of color. An additional forthcoming study finds similar results using different data and methods and compares COVID-19 infection and death rates across neighborhoods in NYC with different immigrant, ethnic, and racial compositions.[21] This study finds that neighborhoods with the highest concentrations of native-born white New Yorkers have the lowest levels of mortality and neighborhoods with high concentrations of both native-born and foreign-born Black New Yorkers have had the highest.

A higher proportion of New York's Black and Hispanic residents live in NYC compared to white residents. However, that population distribution does not fully explain the difference in density between the neighborhoods where Black and Hispanic people live compared to white people. Even within NYC, Black residents live in census tracts 1.5 times as densely populated as white NYC residents and Hispanic residents live in tracts 1.7 times as dense. These neighborhoods also have more crowded housing. Black NYC residents live in neighborhoods with 70 percent more crowded housing—as measured by the percent of units with more than one resident per room—and Hispanic residents live in neighborhoods with twice as much crowded housing as white residents. Black and Hispanic New Yorkers outside NYC also live in neighborhoods with denser and more crowded housing.

Black and Hispanic New Yorkers are also more likely to live in neighborhoods that have other COVID-19 risk factors including larger group quarters populations like nursing homes,[22] prisons,[23] and college dorms.[24] These residential facilities have seen rapid spread throughout the pandemic. Black New Yorkers live in neighborhoods with 10 percent more group quarters residents per 1,000 people compared to white New Yorkers although Hispanic residents live in neighborhoods with a lower group quarters population. However, outside NYC Black and Hispanic New Yorkers live in neighborhoods with more than 50 percent more group quarters residents compared to white New Yorkers.

Education

As discussed above, both Black and Hispanic New Yorkers are more likely to live in homes with school-aged children. However, they are likely to have lower levels of education themselves. There is substantial evidence that education is correlated with health.[25] People with higher education report being healthier and live longer. Some of this difference is attributed to the difference in income between people with higher levels of education and lower levels of education but education itself can also introduce beneficial health behaviors and encourage people to seek high quality preventative medical care.[26]

While education attainment levels are generally high in New York compared to other states, there is substantial heterogeneity across different groups. Overall, 88 percent of New Yorkers age 25 and older hold a high school diploma or above and 38 percent have a bachelor's degree or above. These numbers are even higher when considering a household—94 percent of New Yorkers live in a household where someone has a high school diploma and 49 percent live in a household where someone has a bachelor's degree. These high rates of education, however, are driven primarily by white families.

FIGURE 5A. **Education Attainment, New York State**

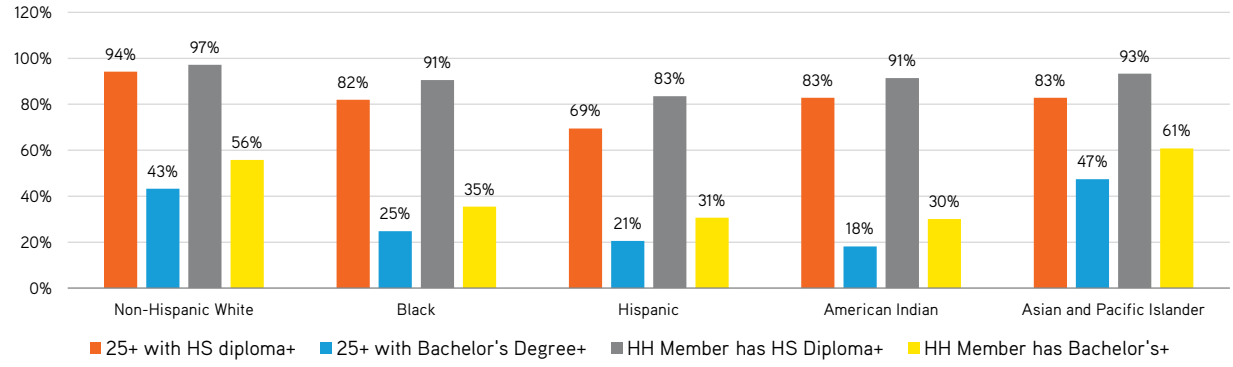


FIGURE 5B. **Education Attainment, NYC MSA**

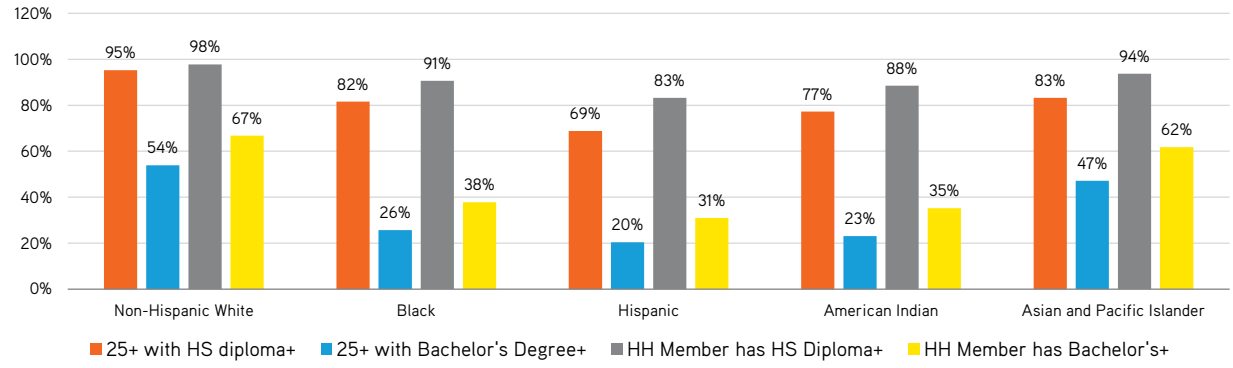
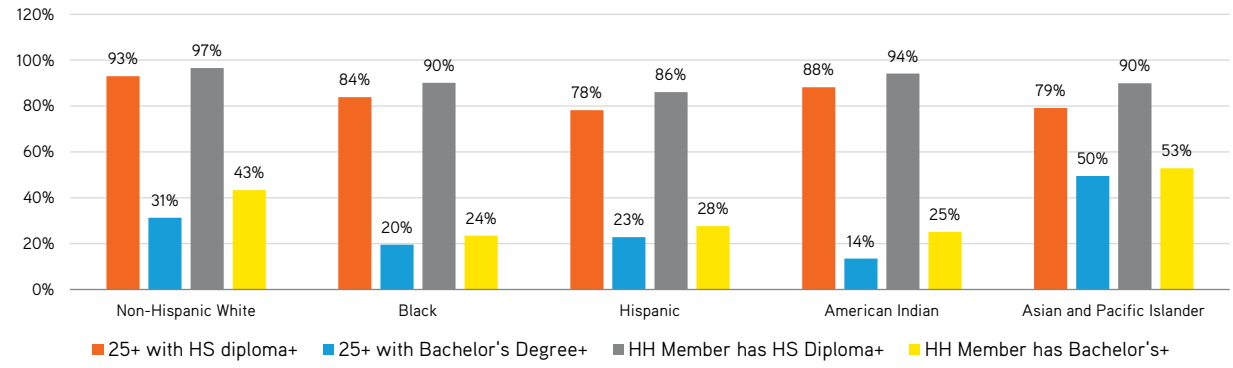


FIGURE 5C. **Education Attainment, Rest of State**



SOURCE: Sarah Flood, et. al, Integrated Public Use Microdata Series, Current Population Survey: Version 8.0 [dataset]. Minneapolis, MN: IPUMS, 2020. https://doi.org/10.18128/D030.V8.0.

As seen in Figure 5, only 82 percent of Black and 69 percent of Hispanic New Yorkers age 25 and older have a high school diploma compared to 94 percent of white New Yorkers. The difference for bachelor's degrees attainment is even greater, 43 percent of white New Yorkers have a bachelor's or above compared to only 25 percent of Black and 21 percent of Hispanic New Yorkers. All levels of education for all races and ethnic groups are higher in NYC than the rest of the state. Outside of NYC, only 24 percent of Black New Yorkers and 28 percent of Hispanic New Yorkers live in a household where someone has a bachelor's degree and 10 percent of Black New Yorkers and 14 percent of Hispanic New Yorkers live in households where no one in the home even has a high school degree. The lack of a family member with a high school degree can mean lower levels of literacy or English proficiency which can limit transmission of important health information.

Job Characteristics

There is evidence that one of the reasons that Black and Hispanic New Yorkers were hit harder by the COVID-19 pandemic is that they are more likely to work in essential industries and employed in jobs that are high risk for infection because they are performed in close quarters or cannot be done remotely.[27, 28] A person's job characteristics contribute both to the social and community context in which they live and their likelihood of being exposed to COVID-19 but also to their economic and financial stability and access to health insurance.

We used the O*Net database to examine two characteristics of jobs that are likely to put workers at higher risk for COVID-19 transmission. The first, proximity to others, measures how close a worker in a job is to other people when performing their job.[29] It ranges from 0, which would be a worker who has their own office and seldom interacts with others, to 100, which is a person who works nearly touching others every day. The other characteristic is exposed to disease or infections, which measures how often a person is likely to encounter a disease pathogen at work.[30] It ranges from 0, which is never, to 100, which is nearly every day. These job characteristics were measured before the COVID-19 pandemic. As seen in Table 4, on average, Black, Hispanic, and Asian New Yorkers have jobs that require them to be in higher physical proximity to others compared to white New Yorkers. They also work in jobs that have a higher exposure to disease score.

The number of cases per 100,000 residents for Black NYC residents is slightly higher than white NYC residents at 3,828 and 3,678 respectively but the rate for Hispanic and Latino New Yorkers is much higher at 5,226.

TABLE 4. **COVID-19 Risk Factors in Employment in New York State**

	Population	White	Black	Hispanic	American Indian	Asian
Proximity To Others Score	62.5	61.1	65.7***	64.2***	64.0**	63.5***
Exposure to Disease Score	24.0	21.9	31.1***	24.7**	23.0	24.5***
High-Risk Occupation (disease>50, prox >75, frontline)	15.4%	13.0%	22.8%***	16.0%	18.5%**	17.6%***
Lives in Household with High-Risk Worker	21.1%	17.7%	29.1%***	23.4%***	25.6%***	22.9%***

*** = average is statistically different from non-Hispanic white at 1% level, **=5% level, *=10% level

SOURCE: IPUMS-CPS, University of Minnesota, https://ipums.org/ and National Center for O*NET Development, O*NET OnLine, accessed January 29, 2021, https://www.onetonline.org/.

Beyond physical proximity and exposure to disease scores, Black and Hispanic New Yorkers are also more likely to work in essential industries compared to white New Yorkers. In the 10 years of CPS-IPUMS we used, Black people made up 17 percent of the workforce and Hispanic people made up 16 percent of the total workforce, however they made up 24 percent and 18 percent of employment in what would become essential industries. Table 5 shows that Black New Yorkers make up a particularly disproportionate part of the healthcare workforce in New York holding 27 percent of healthcare jobs. They were also much more likely to hold other high-risk jobs, including working in public transit, childcare, and family services, as well as building cleaning services.

Hispanic New Yorkers also held a disproportionate number of jobs in essential industries, but these jobs were mostly different from those held by their Black neighbors. Hispanic New Yorkers were also more likely to hold childcare, public transit, and building cleaning services jobs compared to white New Yorkers. However, unlike Black New Yorkers, they were not more likely to hold healthcare jobs. Rather, they are more likely to work in grocery, convenience, and drug stores or agriculture and food processing. Food processing facilities in particular have been sources of COVID-19 outbreaks because workers work in very close quarters often with limited personal protective equipment.[31]

TABLE 5. **Percent of Workers In Essential Industries by Race in New York State**

	White	Black	Hispanic	American Indian	Asian
All Jobs	60.2%	16.9%	16.4%	0.8%	9.5%
Grocery, Convenience, and Drug Stores	57.0%	15.2%	20.4%	1.1%	11.5%
Public Transit	38.9%	32.1%	25.7%	1.0%	7.8%
Trucking, Warehouse, and Postal Service	58.0%	19.9%	17.4%	0.8%	7.8%
Building Cleaning Services	42.4%	20.7%	39.7%	1.5%	4.4%
Healthcare	51.3%	27.2%	14.1%	0.9%	10.8%
Childcare, Homeless, Food, and Family Services	46.9%	31.3%	21.7%	0.8%	6.4%
Agriculture and Food Processing	69.4%	7.9%	19.7%	2.3%	5.0%
Utilities and Telecommunications	47.2%	16.1%	12.3%	0.3%	7.0%
Not Essential Industry	63.0%	14.4%	15.7%	0.8%	9.6%
All Essential Industries	52.5%	23.9%	18.3%	1.0%	9.3%

SOURCE: IPUMS-CPS, University of Minnesota, https://ipums.org/.

Finally, to summarize the total effect of job characteristics and essential industries on Black and Hispanic households, we calculated the percentage of Black and Hispanic people who are in a "high-risk occupation" or live in a household with someone in a high-risk occupation (Table 4). We define high-risk occupations as workers who are in an essential industry and have a job that places them within arm's length of other people (or closer) and exposes them to disease at least once a month. Black New Yorkers are significantly more likely to have these jobs than white New Yorkers although Hispanic workers are not. Twenty-three percent of Black New Yorkers have high-risk occupations compared to only 13 percent of white New Yorkers and Hispanic New Yorkers are in these positions at the same rate as white people. However, the household is very different. While Hispanic people hold high-risk occupations at the same rate as white people they are more likely to live in a household with a high risk worker. Twenty-nine percent of Black residents and 23 percent of Hispanic residents live in a household with a high-risk worker compared to only 18 percent of white residents.

Underlying Health Conditions and Healthcare Access

Historically Black and Hispanic families have had less access to healthcare than white families.[32] Over the past 10 years, even with the enactment of the Affordable Care Act, which expanded health insurance access and Medicaid coverage to uncovered and under-covered families, Black and Hispanic New Yorkers are less likely to have held health insurance compared to white New Yorkers. As seen in Table 5, nearly 95 percent of white New Yorkers have health insurance compared to only 91 percent of Black New Yorkers and 88 percent of Hispanic New Yorkers. Those numbers are relatively constant across the state but New Yorkers of all races and ethnicities who live outside of NYC are slightly more likely to have had health insurance over the past 10 years.

TABLE 6. **Healthcare Access**

New York State						
	Population	White	Black	Hispanic	American Indian	Asian
Below Poverty Line	14.5%	9.4%	22.5%***	24.0%***	19.8%***	16.0%***
Has Health Insurance	92.8%	94.7%	90.7%***	88.7%***	88.6%***	91.6%***
New York City MSA (NYS only)						
	Population	White	Black	Hispanic	American Indian	Asian
Below Poverty Line	14.9%	8.5%	21.1%***	23.7%***	19.4%	14.9%***
Has Health Insurance	92.1%	94.4%	90.5%***	88.6%***	90.6%	91.8%***
Rest of State						
	Population	White	Black	Hispanic	American Indian	Asian
Below Poverty Line	13.5%	10.5%	29.4%***	26.5%***	20.2%***	24.4%***
Has Health Insurance	94.2%	95.0%	91.5%***	90.2%***	86.6%***	90.4%***

*** = average is statistically different from non-Hispanic white at 1% level, **=5% level, *=10% level

SOURCE: IPUMS-CPS, University of Minnesota, https://ipums.org/.

Poverty is also heavily related to healthcare access. Higher poverty areas have worse health outcomes and fewer healthcare services.[33] Black New Yorkers are more than twice as likely to live below the poverty line compared to white New Yorkers and Hispanic New Yorkers are just over two and a half times more likely to live below the poverty line. The percent of New Yorkers below the poverty line is lower in NYC than the rest of the state for all racial and ethnic groups, although the patterns remain the same as the state as a whole. What is really striking is that over a quarter of all Black and Hispanic New Yorkers who live outside of NYC are below the poverty line.

These underlying healthcare access factors of insurance coverage and poverty have partially contributed to Black and Hispanic people suffering more from certain chronic medical conditions that can be fatal and are risk factors for severe COVID-19 disease and mortality. According to the most recent (2018) Behavioral Risk Factors Surveillance Survey (BRFSS), Black and Hispanic New Yorkers are more likely to

suffer from obesity, kidney disease, and diabetes all of which are linked to severe COVID-19 illness and mortality (Table 7). Black New Yorkers were slightly less likely to suffer from COPD and related diseases compared to white New Yorkers and the rate for Hispanics was nearly the same as for whites. Hispanic people were also more likely to report heart disease than white people although the rates for Black and white New Yorkers were nearly identical.

TABLE 7. **Health Risk Factors from 2018 New York BRFSS**

	Population	White	Black	Hispanic	American Indian	Asian
Kidney Disease	2.7%	2.4%	3.1%***	3.3%***	1.8%	2.7%
COPD and Related	5.8%	6.6%	5.1%***	5.3%***	7.9%	2.5%***
Heart Disease	7.8%	8.1%	7.1%**	7.7%	13.3%	6.1%***
Obesity	24.4%	24.9%	29.0%***	26.8%***	27.0%	11.4%***
Diabetes and Pre-Diabetes	12.8%	10.6%	16.8%***	13.5%***	18.7%**	18.0%***
Asthma	10.0%	9.8%	10.5%	11.7%***	9.8%	6.4%***

*** = average is statistically different from non-Hispanic white at 1% level; ** = 5% level; * = 10% level

SOURCE: New York State Behavioral Risk Factor Surveillance System 2018.

The BRFSS measures the extent of certain medical conditions but not their severity. To get some idea of the difference in severity of underlying health conditions between New Yorkers across race and ethnicity we used the CDC's underlying cause of mortality data for the past 10 years in Table 8. Adjusting for age, Black and Hispanic New Yorkers have higher mortality rates from diabetes compared to white New Yorkers and Black New Yorkers also have a higher mortality rate from heart disease.

TABLE 8. **New York State Age Adjusted Mortality Rates per 100,000**

	White	Black	Asian	American Indian	Hispanic
Diabetes	14.19	31.24	12.38	21.46	19.76
Heart Disease	182.89	198.61	98.10	94.36	138.25
Influenza and Pneumonia	18.11	21.08	15.87	11.87	19.62

SOURCE: "National Center for Health Statistics Mortality Data on CDC WONDER," CDC WONDER, US Centers for Disease Control and Prevention, accessed March 2, 2021, https://wonder.cdc.gov/mcd.html.

Although there is no New York specific data on underlying conditions and COVID-19 hospitalizations, there is evidence nationally of differences in underlying conditions (Table 9). Nationally, Black Americans who are hospitalized for COVID-19 are more likely to suffer from diabetes, asthma, obesity, and chronic kidney disease compared to white Americans although they experience hypertension to the same degree. Hispanic Americans are also more likely to be obese but they have lower or similar levels of other underlying conditions compared to white Americans. White Americans hospitalized for COVID-19, in contrast, are much more likely than all other racial and ethnic groups to suffer from COPD or coronary artery disease.

TABLE 9. **Percent of National Hospitalized COVID-19 Patients with Underlying Condition**

	White	Black	Hispanic	Asian	American Indian
Asthma	11.0	14.1	8.8	9.0	16.3
COPD/Emphysema	16.3	6.5	2.6	4.9	2.0
Diabetes	31.8	38.0	31.6	36.8	43.6
Coronary Artery Disease	19.1	10.8	5.2	9.1	11.8
Hypertension	62.3	64.2	33.6	52.8	46.4
Obesity	46.2	53.9	48.7	29.8	54.7
Chronic Kidney Disease	15.5	18.6	8.3	13.9	9.7

SOURCE: COVID-NET: COVID-19-Associated Hospitalization Surveillance Network, Centers for Disease Control and Prevention. accessed January 29, 2021, https://gis.cdc.gov/grasp/COVIDNet/COVID19_5.html.

Conclusion and Further Work

It is impossible to quantify exactly how many of the excess COVID-19 deaths experienced by New Yorkers of color can be attributed to each of the underlying factors measured and discussed above. Existing disparities both in health outcomes and the recognized social determinants of health have existed long before the COVID-19 pandemic but the pandemic has made them far more visible.

In this brief, we have covered many attributes of housing, neighborhoods, jobs, health factors, and medical access that have put New Yorkers of color at greater risk than their white neighbors for contracting COVID-19 and potentially developing severe illnesses. The greatest disparity that we observed relates to job characteristics. Black and Hispanic New Yorkers much more likely to work in a high risk job that cannot be done remotely. Even those who don't work in these jobs are more likely to live in a household with someone who does. High-risk jobs present a way for a COVID-19 infection to enter a household and allow it to spread further. New Yorkers of color live in slightly larger households and are more likely to live in intergenerational families, which could mean a working parent spreading COVID-19 to an older adult or to a school-aged child. The neighborhoods in which New Yorkers of color live also tend to be denser with more crowded housing, which makes social distancing more difficult.

The next stage of research into understanding the racial and ethnic health disparities surrounding COVID-19 is to look beyond the preexisting social determinants of health to how the disease spread through communities of color and how testing, tracing, hospitalizations, vaccinations, and other medical services differed for these groups. Understanding the racial and ethnic differences at every stage of COVID-19—exposure risk, access to testing, positivity, hospitalization, and mortality—and how those stages interact with inequalities in the social determinants of health are key to building a more equitable healthcare system moving forward and better direct existing COVID-19 health policy and relief to the people most injured by the disease and its aftermath.

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