The Unequal Health and Economic Burden of Pandemics On the Poor

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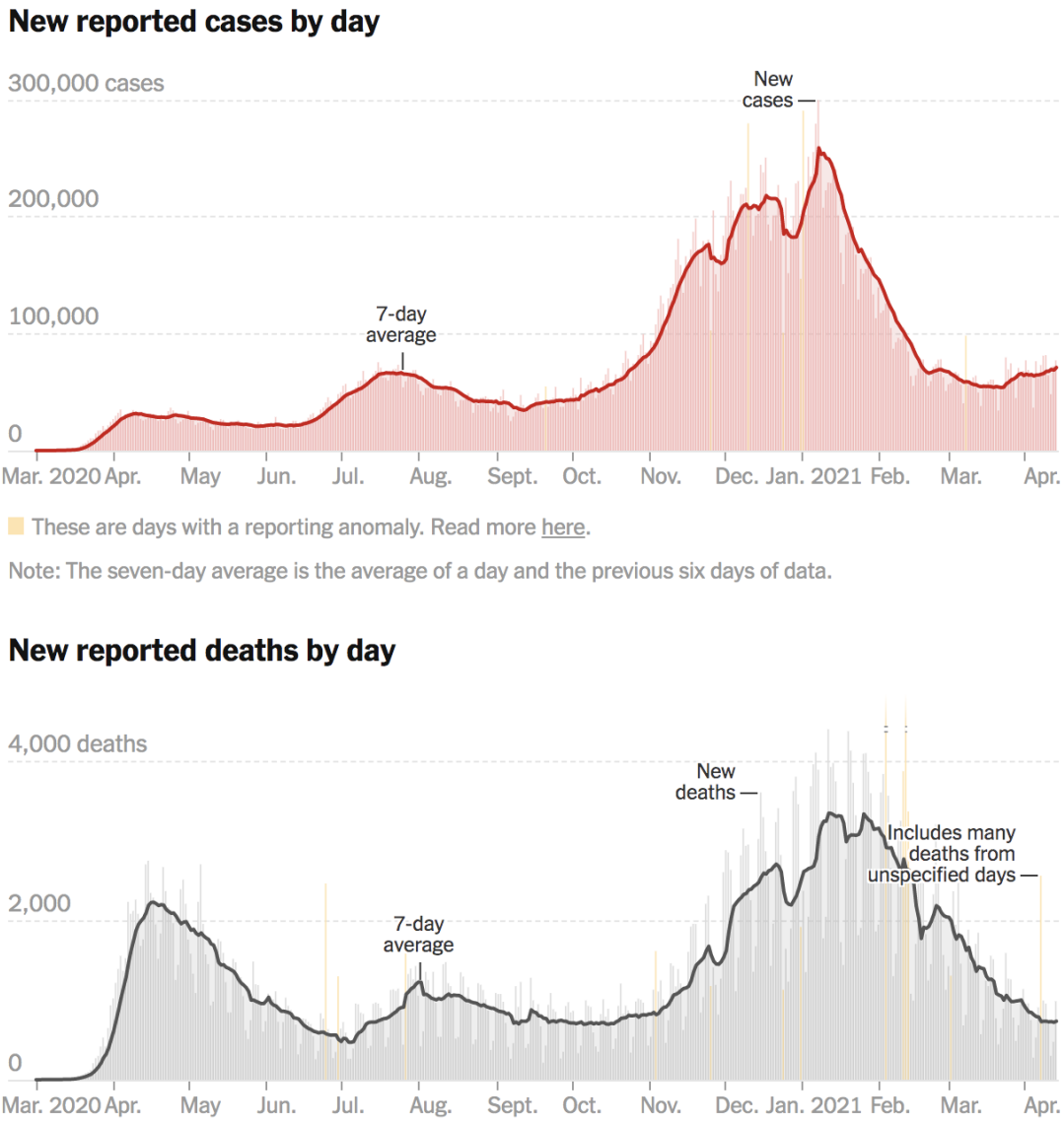
Introduction

In late 2019, a novel coronavirus[1] appeared in Wuhan, China causing severe respiratory illness. The disease swept through the city and reportedly killed more than five thousand people. It overwhelmed the city's hospitals and led to state-mandated mask, social distancing, and lockdown orders. Despite all of these precautions, the virus spread across the globe, was officially named COVID-19, and eventually was declared a pandemic on March 11th, 2020[2]. Globally, by April 14th, 2021, COVID-19 has caused nearly 140 million to fall ill and has killed almost 3 million people. Most notably the virus has hit Italy, Brazil, the United Kingdom, India, and the United States among the hardest in terms of the number of cases and deaths per capita since leaving China. The US alone has experienced over 35 million cases, including over 500,000 deaths, by April 14th, 2021 due to COVID-19 (Johns Hopkins COVID-19 Tracker). The reported cases of COVID-19 and deaths by COVID-19 by day in the US are depicted in Figure 1 below. Daily cases of the virus reached record highs during the winter of 2021, but daily deaths were not as high of a percentage as during the initial spike at the beginning of the pandemic. This may be because the majority of current cases are in younger and less vulnerable populations, and there are improved methods of care by physicians.

[1]Coronaviruses are a diverse family of diseases which includes the common cold and SARS. They are enveloped viruses with a positive sense single stranded RNA genome. Being "positive sense" means that they can directly translate their genetic information into proteins using the ribosomes of a host cell.

[2] The World Health Organization defines pandemics as the "worldwide spread of a new disease".

Figure 1



Source: New York Times, "Coronavirus in the US"

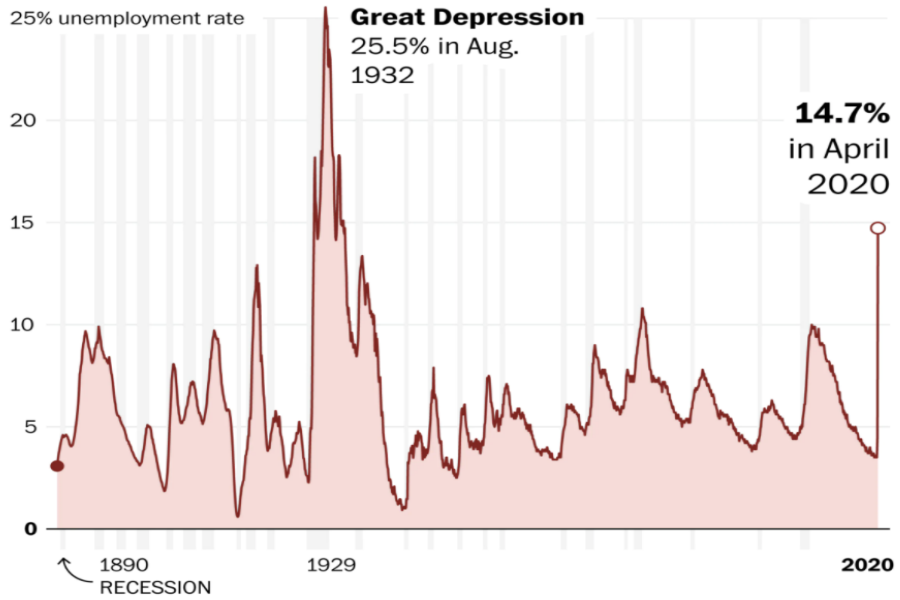
COVID-19, also known as SARS-CoV-2, is a strain of coronavirus related to SARS-CoV-1, which caused the 2002-2004 SARS outbreaks, before it was quickly contained through early recognition and effective public health measures, such as contact tracing and social distancing. COVID-19 is believed to be more contagious than SARS, infecting far more

individuals over a much shorter period of time. COVID-19 spreads from person to person primarily through respiratory droplets through coughing and sneezing, like how influenza or the common cold spreads.

The ease of spread of COVID-19 has posed a great challenge for governments, public health officials, and healthcare workers around the world. Leaders and officials need to make decisions that protect the health and well-being of their citizens, while balancing their rights as citizens and the stability of their economies. Across the United States of America, states have implemented lockdown and stay at home orders with varying restrictions and lengths, which many states lifted. These orders have included closing nonessential businesses, limiting the capacity of restaurants and bars and resulted in millions to shift to working from home. The closing of businesses and widespread cessation of economic activity led to the most jobs lost in the US since the Great Depression (Figure 2). Many who kept their jobs have seen their wages and hours reduced. In April 2020, the official unemployment rate peaked at nearly 15%[3], but has been steadily declining since (Bureau of Labor Statistics).

[3] Despite unemployment reaching as high as 15%, this official number is an underestimate of labor market distress due to the exclusion of individuals who are discouraged from finding work and those who are underemployed (for example, individuals working part-time who are seeking full-time employment).

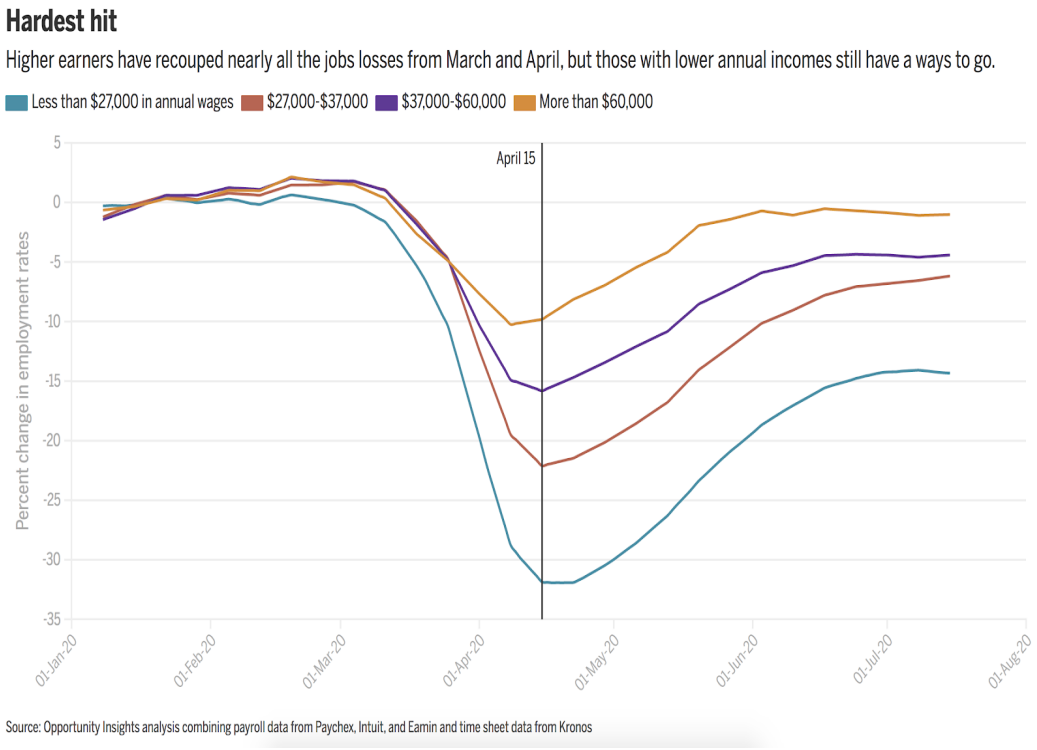
Figure 2 – US Unemployment Rate from 1890 to April 2020



Source: New York Times, April 2020

Unfortunately, the rise and fall of unemployment have been far from equal. At the peak of unemployment, those who previously earned greater than $60,000 experienced a loss of 3.1 million jobs (a decline of 10%) and returned to about normal levels by June 2020. On the other hand, those earning less than $27,000 saw nearly 11 million lost jobs (an increase of 32%) and remained 15% above normal levels in mid-July. This likely occurred because low-wage workers are more likely to have jobs in service industries such as restaurants, leisure, and gyms, which have largely been shuttered since the pandemic began and which employees cannot perform from home (Figure 3).

Figure 3

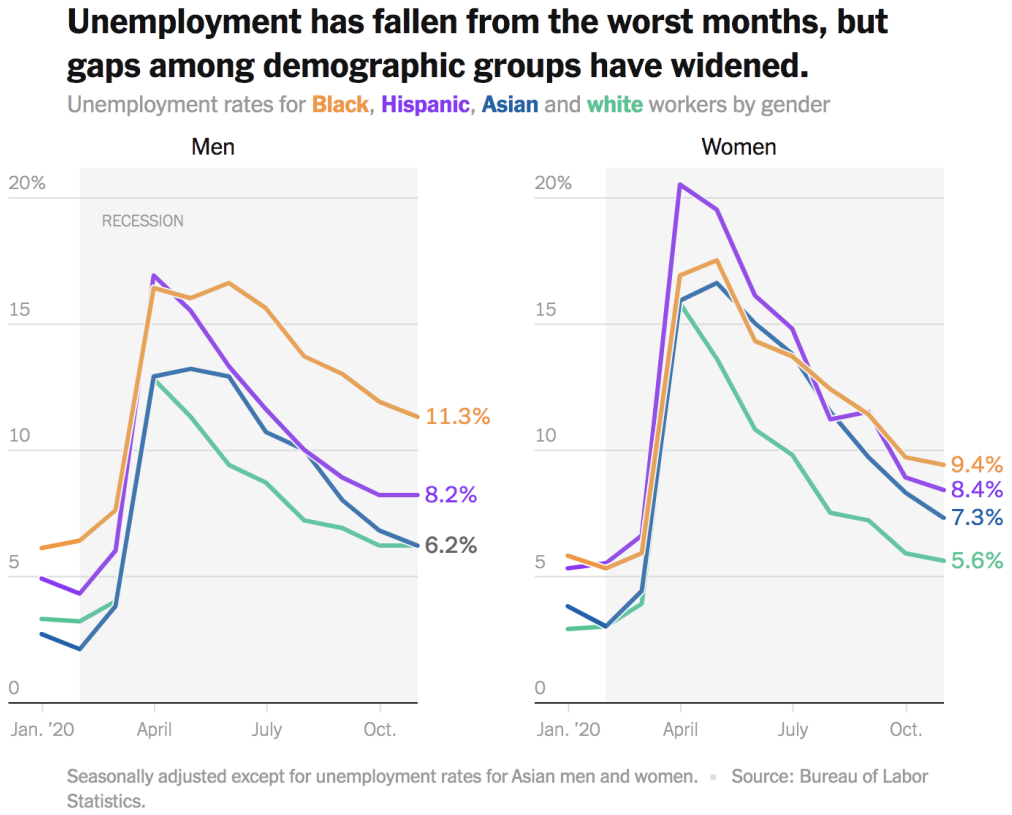


Source: Kronos, August 2020

Disparities in unemployment are not limited to differences in wages. A similar trend was observed when the Bureau of Labor Statistics examined unemployment rates by race (see Figure 4). Immediately following the beginning of the shutdown, all races saw increases in unemployment. Blacks and Hispanics saw the highest unemployment rates in both men and women, while White and Asian unemployment was noticeably lower. As the economy has recovered, this gap has persisted. In the fall of 2020, over half a year since the beginning of the pandemic, White male unemployment was 5 percentage points lower than Black males, while White women were 4 percentage points lower than Black women. When considering the trend in unemployment by wage during the recovery, this suggests that Blacks and Hispanics are more represented in low-wage service jobs that have been slower to come back due to social distancing restrictions (Kmec 2003).

This highlights a need to diminish the inequality experienced by minorities and low socioeconomic status individuals in responses to the pandemic.

Figure 4

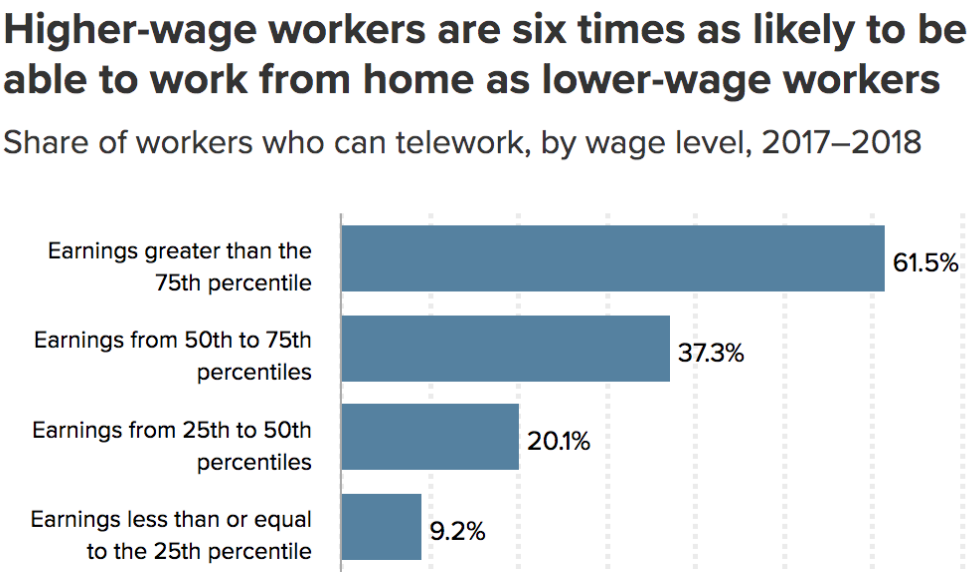


Source: New York Times

Until the large-scale availability of a proven treatment or effective vaccine and its acceptance by the public, on and off periods of loosening and reimposing of restrictions to limit the spread of the virus are likely. In the continuation and re-implementation of lockdowns it is especially important to consider the impact on the most disadvantaged. In addition to bearing the brunt of lost jobs, those with low incomes have also been some of the hardest hit by COVID-19 (Oronce et al., 2020). Due to the nature of some of the lowest wage-earning professions, like meat packing and food delivery, being unable to work from home, the poor have been more

frequently exposed to and more susceptible to contracting COVID-19 than their higher wage counterparts.

Figure 5



Source: Economic Policy Institute

Furthermore, school closures require a move to online learning. This move has been extremely challenging for low-income families, especially those with a single parent. Many low-income families lack access to necessities for online learning, like laptops and Wi-Fi. Remote learning has also been challenging because it often requires the parent to act as a teacher. In many low-income households this is ineffective because the parents are not familiar with the required work and are thus unable to provide sufficient educational support to their children (Brenneman, 2020). Additionally, low income families have had challenges finding child care providers when they go to work, leading them in many cases to forgo wages to take care of their children (Malik et al., 2020).

While social distancing is necessary to protect those most vulnerable to the virus, the restrictions have disproportionately negatively impacted the least fortunate portion of society. COVID-19 has not been the first instance of this. In prior pandemics, such as the Swine Flu (2009) and Spanish Flus (1917-1919), there have been similar trends in regards to the economic, health and social impacts on the poor as illustrated later in this paper.

Through reviewing literature on the impact of these prior pandemics on the poor, I will illustrate the differing impacts of pandemics by socioeconomic status (SES). Initially, I will establish a correlation between wealth and health outside of pandemics, then discuss considerations that should be made when comparing the impacts of very different pandemics. By reviewing the literature, I will show the differential impact of these three pandemics by SES. I will then briefly review literature on the economic impacts of policy that can reduce inequality. To conclude, I will discuss the results of these reviews and points I would like to discuss more in my thesis. I hope to establish considerations that should be taken when implementing social distancing as society combats COVID-19 and future pandemics.

Health and Wealth

Marmot (2002) establishes a causal relationship between wealth and health. In his review he focuses on data from rich nations, where conditions such as a lack of sanitation, clean water and adequate nutrition are not broad issues. In this paper, he establishes that within wealthy nations, mortality rates differ between high and low-income earners. For example, a survey in the United States, using data from a cohort monitored from 1972 to 2000, Marmot found the lowest income (below $15,000) earners had mortality rates nearly four times higher than the highest earning individuals (above $70,000). In addition, Americans earning between $30,000 and

$50,000 (30% of the US population) had a death rate nearly two-thirds higher than the highest income bracket (ibid.).

Income inequality was also shown to impact overall health, with states with higher income inequality having higher death rates than states with low income inequality. Moreover, the 2002 paper establishes a relationship between economic segregation and health. Low income individuals tend to live in areas with low housing costs and have high social needs. These low income areas have relatively low tax bases, on a local and state level, and therefore struggle to support these social assistance programs and infrastructure. This lack of funds affects the quality of schools, infrastructure and healthcare and translates into a lack of access to these goods leading to worse health in low income areas.

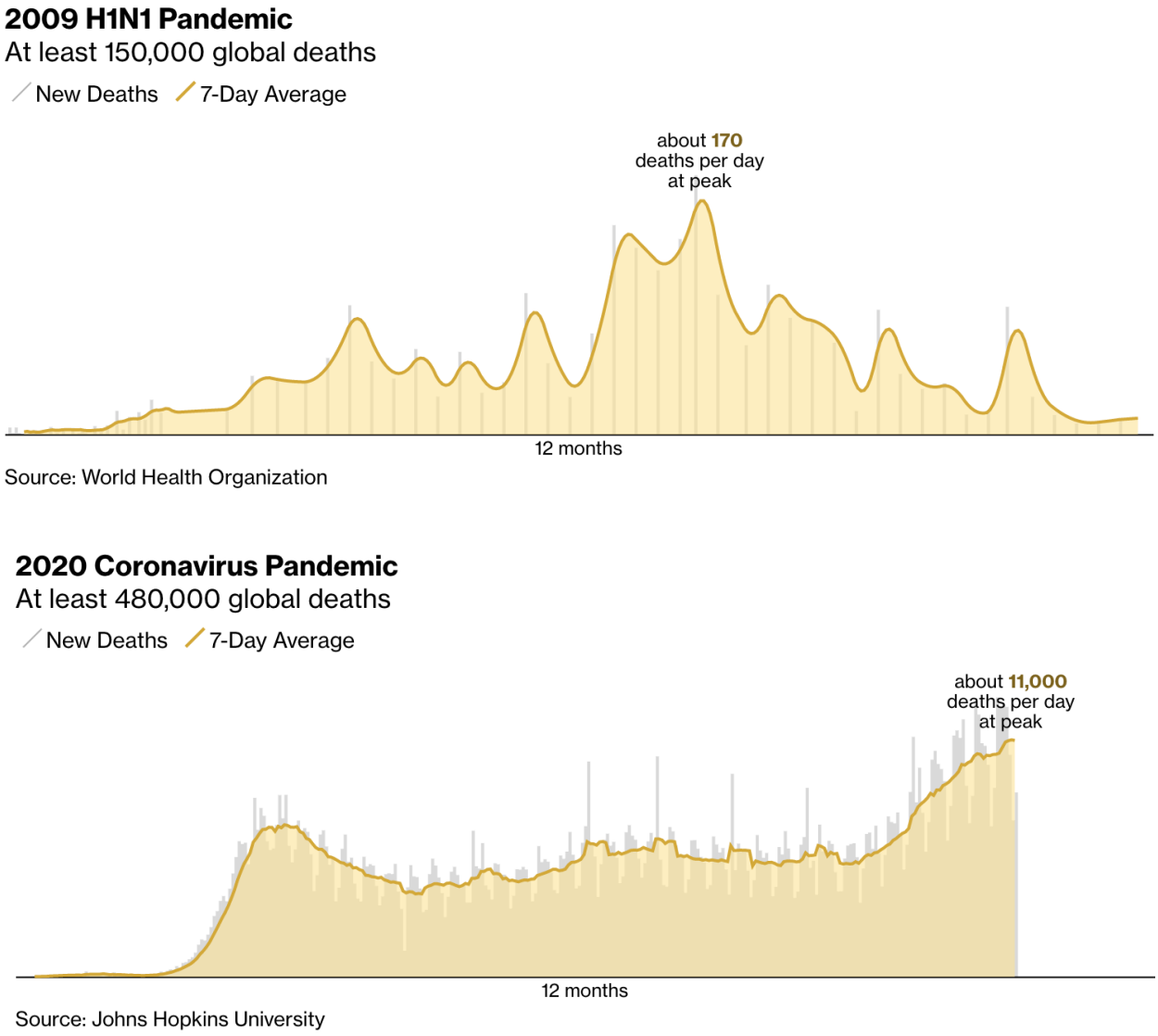
Life expectancy inequality is well documented in the United States. An example of this can be seen in a Boston study by Hinckley et al. (2017), where traveling two stops on the Orange line translates into a loss of 25 years of life expectancy in the inhabitants of those areas. Additionally, life expectancy can range from 92 on Massachusetts Avenue in Back Bay to 60 years in North Roxbury only half a mile away. The authors argue that despite the North Roxbury neighborhood having the highest incidence of violence in the city, the decrease in life expectancy is predominantly due to lack of access to care, with many people unable to afford to take time off work or unable to afford to pay medical bills to seek routine preventative care.

Considerations when comparing COVID-19 and the Swine and Spanish Flus

When comparing these three pandemics it is important to note their major differences. From current data, COVID-19 appears to have a similar death rate as the Spanish Flu, but medicine was far less advanced at the time of the Spanish Flu (1918) than it is now (CDC). This suggests that COVID-19 is a more deadly disease than the Spanish Flu. The 2009 Swine Flu pandemic, an H1N1 virus similar to the strain that caused the Spanish Flu, resulted in an estimated 60 million cases and over 12 thousand deaths in the first year of the pandemic in the United States (Shrestha et al., 2011).

Unlike COVID-19, the Spanish and Swine Flu pandemics impacted those under the age of 65 more severely than they have been impacted by COVID-19. In the first year of the Swine Flu Pandemic, the CDC estimates that about 10,000 deaths occurred in the U.S. among those under the age of 65, with over 1,000 being in those under the age of 18 (Centers for Disease Control and Prevention).

Table 6



Source: *New York Times*, "The Coronavirus in the US"

In contrast, for COVID-19, the American Academy of Pediatrics reports little over 100 deaths by October 2020 among children and the CDC reports only about 20,000 of the first 250,000 deaths in the US occurred in those below the age of 65 (American Academy of Pediatrics and CDC). In Table 7 below, the disparities in rates of current Covid-19 hospitalization and death ratios between age groups are further illustrated.

Table 7: Current Covid-19 Hospitalization and Death Ratios by Age

Rate ratios compared to 18-29 year olds

	Hospitalization[1]	Death[2]
0-4 years	4x lower	9x lower
5-17 years	9x lower	16x lower
18-29 years	Comparison Group	Comparison Group
30-39 years	2x higher	4x higher
40-49 years	3x higher	10x higher
50-64 years	4x higher	30x higher
65-74 years	5x higher	90x higher
75-84 years	8x higher	220x higher
85+ years	13x higher	630x higher

Source: Centers for Disease Control and Prevention

While these diseases may have differed in their number of cases and lethality, it is extremely difficult to pinpoint the exact number of cases and deaths from a disease. Though the Spanish Flu and COVID-19, appear to have the same death rate it is hard to view them as equal diseases in terms of lethality and virulence. Tracking an accurate number of cases and deaths in a pandemic is a nearly impossible task. In past pandemics, like the Swine Flu, the CDC has used a surveillance survey to estimate the effects of the disease. However, the increased ability of laboratory testing to confirm the presence of a virus now allows a more accurate way of measuring the spread of a disease. Though more accurate, the difficulty in obtaining access to tests leads to laboratory confirmed counts possibly being a significant underestimate of the spread of the disease. It is important to remember when comparing the impacts of the Spanish Flu, Swine Flu and COVID-19, that they are all different diseases with different mortality rates in certain age groups, which could cause different economic impacts.

Methods

To investigate the differential effects of pandemics by SES, I will review literature on the disparity of impacts on health, economic, and social factors in members of society with low or disadvantaged SES. Demographic data on casualties of many pandemics prior to the 20th century are not available. Because of this, the review focuses on the well-researched and well-documented Spanish Flu and Swine Flu pandemics, in addition to the ongoing COVID-19 pandemic. The literature review sources articles mainly from the National Institutes of Health and the *American Journal of Public Health*. Additional data will be obtained from Johns Hopkins Coronavirus Resource Center, US Census Bureau, and from the Bureau of Labor Statistics. This literature largely focuses on the socioeconomic impacts of pandemics in the United States. Literature and data on the impacts of policy will come from the same sources.

Differing Impacts of Pandemics by SES

Many pandemics have posed a far greater threat to society in terms of virulence and deaths than the current COVID-19 pandemic or recent history's Spanish and Swine Flus. Notably, the Bubonic Plague (1347 AD), the Plague of Justinian (541-549 AD) and Smallpox pandemics (1400s AD) each killed more than 50 million people worldwide. While these pandemics may have been more impactful, they lack the reliable mortality and demographic data needed to properly analyze the effects of the disease by socioeconomic level. Even before COVID-19, great strides had been made in the field of epidemiology to better understand the impacts of historical pandemics. The mid 2000s through early 2010s saw major work about the 1918 Spanish Flu pandemic, in which records were put into accessible online databases. This

created an explosion of research regarding the pandemic. For these reasons, only literature covering the impacts of Spanish Flu, Swine Flu, and COVID-19 will be analyzed.

Impact of the Spanish Flu (1918)

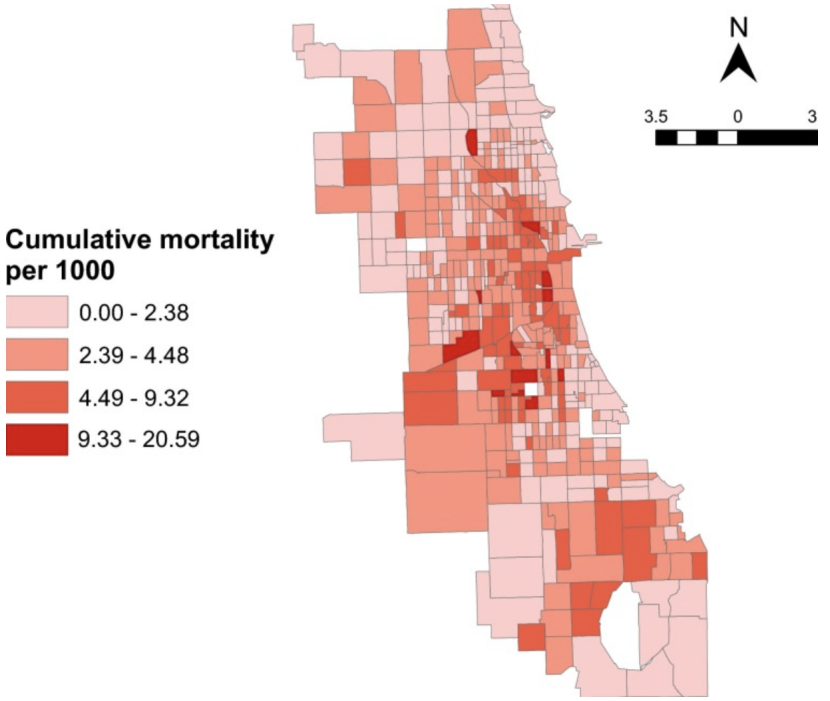
In "Economic Impacts of the 1918 Influenza Pandemic", Thomas Garret (2007) gives an overview of the pandemic's impact on the United States. The Spanish Flu occurred in waves across the US from 1917 to 1919, with the second wave in 1918 being the most severe. The pandemic most severely affected those between the ages of 18 and 40, especially males, who had the highest mortality rates. The loss of prime working age employees had major economic impacts. Analysis of mortality data suggests that more densely populated areas, as well as areas with higher percentages of minority populations, were more severely affected by the influenza pandemic.

Due to a lack of economic data, Garret analyzes the economic impacts of the Spanish Flu by reviewing print media from the time. The analysis suggests that business revenues in Little Rock, Arkansas and Memphis, Tennessee declined by up to 75 percent as a result of the quarantine order. Non-essential businesses and those not related to combatting the pandemic suffered the greatest losses. Additionally, many corporations that were still operating at normal capacity found it difficult to fully staff their operations due to workers falling ill or staying at home.

Grantz et al. (2016) analyzed the correlation between characteristics common in low socioeconomic neighborhoods and mortality rates during the Spanish Flu. The social characteristics analyzed include rates of illiteracy, homeownership, density of population, and unemployment. These factors were compared to mortality rates on a census tract basis across the

city of Chicago during the fall of 1918. Mortality data were sourced from a database of roughly 8,000 influenza mortalities from 1918. As seen in Table 8, the highest mortality rates were seen in the poorer central and south-central regions of Chicago, while richer suburbs to the north, west and southernmost points experienced the lowest disease burden.

Table 8: Mortality Due to the 1918 Spanish Flu Pandemic in Chicago by Census Tract



Source: Grantz et al. 2016

The authors created a poisson model to explore the effects of sociodemographic factors on the spread of the disease. Statistical analysis of these social factors found a significant relationship between transmissibility[4] of the disease and high levels of illiteracy, population density, and unemployment, all hallmarks of low-income neighborhoods. The authors estimated that mortality rates increased by over 30 percent with each 10 percent increase in illiteracy rate adjusted for population density, homeownership, unemployment, and age. Overall, they found

[4] The authors define transmissibility as the rate of contracting the disease.

that the highest mortality rates were observed in neighborhoods with low SES. On a week by week basis we see areas with higher illiteracy rates consistently have higher rates of mortality, except for week 7.

Table 9

Characteristics of influenza and pneumonia deaths in Chicago, 1918

Variable	Cumulative		Week 1		Week 2		Week 3		Week 4		Week 5		Week 6		Week 7	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Influenza and pneumonia deaths	7,971	100	436	5.47	1,030	12.92	2,149	26.96	2,142	26.87	1,258	15.78	619	7.77	337	4.23
Illiteracy rate, %																
<0.7	1,474	18.49	138	9.36	263	17.84	359	24.36	340	23.07	207	14.04	96	6.51	71	4.82
0.71–1.91	1,648	20.67	120	7.28	265	16.08	444	26.94	410	24.88	226	13.71	106	6.43	77	4.67
1.92–5.6	2,138	26.82	86	4.02	252	11.79	585	27.36	585	27.36	350	16.37	196	9.17	84	3.93
>5.6	2,711	34.01	92	3.39	250	9.22	761	28.07	807	29.77	475	17.52	221	8.15	105	3.87

Source: Grantz et al. 2016

Impact of Swine Flu Pandemic (2009)

Placzek and Madoff (2014) reported results similar to those that Grantz et al. found in Chicago in 1918. Placzek and Madoff analyzed the Hospital Discharge Database (HDD) and US Census Bureau data to determine if a correlation exists between Swine Flu outcomes and SES. They first compared hospital discharge data by race/ethnicity to population-based rates from the Census Bureau. Then the authors linked zip code to the percentage of people living below the poverty line in that given zip code. Finally, they examined H1N1 outcomes by racial/ethnic groups and adjusted for SES.

They found that of all Swine Flu hospitalizations in Massachusetts, 11% resulted in ICU admissions. Those admitted to the ICU had more serious cases of the disease with a higher chance of mortality. Placzek and Madoff found that of those admitted to the ICU they were more likely to be of low SES. Of those admitted to the ICU with low SES they predominantly

identified as Hispanic or Non-Hispanic Black. These groups had lower average ages upon admission to the ICU than White ICU admissions. Hispanic and Non-Hispanic Blacks ICU admissions also experienced higher death rates than White admissions.

Quinn et al. (2011) explored the nationwide inequalities observed during the Swine Flu outbreak. Their results mirror the trends observed in the Spanish Flu outbreak of 1918. They conducted a nationally representative survey about household experiences during the 2009 Swine Flu pandemic. They received roughly 1,500 responses in which individuals' ability to socially distance, access to healthcare, and chronic health conditions were surveyed. They found the highest rates of disease and mortality in those individuals with characteristics of low SES or minority status, such as high-density housing and limited education levels. The authors attributed these differences in rates of Swine Flu to an inability of many with low SES or minority status to properly socially distance, as seen in Table 10 below. For example, 75% of Hispanic households, who completed the survey in Spanish, reported that they were unable to work from home compared to the roughly 45% reported by both Hispanic, who completed the survey in English, and White non-Hispanic households.

Moreover, many responses from Black and Hispanic households reported that they lived with multiple generations of family or in apartment buildings with multiple units. Additionally, many worked jobs that did not offer sick leave or which required them to work in person. Major disparities are also observed in access to care in low SES individuals. The authors found statistically significant relationships between minority status and difficulty in accessing healthcare services. The inability to access care for minority groups poses a significant challenge to them receiving care when they fall ill during a pandemic. By the time they are able to access care, their disease may have progressed too far for much to be done.

Table 10

Measures of Exposure to H1N1, Susceptibility to H1N1 Complications, Access to Health Care, and Perceived Discrimination, by Race/Ethnicity: Knowledge Networks Online Research Panel, United States, 2009

Characteristics	White, Non-Hispanic (n = 991), No. (%) or Mean (SE)	Black, Non-Hispanic (n = 194), No. (%) or Mean (SE)	Hispanic, Survey in English (n = 65), No. (%) or Mean (SE)	Hispanic, Survey in Spanish (n = 229), No. (%) or Mean (SE)	P[a]
Measures of exposure					
Structural measures					
Working	558 (55.6)	95 (50.9)	37 (61.5)	120 (53.7)	.58
Living in a metro area	812 (80.2)	172 (89.5)	62 (95.2)	209 (91.6)	< .001
Living in an apartment building	112 (12.3)	63 (35.8)	16 (22.2)	67 (29.0)	< .001
Adults in household	2.15 (0.04)	1.90 (0.08)	2.19 (0.10)	2.89 (0.10)	< .001
Children aged < 18 y in household	0.59 (0.04)	0.64 (0.11)	0.44 (0.11)	1.72 (0.11)	< .001
Work-related measures of inability to impose social distance					
Difficulty staying home from work for 7–10 d[b]	403 (42.4)	82 (48.1)	30 (42.9)	174 (80.7)	< .001
Not able to work at home	429 (45.8)	62 (29.9)	27 (43.5)	161 (75.2)	< .001
Will not get paid if stays home from work	346 (38.3)	55 (29.1)	24 (36.2)	48 (23.6)	.009
Does not have sick leave at job	237 (26.1)	43 (23.2)	19 (33.3)	135 (61.4)	< .001
Could lose job or business if not able to go to work	224 (26.5)	43 (20.9)	15 (23.1)	120 (57.8)	< .001
Job can only be done at workplace	423 (45.4)	66 (34.3)	28 (47.3)	155 (73.1)	< .001
Index of work-related inability to impose social distance	2.26 (0.09)	1.84 (0.17)	2.26 (0.29)	3.73 (0.13)	< .001
Other measures of inability to impose social distance[c]					
Difficulty obtaining day care not with a group of children[b]	66 (7.3)	32 (20.0)	5 (6.1)	118 (53.1)	< .001
Difficulty avoiding public transportation[b]	138 (15.2)	67 (39.7)	19 (34.0)	112 (50.4)	< .001

Source: Quinn et al. 2011

According to Mammelund et al. (2019), the Spanish and Swine Flu pandemics caused the highest mortality rates in the lowest socioeconomic brackets. They analyze the relationship between death rates and income in two of the most notable influenza-caused flu pandemics in recent history. They first discussed a literature review of previous studies on the Spanish and Swine Flus. In studies of the Spanish Flu, the authors found that countries with high average incomes had far lower mortality rates than poorer countries. For example, India had a 40 times higher mortality rate than Denmark did. This trend was mirrored in the Swine Flu with South America having a mortality rate 20 times higher than the rate observed in Europe. While mortality rates are different in countries with differing levels of income, a country with low levels of social inequality, New Zealand, showed no difference in mortality rates across income levels.

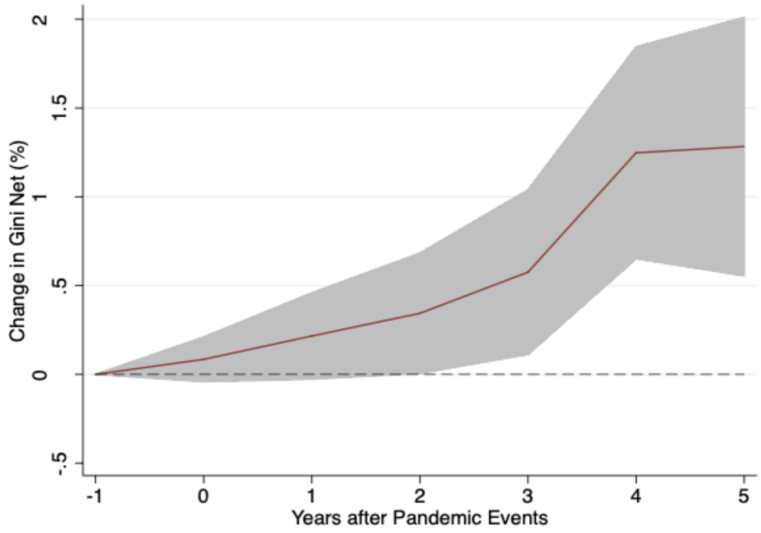
Impact of COVID-19

Though the current pandemic is still ongoing, many researchers have shifted their attention to the socioeconomic implications of COVID-19. With no available database containing information on SES and COVID-19 cases, Chen and Krieger (2020) establish one on a zip code basis. The authors merged county-level data on death counts with population counts and area-based socioeconomic measures, such as percentage below the poverty line and percentage of households being overcrowded[5]. To illustrate the effects on a select geographic area, the authors focused on New York City. The results mirrored the studies of Spanish and Swine Flu, with positive correlations between those living in low-income areas, living in high-density areas, or classified as essential workers and their rates of contracting and dying from the disease. In poorer areas across the city the death rates were nearly twice as high, almost 20 per 100,000 versus 10 per 100,000 in well-off areas. Furthermore, the authors criticize the lack of readily available data on deaths by SES and race by many public health departments for lack of transparency to the public about which groups bear the burden of the disease.

Furceri et al. (2020) compare the early and continued impact of COVID-19 to prior pandemics in its impact on income inequality. Their table (11) shows that GINI coefficients rise in the years following pandemics, meaning more inequality, which suggests that policies undertaken in previous pandemics, such as business and school closures, have had disproportionately negative effects on the poor.

[5] The United States Department of Housing and Urban Development defines a household as overcrowded if there is more than one individual per room in the unit. A household is severely overcrowded when there are more than 1.5 individuals per room in the unit.

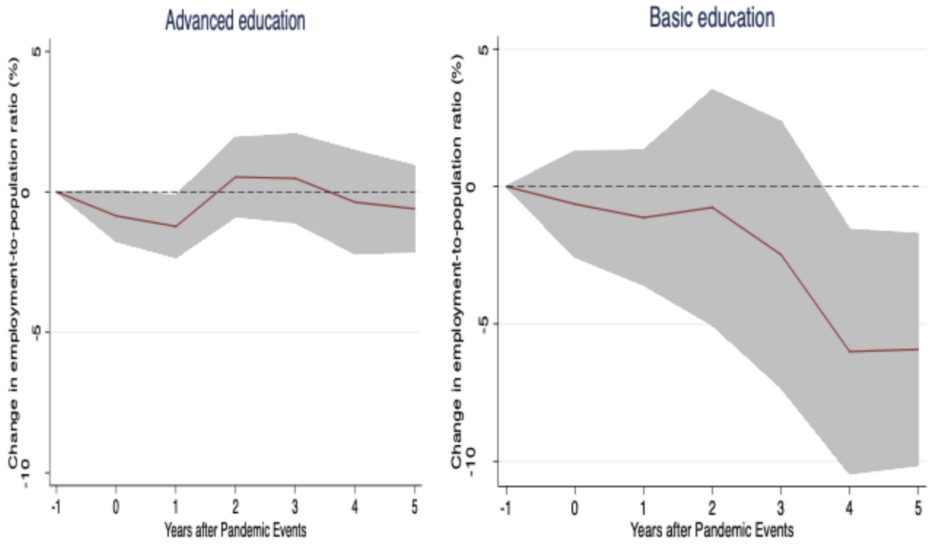
Table 11: Percent Change in Gini following Pandemic Events



Source: Furceri et al. 2020

The authors further support this claim by analyzing the differences in the change in employment to population ratio for those with basic educations compared to those with advanced educations. Those with advanced educations (college degree or greater) see little change in their employment rates during and after pandemics. For those with basic education (anything less than a college degree), they found that the employment to population ratio declines consistently for five years after the pandemic begins. The authors believe that without deliberate and strenuous attempts to protect those with low SES, the pandemic and the policies taken to mitigate its effect could have long term impacts on inequality.

Table 12: Change in Employment by Education Level Following Pandemic Events



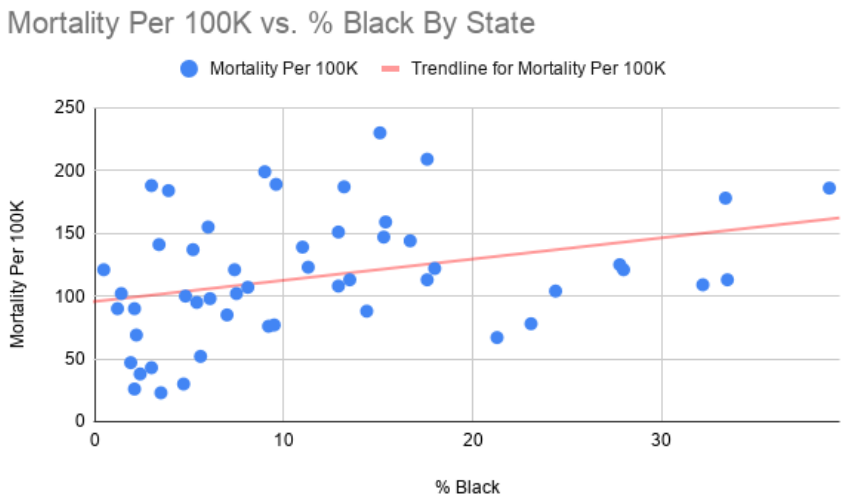
Source: Furceri et al. 2020

Poverty and Healthcare

In *Poverty and The Myths of Healthcare Reform,* Cooper (2016) explores the link between poverty rates and total healthcare expenditures. He finds instances across the country from New York to Los Angeles and Milwaukee to Boston that support this finding. What drives this phenomenon is that lower income individuals lack the access to primary care and preventative medicine which then causes them to eventually utilize healthcare services more. For example, Dr. Cooper looks at admission rates and income in New York City along the 4, 5, and 6 subway lines, which stretch from Brooklyn, through Manhattan and up to the Bronx. These lines travel through areas that range greatly in income from the rich Upper East Side to one of the poorest areas of the City in the South Bronx. Unsurprisingly, the hospital admission rates are significantly higher in the poor areas of Harlem and the South Bronx then they are in Brooklyn Heights and Midtown. This is explained by corresponding high levels of disability in poor areas

and low levels of disability in rich areas of NYC. Higher admission rates and healthcare costs were also associated with areas of higher Black populations and States with higher GINI coefficients, meaning higher inequality of income.

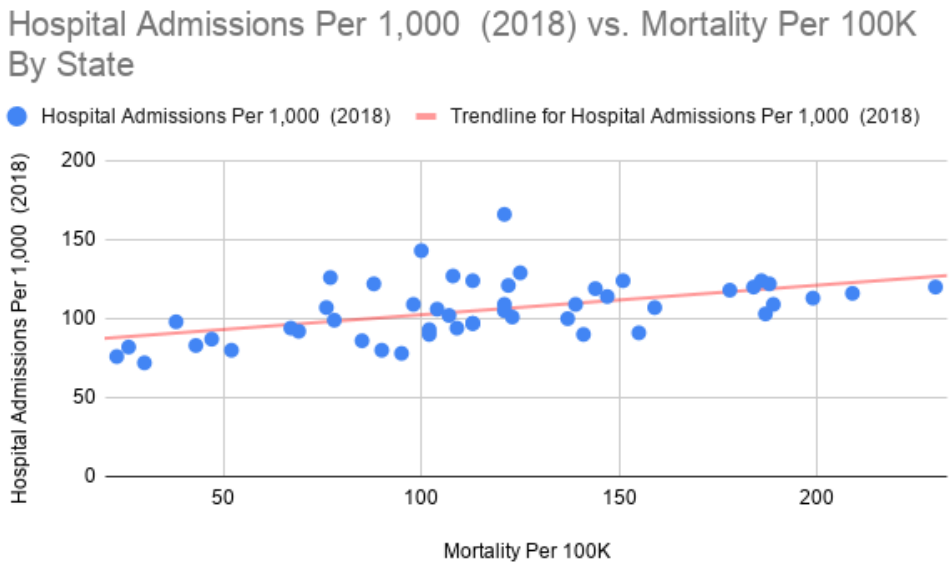
Table 13



Source: CDC and US Census Bureau

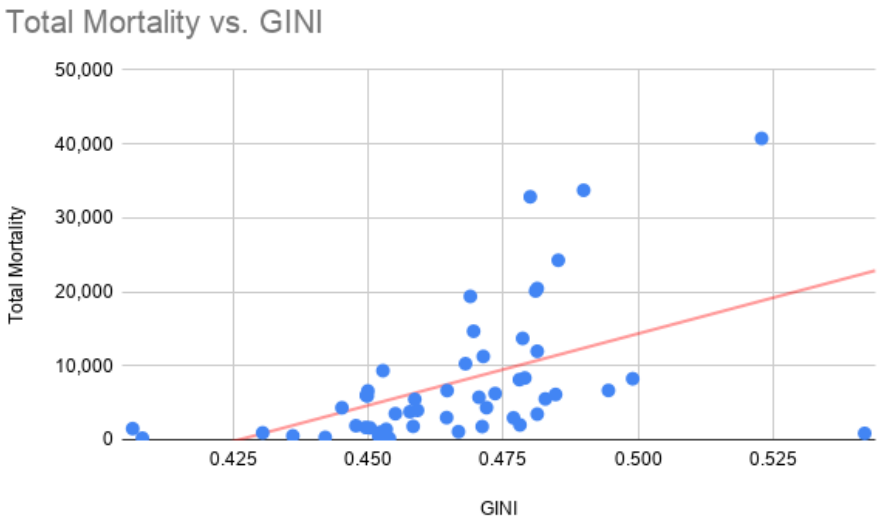
Interestingly, these trends also exist in regards to rates of contraction of COVID-19 and mortality rates from COVID-19. Data for rates of contraction and mortality due to COVID-19 came from the CDC, hospital admission rates came from the Kaiser Family Foundation, and demographic data from the Census Bureau. Analysis of the data found that states that have higher rates of hospital admission per capita tend to have higher rates of mortality per capita due to COVID-19. Furthermore, states with higher the percentages of inhabitants who are Black tend to have higher per capita mortality rates. A similar trend exists when comparing state levels of income inequality and total number of COVID deaths in each state.

Table 14



Source: Kaiser Family Foundation and CDC

Table 15



Source: CDC and US Census Bureau

These data further suggest that the burden of COVID-19 has been shared unequally. Minorities and those of low SES have borne a disproportionate share of the burden of the pandemic economically and in terms of effects on their health. More research needs to be done to definitively determine the multifaceted sources of these differences. Economically, the poor tend to work in service-based, low-wage jobs that make it extremely difficult to work from home. In terms of health, the poor have much lower initial health and higher baseline rates of disability. Additionally, they also contract COVID-19 at much higher rates. This is because of increased crowding and the difficulty or impossibility of working from home. Because of lower baseline health and higher rates of contracting the disease, it comes as no surprise that the disadvantaged have double the death rate of the rich.

Impacts of Pandemics Across Health Systems

Inequality in health is demonstrated even in nations with national health systems. In a review of health inequalities in England, Marmot (2013) finds major differences in the health of the rich and poor, despite them all having access to the same National Health Service. The study finds that in England the people living in the poorest neighborhoods die on average seven years earlier than those who live in the richest neighborhoods. Additionally, those living in privileged areas[6] have a disability-free life expectancy[7] 17 years higher than those who live in poor areas. These massive health differentials by levels of wealth across various health systems suggest that the source of these problems goes beyond access to healthcare. The study suggests that factors such as housing, income, education, social isolation, and disability are also important. These

[6] Areas that have per capita income above the 65th percentile
[7] Disability Free Life Expectancy (DFLE) is defined as the number of years a person is expected to live in a healthy condition.

factors have also been implicated in the disparities in the health impacts of COVID-19 and will be further explored later in the paper.

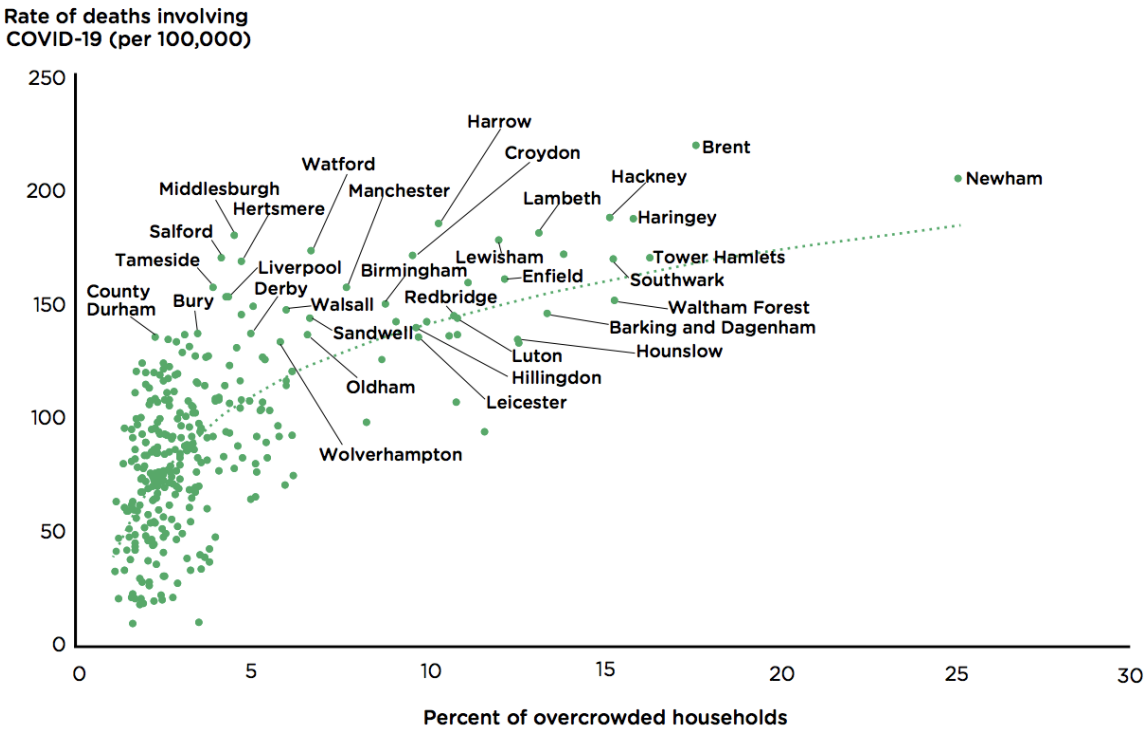
Moreover, the findings of the study detail the health challenges that the poor typically face, which could be related to the higher mortality rates among the poorer populations. Urban poorer populations often reside in areas with significantly higher pollution levels than higher income urban dwellers. Long term exposures to high levels of pollution have been linked to an increased risk of heart disease, lung cancer, and respiratory diseases such as asthma and emphysema. This has caused areas with higher levels of pollution to experience higher rates of mortality due to COVID-19 (Wu et al. 2020). Significantly higher rates of obesity were observed in disadvantaged populations. This is partially due to a lack of access and ability to pay for healthy foods in these communities. The higher occurrence of obesity and other comorbidities, such as asthma and emphysema from pollution, make the disadvantaged populations “high risk” and play a factor in the higher incidence of mortality in these communities.

As previously established, disparities in outcomes due to Swine Flu and COVID-19 exist within the US healthcare system depending on the patient's SES or race. Some point to US healthcare’s private system as part of the problem, as it could restrict access or care to those without insurance. However, countries with national health systems have experienced similar disparities in outcome by SES. In Germany, all citizens are required to have health insurance, which is available in either state-run or private plans, that give them similar access to care. Dragano et al. (2020) study hospitalization rates among Germans aged 18 to 65 who are insured and active in the labor market. All of these individuals were either employed or unemployed but looking for work at the time of their hospitalization due to COVID-19. From hospitalization data, the researchers discovered that unemployed persons were at nearly double the risk of a long term

hospitalization due to COVID-19 than employed persons. As previously established, unemployed individuals during the pandemic have tended to be those that work low-wage hospitality jobs, suggesting that these individuals have a lower SES. This study further supports the idea that disparities in outcomes due to pandemics exist across national borders and healthcare systems.

As established by Marmot (2013) and discussed above, health inequalities by SES exist in the United Kingdom despite the presence of national healthcare in the NHS. This trend continues during the COVID-19 pandemic. In a review of mortality data from COVID-19 in the United Kingdom, Marmot (2020) finds strong evidence that those with low socioeconomic or disadvantaged status bear the brunt of COVID-19 mortality. First, Marmot investigates the impact of living conditions on COVID-19 mortality rates. To measure living conditions the authors source data on overcrowding in housing from local authorities in England and compare these rates to age-standardized mortality rates in these same areas. Excess overcrowding commonly occurs in disadvantaged areas where multiple generations of the same family or multiple families share a rental unit. This increases the likelihood of transmitting a disease due to the higher number of contacts. Unsurprisingly, this leads to a positive association between overcrowding and increased mortality. Particularly concerning are the data from Newham, a borough in East London, with over 25% of households being overcrowded. It is the most ethnically diverse borough in the city with one of the largest immigrant populations. Data from it and similar communities, such as Tower Hamlets and Brent, show the importance of safe housing in mitigating the impact of pandemics (see Table 16).

Table 16



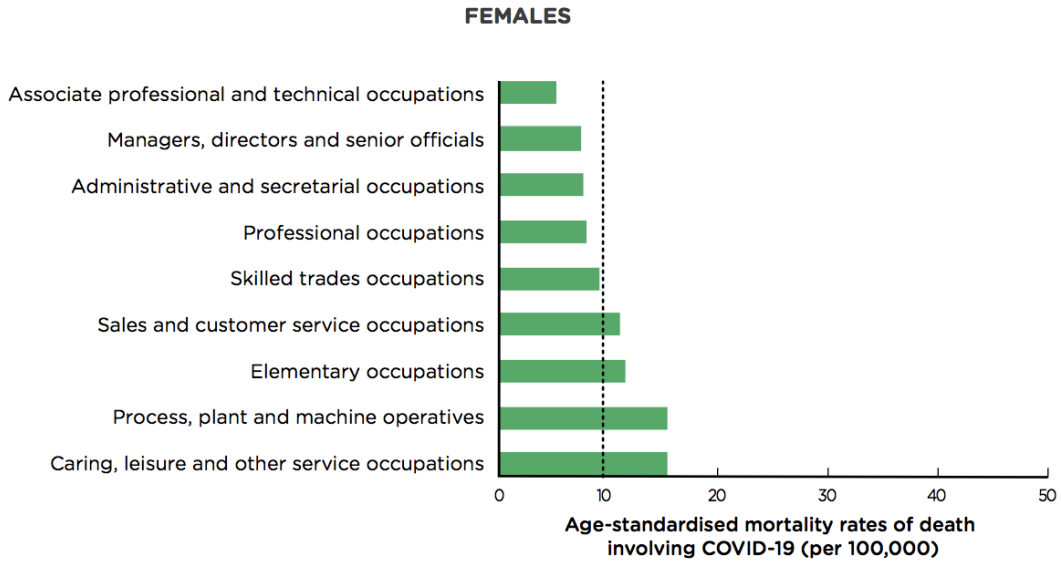
Source: *ONS. COVID-19 age-standardised mortality rates by local authority and percent of overcrowding, 2020 (10) (14).*

Source: Marmot 2020

In addition, the authors investigate mortality rates in major occupational groups in England and Wales for both males and females. The ability of workers to conduct these jobs remotely varies greatly, from professional jobs that can easily be done from home, such as financial services and managerial positions, to low-skilled jobs that involve on-site tasks such as janitorial work, restaurant workers and taxi drivers. Noticeably, males have significantly higher rates of mortality from COVID-19 regardless of profession. Skilled male professionals working in professional, technical or managerial occupations have lower rates of mortality on average compared to unskilled professions that require in-person work. Females only see a slightly elevated risk of mortality from COVID-19 in a few low-wage professions, such as janitorial

services. Unsurprisingly, the professions with the lowest COVID-19 mortality rates, have the highest average wages.

Table 17 COVID-19 Mortality by Occupation Across Genders

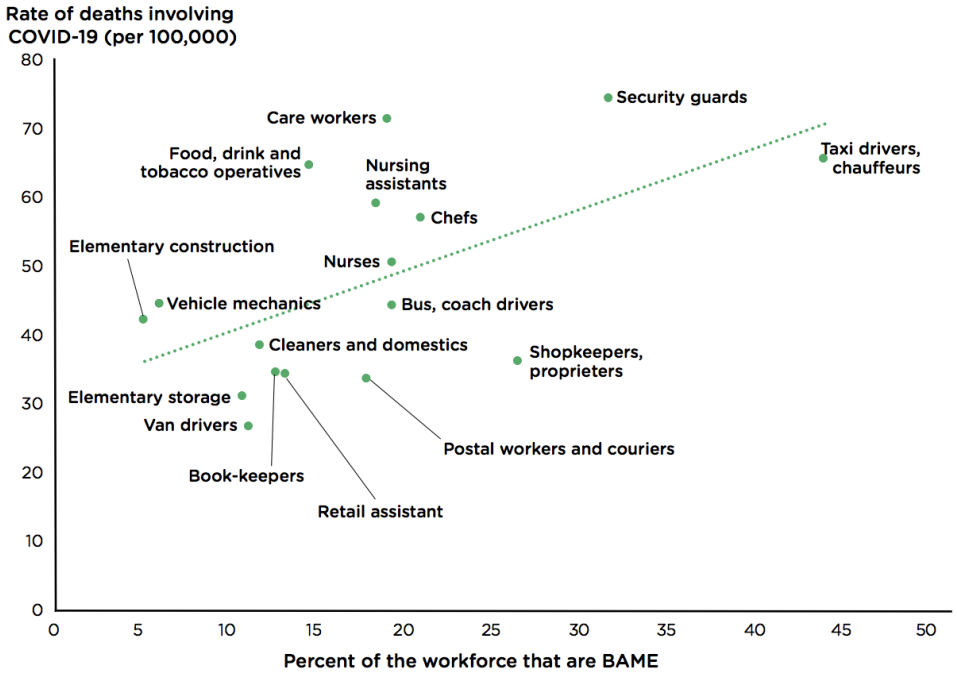


Source: Marmot 2020

Marmot (2020) further investigates the characteristics of these groups of occupations to see what differences drive the inequalities in the mortality rates due to COVID-19. He breaks down the larger occupational groups into specific professions and compares the percentage of minority workers to the COVID-19 mortality rates for that specific occupation. In the United Kingdom, the most at-risk minorities are typically grouped under BAME, which stands for Black, Asian and minority ethnic. BAME groups have been noted to have negative experiences in regards to discrimination and safety in the work place than White British workers. This means these workers typically have less access to PPE or proper social distancing procedures. We see these differences manifest in the relationship between the percentage of workers who identify as

BAME and COVID-19 mortality rates. Professions with higher proportions of BAME workers are more likely to die from COVID-19. Professions like taxi drivers and security guards are forced to be in contact with individuals and their work cannot be done remotely. It is essential these groups of workers are given proper PPE and able to take proper distancing measures. They come into contact with many people each day who may not be following proper COVID-19 protocols.

Table 18

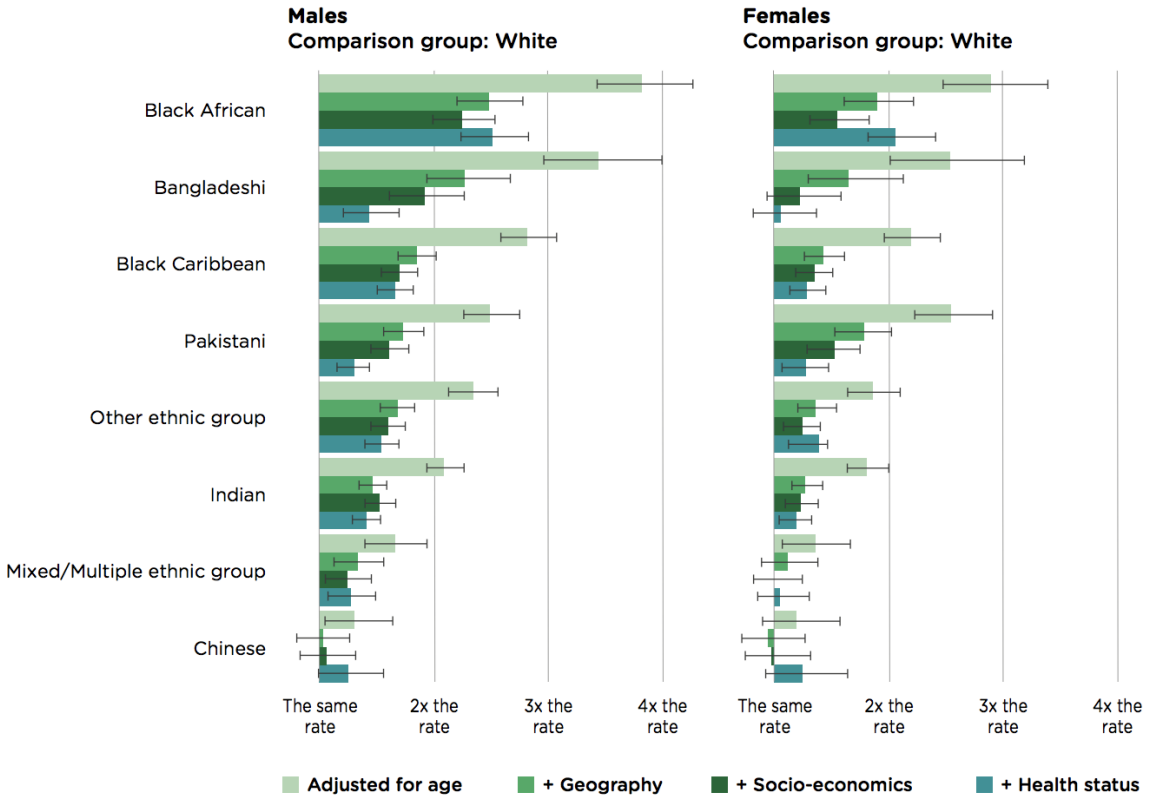


Source: Marmot 2020

Furthermore, the authors investigate the differences in the likelihood of COVID-19 mortality across different races. They use British White individuals as the comparison group and compare their death rates due to COVID-19 to Black African, Banglandeshi, Black Caribbean, Pakistani, Indian, Chinese and other ethnic groups. The analysis finds that Black Africans have

the highest rate of mortality when adjusted for age, and are over three times more likely to die from COVID-19 than British White males. Similarly, Black African and Bangladeshi females have a COVID-19 mortality more than double that of British White females. Significant elevations in COVID-19 mortality rates are observed across genders in Black Caribbean, Pakistani and other ethnic groups. Even when standardizing the data for the differing SES, geography, and health status of these groups, they all show elevated rates of death due to COVID-19 compared to White individuals. This information, when combined with the previously described inequities in housing and professions, confirms that differences in outcomes due to COVID-19 go beyond issues in access to care. Even with universal healthcare access and coverage, similar disparities in the burden of COVID-19 are still experienced in the United Kingdom as they are in the United States.

Table 19 COVID-19 Death Rate by Ethnic Group and Gender



Source: Marmot 2020

Non-Health Impacts

In addition to decreasing the number of cases, steps can be taken to reduce the inequality that is exacerbated by the pandemic. In March of 2020, many schools closed around the world to slow the spread of COVID-19. The reopening of schools has been much less uniform. For example, many schools in Germany[8] reopened in May, while many schools in the United States have still not returned to in-person instruction as of March 2021. Agostinelli et al. (2020)

[8] German schools were re-opened by the national government, unlike in the US where schools were re-opened by localities.

investigate the effects of the shut-down of in-person learning. They believe that education is one of the great equalizers in American society[9] and hypothesize that the lack of access to in-person learning will have a larger negative impact on poorer children than it does on the rich. The authors argue that accrued learning losses are difficult to offset later on, meaning the disruption to education from COVID-19 will negatively impact the economic prospects of children later in life. More research is needed in the future to determine how long disruption from school must be before it causes important damage to children's future prospects.

To model the long-term impact of COVID-19 on education, the authors develop a model that measures the impact of parenting, peer interaction, and quality of education in high school students. They establish a baseline level of education loss by sampling data on grades from ninth graders from different levels of SES. Their model estimated the loss to be roughly half a point on a 4 point grade letter scale for the poorest of high school students from closures of only a few months. This translates to a straight A student receiving Bs in roughly half their classes. Meanwhile in the most affluent of neighborhoods, the researchers found that the impact of COVID-19 will have little if any effect on these students' grades. While a model, it is important to realize that there has been no similar impact on education in recent history. This makes models important to estimate the impact of these unprecedented times.

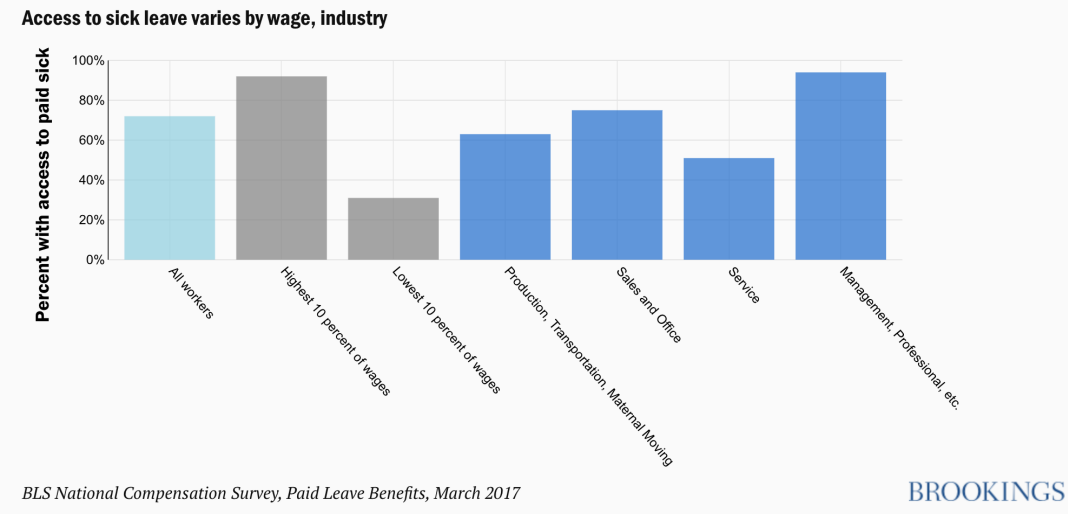
Policy Considerations

As previously established, those who earn the lowest wages are less likely to perform their jobs from home, due to the nature of their work requiring their presence in trades such as meat packing, construction, or food service. Because of a lack of a mandate for paid sick leave in

[9] The authors believe that performance in high school is directly correlated to college placements and job success.

the United States, many workers participate in presenteeism, or working while sick. In the United States, as seen in Table 20, of the lowest 10% of wage earners, only 30% have access to paid sick leave, while 90% of the highest 10% of wage earners have paid sick leave (BLS, 2017). When workers come to work sick they risk spreading communicable diseases to their coworkers, customers, their families and people who they come into contact with during their commute. Paid sick leave programs can prevent presenteeism, reducing the spread of communicable disease, while also not punishing ill, low-wage workers.

Table 20



Source: "Access to Sick Leave Varies by Wage, Industry" 2018.

Kumar et al. (2012) investigate the impact of access to paid sick days and stay at home behavior on the incidence of influenza during the 2009 H1N1 pandemic, using their surveys of a nationally representative sample of over 2,000 individuals. They found that when workers reported a lack of access to working from home or sick leave that they had over 100% higher rate of contracting the disease. The highest incidence of a lack of sick leave or inability to work from home was seen in Hispanics and African-Americans. Racial differences were also observed in

living areas, household size, and public transportation use, with minorities living in more urban areas, having larger household sizes and being more reliant on public transportation than White individuals. High density living, larger household sizes, and increased use of public transportation creates a larger social network that can further spread the disease.

In 2011, Connecticut became the first state in the nation to mandate paid sick leave for all workers[10]. Applebaum et al. (2014) studied the impact of this mandate on Connecticut businesses by conducting a survey of employers and employees who fell under the jurisdiction of the law. In their surveys, employers noted that the law had created minimal to no additional costs for them. Two-thirds of all employers saw less than a 2% change in their operating costs due to the implementation of the law (see Table 19). Statistically significant increases were observed in the availability of sick leave to retail, hospitality and healthcare workers. The study also found that despite workers having on average 8 or more sick days available to them, the median worker only took 3 all year. This finding suggests that paid sick leave was not typically overused. Importantly, a third of employers reported that fewer workers came to work sick and that the spread of illnesses in offices was reduced.

[10] Under the law Connecticut requires that all employers with 50 or more employees within the state provide each worker with 1 hour of paid sick leave per 40 hours worked up to a maximum of 40 hours of sick leave per year (5 days). The law creates mandatory sick leave for service positions typically excluded from this benefit such as fast food and retail positions.

Table 21

Change in costs due to paid sick leave law, Connecticut, 2013 (percent of establishments)	
No change	46.8%
Costs increased	53.2%
Increased less than 2%	19.1%
Increased 2%	11.2%
Increased 3% or 4%	4.5%
Increased 5% or more	6.5%
Increased, % unknown	11.9%

Source: Applebaum and Milkman 2014

In response to COVID-19 in the United States, Congress passed the Families First Coronavirus Response Act (FFCRA) in 2020, which entitled all American workers to two weeks emergency leave at full pay. A study by Health Affairs (2020) analyzed the difference in case numbers between states where sick leave had only become available under the FFCRA and states where it was previously available. The study found that in states that gained paid sick leave from the FFCRA, there was a statistically significant drop in the number of cases per day compared to states that already had the provision. On average, states that gained sick leave from the FFCRA saw a reduction in 400 cases per day. This initial finding suggests that the implementation of paid sick leave is effective in reducing the number of cases of the disease. However, more long-term research will be needed to prove this hypothesis.

Conclusions

The literature and research discussed strongly suggest differing impacts based on SES in major pandemics, regardless of the disease. This tends to be due to the typical characteristics of poverty, which include overcrowding in housing and difficulty socially distancing in the workplace or working from home. Due to social distancing laws to combat pandemics, the poor tend to be among first to lose their jobs and the last to gain them back. The poor are more likely to work in professions such as taxi drivers, security guards, and cashier – jobs that need to be conducted face to face and cannot be performed remotely. Often, these workers are not provided with proper PPE and can easily come into contact with people who are ill. These jobs are a necessity to the poor and essential to supporting their families. Once these workers fall ill, those of low SES bear an unequal burden in the morbidity and mortality rates in pandemics compared to their more affluent counterparts.

COVID-19 and other pandemics affect the poor more severely than the rich for societal and health reasons. The poor tend to live in overcrowded housing, sometimes with multiple generations of the same family. This causes problems in that younger workers can unknowingly pass the disease to their older relatives whom they are working to support. Once the disease enters the household, it can spread and affect other members. In many cases, members of the family will have to take off work to care for their families, despite likely not having familial sick leave at their job. Moreover, the wages lost by the poor during this period generally contribute to growing income inequality following pandemics. Meanwhile, more affluent households can manage to socially distance themselves and isolate members of the family who may have been exposed, mitigating the spread within families.

Another societal difference between the rich and poor is the rate of pollution around where households live. The urban poor are subject to more emissions from vehicles, factories and power plants. From long term exposure, these individuals are more likely to develop respiratory diseases, such as asthma, COPD, and cardiovascular disease.

Moreover, major baseline health differences are present between the rich and poor. Higher baseline disability rates have been observed in the poor than in the rich, with Marmot (2002) finding that these elevated rates of disability can be the difference in 17 years of disability-free life and 7 years of life expectancy between the rich and poor. The diseases that make up these disabilities are most commonly obesity, diabetes, chronic lung disease, and cardiovascular disease. These diseases also put these individuals at a much higher risk of contracting a serious case of COVID-19, or losing their life to it.

In addition, large racial discrepancies are present in the economic and health impacts of pandemics. Economically, we see higher levels of unemployment among minority groups than White individuals, notably in Black men who have experienced higher unemployment than other groups since the beginning of the pandemic. The health differences that exist between White and minority communities that exist are even greater. Even prior to the pandemic, minority communities had higher incidences of disability, which contributed to shorter life expectancies than in predominantly White communities.

During pandemics, minority communities have had higher incidences of the disease and suffered from higher mortality rates. This can be observed from research on the Spanish Flu, Swine Flu, and now COVID-19. Most concerning about the disparity in health impacts is the death rate from COVID-19 by race. Marmot (2020) illustrates the massive differences in death rates between White and minority communities in the UK. Even after adjusting for

socioeconomic status, Black and Bangladeshi males still have more than double the death rate of White males from COVID-19. A similar trend exists in the US where states with higher percentages of Black populations have experienced higher mortality rates. The results of this research are concerning in that it illustrates the inherent differences in life outcomes present due to an individual's color of birth or familial socioeconomic status.

Unfortunately, this problem is much larger than a simple access to healthcare problem. These disparities are present across different health systems as seen in data from the United States, Germany (Bismarck Model), and the United Kingdom (National Single-Payer). A switch for America to Medicare-for-All would clearly not solve the disparities in impact of the pandemic on the poor and on minorities. Instead of entire health systems being the main cause of the disparities, the important sources appear to be the characteristics that define poverty. Overcrowding, inability to work from home, and high baseline disability allow communicable diseases to spread more quickly through poor populations, leading to a higher death rate than in rich communities. Economically, we see similar effects in that the jobs of the poor tend to be the first to be lost in pandemics and the last to come back due to their face to face nature.

Policy changes are needed to prevent the health and economic disparities from widening even further in future pandemics. First, steps need to be taken to improve the baseline health of the poor. This could take many forms including improving access to preventative care, improving public housing, and making healthy foods more readily available. Additionally, changes need to be made to the way governments respond to pandemics, which should focus more on aiding the poor in the health and economic disparities they face. Improving the health response could include making PPE easily available and prioritizing vaccinating disadvantaged communities. Future economic responses could include paid sick leave as it has been proven to

mitigate the spread of the disease. In short, future governmental responses to pandemics, apart from focusing on stopping the spread of the disease, should attempt to prevent increased inequality, in terms of both health and wealth, between the rich and poor.

While reducing health and income inequality would be an effective tool in combating future pandemics, short-term solutions are needed before the pandemic subsides-- solutions that could have an instant effect in reducing the impact of the disease in both health and economic terms. Vaccination can reduce both the health and economic burdens of the pandemic on the poor by providing immunity to the disease. This immunity can provide economic benefits through allowing vulnerable members of the community to return to work and businesses to return closer to normal operating levels. This will allow those in jobs who are unable to work remotely to return to work and start earning wages again in industries such as service jobs which are disproportionately held by lower income and minority individuals.

While the vaccination campaign has been inoculating Americans across the country, it has not been evenly distributed across socioeconomic classes. Table 22 illustrates that by mid-March 2021 over 40% of higher income households had been inoculated, nearly twice the percentage in the poorest income brackets. Additionally, states with the highest levels of income inequality, such as California and New Jersey, have vaccinated a significantly higher portion of their population that resides in the wealthiest 10% of municipalities. Specifically, wealthy Californians have received 156 doses for every 100 doses received by poorer residents and in Washington, D.C. the wealthiest two neighborhoods have double the vaccination rate of the two poorest (Goldhill, 2021). These differences are illustrated across more States in Table 23

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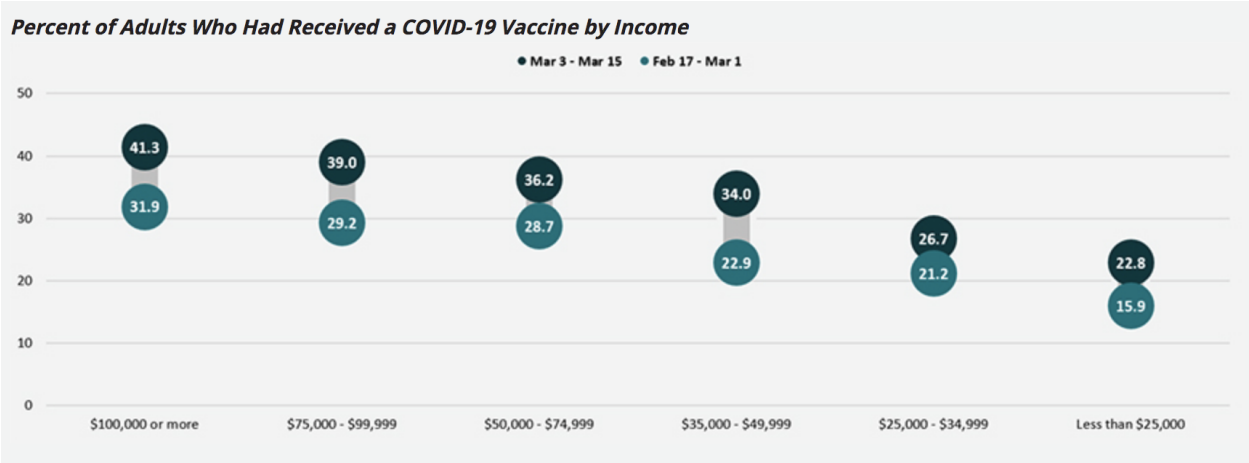
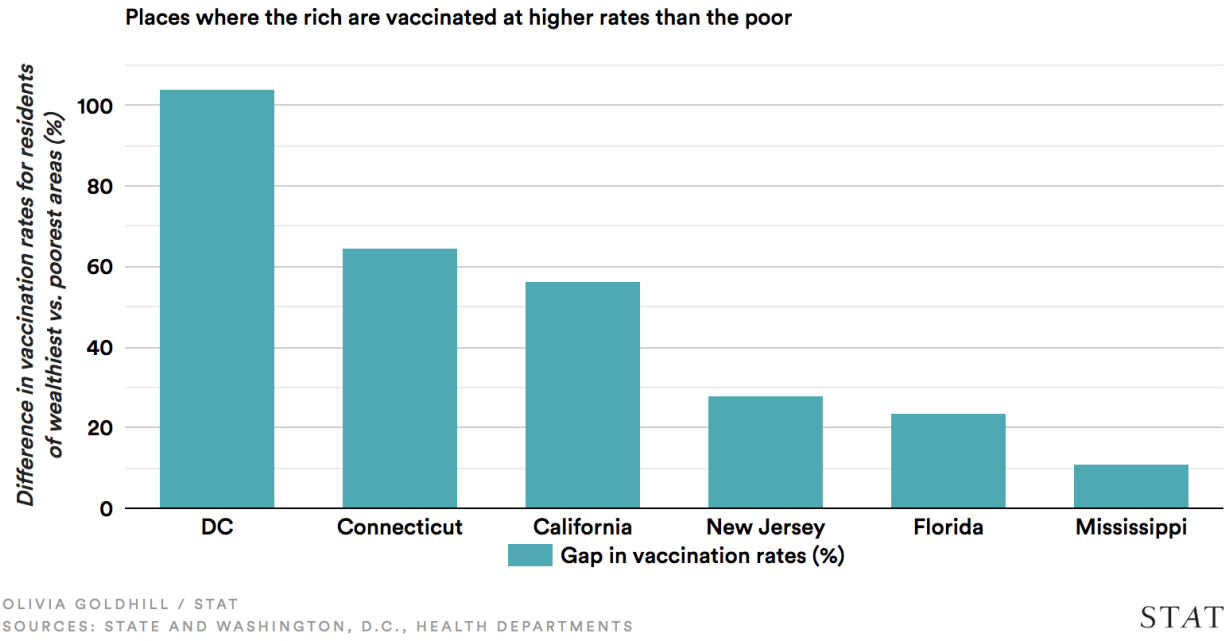
Table 22



Source: State Health Access Data Assistance Center

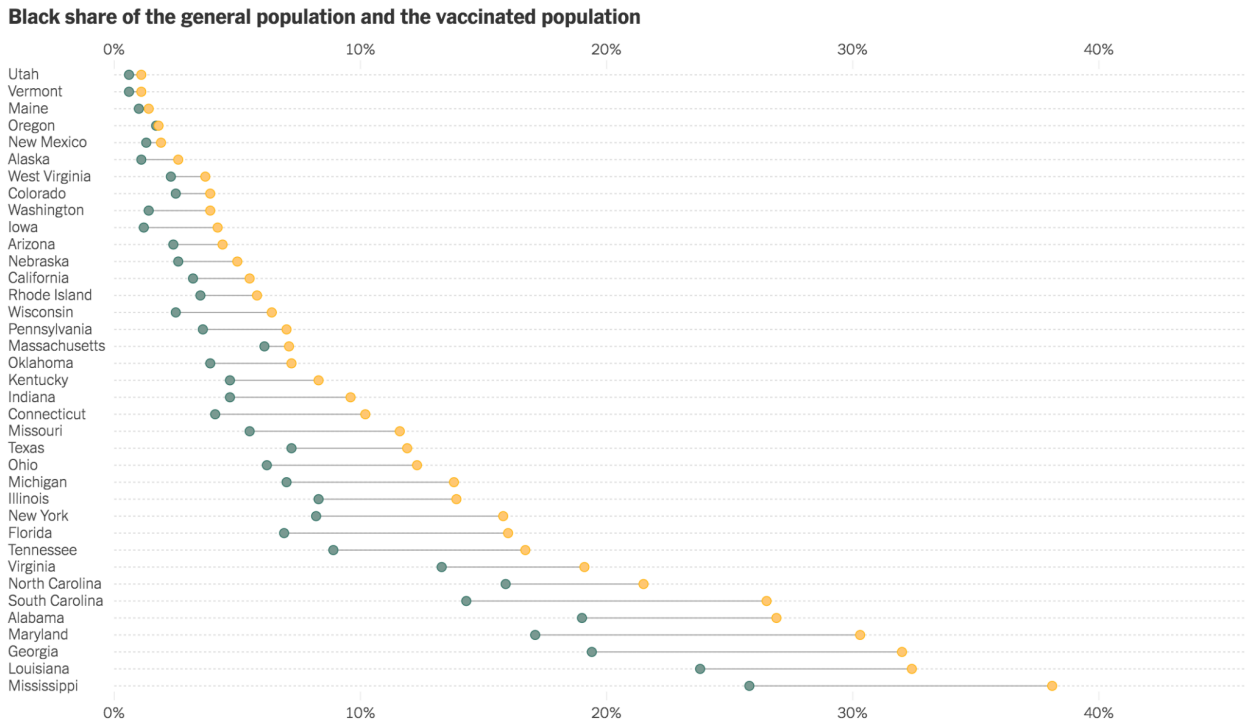
Table 23



Source: Goldhill, 2021

This trend continues across racial lines with Black Americans receiving far fewer vaccines than other races, particularly in the south (Table 24). In states like Mississippi, Louisiana, and Georgia, the rate of vaccination of Black individuals lags behind their share of the population by more than 10 percentage points. Considering the re-opening policies of these states, the disparity in deaths and cases Blacks have already experienced, and the service oriented jobs that are more populated by minorities, a lack of vaccination can further compound the inequalities these groups have already experienced during the pandemic.

Table 24



Source: Pandemic's Racial Disparities Persist in Vaccine Rollout.

Policies that promote the vaccination of low income and minority individuals can help prevent the health and economic disparities experienced by these communities from being furthered as the nation begins to recover from the pandemic. It is essential that the government increases the access and availability of information to these communities so that they can trust the vaccine and be confident in receiving it. Additionally, work should be done to increase the ease of access to signing up for the vaccine. Appointments are often difficult to come by, especially for those lacking internet access, and research and education is needed to understand the process. For example, many individuals use Facebook groups and Twitter accounts to receive information on appointment availability, but not all Americans have access to these social media platforms or knowledge of the existence of these accounts or groups. Health departments should target areas of low income and minority individuals and set up information and vaccination programs at locations frequented by residents such as grocery stores and churches. While vaccination will not eliminate the health and economic burden created by the pandemic, it can prevent disparities from widening further and accelerate movement to a post-pandemic world.

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