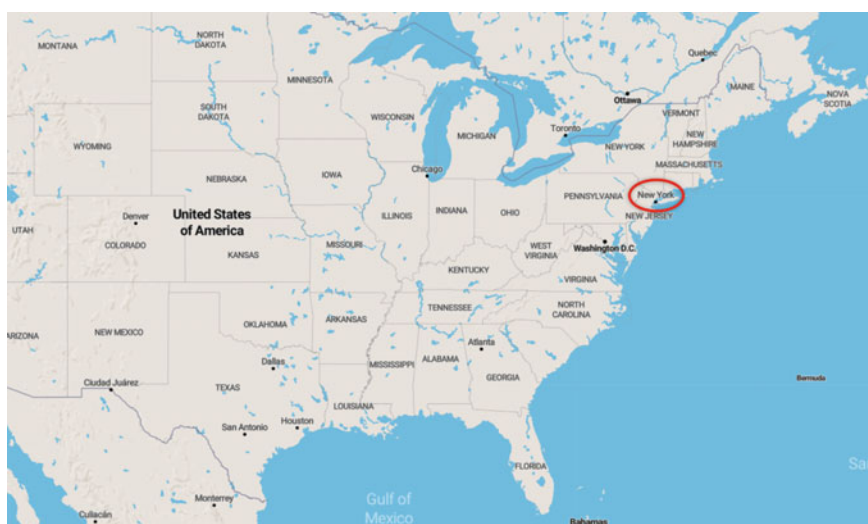


United States of America: New York City and COVID-19



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Source Jawgmaps/uMap/OpenStreetMaps

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1 Introduction

New York City (NYC) was the first major epicentre of COVID-19 in the USA, largely because of its population size, density, and location as a commercial and tourist hub (Angel et al. 2020). Discrepancies between the mayoral, state and federal responses defined both public messaging and policy responses aimed at containing infection and preventing deaths. Mayor Bill de Blasio publicly criticised the response on the federal level led by the Trump administration, while ongoing disagreements between de Blasio and New York State Governor Andrew Cuomo contributed to delays in instituting stay-at-home orders; this substantially increased the number of cases and deaths throughout the city (Shaman 2020). Overall, the impact of the COVID-19 pandemic in NYC magnified the cumulative health and employment disadvantages already existing for many, especially low-income communities and communities of colour. COVID-19 also reduced the financial and institutional ability of NYC to protect the health and wellbeing of its residents.

We discuss impacts of the pandemic in NYC, including effects on housing, transportation and disparities in job losses, which increased inequality in health and earnings. Some innovative policy responses, such as the reallocation of street space for dining and recreation are also discussed.

We cover the first two spikes of cases in March–April 2020 and then in December 2020–January 2021, as well as policies and responses instituted between. Statistics are provided until December 2021.

2 Demography

NYC comprises five boroughs (Manhattan, The Bronx, Staten Island, Queens and Brooklyn) with an estimated total population of 8.34 million (CENSUS 2019) and 27,000 people per square mile, the highest urban density in the United States (New York City Department of City Population 2019). NYC's high poverty rate has been declining slowly over the last decades, with a 3.6% reduction during 2013–2018. However, the rate (17.3%) remains starkly above the national average (11.8%) (Office of the Mayor 2019). Over the last decade, income inequality has increased, with households earning at the 20th percentile experiencing only a 10% increase in annual income from \$20,000 to \$22,000, while those in the 80th percentile saw income growing 22%, from \$126,000 to \$154,000 (Fig. 1).



Fig. 1 Map of New York City showing five boroughs (Source NYC MapPLUTO)

3 City Governance and Autonomy

During the course of the pandemic, the term of de Blasio, NYC mayor since 2014, ended and he was succeeded in January 2021 by Eric Adams. After Cuomo’s resignation, Kathy Hochul succeeded him as governor in August 2021. In terms of governance, many fiscal, regulatory and enforcement powers sit with Albany, the state’s capital. The state sets a broad range of policies that affect local issues, from vehicle speed limits to plastic bags in grocery stores. The Metropolitan Transportation Authority (MTA), the entity that controls the NYC subway, is—perversely—controlled by the state governor, so that revenue for this vital service for New Yorkers can only be increased by state legislature decision (Five Borough Future 2019). Most importantly in a pandemic, governance structures mean that the NYC mayor cannot mandate a lockdown without the approval of the state’s governor.

4 The Pandemic's Impact on Health Expenditure, Health Insurance Costs and Rates

Prior to the pandemic, New Yorkers' health care expenditure totalled \$163 billion in 2019, the second highest in the country (Rodin DMPH et al. 2014, p. 61). In response to the pandemic, the Department of Financial Services kept the increase in insurance premiums for 2021 to a 1.8% increase for individuals (Department of Financial Services 2020). Despite such provisions the pandemic has had a severe impact on many people's ability to pay for health insurance, in part due to severe wage losses in some industries. Many New Yorkers who suffered the highest share of job losses are also less covered by insurance. The pandemic halted a long-term trend that saw a steady drop in the rate of uninsured New Yorkers from 9.3% to 6.9% in the period from 2015 to 2019 (Community Service Society 2020). The overall number of uninsured varies by industry. Some industries hit hard by the pandemic have particularly high rates of uninsured workers, including restaurants and hotels (26%), construction (24%), personal services (21%), and administrative and support services (14%) (Parrot 2021). Ongoing pandemic-related job losses in face-to-face industries will exacerbate social and economic disparities. Although average wages in the face-to-face sector (e.g., hospitality and construction) are only one-third those in the remote sector, total 2020 estimated wage losses were \$28 billion in the former and \$11 billion in the latter (Parrot 2021).

5 Hospital Losses and Relief

NYC's healthcare services landscape is complex. We focus on the NYC Health + Hospitals (H+H), which is the largest public health care system in the U.S. H+H operates eleven acute care hospitals, five nursing homes, six diagnostic and treatment centres, and more than 70 community-based primary care sites, serving primarily the poor and working class. H+H typically operates on a one percent profit margin (Palazzolo and West 2020). Its non-operating revenues include federal, state and municipal grants (the latter being the largest) and investment earnings. During the height of the pandemic the H+H system lost \$20 million a week in operating revenue as elective procedures were cancelled. Shortfalls in funding were made up by \$246.2 million in Federal Emergency Management Agency (FEMA) funding related to COVID-19 and \$31 million to protect workers' salaries against budget cuts (New York City Council 2020). Other federal pandemic relief programmes provided an estimated \$3.3 billion for hospitals in NYC.

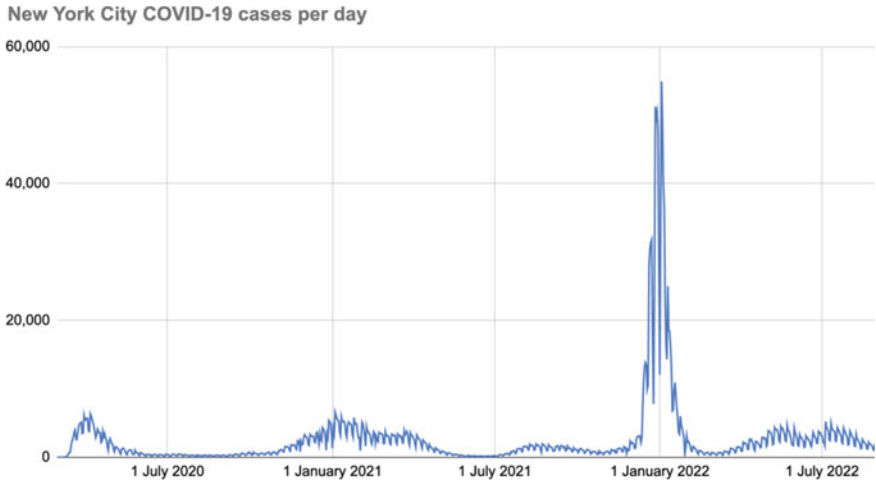


Fig. 2 Daily COVID-19 confirmed cases in New York City. NYC Health (2021) (Source GitHub, <https://github.com/nychealth/coronavirus-data/tree/master/trends>)

6 Timeline of Covid-19 Effects

There were three peaks in cases, in March/April 2020, in December 2020–January 2021 and a much higher Omicron peak in December 2021 (Fig. 2). This last spike may be attributable to much wider access to and availability of testing than at the beginning of the pandemic, when the reliance was solely on hospitals and urgent medical clinics; pop-up street COVID-19 testing sites and testing at pharmacies were not deployed until later in the pandemic. At the same time, it may also mean that confirmed cases at the beginning of the pandemic went largely undercounted. Additionally, the higher infectivity of Omicron is a factor. Figure 3 shows confirmed deaths spiking in December 2020–January 2021, followed by a smaller rise in deaths in January 2021–December 2021.

Here we provide the main impacts of the pandemic on hospital services, in terms of the ability to detect COVID-19 cases and the availability of hospital equipment, as well as the immediate consequences for people’s behaviour following the introduction of measures such as mask wearing and social distancing. We also show how existing racial disparities in health have been exacerbated by the pandemic.

7 COVID-19 Cases and Death Count

NYC has not implemented a comprehensive contact tracing programme, and the limited testing means that determining the rate of transmission of the virus has been a difficult process, given the large numbers of undocumented infections, fluctuating

New York City COVID-19 deaths per day

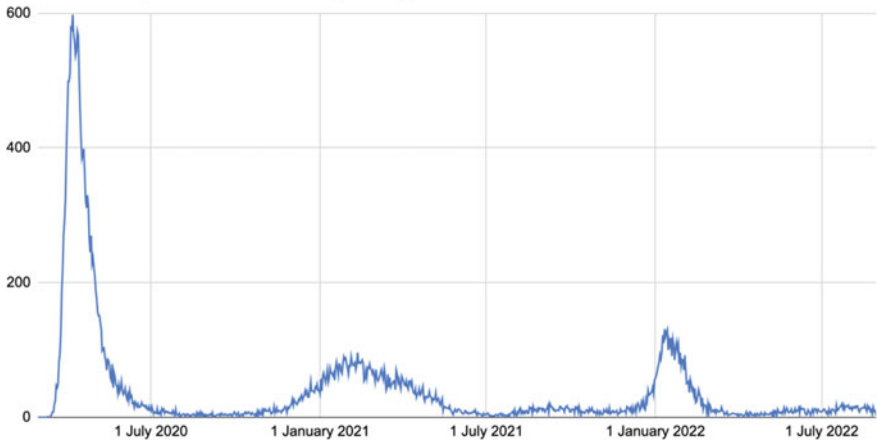


Fig. 3 Daily confirmed COVID-19 deaths in New York City. NYC Health (2021) (*Source* GitHub, <https://github.com/nychealth/coronavirus-data/tree/master/trends>)

Table 1 COVID-19 by the numbers in NYC (Feb 2022)

Measure	Number of NYC residents
Confirmed cases (people with a positive molecular test)	1,937,200
Probable cases (people with a positive antigen test, or symptoms and confirmed exposure, or probable death)	340,453
Total cases	2,277,653
Hospitalisations (within 14 days of diagnosis)	160,308
Confirmed deaths (with positive molecular test)	34,271
Probable deaths (cause of death listed as COVID-19 or similar, but no positive molecular test)	5,513
Total deaths	39,784

Source NYS Department of Health

infection detection rates and conflicting reports of cases. This is also why the NYC Department of Health (DOH) refers to confirmed and probable cases on their data platform. In July 2020, scientific publications tried to ascertain the crude case-fatality risk (CFR), i.e., the number of deaths per number of confirmed cases, or the adjusted CFR (i.e., the crude CFR adjusted for delay from infection or diagnosis until death) in NYC (New York City Council 2020) (Table 1).

8 Availability of Ventilators and Protective Equipment

Living in NYC during the 2020 March/April peak meant experiencing the constant presence of ambulance sirens, and indeed between 16 March and 15 April there was a 60% increase in emergency medical services calls compared to the same period in 2019, primarily comprising respiratory and cardiovascular calls (Prezant et al. 2020). The surge in hospitalisations also brought a shortage of critical protective equipment and ventilators. Early in April, one hospital sector journal declared that NYC hospitals would be 25,000 ventilators short, considering that 4,000 COVID-19 patients hospitalised were already on ventilators at the time (Anderson 2020).

The shortage of protective equipment and ventilators, which spiked as hospitalisation rates first peaked in April 2020 (Goodman and Goldstein 2020) was primarily met with a response at the state level. Cuomo announced an executive order allowing the redistribution of protective equipment, and ventilators by the national guard between different locations across the state. At a federal level there was criticism that the national stockpile, the responsibility of the Trump administration, was poorly maintained. Ventilator shortages also extended to field hospitals. A field hospital was rapidly assembled within the Billie Jean King National Tennis Center at the cost of \$52 million and ultimately served only 79 patients (Rosenthal 2020). Other army corps field hospitals such as that erected in the Javits Convention Center on Manhattan's West Side treated a greater number of COVID-19 patients, but never reached full capacity (New York State 2020). In terms of hospital beds, the shortages echoed spatial disparities in hospital care, with wealthy boroughs having a proportionally greater number of hospital beds than less wealthy boroughs (5 hospital beds for every 1,000 residents in Manhattan, vs 1.8 per 1,000 residents in Queens, 2.2 in Brooklyn and 2.4 in the Bronx) (Wadhera et al. 2020).

9 Stay-At-Home Orders, Mask Wearing and Social Distancing

The state-wide Policies that Assure Uniform Safety for Everyone (PAUSE) of March 2020 listed ten policy directives including: limiting public gatherings to ten people or less, directing all non-essential businesses to close, requiring individuals to only leave their home to access essential services, social distancing of six feet in public places, and the limiting of outdoor recreational activity and public transport. The PAUSE lasted 55 days and highlighted existing tensions between de Blasio and Cuomo. On April 15 de Blasio announced that New Yorkers visiting grocery stores would be required to wear some type of face covering. Cuomo later issued an executive order requiring all New Yorkers to wear a face covering in public. Two days later Cuomo announced an executive order requiring all people in New York State to wear a mask or a face covering when in public and in instances where social distancing cannot be maintained, such as on public transportation.

Racial disparity also had an impact on measures to prevent the virus spread. A May 2020 report issued by the Brooklyn District Attorney General showed the racial breakdown of social-distancing enforcement from March 17 through May, which until that time was conducted by officers of the NYPD. Within the Brooklyn borough, police had arrested a total of 40 people for social-distancing violations. Of those a vast majority, 35 were African-American, four were Hispanic and only one was white. The violations carried potential fines of \$250–\$500 (NYC to fine people violating social distancing rules 2020). Evidence of disproportionate policing of ethnic minority groups in NYC is long standing and well documented (Levchak 2021). Existing racial disparities in NYC also underlie spatial differences in health, which as explained below, begin with differences in cases, hospitalisation rates and death counts.

10 Evidence of Pandemic Ethnic Disparities and Their Causes

In April 2020, the Brookings Institution published an analysis showing how black people in almost every US State were more likely to be infected with the virus than white people (Rashawn 2020). In mid-April 2020, the NYS Department of Health COVID-19 Data Tracker showed that in NYC, black people, who represent 22% of the population, accounted for 28% of the deaths. Hispanics, representing 29% of the population, accounted for 34% of the deaths (NYS Department of Health 2021). Age and population-adjusted black mortality was reportedly more than twice that for whites. Such disparities also have spatial attributes. Early studies conducting descriptive statistics on hospitalisation rates and deaths across NYC's five boroughs as of April 25 found the Bronx, which has the highest proportion of racial/ethnic minorities, the most people living in poverty and the lowest levels of educational attainment, had higher rates of hospitalisation and deaths related to COVID-19 than the other four boroughs (Wadhera et al. 2020). These findings echo previous research in NYC, which has found increasing inequality between wealthy and poor neighbourhoods in mortality from HIV/AIDS, diabetes, and liver disease between 1989 and 2001 (Karpati et al. 2006).

More recent studies have taken a granular approach to understanding health disparities by analysing the social distribution of COVID-19 testing and associated indicators of confirmed positive cases, deaths, and disease severity across NYC zip codes (Maroko et al. 2020; McPhearson et al. 2020). Results showed COVID-19 had a disproportionate impact on communities with lower incomes and a higher proportion of ethnic minority groups; the highest incidence was in the Bronx and Queens zip codes. Zip codes in the top quantiles of testing, confirmed cases, mortality, and severity all showed consistently higher social vulnerability as indicated by poverty, unemployment, disability, population under 17, language isolation, rent burden, and housing crowding (McPhearson et al. 2020). Another study suggests that legacies of

spatial segregation due to redlining—discriminatory practices where banks historically avoided investing based on neighbourhood demographics—correlated at a neighbourhood level with higher COVID-19 cases and deaths, suggesting that in historically neglected neighbourhoods, containing COVID-19 is more difficult (Choi and Unwin 2020).

Pre-existing comorbidities is a key risk indicator for COVID-19 pointing at higher mortality rates across communities of colour, although at the time of this study, research only looked at selected cohorts of patients in specific hospital systems across the city and not at city-wide scale (Ogedegbe et al. 2020). The linkages between occupational exposure and poverty are, however, already evident. Black and Hispanic populations are more likely to be exposed to the risk of transmission because they work outside their homes; 44% of NYC's independent contractors, who primarily work in low-paying industries, are part of ethnic minority groups. In NYC, 24% of frontline workers live at or below twice the poverty line. They also may suffer inequalities that do not allow them to adequately social distance (e.g., home crowding) (Yancy 2020). Ethnic minority groups may have unequal ability to afford insurance and so many black people testing positive may be uninsured and, therefore, avoid hospitalisation and contribute to undetected deaths at home (which may have influenced overall case rates and comorbidities). The larger share of people without insurance in NYC are immigrants, partly because they are also cut off from many other government services. However, since the pandemic, black people in NYC reported losing health insurance twice as often as white New Yorkers (CUNY Graduate School of Public Health and Health Policy 2020).

NYC lost 750,000 payroll and self-employed/independent contractors' jobs on average between February and December of 2020, the single worst job decline since the 1930s (Parrot 2021). Nearly two-thirds of jobs lost were held by workers paid less than \$40,000 annually, whereas only 10% of lost jobs occurred among those who earned \$100,000 or more annually (Parrot and Moe 2020). An estimated 68% of job losses were among workers of colour and Latinx workers were 21% more likely to have lost jobs than other workers. The disparity in job losses between white women and white men was also great (2 to 1) since many women stayed home to care for children not attending school or daycare (Parrot 2021).

11 Broader Consequences for Housing, Transport and Public Space

In this section we discuss the consequences of the pandemic for three key sectors which are important for the longer-term recovery of New Yorkers: housing conditions and ability to pay rent, transportation, and public space. We describe how certain housing characteristics made some ethnic groups more exposed than others by increasing chances of transmission. We also briefly discuss responses to the current

housing crisis when many people fall behind on rent and mortgage payments. Transportation, especially through public subway and bus services, is crucial for many low-income workers and essential workers to reach their jobs. We discuss how trips for some ethnic groups declined due to increased fear of virus transmission, and the measures set in place by the Metropolitan Transportation Authority (MTA) to keep the subway and bus services running for those who cannot work from home.

11.1 Consequences for Housing

Housing conditions determine many health outcomes. Three main dynamics of insecure housing appear to be exacerbating exposure to COVID-19 as well as being worsened by the current pandemic: forced evictions, crowding and the relationships between displacement, crowding and confirmed COVID-19 cases.

Research analysing cumulative rental displacement by zip code showed that the rate of confirmed COVID-19 cases in July 2020 was highly, significantly, and positively correlated with the 2017–2020 rate of housing evictions in NYC (Egan et al. 2020). Eviction is likely to increase COVID-19 infection rates because it contributes to overcrowded living environments, doubling up (Gray 2021), transiency, limited access to healthcare, and a decreased ability to comply with pandemic mitigation strategies, such as social distancing. It is also a driver of further health inequality as historic trends show eviction is more frequent in neighbourhoods where predominantly ethnic minorities live (Benfer et al. 2021). NYC zip codes with high rates of crowding are also positively correlated with confirmed COVID-19 cases (Egan et al. 2020).

11.2 Consequences for Transportation and Public Space

As the extent of the pandemic's effects in the city became glaringly clear, panic over coronavirus transmission in public transportation systems spread. Yet avoiding public transportation was not a choice for some social groups. By March 17 the MTA, the largest transportation system in North America, saw its ridership plummeting by 60% on subways and 49% on buses, compared with the previous year. Similarly, interurban transportation like Metro-North Railroad and the Long Island Rail-Road (LIRR), also run by the MTA, saw a 90% and 67% drop in ridership respectively against the previous year (Goldbaum 2020).

Currently, subway ridership is 82% down compared to the previous year and bus patronage is down 79% (NY Hudin Center, 2020). Due to the ensuing budget deficit of \$15.9 billion, the MTA is requesting \$12 billion in federal funds, among other measures. The human cost is also high: 4,000 MTA employees tested COVID positive and 136 employees, mostly subway and bus drivers, have died through job exposure. In early March 2020, the MTA barred their transit workers from wearing masks,

because they were afraid that it would cause panic in riders. This policy initially followed guidance from the WHO and CDC that healthy people did not need to wear masks. The high number of workers infected in the early days of the pandemic also put strain on the operations of the system, causing lengthy delays before stay-at-home orders were put in place, when ridership was still high. The MTA was sharply criticised by its employees for these high infection rates and loss of life amongst workers.

The decline in MTA ridership was uneven across the city. According to MTA commuting data (turnstile data repository) from 20 March 2020, ridership in some poorer areas of NYC, such as the Bronx, remained 20% higher than in the wealthier borough of Manhattan. This disparity between wealthier and poorer citizens is aligned with race and underlies the extreme and long-standing health disparities in NYC.

While trips on public transit decreased, there was an increase in private car ownership caused in large part by fears about contracting the virus on public transit, and the ability of white-collar workers to work from home or in locations outside the city. The Department of Motor Vehicles reported that in Manhattan, Brooklyn, Queens and the Bronx, vehicles registered between August and October 2020 increased by 37% compared with the same period in 2019 (the increase was only 6% in Staten Island, which already has significantly higher car ownership than another borough). Partly in response to these changing travel patterns, the mayor in June 2020 unveiled a plan for the rapid installation of 20 miles of new busways and bus lanes. While the MTA controls the operation of city buses, the city oversees the city streets, which are under the purview of the NYC Department of Transportation. However, the expedited rollout of the busways, which was initially scheduled for October 2020, is behind schedule, in part due to local opposition.

From 7 May 2020, subway service was reduced from 24 h, with the subway closing between 2 and 5 a.m., for the first time since 1904. These cuts to MTA service have had the greatest impact on essential workers and those in low-wage jobs. Subway and bus service were “in crisis” (with very slow bus speeds) even before the pandemic (New York City Department of Transportation 2019). The MTA’s pre-pandemic plans to put the subway system back into a state of good repair, such as replacing the antiquated signal system, are also delayed. Ridership is not expected to get back to pre-pandemic rates (90%) until at least 2024.

11.3 Long-Term Policies for Public Space Activities: Open Streets and Open Restaurants

The NYC Department of Transportation also sought to implement programmes that encourage active travel modes such as walking and cycling through the Open Streets initiative announced by de Blasio in May 2020 and rolled out in the subsequent months. Open Streets was in part a response to the increase in car travel created by the pandemic, as New Yorkers tried to avoid public transit. Others took to cycling,

with trips in July 2020 increasing to 80% above the July 2019 level. The increase was primarily driven by more women cyclists: women's biking numbers rose 147% compared to a 68% increase among men. Walking and cycling had to contend with increased car speeds, partly a result of less congested streets. Over February–August 2020, there was a 67% increase in the number of speeding tickets issued per day.

The initial Open Streets programme designated streets primarily for walking, exercise and cycling with a five mile per hour vehicle speed limit. The initial pilot programme consisted of just four open streets (1.6 miles) and lasted for just over a week. The primary critique of the pilot programme was the heavy presence of NYPD officers at the sites. The city subsequently committed to creating 67 miles of Open Streets plus temporary protected bike lanes, totalling roughly 100 miles of active travel infrastructure throughout the city.

The broader Open Streets programme has met with mixed success. While in some communities residents took it upon themselves to manage the barriers that limited through-traffic and signalled the presence of the corridors, in other neighbourhoods this responsibility fell to the NYPD who failed to perform the task consistently. One citizen's audit of Open Streets in Brooklyn concluded that the programme was "structurally racist", noting not only that there were more Open Streets designated in predominantly white neighbourhoods, but that 70% of streets in white neighbourhoods were installed properly compared with just 12% in predominantly non-white neighbourhoods (Aickin 2020).

The 12 March 2020 ban on events with more than 500 people required that restaurants reduce their capacity by 50%, and on 16 March Cuomo further limited restaurants, which had not already voluntarily opted to do so, to only serve customers via takeout and delivery. This restriction was not lifted until 4 May, when the third phase of New York's reopening plan began. On 28 May, as the weather began to warm and patrons collecting drinks and food increasingly started to gather outside restaurants, the NYC Council introduced legislation calling for the city's Department of Transportation (which has jurisdiction over the city's streets and sidewalks) to identify streets, sidewalks, and plazas that could be utilised for outdoor dining. On June 22 the mayor officially opened its Open Restaurants programme allowing outdoor dining to utilise sidewalks, parking spaces and backyards. The programme has significant implications for public space across the city. Immediately after the programme was announced, 6,800 establishments were authorised to serve food and drinks at outdoor tables. By September 2020, when a permanent version of the Open Streets programme was announced, more than 10,000 restaurants were participating, occupying 10,000-plus curbside parking spaces across the city.

Restrictions placed on NYC's restaurants due to the pandemic have had major implications for the city's cultural and economic life. In 2019, the restaurant industry employed 317,800 people, a large proportion of whom are immigrants (60% compared to 45% across all occupations). These workers were especially hard hit by the pandemic. Despite the city's rollout of the Open Streets programme, as of August 2020 employment in the restaurant industry was still only 55% of February 2020's pre-pandemic levels.

By the end of 2021, the NYC Planning Commission passed a city zoning amendment to develop and regulate a permanent outdoor dining programme. The amendment is under review by newly elected Mayor Adams (NYC Planning ZAP Search 2022). Similarly attempts are ongoing to pass legislation through the NYC Council to make Open Streets permanent. The bill contains attempts at increasing the equitable rollout of the programme by “provid[ing] resources to at least 20 open street sites in areas that would be otherwise underserved by the program” (The New York City Council 2020). However by October 2021, only 46% of the designated Open Streets were operational (2022).

12 Conclusions

During the course of the pandemic, de Blasio’s seven-year mayoral term came to an end and he was succeeded in January 2021 by Eric Adams. Similarly, Cuomo was replaced by Kathy Hochul as governor in August 2021, after Cuomo’s resignation. Overall, the brunt of governing pandemic responses in 2020 fell largely on de Blasio and Cuomo. The opening sections of this chapter described and illustrated city case rates and death counts, focusing on the immediate responses by city and state-level governing bodies. The initial poor coordination on mask wearing and social distancing and poor deployment of testing sites may have contributed to wider community transmission, with case rates being undercounted at the early stages of the pandemic. Disparities in impacts across social groups in the impact of the pandemic were likely accentuated by some poor decisions (e.g. banning subway train drivers from wearing masks) and lack of coordination across levels of governance. The impact of first, second and booster shot vaccinations—though not described here—along with stricter implementation of mask mandates and social distancing clearly resulted in lower death rates as the pandemic continued.

We also focused on the systemic interconnection between inequality across existing social groups in access to health services, including equipped hospitals and insurance, transportation, rent-stabilised housing, better paid and secure jobs and citizenship status. These inequalities were reflected in COVID-19 case rates and deaths. Such inequalities are spatially codified and have resulted in a disproportionately high loss of life among the disadvantaged, as well as greater wage losses among people of colour and lower income groups. We believe that a systematic and consistent assessment of the overall impact of such inequalities is important in pointing to more effective pandemic management programmes in the future. It is also desirable to find ways to buttress the financial resilience of the City to manage future pandemics, to protect the future health and wellbeing of NYC residents.

We also looked at the impacts of the pandemic on NYC’s housing, transport and employment status. We noted the detrimental impacts on public transit, and the need to make good the damage done to the transit system for the sake of social equity.

Lastly, we noted creative measures to make use of social distancing rules, describing the rollout of the public space programmes Open Streets and Open Restaurants. Efforts to embed these programmes in the city are ongoing.

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