



COVID-19 Leads to Dramatic Changes in the Food Retail Environment in New York City: May–July 2020

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Accepted: 12 June 2021 / Published online: 13 July 2021

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Abstract

A systematic assessment of the effect of COVID-19 on the food retail environment—an important determinant of health—has not been conducted. Our objective was to assess the impact of COVID-19 on closures of restaurants, food retail stores, and fresh produce vendors in New York City (NYC). We conducted a cross-sectional study following the peak of COVID-19 in six neighborhoods in NYC. Two Chinese ethnic neighborhoods and four higher/lower resourced comparison neighborhoods were selected a priori based on 14 sociodemographic indicators. The primary outcome was indefinite/temporary closures or absence of food businesses. Of 2720 food businesses identified, produce vendors and restaurants were more likely to close than food retail stores. A higher proportion of food businesses closed in Chinese ethnic neighborhoods vs. comparison neighborhoods. COVID-19 impacted food businesses in six NYC neighborhoods examined in this period, with the greatest effect observed for Chinese ethnic neighborhoods.

Keywords Food retail environment · Immigrant health · COVID-19 · New York City · Xenophobia · Chinese American · Asian American

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Background

COVID-19 has exposed deep disparities related to structural racism and income inequality, that give rise to inequitable food access and economic opportunity. One sector that has been particularly affected is the food service industry. On March 22, 2020, New York State (NYS) on Pause went into effect and shuttered all non-essential businesses statewide—including indoor dining at restaurants. Numerous media and reports point to the initial and ongoing struggle of restaurants and small businesses [1–4]. While also documenting an increased demand for groceries and the services of food retail stores [5]. Despite this, the cumulative effect of these factors on the food retail environment—an important determinant of health—has not been characterized.

Moreover, reports as early as January 2020 revealed the troubling effect that a new strain of coronavirus was having on businesses in Manhattan's Chinatown; tourism and business were down in part due to decreased visitors from China, but also purportedly due to fear of contracting the virus if one were to visit Chinatown [6, 7]. Community partners were also reporting concern about the survival of small businesses and the well-being of neighborhood residents.

To shed light on the economic impact faced by the NYC food retail environment during COVID-19 (including the potentially disproportionate impact faced by Chinese neighborhoods), we undertook an investigation to analyze closures of food retail stores, restaurants and produce vendors in six New York City (NYC) neighborhoods during the pandemic. We hypothesized that closures would differ across food business type, and further, given COVID-related xenophobia, that businesses in Chinese ethnic neighborhoods would be particularly affected.

Methods

The current study did not include human subjects research and was granted exemption from the New York University Grossman School of Medicine Institutional Review Board.

Neighborhood Selection

Data from this work is a part of the COVID Closures (CoClo) project, which was launched in April 2020 to understand the interrelated issues of food access, economic security and racism. The CoClo Project includes both quantitative and qualitative data collection and analysis, as well as simulation modeling to assess these impacts. Herein we describe results from the quantitative data collection activities. For this component we utilized administrative data and ground truthing to enumerate changes to the food retail environment in select NYC neighborhoods. We defined neighborhoods as neighborhood tabulation areas (NTAs). NTAs were developed by the NYC Department of City Planning, each of which has a minimum population of approximately 15,000 and were created using whole census tracts in order to align with other geographic projects such as the Public Use Microdata Areas (PUMAs) [8]. We opted to focus on these smaller geographic areas in order to make the data collection feasible within the timeframe and with available person power on our team. The neighborhood selection process was as follows: first the two most populous Chinese ethnic neighborhoods were selected: Manhattan Chinatown and Sunset Park in Brooklyn. To select comparison neighborhoods, we relied on data from the NYC Neighborhood Health Atlas which reports on numerous sociodemographic and health factors for 59 community districts in NYC. Community districts are larger geographic areas that encompass NTAs with similar but not precisely equivalent boundaries as NTA neighborhoods [9]. We examined all community districts in Manhattan and in Brooklyn on 14 different factors including food access (supermarket: bodega ratio), demographics (population, foreign-born, limited English proficiency), socioeconomic factors (poverty, unemployment, rent burden, uninsured), health behaviors (physical activity,

fruit & vegetable (FV) and sugary drink consumption) and chronic conditions (obesity, diabetes, hypertension). We then selected the higher and lower resourced comparison neighborhoods in Manhattan and Brooklyn. There were no universal best/worst neighborhoods on all characteristics; thus final selection was reached through group discussion and with longtime NYC residents. The higher/lower resourced neighborhoods selected were the Upper East Side (UES) and East Harlem in Manhattan; and Park Slope and Brownsville in Brooklyn. Select characteristics pulled from the NYC Department of Health and Mental Hygiene Community

Health Profiles are available in Supplemental Table S1.

Building Complete Lists of Food Retail Stores, Restaurants and Grocery Stores

CoClo methods are described elsewhere [10, 11]. In brief, food retail stores and restaurants for each of the six neighborhoods were ascertained by the most up-to-date NYS Agriculture and Markets Retail Stores list and by the NYC Health Department Restaurant Inspections database (last updated March 16, 2020). Existing locations of produce vendors were available for Chinatown [11, 12] and verified using Google Street View (last neighborhood update, June–October 2019). Locations of produce vendors were not available in other neighborhoods but were ascertained using Google Street View to conduct virtual walks down each street of each neighborhood [11]. Because NTA information was not available in either the NYS or NYC Health Department lists, ArcGIS was used to map out all the restaurants and food retail stores, and then identify which stores were within the boundaries of each of our six study neighborhoods.

Assessing pre-COVID ‘Open’ Status and During-COVID Closure Status

Working from this ‘universe’ of food retail stores, restaurants and produce vendors in each of the six neighborhoods, the following process was undertaken for each neighborhood: (1) verification that location was open pre-COVID (late 2019/early 2020); (2) Internet checks by two sources (e.g., business’ site, Google Maps/reviews, Yelp, etc.) of status; (3) call checks (in language—Mandarin Chinese, Spanish, as needed); and (4) in-person checks. For Step 1, there were a number of ways food businesses were verified as open pre-COVID. For example, the business might have received customer reviews on Yelp, or images were found that included calendar dates of the food retailer on Google Street View showing the business was open and active. In this step we attempted to find evidence of having been open as close to March 2020 as possible. For produce vendors, Google Street View images were used to identify

their presence on sidewalks; the last update of the Google Street View images in the six neighborhoods were from June to Oct 2019.

The next step was to assess the status of each food retail store or restaurant as being open or closed through a three-step verification process (Steps 2–4). First, multiple internet sources were checked to find evidence that indicated whether the food retailer was open or closed from May 2020 onwards. If the food retailer was open, data on any changes to the services of the vendor was collected (e.g., a restaurant was only offering delivery). If closed, information indicating if the food retailer was temporarily closed or indefinitely closed was sought. Various sources were used to find this information, including Google maps, delivery apps (e.g., Grubhub, Chowbus), and other social media; two different internet sources were required for this verification step. If the status of the food retailer could not be verified using online sources, the next step was to directly call the food retailer and inquiring in English, Mandarin, Cantonese or Spanish, as needed. After calling the phone number at least two times, if status could not be verified, an in-person check of the food retailer was conducted. During in-person checks, a shared Google Maps account was used to note the status of the business with detailed notes. For example, the business could be open; open but operating with limited service (e.g., a visibly limited selection of produce/products on display); closed with a paper sign with additional information (English, Chinese); closed without additional information; and closed down (e.g., restaurant was empty of chairs/tables). For produce vendors, since internet information or phone numbers for the vendors did not exist, in-person checks were used to indicate presence, absence, or any changes to services (e.g., evidence of scaling-down or limiting certain services). A variable was then created representing whether

the food outlet was open (opened/re-opened between June 1 and July 31), was temporarily closed (closed w/notice of re-opening schedule), or an indefinite closure (closed w/no info on re-opening). Duplicates, outlets closed in 2019, anomalous locations (e.g., wedding/sporting event venues) and outlets not found were excluded. Differences in COVID-related changes were tested using F-tests and post-hoc Bonferroni test for pairwise comparisons in STATA v.12.1.

Timeline

Key dates salient to the opening and closures of food retail stores, restaurants and produce vendors—including dates of social unrest—are depicted in Fig. 1. Data collection was conducted from May 1 to July 31, 2020. Data steps were conducted in sequence (e.g., internet checks for neighborhoods at one point in time vs. data collection steps for Chinatown, then UES). Reports from community partners that documented the openings and closures of grocery stores and restaurants were reviewed and administrative data were pulled in May 2020. During this time period was the murder of George Floyd, and as a result both peaceful protesting and looting and vandalism erupted in NYC. These events bear mentioning since the Manhattan Chinatown neighborhood was geographically centered where much of this activity was occurring in the downtown area—and may have also affected the closures observed. Data collection for Manhattan occurred from June 3rd to July 5th, and for Brooklyn from June 18th to July 31st during which time outdoor dining was introduced; indoor dining was postponed indefinitely, and NYC introduced Open Streets for dining including designated areas in Chinatown.

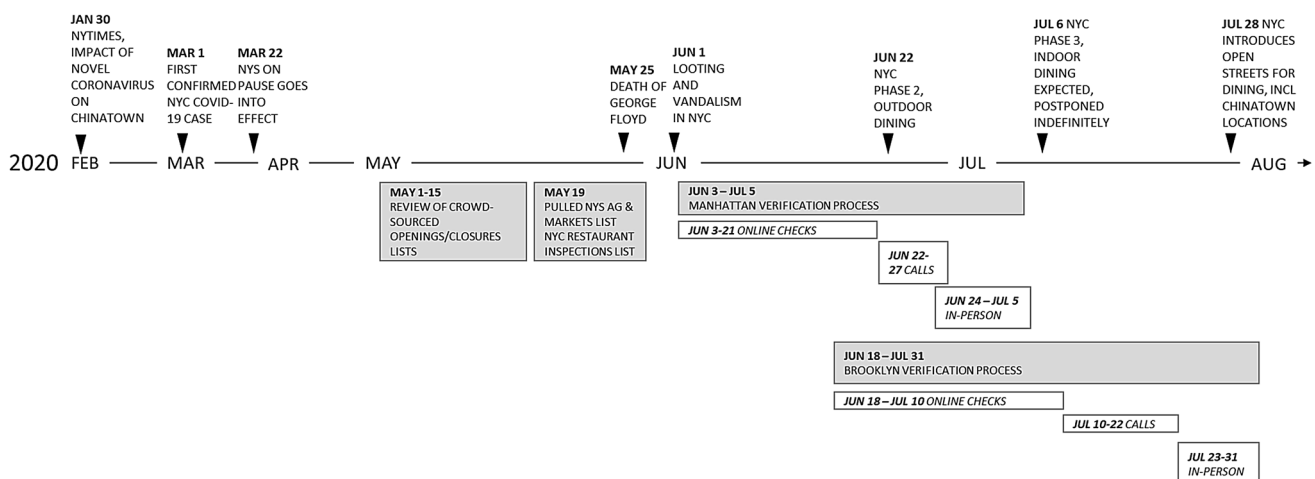


Fig. 1 Timeline of events and data collection, CoClo May–July 2020 displays the timeline of salient events pertaining to closures within the food retail environment in New York City prior to and concurrent with data collection

Results

The six selected neighborhoods differed on the examined food access and sociodemographic factors selected (Supplemental Table S1). The lower vs. higher resourced neighborhoods had higher estimates of poverty; unemployment; rent burden; lack of health insurance; sugary drink consumption; and obesity, diabetes and hypertension. The Chinese ethnic neighborhoods had the highest estimates having populations who were born outside the U.S.; were limited English proficient; had similar or higher estimates of poverty and rent burden vs. lower resourced neighborhoods; and were ‘midway’ between lower and higher resourced neighborhoods for unemployment, obesity, diabetes and hypertension. April 1, 2020—the first day for which neighborhood-level data on COVID-19 cases were available there were 4248.0 cases per 10,000 in Chinatown, 4341.3 cases per 10,000 in East Harlem, and 3142.9 cases per 10,000 in the UES, as well as 5666.7 cases per 10,000 in Sunset Park East, 5874.7 cases per 10,000 in Brownsville, and 4073.2 per 10,000 in Park Slope [13].

Of the 2720 food businesses identified (753 food retail stores, 1832 restaurants, 135 produce vendors), there were 874(32%) in Chinatown, 358(13%) in the UES, 232(9%) in East Harlem, 537(20%) in Sunset Park, 512(19%) in Park Slope, and 207(8%) in Brownsville. The composition of food businesses was different across the six neighborhoods (Figure S1). Produce vendors were the most likely food business type to close; followed by restaurants and grocery stores (Figs. 2; Supplemental Table S2). For example, during our observation period, in Chinatown, 52% of produce vendors, 26% of restaurants and 12% of food retail stores were closed, with similar patterns observed across the other five neighborhoods.

A higher proportion of food businesses closed in Chinatown during the observation period vs. East Harlem (27% vs. 9%, $p < 0.01$; Fig. 3). Similarly, a higher proportion of food businesses closed in Sunset Park as a result of COVID-19 vs. Brownsville (16% vs. 6%, $p = 0.01$) and Park Slope (16% vs. 10%, $p = 0.05$). The proportion of food businesses closed was the highest in Chinatown compared to all other neighborhoods, excluding the UES ($p < 0.01$ for all vs. Brooklyn neighborhoods; two Manhattan neighborhoods differences listed above). Lastly the greatest number of food businesses

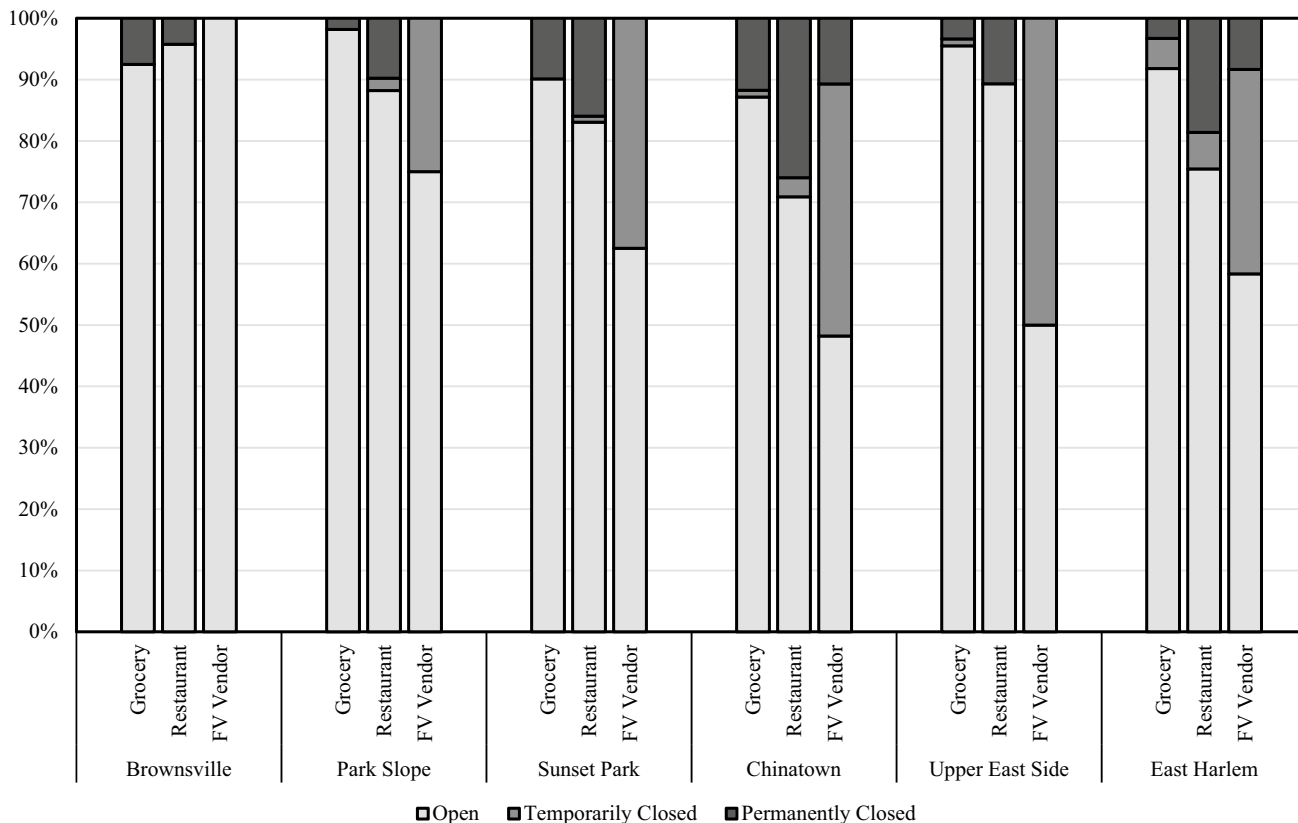


Fig. 2 Percentage of closures in restaurants, food retail stores and fresh produce vendors, CoClo May–July 2020. Displays the of **a** restaurants; **b** food retail stores; and **c** fresh produce vendors were that open, temporarily closed or indefinitely closed during this time

period. For fresh produce vendors, the categories were present, limited service, or absent. Actual values available in Supplemental Table S2.

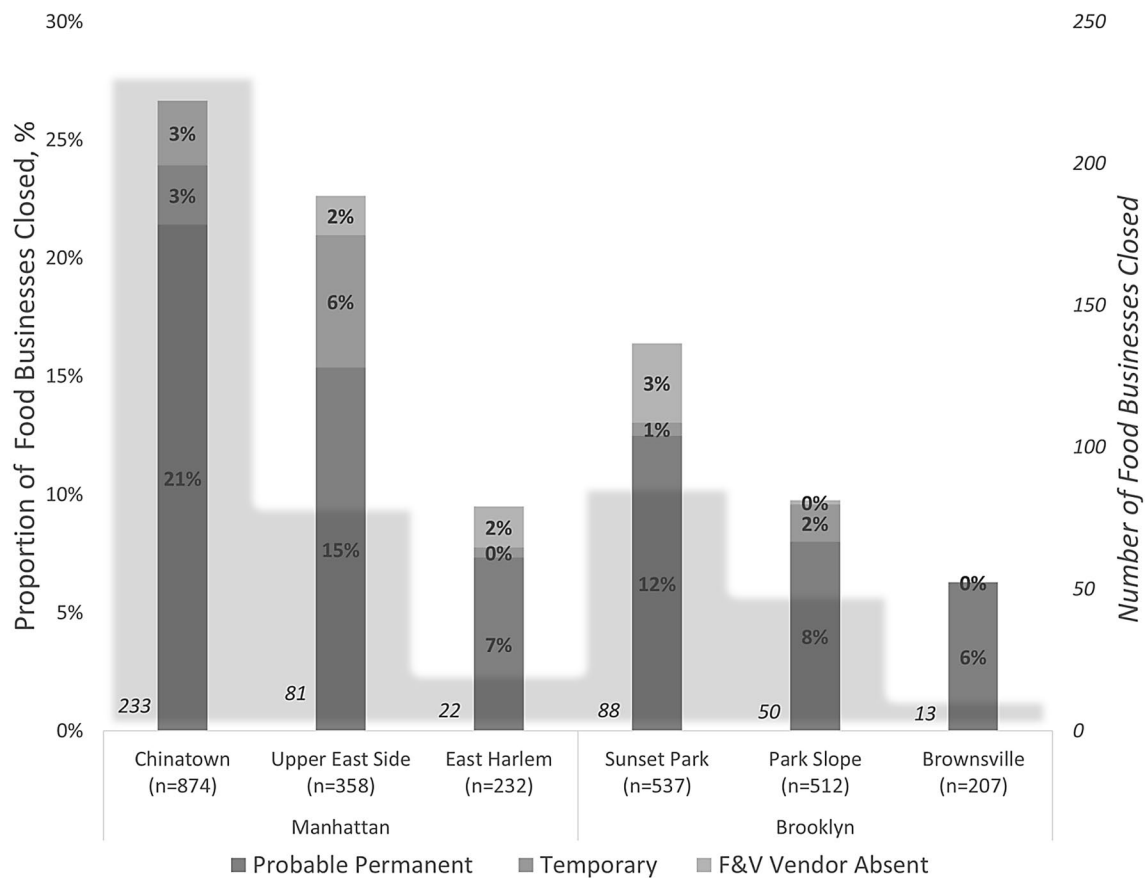


Fig. 3 Proportion and number of closures in NYC food businesses, CoCo May–July 2020. Displays the proportion of food businesses overall (restaurants, grocery stores, fruit and vegetable vendors) that

were closed or absent during this time period. On the tertiary axis, the # of affected businesses are displayed

closed in Chinatown ($n = 233$) as a result of COVID-19 compared to the other five neighborhoods. A higher proportion of restaurants, food retail stores and produce vendors either closed or were absent in the Chinese ethnic neighborhoods vs. comparison neighborhoods in both Manhattan and Brooklyn (Fig. 2).

Discussion

To the authors' knowledge, this is the first investigation of the impact of COVID-19 on the food retail environment. During the observation period, COVID-19 had a large effect on businesses in the six NYC neighborhoods examined, with the greatest effect being observed for Chinese ethnic neighborhoods. Although the burden of COVID-19 in Chinatown is similar to that of the UES, there were more closures in Chinatown. These results reflect the impact of multiple effects on Chinatown including reduced tourism, COVID-19 stigma and discrimination, reduced business lunch/foot traffic, and potential fear on the part of small business owners as

a result of nearby protests that sometimes erupted in vandalism and violence [6, 7, 14, 15]. It is important to underscore the temporal nature of these results; we feel they are reflective of what was happening at this point in time.

Manhattan's Chinatown, one of the oldest and most populous Chinatowns in the country, has long been a food and tourist destination. Moreover, Chinatown serves as an important hub and source of cultural food items and produce not only for its own neighborhood residents, but for many immigrant groups within NYC and more broadly up and down the Northeast Corridor for food retail stores and restaurants. COVID-19 therefore may have farther reaching effects on food systems across the U.S. that rely on the Chinatown infrastructure to survive [16]. A report released concurrently with the timing of the CoClo data collection efforts highlights the disproportionate representation of Asian Americans in the food service industry and the economic hardship that they are newly facing [17], indicating both deep structural and individual-level implications of this work. Moreover, in more recent months—the longer term impacts are beginning to materialize, with the highest

unemployment rates being observed in the Asian American community, and a slower economic recovery of Asian American owned small businesses [18, 19].

A key strength of this study is the multi-tiered open verification approach to assess vendor status. Key limitations include, first, data were collected at a discrete point in time. Due to logistical limitations (e.g. call and in-person checks), a 5-week cross-sectional timeframe was used to assess vendor status; some that were closed at the start of that timeframe may have re-opened by the end. However, at the time of the study, given the indefinite delay of reopening for indoor dining in NYS [20] many small businesses were reportedly closing anyway [21]. This may be particularly true for densely populated neighborhoods like Chinatown that have fewer opportunities to allow for outdoor dining. In currently ongoing research we are conducting a second timepoint of data collection, particularly given the broader introduction of Open Streets for outdoor dining in NYC and in Chinatown specifically; the election and continued anti-China rhetoric from President Trump; and the potential second wave of COVID-19 in NYC. Second, although the administrative datasets used to identify the restaurant and food retail store were comprehensive, some vendors may have been missed in the assessment; however it is unlikely that any missingness is differential or related to neighborhood. Moreover, analysis was also limited by the number of food vendors that existed in each neighborhood, and as a result there were some significant disparities between neighborhoods (e.g., Park Slope had nearly eight times as many grocery stores as Upper East Side). Additionally, we conducted bivariate analyses and did not adjust for any significant differences in neighborhood characteristics. We acknowledge that there were differences in baseline sociodemographic characteristics of the neighborhood, as well as food retail composition. However, the purpose of this paper was to describe the preliminary findings from the study, future analyses of CoClo data should explore differences in closures after accounting for baseline differences in neighborhood characteristics. Lastly, we did not have information on a typical ‘endemic’ rate of closures that are typical within any given calendar year.

Construction of the CoClo dataset highlights innovative data methods that may be replicated by others looking to understand the impact of COVID-19 on the local food retail environment. The majority of this data collection was conducted virtually, maintaining social distancing and shelter in place orders. Our results have implications for food access, food systems and economic opportunity not just for, but primarily for Asian American communities.

Our results paired with emerging work support early evidence of the far-reaching and deeply embedded ways xenophobia is affecting the Asian American community if these proportions of closures are indeed permanent. While

we are unable to parse out the differential impacts of being a tourist destination vs. a business center vs. xenophobia on the effects observed in Manhattan Chinatown, a few pieces of evidence point towards xenophobia being at least some part of the explanation for these results. First, as of April 1, 2020—the first day for which neighborhood-level data on COVID-19 cases were available—there were 4248.0 cases per 10,000 in Chinatown, 4341.3 cases per 10,000 in East Harlem, and 3142.9 cases per 10,000 in the UES, as well as 5666.7 cases per 10,000 in Sunset Park East, 5874.7 cases per 10,000 in Brownsville, and 4073.2 per 10,000 in Park Slope [13]. In other words, the case counts were actually lower in the Chinese ethnic neighborhoods vs. the comparison neighborhoods. Second, Sunset Park is not a tourist destination nor proximal to a business center, yet closures were disproportionately observed there compared to comparison neighborhoods in Brooklyn. Third, Asian American owned businesses actually recovered faster than other group owned businesses following the Great Recession [22]. Similar patterns may not hold true with the COVID-19 pandemic though it remains to be seen in the longer term [19, 23]. Lastly, the impact on Chinatowns across the nation and globally has also emerged [24–27]. Indeed, despite the fact that the source of COVID-19 for NYC was not from China but from Europe [28], xenophobia and fears of ‘yellow peril’ may persist long after the pandemic has passed [29, 30].

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s10903-021-01230-7>.

Acknowledgements We’d like to extend our warmest gratitude to Samuel H. Kaplan and Kaye Stevenson – our two enthusiastic high school interns – for their invaluable assistance and insights contributing to this project. We also thank Dr. Joel Gittelsohn for his helpful input on the manuscript draft.

Funding This publication is supported by grant numbers U54MD000538 from the National Institutes of Health (NIH) National Institute on Minority Health and Health Disparities, and R01HL141427 from the National Heart, Lung and Blood Institute. The contents of this publication are solely the responsibility of the authors and do not necessarily represent the official views of the NIH.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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