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Disparities in the distribution of COVID-19 testing sites in black and Latino areas in new York City

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A B S T R A C T
In New York City (NYC), there are disproportionately more cases and deaths from COVID-19 for Blacks and Latinos compared to Whites. Using data from the NYC coronavirus data repository and the 2018 American Community Survey 5-year census estimates, we examined the distribution of testing sites across NYC areas (zip code tabulation areas) by race in May 2020. ArcGIS was used to create majority race zip code-level maps showing the distribution of testing sites on May 1, 2020 and May 17, 2020 in NYC. \( t \)-tests were used to determine whether significant differences existed in the number of testing sites by the majority race of zip codes. Between May 1, 2020 and May 17, 2020, testing sites in majority Black areas increased by more than 240% from nine to 31, and more than 90% from 16 to 31 in majority Latino areas. Black (\( M = 1257.7 \)) and Latino (\( M = 1662.3 \)) areas had significantly more COVID-19 cases (\( p < 0.05 \)) compared to White areas. Nonetheless, White (\( n = 70; 38.9\% \)) areas had most of the 180 testing sites on May 17, 2020, compared to Black (\( n = 31; 17.2\% \)) and Latino (\( n = 31; 17.2\% \)) areas. Due to the socio-economic and underlying health conditions that may place Blacks and Latinos at high risk for COVID-19, it is imperative that access to testing is improved for vulnerable groups.

1. Introduction
The novel severe acute respiratory coronavirus 2 (SARS-Cov-2) has infected more than 1.5 million Americans as of May 23, 2020, leading to approximately 95,000 deaths due to COVID-19, the disease caused by the virus.(Gorbunova et al., 2020; Johns Hopkins Coronavirus Resource Center, 2020) New York City (NYC), initially considered the epicenter of COVID-19 in the US, has been hit especially hard by the virus. As of May 21, 2020, 192,840 cases of COVID-19 have been identified in NYC, along with 16,233 confirmed deaths.(Health, 2020) Non-Hispanic Black (Black) and Latino New Yorkers, however, have experienced the greatest burden of COVID-19. Recent estimates indicate 1470 cases of COVID-19 per 100,000 Blacks, 1307 cases per 100,000 Latinos, compared to 934 cases per 100,000 non-Hispanic Whites (White) in NYC.(Health, 2020) Moreover, Black (208 per 100,000) and Latino (217 per 100,000) New Yorkers are dying at much higher rates of COVID-19 compared to White New Yorkers (104 per 100,000).(Health, 2020) Anecdotal evidence highlights racial and ethnic disparities in access to testing that is critical for identifying cases and preventing the spread of COVID-19 among these groups.(Farmer, 2020) However, no studies at the time that this research was performed had explored the distribution of testing sites within predominately Black and Latino areas in NYC. Moreover, few studies have accounted for the potential impact of the introduction of the Paycheck Protection Program and Health Care Enhancement Act (PPP) on the availability of testing options.(Probasaco, 2020) The PPP was signed on April 24, 2020 to provide $25 billion for increased COVID-19 testing across the US.(Probasaco, 2020) Visualizing the distribution of testing sites is critical for determining how to target efforts addressing testing access for vulnerable COVID-19 populations such as Blacks and Latinos. We hypothesize that compared to White areas, Black and Latino areas will have fewer COVID-19 testing sites, despite having a higher percentage of positive tests.

2. Materials and methods
Four primary data sources were used to complete this analysis. The

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addresses for testing sites were identified from the New York state government testing website which is run in collaboration with Castlight Health, a health navigation company. (New York State: Find a Test site near you, 2020) Castlight Health was selected as the source for NYC testing sites due to standardized data collection methods (e.g., consistent definition of what constitutes a testing site across New York, and uniform verification procedures for identifying testing sites). In addition, it is the sole resource provided by the New York state government for locating testing sites. (New York State: Find a Test site near you, 2020)

We analyze 2020 data on two dates: May 1 to reflect the introduction of the PPP in April 2020 and May 17, which reflects the most recent data at the time of writing. (New York State: Find a Test site near you, 2020) We analyze 2020 data on two dates: May 1 to reflect the introduction of the PPP in April 2020 and May 17, which reflects the most recent data at the time of writing. (New York State: Find a Test site near you, 2020) We analyze 2020 data on two dates: May 1 to reflect the introduction of the PPP in April 2020 and May 17, which reflects the most recent data at the time of writing. (New York State: Find a Test site near you, 2020)

Testing sites were geocoded across 177 zip code tabulation areas (zip codes hereafter) in NYC as the smallest unit of analysis with publicly available COVID-19 data. We then extracted demographic data from the 2018 American Community Survey 5-year estimates collected by the Census to determine the concentration of Blacks and Latinos across those zip codes. (Tiger/Line with Selected Demographic and Economic Data, 2020) Specifically, we designated areas as majority White, Black, or Latino, if 50% or more of the residents were identified as belonging to at least one group. In addition, if there was no plurality group, we indicated these areas as “no majority.” We also further segmented the “no majority” areas into majority White-Asian, White-Black, White-Hispanic, Black-Asian, Black-Hispanic and Asian-Hispanic if the combination of the two racial and ethnic groups accounted for 50% or more of the residents in a zip code.

Lastly, to map COVID-19 cases by zip code, we calculated the percentage of residents that tested positive using the NYC COVID-19 city-wide data portal, which is updated on a daily basis. (Health, 2020)

We used ArcGIS version 10.8.1 (ESRI)(ArcGIS Desktop, 2019) to
create 1) majority race zip code-level maps showing the distribution of testing sites on May 1, 2020 and May 17, 2020 in NYC and 2) majority race zip code-level maps showing the percentage of residents identified as having COVID-19 based on the cumulative number of individuals tested on May 1, 2020 and May 17, 2020. Independent samples t-tests were used to determine whether significant differences existed in the number of testing sites by the majority race of zip codes.

3. Results

Despite increased reports of higher numbers of cases and deaths among Blacks and Latinos due to COVID-19, (Yancy, 2020) clear disparities exist in the distribution of COVID-19 testing sites in NYC. On May 1, 2020 there were a total of 126 testing sites across NYC with 63 (50%) in majority White zip codes, compared to 9 (7.1%) in majority Black zip codes, and 16 (12.7%) in majority Latino zip codes (Fig. 1). This represented 2.5 sites per 100,000 White residents, 0.6 sites per 100,000 Blacks, and 16 (12.7%) in majority Latino zip codes (Fig. 1). There were no significant differences found in the average number of testing sites across zip codes categorized by majority race. The number of testing sites increased to 2.2 per 100,000 Blacks, and to 2.1 per 100,000 Latinos on May 17. The percentage of residents testing positive relative to the number of tests administered also decreased to 38% from 9 to 31, and more than 90% from 16 to 31 in Latino areas were found to have positive tests for COVID-19 (Fig. 1). The differences in testing sites and the number of positive tests by majority race of areas were found to be statistically significant (Table 1).

By May 17, 2020, testing sites in Black areas increased more than 240% from 9 to 31, and more than 90% from 16 to 31 in Latino areas (Fig. 1). There were no significant differences found in the average number of test sites across zip codes categorized by majority race. The number of testing sites increased to 2.2 per 100,000 Blacks, and to 2.1 per 100,000 Latinos on May 17. The percentage of residents testing positive relative to the number of tests administered also decreased to 38 per 100,000 Blacks, and 39.2 per 100,000 for Latinos (Table 1). Nonetheless, more testing sites (70 (39.9%) of the 180 sites) in NYC were located in predominately White areas (Table 1) compared to any other subgroup. Moreover, the number of test sites (2.8 per 100,000 residents) was highest in White areas and the test positivity rate (27.1%) was more than 10% lower than the test positivity rates in Black (38%) and Latino (39.2%) areas.

When we examined geographic units like combinations of two racial and ethnic groups, we found the greatest disparity for the distribution of testing sites with combinations including Black race (Fig. 1). Majority Black-Asian (n = 0), Black-Hispanic (n = 9), and White-Black (n = 4) areas had far fewer testing sites on May 17, 2020, compared to White-Asian (n = 12), White-Hispanic (n = 9) and Asian-Hispanic areas (n = 12) (Fig. 1).

4. Discussion

In this paper, we mapped the distribution of testing sites in NYC in majority Black, White, and Hispanic areas. Initially, we found a significant disparity in the availability of testing sites for Black and Hispanic neighborhoods compared to White areas (Table 1). This disparity is consistent with the literature showing the marginalization of majority Black areas due to economic disenfranchisement and limited health-promoting attributes. (Poteat et al., 2020; Williams and Collins, 2001) Notably, efforts to increase testing availability between May 1, 2020 and May 17, 2020 (after the passage of the PPP) to decrease the disparity in the placement of testing sites seem to have made an impact. We did not find significant differences in the availability of testing sites between White and Black or Hispanic areas on May 17, 2020 (Table 1). New York City and state government should continue to make efforts to target and increase the placement of COVID-19 testing sites in Black and Latino areas, since this is likely to mitigate COVID-19 fatalities among these vulnerable groups.

5. Conclusions

Our study represents one of the first studies to map the geographic distribution of COVID-19 testing sites for predominately Black and Latino areas in NYC. While this analysis could not be performed at a smaller geographic unit (such as a census tract) due to the lack of COVID-19 data at smaller units of geography, our study is one of the first to map the distribution of COVID-19 testing sites by race in NYC. However, there is some limited generalizability of our findings, due to both the unique size and racial/ethnic make-up of a large city such as NYC. As more testing sites are being continually added, this research suggests further monitoring and exploration of race, testing access, and COVID-19 issues in NYC, and comparable cities impacted by the pandemic.

Credit author statement

DGT, AJ and JCS conceived the study. DGT was responsible for project administration, including overseeing the data analysis and data curation for the paper, as well as writing the original draft of the paper. JCS was responsible for data analysis. All authors reviewed, commented and edited later drafts of the paper, and approved the final version.

CRediT authorship contribution statement

**Professor Grigsby-Toussaint:** Conceptualization, data curation, methodology, analysis, project administration and writing, review and
Professor Antwan Jones: Conceptualization, methodology, writing, review and editing. Dr. Jong Cheol Shin: Conceptualization, methodology, analysis, writing, review, and editing.

Declaration of competing interest

None.

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