Descriptive analysis of social determinant factors in urban communities affected by COVID-19

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ABSTRACT

Objectives To provide a descriptive analysis of communities severely impacted by COVID-19 to that of communities moderately affected by COVID-19, with an emphasis on the social determinant factors within them.

Methods To compare the communities with extremely high COVID-19 rates to that of communities with moderate COVID-19 cases, we selected six community districts in Queens, New York using public data from New York City Health Department that provides the percentage of positive COVID-19 cases by zip codes from March 1st, 2020 to April 17th, 2020.

Results The results of the study showed that COVID-19 cases were 30% greater in communities with extremely high cases than in communities with moderate cases. There were also the several outstanding social determinants commonalities that were found in communities with extremely high COVID-19 cases. These include severe overcrowding, lower educational status, less access to healthcare, and more chronic diseases.

Conclusion This study adds to existing literature on vulnerable urban communities affected by COVID-19. Future studies should focus on the underlying factors in each social determinant discussed in this study to better understand its association with the spread of COVID-19.

Keywords COVID-19, descriptive analysis, social determinants, health disparities, severely affected communities

Introduction

Prior emerging infectious diseases, like severe acute respiratory syndrome (SARS) and the Ebola virus, have taught us that urban communities are a catalyst for the rapid transmission of novel infectious diseases. The built environment (the design of urban living space), housing congestion and densely populated communities marginalize people to live in remarkably close quarters, which often exacerbates the spread of diseases in urban centers during an outbreak. When this occurs, underprivileged (such a low-income) and vulnerable populations (such as minorities) are disproportionately affected, contributing to heightened prevalence in morbidity and mortality among these groups.

In the current COVID-19 pandemic, New York City (NYC) has the largest number of COVID-19 cases worldwide. Recent data from the New York City Department of Health and Mental Hygiene (NYCDOHMH) shows higher rates of COVID-19 deaths among Latinos and Blacks in comparison to Whites and Asians who reside in the City’s five boroughs. Data from NYCDOHMH indicates that a significant proportion of patients had an underlying medical condition (such as diabetes, heart diseases, hypertension and asthma). This finding is consistent with prior research on SARS coronavirus indicating that underlying medical conditions led to severe disease progression or death among persons infected with coronavirus. Even though 76% of Queens’ residents self-report their physical and mental health to be ‘very good’ or ‘excellent’, and only 14% reported to be smokers, underlying medical chronic conditions continue to be an issue in the borough. Some of these parallel the underlying health conditions to have caused severe COVID-19 disease and death. While these diseases are important due to their association with increased risk of death from COVID-19, they alone cannot explain the disproportionately higher levels of infections and deaths currently observed in certain neighborhoods in Queens. The purpose of this study is to provide a descriptive analysis...
of communities severely impacted by COVID-19 to that of communities less affected by COVID-19, with an emphasis on the social determinant factors within them.

**Methods**

This study is a descriptive analysis of three community districts with an extremely high incidence of coronavirus (COVID-19) in comparison with three community districts with the moderate incidence of COVID-19 in Queens, New York. To compare the communities with extremely high COVID-19 rates to that of communities with moderate COVID-19 cases, we selected six community districts in Queens, New York, using public data from NYCDOHMH that provides the percentage of positive COVID-19 cases by zipcodes from 1 March 2020 to 17 April 2020. Communities with extremely high incidence were collapsed and averaged into one group (called Group A-Extremely High Cases). Likewise, communities with moderate incidence were collapsed and averaged into another group (Group B-Moderate Cases). We then matched the communities in Group A and B to the New York City Health Department’s Queens Community Health Profiles (of similar population size) to examine their health and social determinants status.

The extremely high percentage of COVID-19 cases in communities includes Elmhurst-Corona, Jamaica and Far Rockaway. Moderate percentage of COVID-19 cases in communities includes Astoria, Flushing and Forest Hills. Variables that were examined include demographic data specifically age, race, education, foreign-born and limited English language proficiency, a social determinant factors such as access to healthcare, avoidable hospitalizations and chronic diseases—diabetes, hypertension and obesity. Another social determinant factor we studied was severe overcrowding using data from New York University’s Furman Center, a center that researches on housing, neighborhoods and urban policy. The Furman Center provides data based on community districts similar to that of NYCDOHMH. All data for this research was retrieved on 17 April 2020.

**Results**

According to NYCDOHMH, Queens, NY, has the highest number of COVID-19 cases compared to any other NYC boroughs. However, it is third in rank in the rate of infections at 1701 per 100 000. Staten Island ranks first at 2115 per 100 000. The percentage of COVID-19 rates in communities with extremely high incidence includes Elmhurst, Jamaica and Far Rockaway. Conversely, the percentage of COVID-19 rates in communities with moderate incidence includes Astoria, Flushing and Forest Hills (even though each community shares similar population size with Elmhurst, Jamaica and Far Rockaway, respectively).

Table 1 shows the percentages of demographics and social determinant factors that were averaged and compared between the two groups. You will notice that the population between Groups A and B is similar in size. However, COVID-19 cases show to be 30% greater in Group A-Extremely High Cases than in Group B-Moderate Cases. Similarly, Group A shows to be significantly overcrowded than Group B, almost twice the average percentage. Blacks represent the largest of all racial groups in Group A followed by Latinos. Conversely, Whites represent the largest of all racial groups in Group B followed by Asians in moderately affected communities. With respect to educational status, Group A represents a more significant percentage of persons with less than a high school diploma, almost 40% more.

Increased rates of health disparities are another social determinant factor found in severely affected communities. The representation of uninsured in Group A is almost 40% greater to that of the percentage in Group B. Avoidable hospitalizations (hospitalization that could have been avoided with access to primary care) reflects a 30% greater average in Group A than Group B. The percentage of chronic diseases is also overrepresented in Group A than Group B. Diabetes is almost double the percentage, 15% versus 8%. Obesity is found to be 35% greater in Group A than Group B. Lastly, hypertension is shown to be 25% higher in Group A than Group B.

**Discussion**

The aim of this study was to provide a descriptive analysis of communities severely impacted by COVID-19 to communities less affected by the disease, with emphasis on the social determinant factors within them. Our results show that overcrowding, chronic diseases, limited access to healthcare and poor education were prevalent in communities with severely high rates of COVID-19. As noted above, overcrowding in severely affected communities was almost double the percentage in comparison to moderately affected communities. This is consistent with prior studies that highlight population density and overcrowding in urban areas as a breeding ground for the rapid spread of infectious diseases. Moreover, the communities affected with COVID-19 such as Corona, Queens, NY, already have a prior history of infectious disease burden, tuberculosis (TB) due to overcrowding. Overcrowding can occur due to multigenerational families living in the same household or the inability to afford rent whereby more than one family share a confined space. Gentrification may
also play a role as well in that as more middle-income residents move into affordable neighborhoods, low-income families are pushed further away into more densely packed congested communities.

Lack of access to healthcare services emerged as another strong factor between severely high-affected COVID-19 communities and moderately affected COVID-19 communities. Access was defined as not having health insurance which averaged over 50% greater in severely high-affected COVID-19 communities. Lack of health insurance may explain the overrepresentation of avoidable hospitalization in severely affected communities as it is a barrier to primary healthcare. High percentages of lower education (less than a high school degree) and poverty were also observed in severely affected communities reiterating that high rates of infectious diseases occur in poor and vulnerable communities as indicated in previous studies.6, 13, 14

The interconnectedness of communities with limited access to healthcare, poverty and low education is likely to have a ripple effect on manageable chronic diseases like diabetes, obesity and hypertension. For instance, the Gaskin et al.5 study demonstrated that persons living in densely impoverished communities increased their odds of developing diabetes. According to our analysis, rate percentages of these chronic conditions were greater in communities severely affected by COVID-19 than other communities.

Table 1 Average of extremely high incidence communities compared to moderate incidence communities

| Demographic characteristics | Group A-extremely high cases | Group B-moderate cases |
|-----------------------------|------------------------------|------------------------|
| Population                  | n = 178,469                  | n = 178,196            |
| COVID cases                 | 65%                          | 46.00%                 |
| Housing                     |                              |                        |
| Severe crowding rate (% of renter households) | 7%                          | 4%                     |
| Race                        |                              |                        |
| Asian                       | 17%                          | 28%                    |
| Black                       | 37%                          | 5%                     |
| Latino                      | 30%                          | 18%                    |
| White                       | 14%                          | 47%                    |
| Other                       | 2%                           | 2%                     |
| Age                         |                              |                        |
| 0–17                        | 23%                          | 17%                    |
| 18–24                       | 9%                           | 8%                     |
| 25–44                       | 28%                          | 31%                    |
| 45–64                       | 26%                          | 27%                    |
| 65+                         | 13%                          | 17%                    |
| Foreign-born                 |                              |                        |
| Born outside                | 44%                          | 44%                    |
| Language                    |                              |                        |
| English prof                | 26%                          | 29%                    |
| Education                   |                              |                        |
| Less HS                     | 24%                          | 15%                    |
| HS and some college         | 45%                          | 38%                    |
| College degree              | 31%                          | 47%                    |
| Access to healthcare        |                              |                        |
| Uninsured                   | 16%                          | 10%                    |
| Avoidable hosp              | n = 1280                     | n = 890                |
| Chronic diseases            |                              |                        |
| Obesity                     | 28%                          | 19%                    |
| Diabetes                    | 15%                          | 8%                     |
| Hypertension                | 33%                          | 25%                    |

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suggesting that they may be more susceptible to the disease. Furthermore, a significant proportion of deaths caused by COVID-19 were due to patients having an underlying medical conditions such as those listed above. Understanding more of the underlying factors that leads to these chronic conditions may be helpful in preventing the severe rates of COVID-19 in the severely affected communities.

Another result of our analysis is the racial disparities affecting severely affected COVID-19 communities. The high percentage of Blacks and Latinos severely affected by COVID-19 is synonymous with the high percentages of chronic disease conditions, low education and overcrowding. For instance, Blacks only represent 18% \(^{12}\) of the racial demographic in Queens but represent 37% of COVID-19 cases in extremely high COVID-19 affected communities. Given these factors, people of color may be at greater risk for COVID-19 and/or death from the disease.

**Conclusion**

In conclusion, this study adds to existing literature on COVID-19 affecting vulnerable communities. In as much as these communities face poverty, lack of access to healthcare and are densely populated, there needs to be more focus on the underlying factors that puts them at risk beyond these findings. More emphasis should be placed on their social distancing behaviors and assessing their needs for basic resources such as food, medication, personal protective equipment and other essential supplies needed to socially distance during a pandemic.

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