The Correlation Between COVID-19 and Homelessness in Toronto in 2020

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COVID-19 is a novel problem in society that has gained the world's attention in 2020. As a pandemic of this scale hasn't been experienced since the 1920s, understanding the effects COVID-19 has had on society has been difficult. Our project aimed to analyze specific impacts of the pandemic in Toronto, including how COVID-19 affected different groups, and how homelessness was affected by the pandemic through analyzing homeless shelter occupancy. City-wide, COVID-19 has disproportionately affected older populations and lower-income areas, as well as dramatically decreasing homeless shelter occupancy.

COVID-19 in Toronto

The correlation between COIVD-19 and different age groups/income levels is quite strong.

Analyzing COVID-19 in different regions in Toronto, we were provided with the top 5 hotspot neighborhoods in the city:

M9V | Thistletown-Beaumond Heights – 3432 cases

M3N | Glenfield-Jane Heights – 2398 cases

M1B | Malvern – 2375 cases

M9W | West Humber-Clairville – 1709 cases

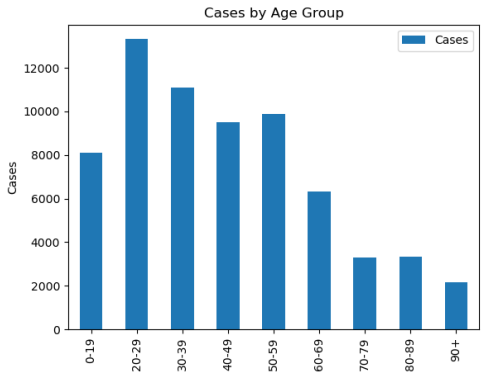
M6M | Mount Dennis – 1655 cases

The data on its own is not informative until you look at it through the income rates of these neighborhoods. We found that each of these neighborhoods has income levels classified as "Very Low" or "Low" by the United Way[1] (Very Low: 37%-67% of average, Low: 60%-80% of average).

Analyzing COVID-19 and its effects on different age groups, we realized that there are many ways to represent this data that can be misleading and deceptive. We found 3 reasonable approaches to analyzing this:

Cases by Age Group

Understanding COVID rates in this way offers the answer that the younger population in Toronto is being affected the most by COVID-19.

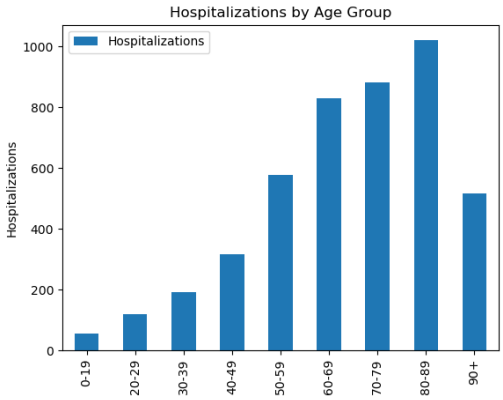


As can be seen here, the age group 20-29 has the largest share of COVID-19 cases, dramatically more than those we would consider elderly (70 – 90+). Despite this, the news often reports that these elderly age ranges are the ones being affected by COVID-19 the most.

This graph's results, while seeming very conclusive, are inherently misleading. The graph does not take into consideration how severe the covid cases are, as many may be asymptomatic, especially in these younger age ranges. Additionally, the younger age ranges include far more people, so the per capita case rate could be vastly different than what we see here. To fix these issues, we tried a few more metrics.

Hospitalizations by Age Group

Using hospitalizations rather than total cases gives us insight into how severe COVID-19 has been on different age groups, providing vastly different data than seen before.

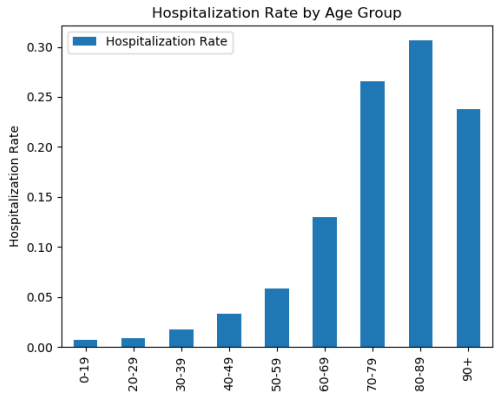


Whereas the previous data suggested that those aged 20-29 were affected the most, this new metric suggests that those aged 80-89 are instead being affected the most. The trend is much more dramatic than the one seen before, as the hospitalization numbers consistently climb as the population gets older (excluding the 90+ range)

Using this metric, we solve the issue of our data ignoring the severity of COVID-19 by exclusively analyzing cases that brought patients to the hospital. This is a step in the right direction, but we are still left with the issue of the lack of a per capita assessment. This can be seen in how the 90+ age range is far lower than any of the others because the 90+ age range is a massively smaller subset of people, so the hospitalizations would still be less than some other groups.

Hospitalization Rate by Age Group

Our final metric aims to solve both problems we found in our first analysis by only assessing how many cases led to hospitalizations in each age group. This metric reinforces the findings of the second approach and shows how dramatic the differences between younger and older populations are.

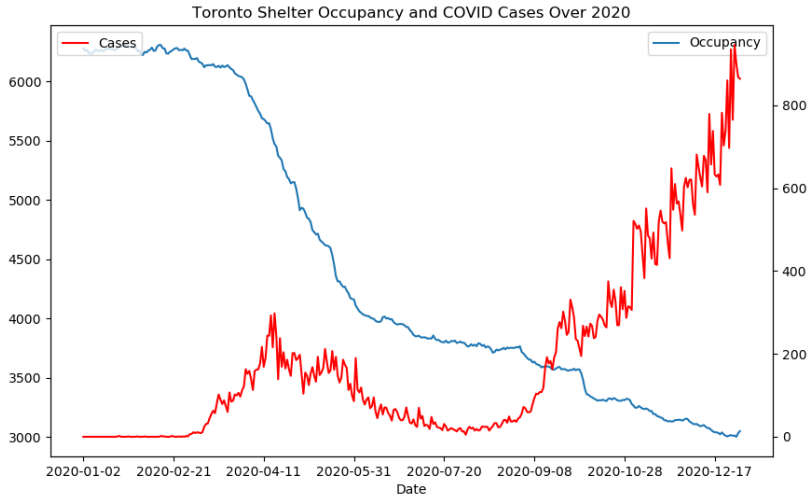


This data simply accentuates the findings of the previous approach, as the differences between younger age ranges (0 – 29) are vastly different than older ranges. For example, those aged 0-19 had a 0.69% chance of being hospitalized for a COVID-19 case, whereas those aged 80-89 had a 30.6% chance of hospitalization. This is equivalent to a 44x increased likelihood of being hospitalized.

This final metric addresses the previous problems, but still lacks information relating to per capita case rates. The optimal metric would be too likely to use hospitalizations per 100,000 people, but the counts of population in these age ranges outside of COVID cases is not accessible to us in the datasets chosen, so we must compromise with our best metric, hospitalization rate by age group, to understand how COVID-19 affects different populations.

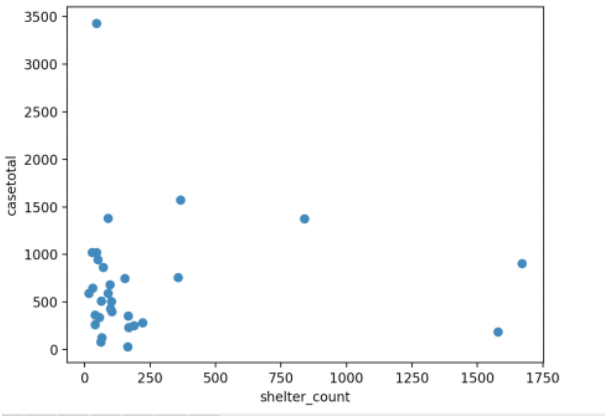
COVID-19 and Homelessness

Our further investigative questions aimed to find the correlation between homelessness and COVID both city-wide and by neighborhood. We first analyzed the change in both homeless shelter occupancy and COVID 19 case rates over 2020. Our expected outcome of this was that shelter occupancy would decrease as COVID restrictions began (around March 15th) but steadily increase as people lost jobs due to COVID.



The actual results of the data are starkly different from our hypothesis, and quite concerning. COVID-19 In no way made financial situations easier on people, and many lost their jobs and homes due to COVID. The initial drop in occupancy could be understood as people leaving shelters as the temperatures rose, but that could not explain how the numbers never recovered. It is safe to assume that homelessness itself didn't decrease during the pandemic, so this data suggests that COIVD-19 drove many people out of shelters and onto the streets, remaining there for the Winter of 2020-2021.

We also attempted to see if the total capacity of homeless shelters per neighborhood was correlated with COVID-19 cases. To do this we plotted Cases and Shelter Capacity by each FSA (Forward Sortation Area).



This data is relatively inconclusive as there is no linear correlation between shelter capacity and cases by FSA. A result like this was very unfortunate to receive, as one of our main investigative questions was inconclusive. Many factors affect COVID-19 rates, so finding out that shelter capacity isn't a major factor is not too surprising.