Through the Turnstiles: Analyzing NYC Subway Ridership

Our stakeholder, the MTA, wants us to determine how New York City subway ridership has changed since the Covid-19 pandemic. Specifically we are tasked with determining how ridership has changed based on neighborhood, what some factors might be causing the difference, and what strategies we would recommend going forward.

According to the MTA, 56% of New York City residents rely on public transportation. The Covid-19 pandemic heavily impacted ridership, driving it down to only 2.5 million daily riders from an average of 33 million riders before March 2020. Although ridership has recovered from the start of the pandemic, the numbers are not yet at pre-pandemic levels. Our dataset, MTA Ridership Data, spans from 2019 to 2023. We created a line graph based on the MTA ridership from 2020 to 2024 to show that the average pre-pandemic weekly ridership was 33 million, and although ridership has increased since the peak of the pandemic, even in 2024 the all-time ridership is still below 33 million.

To gain a better understanding of why ridership numbers are still below pre-pandemic levels, we decided to analyze subway ridership based on neighborhoods. Using a different dataset we created a heatmap that shows the percentage change of subway ridership from before the pandemic to now. From the heatmap we can clearly see that usage of subway ridership differs based on neighborhood, and from further analysis, neighborhoods with lower median income tend to have higher subway ridership. We focused on 3 high income (Upper West Side, Midtown/Chelsea, and Battery Park/Greenwich/Soho) and 3 low income (Far Rockaway/Board Channel, Bay Ridge, Bensonhurst, and Bath Beach) neighborhoods to show their weekly ridership as compared to NYC overall. We theorize that the differences between lower income and higher income neighborhood ridership numbers could be due to the types of work available to residents that live there. Lower-income neighborhoods don't have the luxury of exploring other forms of transportation because the subway is the most affordable mode of transportation within NYC. Meanwhile, higher-income neighborhoods post-Covid have adopted a work-from-home or hybrid lifestyle which has led to less ridership in those areas.

We also looked into serious incidents on the subway according to the MTA, and from our analysis many of the train lines that run through lower socioeconomic neighborhoods also experienced higher numbers of serious incidents. These “serious incidents” are defined by the MTA as persons on trackbed/ police / medical, incidents which required first responders to be called to the scene. It is also important to note that since lower income residents have to rely on public transit, an increase in transit crime disproportionately affects them, however since we didn’t have station specific data we can not confidently make any conclusions.

From our analysis we suggest that the MTA put more resources into stations that are in lower income neighborhoods. These can be to increase safety such as increasing the number of safety officers, installing more emergency kiosks, or increasing the number of MTA workers in the area. Upgrading the stations to be brighter might also help deter crime. In addition any new projects to expand the subway system should take into consideration that lower income residents are using trains more than their high income counterparts, therefore an effort should be made to increase the number of trains serviced to stations in lower income neighborhoods.