

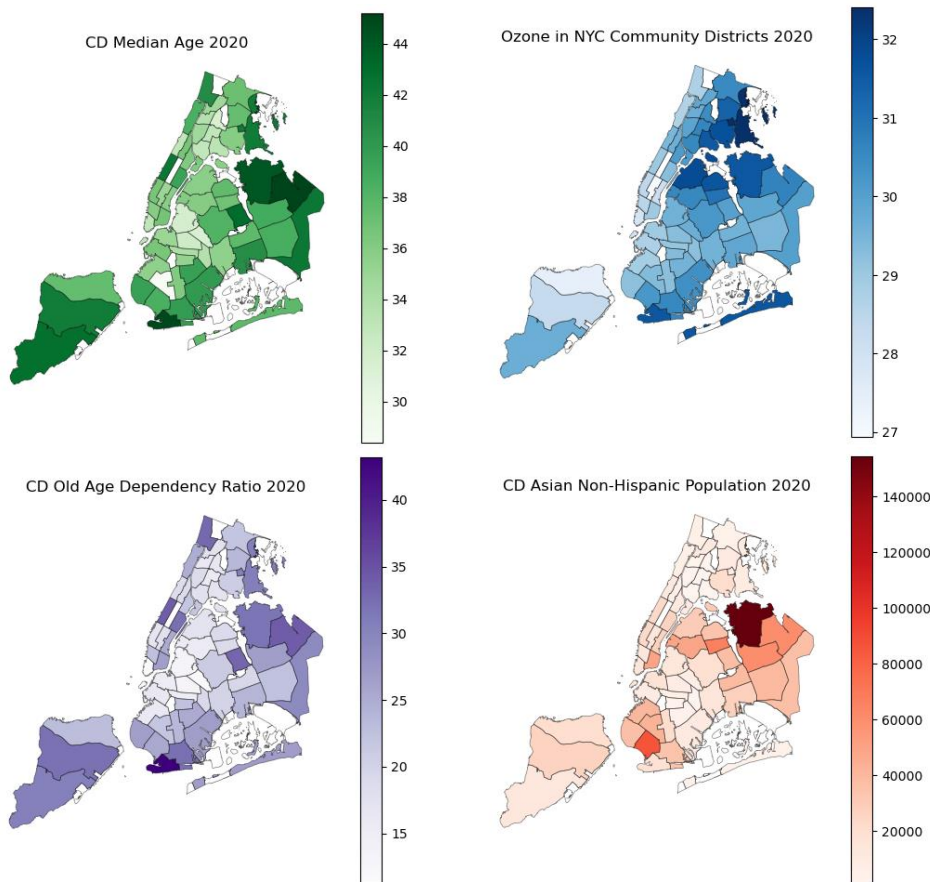
Data Analysis Report

Relationship between NYC Air Quality and Demographic

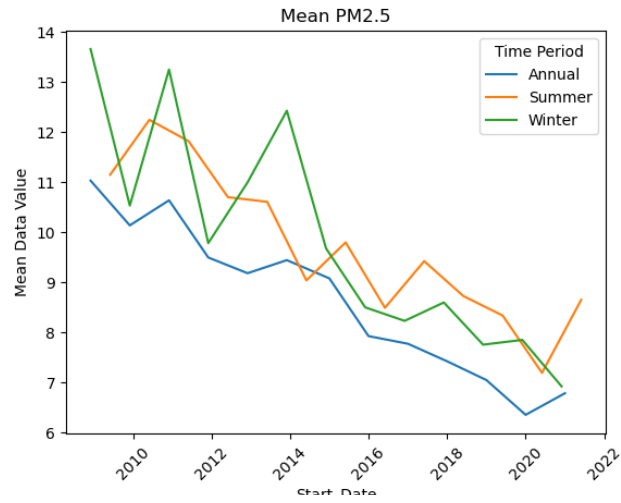
Jiacheng Chen

Insights:

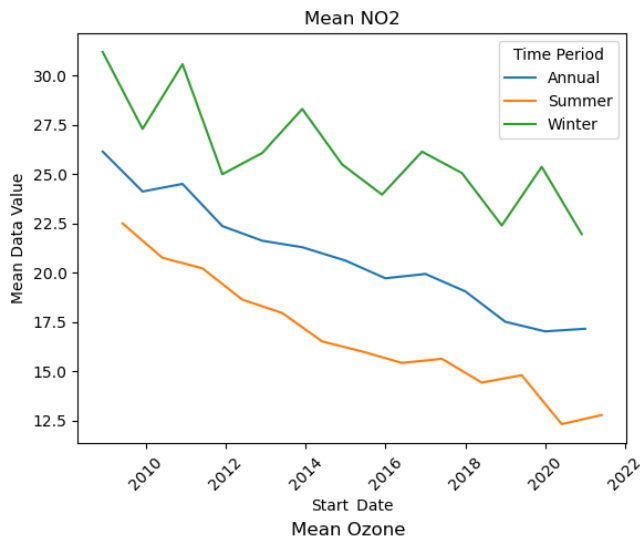
This initial analysis provides insight into the correlation between air quality and demographics in New York City, particularly at the borough and community levels. In general, air pollutant levels have been declining over the years. With a focus on three major air pollutants (NO₂, PM 2.5, and ozone) and demographic factors including age and racial composition, we looked closely at dependency ratios, ethnicity ratios, population densities, and overall demographic trends among different age groups. At the borough level, our investigation highlighted general patterns in pollutant distribution, revealing potential positive correlations between transportation activity (especially vehicle miles traveled) and pollutants such as PM 2.5 and nitrogen dioxide. At the core of our investigation are community-level data that show regions with higher levels of Ozone tend to overlap with areas with large Asian populations, especially those with large elderly populations. These findings highlight living conditions in these areas that require further consideration. Supported by a series of maps and plots, these insights point to potential avenues for more in-depth investigation in these datasets and in this research area.



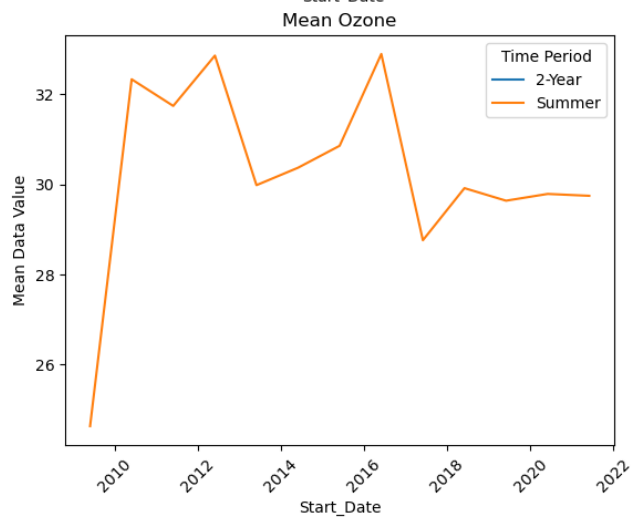
By comparing the maps on the left, we can see that there are some overlaps between the Air Quality and Demographic data. The Bronx and Brooklyn have some community districts with high Ozone level, and these community districts also have a large population, especially the Asian Non-Hispanic population. It is also noticeable that the community districts with high Ozone level have a larger median age and a higher old age dependency ratio.



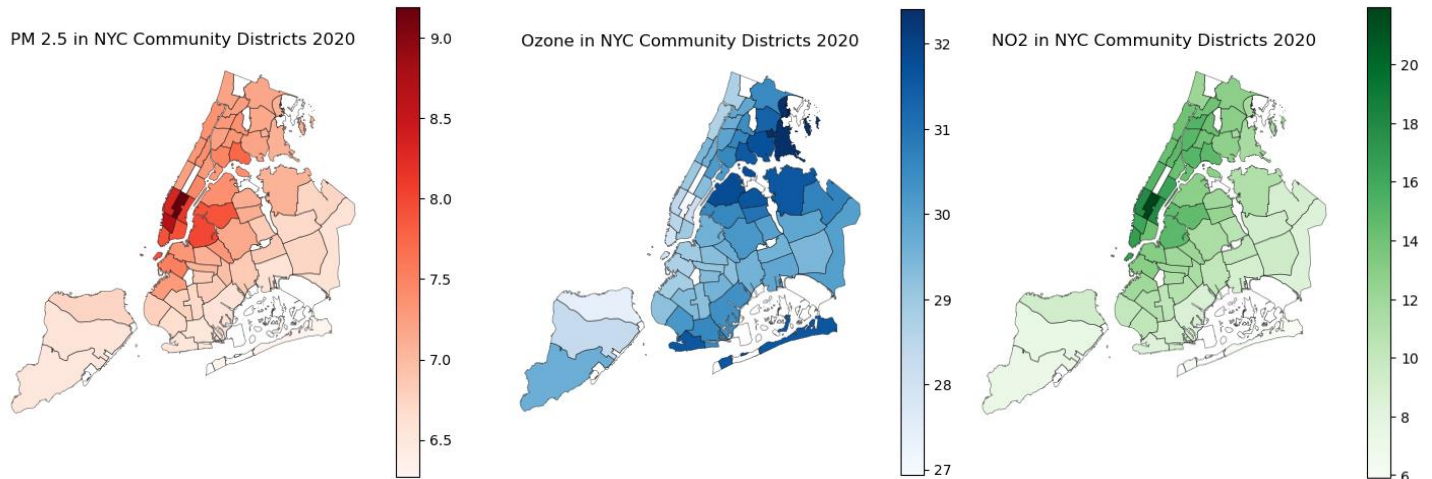
The overall mean PM2.5 concentration in NYC is decreasing. Summer and Winter have higher PM2.5 concentration than the annual average.



The overall mean NO2 concentration in NYC is decreasing. Winter has a higher NO2 concentration than the annual average and Summer has a lower NO2 concentration.



The Ozone data has only summer records. It seems that the pattern of Ozone is slightly decreasing over time, but the trend is not clear.



- Lower Manhattan and some Community Districts in Brooklyn and Queens that are close to the East River have higher PM 2.5 levels.
- Overall, Bronx and Queens have higher Ozone level, and some community districts in Brooklyn such as Coney Island and Rockaway also have high Ozone level.
- Manhattan has the highest NO2 level overall, and midtown has the highest NO2 level in Manhattan.

Questions:

- Understanding the target audience for this op-ed can greatly improve our analysis and visualization. Who do you most want to resonate with - City Council members, the general public or a specific group?
- Do you have previous reports or findings that have been successful in your air quality advocacy efforts? We would be happy to incorporate them into our analysis to build on your existing information.
- We noticed that the primary dataset includes housing information, which has the potential to enrich the analysis by integrating complementary data sources such as income, education, and related factors. We would like to hear your thoughts and leverage your expertise to come up with a more comprehensive analysis.

Potential Future Plans:

This is a preliminary analysis of the relationship between demographic data and air quality data of NYC, and there are still several factors that have not yet been examined. For example, the number of illnesses is not considered in the statistical model. In addition, the air quality data and the demographic data are only for 2020. The air quality data and the demographic data for other years can be considered to see if there is a change in the relationship between demographic data and air quality data over time.

It is also worth noting that the time periods for the air quality datasets are not consistent. For example, the time period for ozone is "summer 2020" while the time period for NO2 and PM 2.5 is "all of 2020". As a result, the analysis may not be able to cover differences in air quality between seasons.

Future work could examine this relationship in greater depth, consider broader time scales and resolve inconsistencies to gain more comprehensive insights.