

Analysis of PM2.5 Pollution and Its Impact on Public Health

PROBLEM STATEMENT

Air pollution (PM2.5) poses severe health risks in NYC

Air pollution, particularly PM2.5, poses a severe public health risk, causing respiratory and cardiovascular diseases. Despite a 78% reduction in U.S. pollutants since 1970, NYC remains heavily impacted, with significant racial and neighborhood disparities. Our project aims to examines PM2.5 trends (2009–2022) and their health impacts & neighborhood disparities to highlight the need for targeted interventions.

OBJECTIVE

Analyze air quality trends, disparities, and health impacts

02. Motive

- Despite reductions in overall air pollution, PM2.5 continues to significantly impact public health, particularly in densely populated cities like NYC.
- This study seeks to analyze PM2.5 trends, link exposure to health outcomes, and generate actionable insights to inform policies addressing environmental justice and public health improvement.

02. Data Sources

- 1.Air Quality Dataset
 - 2.PM2.5 levels and hospitalizations
- Asthma
 - Cardiovascular hospitalizations
 - Respiratory hospitalizations

03. Goals

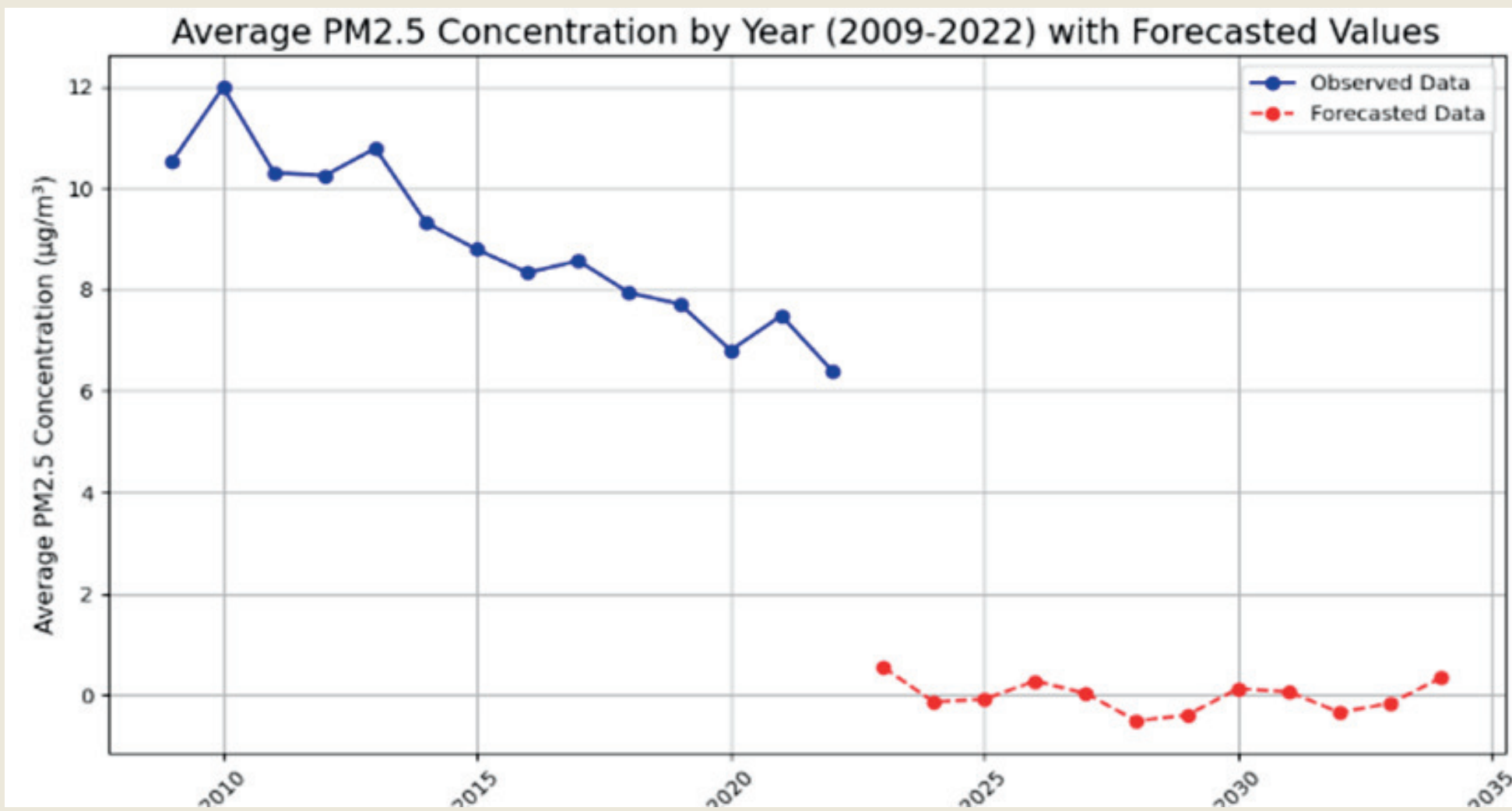
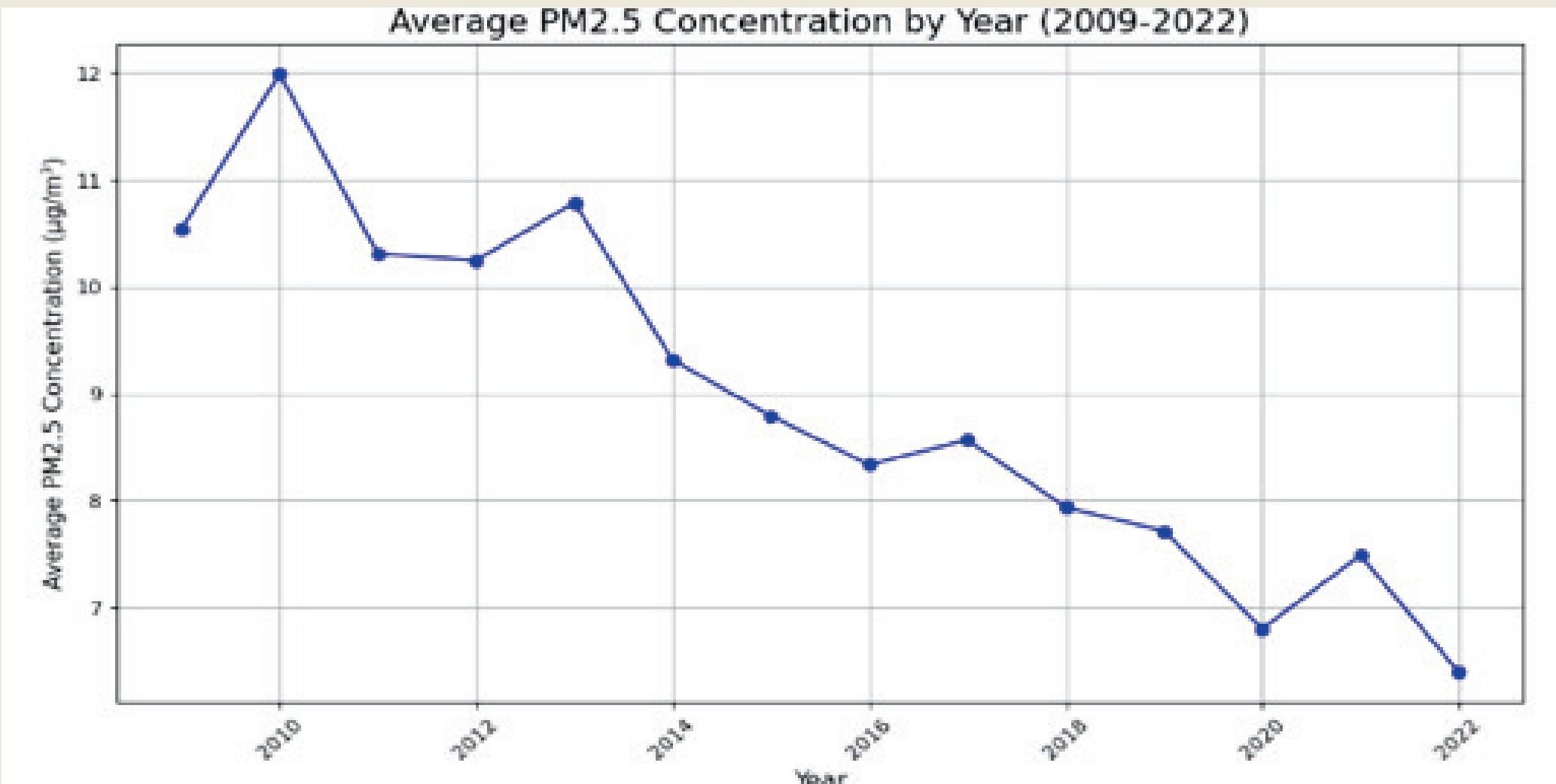
- Assess air quality disparities across neighborhoods
- Evaluate the trend in PM2.5 levels
- Link PM2.5 levels to hospitalization rates

03. Hypothesis

- Neighborhoods with more people of color(population density) have worse air quality.
- PM2.5 levels have decreased over time from 2009 to 2022.
- Higher PM2.5 exposure leads to increased hospitalizations.

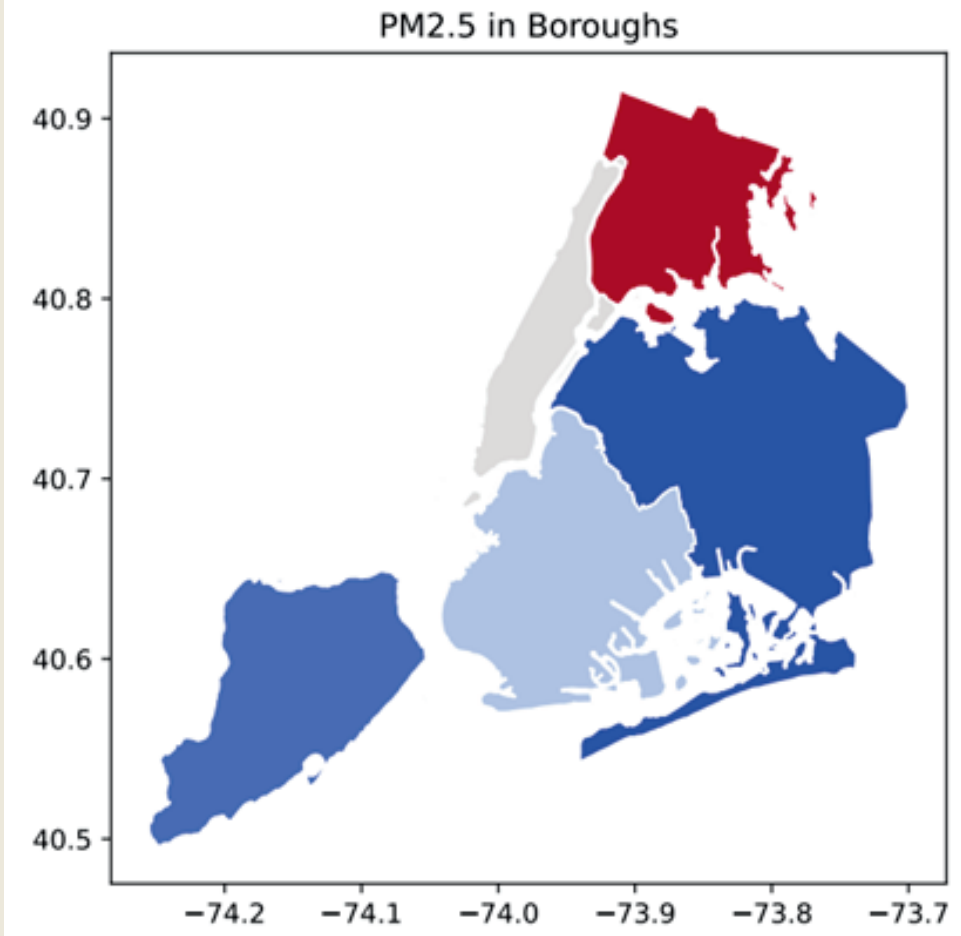
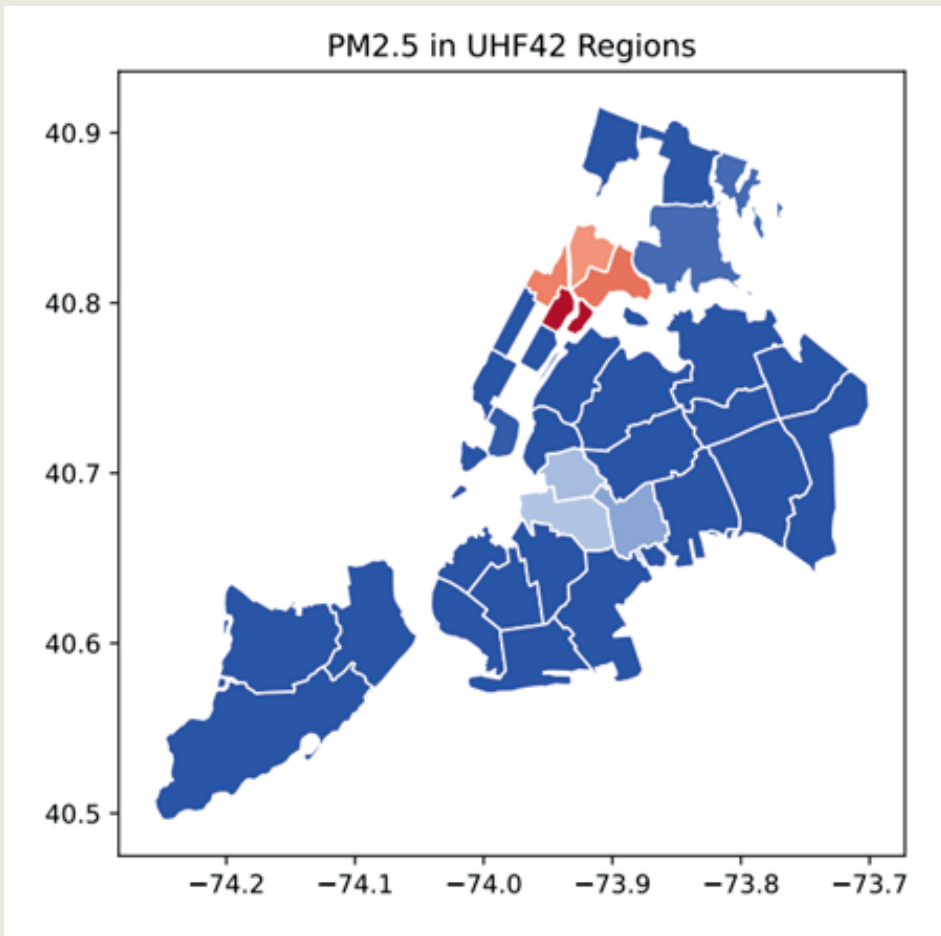
05. Time Series Analysis

- General decline in PM2.5 from 2009 to 2022: indicating improvements in air quality over the years.
- While seasonal patterns are evident in PM2.5 as well through the years.
- Residuals suggest some unexplained variations due to short-term events (such as pollution spikes or specific events like wildfires or industrial accidents).



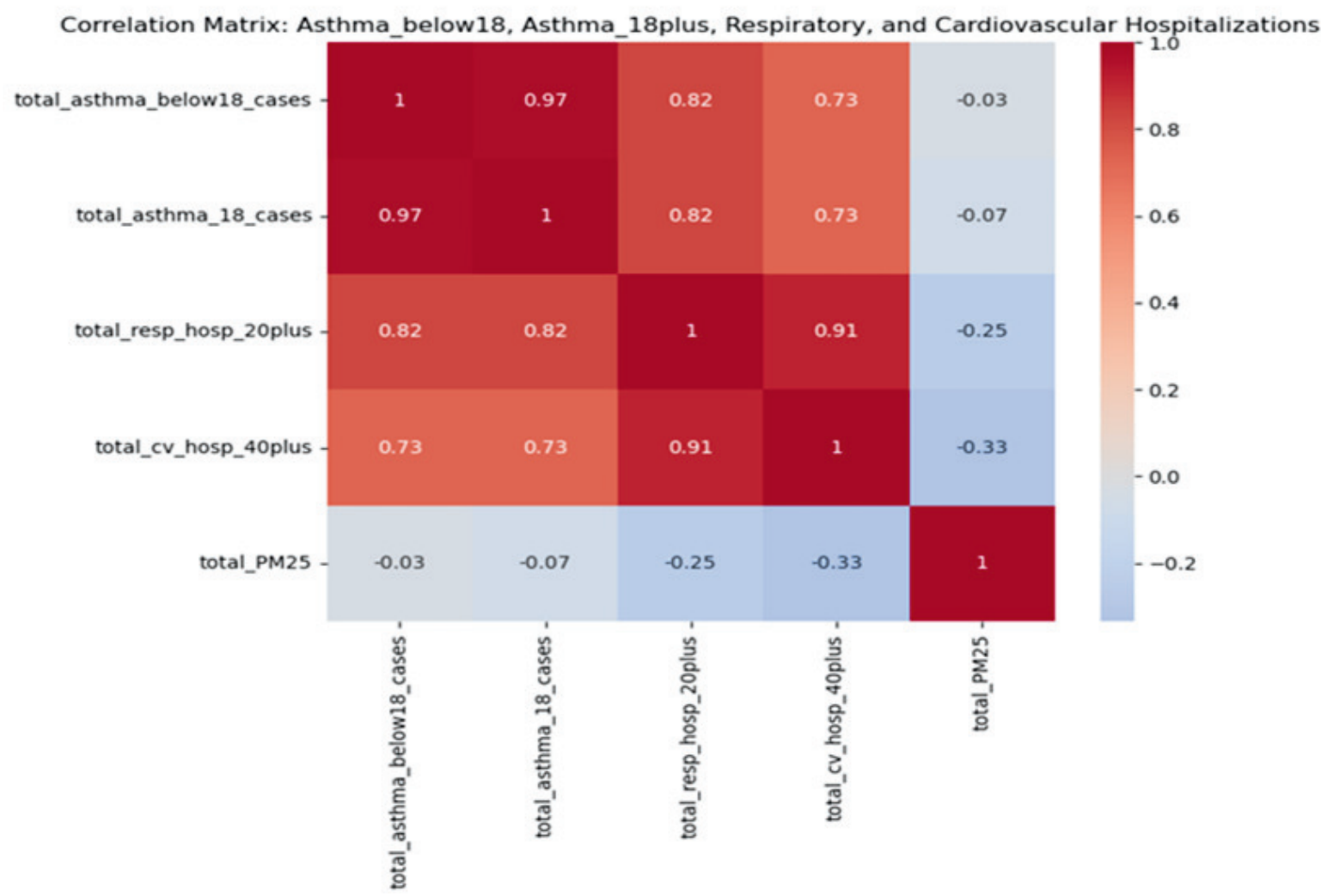
04. Geospatial Analysis

- Disparities in PM2.5 concentrations are higher levels in neighborhoods with people of color.
- Bronx(Borough) and East Harlem(UHF42) among the worst-affected areas.
- These neighborhoods are historically underserved and have higher minority populations – like Hispanic and Blacks (US Census Data, 2020)



06. Regression Analysis

- Correlation between PM2.5 and hospitalizations
- Linear regressions – results are non-significant
- Need to incorporate additional variables



07. Conclusion

- Disparities exist in the neighborhoods with a higher population of people of color (H1)
- PM2.5 trends have reduced over time from 2009 to 2022 (H2)
- Insignificant results to determine rising cases of respiratory illness and cardiovascular diseases due to PM2.5 (H3)

08. Future Directions

- Incorporate additional variables, such as income, occupation, and access to healthcare, for a more nuanced analysis.
- Conduct seasonal studies to identify periods of heightened risk and tailor interventions.
- Develop predictive models using real-time monitoring to proactively manage air quality and reduce health risks.