Transit Air Quality Team D

Deliverable 3

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Project Motivation & Goal

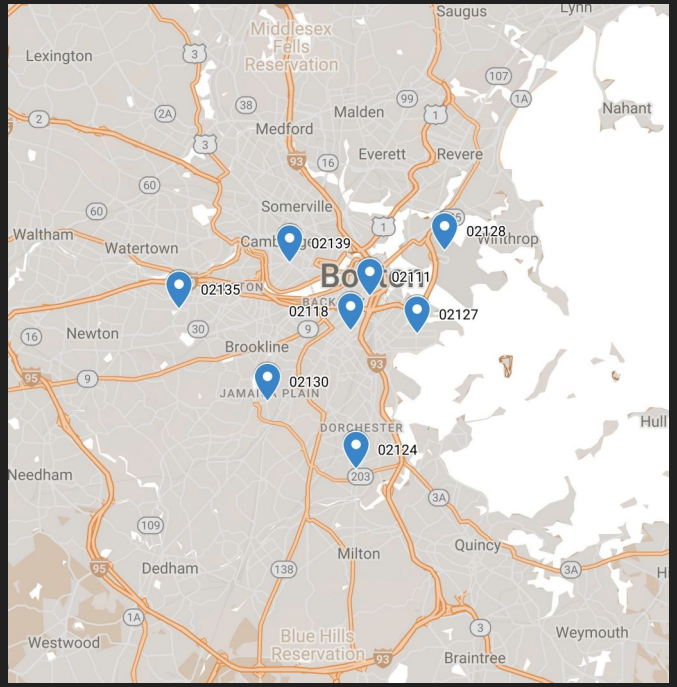
- Understanding the connections between air quality, health issues, transportation patterns, and demographic factors at a zip-code level.
- Identifying correlations, trends, and potential causal relationships
- Gaining a better understanding of how air quality affects public health and how transportation behaviors may contribute to health outcomes.
- Our motivation is to uncover valuable insights that can inform public health policies, urban planning, and environmental initiatives to improve air quality and mitigate health risks

Background

- Analyzed relationships between census data and air quality
- Investigated correlations between changes in yearly air quality and changes in census data
- Observed that Hispanic Latino population and Foreign born population metrics are highly related to changes in air quality
- Made initial observations about potential relationships between air quality and health problems across Boston

Data Used

- New AQI Data (2022)
- Major Challenge: Calculating the mean
- 2 AQI Metrics: Mean AQI & Avg Max AQI
- CDC Health Data
- Census Data (Race/Ethnicity & Transit)
- Zip-code Based



AQI - CDC Correlations

- AvgMaxAQI not a helpful metric
- MeanAQI displays more meaningful relationships
- Pulmonary Disease, Coronary Heart Disease, High Cholesterol, Depression highly related to MeanAQI

	MeanAQI	AvgMaxAQI
ACCESS2_CrudePrev	0.186275	-0.250063
ARTHRITIS_CrudePrev	0.261498	-0.187957
BINGE_CrudePrev	0.256889	-0.123239
BPHIGH_CrudePrev	0.165619	-0.028565
BPMED_CrudePrev	0.104009	0.078206
CANCER_CrudePrev	0.142101	-0.466372
CASTHMA_CrudePrev	0.191922	-0.339937
CERVICAL_CrudePrev	0.057734	-0.432475
CHD_CrudePrev	0.313530	-0.021008
CHECKUP_CrudePrev	0.071645	-0.010915
CHOLSCREEN_CrudePrev	-0.024682	-0.268129
COLON_SCREEN_CrudePrev	-0.226528	-0.174282
COPD_CrudePrev	0.347405	-0.164740
CSMOKING_CrudePrev	0.391466	-0.060811
DENTAL_CrudePrev	-0.292749	-0.074216
DEPRESSION_CrudePrev	0.409928	-0.413566
DIABETES_CrudePrev	0.222201	0.068704
GHLTH_CrudePrev	0.305696	-0.091427
HIGHCHOL_CrudePrev	0.258266	0.054532
KIDNEY_CrudePrev	0.249956	-0.077541
LPA_CrudePrev	0.235133	-0.011984
MAMMOUSE_CrudePrev	-0.319776	-0.062989
MHLTH_CrudePrev	0.251783	-0.363883
OBESITY_CrudePrev	0.191871	-0.290832
PHLTH_CrudePrev	0.325904	-0.146186
SLEEP_CrudePrev	0.198608	-0.044841
STROKE_CrudePrev	0.237206	-0.059717
TEETHLOST_CrudePrev	0.218312	-0.205386

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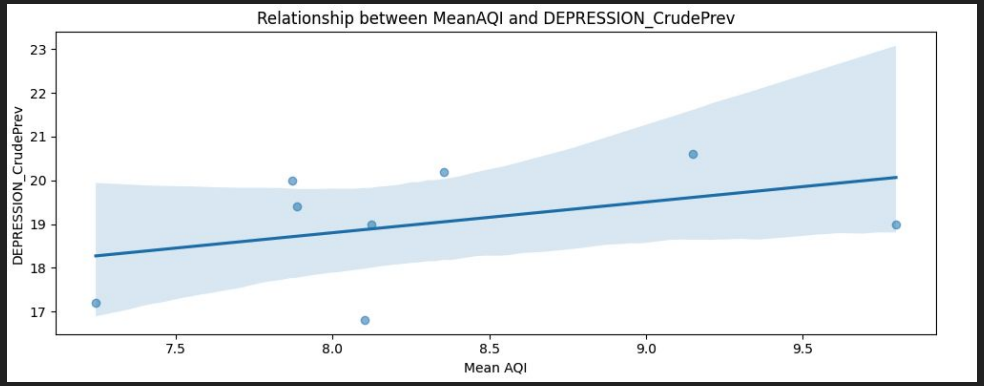
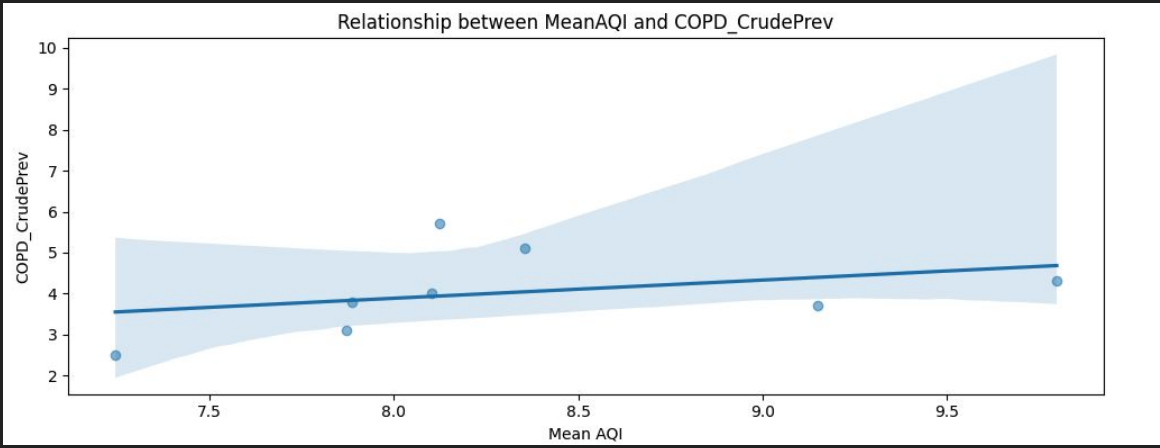
Air Quality & Depression Prevalence

- Highest correlation (0.41) with AQI
- Inflammatory response
- Neurotransmitter imbalance
- Stress response
- Reduced physical activity & social isolation



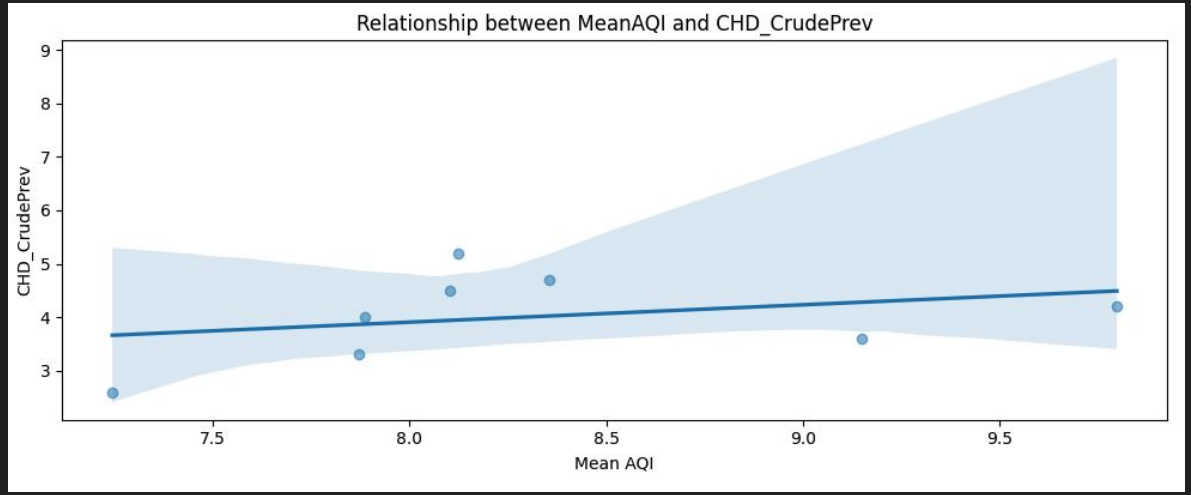
Air Quality & Chronic Obstructive Pulmonary Heart Disease Prevalence

- Decreased lung function
- Increased respiratory infections
- Airways inflammation

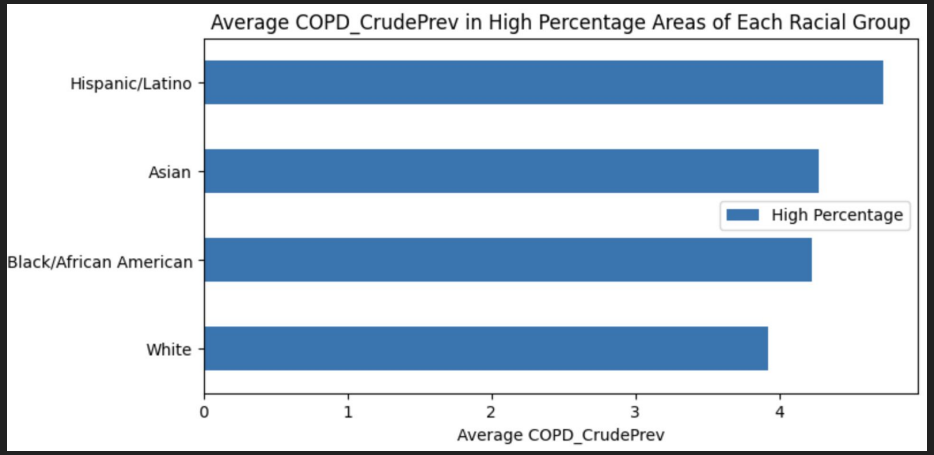


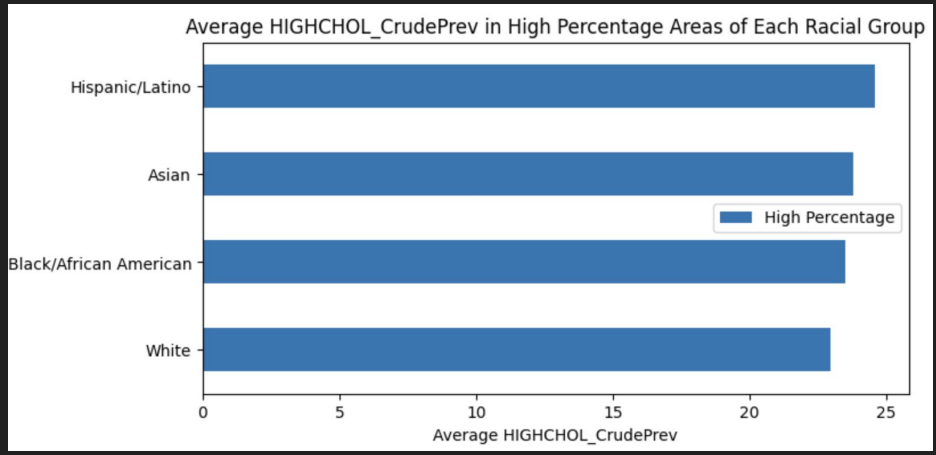
Air Quality & Coronary Heart Disease Prevalence

- Inflammation in blood vessels
- Increased risk of heart attacks
- Development of Atherosclerosis, the underlying condition in CHD



Health Issues Prevalence Amongst Different Ethnicities





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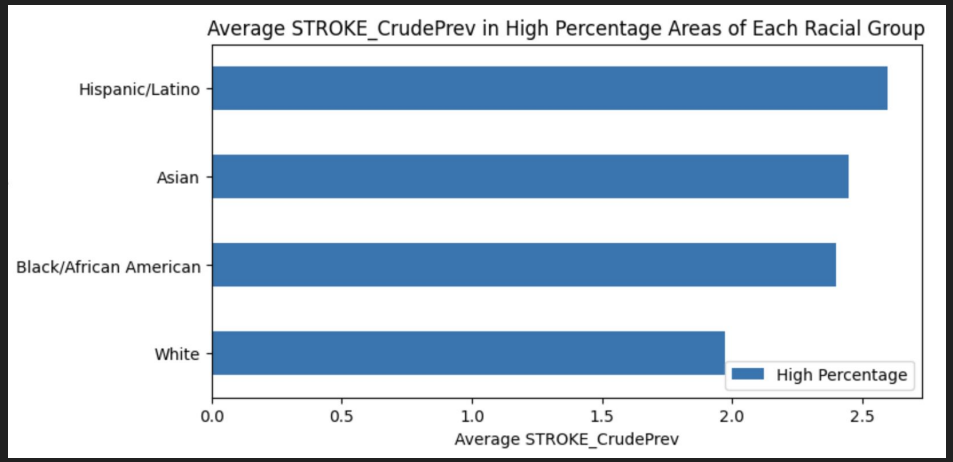
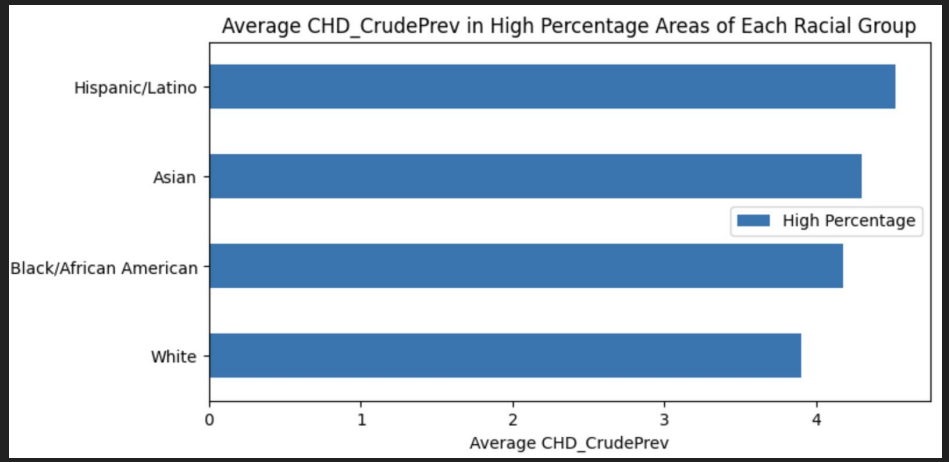
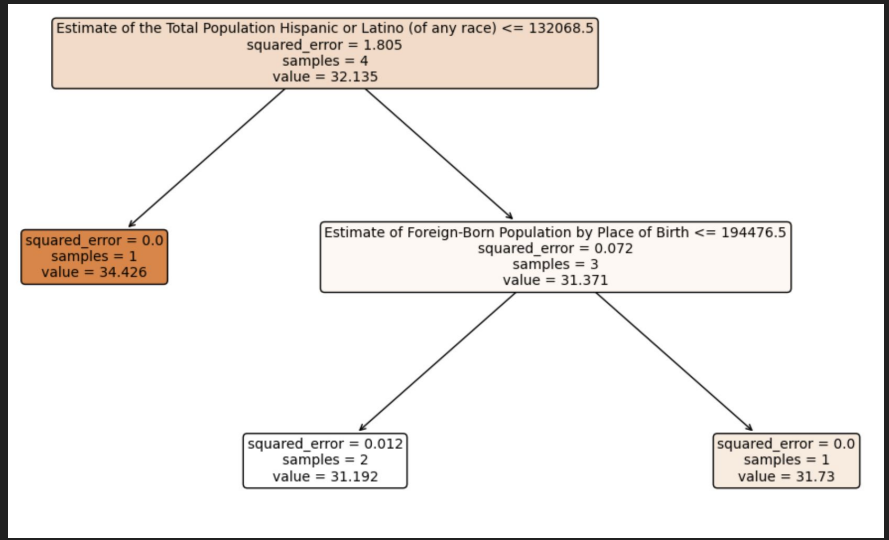




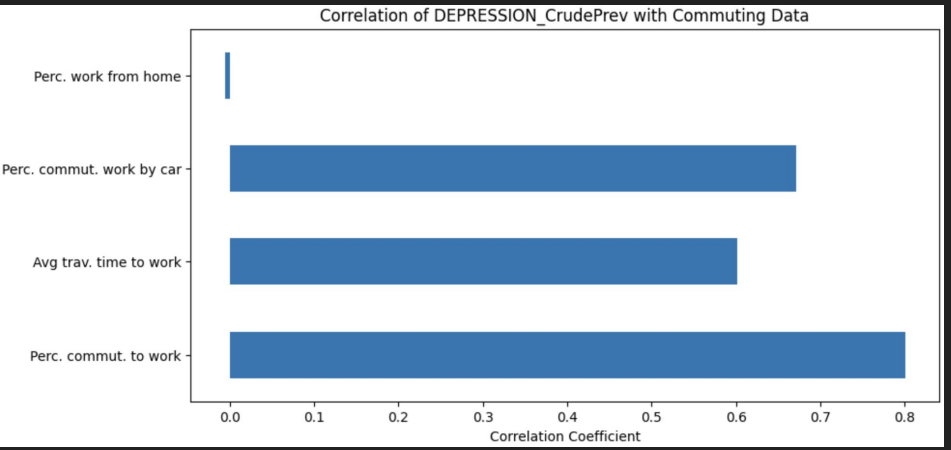
How This Supports Our Findings From Deliverable 2

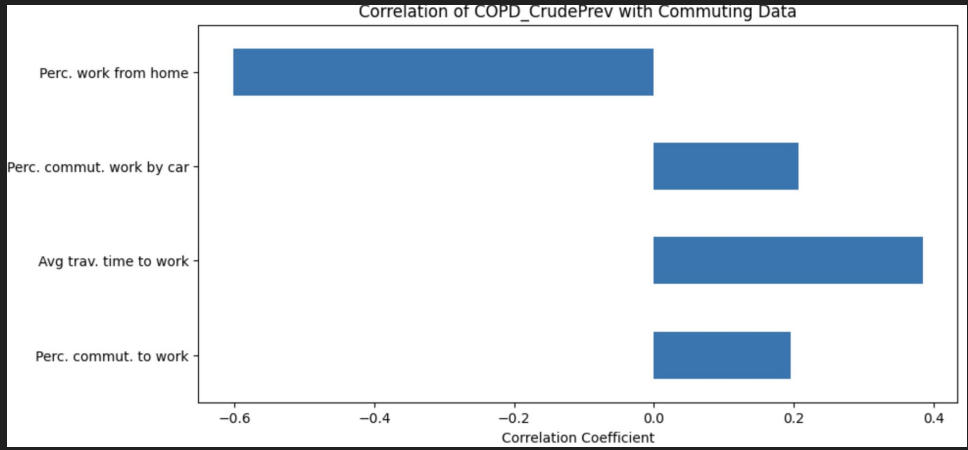
- Hispanic / Latino population primary node and foreign born population secondary node in our decision tree analysis
- These communities are likely situated in areas where air quality is poorer
- Minority groups, especially the Hispanic / Latino community often reside in areas with worse air quality



How the Health Data Relates to Transportation

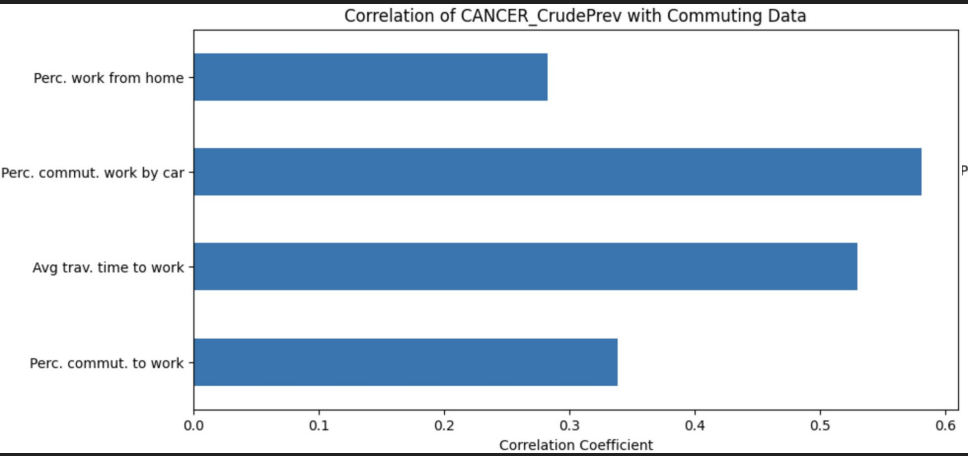
- Working from home has a negative correlation with COPD & depression prev.
- Commuting to work in general is related with higher levels of depression & COPD
- As shown previously, these health metrics are highly correlated with air quality
- This could suggest longer exposure to bad air quality leads to health conditions

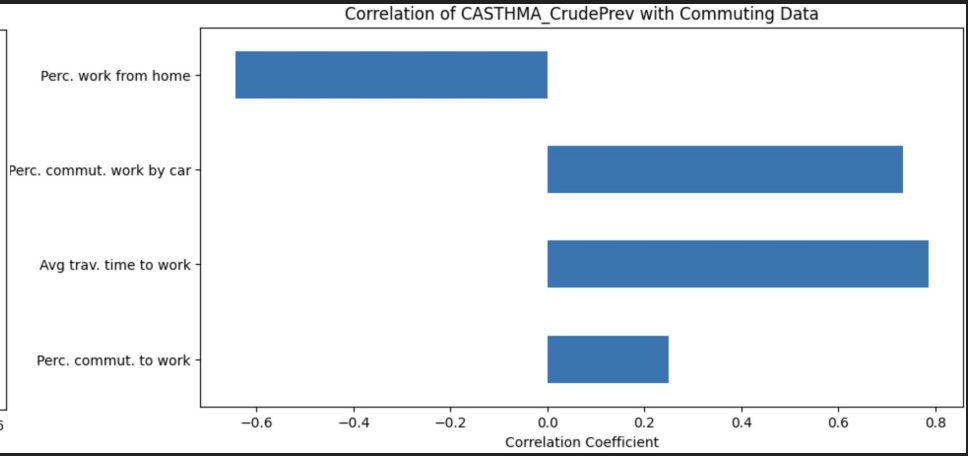




How the Health Data Relates to Transportation

- Commuting to work in general is highly correlated with cancer & asthma
- Longer commute times are related to higher asthma & cancer prevalence
- Elevated levels of exposure to particulate matter & pollutants
- Higher exposure to carcinogens present in air pollutants, such as benzene, formaldehyde, and polycyclic aromatic hydrocarbons





Individual Contribution

Mithat: Collected new AQI and CDC data. Conducted extensive data analysis. Prepared the presentation.

Maria: Played a key role in management and coordination. Acquisition of census data based on race/ethnicity. In depth research between air quality & disease prevalence.

Sanath: Contributed extensively to the data analysis. Responsible with finding correlations between transportation and health conditions. Preparation of the presentation.

Chengkai: Important role in data collection. Gathering information of how air quality leads to health conditions. Organized the presentation materials. Consistently offering important feedback on the progress of the project.

Thanks For Listening

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