The Association Between Particulate Matter (PM2.5) and Asthma Percentiles in All 58 California Counties

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STUDY OBJECTIVE

- To compare the strength of the association between particulate matter (PM2.5) and asthma percentiles in all 58 counties in California using linear regression.

METHODS

- The CalEnviroscreen 3.0 of the California Office of Environmental Health Hazard Assessment (OEHHA) from 2017-2018 contains environmental data of all 58 counties in California.
- Using this data, the association between PM2.5 levels and asthma percentiles was examined through a cross-sectional study by calculating the mean PM2.5 levels and mean asthma percentiles among the 58 counties in California using linear regression.

RESULTS

- Mean PM2.5 Level = 10.37, Median PM2.5 Level = 10.37, Standard Deviation = 2.59
- Mean Asthma Percentile = 50.18, Median Asthma Percentile = 50.256, Standard Deviation = 28.817
- Regression equation: $y = 1.6665x + 32.8861$. $R^2 = .02247$
- Top 10 in both PM2.5 Means and Asthma Percentile Means: Kings, Fresno, Merced, San Joaquin – all of which are in the Central Valley
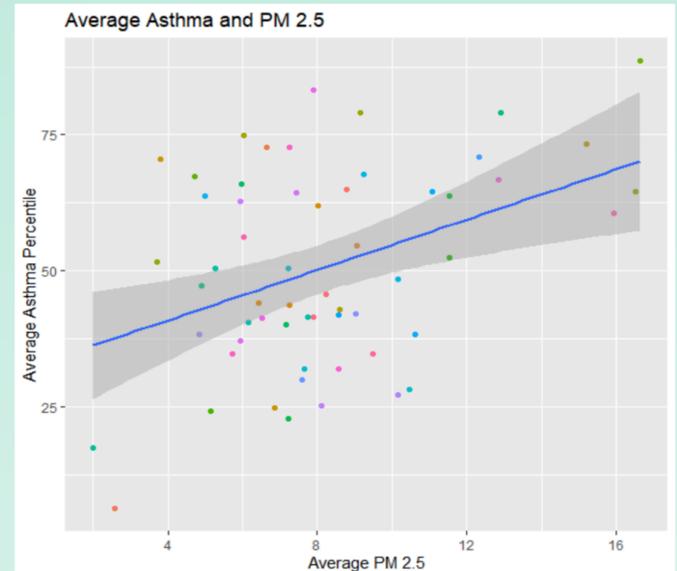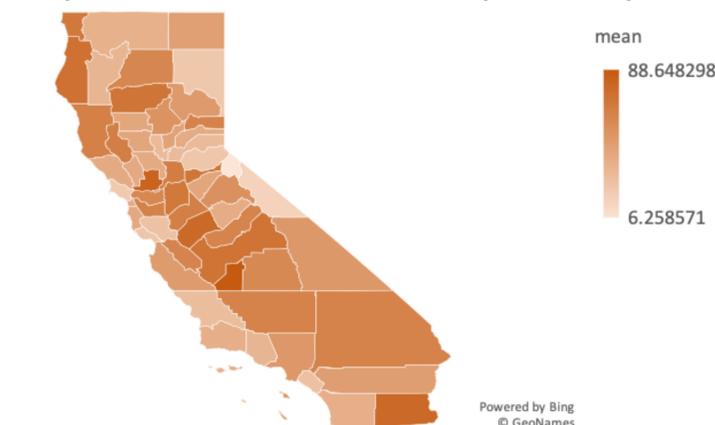
RESULTS

Mean PM2.5 Levels by CA County (From Highest to Lowest)

Mean Asthma Percentiles by CA County (From Highest to Lowest)
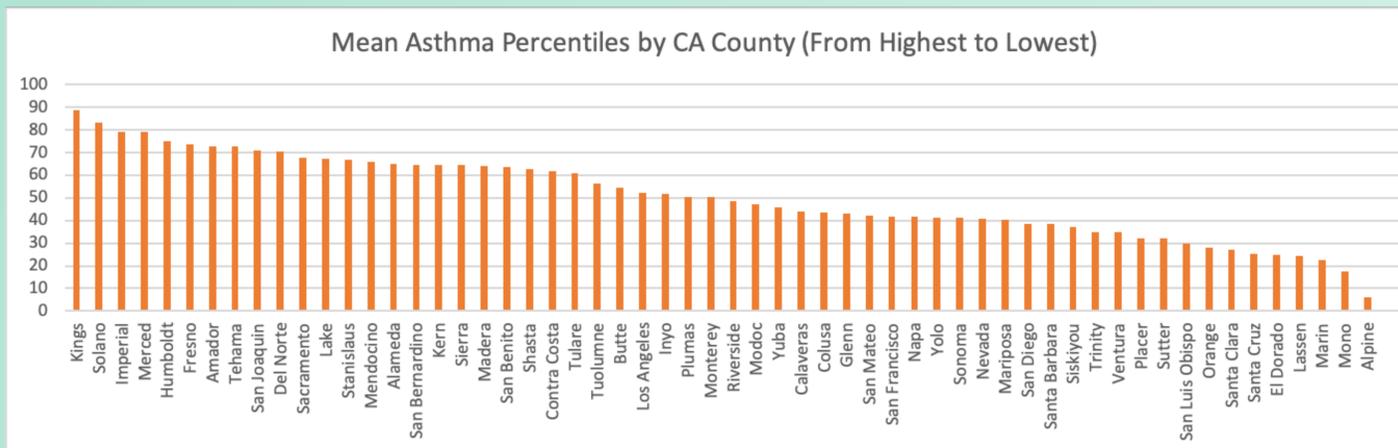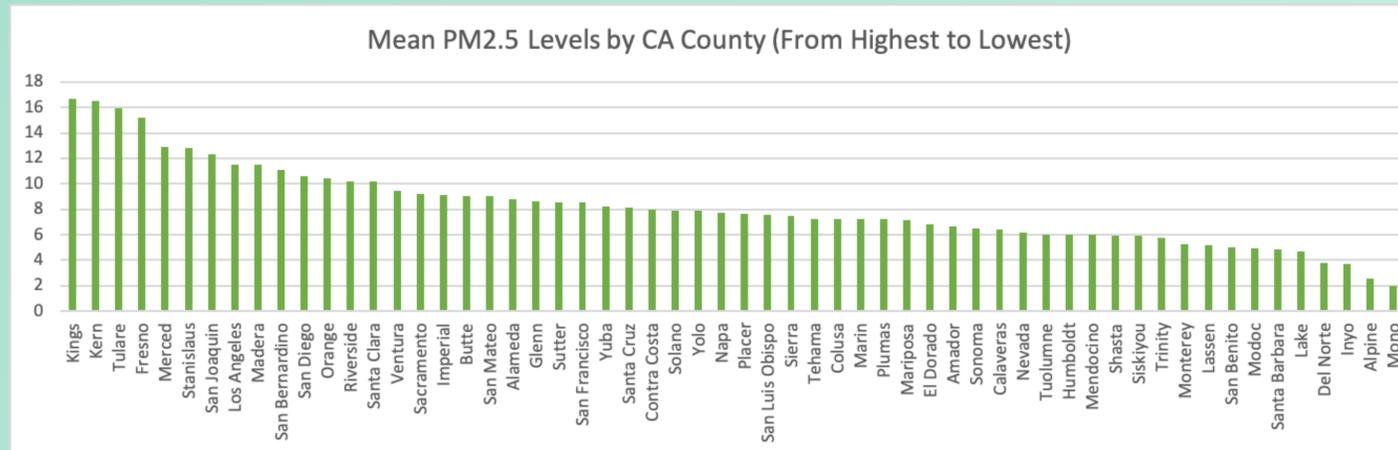
Map of PM2.5 Means by CA County

Map of Asthma Percentile Means by CA County

Average Asthma and PM 2.5

CONCLUSIONS

- This study suggests that an increase in PM2.5 levels is correlated with an increase in asthma percentile. This is especially true for the Central Valley counties of Kings, Fresno, Merced, and San Joaquin where high mean PM2.5 levels and high mean asthma percentiles are prevalent. More studies should be conducted in relation to other forms of air pollution, such as diesel and ozone.

POLICY IMPLICATIONS

- Implement a carbon tax on California counties, particularly the Central Valley counties, so that they do not exceed a specified amount of carbon emissions yearly.
- Stricter regulations on truck emissions, oil refineries, commercial charbroiling, and methane emissions