Significant Paper Report

**Article Title:** PM2.5 air pollution and cause-specific cardiovascular disease mortality

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The article dives into the relationship between ambient PM2.5 exposure with defined cardiovascular disease mortality. In the study they surveyed 565 men and 477 women, who were between the age of 50 and 71. 60% of the participants were men and 91.2% were Non-Hispanic whites. 13.5% of participants were below average income of US as per year 2000. The participants from six different states in US : California, Florida, Louisiana, North Carolina and Pennsylvania. The following urban cities were also selected for the study- Atlanta, Georgia and Detroit, Michigan. The cities and states were selected based on data that was analyzed from the National Institute of Health (NIH-AARP) Diet and Health Study. This dataset had members primarily active the states and cities, and they also represented many cultures.

The study also included questionnaires, which collected the linkage to national databases for mortality follow ups, along with census data. The dataset includes additional details such as age, health problems, and industry that they worked in, education details – less the high school, college graduated, post-graduated, high school, dropped out. Sensex data on social status, marital status, body mass index (BMI), smoking and drinking habits.

To analyze the data the researches first used a hybrid land use regression geological statistical model to estimate the PM2.5 amount. Then they use a multivariate cox regression model to estimate the risk of mortality in patients with a 95% confidence interval. Annually the social security master death file was looked into to determine the mortality rate.

What they found was that for each 10 ug/m3 increase in PM2.5, there was a 14% increase in mortality from a stroke and a 16% increase in mortality from ischemic heart disease. They concluded that long-term exposure to PM2.5 can increase the chance of mortality for cardiovascular diseases, and that we should spend more time looking at ways that we can improve the air quality around us. From geographical data, the high exposure was recorded in Atlanta urban areas, whereas lowest in Florida. For individual exposure, California leads compared to other 16 states. The risk factor stoke or IHD was similar for both the gender, race and age.

For statistical analysis, the authors have repeated the experiment in different cohort study in Rome. In the second experiment, the analysis results 8% increase in stoke rate per 10 ug/m3 PM2.5 and 19% increase in IHD .

Further thoughts, this paper used only Cox Regression multivariant model, and the researchers haven’t compared the performance with any other models. This research would have been extended to predict the effects of disease with children. The research results doesn’t convey much information about pre-existing disease conditions. From the results, are highly depend on location and social lifestyle of the people.

Overall the paper provided us with great insight about our project, along with reinforcing the material that we had learned in class. The findings in the paper helped push all of us to work towards understanding our problem statement and answering our problem as best we could in the timeframe that we had.

We paper is in-line with our project. In the paper, they discuss PM2.5’s effect on cardiovascular disease and in our paper, we discuss the effect of PM2.5 on airborne diseases. The model helped us formulate ideas on what factors we should take into consideration, such as mortality rate for different illnesses, location, age, type of population. These factors helped us select a model that would best fit our problem statement. We also tried to utilize the model suggestions that were provided in the paper, but those did not fare as well for our problem statement.