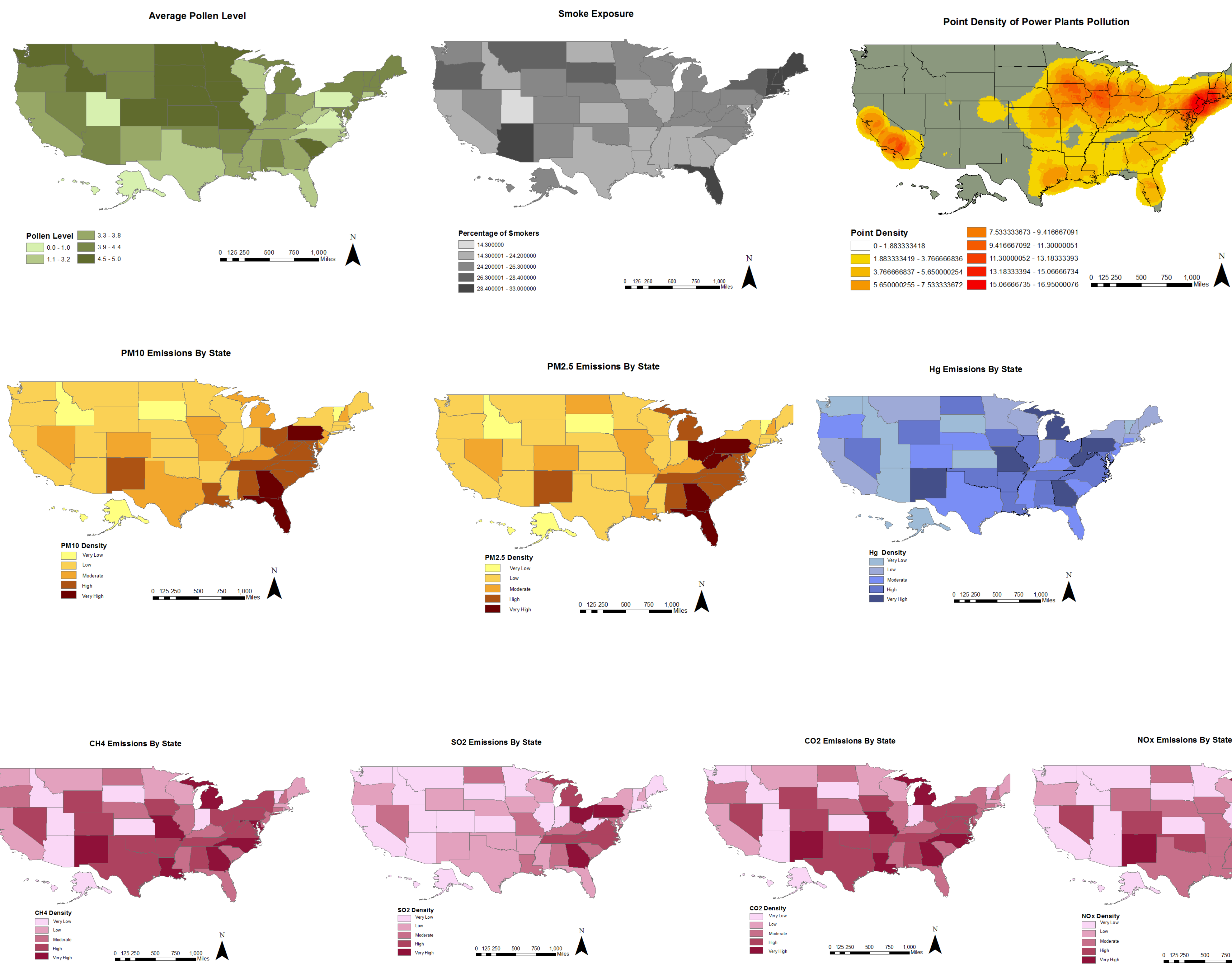


The effect of living condition on asthma severity in the USA



Background

Asthma is a chronic disease that affect breathe. It is common, deadly and hard to cut off. There are 25.7 million people had or currently have asthma in America. Every 1 in 11 children has asthma. More than 3000 people died from asthma every year. In the last decade, the proportion of people with asthma in America increase by 15% according to the Center for Disease Control. The asthma attack can be caused by spasms of muscles around the airways, inflammation and swelling of mucosal membrane lining the airways, and excessive amounts of mucus contribute to airway narrowing. Sadly, we still don't know for sure why part of people have asthma and others do not. But we notice that some factors might related to asthma. Tobacco use, exercise, air quality and allergens (like pollen and mold) are considered as asthma attack triggers. It is very important to know how well these triggers influence asthma. Triggers related to environment can help people use spatial software in predicting prevalence and making alert. Our study focused on data from United State in 2010.



Results

The pollen level map indicates that midwest region and west region have higher pollen level. These two regions have more possibility to lead to pollen allergy. The smoke exposure indicates that northeast, Florida and Arizona have more severity problem of smoke exposure. People in south region are the least exposed to smoke. The power plants point density analysis map indicates that east region and California have the most power plants. The air quality of these two regions are more dangerous for people who have asthma. The PM2.5 and PM10 maps have great meaning for people who have asthma. High level of PM2.5 and PM 10 affect everyone's airways and make people sick. It seems that south region have more serious particular pollution problem. Emissions maps of Hg, CO2, N2O, NOX, SO2 indicate general situation of air pollution. It is obvious that south region and south west region need to pay more attention to air quality if they want to reduce prevalence of asthma.

Methodology

To measure air quality, we use both behavior factors and environmental factors. The behavior factor was examined by smoker prevalence according to BRFSS GIS data in 2010. We don't need to know if the smokers have asthma since the effect of secondhand smoke. We use Choropleth maps to show the smoke prevalence by state.

Pollen level, as an important environmental factor that relate to asthma, was jointed to the geopolitical boundaries of the 50 states. The data was provided by Pollen.com. The website only provided data based on location, so we have to joint data to states. A continuous distribution of pollen level would be better. We use Choropleth maps to show the pollen level by state. Power Plant is one of major industries that cause air pollution, so we used power plants distribution data (2014) to make a point density analysis. The data is provided by Commission for Environmental Cooperation.

Besides the behavior and environmental factors that affected air quality, we choose 8 index to measure the actually quality of air. The indicators are PM2.5, PM10, Hg, CH₄, CO₂, N₂O, NO_x, SO₂. All the data were jointed to the geopolitical boundaries of the 50 states. All the data density were classified into five level. The data are all provided by Commission for Environmental Cooperation. The data were recorded in 2014.

Discussion

This project show us how different region people protect themselves from asthma attack. It also implies us what to do for prevent asthma. Western people should pay more attention to reduce the pollen. Southern people should improve their air quality. Northeastern people should reduce unnecessary power plants. The strength of this project is that it describe detailed air quality. The weakness is that we need to prove there is a strong association between asthma prevalence and air quality. Further study should get more subregional data and consider the effect of season.

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 Data Source : BRFSS-SMART, EPA, Pollen.com, Commission for Environmental cooperation
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