Tackling air pollution and climate change together

Challenge 2

University: University of Texas at Dallas

Team Name: Power Puff girls

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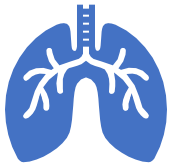


SUMMARY

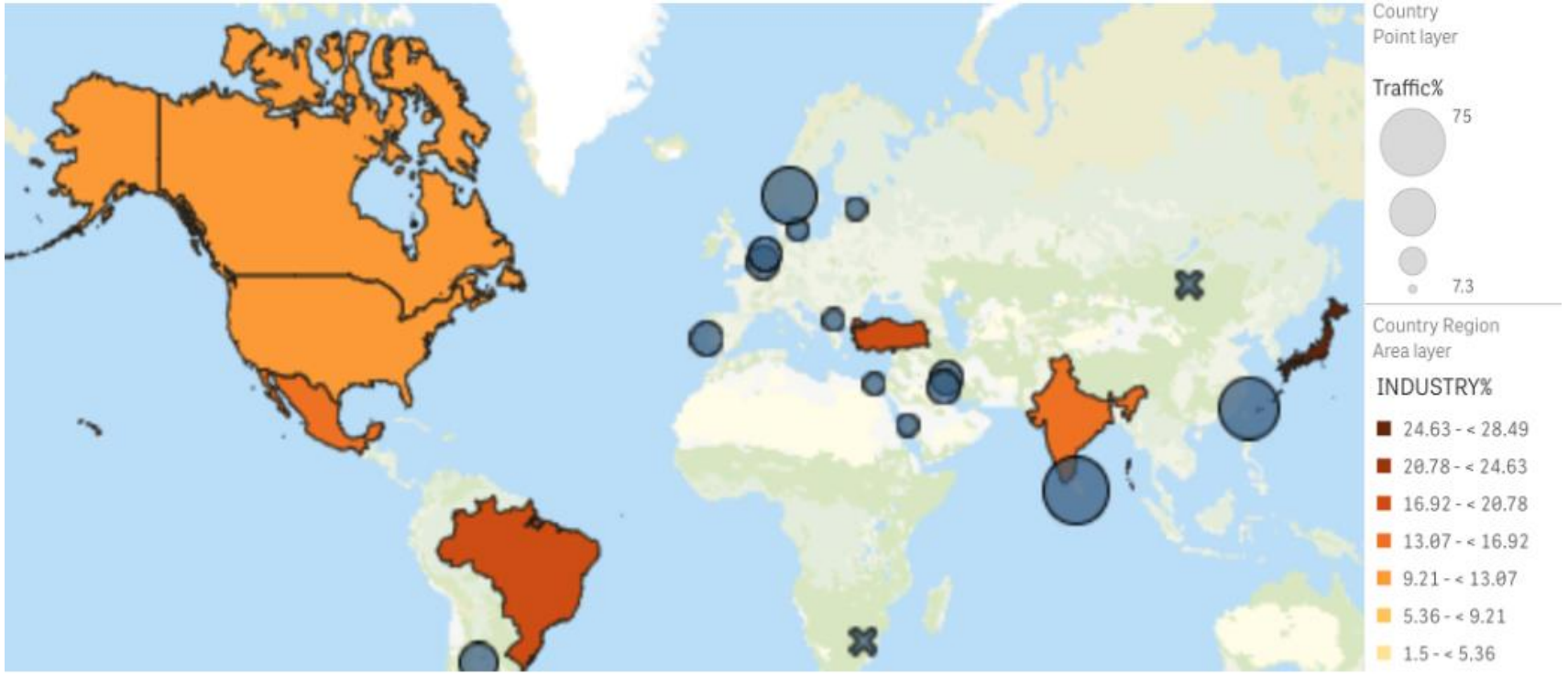
- Public health can be affected by disruptions of physical, biological, and ecological systems
- The health effects of these disruptions include Acute Lower Respiratory Infections, Ischemic Heart Disease, Stroke, Chronic obstructive pulmonary disease, Lung cancer and cataract to some extent
- This climate change is threatening air quality across the world
- Extreme measures need to be adopted to control the emission of air pollutants like dust, traffic, industries, household waste as well as hazardous gases like co2, methane, hydrofluorocarbons and other greenhouse gases
- These substances release particulates like PM10 and PM2.5 which pose the greatest health risk affecting a person's lungs and heart

Questions Addressed

- Different sources of air pollution
- Health impacts of air pollution
- Sources of greenhouse gas emissions
- City/region/countries affected by pollution
- Change in sea ice over time due to climate change

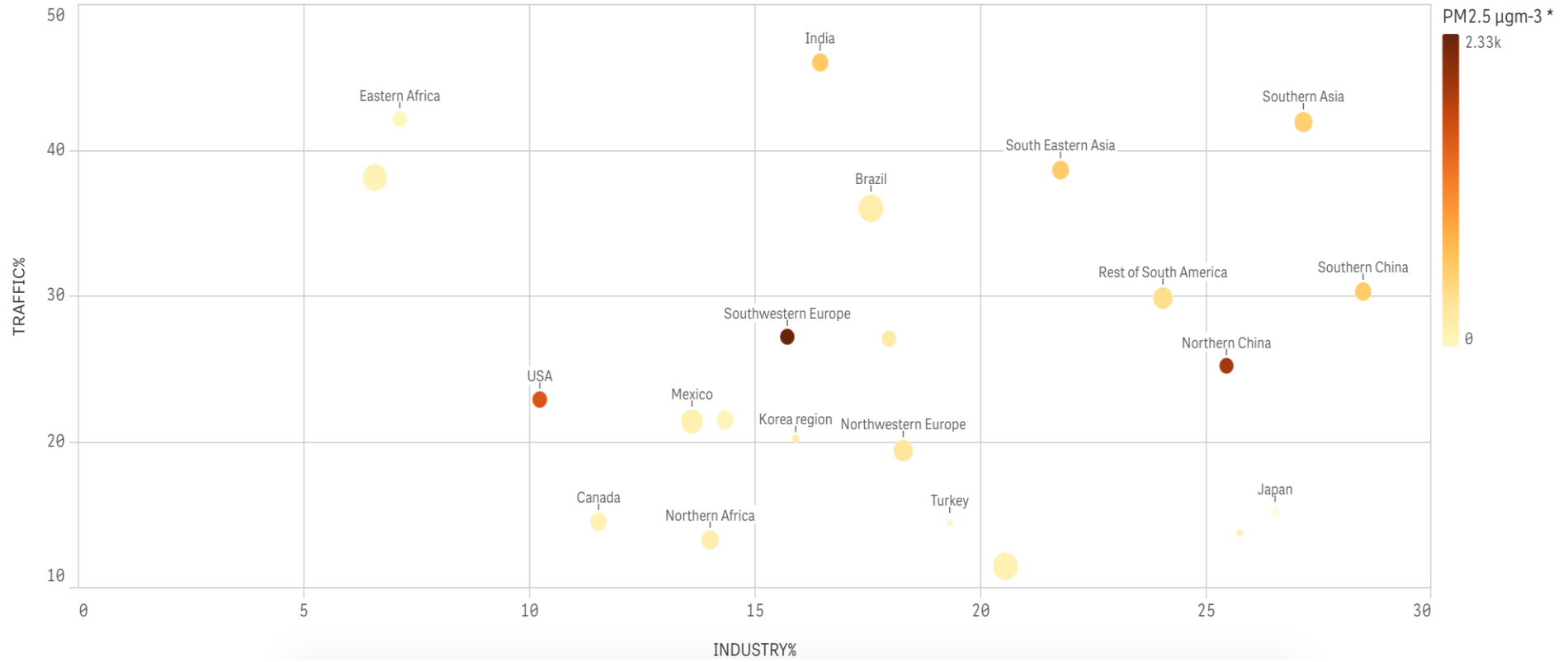
Visualizations

Average Industrial and Traffic pollution



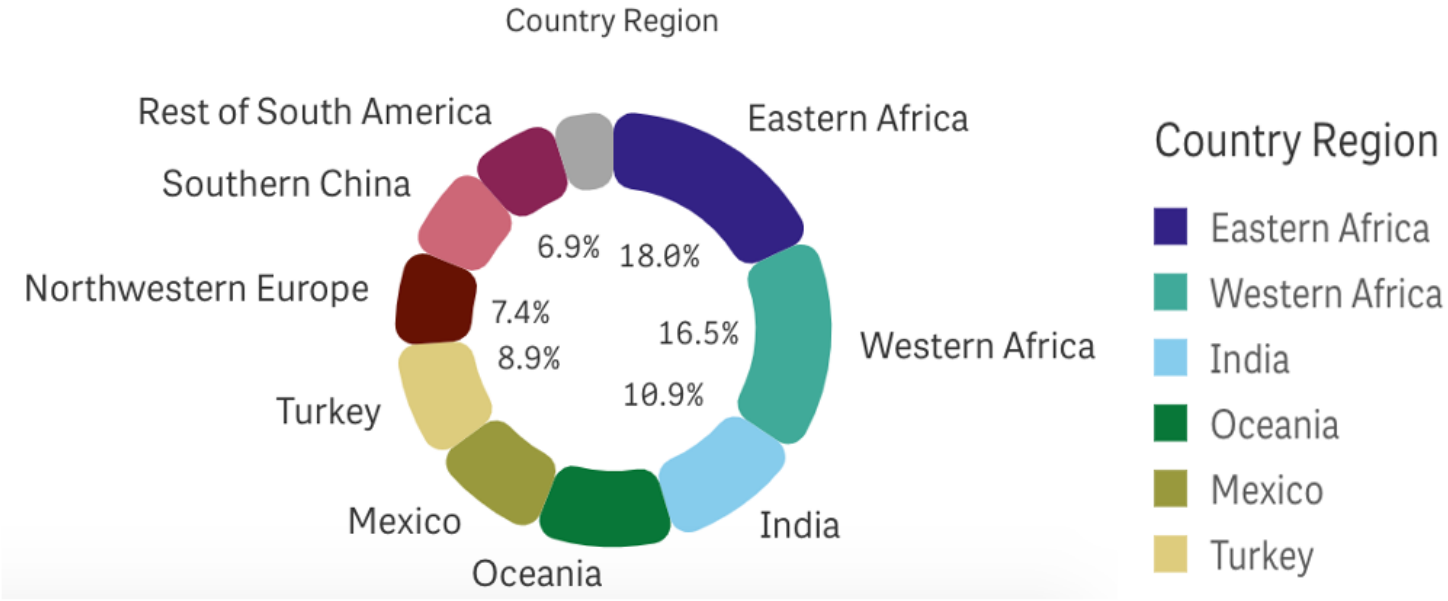
- According to the data, Japan has the highest industrial pollution followed by Brazil and Turkey
- Traffic issues are more prominent in Asian and European sub-continents
- This might be due to high population and more career opportunities in metropolitans.
- This eventually affects the quality of air causing health issues

Industrial, Traffic and Biom affecting PM 2.5 levels



- PM2.5 are tiny particles in the air that reduce visibility and cause the air to appear hazy when levels are elevated.
- It is evident from the scatter plot that southwestern Europe, Northern China and United States have high presence of PM2.5 level in the air due to large number of industries and biom burning

Percentage of sea-salt in different regions



- The continent of Africa has the highest percentage of sea salt owing to the fact that it is surrounded by ocean and produces 5 million tons of salt annually

- Sea salt worsens coastal air pollution

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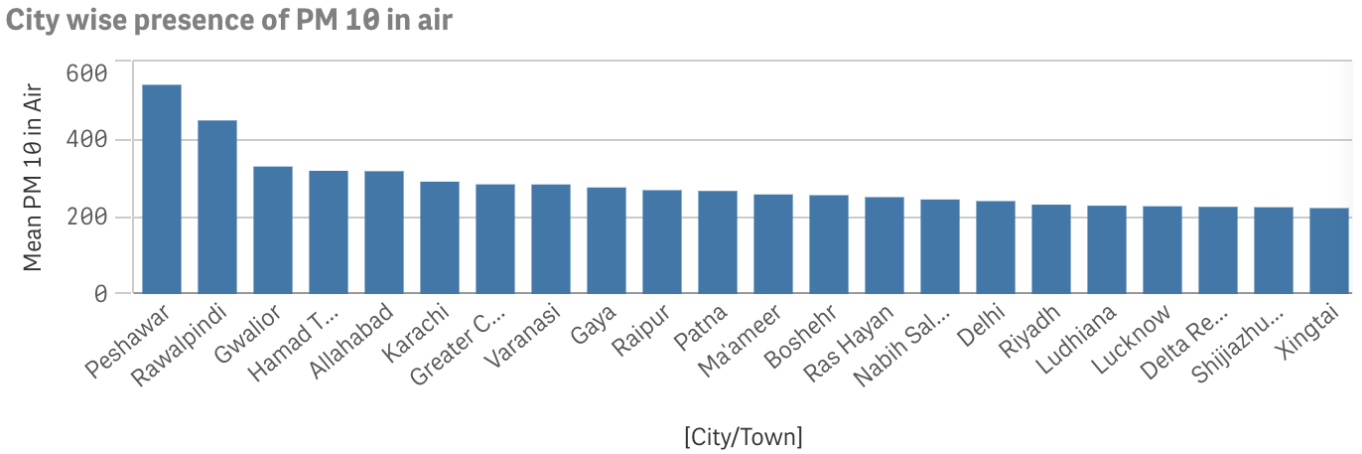
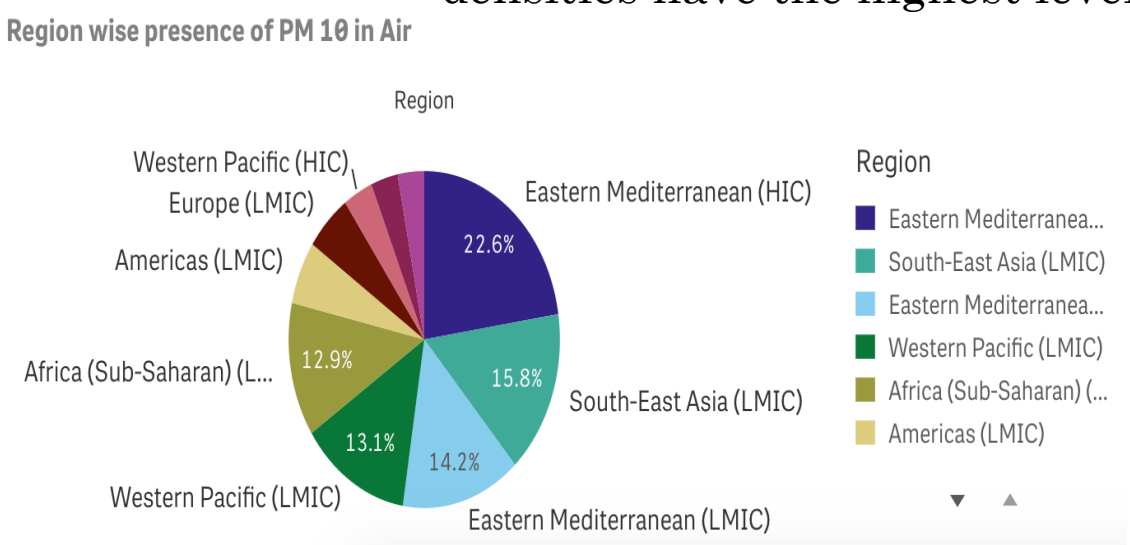
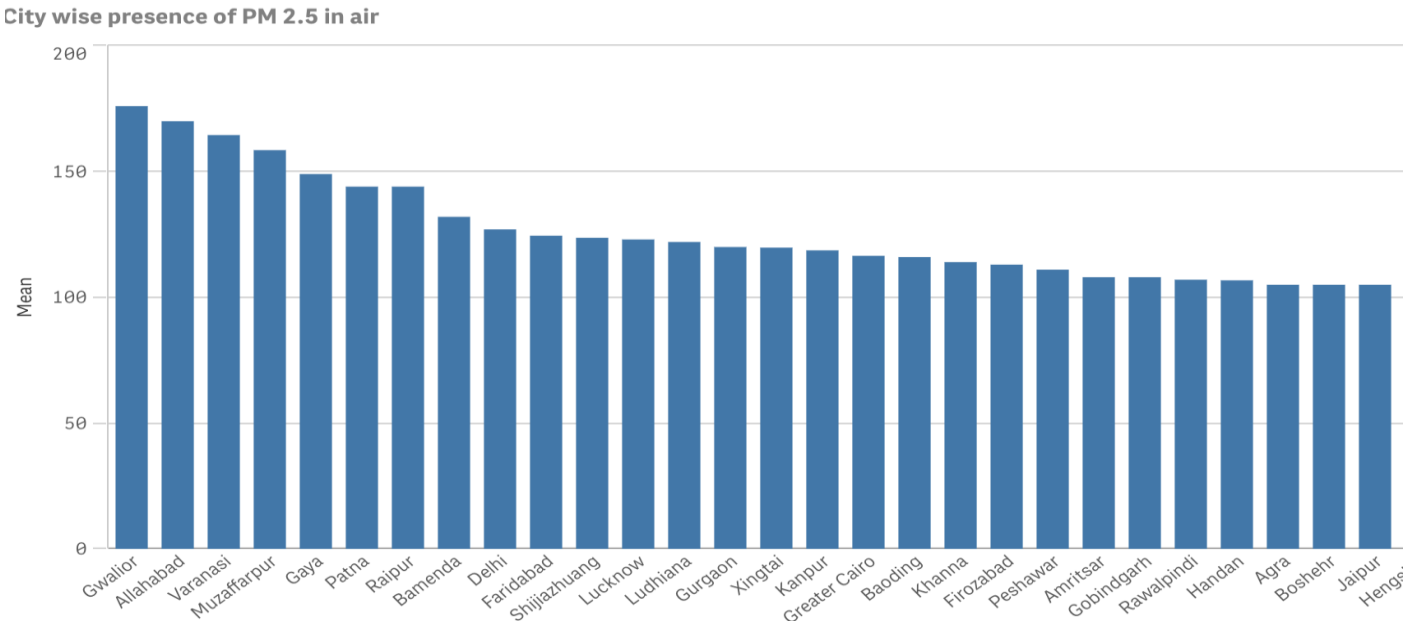
Presence of PM10 in air



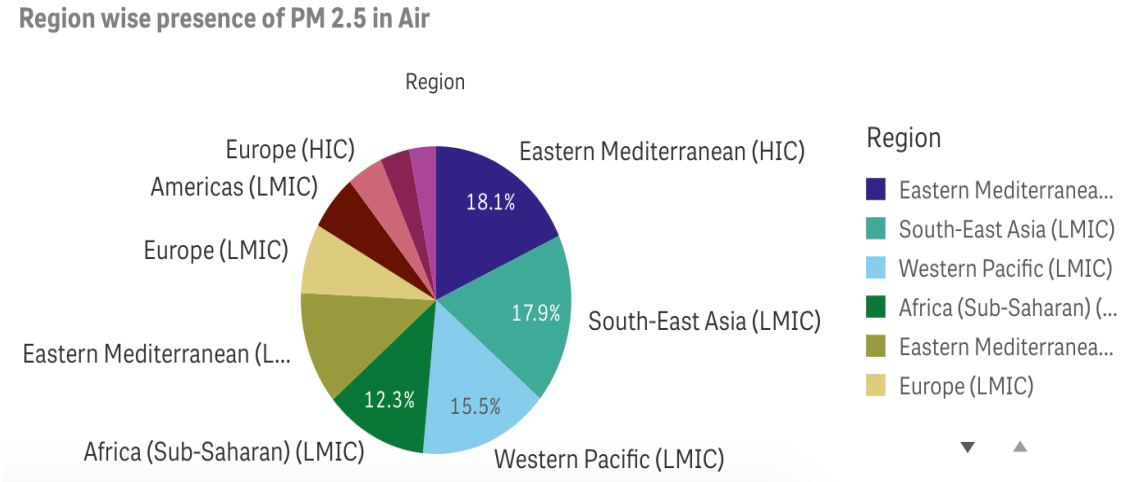
- PM10 particles form in the atmosphere as a result of complex reactions of chemicals such as sulfur dioxide and nitrogen oxides, which are pollutants emitted from power plants, industries and automobiles.
- Urban and heavily industrialized Asian cities with high population densities have the highest levels of vehicular emissions



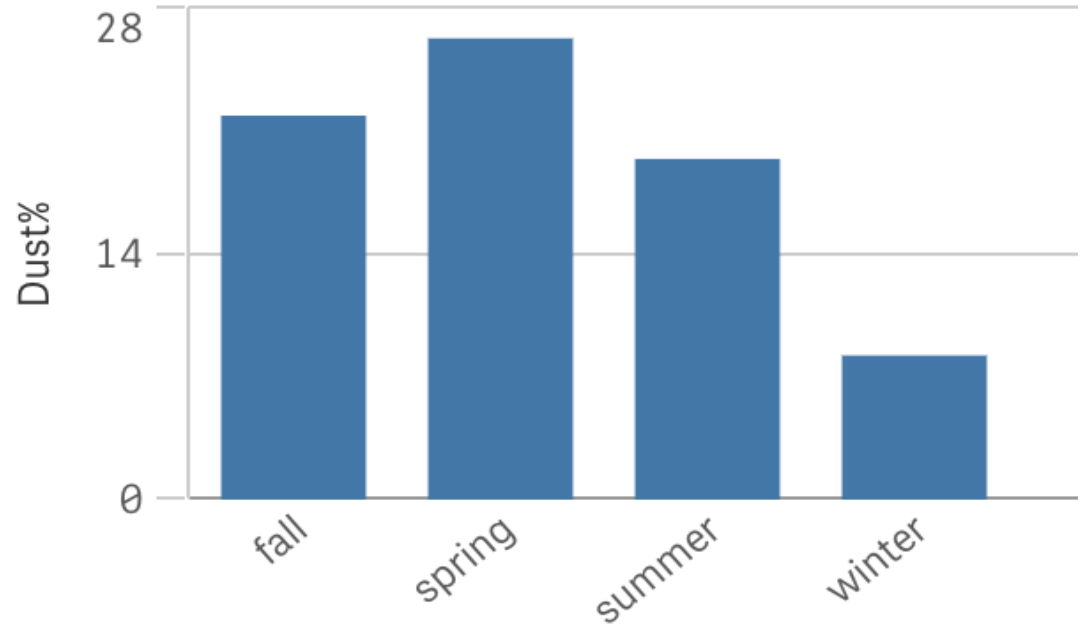
Presence of PM2.5 in air



- Pm2.5 is the mixture of solid particles and liquid droplets in air.
- Emitted due to combustion of fuels and domestic heating.
- It also has damaging impacts on the environment and agricultural crop yields.
- Asian cities are the most affected ones

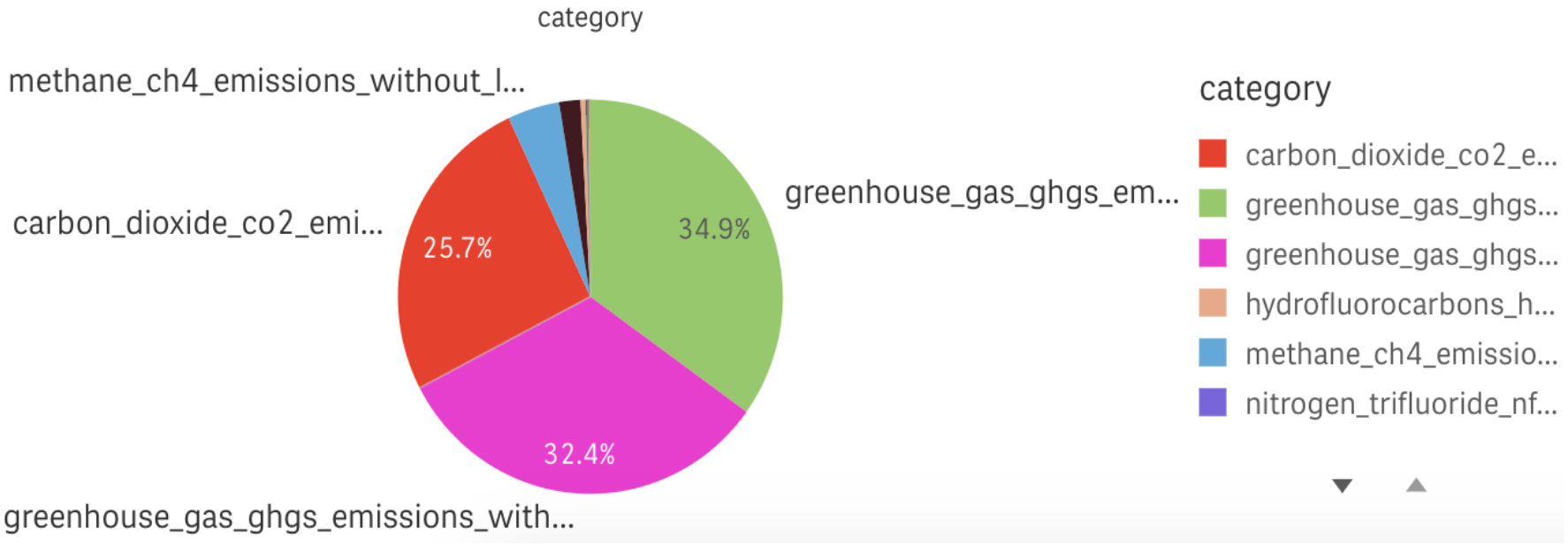


Effects of seasons on percentage of Dust in air



- People often think about dust only once it's settled—as something that needs to be cleaned from the surfaces of our homes, cars, and clothes. But when those fine particles are kicked up into the air, dust can have significant effects on human health.
- It has been linked to various respiratory illnesses
- In March, April and May, temperatures and humidity levels rise. These bring accompanying pollen, dust and mold inside through open windows and doors due to which we can observe that the percentage of dust is highest in spring.

Gases in atmosphere

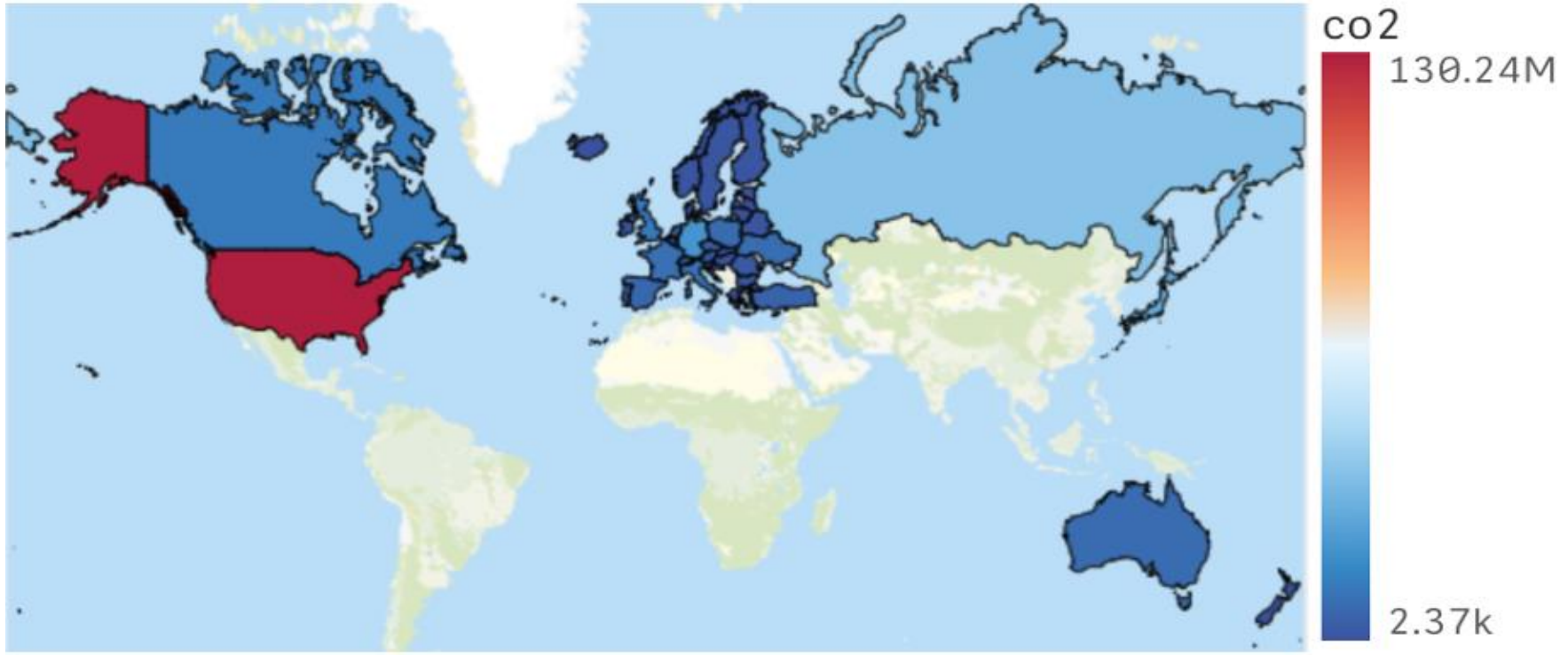


- Gases that trap heat in the atmosphere are called greenhouse gases.
- Greenhouse gases contributes towards 32.4% of the total gases present in the atmosphere
- Some gases are more effective than others at making the planet warmer and thickening the Earth's blanket.

Distribution of Methane

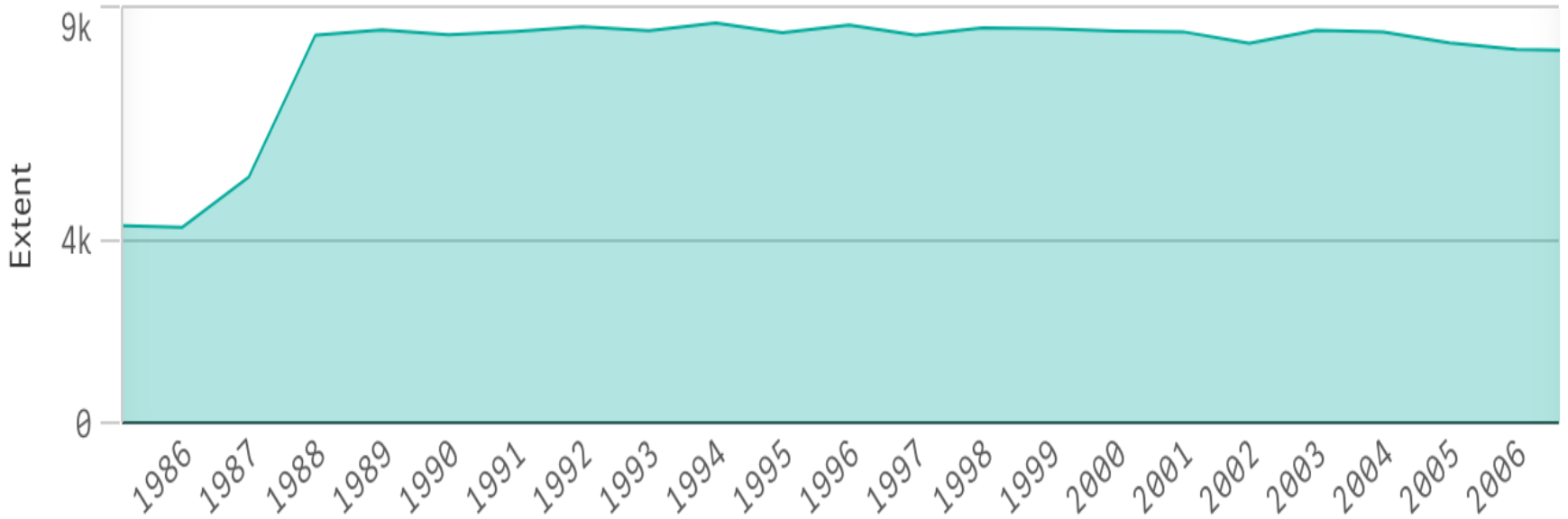
- Methane is emitted during the production and transportion of coal, natural gas, and oil.
- Methane emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.
- In addition to its climate impacts, Methane contributes to higher global background levels of ozone pollution.

Distribution of CO2



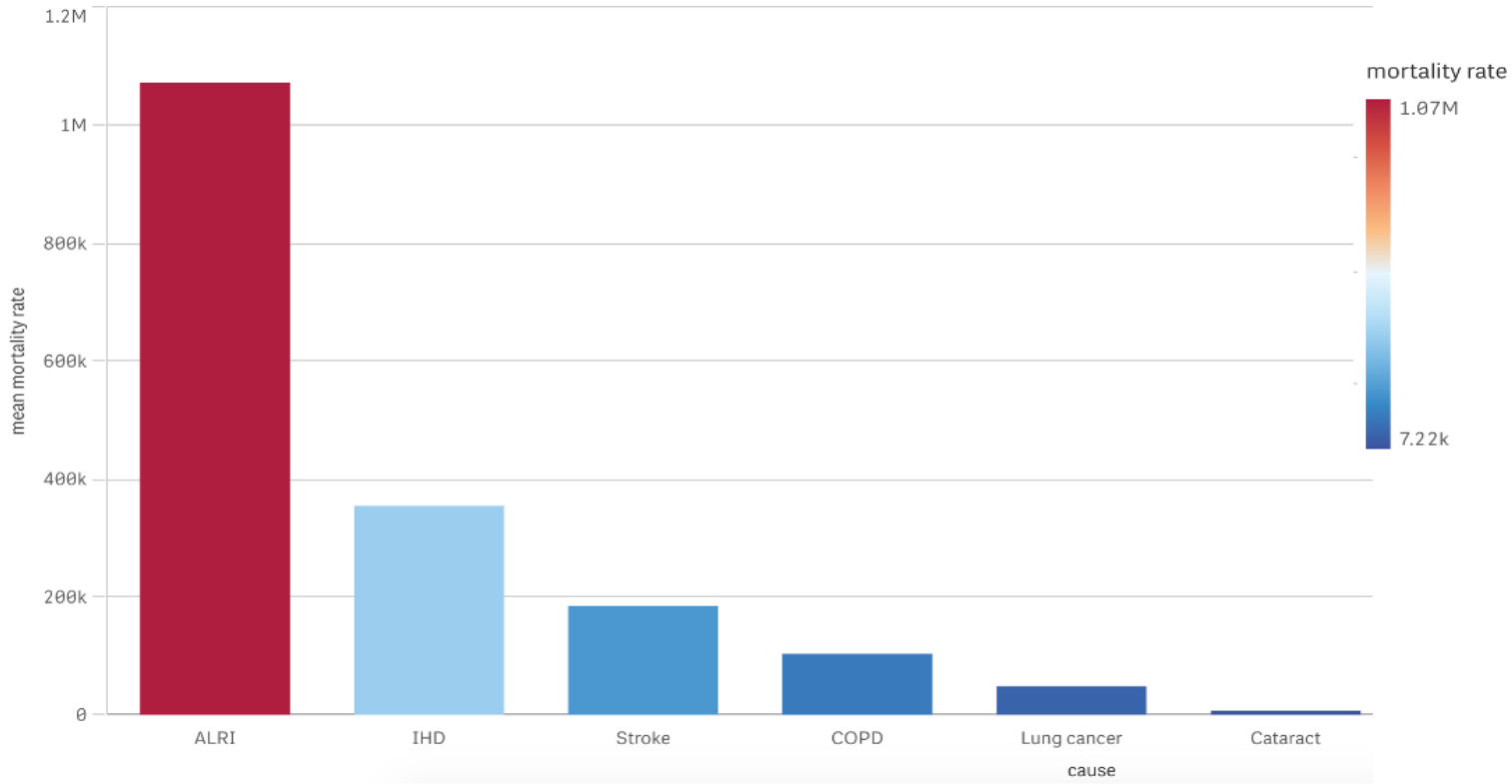
- Carbon dioxide has a significant impact on global warming partly because of its abundance in the atmosphere. According to the EPA, in 2016, U.S. greenhouse gas emissions totaled 6,511 million metric tons of carbon dioxide equivalents, which equaled 81 percent of all human-caused greenhouse gases .
- Additionally, CO2 stays in the atmosphere for thousands of years.
- Co2 emissions are prominent in United States

Extent to which ice melted over the years



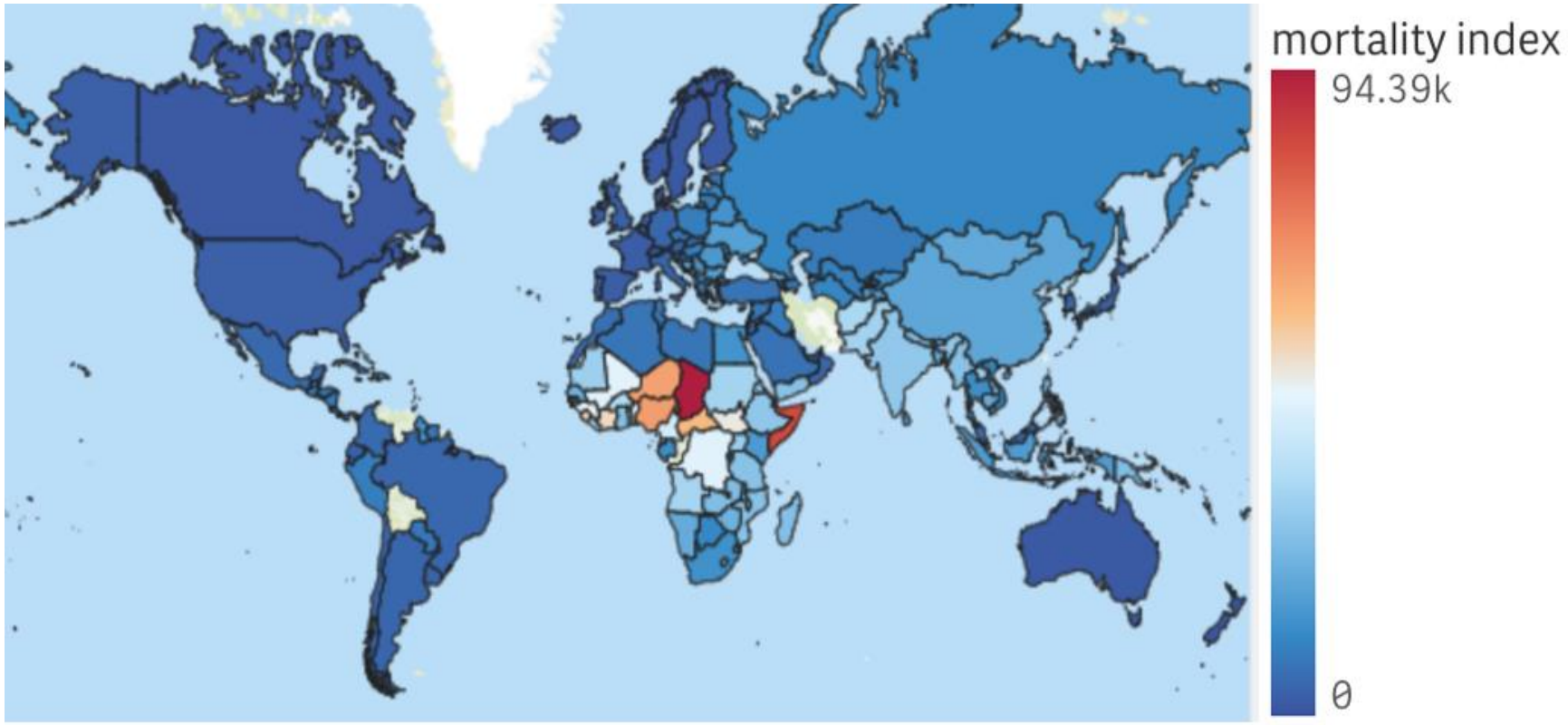
Human activities are at the root of this phenomenon. Specifically, since the industrial revolution, carbon dioxide and other greenhouse gas emissions have raised temperatures, even higher in the poles, and as a result, glaciers are rapidly melting, calving off into the sea and retreating on land.

Health issues due to pollution



- ALRI, COPD, Lung Cancer is caused by exposure to pollutants such as particulate matter and ozone that produce inflammation, an immunological response which leads to high mortality rate
- Long term exposure to particulate matter and nitrogen oxides can prematurely age blood vessel. With calcium buildup in the arteries blood flow to the heart is restricted leading to IHD and stroke
- In the developing countries, household air pollution resulting from inefficient burning of biomass causes blindness, cataract and dry eye disease

Mortality rate due to air pollution



- There is an estimation of 5 million deaths globally which contributed to nearly 1-in-10 deaths.
- Mortality rate is high in low to middle income countries.
- The central African region shows the highest mortality.

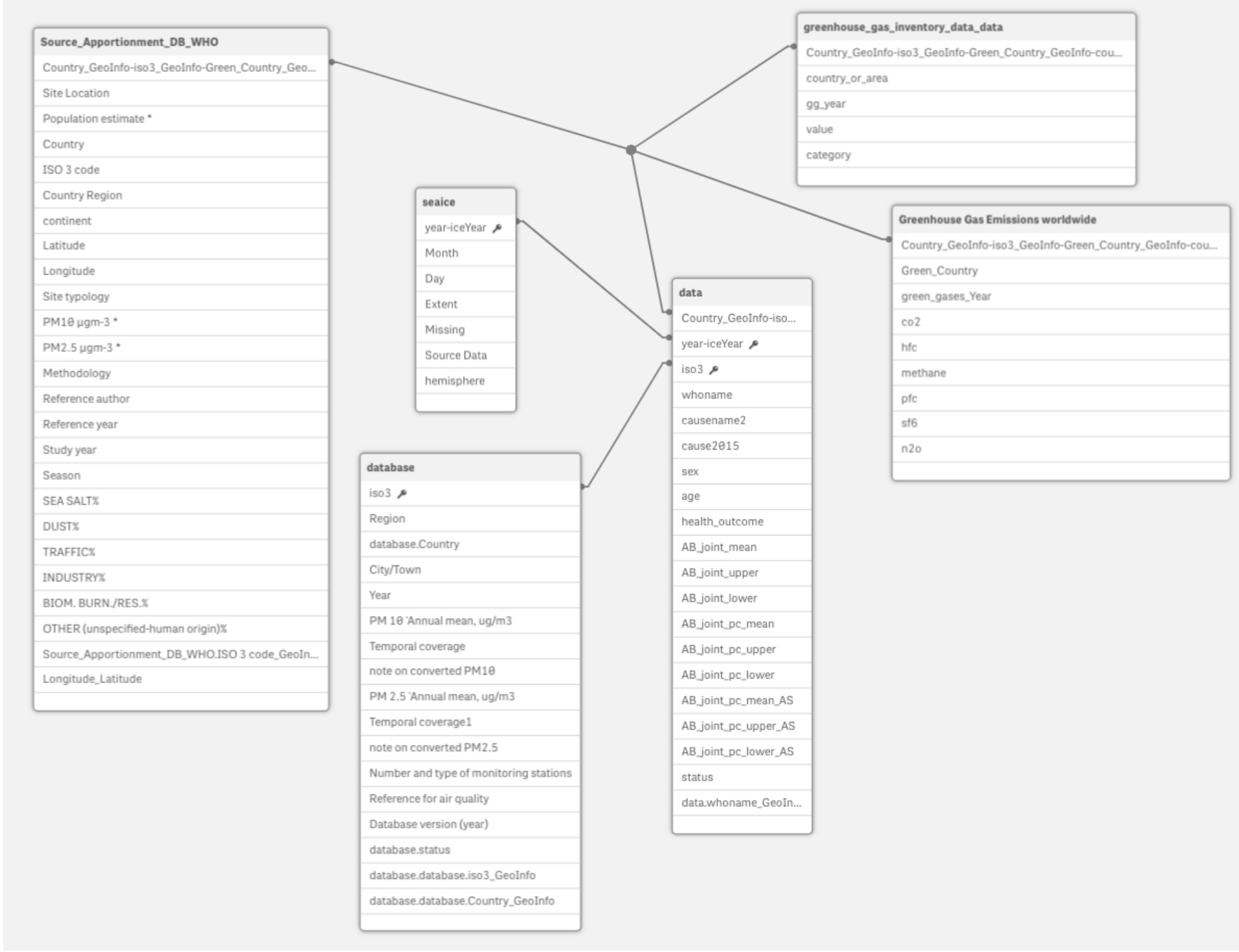
SOLUTION

- Usage of renewable resources
- Cities must think of heavily investing in convenient public transportation
- Asian cities have experimented with alternately banning cars with odd and even number plates
- Try to destroy pollutants before they enter the atmosphere by employing abatement mechanisms like catalytic oxidizer and recuperative thermal oxidizer
- To reduce household pollution, one can implement clean cooking to eliminate biom burning
- Government bodies should initiate and encourage tree plantation

CONCLUSION

- Human chain can combat pollution
- Due to the current pandemic situation, nations have come to standstill. With months of lockdown air pollution has reduced drastically and there is a significant improvement in air quality
- Although this measure is not feasible in our fully functioning economy, we should at least consider to be harmony with nature
- Adopting sustainable development patterns will prove beneficial

Data Model Diagram



Data Sets Used and Referenced

- https://www.kaggle.com/hafeezabro/greenhouse-gas-emissions-worldwidecsv
- https://www.kaggle.com/unitednations/international-greenhouse-gas-emissions
- https://www.kaggle.com/nsidcorg/daily-sea-ice-extent-data
- https://www.who.int/airpollution/data/cities/en/

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Thank You