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Data Visualization II

Air Pollution

Air Pollution is caused by various contaminants such as NO_2 (ug/m^3), PM_{10} (ug/m^3), and $\text{PM}_{2.5}$ (ug/m^3) present in the atmosphere. These contaminants are very harmful for human health and so precautions are required. The World Health Organization (WHO) offers global guidelines for important pollutants that risk human health and environment. In this project, we aim to create two dashboards using Tableau to visualize air pollution over the world by addressing our individual questions. The data that we used is from the WHO Air Quality Database.

Ashley's Dashboard: Visualizing Global PM_{10} Levels from 2016-2021 in WHO Air Pollution Data

One major pollutant in the atmosphere is PM_{10} , also known as particulate matter. PM_{10} are airborne particles that are less than 10 μm in diameter, they are so small that they effectively act as a gas. When breathed in they penetrate deep into the lungs and at high exposure it can result in a number of health impacts ranging from coughing, high blood pressure, heart attack, strokes, premature death, etc. The WHO provides an annual Air Quality Guideline (AQG) that recommends an average of $15(\text{ug}/\text{m}^3)$ of PM_{10} . However, oftentimes that recommendation varies across countries and so different interim target levels are given to help provide precaution to areas with high risk of PM_{10} pollutants.

Taking the WHO guidelines into consideration, my dashboard aims to visualize the global average of PM_{10} (ug/m^3) over 5 years (2016-2021) and evaluates individual countries standing in accordance with the WHO's recommended annual mean AQG level and interim targets for PM_{10} . In addition, the number of monitoring devices for pollutants were also visualized globally. During the process of creating this dashboard, there were several unique findings. It was found that the countries that reach interim target levels with lower PM_{10} concentrations have significantly more monitoring devices compared to countries with higher PM_{10} concentrations. Overall, it can be assumed that there is a possible correlation between PM_{10} concentrations and monitoring devices.

Xuechun's Dashboard

My dashboard is intended to answer two big questions: 1) what has world air pollution changed over the last 6 years? 2) What does the trend look like each year for the target countries?

In order to address these two questions, I created a dashboard which includes three pie charts and two line graphs. Three pie charts represent the sum of three different air pollutants (PM_{10} , $\text{PM}_{2.5}$, NO_2) for different countries over the last 6 years to answer my first question. According to the pie charts, European countries such as Italy, Germany, and France dominate the world for NO_2 emissions. India and European countries dominate the world PM_{10} emissions. However, for $\text{PM}_{2.5}$, China takes up 50% of world $\text{PM}_{2.5}$ emissions.

To address the second question, I picked two target countries, China and India because of their significant dominance of $\text{PM}_{2.5}$ and PM_{10} emissions. I created two line charts demonstrating the air pollution emission $\text{PM}_{2.5}$ and PM_{10} by year measurement to see the air pollution trend of each year. According to the line graphs, for $\text{PM}_{2.5}$, from 2011-2019, China's $\text{PM}_{2.5}$ emission goes up and down by different years. But the overall $\text{PM}_{2.5}$ emission increases from 2011 to 2019. In addition, China reaches

its peak emission in 2018 and goes down afterwards. For India, NO₂ emission increases every year from 2010 to 2019 and it reaches its peak in 2019.

Our Experience

Learning about Tableau and being able to practice visualizing real-world data was a very enjoyable and educational experience for us. Initially, it was not an easy process for us as we were new to Tableau and had to take some extra time to explore. However, we learned and helped each other at times when problems occurred. We had a great time working together. Also, we are truly grateful for all the advice and support that we received from our coach Dr. Hermione Zouridis.

All in all, Tableau is definitely a tool we look forward to using on future projects!