CSC343 Project Phase 3 - Discussion

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Investigative question 1: Does the amount of emissions affect the amount of people dying from air pollution?

To answer this question, we calculated the percent change in deaths per 100,000 for consecutive years in the world, as well as the percent change in emissions for consecutive years in the world. We then used a where clause to select the rows where the percentage change in deaths was positive (indicating an increase in the number of deaths in that time) and the percentage change in emissions was positive (indicating an increase in the tonnes of emissions). The result was that there are zero rows that fit the above criteria. When we decided to look at the result of the previous query (**WorldConsecutiveDeathsAndEmissionslabel in demo**), which printed those percentages, we noticed that there are no consecutive years where the percentage change in deaths due to air pollution is positive. This means that deaths due to air pollution have only been going down. Emissions were unrelated to deaths due to air pollution, as the value of the percent change of emissions would constantly fluctuate. As a result, we concluded that there was no correlation between emissions and deaths due to air pollution. 0% percent of the time, deaths due to air pollution and emissions both increased (**Percent_DeathsEmissions_ConsecutiveYears_Increase**).

As a follow up, we decided to calculate the exact number of deaths from 1990 to 2017 (**CumulativeWorldDeaths1990to2017 label in demo**) by summing up the total deaths due to air pollution in the world. We found that the majority of deaths due to air pollution are indoor deaths. Along the way, we also were curious to see what percentage of the world's total population dies to air pollution, so we divided total deaths due to air pollution of the world in every given year by the total population of the world in every given year (**WorldAllDeathsActualAmount label in demo**). We found that the results of that also reflected our previous answer, as the percentage of deaths caused by air pollution decreased each year.

Investigative question 2: Does socio-demographic index have an effect on the number of deaths from air pollution?

To answer this question, we found the average total, outdoor, indoor, and ozone deaths per 100,000 for each of the Socio-demographic Index (SDI) categories (low, low-middle, middle, high-middle, high), and then sorted by total deaths in descending order. (**AverageDeathsBySDI label in demo**) We observed that the order of the SDI's, when ranked by average total deaths due to air pollution (descending) was: low sdi > low-middle sdi > middle sdi > high-middle sdi > high sdi. In other words, SDI rank is inversely correlated with total deaths due to air pollution. We discussed the possible reasons for this, and concluded that it may be because of a few factors including:

- Higher SDI countries have more infrastructure, and are therefore able to build landfills away from residential areas, and have enforced guidelines in place for disposal of waste,

whereas lower SDI countries do not always have this, resulting in residents of lower SDI countries are more often exposed to emissions stemming from waste disposal

- Higher SDI countries are more likely to have better healthcare - by virtue of having the infrastructure to build post-secondary institutions, hospitals, and have access to better medical technology
- Higher SDI countries are more likely to have workers work in humane conditions, as jobs in developed countries are often done in offices and other buildings that are well ventilated, whereas lower SDI countries have workers that are working in less humane conditions. Housing is also more likely to be well ventilated in higher SDI countries.

This led to us looking into the percent change between consecutive SDI ranks. (**ConsecutiveSDIsAverageDeathsChange label in demo**) We took the results from the previous answer and decided to calculate this percent change between low to low-middle, low-middle to middle, middle to middle-high, and middle-high to high. We found that generally there was a 20% decrease in deaths due to air pollution when jumping from one SDI rank to the one above it. The only exception was the jump from middle-high to high, which was a 66% decrease in deaths due to air pollution.

Investigative question 3: Is there a general correlation between population and the amount of emissions?

To answer this question, we found the year over year percentage change in population of all our countries, as well as the year over year percentage change in emissions in that given country, and checked to see if there was a correlation between increasing population and increasing emissions. (**ConsecutivePopulationAndEmissions label in demo**) We observed that most of the time, when the year-over-year percentage change in population was positive (indicating an increase in population over that period), the percentage change in emissions (indicating an increase in deaths due to emissions over that period) was also positive. We believe that although population and emissions are correlated, the emissions may not be exclusively caused by population, and vice versa.

As a follow-up, we wanted to see exactly how much more likely it is that an increase in emissions happens at the same time as an increase in population. To answer this follow-up we decided to count the number of rows where there is a percentage increase in population and emissions, as well as counting the number of rows where there is an increase in population and a decrease in emissions, and then divide both by the total number of rows. What we found was that approximately 78% of the time, emissions and population both increased. (**Percent_PopulationEmissions_ConsecutiveYears_Increase label in demo**) It should be noted that there was no situation in our sample data where there was a decrease in population between consecutive years for any country.