Exploratory Data Analysis on Mortality rate and factors effecting it (Correlation with Life Expectancy)

INTRODUCTION

The mortality rate, often known as the death rate, is a measurement of the number of fatalities (generally speaking, or those caused by a particular cause) in a given population, scaled to that population's size, per unit of time. A mortality rate of 9.5 (out of 1,000) in a population of 1,000 would represent 9.5 deaths per year in that entire population, or 0.95% of the total. Mortality rates are commonly reported in units of deaths per 1,000 people per year. It is different from "morbidity," which refers to a disease's prevalence or incidence, as well as the incidence rate (the number of newly appearing cases of the disease per unit of time). The mortality rate, which examines mortality from all causes in a particular time period for a given population, is a crucial specific mortality rate measurement. For instance, according to CIA predictions, the worldwide crude mortality rate will be 7.7 per 1,000 individuals in a population per year by 2024. In a generic form, 189 mortality rates can be seen as calculated using {(d/p). 10^{n}}, where d represents the deaths from whatever cause of interest is specified that occur within a given time period, p represents the size of the population in which the deaths occur (however this population is defined or limited), and 10^{n} is the conversion factor from the resulting fraction to another unit.

FACTORS AFFECTING MORTALITY

POVERTY

Poverty is often associated with poor nutrition, poor health, and high mortality. But how strong is that association? Is it changing, or is it the same today as it was in the past? Mortality rates in the world have decreased considerably over the past 50 to 100 years. The crude death rate in the world—that is, the number of deaths in a year relative to the number of people alive at the start of that year—has declined

ENVIRONMENT

THE study found that exposure to above-average levels of outdoor air pollution increased risk of death by 20% and risk of death from cardiovascular disease by 17%. Environmental factors, such as air pollution, are also highly predictive of people's chances of dying, especially from heart attack and stroke. These factors include high blood pressure, diabetes, and smoking.

Cooking meals on wood or kerosene stoves that aren't adequately vented through a chimney increases total mortality risk by 23% and cardiovascular death risk by 9%, respectively (by 36 percent and 19 percent). Living close to busy roadways and distant from specialized medical centers both raise the chance of dying.

Research Questions:

1. Which country has the highest mortality rate and how it is changing over past decades?
2. Does poverty effecting mortality rate and is there any correlation between life expectancy and mortality?
3. Does environmental change effecting mortality rate?
4. Age, sex and other factors effecting mortality rate? Is it the same or different in different age groups?
5. Based on relation with the group of age, which factor causing more fatalities leading for increase in mortality rate?
6. Does the emergence of new medicines and technologies in healthcare system effecting mortality rate?

Methodology:

To get the required insights, it is important to get the required data from different sources and do the preprocessing to make sure it is not biased.

The data is sourced from:

https://ourworldindata.org/

www.cdc.gov/nchs/data/databriefs/db427.pdf

https://ourworldindata.org/explorers/poverty-explorer

https://ourworldindata.org/life-expectancy

https://www.who.int/data/gho/gho-search

https://platform.who.int/mortality

https://www.kaggle.com/datasets/rrp170330/variability-in-the-poverty-rate-in-the-us-counties

https://fred.stlouisfed.org/

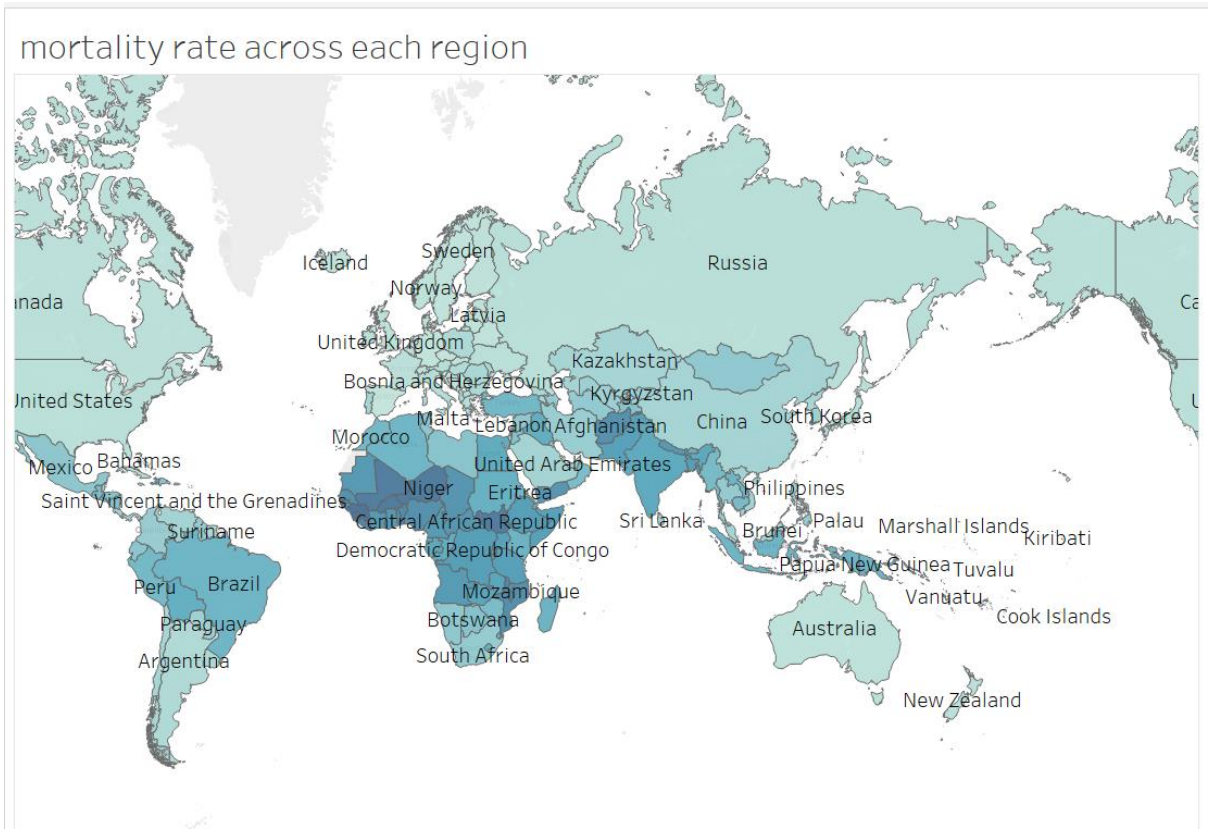
https://platform.who.int/mortality/themes/theme-details/topics/topic-details/MDB/ill-defined-injuries-accidents

With the data gathered, we have also created a new table named new drugs improved by gathering data from a paper published with link given above.

Analysis:

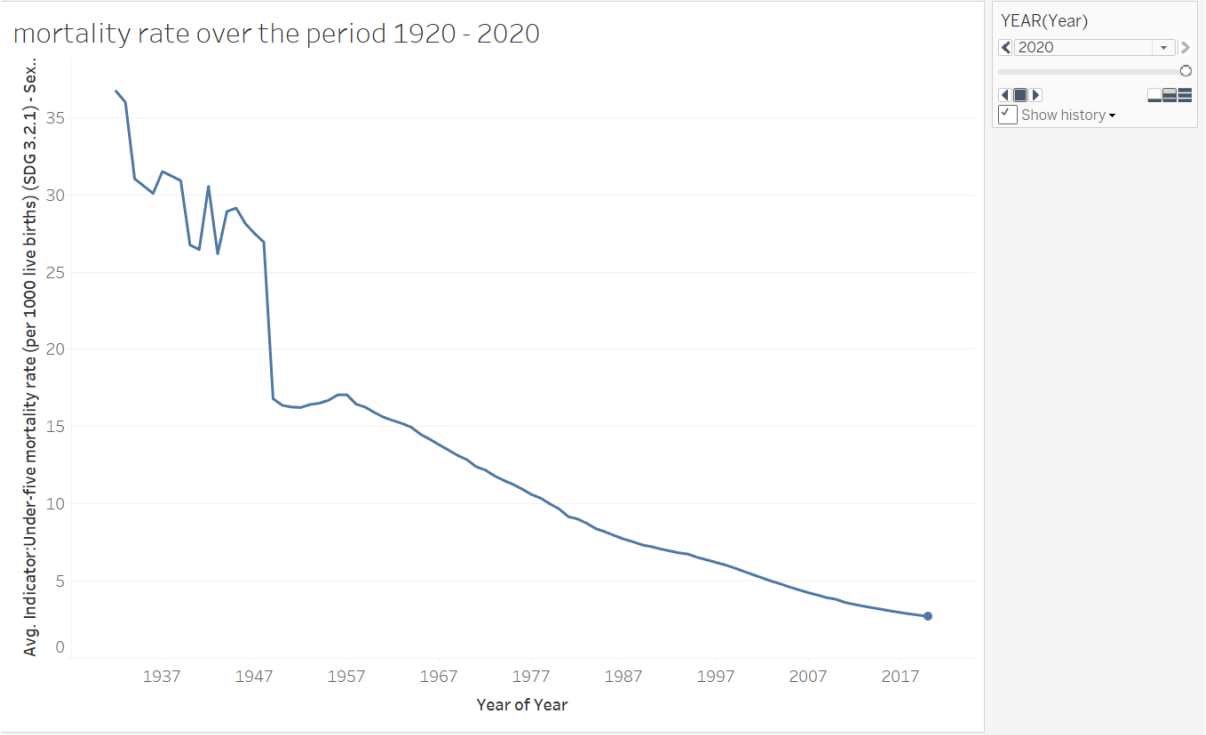
Technology Used: Tableau desktop, Tableau Prep builder

1. Mortality rate Across each region



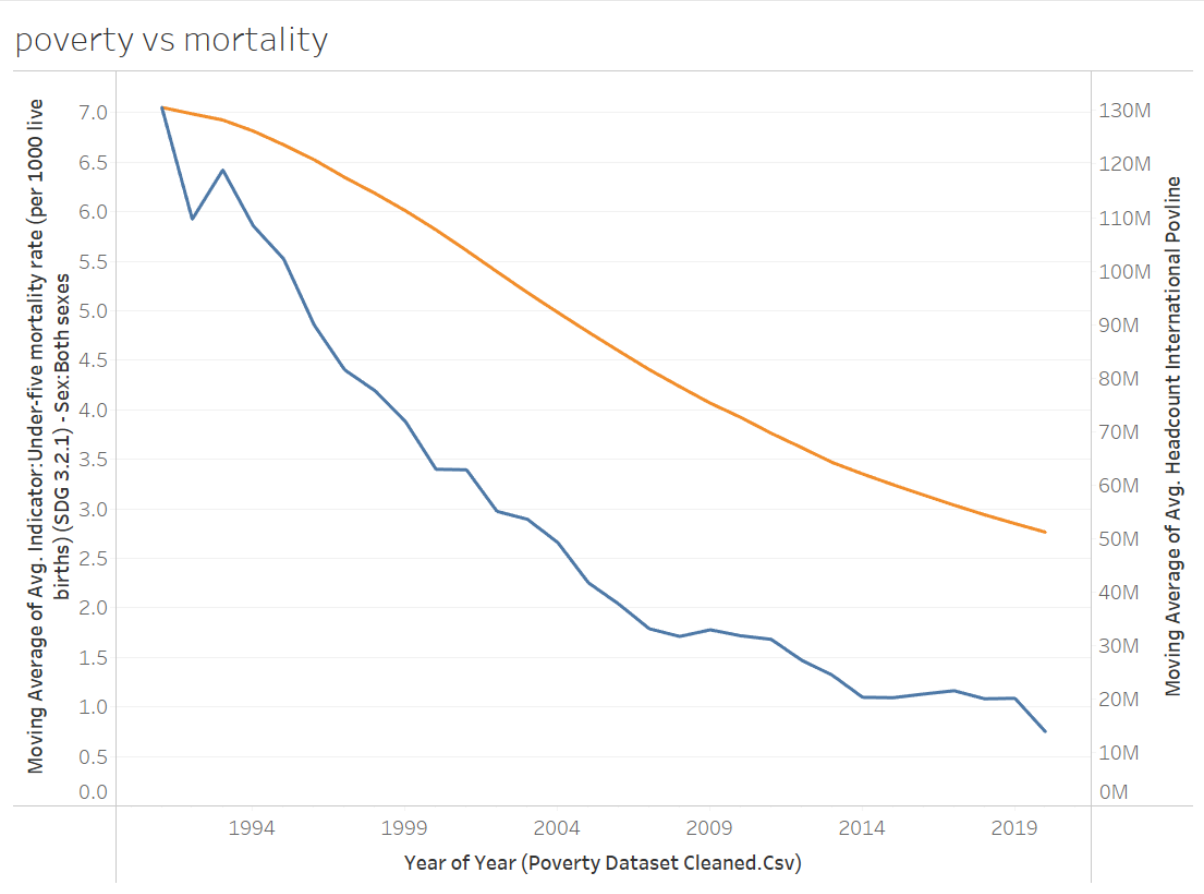
- African states have the highest mortality rate.
- Our next analysis is to know whether it is same in all the past decades or is it getting better

2. Mortality rate over the period of 1920-2020



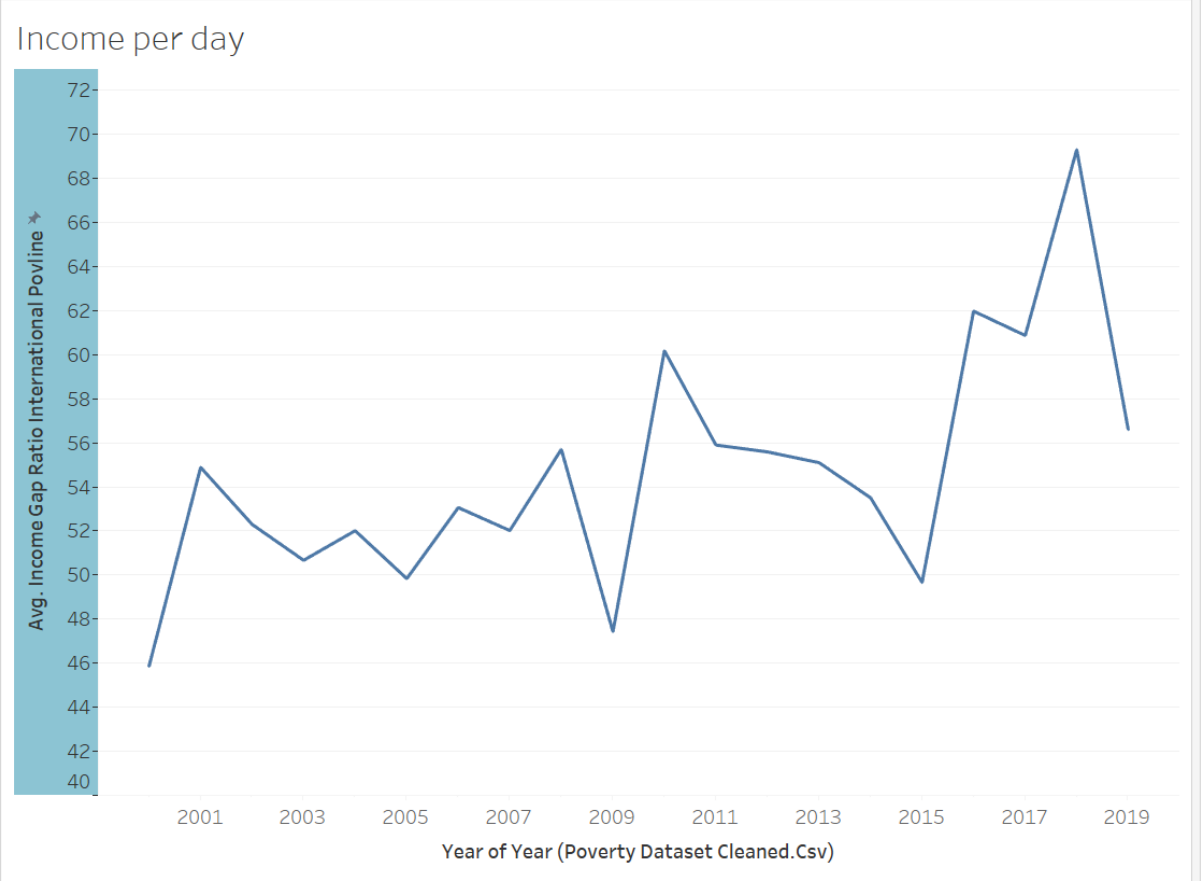
- We can see that there is decrease in mortality rate over the last decade
- This is a good sign as the number of deaths per count in region is decreasing
- Let us drill into the factors effecting mortality

3. Let us see if there is any relation between poverty and mortality



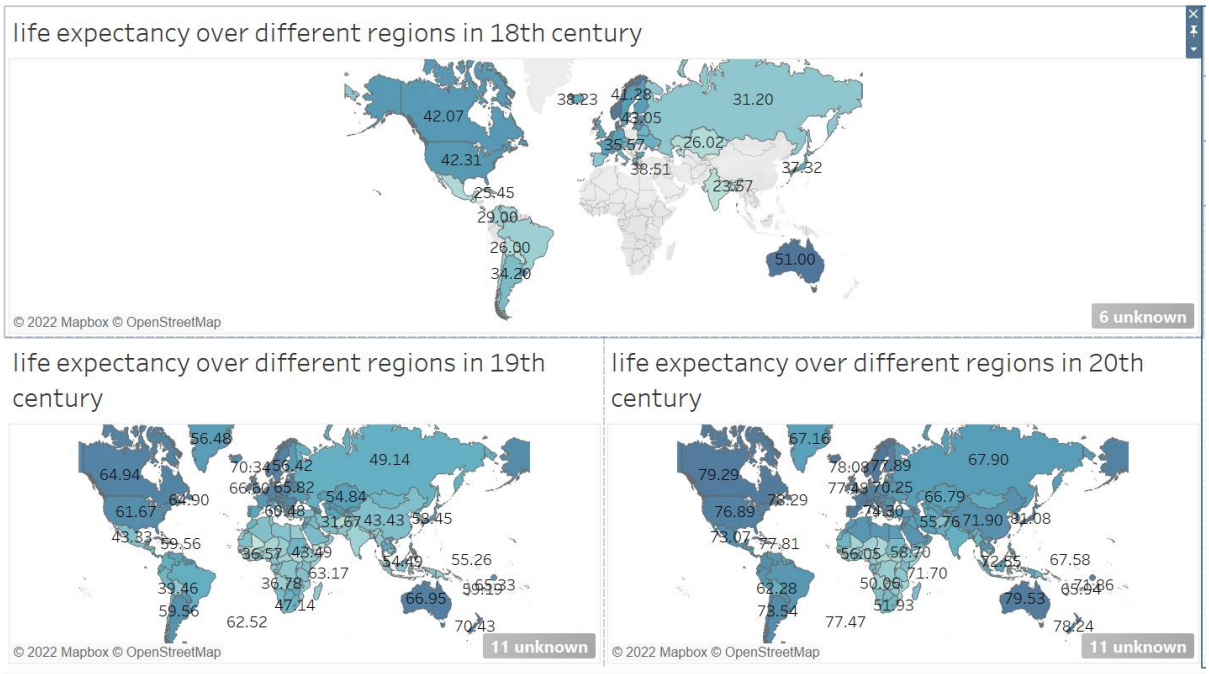
- We can see that the decrease in poverty leading for decreasing mortality rate
- It is clear that there is a linear relation between poverty and mortality with a significant slope value
- As we know that there are intermediate factors effecting poverty, let us see if they are effecting the mortality

4. As income per day is a factor effecting poverty, let us see if it is increasing over the past century



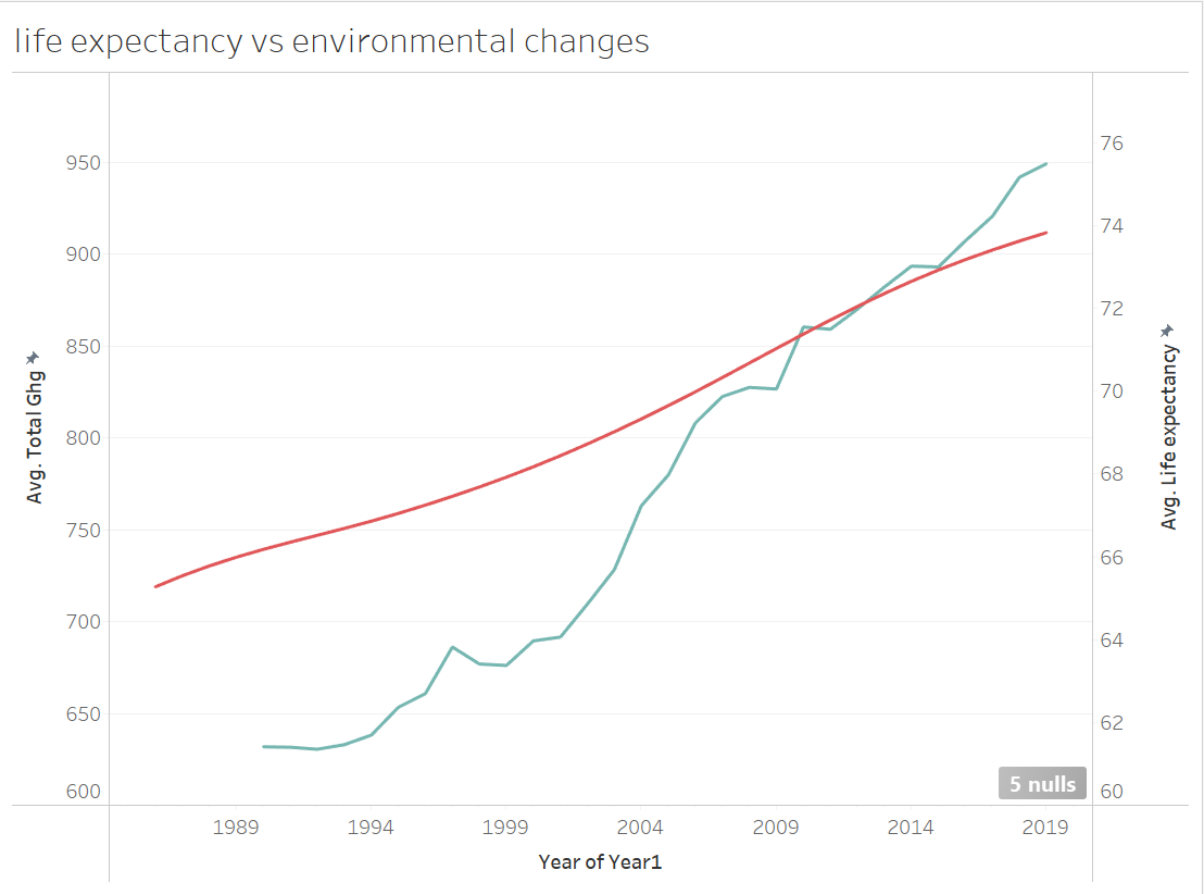
- There is a clear rise in income per day which shows that it is a sub factor which is indirectly effecting mortality rate
- Let us see using the life expectancy metric in 18th, 19th and 20th century

5. How life expectancy is changing across all the regions in different centuries



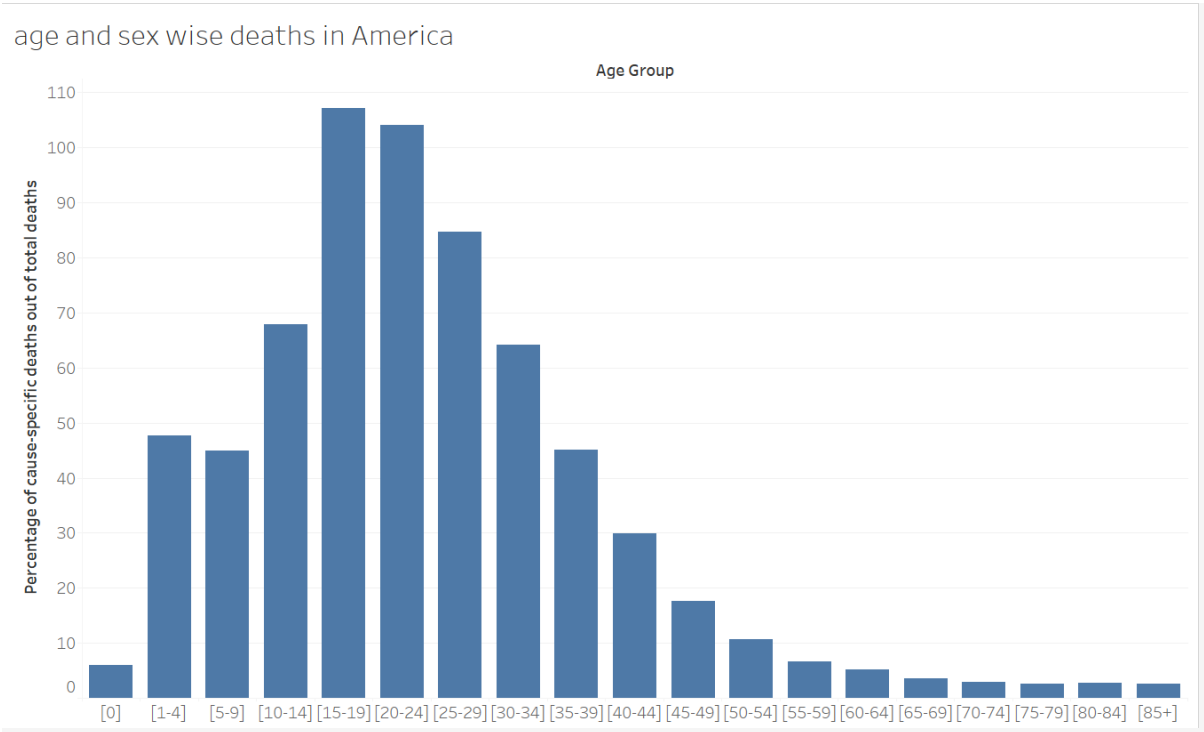
- We can see that there is a significant change in life expectancy from 18th century to 20th century
- Let us consider United States and we can see that the average life expectancy in 18th century is 42.31 and in 19th century is 61.67 and in 20th century is 76.89
- Let us see how environment is effecting mortality and get some insights

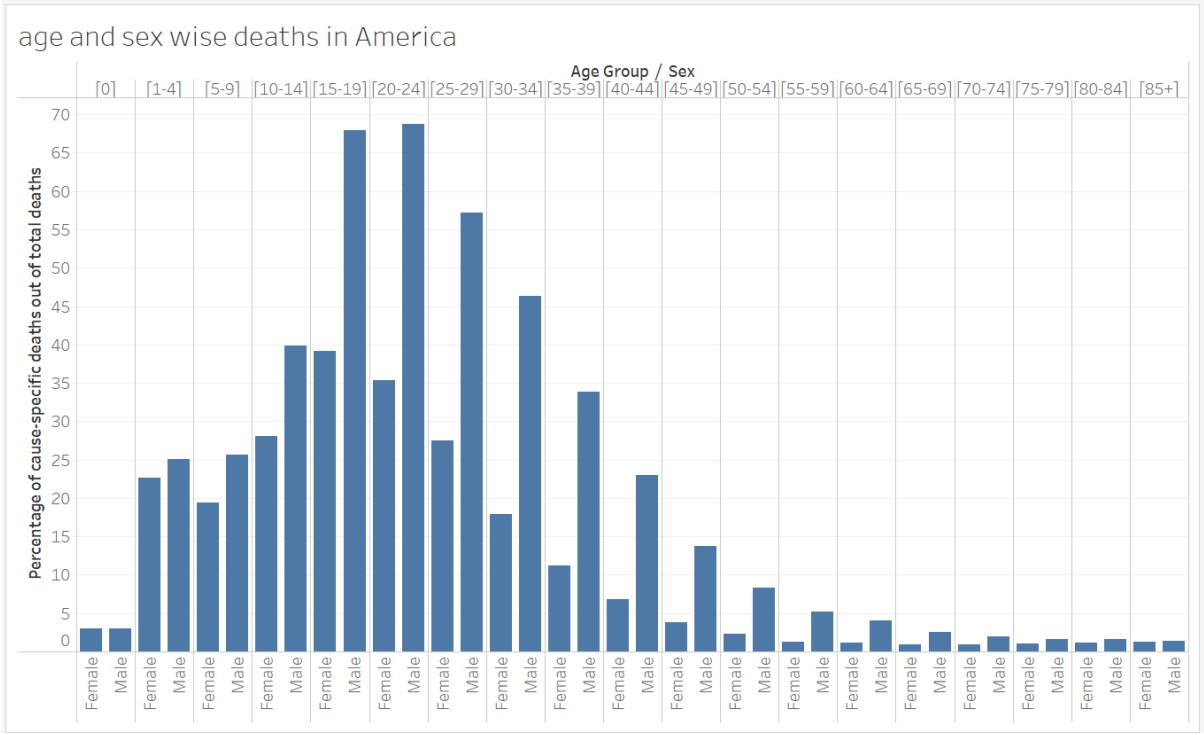
6. Let us see how emission of green house gases effecting life expectancy



- Here, the emission of green house gases is increasing and also the life expectancy is increasing
- Despite of increase in pollution and bad weather conditions, the life expectancy rate is increasing
- This might be because of the advancement in health care system and new drugs improvement
- Let us find out how the production of new drugs has been in the last decade in the later part of analysis

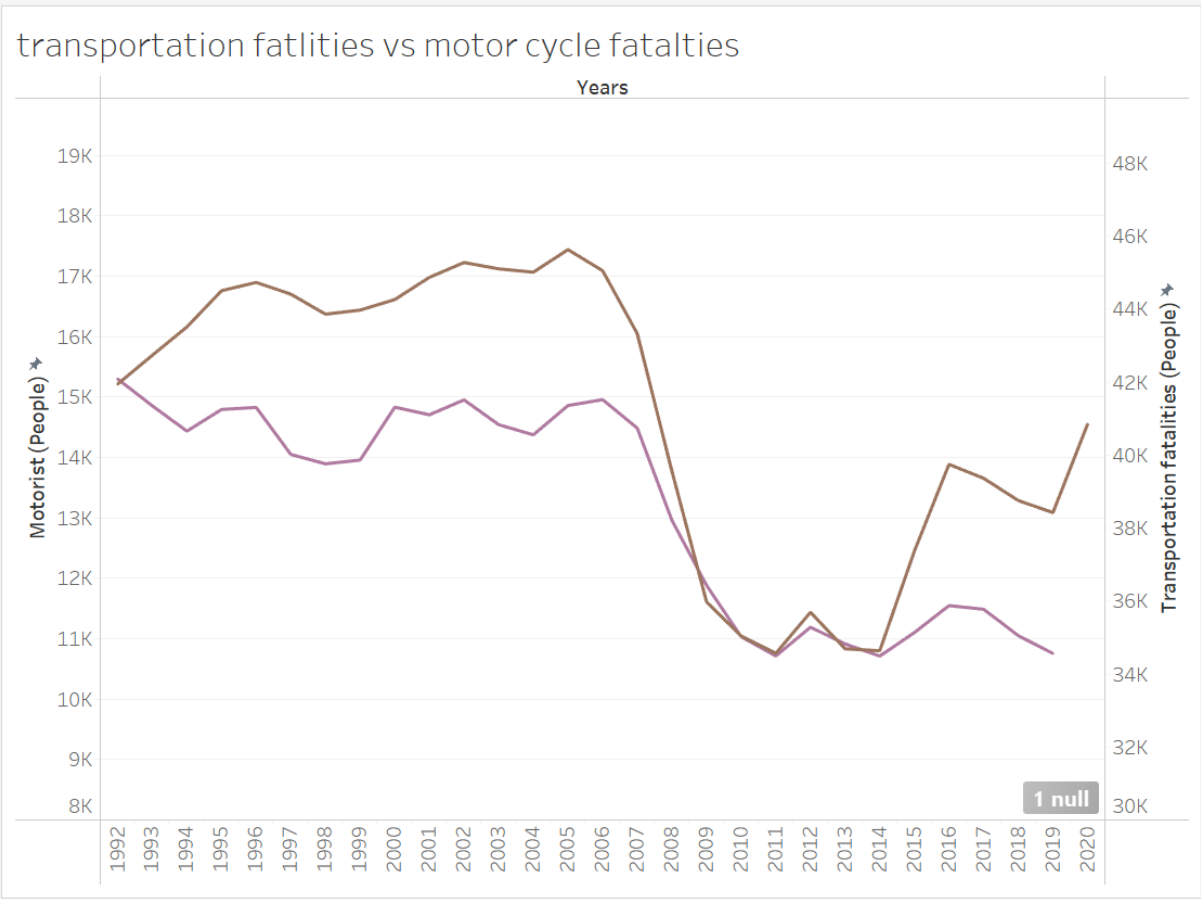
7. Age and sex wise deaths in United states





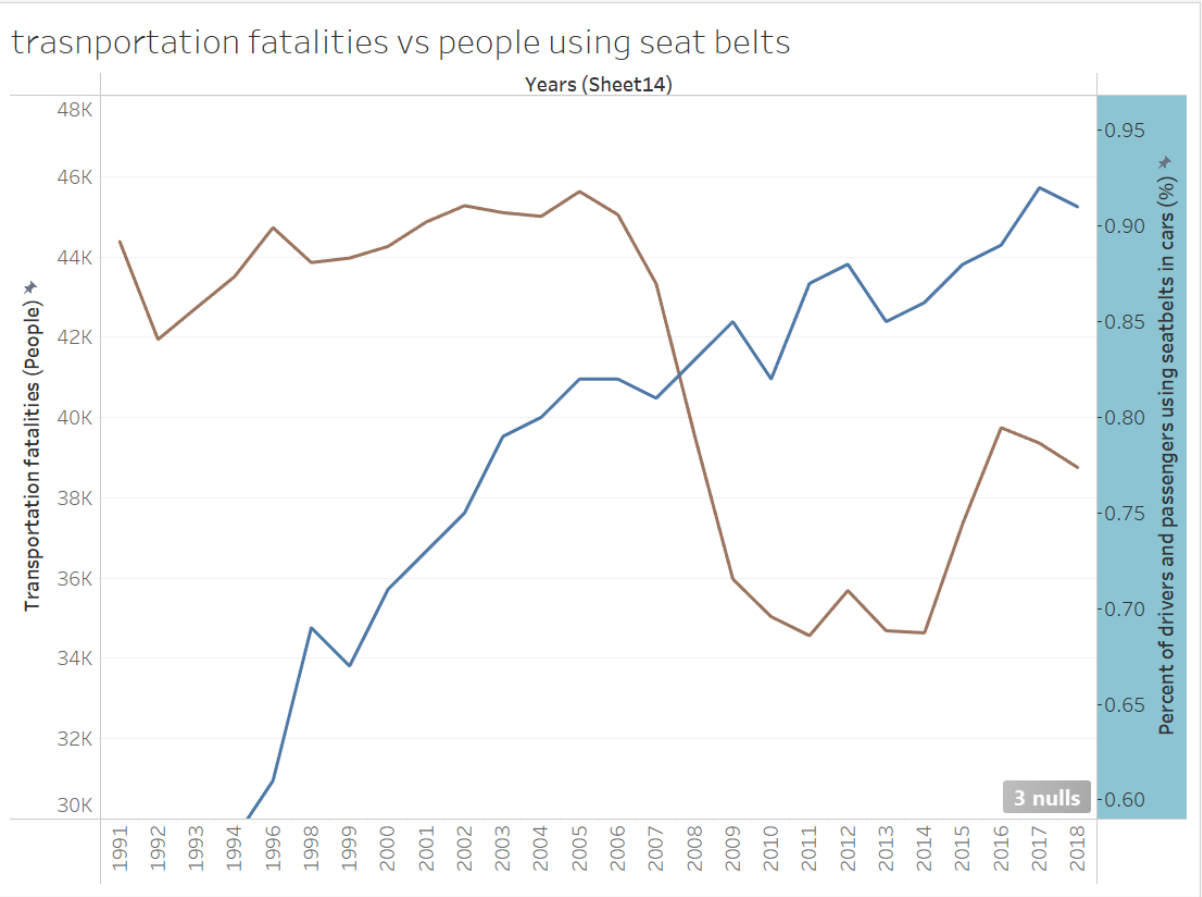
- It is clear that the deaths in males are higher than females

- The number of deaths are higher in the age group of 15 – 24
- Most of the young adults are dying in united states
- This might be because of transportation fatalities and as the age group is young adults, it might be because of motorcycle accidents
- Let us see how fatalities related to motorcycle in united states are



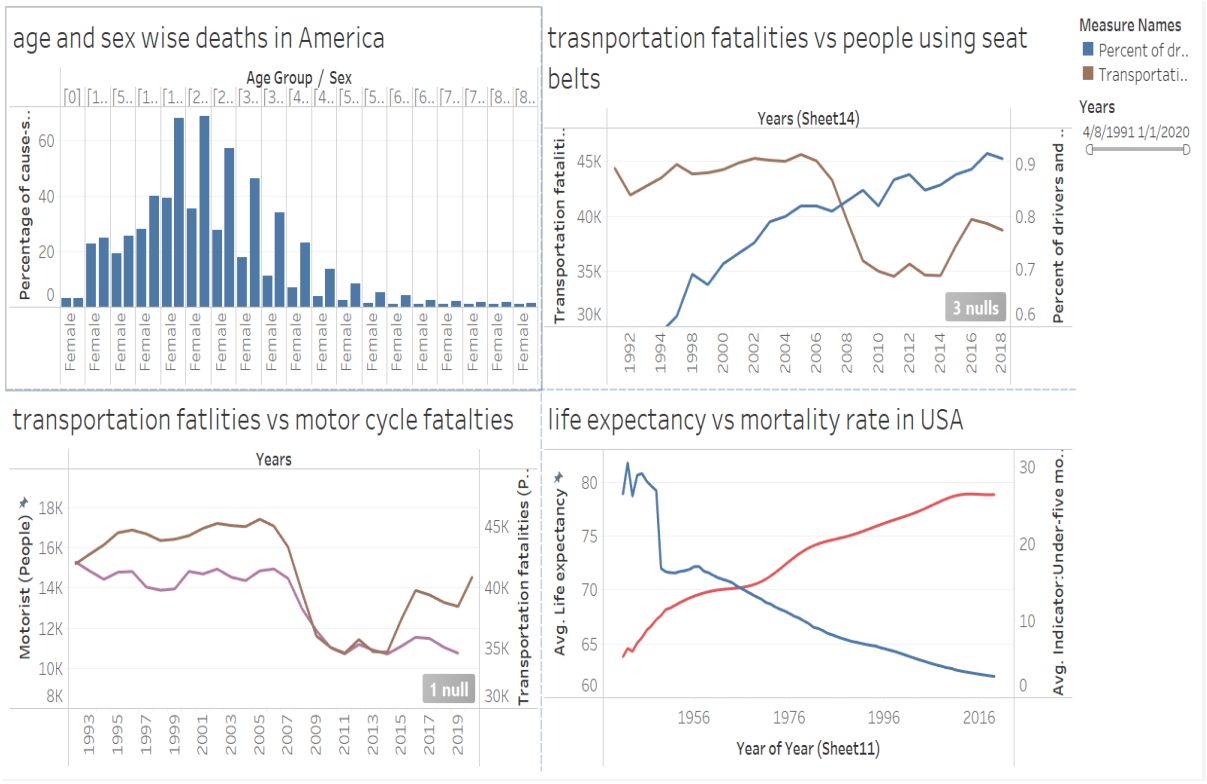
- We have seen that fatalities related to motor cycle are the major and clearly affecting the total transportation fatalities
- This should be consider to reduce the motorcycle accidents as the safety precautions are very less
- Let us also go through the analysis done on number of people wearing seat belts to support our hypothesis on motor cycles causing more deaths

8. Transport fatalities vs number of people using seat belts



- We have seen that number of people using seat belts increased over past 30 years and hence decrease in number of transport fatalities
- During period 2011 – 2014 we have seen slight decrease in slope of seat belts and increase in number of fatalities and hence support our hypothesis

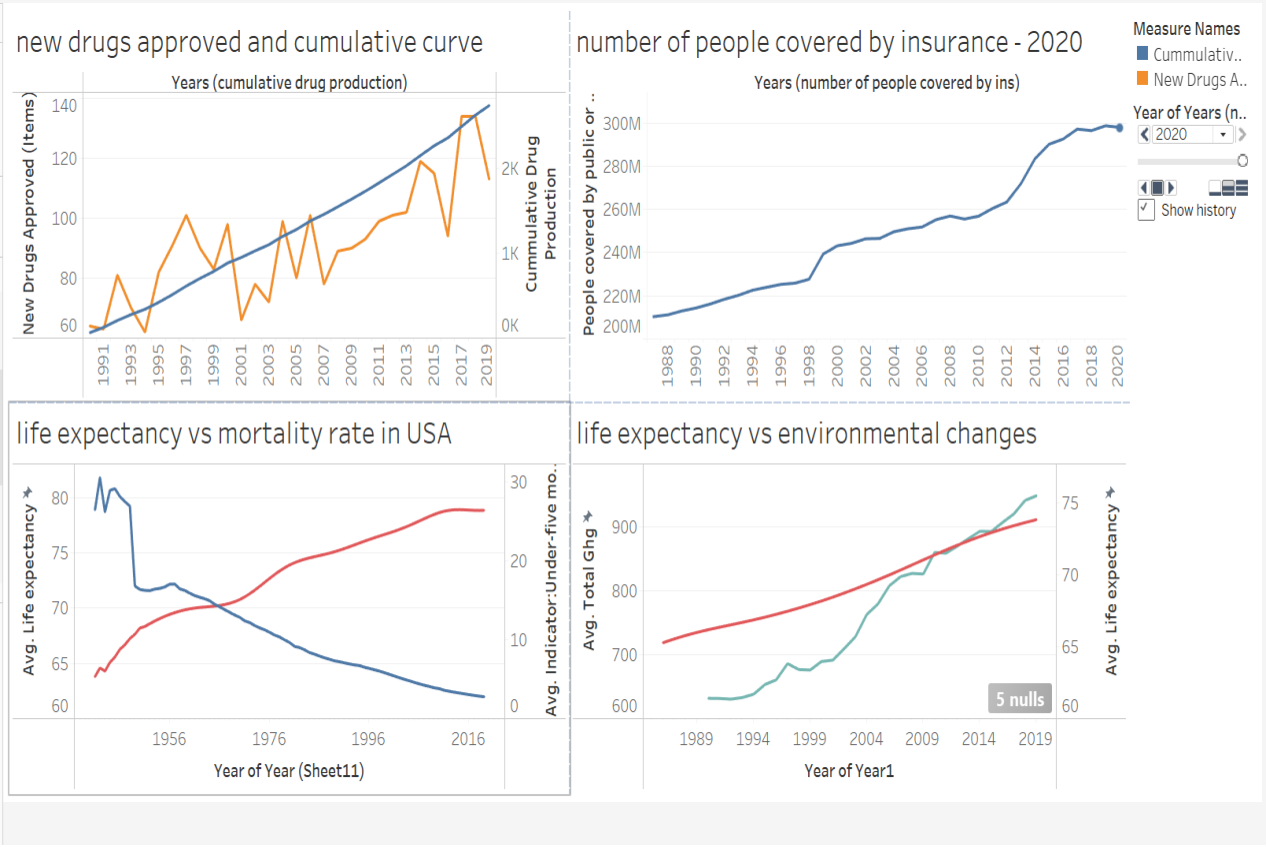
9. Dashboard showing all the transport related fatalities and change in mortality rate



- Life expectancy is increasing, mortality rate decreasing, as number of deaths related to transport and motorcycle decreasing
- This analysis is done as the most deaths are in the age group of 15 – 24 to help our hypothesis that these deaths are related to people riding motor bikes

10. Health care analysis

Hypothesis – Environmental change not effecting the mortality rate, this might be because of advancement in health care system and improved drugs



- Greenhouse gases emission increased; this should result in increase in deaths over the period
- But the deaths decreased

Reason?

Conclusion:

- Mortality rate and life expectancy are the prime factors indicating a countries effort in protecting their people and how well there is growth in economy
- Poverty being a major metric in a country economy, we have seen its relationship with the mortality rate
- We have also seen how healthcare improved over the past decades
- These metrics help a country to know if it is safe to live in or not
- We can see that new drugs are improved from 60 to 140 during 1991 to 2019
- Also, we can see number of people covered by insurance from 1980 to 2020 increased

- Improved drugs and insurance support to all the people in united states might increase the efficiency of health care system implying to reduce death rate even with the increase in new diseases and pollution

Other Research Question:

- Are there any backward countries still suffering with high death rate?
- Does any country receiving support from united states in terms of health care as some countries are lagging in diagnostic machines and advanced technologies in health care systems but still their mortality rate is decreasing?
- As we concentrated on only transport related fatalities due to the age group, are there any other factors like narcotics consumption in the respective age group causing major fatalities?