# Exploratory Data Analysis

The initial steps were to visualize the data to see if there were any obvious correlations.

* Mortality Rate vs Year
  + There was a clear downward trend in the mortality rate over time.
* State Mortality Rate vs Year
  + The goal was to decipher whether or not the mortality rate downward trend held for every state.
  + Every state contained the same trend.
* Poverty Rate vs Mortality Rate
  + There was not an apparent correlation between the two.
* State Population vs Mortality Rate
  + Again, there was no apparent correlation.
* Finally, we plotted all pairwise combinations of the variables to spot any apparent trends.
  + In regards to our question, it seems like only Year variable is of any significance.

# Variables With Strong Correlations

* We calculated the Pearson coefficient for every possible variable pair.
  + In regards to our question, the only pair with a statistically significant correlation was the Year and Mortality Rate pair.
    - Correlation = -.855237, p=2.247e-103

# Statistical Significant Variables

* Our next step was to determine if the year variable was statistically significant in determining the mortality rate.
  + We performed a mixed linear model regression because our data came from a longitudinal study. The normal assumption that our samples were independent did not hold and so we could not rely on a regular anova test.
  + We grouped the data by state, and found that the year variable was statistically significant.
* We decided to attack this from a different direction by grouping each state by region and then comparing the year vs mortality rate.
  + We followed the US Census state grouping.
  + Again, the year variable was statistically significant using a mixed linear model regression.

We have established that the year variable is statistically significant, the next challenge will be to determine what makes that year variable important. Using the data that we currently have, can we break down the year variable into different factors?