

Analyzing Worldwide Suicide Rates

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Introduction

Suicide is one of major social issues across the world. In this report, the dataset to be analyzed includes the suicide number, gender, age group, population and GDP from 101 countries over 3 decades. The key signals correlated to increased suicide rates will be explored among different cohorts globally and across the socio-economic spectrum. The global situation is shown and North America is then focused, including Canada, the United States and Mexico. The purpose is to get key factors that affect suicide rate, to predict the trends and thus supporting the prevention of suicides.

Data Preparation

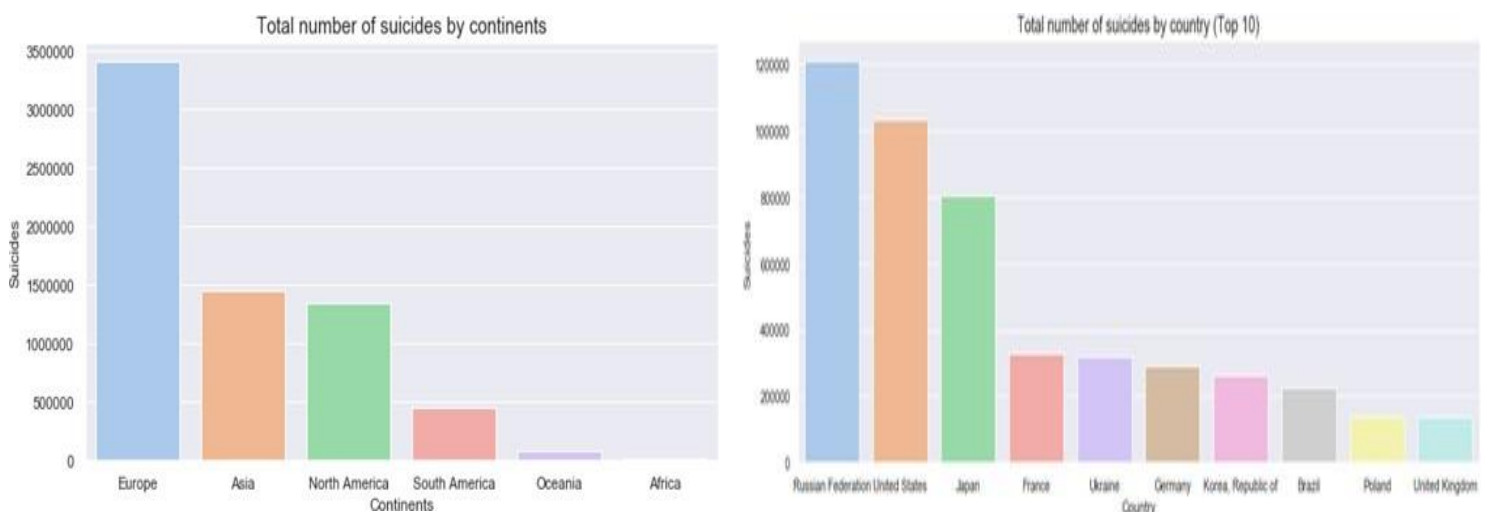
Data source: <https://www.kaggle.com/russellyates88/suicide-rates-overview-1985-to-2016> This is an overall quality dataset with rich information except some columns with null values, which are dropped or processed to ensure accurate analysis.

Analysis Method

· Descriptive statistics · Autocorrelation time series · Linear Regression OLS model

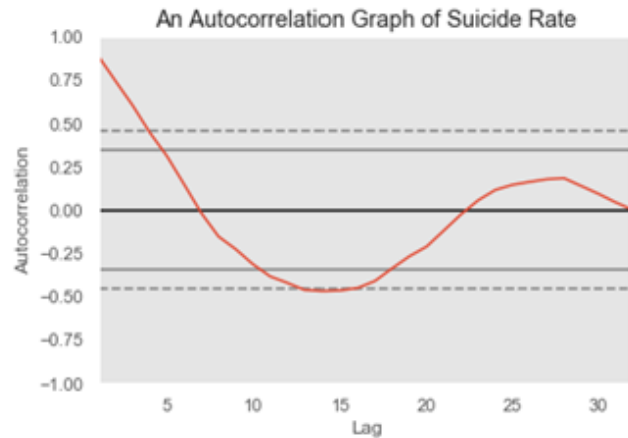
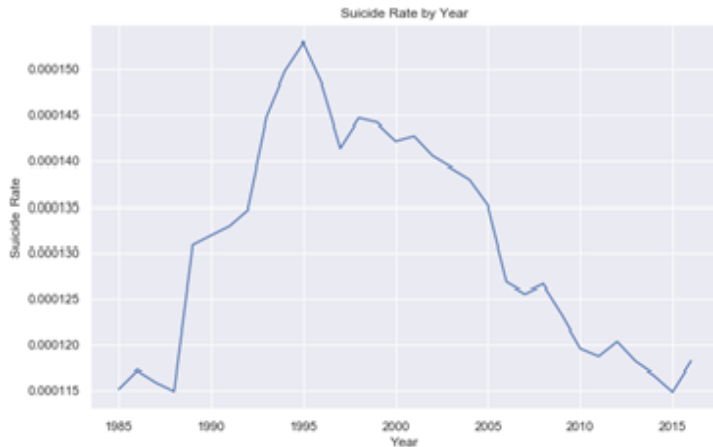
Global Overview

1. Suicide Rate by Continents and Countries



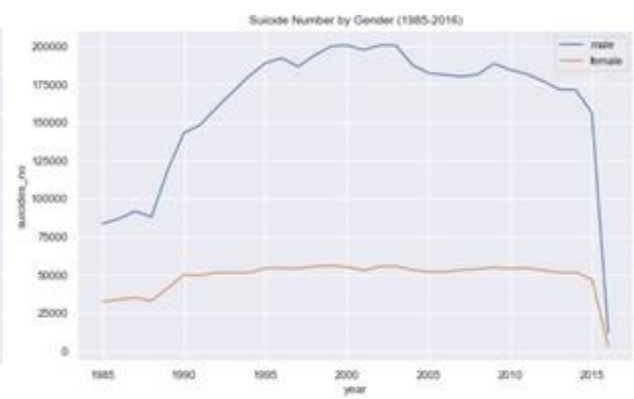
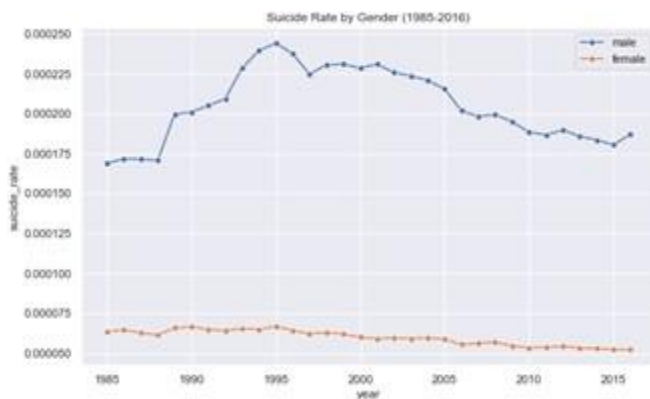
Europe has the highest suicides among 6 continents. Among the top countries, Japan has a higher suicide to population ratio compared to the other top two, Russian and the US. The reason can be inferred that the historical cultural attitudes towards suicide in Japan have been described as "tolerant", with certain types of suicides being considered honorable may still result in high suicides.

2. Suicide Rate by Year



The graph of autocorrelation measures the linear relationship between the suicide rate by year (lagged values of a time series). They are autocorrelated. The positive values are shown at the beginning, which means the present and future values of this time series move in the same direction. After that, the negative values are shown in the curve, which means the two move in the opposite. In the suicide rates time series, the statistically significant values are associated with lags equal to 1 to 4, 10 to 18 years.

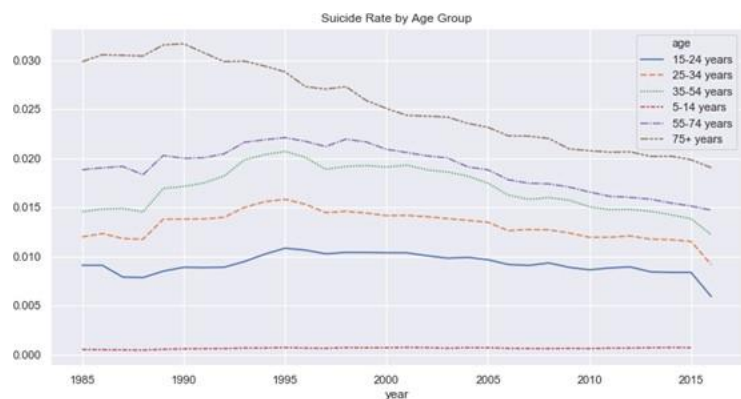
3. Suicide Rate and Number by Gender



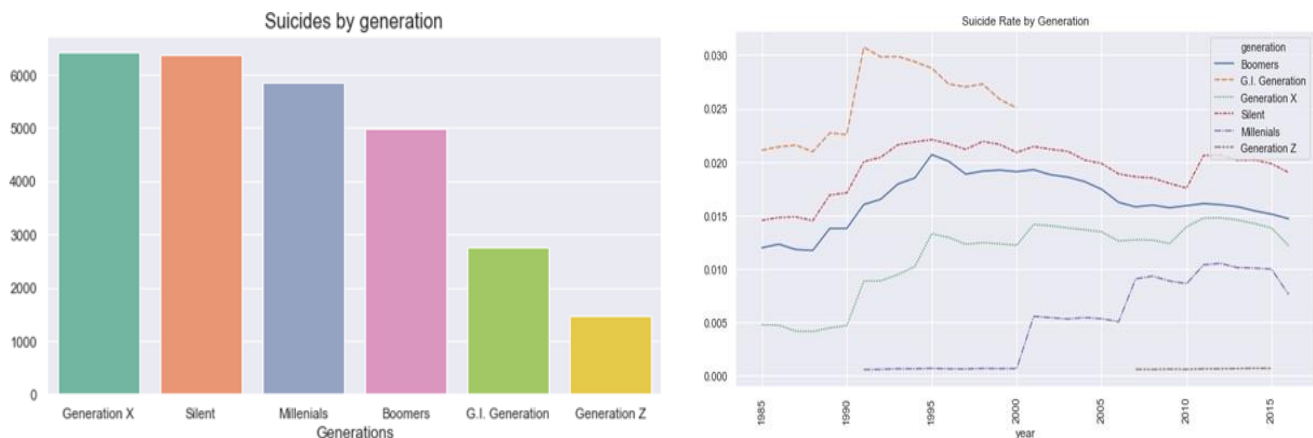
The average suicide rate of male is approximately 3.5 times of rate in female. This result is matching our assumption that men have higher suicides than women since men are usually working outside and support family expenses and have higher social pressure.

4. Suicide Rate by Age

The suicide rate is getting higher when the age is higher. That is, age is a factor of suicide. Young people below the age of 14 have negligible suicide rate.



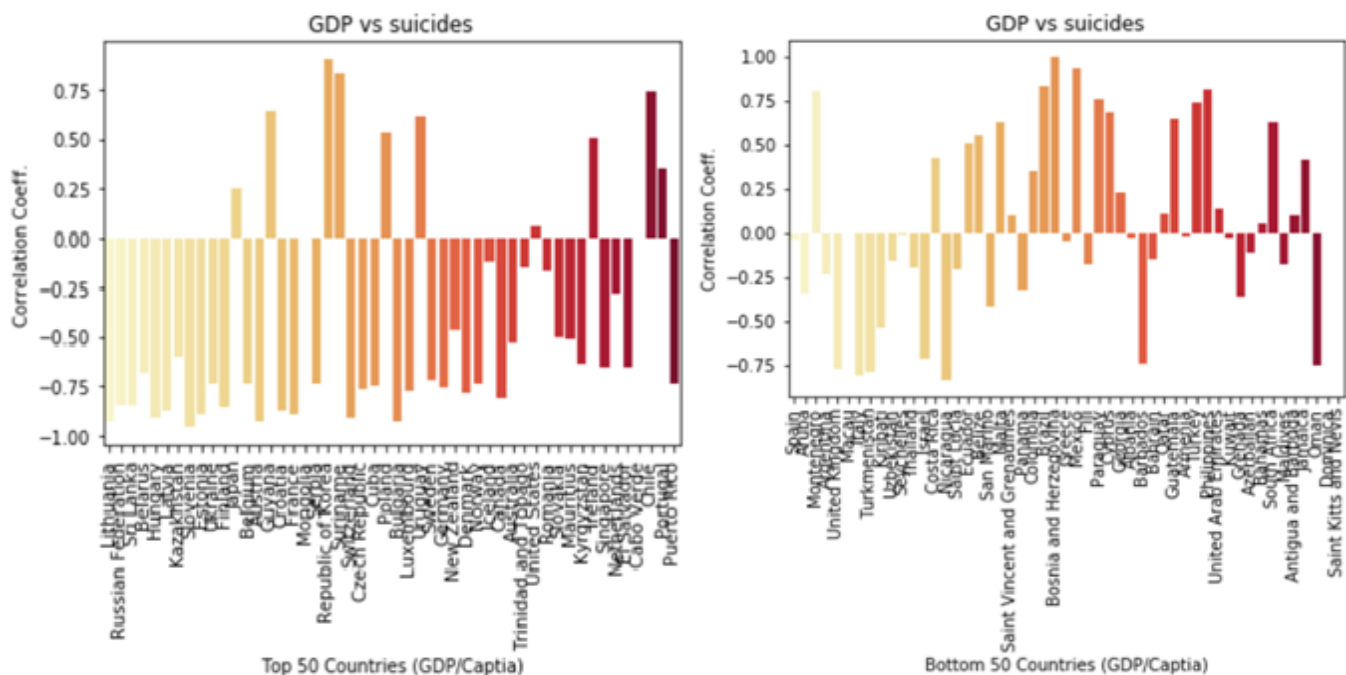
5. Suicide Rate by Generation



Gen X and silent generations have the maximum number of suicides, followed by Millenials and Boomers. Whereas G.I. generation, and Silent have had the highest rate of suicide in the world. These results are matching our assumption that adults in middle age (36 to 55 years) which is shown "Generation X" in the graph above, have higher suicides than other generations.

6. Suicide Rate by GDP

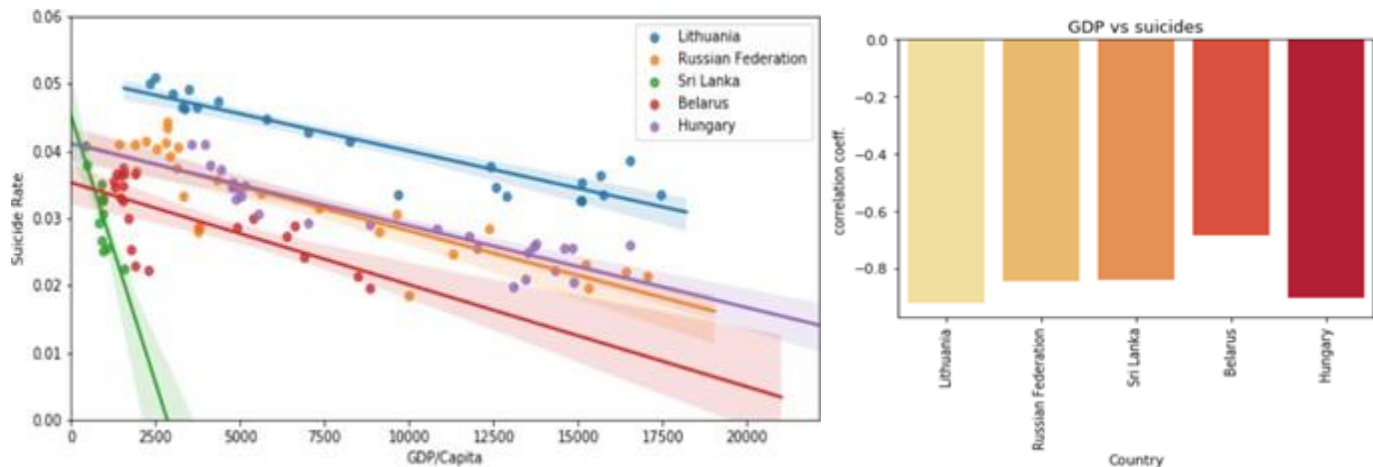
a. Overview of all countries



Most countries have a negative relationship between suicide rate and GDP, especially among the top 50 countries (GDP/Capita). Several countries do not show a clear relationship between the two factors, including the United States mentioned above. However, there are some countries with positive relationships between them, which is more apparent among the bottom 50 countries (GDP/Capita). Further analysis among the 5 countries with strong positive correlation will be done in the next section.

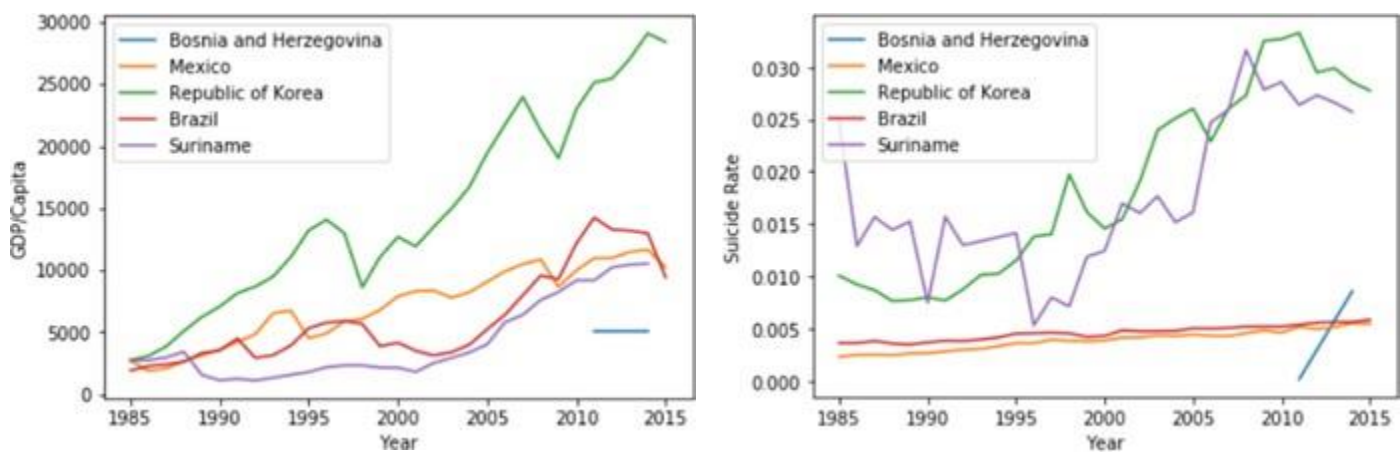
b. Top 5 GDP/Capita Countries

The chart shows that the ratio of suicides decreases as GDP per capita increases among the 5 countries with highest GDP/capita. There is a strong negative relationship between ratio of suicide and gdp per capita among the 5 richest countries.



c. Top 5 countries with positive correlation

Among these 5 countries, the Republic of Korea is a notable one. The GDPs of remaining countries are mostly under 15000 over the years, but South Korea almost doubled in 2015. In contrast to the result of section a, the suicide rate of this country increases as GDP does, which can be assumed that other reasons, like social norms and peer pressure in East Asian culture, also contribute to suicide rate besides GDP.

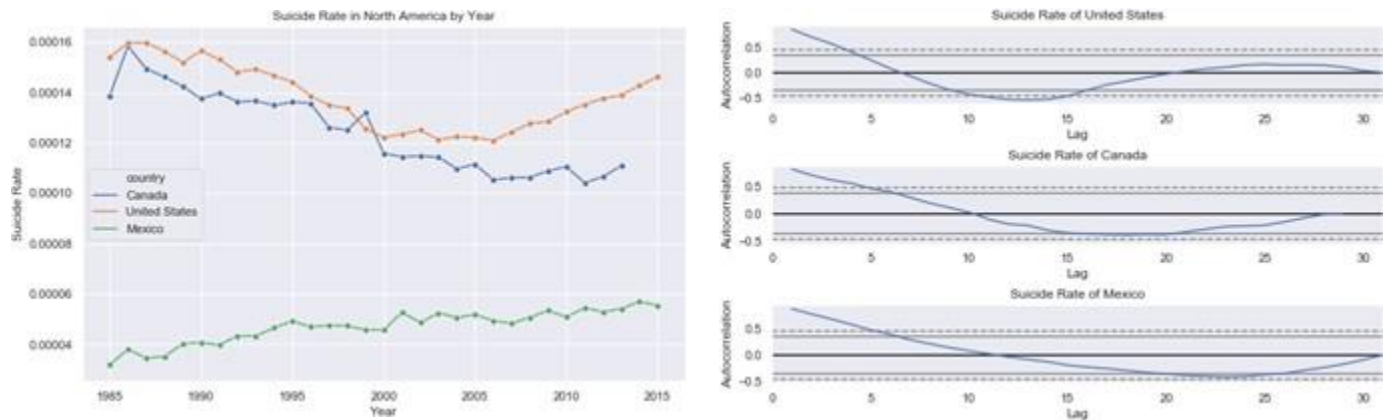


Overview of North America

1. Suicide Rate by Year

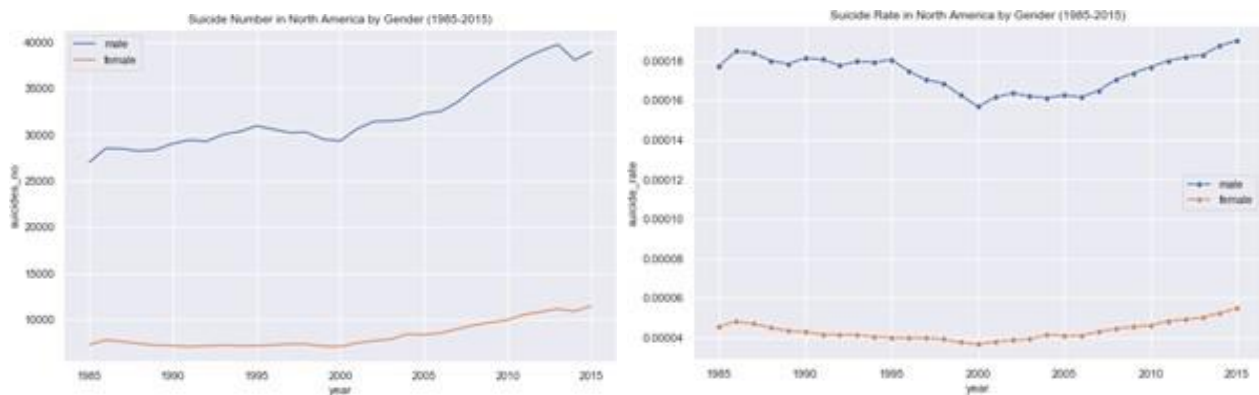
The graph shows that autocorrelation is not very significant. In the suicide rate of United States time series, the statistically significant values are only associated with lags equal to 1 to 4, 9 to 16 years. In

Canada time series, the statistically significant values are associated with lags equal to 1 to 7, 15 to 20 years. As of Mexico, the values are only associated with lags equal to 1 to 7, 20 to 25 years.



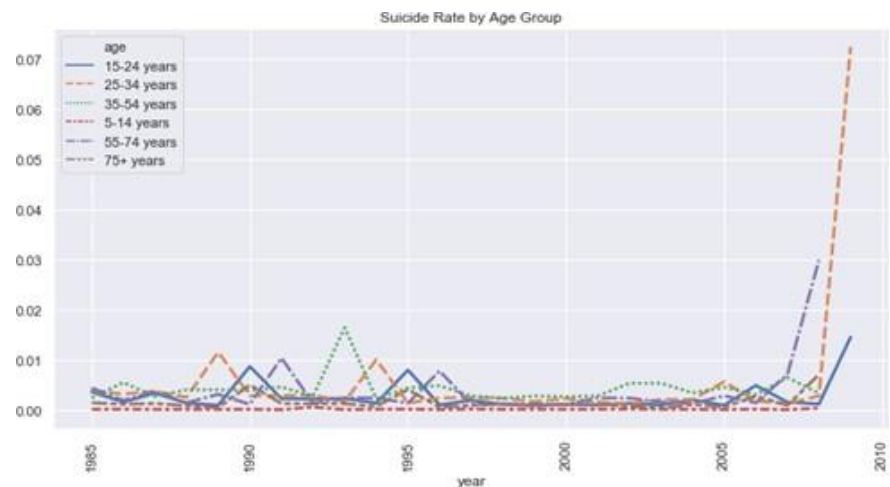
2. Suicide Rate by Gender

The average suicide rate of male is over 4 times of rate in female, which matches our assumption that men are usually working outside and support family expenses in the society. The suicides in both genders have increased since 2000, but male show a faster rate.

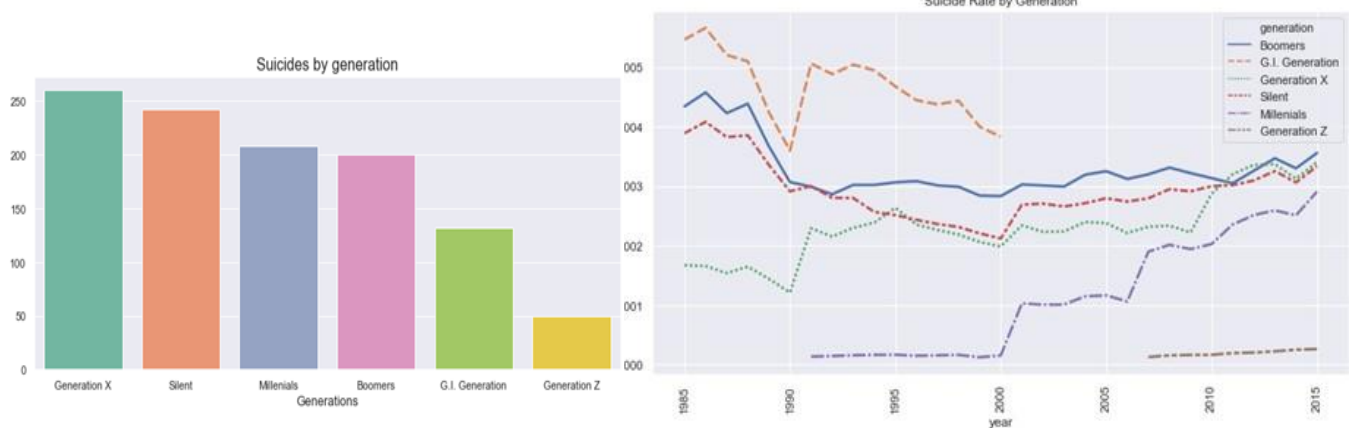


3. Suicide Rate by Age

The unusual spike in 2008 could be attributed to the subprime crisis where young professionals and college graduates would have found it difficult to find jobs or livelihoods during the crisis.



4. Suicide Rate by Generation



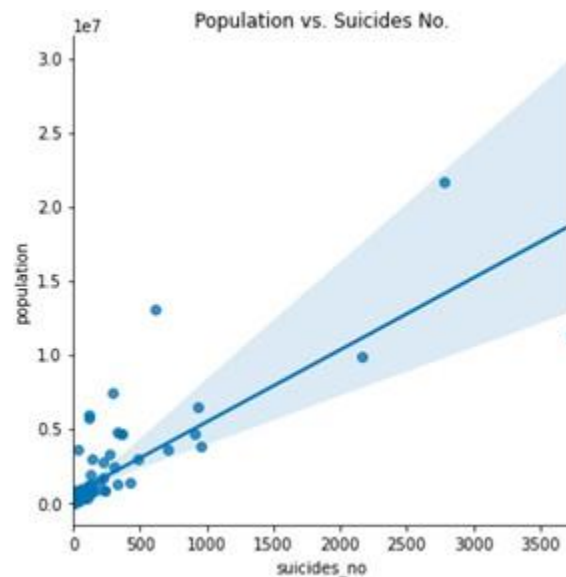
Gen X and silent generations have had the maximum number of suicides, followed by Millenials and Boomers. Whereas G.I. generation, and Silent have had the highest rate of suicide in the world.

5. Suicide Rate by Population

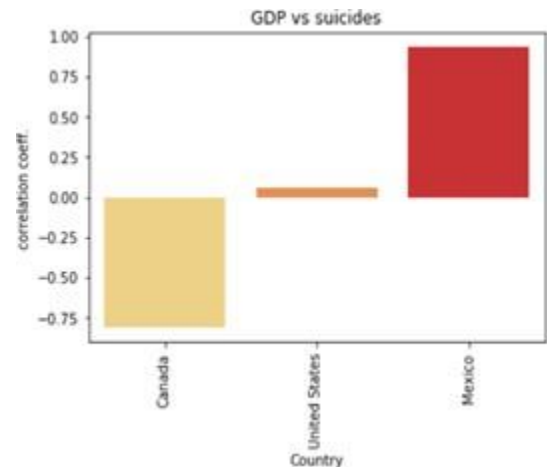
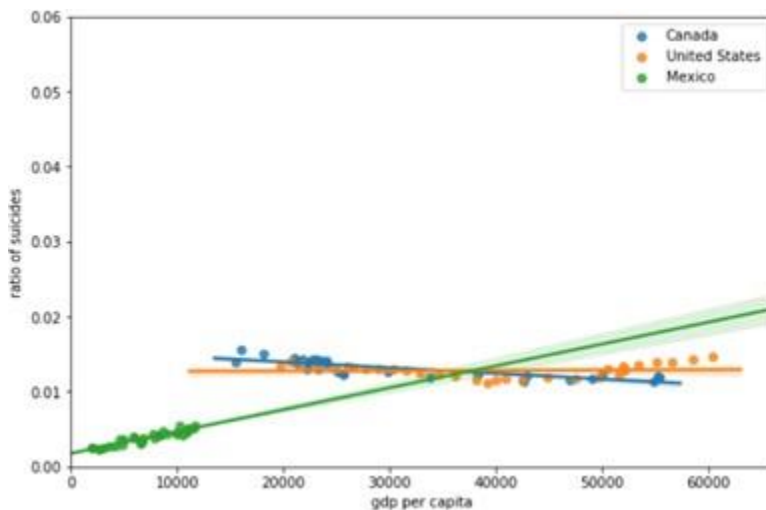
	population	suicides_no
population	1.000000	0.812873
suicides_no	0.812873	1.000000

The graph above shows the mean population vs. the mean suicide_no. The general trend seems to follow a linear relationship.

There seems to be a high positive correlation with population and suicide_no. In countries where the overall population is high, the suicide rate is also higher and in countries where the overall population is low, the suicide rate is also lower.



6. Suicide Rate by GDP



In North America, Canada shows a negative relationship between the two factors, while the US shows little relationship. However, Mexico has a positive relationship between suicide rate and GDP/capita. A notable point is that the gdp per capita of Mexico mainly lies under 10000, while the data of Canada and USA mostly are between 20000 and 60000.

Conclusions

After the analysis, suicides are generally affected by following factors:

- Increased GDP per capita can lower the suicide rate, especially in European countries. Suicides in some countries, like South Korean, increased as GDP grew, which could be affected by other factors, including local culture, social norms and peer pressure.
- European countries represented the highest suicides number in the world due to changes in the social and economic system, especially among East European countries, over past decades.
- Males have higher suicide rate than females. Males are three times more likely to commit suicide in the world, while this ratio is four times in North America.
- According to the suicide rate of each age group, the suicide rate is getting higher when the age is higher. The elderly should be cared for more than young people. In addition, the country welfare of the elderly may also impact the rate.
- Gen X and silent generations have had the maximum number of suicides. Whereas G.I. generation, and Silent have had the highest rate of suicide in the world.
- The suicides among young professionals in North America peaked in 2008 due to the financial crisis. There is a peak suicide rate in 1995, seems goes up from 2016, but no further information to clarify this trend because of the limitation of dataset.