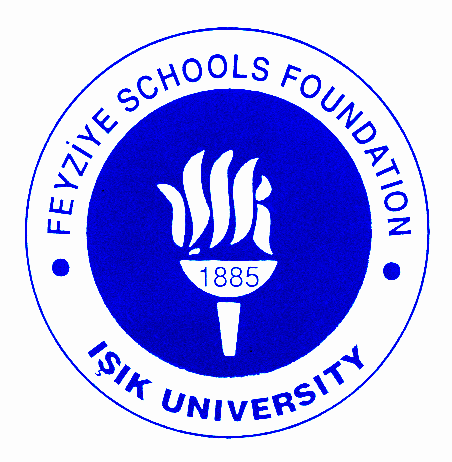
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**IŞIK UNIVERSITY**

**Faculty of Arts and Sciences**

**Department of Information Technologies**

***B. S. Thesis***

Examining and Analyzing World Suicide Cases from Different Perspectives

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**JANUARY-2022**

**Examining and Analyzing World Suicide Cases from Different Perspectives**

A Project Presented  
by

**Zeynep Diğde Aydı**

**217MI1189**

to  
The Department of Information Technologies

in partial fulfillment of the requirements  
for the degree of

**Bachelor of Science**

in the field of  
Management Information Systems

Işık University  
İstanbul, Turkey

JANUARY-2022

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### Abstract

Suicide has become one of the most important issues that psychiatrists and psychologists deal with, especially in our century.

In the last 45 years, the world suicide rate has increased by 60% and suicide deaths are expected to reach 1.6 million by 2022.

In my project, I used various factors such as age, gender, and geographic region to find out what had a major impact on the suicide rate.

To compare different factors, I aimed to draw meaningful conclusions by visualizing whether the correlation was weak or strong, with graphs and various Python codes.

My focus was on whether suicide was affected by age, gender, place of residence, or the country's monetary status (GDP). I hope this study will help suicide prevention strategies for countries.

### Acknowledgements

I would like to thank my advisors Assist. Prof. Dr. Şahin Aydın and Assist. Prof. Dr. Gülsüm Çiğdem Akkoç, , who did not spare their support during the execution of this study and showed patience during my studies also, my friends who were by my side at every moment and did not hesitate to give their help.

Zeynep Diğde Aydı

January-2022

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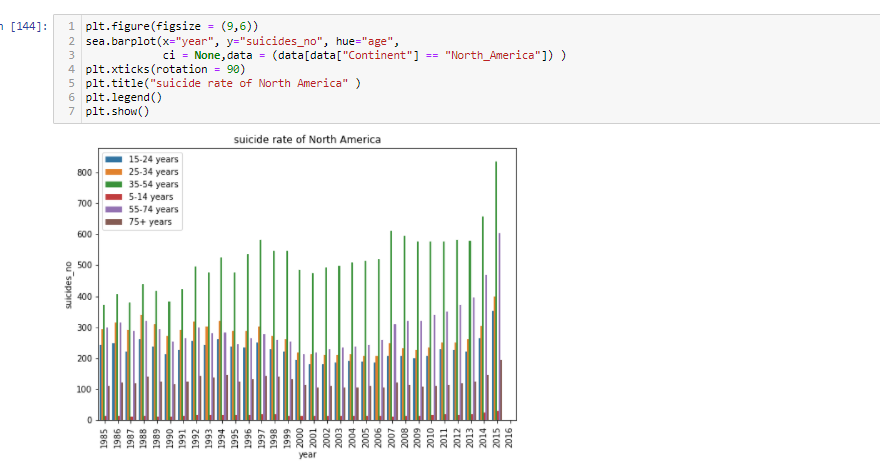
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### Introduction

##### Overview

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Açıklama otomatik olarak oluşturuldu

Figure 1 -WHO Report

The dataset provides information on suicide rates worldwide. This data set includes suicide information for the years 1985 and 2016. There are about 27,000 data from 100 countries. Suicide rates dataset includes country, year, gender, age , suicide\_no, population, ,country-year, HDI for year, gdp\_for\_year, gdp\_per\_capita and generation.

Source of dataset [**https://www.kaggle.com/russellyates88/suicide-rates-overview-1985-to-2016**](https://www.kaggle.com/russellyates88/suicide-rates-overview-1985-to-2016)Also My Project all steps are in my GitHub repository

[**https://github.com/zeynepdigdeaydi/Examining-and-Analyzing-World-Suicide-Cases-from-Different-Perspectives-**](https://github.com/zeynepdigdeaydi/Examining-and-Analyzing-World-Suicide-Cases-from-Different-Perspectives-) available.

Data Analysis is the process of examining, cleaning, transforming, and modeling data to discover useful information, report results, and support decision making.

While data analysis is used in different fields of business, science and social science, it has multiple aspects and approaches that cover different techniques under various names.

In my project, I will analyze the factors associated with suicide rates among different relationships in various countries between 1985 and 2016. I will first look at whether there is any association with suicide rates among various factors such as age, gender, continent and generation, GDP. I want to analyze suicide data and find out which factors are most likely to cause suicide.

Death by suicide is an extremely complex issue that afflicts hundreds of thousands of people around the world each year. The World Health Organization (WHO) estimates that around 800,000 people die by suicide each year.

Suicide rate is calculated as one in 100 thousand people all over the world. Looking at the countries with the highest suicide rate in the world, it is difficult to find a clear partnership between them.

**Country Suicide Rate**

Guyana 30,20

Lesotho 28,90

Rusya 26,50

Litvanya 25,70

Surinam 23,20””””””””””””

In fact, it turns out that this is a global public health problem, considering that anyone who has ever attempted suicide is in the risk group.

##### Contributions

After the knowledge that suicide is a global problem and approximately 800,000 people die every year, I decided to raise awareness by working on this issue.

I want to analyze suicide data and find out which factors are most likely to cause suicide.

In my project, I used various factors such as age, gender and geographic region, generation to find out what had a major impact on the suicide rate. To compare different factors, to find out whether the correlation is strong or weak, I used graphs and made interpretive conclusions.

The results we expect to find;

Are younger individuals more prone to suicide?

Do men commit suicide more than women?

Suicide increases with age

Suicide is less in countries with high GDP?

Does the generation gap affect suicide?

## 1.4 Research Question

Is there any correlation between suicide rates and factors such as gender, age, and gdp?S

##### Outline of the Project

Data visualization technologies aim to present us as concrete information and thus allow us to make inferences, that is, each user can interpret the data according to his/her own purpose and make different inferences.

When you want to make the data interesting and easy to understand, evaluate trends and anomalies in your data, understand the story of the data, reinforce a thesis, and highlight the important parts in the data set, it will be enough to start using data visualization tools and technologies..

Suicide is often considered a troubling indicator of underlying social problems, and this increase in suicide rates may be an indicator of increasing societal problems.

More than two-thirds of those who die by suicide are men.

In the age group of women, suicides lag behind the overall average for men.

Dimensions:

Age – Age range of the population from 5 years to 75+ years.

Country – 100 countries

Country-Year – Essentially a combination of country and year

GDP for year – GDP of the country based on year ($ value)

Generation – A set of 6 generations based on factual representation of age

Sex – Male and female only

Year – Year from 1985 to 2016

GDP per capita – GDP of relative country as per population

HDI for year – Human development index for the relative year

Population – total population of relative country

Suicides no – No of suicides

Suicides/100K Pop – No of suicides per 100,000 people in the relative country

**1. GI Generation**

Born 1901-1924 (90+ years)

**2. Silent Generation**

Born 1925-1942 (Age 72-89)

**4. Generation X**

Born 1965-1979 (Age 35-49)

**5. Generation Y**

Born 1980-2000 (Age 14-34)

**6. Generation Z**

Born in 2001-2013 (Ages 1-13)

Null values:

HDI for year – Most of these values are null and we will not be using these values in our visualizations.

Data clean:

The dataset contained missing values for the HDI dimension for "Year. Since these missing values are approximately 70% of the records for this variable, we excluded the dimension from our analysis.

I wanted to investigate possible causes that may increase the risk of suicide in populations by using different data analysis methods.

### Literature Review

##### Overview

Suicide is a serious problem in all societies to varying degrees, but the lower or higher incidence in some parts of the world may provide clues as to the causes of suicides.

A large percentage of total suicides from low- and middle-income countries appear to be due to a larger population living in these countries, as high-income countries account for 23.9% of global suicides.

The questions I got from the literature review;

##### Is there a significant difference in suicide rates between age groups?

Suicide; Self-intentional killing is one of the leading causes of death worldwide.

It is important to monitor suicide rates among age groups. Findings based on identifying risky groups among women and men, predicting suicide and taking precautions have an important role in developing policies to prevent more suicides.[4][2]

Teens are by nature vulnerable to mental health issues, especially during their teenage years. In recent years, interviews with key sources of information and review of records have revealed important information about risk factors for youth, including follow-up studies of suicide attempters. It is very important to identify the different types of factors that are clearly associated with an increased risk of teen suicide. [3]

##### Is there a significant difference in suicide rates between sex groups?

There are also differences in the sex ratio according to age. There are many possible reasons for the different suicide rates in men and women: gender equality issues, differences in the socially acceptable ways for men and women to cope with stress and conflict. Availability and preference of different means of suicide, availability and patterns of alcohol consumption, and differences in the rates of seeking care for mental disorders between men and women cause these rates to vary. The very wide range in sex ratios for suicide suggests that the relative importance of these different causes varies widely by country and region.[5]

##### “Preventing suicide: a global imperative”

800.000 people commit suicide each year, and there are many more who attempt suicide. Every suicide is a tragedy that affects families, communities and entire countries, with long-lasting effects on the people left behind.

As mental health awareness grows, there is more public understanding of potential contributing factors. One of the questions that remains, though, is about this gender gap. This rate seems particularly large given that women tend to have higher rates of depression diagnoses.

WHO recognizes suicide as a public health priority. The first WHO World Suicide Report, "Preventing suicide: a global imperative", published in 2014, aimed to raise awareness of the public health importance of suicide and suicide attempts, and to make suicide prevention a high priority on the global public health agenda. [6,7,8,9]

### Researches, Usage Areas

##### Python Programming Language

Python is a required programming language created in 1990 by Guido van Rossum, a Dutch software developer.

Python is a general purpose, versatile and powerful programming language. It's a great first language because it's short and easy to read. Whatever you want to do, Python can do it. From web development to machine learning and data science, Python is the language you need.

It was necessary to use data visualization in big data analysis, where technology needed to operate much more clearly and quickly.

With data visualization, which is used to interpret the complex language of the data world consisting of numbers and letters, we can narrate this data and turn it into more easily perceptible visuals. In this way, we can interpret the data much more accurately and make much more informed decisions.

In this project, we used various factors such as age, gender, and geographic region to find out what had a major impact on the suicide rate. To compare different factors, we used charts and graphs to find out whether the correlation was strong or weak.

##### Python Variable Types

Different types of variables are supported in the Python programming language.

• Numeric Types

• Character Strings (string)

• Boolean Types

• Special Types

There is no need to write special keywords to define the types of variables in Python codes.

##### Numpy Library

The Numpy library got its name from the abbreviations of the words Numerical Python. The most important feature of the library is that it offers sequences that can perform fast mathematical operations.

##### Seaborn Bar

Seaborn is one of the most widely used data visualization libraries in Python as an extension of Matplotlib.

It offers a simple, intuitive, yet highly customizable feature for data visualization.

A heatmap is a data visualization technique that uses color to show changes. Heatmaps are most useful for identifying patterns in large amounts of data at a glance.

##### Pandas Library

With this library, data can be read from and written to many different sources such as excel, json, text (csv) and database.

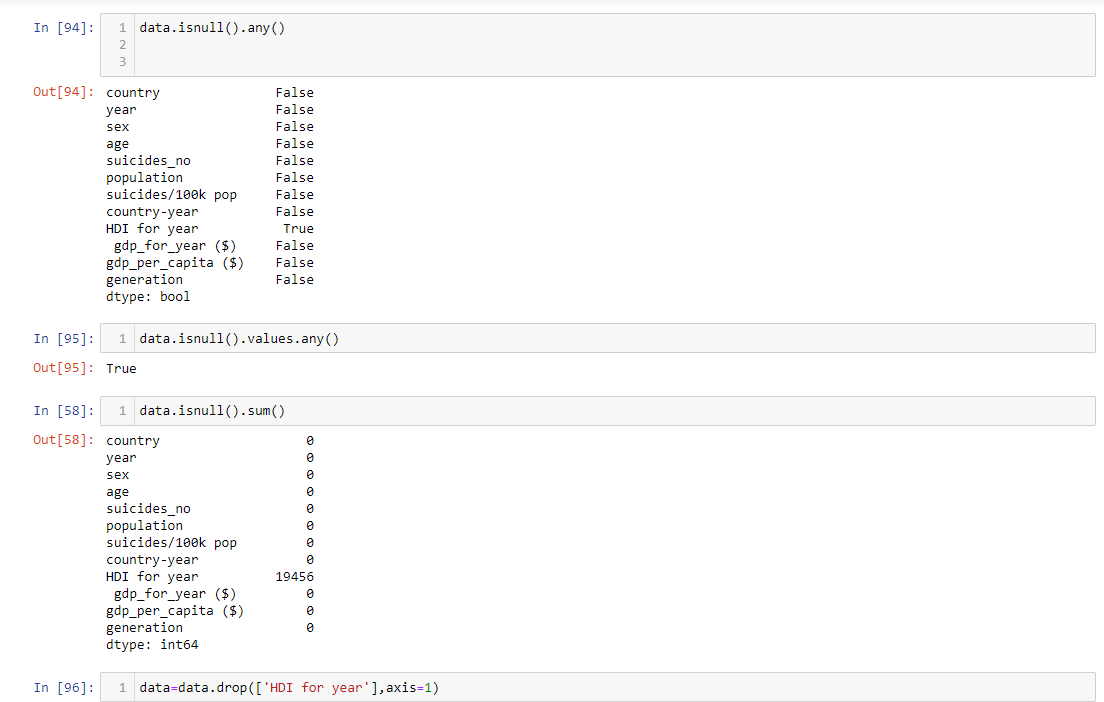
### DATA ANALAYSIS

##### Data Cleaning

Data preprocessing is one of the most important steps in the data mining process, which deals with the preparation and transformation of the initial data set. While the dataset itself is relatively clean, it is still necessary to remove any excess data that is not needed for this analysis.

All steps of data preprocessing for my project are in my GitHub repository [**https://github.com/zeynepdigdeaydi/Examining-and-Analyzing-World-Suicide-Cases-from-Different-Perspectives-**](https://github.com/zeynepdigdeaydi/Examining-and-Analyzing-World-Suicide-Cases-from-Different-Perspectives-)avaible.

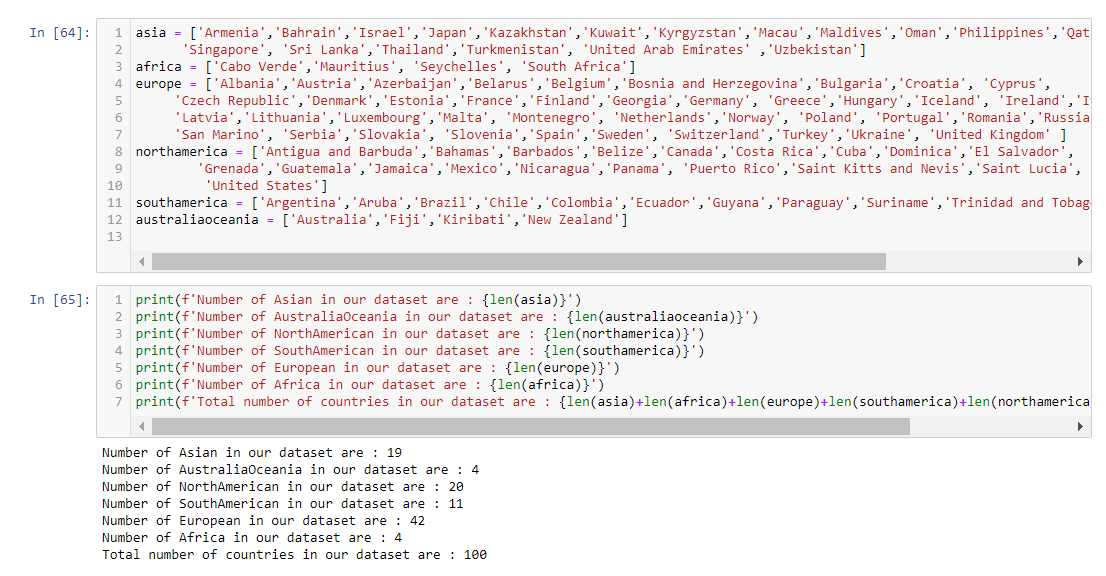
First, it is useful to check for any missing data, as analysis on frames with missing data will result in errors. As we can see below, there are many blank entries in the HDIForYear column. It is therefore best to leave the column completely.

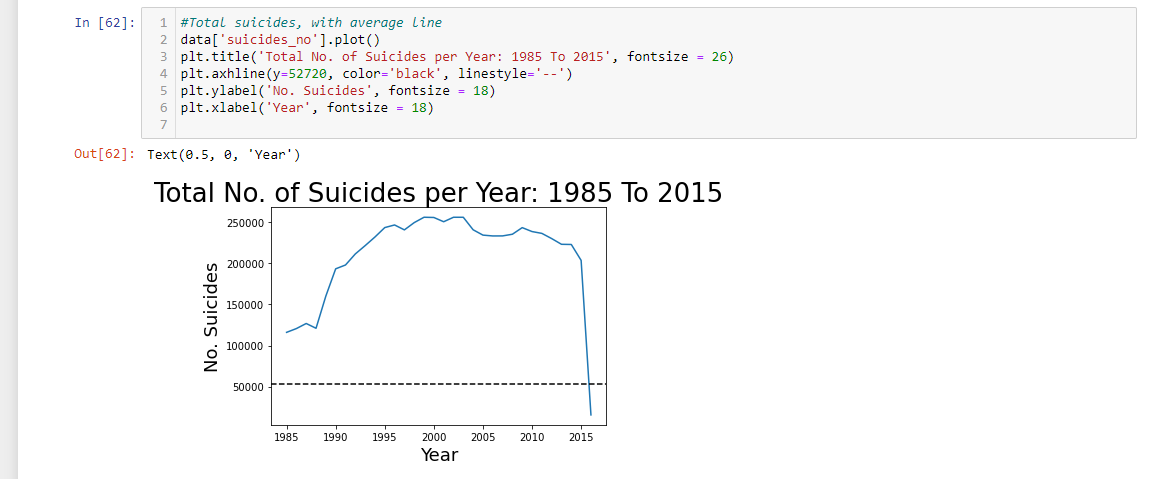


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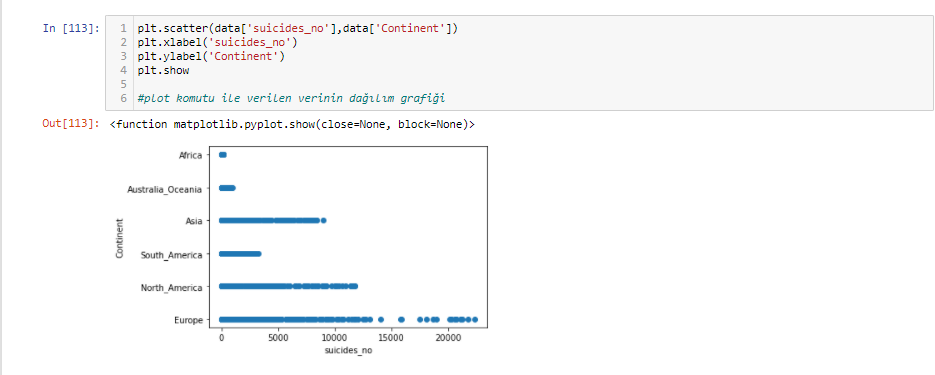
Açıklama otomatik olarak oluşturulduData collecting**

We know that the dataset is a Country column, but if we want to analyze larger groups such as continents, our work becomes easier. This can be accomplished in Python/Pandas, again in three fairly simple steps.





We can see that there is a downward trend here and the global suicide rate has fallen over the years. This is due to increased awareness or funding etc. It's predictable, but that's something that can be explored in greater depth later on.

We can then use a bar chart to show the average number of suicides per 100,000 population per year by continent. This time a new data frame is created, grouped by continent. This data frame is then represented below:

##### Exploratory Data Analysis(EDA)

Going through questions and findings is more effective in terms of data visualization.

##### Who is more suicidal? Youth? Adults? Old?

****

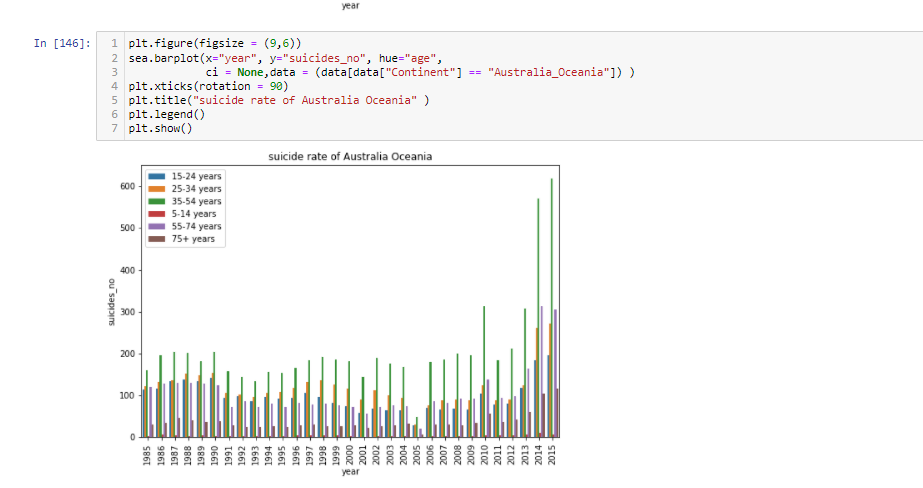
Well, adults certainly seem to be suicidal more, but what does that mean? According to the data, we have no information to answer. But I guess it's a common age for depression and the like**.**

##### Suicide Rates of Age Range By Continents

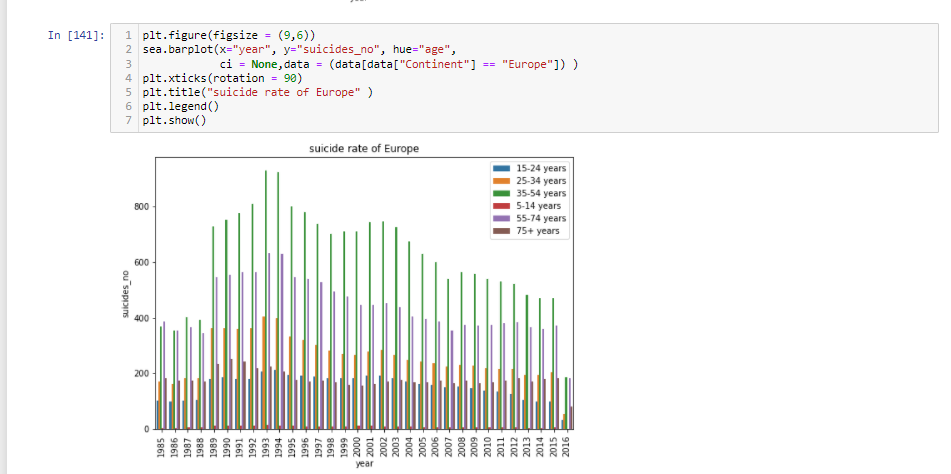
##### Middle-aged people have been more tendencies to suicide . Followed 55-74 age range.

##### 

Asia, 35-54 age range suicide rate is highly compared to other age ranges. It is followed by the 55-74 years old and with a nonlinear,linear graph , the suicide rate stays stab

****

Australia Oceania can say it is the continent with the lowest suicide rate compared to other continents. In the last 10 years, suicide rates have reached the highest level in the 35-54 year old.

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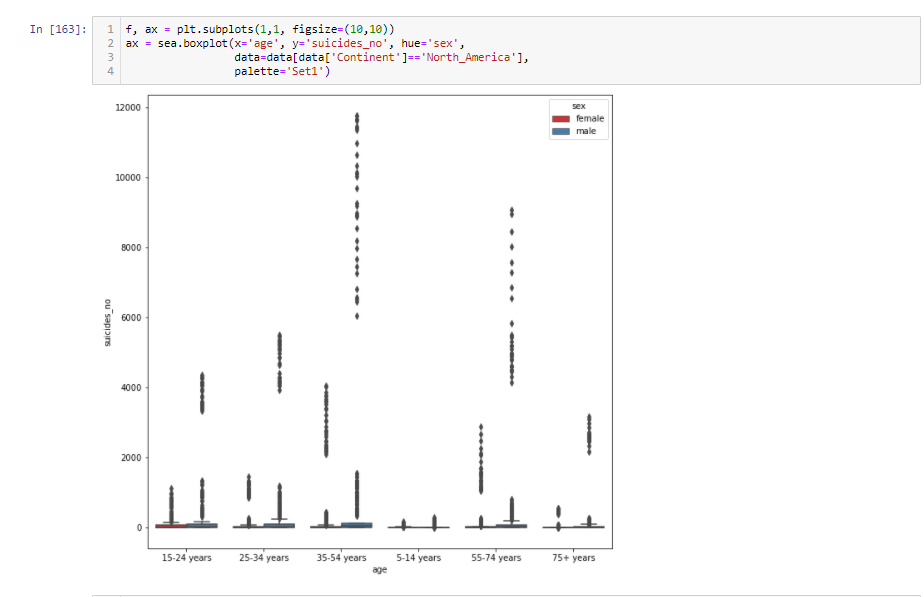
Europe the continent with the highest suicide rates, was the highest suicide age at the 35-54 age period. It has decreased linear with the mst suicides 75+ and with suicide preventtion policies followed.

It is clear that there is a visible difference between the 55-74 age range.

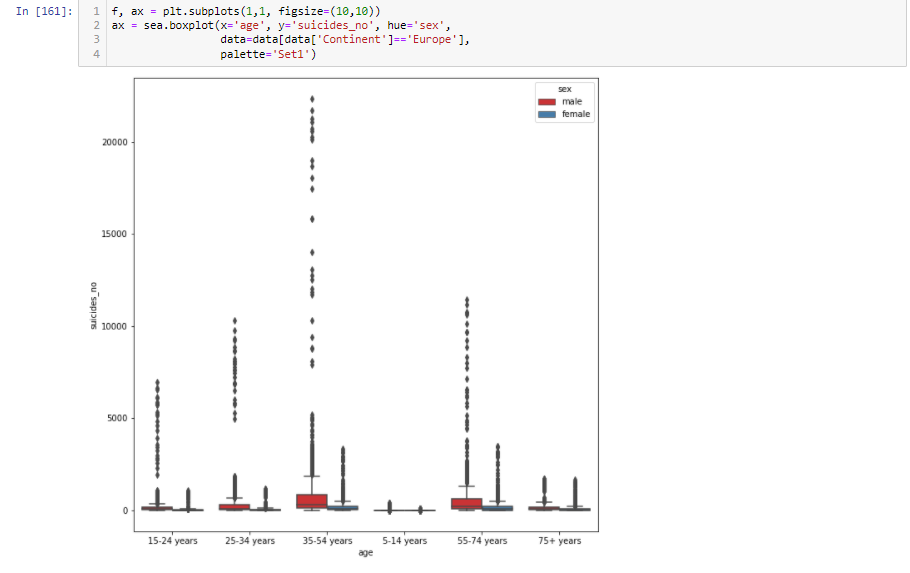
Adults commit suicide more, but I cannot give an exact answer with the data we have. However, it is clear that it is a suitable age for depression.

##### Relationship Between Sex and Age Range and Suicide

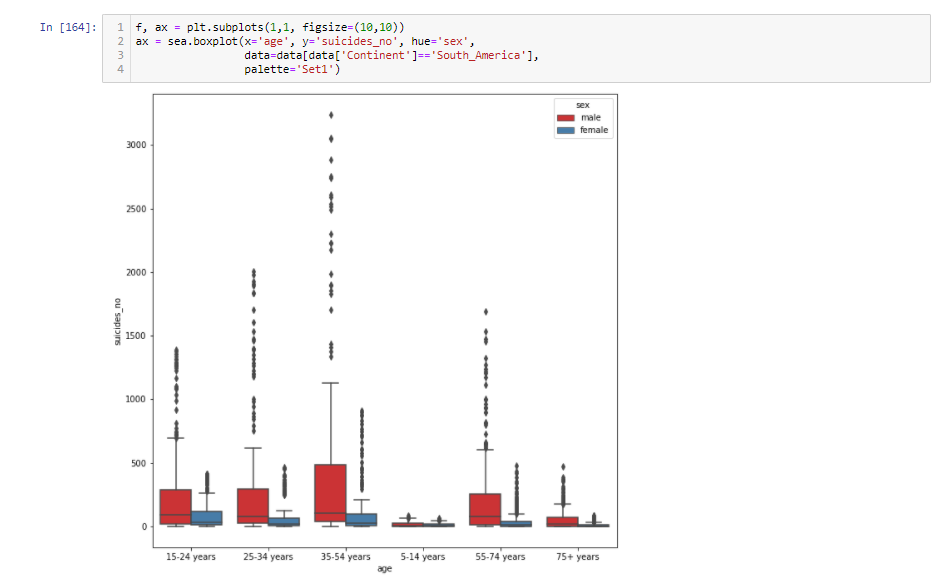
Let's examine the suicide data according to the continents, this time as men and women. As a result of this analysis, if the gender who committed suicide is high, I will investigate possible causes.



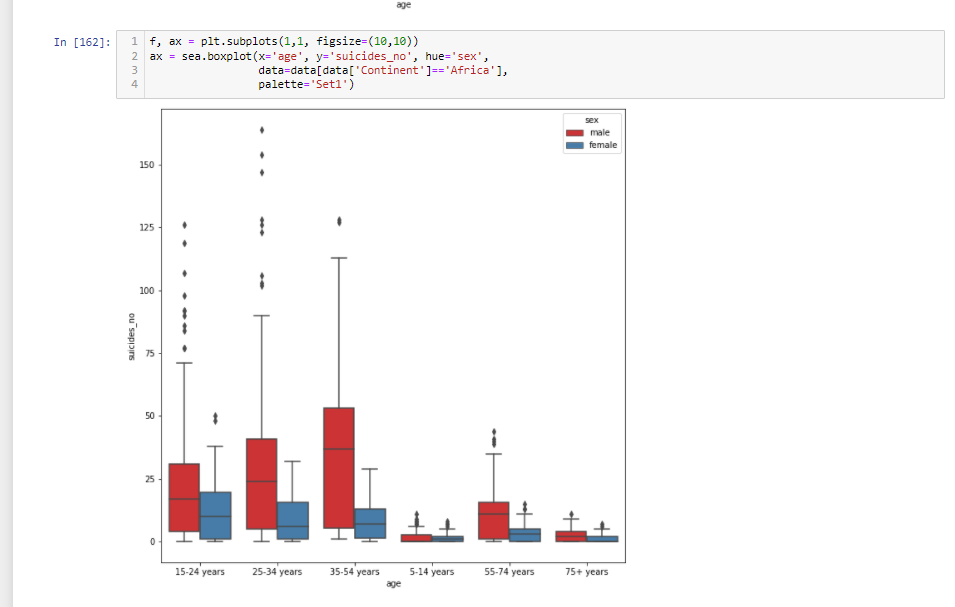
Nort-America,Surprisingly, the suicide data are not messy at all. however, male suicide rates seem to be considerably higher than female suicide rates. In this case, female suicides between the ages of 15-24 draw attention when compared with other continents. It would be more beneficial for countries to include other features in the table and make a detailed analysis.



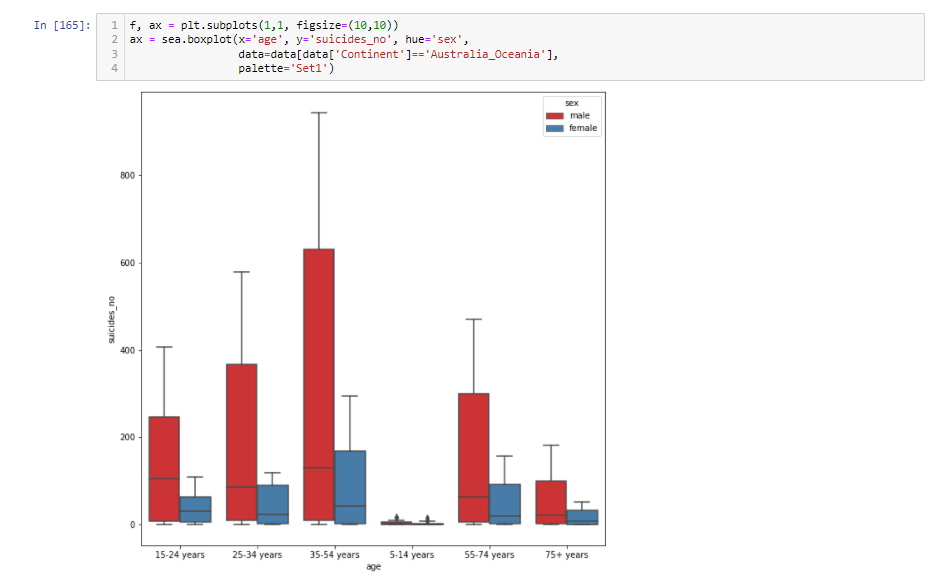
Europe, Again, in the 35-54 age group, suicide can be seen at a higher level than it has been seen before. Male suicide aged 35-54 is almost 4 times higher than female suicide. This is a situation that needs to be examined with other data sets. The underlying reasons are quite interesting.



South-America,there is less dispersal than other continents. However, I find that suicide is quite high in the 35-54 age group and male suicide is again 4 times that of women. Then comes the 55-74 age range.



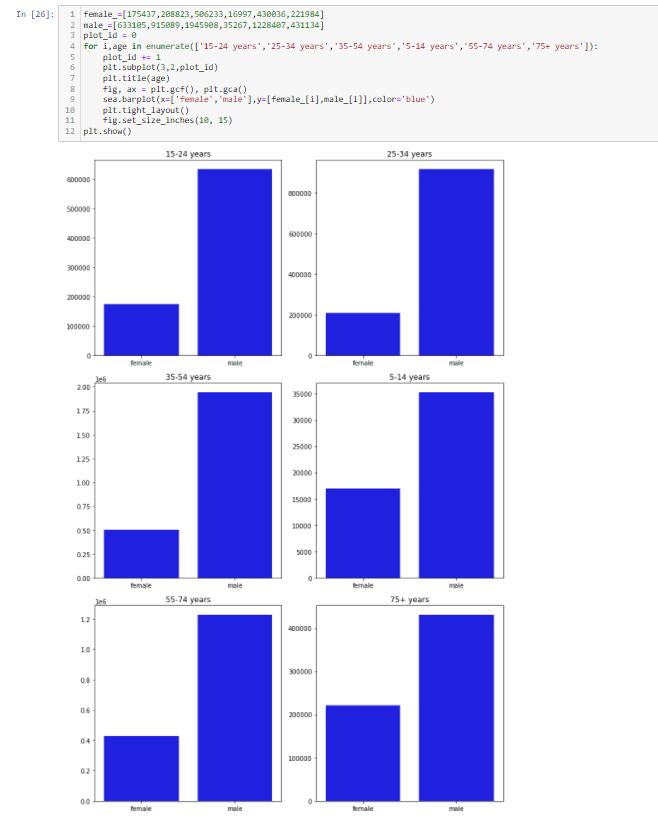
As a matter of fact, although the suicide rate in Africa is lower than in Europe and Australia, I conclude from the results we obtained with these data that men between the ages of 35-54 commit suicide more.

Australia, 35-54 year old male suicide is very high. This data is followed by men between the ages of 55-74. We can observe a diffuse spread between the ages of 35-54 and intense suicide in these countries.

When there is an economic downturn that results in increased unemployment, there tends to be an associated increase in suicide – typically 18-24 months after the crisis. A 2015 study found that for every 1% increase in unemployment, there was a 0.79% increase in the suicide rate.

When we look at the country-based suicide rates outside of the continents, the highest suicide rate in the 15-24 age range is in Russia, in the 25-34 age range in Russia, 35-54

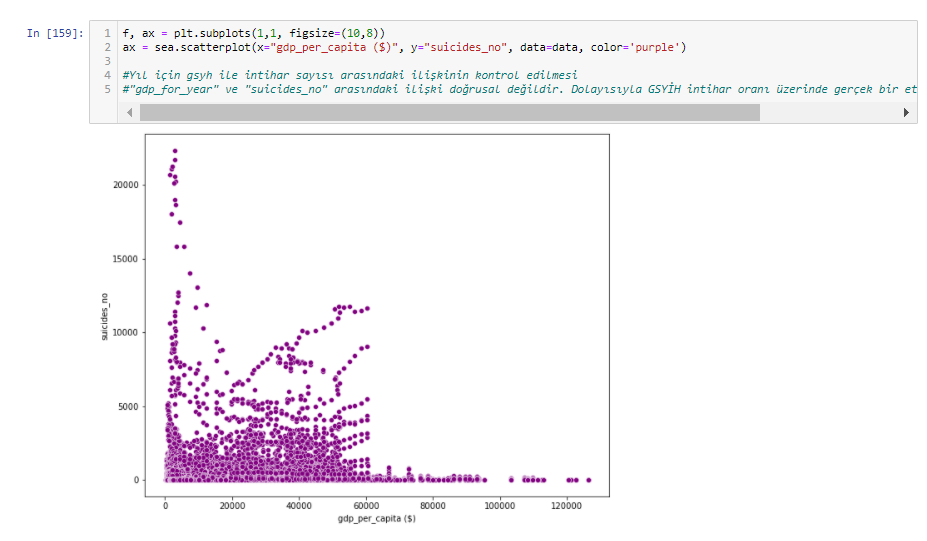
We see it in Lithuania in the age range, in Kazakhstan between the ages of 5-14, in Lithuania in the age range of 55-74 and in Hunhary in the age range of 75+. In fact, in line with these data, we can put forward the diagnosis of suicidal tendency in countries with colder climates and more sunshine.



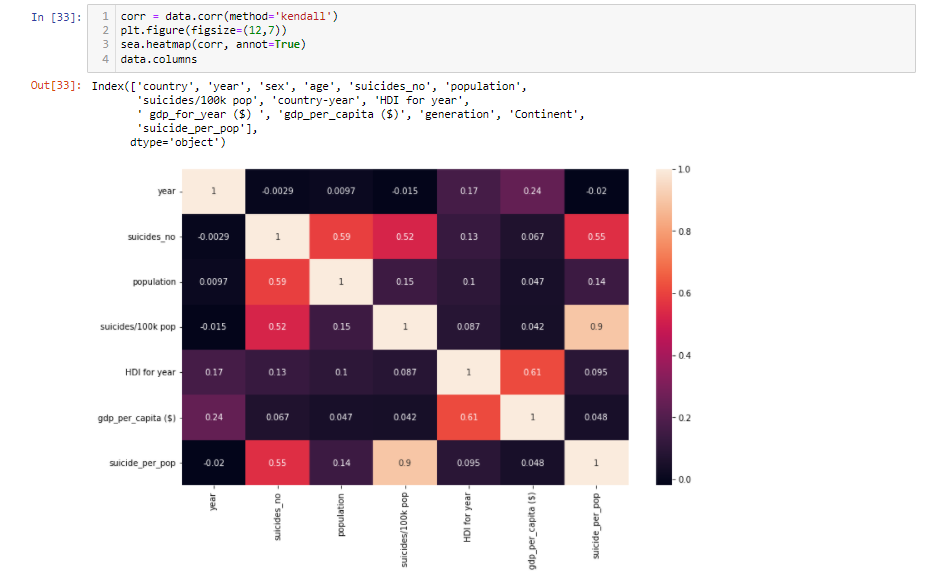
When suicide is mentioned, two age groups worldwide come to mind: 15-29 years old and 30-49 years old. On the other hand, the group with the highest suicide rate globally is 70 years and older. This rate is increasing. Especially in developed countries, factors such as the prolongation of the average life expectancy, the weakening of social ties, the decline of the welfare state and the worsening of retirement conditions increase the suicide rate of the elderly. In short, suicide has to do with age.

In our data analysis, with a clear difference, it has been determined that males are more suicidal in all age ranges. It has become an issue that needs to be investigated and prevented due to its sub-reasons. Depression and financial reasons may underlie the suicidal tendency of the young and middle age group of 25-74. Then let's continue to extract meaningful data with our analysis of countries' GDP.

##### 4.2.5 Does GDP Per Capita Have an Effect on Suicide?



We can see from this graph that there are more suicides in poor countries. Suicide decreases as income increases, but tends to increase again at some point (about 20k).



Interpretation of the correlation coefficient (r);

If r<0.2, very weak correlation or no correlation

between 0.2-0.4 weak correlation

Moderate correlation between 0.4-0.6

High correlation between 0.6-0.8

If it is 0.8>, it is interpreted that there is a very high correlation.

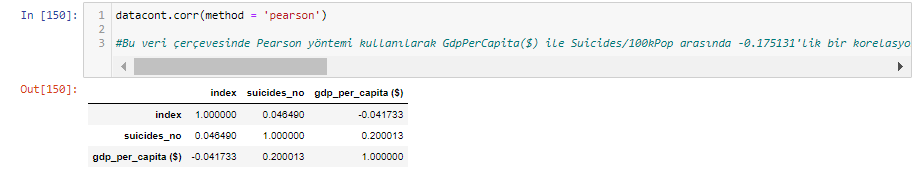
We can see from the Correlation Heatmap that the number of suicides is clearly related to population.

What I didn't expect is that the number of suicides has less interaction with GDP per capita. Before I made this correlation I was thinking that the suicide count would have a high correlation with gdp. I expected higher GDP to be less suicidal. What came out didn't fit my theory.

There is a weak correlation between GDP per capita and Suicide per 100,000.

This means that when the suicide rate increases, GDP per capita also decreases.

I have done GDP\_PER CAPITA and suicidality correlation using Pearson method. Using the Pearson method in this data frame, we can say that there is a positive correlation between GdpPerCapita($) and Suicides\_no 0.042, that is, there is a positive correlation between the two. However, we see that they are not very related to each other.



I will now examine the relationship between suicide rates and different continents.

However, we also take into account the correlation between suicide rates and country GDP.

Based on this information, we cannot interpret the relationship between GDP and suicide.

##### 4.2.6 Generation and Suicide

Here is some information regarding the generations.

• Greatest Generation (G.I. Generation): 1901-1927

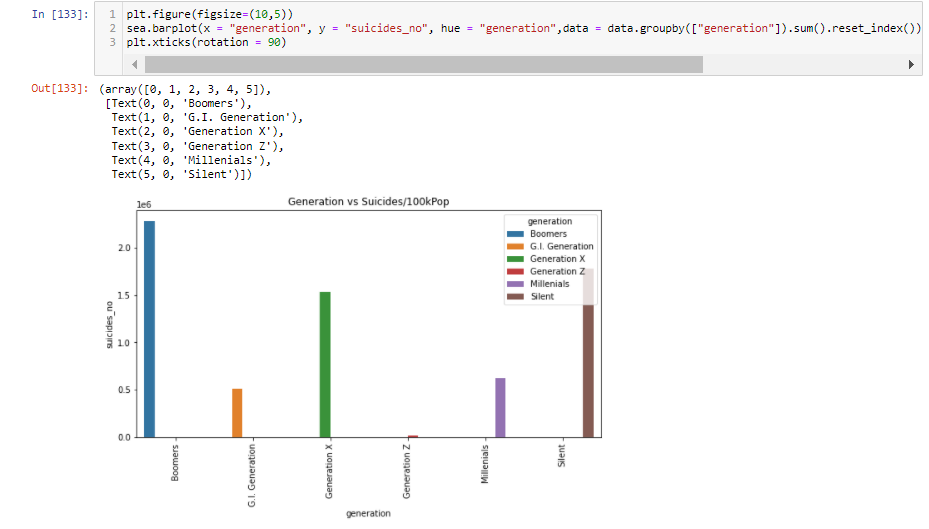
• Silent Generation: 1928-1945

• Boomers: 1946 – 1964

• Generation X: 1965 – 1980

• Millennials (Generation Y): 1981 – 1996

• Generation Z: 1997 – 2010



Then I plotted the average suicide rate for each generation.

We see that the Generation of Boomers has the highest suicide rate.

Boomers are people born between 1946 and 1964. Next comes the Silent Generation, followed by Generation X. Therefore, we see that older people have a higher risk of suicide.



This field shows the number of suicides committed by people of different generations, depending on their gender.

Suicide numbers are higher in the Silents generation for both sexes (Female and Male).

Suicide rates are lower for both genders in Generation Z.

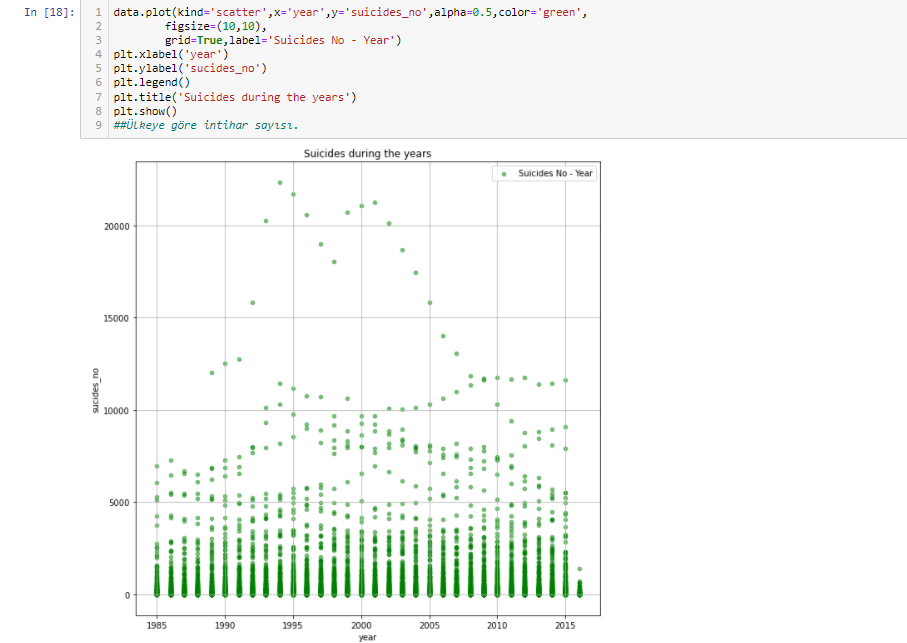
When I wondered if the generation differences had anything to do with gender, I saw that the Silents generation had a very high suicide rate for both men and women. In Generation x and Millennials that follow him, the suicidal tendency is quite high. I predicted that this situation should be taken seriously and necessary studies should be carried out to reduce suicide rates.

Teen suicides constitute an important public health problem. Young people, and especially adolescents, are by nature a vulnerable group to mental health problems.

While suicide in children is relatively rare, suicidal ideation increases significantly throughout adolescence. Although youth suicide rates have dropped slightly in Europe and around the world, it remains the leading cause of death among young people and therefore we must live with this sense of responsibility as a whole society.

### Implementation of Project

##### Overview



We see the change in the number of suicides by country as the most obvious analysis.

While suicide rates were more stable between 1985-1990, they reached a very high peak between 1990-2005. Although the economic crisis developing in the world is one of them, it is necessary to examine this important situation with other data sets.

### Results and Discussion

First, it asks what causes suicides globally, which is our problem, and who affects them.

The scope of my project has covered many countries over the last thirty years. I worked with the Kaggle called 'Suicide Rates Overview 1985 - 2016' dataset, as the results of my project were to gather information about what causes suicides around the world.

Data are organized by country, male or female, and age, generation and continents, and the number of suicides per year.

I analyzed various analytical elements to see correlations between age, gender, year and GDP to get the most unbiased analysis possible.

##### Results

The distribution of suicide rates among age ranges shows us that the general prejudice about suicide is most prevalent in the younger group. The distribution says that neither teenagers nor young adults are in the most common age range for suicide rates. Mid-adults showed the highest suicide rate, with children and youth was even more than the sum of their rates.

Why was the middle adult population at such a high risk of suicide between 1985 and 2016?

Wars, scientific development, technology, industry, social changes, economic crises and/or many possible situations in our environment can affect our actions towards ourselves more.

It shows that the high variability of suicide rates in men over the years has increased, and sometimes even doubled, compared to women. The data show that middle-aged adults aged 35 to 74 have the highest number of suicides. Seniors and adolescents are about half as old as middle-aged adults.

Suicide is one of the leading causes of death among adults worldwide.

The data show worrying differences in suicide for the different sexes. It is clear that men are more suicidal than women.

While rates did not differ much from the mid to late 1980s, after 1990 there is a huge difference in male suicide, but not so much in female suicide.

The data also allow us to see that population size is a great indicator and one of the reasons for suicide rates in general.

People living in countries with larger populations have a higher rate of attempting and committing suicide than countries with smaller populations.

In the data, annual GDP also appears to be a key point in suicide rates. In addition, a higher GDP seems to be associated with higher suicide rates.

We might think that a person killed himself because of financial problems, puberty problems or gender and many guesses. But the reality doesn't even seem close to these predictions.

People commit suicide and we can't generalize that. We shouldn't try to mold it. . Suicide is not like other harmful or negative actions because ending one's life is more than statistical data.

##### Discussion

I assumed that suicide rates would be higher for younger individuals, men, and those in countries with lower GDP.

First of all, when we look at our dataset by dividing it into age groups (5-14, 15-24, 25-34, 35-54, 55-74, 75+), it is seen that the suicide rate increases gradually in each group, and there are more suicides in each gender in the 35-54 age range. we saw that. These observations directly contradict our hypothesis that we think younger individuals would have higher suicide rates.

Finally, I wanted to see if there was a relationship between country GDP and suicide rates, and I did my analysis in that direction. I have determined that there is a positive correlation between the country's GDP and suicide rates, but we cannot clearly obtain the connection with the data we have.

Overall in our project, we discovered through graphs, charts and tables that higher suicide rates came from men and the elderly.

### Conclusion

Therefore, our conclusion from this project is that there are more cases in men than in women.

Although I searched for a connection between GDP and suicide, I couldn't get a clear idea. There is always an inverse relationship between GDP and the suicide rate

When I made a connection between the generational and suicide data, I concluded that the Boomers generation was the most suicidal bird. In the light of these data, I think that those born this year commit suicide more due to economic and war reasons.

People between the ages of 35-54 commit suicide more than other age groups. Suicide is a method that cannot be crusted at any age and period. In the light of these data, I can foresee that Countries should observe more and work in partnership with WHO to deal with suicide.

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