BIRMINGHAM CITY
University

Faculty of Computing, Engineering and the Built Environment

School of Computing and Digital Technology

CMP5352 Data Visualisation Coursework:

Suicide Rates 1985-2015 Data Visualisation

Using ggplot2 and plotly

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Birmingham, 2020
Word count: 1898

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1 Introduction

According to World Health Organisation reports close to 800 000 people die due to suicide every year Suicide is a global phenomenon and occurs throughout the lifespan. Effective and evidence-based interventions can be implemented at population, sub-population and individual levels to prevent suicide and suicide attempts. There are indications that for each adult who died by suicide there may have been more than 20 others attempting suicide.

WHO Director-General Dr. Tedros Adhanom Ghebreyesus says "Despite progress, one person still dies every 40 seconds from suicide every death is a tragedy for family, friends and colleagues. Yet suicides are preventable. We call on all countries to incorporate proven suicide prevention strategies into national health and education programmes in a sustainable way."

Suicide was the second leading cause of death among young people aged 15-29 years, after road injury. Among teenagers aged 15-19 years, suicide was the second leading cause of death among girls (after maternal conditions) and the third leading cause of death in boys (after road injury and interpersonal violence).

The timely registration and regular monitoring of suicide at the national level are the foundation of effective national suicide prevention strategies. Yet, only 80 of the 183 WHO Member States for which estimates were produced in 2016 had good quality vital registration data.

While trying to visualise the suicide data between year 1985 and 2015 I will try to raise awareness in this global problem, by visualising numbers into plots to show the seriousness of it. I will also answer the following questions:
1. What are the differences between sex and age suicide rates? Do people from different generations tend to suicide more than the other? Was there any years when the suicide rates were rising or falling? If so, were there any clear factors?
2. Is there a correlation between suicide rates and GDP(Gross Domestic Product) per capita. As GDP per capita is a great measure of a country's standard of living, is GDP a universal factor and does higher GDP means lower suicide rates as the people are more financially stable?
3. Is there a correlation between alcohol consumption per country and suicide rates? Do bigger alcohol consumption having countries, have increased suicide rates and vice versa?
4. Is there a correlation between happiness and suicide rates?

For this coursework I used R programming language, which is is a language and environment for statistical computing and graphics. Everything has been done using RStudio IDE, using tidyverse collection of packages which included ggplot2 package, which has been used for plotting the data. For interactive web application I used Shiny package. Report has been written using LaTeX document preparation system.

2 Suicide rates over the years 1985-2015

In this section I will present you the visualised data and will use these visualisations to answer the questions mentioned above. All of the plots have been done using ggplot2 package.

2.1 Global suicide rates

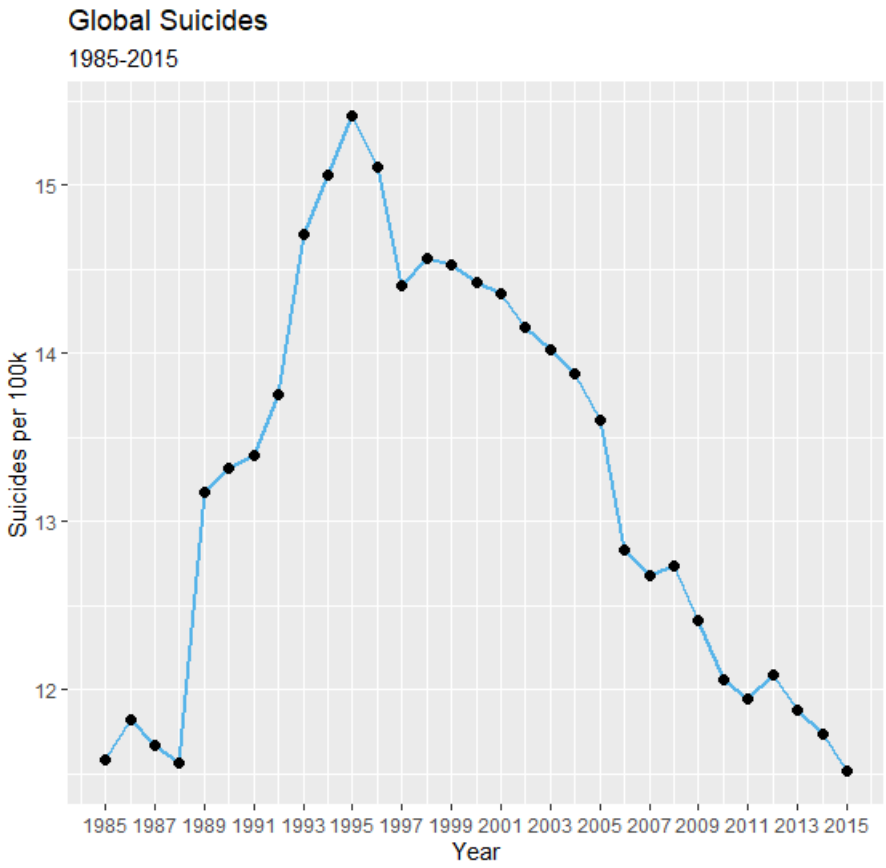

Figure 1: Global suicide rates (1985 - 2015)

As we can see from the Figure 1, the suicide rates peaked at 1995 with over 15 suicides per 100 000 people. It is clear to see that from then suicide rates steadily decrease. It is hard to say why in 1995 there were so many suicides, so to try and do so, I will have to separate the global statistics into continents and even countries.

2.2 Global suicide rates by gender

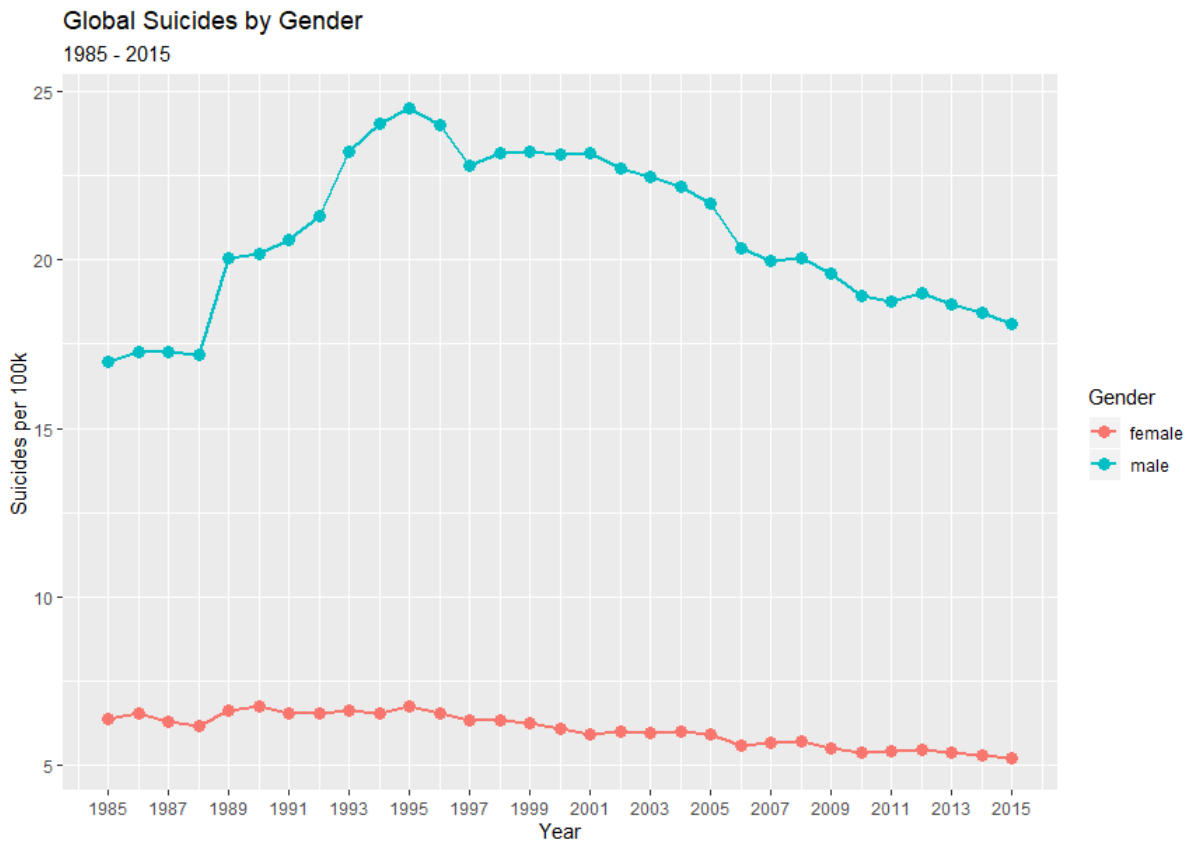

Figure 2: Suicide rates by gender (1985-2015)

According to Figure 2 the difference between gender is significant globally. The suicide rates for male has been higher 3-4 times than female. Comparing to Figure 1 both male and female suicide rate peak was at 1995 and has been declining since.

Harkavy-Friedman(2019) says "Men seek help for mental health less often, it's not that men don't have the same issues as women – but they're a little less likely to know they have whatever stresses or mental health conditions that are putting them at greater risk for suicide."

Many researchers have attempted to find explanations for why gender is such a significant indicator for suicide. A common explanation relies on the social constructions of hegemonic masculinity and femininity. According to literature on gender and suicide, male suicide rates are explained in terms of traditional gender roles. Male gender roles tend to emphasize greater levels of strength, independence, risk-taking behavior, economic status, and individualism. Reinforcement of this gender role often prevents males from seeking help for suicidal feelings and depression.

2.3 Global suicide trends by age

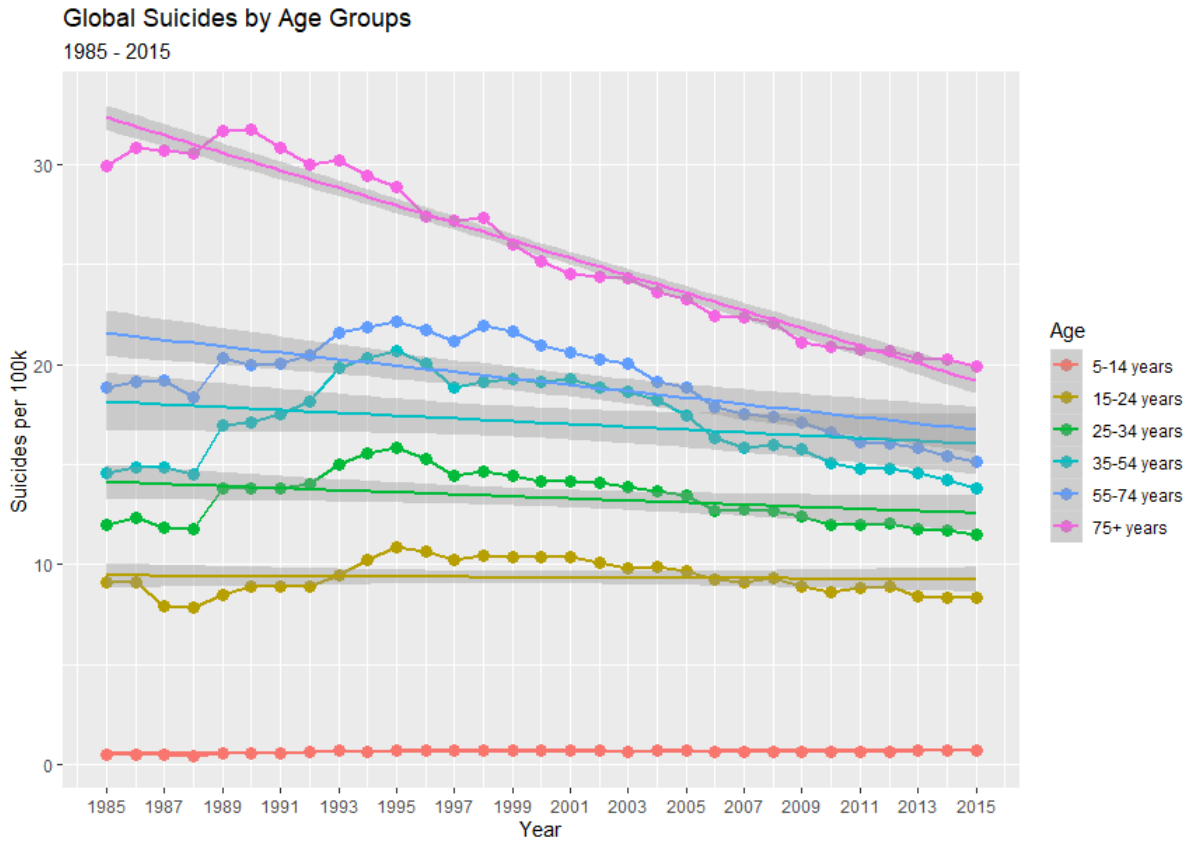

Figure 3: Suicide rates by age groups (1985-2015)

According to Figure 3 we can see that suicide rates increases with age. Throughout the years (1985-2015) the people from age group 5-14 have the lowest suicide rates, while people aged over 75+ have the highest. However the 75+ age group suicide rates has been decreasing steadily from early years, while other groups started declining 5-10 years later.

Older adults are particularly vulnerable to health problems due to several factors: mental and neurocognitive disorders, social isolation, feelings of disconnectedness and loss of relatives, neurocognitive impairment and altered decision making, chronic physical illnesses, and physical and psychological pain. These factors increase the complexity of the classical stress–diathesis model for suicidal behavior. (Ismael conejero et al.. 2018)

2.4 Continental suicide rates

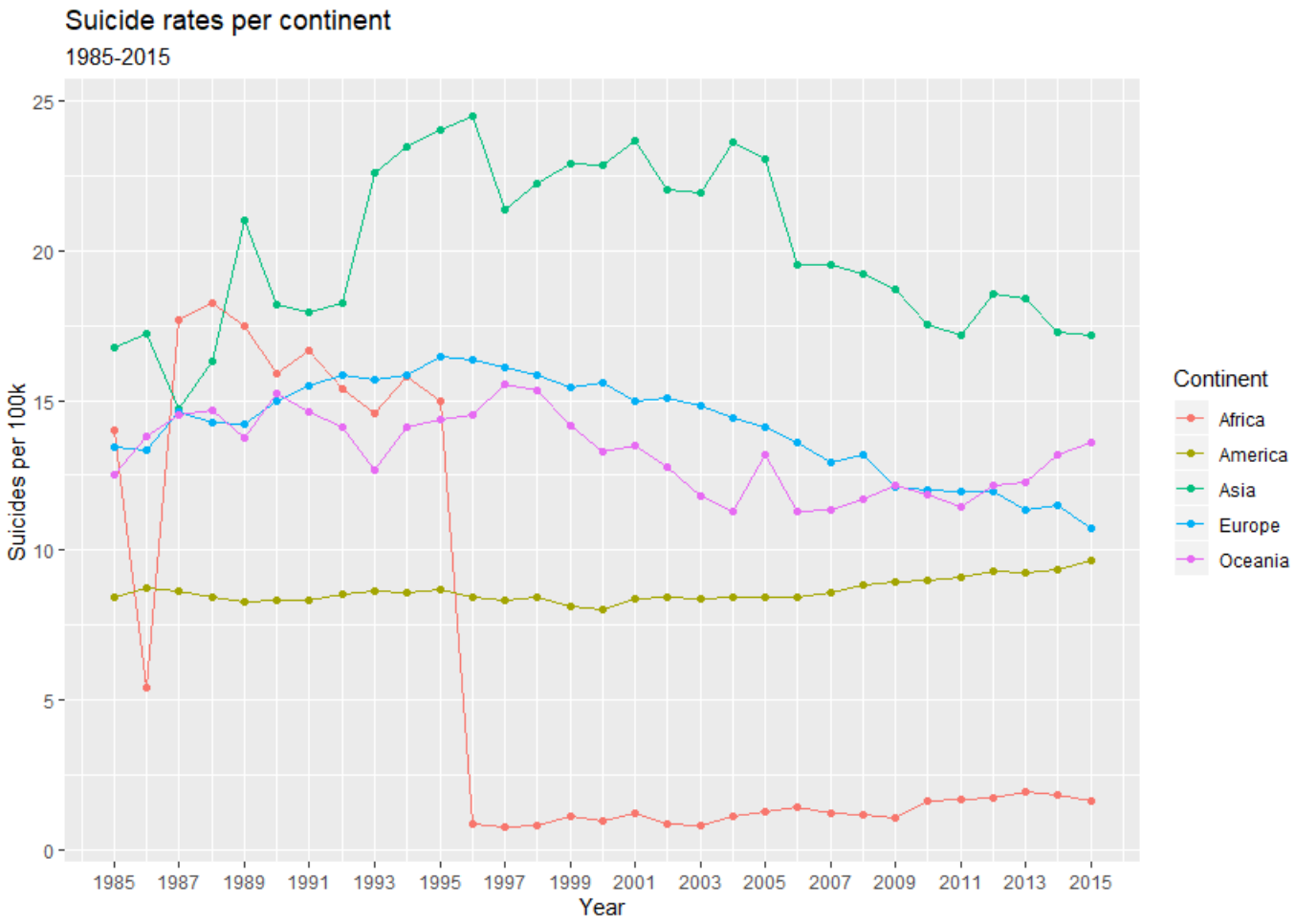

Figure 4: Suicide rates by continents (1985-2015)

According to Figure 4 we can see that the Asia is at the highest risk of suicides, however it has been declining since 2005. As America, Africa and Oceania have the lower level of risk, however the suicide rates are slowly increasing. Comparing to Figure 1, we can see that Asia increased suicide rates globally by great amount. Difference in 1995 between Asia and other continents was at least 9 people per 100 000.

2.5 Suicide rates by countries

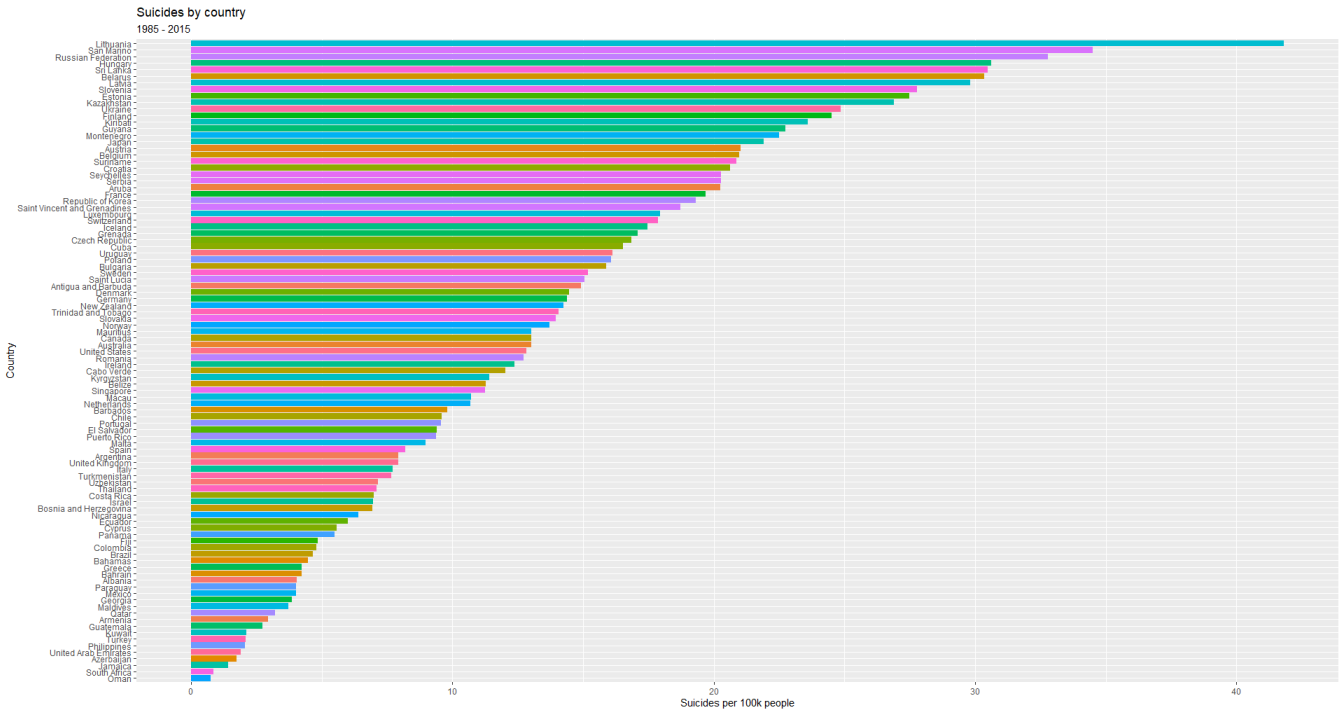

Figure 5: Suicide rates by countries (1985-2015)

According to Figure 5 Lithuania stands out massively from other countries with over 40 suicides per 100 000 people. Followed by San Marino(39.7 per 100k) and Russia(34.8 per 100k). While Oman, South Africa and Jamaica have the lowest suicide rates, all of them having less than 2 per 100 000.

Suicide in Lithuania has become a significant social issue in the country due to its high rate.Despite constantly decreasing since its peak in 1995, the suicide rate in Lithuania remains the highest in the EU and the world. Social and financial problems in Lithuania are thought to be important factors behind the high rate of suicides. According to Onutė Davidonienė, director of the State Mental Health Center, a major reason behind the dramatic rise in suicides over the last decade is the economic and social transition. This can be linked to the Russian economic crisis of 1998 which was prolonging the phenomenon in Lithuania. (R. M. Tracevskis and T.Coulaloglou, 2002)

3 Suicide rates and GDP correlation

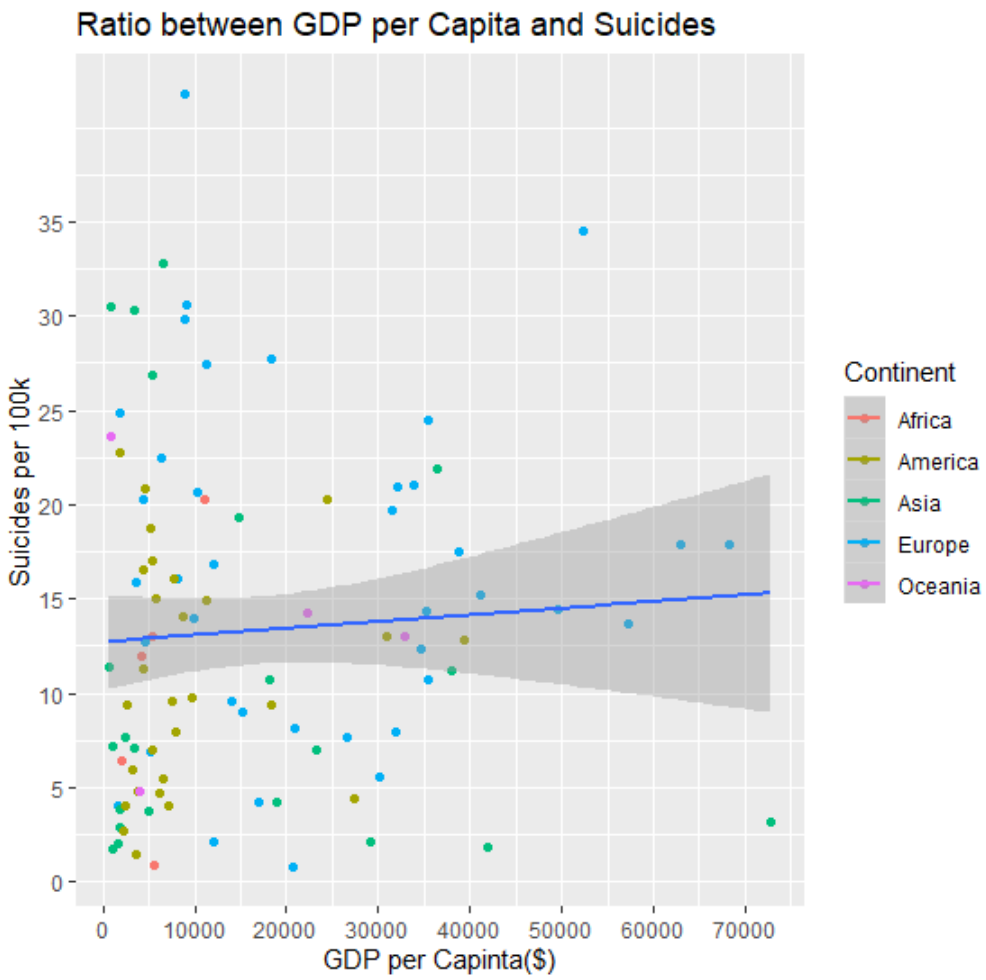

Figure 6: Suicide rates and GDP correlation between continents (1985-2015)

According to Figure 6 we can see that there is weak but positive linear relationship. Wealthier countries have higher suicide rates, but the relationship is not too strong.

GDP does not in any way directly impact the suicide rates, this could be one of the many contextual reasons as it relates to economic aspects as people being more financially stable. However, based on this visualisation, it is not statistically significant to support that GDP per capita of one's country contributes to the suicide rates.

4 Suicide rates and alcohol consumption correlation

I visualised the top 15 countries by alcohol consumption and top 15 countries by suicide rates from year 2015.

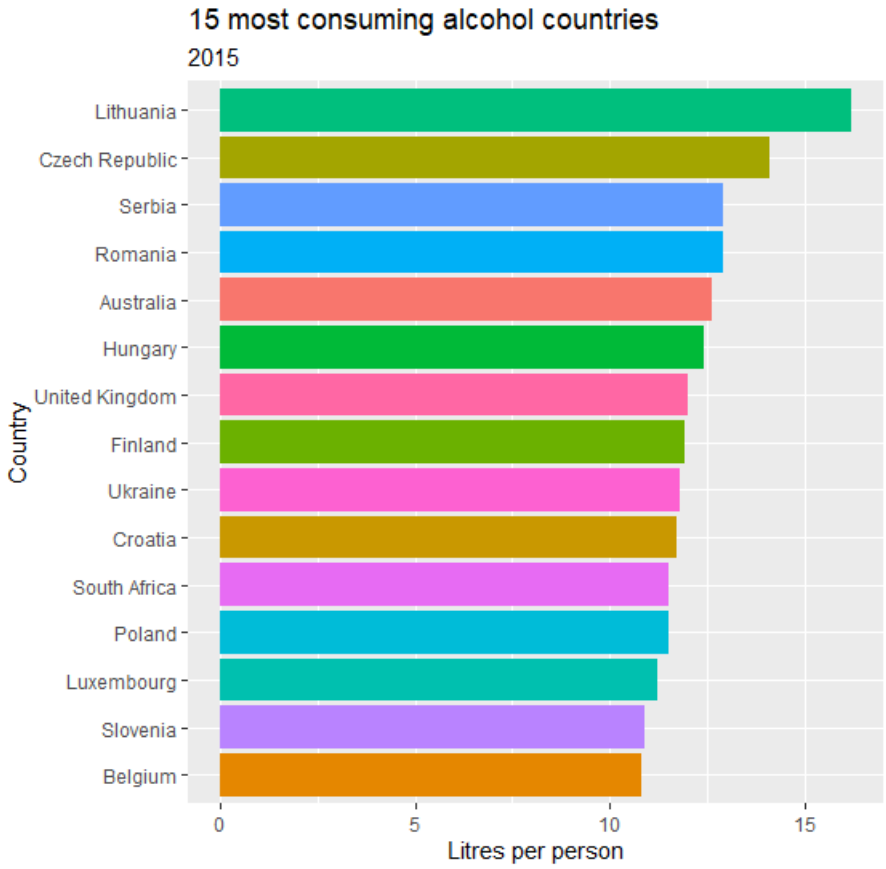

Figure 7: Top 15 countries by alcohol consumption (2015)

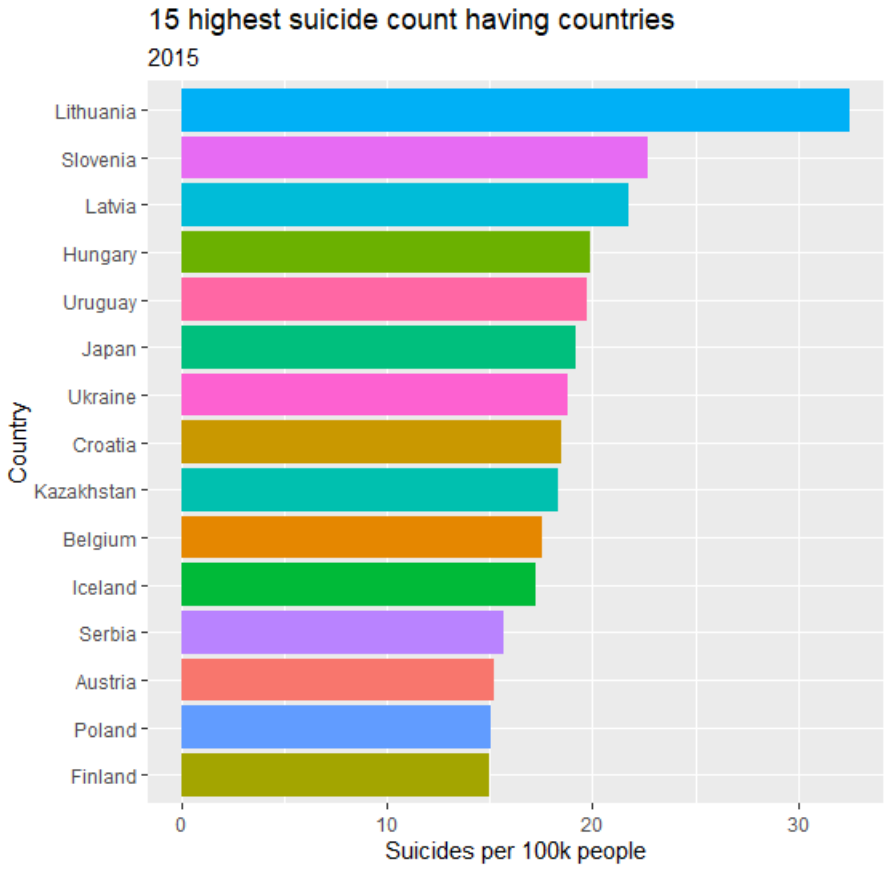

Figure 8: Top 15 countries by suicide rates (2015)

According to Figure 7 and Figure 8 the most alcohol consuming country and highest suicide rates having country is Lithuania. There are 3 other countries which appear to be in both graphs: Serbia, Hungary, Ukraine. So far it is not accurate to tell if suicide rates are correlated to alcohol consumption.

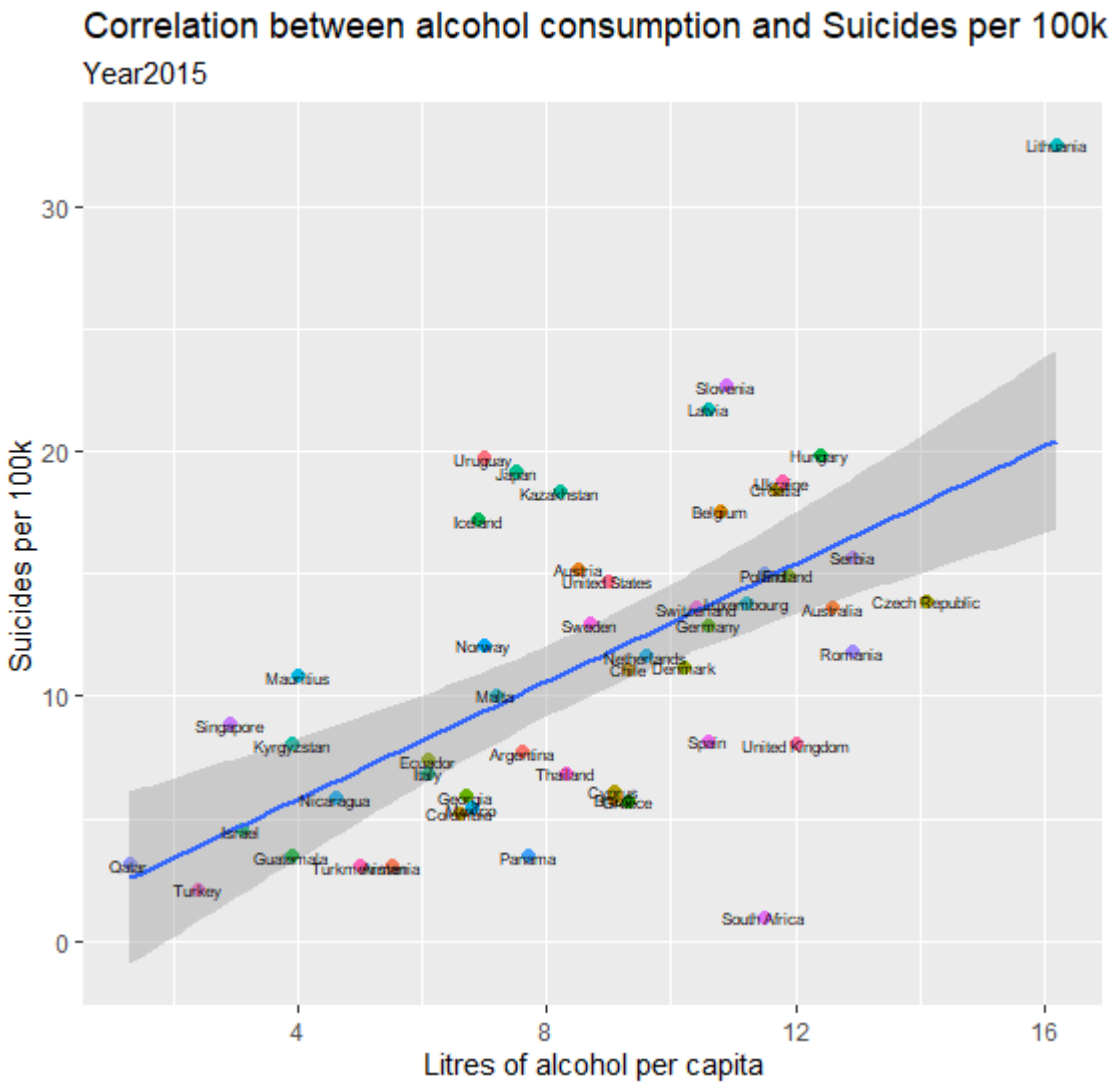

Figure 9: Alcohol consumption and suicide rates correlation (2015)

By looking at Figure 9 we can see that there is a strong relationship between alcohol consumption and suicide rates. According to AA (Alcoholics Anonymous) alcohol has been found in relation to nearly one-third of suicides – a significantly larger concentration than there are people who suffer from alcoholism in the general population. The abuse of alcohol is often a first step down the road. Although alcohol may provide temporary relief from suicidal ideation (thoughts of suicide), it actually makes the issue exponentially worse. In most cases, mid-to-long-term alcohol abuse makes suicidal ideation both more frequent and more powerful, increasing the likelihood of suicide attempts. Additionally, alcohol abuse generally makes other contributing factors to suicide worse.

5 Suicide rates and happiness rating correlation

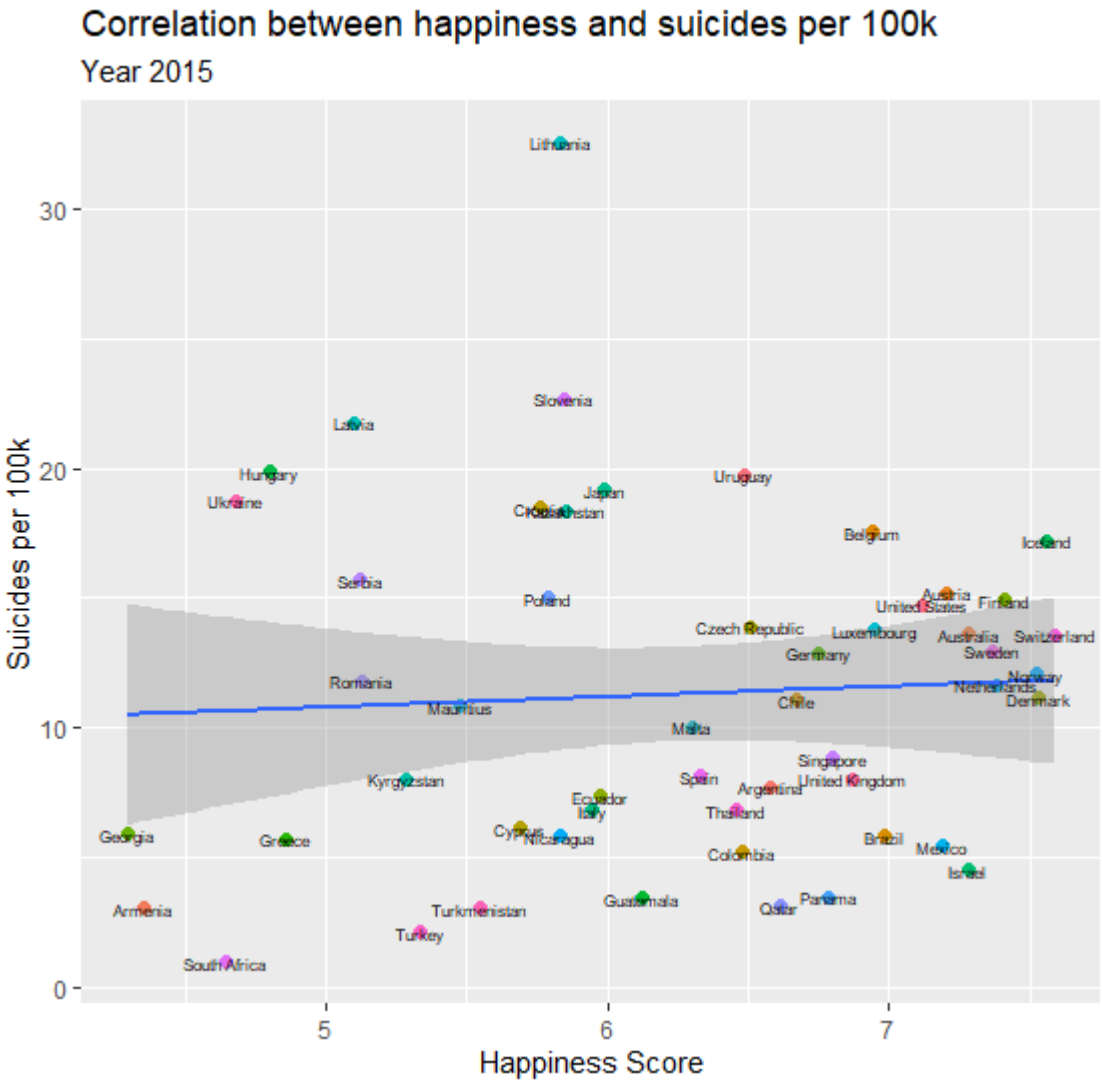

Figure 10: Happiness rating and suicide rates correlation (2015)

We would like to think that the countries having higher happines ratinng tend less to suicides. However, according to figure 10 it is hard to find any evidence that the countries with higher happiness rating have lower suicide rates and vice versa. We can see that the Easter Europian countries, still have higher suicide rates despite having quite high happiness score.

6 Conclusion

To summarize using the data visualisations I can say that the good thing is that the suicide rates are decreasing steadily and according to Figure 1 we are coming close to the numbers been seen before 1990's, the lowest we had so far. There is a high difference between generations, who tend to suicide more, which are older adults. Male being more than 3 times vulnerable to this worldwide problem. There was no clear correlation between the money and suicide rates, neither between happiness score. However there was a clear indicator that alcohol may lead to suicide either it was a option for solving the preexisting problems, either it was a longtime addiction. Suicides are a major problem in global world despite decline.

7 References

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