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Final Project Paper

**Introduction:**

Suicide is a pressing global and national public health issue, affecting individuals across all demographics and social strata. While suicide rates vary significantly across countries, it is universally recognized as a complex phenomenon influenced by a range of individual, social, and environmental factors (Frontiers in Psychiatry, n.d.). Among the notable risk factors are substance use disorders, trauma, chronic health conditions, social isolation, exposure to violence, family history, and economic hardship (National Institute of Mental Health, n.d.).

This paper aims to examine global and national suicide trends, their predictors, and the effectiveness of countermeasures. In particular, it explores how various indicators—such as Gross Domestic Product (GDP), Human Development Index (HDI), sex, and generational differences—correlate with suicide rates.

Countries and communities implement diverse strategies to mitigate suicide, yet their success varies. For instance, Japan, historically facing high suicide rates, implemented a national strategy focused on mental health awareness and reducing social isolation. In contrast, Nordic countries like Finland have prioritized comprehensive mental health services and early intervention in their efforts to address suicide (World Health Organization, 2018; National Mental Health Strategy, 2020).

This paper will be broken into several sections, these sections are a review of past literature on the topic of suicide, a methodology section describing my “methods for data collection and the approaches to analysis”, an analysis section describing how I “analyzed and visualized the data”, a results and discussion section, and finally a conclusion section stating the conclusions of my research project.

**Review of Literature**

*Background Information*

Suicide is a critical global and national public health crisis. Although different countries and regions experience varying suicide rates, no nation is immune to this challenge (World Health Organization [WHO], 2021). Globally, the average suicide rate is approximately 9 per 100,000 people, but these rates can differ significantly across countries and regions (WHO, 2021). A consistent finding across most studies is that men are generally 2 to 3 times more likely to die by suicide than women (Värnik, 2012). Additionally, suicide ranks as the second leading cause of death among young adults aged 15 to 29 (WHO, 2021).

According to the WHO (2021), countries with the highest suicide rates include Lesotho, Guyana, South Korea, and Russia. South Korea stands out as the only high-income country on this list, suggesting that socio-economic factors may play a significant role in influencing suicide risk. Other contributing factors often linked to suicide include mental health disorders, economic stress, cultural and societal norms, access to means (such as firearms), and a history of trauma or abuse (Turecki & Brent, 2016).

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*Global and National Trends in Suicide Rates*

Currently, in the United States, the suicide rate is 14.5 per 100,000 people, making it the 10th leading cause of death overall (World Health Organization, 2021). Notably, firearms are involved in over 50% of suicides in the U.S. Additionally, military veterans are at significantly higher risk, with estimates suggesting their risk of suicide is approximately 1.5 times higher than that of the general population (U.S. Department of Veterans Affairs, 2020).

Suicide rates also vary greatly between countries. For example, South Korea has a suicide rate of approximately 28.6 per 100,000—nearly double that of the U.S. (World Health Organization, 2021). Leading causes in South Korea may include social isolation, high societal expectations, and mental health stigma (Park & Lee, 2019). A phenomenon known as the “gender war” in South Korean media may contribute to this isolation, particularly among young people. In South Korea, marriage rates are declining, with estimates suggesting over one-third of men and a quarter of women in their 30s may never marry (Statista, 2020). These regional and national issues demonstrate how societal factors can influence suicide rates and explain some of the disparities between countries.

Globally, suicide rates have decreased significantly over the past two decades, particularly in Europe and the WesternPacific, where rates have fallen by nearly 47% and 49%, respectively (World Health Organization, 2021). However, this progress is not universal. In the U.S., suicide rates are increasing, with firearms involved in over 55% of cases (CDC,2022) Suicide rates among Black, Hispanic, and younger populations, particularly men, have also risen (Curtin, Heron, & Miniño, 2019).

*Demographic Patterns*

While suicide impacts all demographics and countries, it appears to most heavily impact middle-aged men. According to the World Health Organization (WHO), globally, suicide rates are higher among men, particularly those in middle age. While no one factor can be solely attributed to this phenomenon, there is some literature to suggest that a few key factors increase the likelihood for this demographic to take their own lives.

Some of the major documented factors include economic pressures, such as job loss, financial stress, and changing labor markets, which have left many men feeling marginalized. Social isolation, especially after relationship breakdowns such as divorce and shrinking social circles, also plays a role. As men age, their social networks typically shrink due to family and work responsibilities. In contrast, research shows that women tend to maintain stronger emotional support networks, which can provide resilience against stress and mental health challenges.

Other factors come into play, such as untreated mental health issues, substance abuse, and societal expectations surrounding masculinity, but these, while significant, are outside the scope of this discussion for brevity.

**Methods & Analysis**

To begin with, the dataset I used was a 2643 KB CSV file from Kaggle, the world’s largest open-source data science platform. I browsed their datasets section, filtered for datasets related to public health, and decided to use the dataset titled "Suicide Rates Overview 1985 to 2016." I chose this dataset because it met the criteria set by the professor: “our dataset should contain at least 1,000 records” and “focus on a topic you care about.”

The dataset includes the following fields:

| country | year | sex | age | suicides\_no | population | suicides/100k pop | country-year | HDI for year | gdp\_for\_year ($) | gdp\_per\_capita ($) | generation |

Using the Python programming language, I read the CSV file and performed exploratory data analysis (EDA). This analysis involved examining suicide rates and numbers, and how these findings correlate with gender, income, and age groups. As part of the initial EDA, I also looked for extreme outliers. Several outliers appeared in the suicides/100k pop field, which I highlighted in both the project and the visualizations. I noted that while the suicide rate was high in some countries, the actual number of suicides was relatively low. As a result, these findings should be interpreted cautiously.

For the analysis, I used libraries such as Pandas for data manipulation and Seaborn and Matplotlib for visualizations, including bar and line plots. I employed linear regression to examine how GDP and HDI influenced suicide rates. I also created various data visualizations to display descriptive statistics, such as the number of suicides by gender and age groups.

Finally, I made my code available for public viewing on GitHub.

**Results and Discussion**

Some of the major findings in my analysis are that gender and age are strongly associated with suicide risk, with middle-aged men (35-54 years) being the most affected. There are many potential reasons why this might be the case, including, but not limited to, mental health issues, social isolation, and economic hardships (Korhonen et al., 2016; Choi et al., 2021). Another interesting finding from my analysis shows that suicide rates spiked in the 1990s and early 2000s. Several significant events occurred during the mid-1990s, such as the fall of the Soviet Union, the Asian financial crisis, and the Rwandan Genocide, among others. Additionally, I found a weak correlation between HDI and suicide rates, with the highest suicide rates occurring in countries with an HDI between 0.6 and 0.7. This suggests that the highest suicide rates are in countries transitioning between low and high development. Finally, I conducted an ordinary least squares (OLS) regression analysis. The results showed that HDI and GDP per capita together explain only 5.4% (the R-squared value) of the variance in suicide rates, indicating that other factors are likely influencing these rates. While both predictors are statistically significant, the positive relationship between HDI and suicide rates suggests a potentially complex interaction that warrants further investigation.

**Conclusions**

The major conclusions of the study show that there is strong correlation between age, sex, and suicide, and a weak, but positive, correlation between HDI, GDP, and suicide. Some of the limitations of this analysis include, but are not limited to, not measuring mental health parameters, not looking at suicide prevention measures effectiveness, and the dataset is 8 years old at this point.

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