# Does the availability of mental health institutions and mental healthcare personnel affect the suicide rate of young people?

Introduction

Suicide rates are increasingly significant internationally nowadays. There are lots of factors that can affect the suicide rate such as mental health conditions, family environment, stressful life events, etc. Individuals with mental health disorders such as depression, anxiety, or personality disorders, are at a higher risk of suicidal intentions and attempts. According to the "Diagnosed Mental Health Conditions and Risk of Suicide Mortality" (Yeh et al. (2019). Diagnosed mental health conditions and risk of suicide mortality. Psychiatric services, 70(9), 750-757.), the article exhibits the conclusion that half of the people who suicide was diagnosed with mental health disease one year ago, which means there exists an association between an increase risk of suicide and mental health conditions. Young adults, grappling with academic and work-related pressures, are especially vulnerable. Access to prompt and effective mental healthcare is essential in preventing suicide by addressing mental health disorders early. Nonetheless, there is global variability in how countries provide mental health services, reflected in differing suicide rates. This essay investigates the potential correlation between the accessibility of mental health facilities and professionals and the suicide rates among young people.
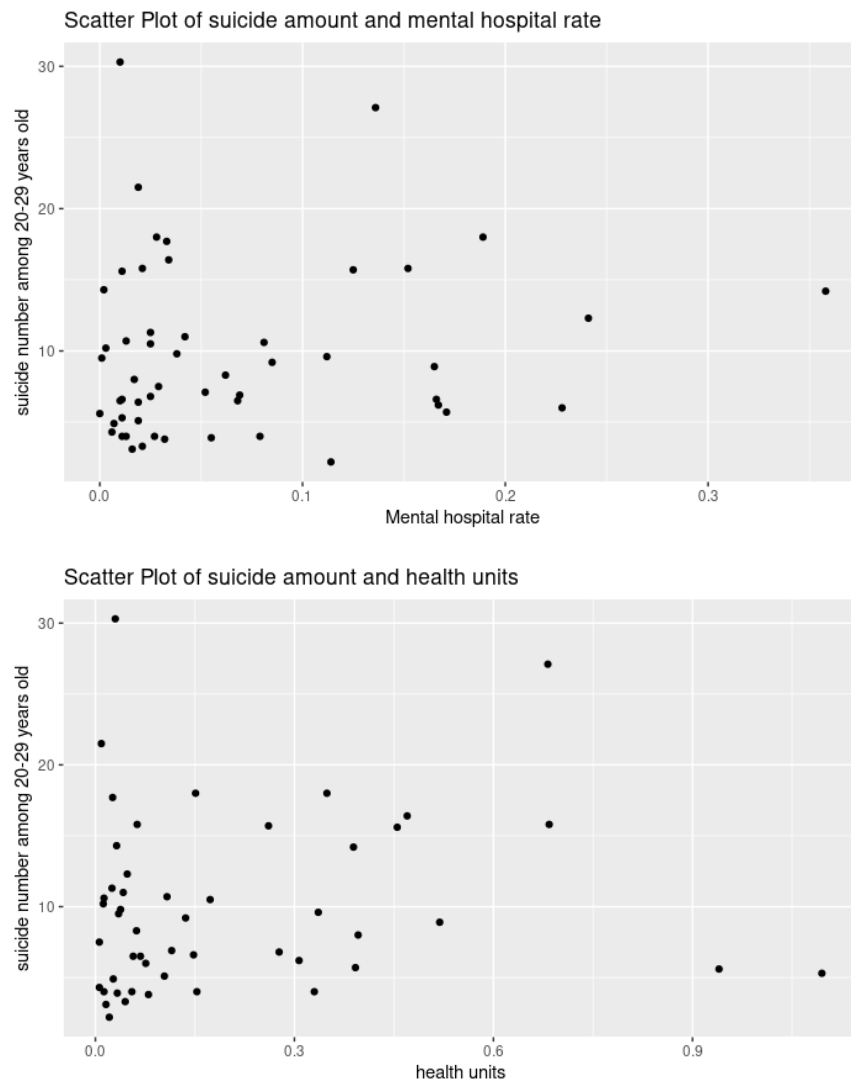
Data

The initial dataset comprises global suicide data from 2016, categorized by age and gender. To solve the question mentioned in this essay, I focused on the age group of young people whose age between 20-29 years old in terms of both sexes. The second and third datasets include the corresponding countries' mental health-related facilities and human resources, which can represent the availability of mental health institutions and mental health care personnel in our analysis. By integrating these datasets, I compared the suicide rates for the specified age group with the number of mental health hospitals, health units, psychiatrists, and psychologists per 100,000 people, using boxplots to visualize the distribution of these variables.
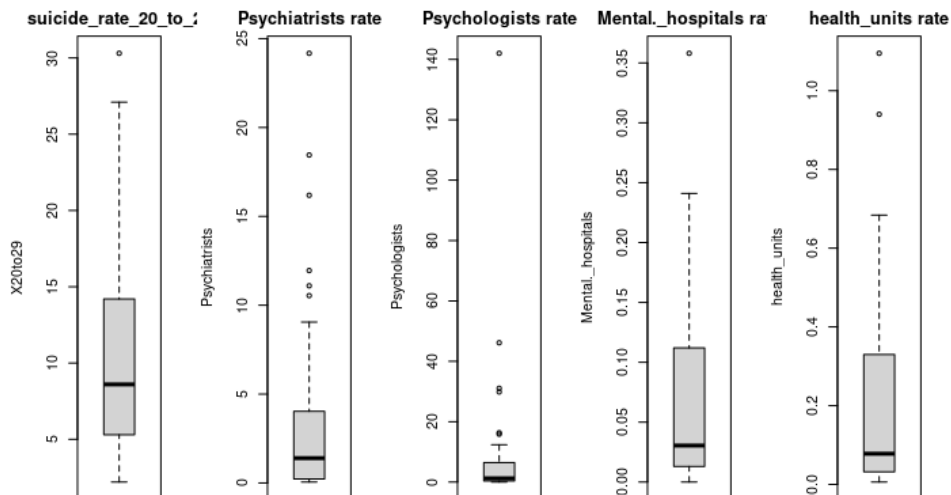
The boxplots reveal that suicide numbers vary from 5 to 30 per 100,000 people, indicating the suicide rate range. The quantities of psychiatrists and psychologists span from 0 to 25 and 0 to 140 per 100,000, respectively, showing the availability of mental health professionals in different countries. The availability of mental health institutions can be measured by the number of mental health hospitals and health units, separately, ranging from 0 to 0.35 per 100,000, and 0 to 1 per 100,000 people. Given the consistent baseline for suicide data across countries, a lower figure indicates a lower suicide rate and vice versa. The subsequent analysis will explore the relationship between the availability of mental health resources and suicide rates.

Exploratory Data Analysis

To investigate the correlation between the availability of mental health facilities and suicide rates, we will analyze two scatter plots comparing the number of health units, mental health hospitals, and the country's suicide rate.

Scatter Plot of suicide amount and mental hospital rate


Scatter Plot of suicide amount and health units

From the plots above, the data points in both graphs are widely dispersed. At the lower range of the mental hospital availability and health unit number, there's a wide variation in suicide

amount, indicating that countries with fewer facilities also report varied suicide number. Additionally, the other points on the graphs do not show an increasing or decreasing trend in suicide amount relative to the number of mental health hospitals or health units. We can not conclude any correlation from the plots. Then we applied two linear regression models for the factors to explore the statistical relationship of these variables. In terms of the number of mental health hospitals, the coefficient's p-value is 0.443 greater than 0.05, for the number of the health units' model, the slope's p-value is 0.397 which is also greater than 0.05. Therefore, we can conclude that there is no significant correlation between mental health facility availability and suicide rates.

As part of the medical resources, having access to mental health providers is also an essential factor that can influence the suicide rate. The dataset includes two variables—psychologists and psychiatrists—as indicators of mental health human resources. The analysis aims to determine whether there is a relationship between the availability of these professionals and suicide rates. Therefore, we can utilize two scatter plots to examine potential associations.

Scatter Plot of suicide amount and Psychiatrists

Scatter Plot of suicide amount and Psychologists
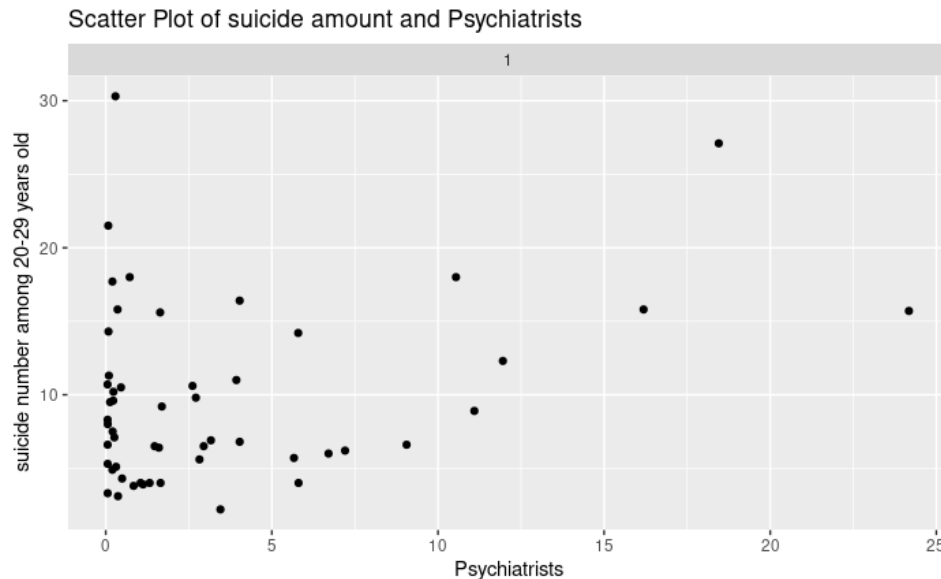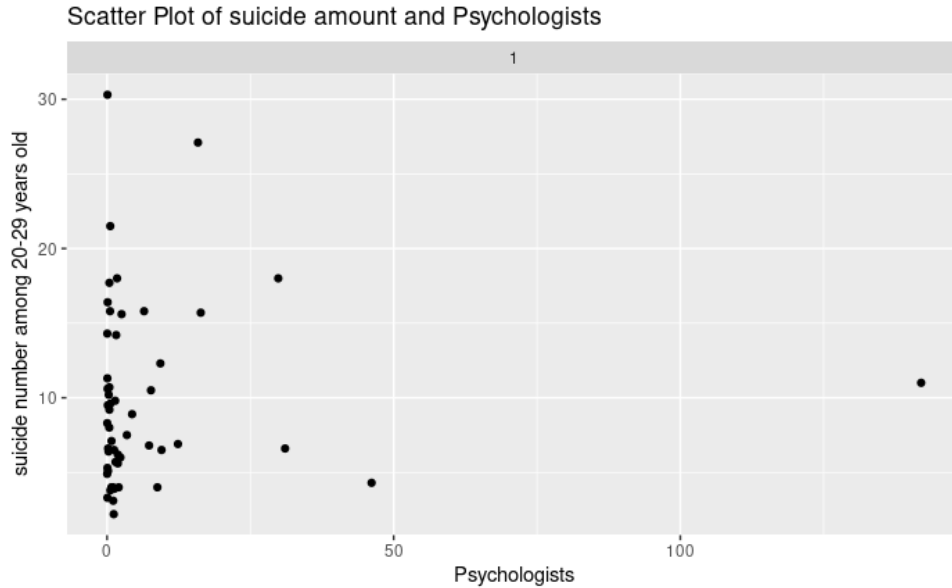
As shown above, we can see from both scatter plots, that in countries with fewer Psychologists and Psychiatrists, suicide rates still span a broad range, from low to high, which means that in the countries with a lack of mental health resources, the suicide rate can also vary from the low to high. Additionally, no distinct patterns or trends emerge from the data. Thus, by observing the scatter plot, we can not have any conclusion that there exists some relationship between the number of mental health professionals and suicide rates. In the further analysis, we fit two linear regression models for these variables. In terms of Psychologists and suicide amount, the p-value of the coefficient is 0.776 which is much greater than 0.05, therefore, we can conclude that there does not exist any linear relationship between these two variables. In terms of Psychiatrists and suicide amount, the p-value of the coefficient is 0.034, although it is less than 0.05, its R-squared is only 0.09, meaning that the linear regression model can only explain less than 10 percent of the dataset, which is inconvincible in a data analysis. Overall, we can consider that there is also no correlation between the number of mental human resources and the suicide rate as well.

Since we can not see there is any clear link between the availability of mental health institutions, personnel, and the suicide rate when we analyze these two dimensions separately, therefore, we can propose generating a comprehensive model that integrates all these factors. This approach can help us to explore if there exist any potential associations. What is more, combining all factors in one model could possibly bring us some effect caused by these covariables on suicide rate which may can not be found in the isolated factor regression model.

Table: summary of the integrating linear regression model

term	estimate	std.error	statistic	p.value
(Intercept)	9.02968303	1.32478085	6.81598246	1.9111E-08
selected_data$Psychiatrists	0.44757117	0.23185386	1.93040208	0.05987342
selected_data$Psychologists	-0.00666123	0.04208787	-0.15826966	0.87495244
selected_data$Mental._hospitals	-9.64693072	14.4138494	-0.66928205	0.50673507
selected_data$health_units	0.04770512	3.85586453	0.01237209	0.99018344

Through fitting the linear regression model, we can output a summary table. By observing the indexes in the table, we can see that except for the Psychiatrist rate, all other three factors' p-values are less than 0.05, indicating there is still no statistical association between these variables and suicide rate. Although the p-value of Psychiatrists is less than 0.1, we face the same issue as before that R-square is only 0.0995 which means it still cannot explain enough data points in the dataset. Therefore, compared to the previous models, togethering all factors into a single regression model did not provide us with additional meaningful information. We also did not observe any covariate effects on the suicide rate produced. We can have the clue that through our integrating model analysis, there also does not exist any relationship between the availability of mental health facilities, human resources, and the suicide rate among young people.

The article "Emergency Department Contact Before Suicide in Mental Health Patients" (D Da Cruz, (2011). Emergency department contact before suicide in mental health patients. Emergency Medicine Journal, 28(6), 467-471.), noted that over 40% of people who suicide attended an emergency department one year before death. What is more, it also states that mental health care providers should be alert to the possible association between frequent attendance and suicide so that they can prevent some potentially dangerous behavior through their treatments. Although our analysis found that there is no significant relationship between the rate of mental health institutions and healthcare personnel relative to suicide rates among young people, this paper implies that there is still some unique correlation between mental healthcare engagement and the occurrence of suicide.

Limitation

For data analysis, a robust database can reduce biases introduced by other factors. However, the current dataset only has nearly 150 rows of data, which can be regarded as a limitation that can be enhanced by collecting more data for this analysis. Moreover, in terms of the suicide rate, there are also lots of other cofactors that can affect this. For example, in a stressful society environment with high inflation and a high unemployment rate, more and more people can not stand huge stress from the financial situation, workplace, or other aspects, which can drive them to despair and suicide. In addition, it is crucial to consider the influence of geographic criterion on mental health, the impact of country urbanization on mental health is also a non-negligible factor that should be involved in the analysis. Therefore, in our data analysis, we should consider more factors such as unemployment, personal debt, urbanization rate, etc. We should also take

into consideration that in countries with a higher number of individuals with mental illnesses, there may be a simultaneous increase in the number of mental hospitals and doctors in that country. That is why in our scatter plots there exist some data points with a high suicide amount and high ratio of our healthcare institutions and personnel. This kind of supply and demand bi-direction effect should also be considered in the further exploring.

Conclusion

In sum, for young adults, there is no direct link between the suicide amount and the availability of mental health institutions. Countries with more mental health hospitals or health units can also display a high suicide rate. Similarly, the availability of mental health care professionals does not correlate with lower suicide rates, indicating that although in a region with lots of mental health care providers, there still can remain a high suicide rate. Therefore, it suggests that beyond expanding mental health services, governments must implement diverse strategies to reduce youth suicide rates. For example, increasing the minimum wage to make sure people who just started work can survive in society. Universities can decrease students' course workload during exam months, providing them with more time for review. Alternatively, colleges can implement more humane policies to assist students in successfully passing their courses, and so forth. The suicide rate is a significant societal issue, and finding accurate solutions remains a long-standing subject worthy of our research and exploration.

Reference

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