

Research Paper on Suicide Prevention using Data-Science Techniques

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1. Abstract

Suicide is described as causing one's death intentionally. Multiple mental disorders, stress, relationship problems are some suicide impulsive. According to Wikipedia, 0.5% people commit suicide every year with around 10 to 20 million suicide attempts. Suicide is a serious issue that needs to be addressed. Since Data Science is a multidisciplinary field, we can get some insight into why there is a high suicide rate in India by detecting patterns in our datasets. The objective of this paper is to analyse the correlations between suicide rate and socioeconomic mental health metrics by finding the pattern. Here we use python and different libraries to detect the pattern in our data and find the correlations.

Suicide is an act which is defined by various types of social factors. More than a hundred thousand lives are lost every year in India due to suicide which is why suicide is a serious issue in our country. Compared to women, men are more prone to suicide and around forty percent of people who commit suicide are under the age of Thirty. Suicide among this age group is of more concern since this age group is responsible for the economic growth and development of the country. Unemployed people like men and housewives are more abandoned for suicide attempts. This causes huge socio-economic and emotional burden on our society.

Every year more than 6% of the student's commit suicide in India. India stands at number 1 on youth suicide "which is of great concern toward mental and social care of students. Farmers that contribute to 17% of economic growth in India are also more likely to commit suicide. This is an important issue that

needs to be addressed by the government of our country.

Results in my paper shows that many determinants such as Religions, Sun, and Sleep can have a positive influence on mental "well-being and harmful ideation alongwith other factors such as good parenting and schools teaching self-awareness can also reduce suicide risks in India.

Keywords

Analysis, Correlation, Data Science, Suicide, Visualization.

Abbreviations

EDA - Exploratory Data Analysis

SR - Suicide Rate

HDI - Human Development Index

WHO - World Health Organization

2. Introduction

Did you know 0.5% of people in the world commit suicide every year? While it is generally believed that a person is committing suicide due to depression but there are multiple other circumstances too. This implies that the mental wellbeing of a person can't cure suicidal thoughts. In my research paper, I found some additional factors that induce suicide and help reduce suicidal thoughts.

Dataset used in my paper is from diverse sources. My data is mainly tailored towards

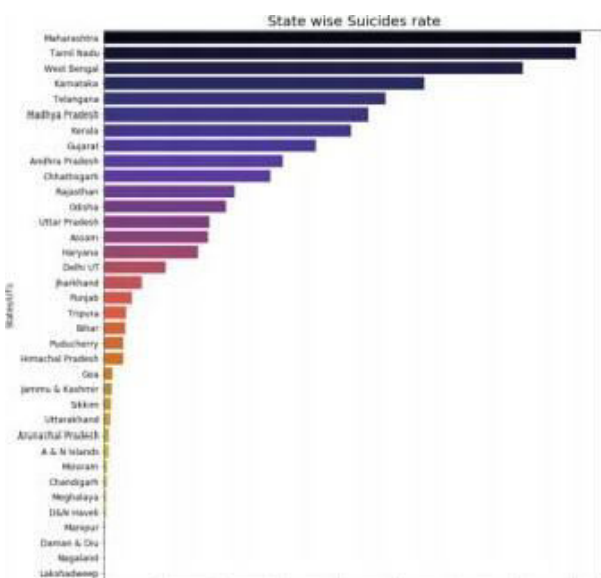
India. Dataset compilation is done from secondary source i.e. Internet. Data is collected from the Indian data government website and other open sources accessible on the Internet. All the data is available freely and is open-sourced.

Dataset was cleaned and analysed using Python opensource libraries such as numpy, sklearn, pandas, scipy and was visualized using matplotlib and seaborn.

3. Suicide Rate all over India

In terms of population, the second most populated country in the world is India. Human Development Index ranks India at 130. HDI is a tool that measures our country's overall development and achievements in multiple dimensions such as socioeconomic development. According to WHO, India's suicide rate for women is ranked 6th and for men is 22nd. This is a concerning issue for our country which is developing and it is needed to be addressed by government and people.

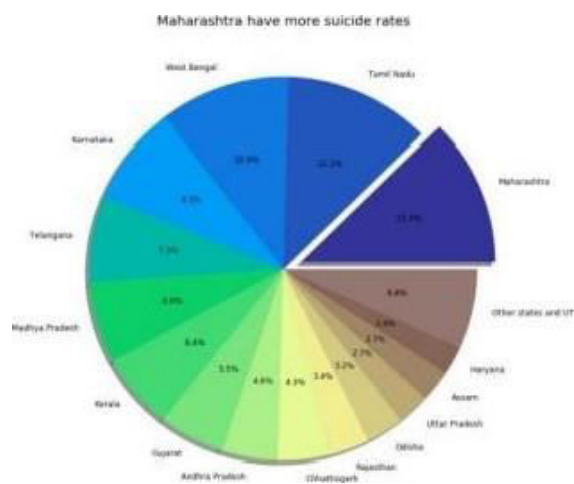
Currently India is ranked 19th in suicide rate with ratio of 1.28 between male and female.



Bar plot of state wise suicide rate in India

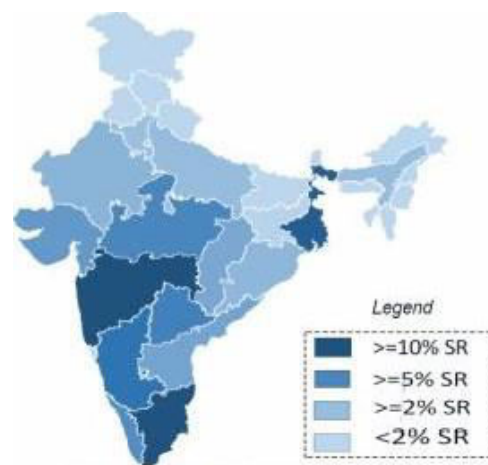
According to my data analysis, Maharashtra our second most populated state has most number of

suicides in entire country. Maharashtra suicide rate is 12.4% and Tamil Nadu follows up with suicide rate of 12.2% all over India.



Pie diagram of suicide rates of states of India

Nagaland have the least amount of suicides over the decade and Union Territory, Lakshadweep also has very less suicide rate.



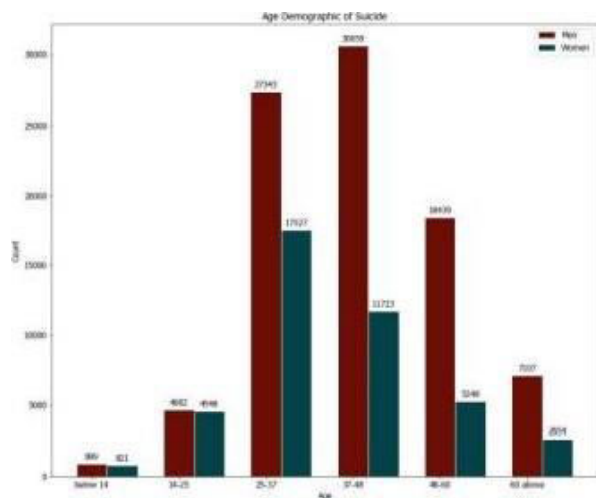
Heat map of India with suicide rate.

Looking at heat map of suicide rate in India, southern part of India have more suicides overall. Northern part of our country does not have high suicide rate.

According to Wikipedia, Puducherry and Sikkim have the highest suicide rate per area.

4. Suicide Demographics for gender

After analysing the data we can see which gender is more inclined toward suicide risk.

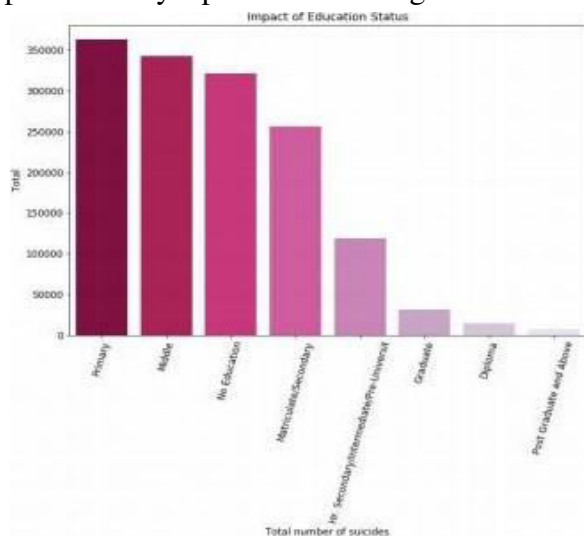


Group Bar chart of Age demographics of suicide in India

Our study reveals that men are more prone to Suicide. Men between the age of 37-48 suicide and women between the ages of 25-37 are more prone to commit suicide. Children below the age of 14 are also commit suicide which marks the question on parenting and schools. Our elderly that are to provide wisdom to the modern generation are having suicidal thoughts.

5. Education Of the person

As we all know education plays a very Important role in the mind-set of the person. Education transpose the way a person's thinking.

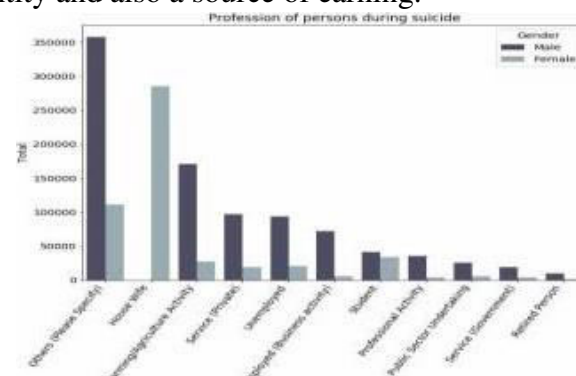


Bar plot of Education Impact on Suicide

My data analysis reveals that the impact of education on people's mind-set is exceptional; people with more than 15 years of education are less likely to commit suicide whereas people with no education are more likely to suicide.

6. Profession Of the person

Profession of the Person gives him/her an identity and also a source of earning.



Group Bar Plot of Profession of suicide person

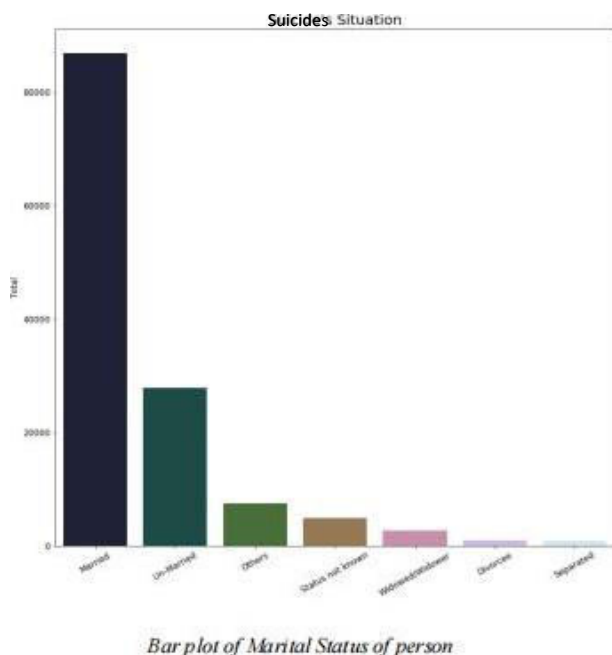
House wives are more likely to suicide. In my data analysis I found out Women's with good education and profession are less likely to commit suicide. The Campaign Save the girl child, educate the girl child (Beti Bachao Beti Padhao Yagna) Initiated by Indian government is functioning successfully.

Agriculture is considered the primary sector of India. Indian economy is mostly dominated by Agriculture and Farmers thus farmer's suicide has a huge Impact on our society. According to data collected Farmers are more prone to suicide than any other professions.

People working in Private sector are more inclined towards suicide than people working in the Government Sector.

7. Marital Status Of the person

Suicide not only affects the person committing suicide but also their family, Family also plays an Important role on person's mental health.

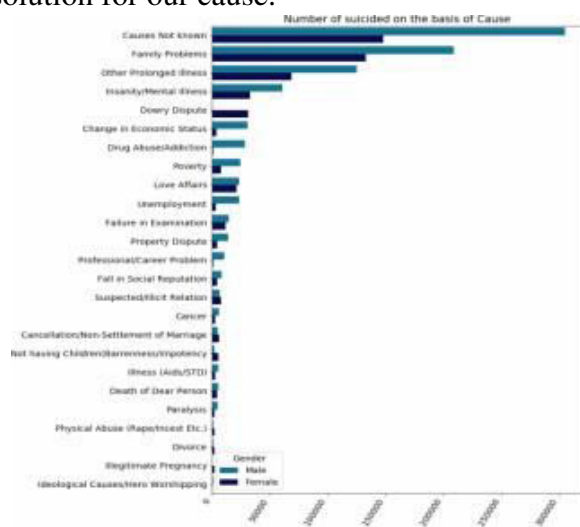


In my data analysis, Married people are more inclined toward the suicide. This can be due to economic problem or family pressure on the person.

Married women are also at great suicide risk. This is mostly due to domestic violence and family disputes.

8. Suicide cause and Nature Of Suicide

What are the most common causes of suicide? If we can detect the causes of suicide maybe we can implement the solution for our cause.



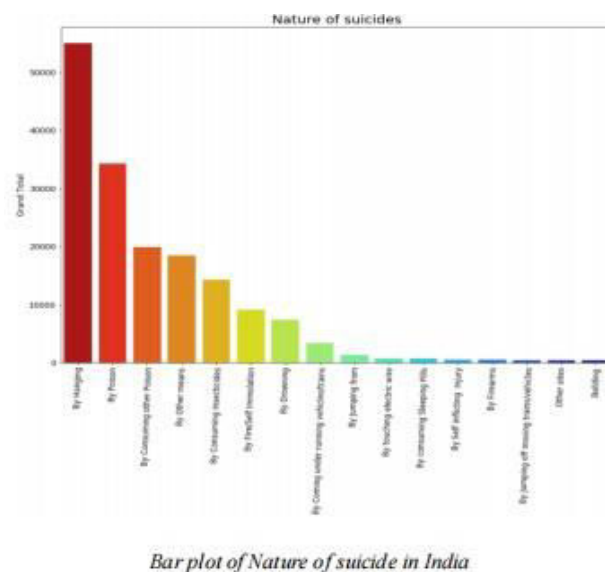
Horizontal Bar plot of Cause of Suicide

Family problems are main cause of suicide in Indian Community. Another important cause of suicide in "Women is Dowry Dispute. Changes in economic status of the person have more impact on men. Failure in examination also leads to suicidal thoughts. Mainly students fell for the failure in exam due to pressure by society and less confidence.

Ideological cause or Hero worshipping is an important cause to look at when celebrity or other people having an influence on people commits suicide, media shows this on news and people following them exactly and try to Impersonate them. This has to be observed during telecasting suicidal report.

What are the natures of suicide in India?

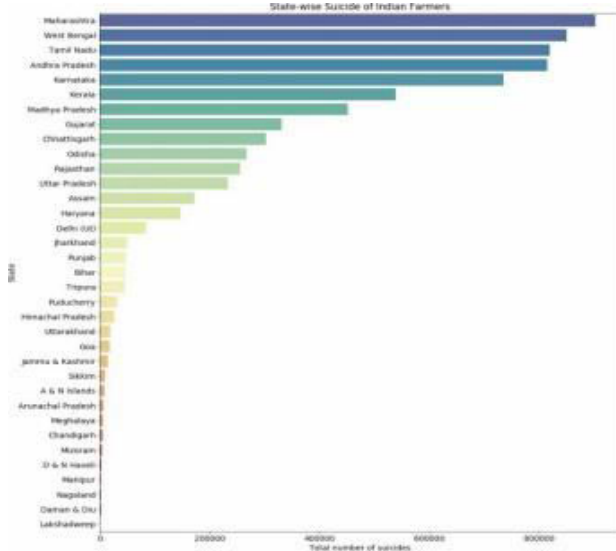
Hanging is the most common nature of suicide followed by poisoning. Many poisoning medicine are available in medical stores. Government can apply some conditions on selling these poisonous medicines without prescription. This also applies for sleeping pills. Doctors should regularly check their patients for their prescription and make sure individual is taking right amount of medicine.



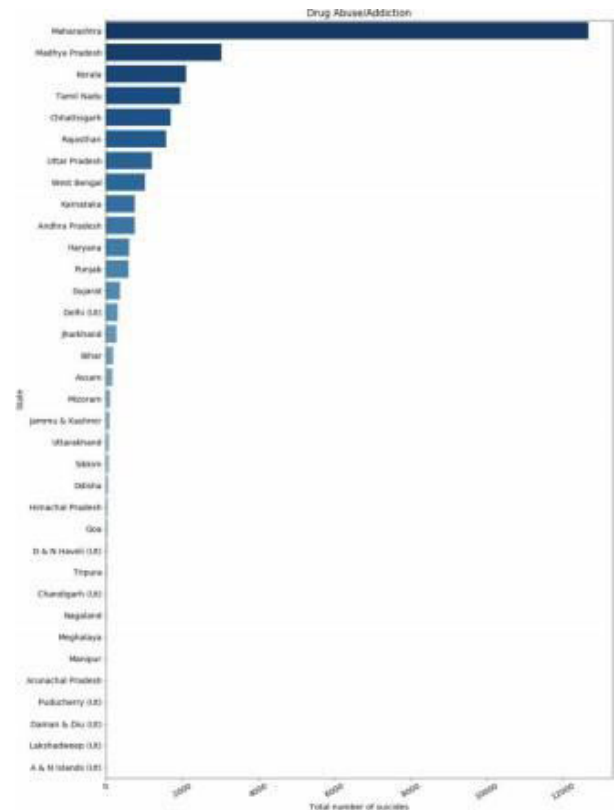
Bar plot of Nature of suicide in India

9. Suicide of Indian Farmers

In our data analysis we saw that farmers hold the large share of suicides in India. Can we detect "which state has more farmer suicide in India?"



Horizontal Bar Plot of Suicide of Farmer wrt States



Bar for States vs Suicide due to Alcohol and Drug consumption

Maharashtra has the highest number of farmer's suicides. Farmers from southern and central states suffer most. These are due to a different cause such as_

1. Intense Monsoon
2. Water table depletion
3. Withering up of rivers
4. Poor farming techniques
5. Water management
6. Other factors such as financial instability.

Government and NGO's could provide better water management, loan waiver, seeds or fertilizers subsidiary, teaching them better farming techniques, desalinized water, etc.

10. Suicide due to Drug and Alcohol Addiction

Alcohol and drugs have a great Impact on person's mind and can lead to suicidal thoughts.

Maharashtra has most amount of suicide due to drug and alcohol consumption than any other states. Maharashtra is about 60% ahead of all the states in suicide with drug and alcohol consumption. Government of Maharashtra need to address these issues. Alcohol and drug consumption should be monitor by the Government and other bodies.

Therapy for alcohol and drug utilization is to go for support groups, self-care and counselling.

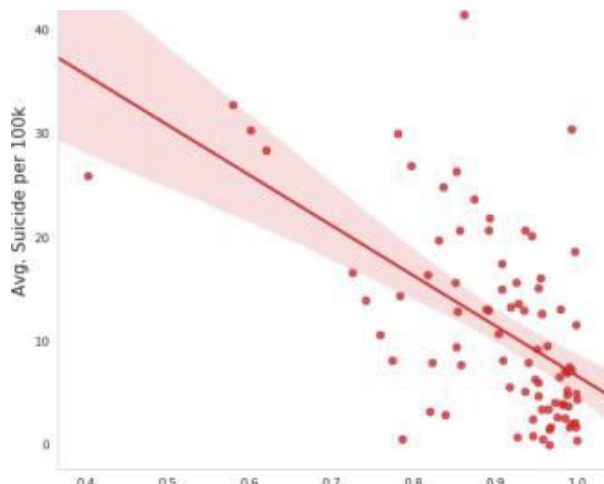
11. Religion and Suicide

I was really surprised to find out that religion has a great Impact on the suicide rate. This could be mostly due to religion revolves around faith and hope.

There are also others variables that religion provides like, religious establishment (Temple, Church, Mosque etc.) provide support system and sense of community which could help in tackling loneliness and antisocial behaviour.

Also many religions have a strict rule for drugs and alcohol.

SR Versus Religion



% of population religious

Scatter line plot

As we can look from above plot countries with more religiousness are less prone to suicide than country with atheism.

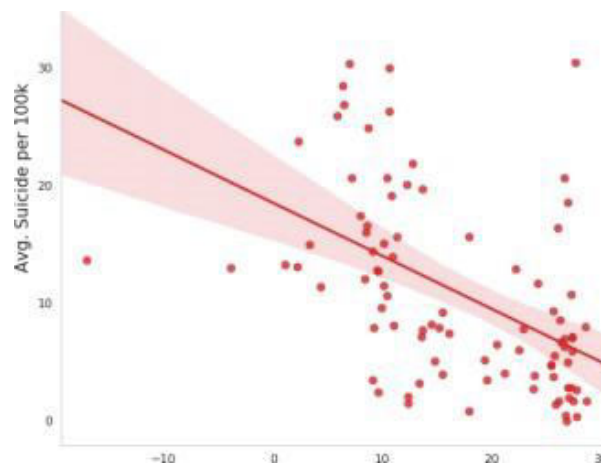
12. Sun Exposure and Suicide

Temperature is related to Sun and Sun Exposure. Sun Exposure is directly related to Vitamin D. Studies have shown that Vitamin D is a factor related to mental health and depression.

Studies have shown that exposure to sunlight increases the release of hormone Serotonin and Melatonin. Melatonin hormone is responsible for sleep-wake cycle and sleep quality is related to mental-health quality.

After exploring the data and after more analysis I found out that areas with people having more exposure to sunlight are less likely to commit suicide.

SR Versus Temperature



Scatter line plot

Average Temperature between 1985 and 2015

13. Conclusion

After all of the data wrangling and data analysis, I conclude that the suicide rate in India is increasing and the youth of India is getting the most of it.

While Maharashtra, Tamil Nadu are having the highest suicide rate other Union Territories such as Puducherry have more suicides per area km.

Looking at the gender demographics of suicide, Men between the ages of 37-48 and women between the ages 25-37 are more likely to commit suicide.

Education has a great impact on the suicide rate. The more the person is educated less likely the person have suicidal ideations.

Housewives and farmers are at greater risk. Women that are educated and working professionals are at less.

According to analysis Married persons are at highest suicide risk this could be related to family problems or changes in economic state. Dowry dispute is the main cause of women's suicidal rate.

Farmers from southern and western states suffer the most suicide due to imbalance in weather and underprivileged circumstances.

Maharashtra has a great drug and alcohol consumption suicide risk than any other state. The government of Maharashtra needs to take some actions to control the drug and alcohol distribution.

While Religion is believed to help a person's mental wellbeing, Exposure to the sun also has a great impact on a person's mental health.

In the end person's mental wellbeing is the utmost variable that comes to account for suicide risk. Many Government agencies and NGO's are working towards this critical issue of suicide. Aasra is a great example of an organization that helps people using public charity. Aasra is available in Mumbai²⁴*7.

WHEN IN NEED. FOR HELP CALL- 022 2754 6669

14. References

Data Collection

<https://data.world/>

<https://www.kaggle.com/>

<https://data.gov.in/>

Data Cleaning, Analysis and Visualization

<https://pandas.pydata.org/>

<https://seaborn.pydata.org/>

<https://matplotlib.org/>

Wikipedia

https://en.wikipedia.org/wiki/Suicide_in_India

<https://en.wikipedia.org/wiki/Suicide>

https://en.wikipedia.org/wiki/Religious_views_on_suicide

Othersources

<https://healthline.com/health/depression/benefits-sunlight>

Python Notebook on Suicide (Created by Myself)

<https://github.com/AasimBaig/Suicide-Prevention-Datascience>