Visualizing the Mental Health Standing of India: An evident future crisis deduction

Anshika Srivastava, Arjun Sethi, Atharva Sawant & Divita Jain (Team 04)

Students, Plaksha University

Dr. Saumya Jetley & Dr. Sukrit Gupta

FM111: Fundamentals of Computational Thinking

February 07, 2021

Introduction

Mental Health plays an integral role in every individual's life as it is responsible for their cognitive capabilities and psychological well-being. Synonymous to Physical Health, Mental Health requires care and perseverance; yet, individuals neglect their mental well-being and solely care for their physical health. If an individual is undergoing high stress, lack of sleep, or has encountered trauma, they might presumably have a mental disorder. And, if not treated, they might attempt a life-threatening action or proceed into a state of depression. Mental Disorders among teenagers are not uncommon; they have been part of the world for a long time and neglected due to the scarcity of understanding.

According to a 2017 study led by the Indian Council of Medical Research (ICMR), 1 in 7 individuals in India has experienced mental disorders of varying stringency, with depression and anxiety disorders being the most common mental disorders impacting 45.7 million & 44.9 million people, respectively. There is only 1 trained psychiatrist for every 100,000 people with a mental illness, which is more undersized than what should have been. Mental disorders are predominantly underestimated because of the interplay between mental illness and other health disorders.

Hence, the predominant goal of this analysis is to visualise the prevalence of mental health disorders at the state level, with reflectance on the most affected demographic group, fostering public awareness and aiding authorities in enforcing the valid benchmarks. Therefore, this project will recognize the most prevalent mental disorder among diverse gender and age groups and relative prevalence of each mental disorder. Also, through analysis we will try to observe the most noticeable mental disorder prevailing in each state to discontinue the future deterioration of the situation and help authorities in supplying vital insights to each state.

Dataset

While searching for datasets, we did extensive literature reviews, but most of our data gatherings concentrated on 2-3 study reports. While reviewing *India: Health of Nation's States,* we came across Global Health Data from the Global Burden of Disease Study (GBDs). GBD is managed by the Indian Council of Medical Research (ICMR), the Public Health Foundation of India, and the Institute of Health Metrics and Evaluation, which makes it a trusted source to work with. The scope and quality of these datasets are assessed by expert groups; including many leading health experts in India, who check the validity of the dataset. Hence, the datasets that we have utilised in our project are taken from the Global Burden of Disease Study (GBDs) and StatisticsTimes.

We first shortlisted the seven most significant mental disorders in India that we wanted to work upon. We extracted the data for these mental disorders from GBD. After the extraction, we discovered that the data was age-specific but wasn't well-structured and uniform as the GBD is composed of data that contains the number of cases for every disease in the world. Further, we divided the data on the basis of age, gender, and geographical location, i.e, State-Wise. While collecting the data sets, we also got some null values which we cleared. The data from StatisticsTimes provided us the information about the population

of each state, subdivided into gender, age group, total population, and their share. We extracted the necessary population data based on age group and gender classifications from there. And finally, we combined the data from all of the sources and converted them into .csv files to be computed in Jupyter Lab.

Methodology

To reach our intended goal, we employed the following methodology:

1. Reviewing vast amounts of literature to understand the existent developments and what future advancements can be made.
2. Sorting this data according to various parameters for analysis and importing jupyter libraries
3. Converting .csv files into dataframes and plotting heatmaps and histograms
4. Statistically analysing the graphs to find the relative prevalence of each disorder.
5. Using mathematical operations to perform percentage related calculations
6. Performing quantitative analysis of the accumulated data.

Experiments and Results

To analyse the data, first we plotted the number of cases in a particular age group per 100,000 people on a heatmap and categorised them according to their age, gender and disorder. We also plotted the population of each state, categorised by age group and gender in order to find the total number of people suffering from that disorder. (Heat-Maps)

Dividing the number of affected people in a particular state by the total population of this state gives a normalised value for all disorders in that state. By plotting the number of cases and normalised values for each condition in the form of histogram, we were able to derive the intensity of each disorder and their relative prevalence in each state. We did the comparative analysis of the two histograms.(Comparative Analysis)

The graphs in Fig. 1 & Fig. 2 below reveal the number of cases of Depressive Disorder in each state and their normalised scores respectively. From Fig. 1, we can infer that

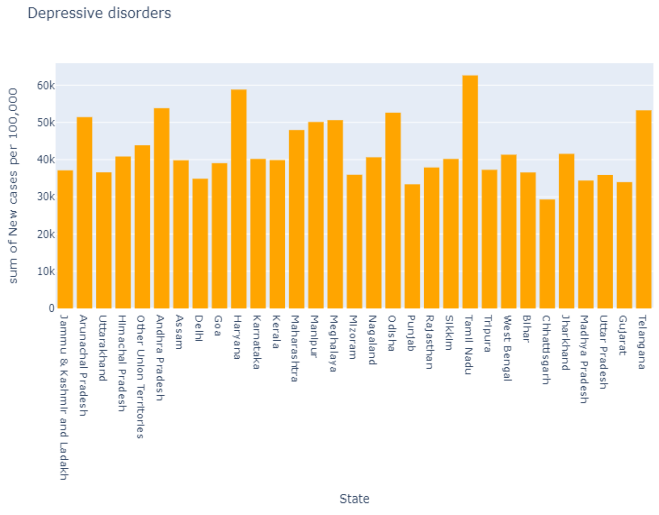

Fig.1

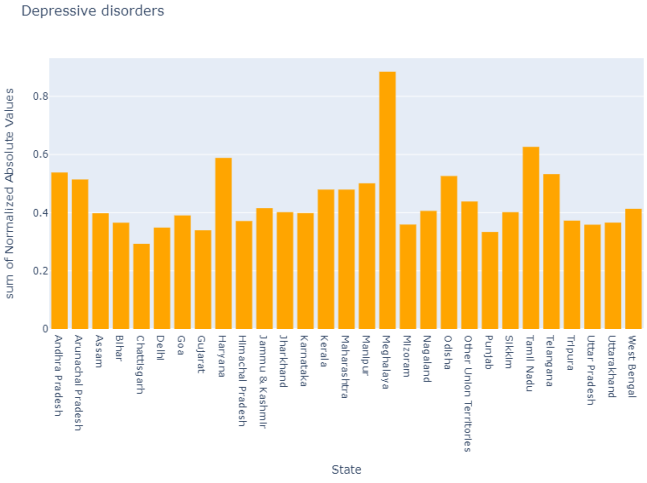

Fig. 2

Tamil Nadu and Haryana have more cases of Depression, but Meghalaya has high normalised value in the same. This is because the normalised values are population-dependent. For the same number of people selected from the total population of Tamil Nadu and Meghalaya, there will be more people suffering from depression in Meghalaya than in Tamil Nadu.

Further, we plotted graphs on the basis of age (Age-Wise Comparison) to compare the prevalence of each disorder within all age groups gender-wise. After analysing these graphs, we found that every different disorder was affecting different age groups differently. Schizophrenia was found most common in the age group of 20-24 years and rarely in the age group of 10-14 years whereas Conduct disorder and Attention Deficit/Hyperactivity Disorder was affecting the 10-14 years age group the most. Depressive disorder was most prevalent in the 35-39 years age group, Eating disorder in the 15-19 years age group and Bipolar in the age group of 15-19 years. (represented in Fig. 3).

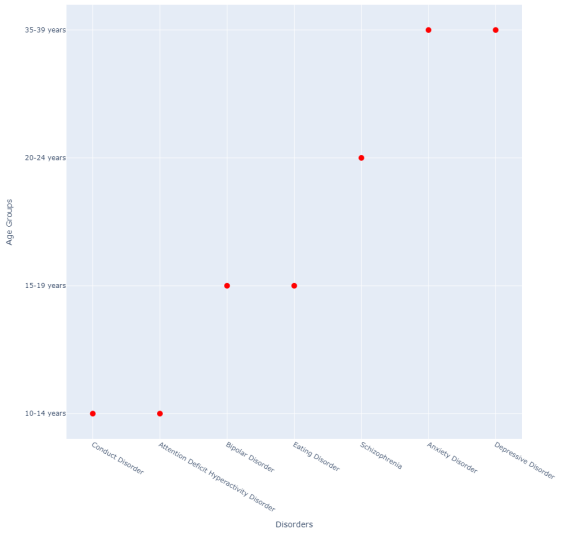

Fig. 3

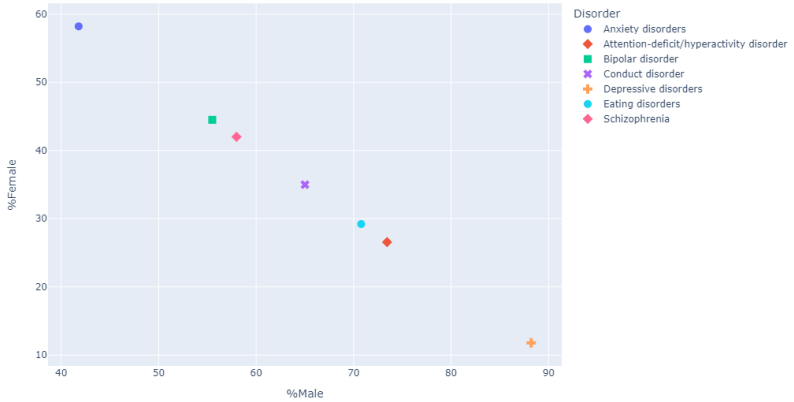

Fig. 4

We plotted the scatter plot in Fig. 4 to present the percentage of men and women suffering from these mental disorders. We can see the relative prevalence of a disorder in the two genders. The number of cases per 100,000 for Depressive disorder in the case of females is higher than that of males, but when we calculate the percentage, we can see that the percentage of females suffering from Depressive disorder from the total population appears to be very low in comparison to males. This is mainly due to the small female population. Similarly conclusions are drawn for other disorders as well.

Conclusion

Finally, after numerous literature reviews and visualisation, we can conclude that the predominant cause of the depleting mental health in India is the lack of mental health resources in the country. The most prevalent disorder relatively seen in each state is Depression. We found from our visualisations the disorder that is affecting each group in every state. Comparing the relative values with their normalised values together helped us in understanding the role of the population and apprehend the situation. We can see a well defined difference in the percentages of the males and females getting affected by each disorder.

All this analysis can help provide data to create resources and deliver the relevant results as to which states and which disorders need to be given priority in a particular group and gender. This study can be further enhanced by employing advanced techniques of data analysis and visualisation. By analysing the previous year's data we can also create a predictive model of the number of cases for each state in order to prepare adequate resources for the same in the future.

Most of the cases of mental disorders in India are not reported or detected, because of the presence of stigma to seek help for mental health. So, if more accurate numbers are detected, it would help improve this study further. Due to lack of time, we were able to analyse only seven disorders. But using these graphs, all the major disorders can be properly analysed. We can even predict and analyse resource allocation using these visualisations. This analysis also summons for a deep dive at national policies that focus on providing primary health care and integrating mental health in it, as well as the role of mental health communities in promoting the significance of mental health.

References

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Appendix

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
import plotly.graph_objects as go
import plotly.graph_objects as go
%matplotlib inline
```

```
df = pd.read_csv('AGE 10-40 new.csv')
df.drop('Unnamed: 9',axis=1,inplace = True)
df = df.dropna()
df
```

```
adf=df.loc[df['State'] == 'Uttar Pradesh']
adf
wdf= adf.loc[adf['Type of Mental Disorder'] == 'Anxiety disorders']
wdf
```

```
w2df = wdf[['Age','Sex','New Cases / 100,000']]
a_df = w2df.pivot(index='Sex',columns='Age')
a_df
```

```
fig = sns.heatmap(a_df,cmap='Blues', annot=True);
ax = fig.get_figure()
ax.savefig('Anxiety disorders_anxiety.jpeg',dpi =150,bbox_inches='tight')
```

```
df2 = pd.read_csv('State Wise Population new as.csv')
df2.drop(['Unnamed: 7','Unnamed: 8','Unnamed: 4','Unnamed: 5','Unnamed: 6'],axis=1,inplace=True)
df2
```

```
edf = df2.loc[df2['State'] == 'West Bengal']
e2df = edf[['Age Gap','Sex','Number of People']]
```

```
e2df = edf[['Age Gap','Sex','Number of People']]
b_df = e2df.pivot(index='Sex',columns='Age Gap')
b_df
fig = sns.heatmap(b_df,cmap='Blues',annot = True)
ax = fig.get_figure()
ax.savefig('West Bengal',dpi =150,bbox_inches='tight')
```

```
cdf = df.loc[df['Type of Mental Disorder']=='Eating disorders']
cdf
px.histogram(cdf,title="Eating disorders",x='State',y= 'New cases per 100,000', barmode= 'group',color_discrete_sequence=['chocolate'], height=600,widt
```

```
px.histogram(cdf,title="Eating disorders", x='State', y= 'New cases per 100,000', color= 'Age', barmode='group', facet_row='Sex', height =800,width=130
```

```
df3 = pd.read_csv('Absval.csv')
df8=df3.loc[df3['Disorder']=='Eating disorders']
```

```
px.histogram(df8,title="Eating disorders",x='State',y= 'Normalized Absolute Values', barmode= 'group',color_discrete_sequence=['chocolate'], height=600
```

```
df4 = pd.read_csv('malesvsfemales.csv')
df4.drop(columns=['Unnamed: 6','Unnamed: 7'],axis=1,inplace =True)
df4=df4.dropna()
df4
```

```
fig=px.scatter(df4, x='%Male', y= '%Female', color= 'Disorder', symbol= 'Disorder', height =600)
fig.update_traces(marker_size=10)
fig.show()
```

```
df7 = pd.read_csv('DisorderGroup.csv')
df7
fig=px.scatter(df7, x='Disorders', y= 'Age Groups', color_discrete_sequence=['Red'], height =1000, width =1000)
fig.update_traces(marker_size=10)
```