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Statistical Analysis of suicides in India

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ABSTRACT

According to the World Health Organization's report in 2016, India had the highest suicide rate in the South-East Asian region. In India in 2016 the age standardized suicide rate was 16.4 per 100,000 in case of women ,which is 6th highest in world and for men it was observed 25.8 ranking 22nd.The most common cause of unnatural death was suicide in both age groups of 15-29 years and 25-39years. The purpose of this paper is to investigate correlation of suicide cases with numerous variables, like occupation, demographic parameters - gender (male- female) and age. we collected data from various sources to study statistically significant relationship between suicide with respect to age, gender and occupation, Chi-square ($\chi 2$) test was used (the significance level of test was 0.05). In our study, the statistical test was significantlly indicating that there is some significant relationship between age, gender and occupation.

Keywords : level of significance, sex ratio, Degree of freedom, critical value, null hypothesis, non-parametric tests component.

I. INTRODUCTION

HISTORY

Suicide is Prematurely taking life of self .Suicide in ancient India has principally been prejudiced by sacrificial motives, for the sake of honour, religious, and socio-cultural beliefs rather than from psychiatric and other causes. In Ramayana Sita proves vain, for a moment decides to commit suicide. In Mahabharata, Arjuna wanted a huge fire to be prepared for him to commit suicide, on hearing the news about the death of his son Abhimanyu in the battle[1],Chandra Gupta Maurya in 298 BC together with one of his Jain fellow and many other monks went to South India ,he ended his life by deliberate slow starvation in the orthodox, there are unlimited example like that in history[2].

Statistics and fact

India is reported as "Suicide Capital of South-East Asia' for highest number of suicides in South-East Asia in 2012, as per WHO report[4][5]. 1967 the suicide rate in India was 7.8, but it has steadily increased to 11.0 in 2013, with a peak rate of 11.4 in 2010.More than 1,00,000 people commit suicide every year in our country due to employment issues, isolation, abuse issues, caste system, violence, family problems, mental disorders, addiction to alcohol, financial loss, chronic pain etc. NCRB collects data on suicides from police recorded suicides cases. As per records , during the Decade 2005-2015 there was increase of 17.3% in number of suicides in the country. This trend continued till 2011 then there was a decreasing trend till 2014.This trend can be studied from the table-1 and Graph-1. In 2016 the number of suicides in India had increased to 230,314 and since then it is increasing ,in particular in youth.

Table.1

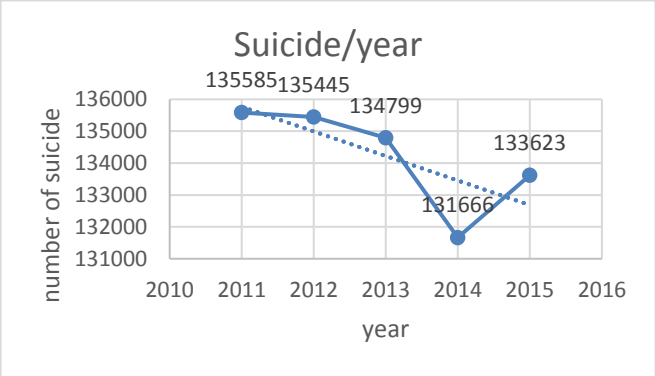
S.no	Year	Total Number of Suicides	Mid-Year Projected Population (in Lakh)	Rate of Suicides (Col.3/Col.4)
1	2011	135585	12101.9	11.2
2	2012	135445	12133.7	11.2
3	2013	134799	122287.9	11.0
4	2014	131666	12440.4	11.6
5	2015	133623	12591.1	10.6

Mid-year Projected Population as on 1st July;

Source: The Registrar General of India

One Lakh = 0.1 Million ,Rate of Suicides = Incidence of suicides per one lakh(1,00,000) of population.

Graph-1

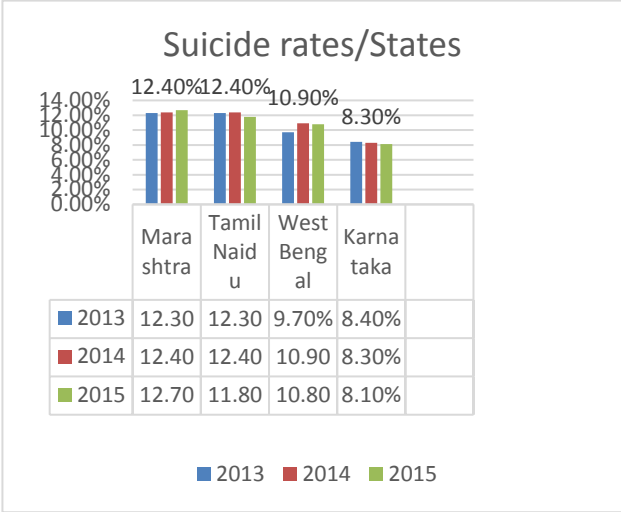


II. FACTORS RELATED TO SUICIDE

REGION WISE SUICIDE

Five States Maharashtra, Tamil Naidu, west Bengal, Karnataka, Madhya Pradesh together accounted for 51.2% of the total suicides observed in India in 2016. The remaining 48.8% suicides were reported in the remaining 24 States and 7 UTs. Maharashtra with 16,970 had maximum suicide victims followed by 15,777 suicides in Tamil Nadu and 14,602 suicides in West Bengal, which is for 12.7%, 11.8% and 10.9% of total suicides respectively. Karnataka (10,786 suicides) and Madhya Pradesh (10,293 suicides) accounted for 8.1% and 7.7% of the total suicides observed in the country respectively.

Graph-2



Among union territories Delhi has maximum suicides (1,845) , followed by Pondicherry (711). Seven UTs together accounted for 2.2% of total suicides in the country.

CAUSES OF SUICIDES

More than 50% of suicides are committed by people younger than 45 years, mostly belonging to lower and middle income families. 'Family Problems' (27.6% of total suicides) and 'Illness' (15.8%of total suicide) were the major causes of suicides recorded during 2015.India is a agricultural country, Maximum population directly or indirectly depends upon agriculture. Due to variation in monsoon and lack of technology many formers faces issues and led to commit suicide; around 11.2% are farmers ,out of total suicide victims. Apart from that unemployment, mental health, injury, diseases, are few other reason as per record (graph-3).

Professional Effect

In India, during 2015, housewives accounted for 53% of total female victims and 16.7% total victims. Self employed 19.1% etc graph-4 can give us clear picture of suicide rate based on profession.

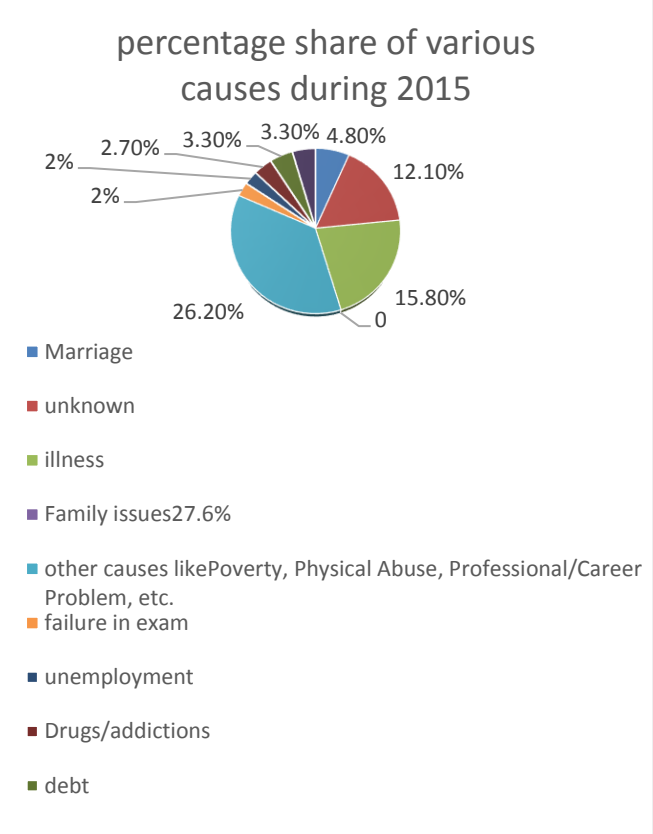
Means Adopted for Committing Suicides

Consuming poison, jumping from height, jumping in water bodies, hanging, were the most common method adopted by victims for committing suicide. Drinking pesticides and hanging was common amongst farmers. Getting in fire and hanging by house wives.

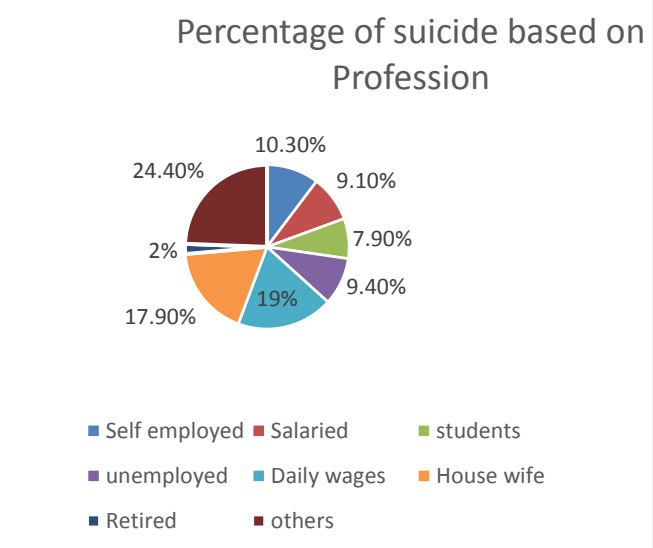
Suicide Victims by Sex and Age Group

For the year 2015, Male: female ratio of suicide victim was 68.5:31.5 and for the year 2014 it was 67.7:32.3. The proportion of Boys: Girls suicide victims (below 14 years of age) were 53.8:46.2 in 2015 as compared to 52.3:47.7 in 2014. Female victim's proportion was observed more in Marriage Related Issues like Dowry, Divorce, Physical Abuse, and Rape. Also Middle aged people in age group 30 to 45 years and Youth 18-30 years were more. Records can be summed up in graph- 5

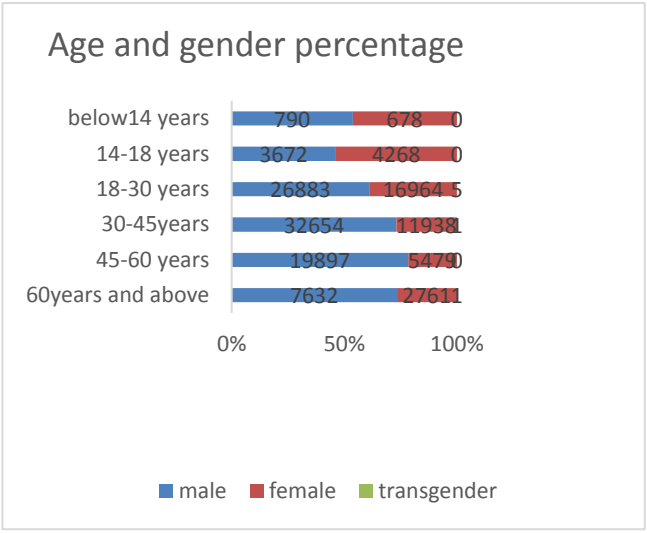
Graph-3



Graph-4



Graph-5



III. STATISTICAL ANALYSIS AND CALCULATIONS

For our analysis we collected data from various sources, we applied chi-square test to understand and compare association between different variable like, age, gender and profession in case of suicide victims. Statistical Analysis, Pearson Chi-Square Statistical test ($\chi 2$) is also known as the chi-square test which measures expectations compare to actual observed data, It is one of the simplest and the most widely used non-parametric tests. The ($\chi 2$) test was first used by Karl Pearson in the year 1990. There are two main kinds of chi square tests, the test of independence for data and tests of goodness of fit for a model. These tests can be used to determine if a certain null hypothesis can be rejected in hypothesis testing.

The (χ 2) describes the independency between the sub categories of two variables of r*c (Row*Column). Basically chi-square test is difference between the observed(O_i) and expected values(E_i) for each category. The chi square statistic is defined as

$\chi^2=\Sigma$ ▒ 〖〖(O_i-E_i)〗^2/E_i)〗

This sum is known as chi squared value.

Degrees of Freedom refers to the maximum number of logically independent values, which are values that have the freedom to vary, in the data sample and is obtained as:

$d.f. = (r-1)(c-1)$

where r = number of rows,

c = number of column

Based on degree of freedom and level of Significance we take critical values from table and compare it with calculated value. If calculated value is more than critical value null hypothesis is rejected.

Hypothesis 1

Hypothesis 1: chases ascertain whether there is a significant relation between male and female suicide victims

H_10:No significant relation is there between male and female suicide victim.

H_11 H_11:Significant relation is therebetween male and female suicide victim.

Gender	Observed valueOiOi	Expected values	(O_i-E_i) 〗^2/E_i)
Male	91528	66808	9146.785
Female	42088	66808	9146.785

Assuming that population in 2015 had 1:1 sex ratio we have calculated Expected values, though in 2015 sex ratio(number of females per 1000 males) was 896 in 2015.In case of one column and two rows degree of freedom is 1.

Chi-Square test

Variable	Calculated value	level of significance	Degree of freedom	Tabulated value/critical value
Gender	18293.57	5%	1	3.84

As calculated value is more than tabulated value (18293.57 > 3.84) at 5% level of significance. We have to reject null hypothesis and accept alternative hypothesis It shows that there is a significant relation between male and female suicide victims.

Hypothesis 2

Hypothesis 2: Seeks to check whether there is a significant relation between gender and Age.

H_20: No significant relation is there between gender and Age of suicide victims.

H_21: Significant relation is there between gender and Age of suicide victims

Observed values

Gender/ Age	below 18	18-30	30-45	45-60	above 60	Total
Male	4462	26883	32654	19897	7632	91528
Female	4946	16964	11938	5479	2761	42088
Transgender	0	5	1	0	1	7
Total	9408	43852	44593	25376	10394	133623

Expected values

Gender/ Age	below18	18-30	30-45	45-60	above 60	Total
Male	6444.21	30037.39	30544.95	17381.85	7119.59	91528
Female	2963.29	13812.32	14045.71	7992.82	3273.85	42088
Transgender	0.49284	2.297239	2.336057	1.32935	0.54450	7
Total	9408	43852	44593	25376	10394	133623

Chi -square calculation

O	E	O-E	〖 (O_i-E_i) 〗^2/E_i)
4462	6444.216	-1982.21562	609.7218
4946	2963.292	1982.708471	1326.6102
0	0.492849	-0.49284928	0.4928493
26883	30037.39	-3154.3877	331.25922
16964	13812.32	3151.684934	719.14939
5	2.297239	2.702760752	3.1798672
32654	30544.95	2109.048128	145.62419
11938	14045.71	-2107.71207	316.28515
1	2.336057	-1.33605742	0.7641291
19897	17381.85	2515.153102	363.94263
5479	7992.824	-2513.82375	790.62294
0	1.329352	-1.32935198	1.329352
7632	7119.598	512.4020865	36.877911
2761	3273.858	-512.857584	80.340362
1	0.544502	0.455497931	0.3810424
		Sum	4726.5811

Chi-Square test

Variable	Calculated value	level of significance	Degree of freedom	Tabulated value/critical value
Gender	4726.5	5%	8	15.507

As calculated value is more than tabulated value (4726.5 >15.507) at 5% level of significance. We have to reject null hypothesis and accept alternative hypothesis .Its shows that there is a significant relation between male and female suicide victims. Also from graph-6 and above table it is evident that male suicide victims are more in age group of 30-45 years ,while female suicide victims are more in age group of 10-30 years which shows there is significant relation.

Hypothesis-3

Hypothesis 3 seeks to check whether there is a significant relation between suicide victims and profession.

H_30: No significant relation is there between Professional status of suicide victims.

H_31:Significant relation is there between Professional status of suicide victims

Chi-square calculation

Profession	O	E	O-E	〖(O_i-E_i)〗^2/E_i)
Retired	2	12.5	-10.5	8.82
House wife	17.9	12.5	5.4	2.3328
Dailywages	19	12.5	6.5	3.38
unemployed	9.4	12.5	-3.1	0.7688
students	7.9	12.5	-4.6	1.6928
salaried	9.1	12.5	-3.4	0.9248
self employment	10.3	12.5	-2.2	0.3872
others	24.4	12.5	11.9	11.3288
			sum	29.6352

Chi-Square test

Variable	Calculated value	level of significance	Degree of freedom	Tabulated value/critical value
Profession	29.6352	5%	7	14.067

Calculated value is more than tabulated value (29.6 > 14.067) at 5% level of significance. So we have to reject null hypothesis and accept alternative hypothesis. It shows that there is a significant relation between suicide victims and profession.

IV. CONCLUSION

As per calculated values of Chi-square in all three hypothesis and the tabulated critical values, it is observed that suicidal tendency in India is highly affected by gender and age .Suicidal victims are high in middle age 19-30 years in case of females though for male suicide victims are more in 30-45years age group. Also the causes and the means vary with gender and age. It was also observed that profession also has an impact on suicide. In India unequal distribution of economy, corruption and growing media, too much exposure for youth are becoming prominent reasons for suicide. Suicide is a tragic height of the interaction of a large array of factors including biological, socio-cultural, environmental, and psychological causes. Since our country has been flooded with high suicide rate, strong steps are required to be taken to meet the challenges ahead for suicide prevention in India. Though a remarkable decline in suicide rates is observed but the existing rate of decline is not enough to meet global targets to reduce suicide transience, as per WHO records. Controlling access to means of suicide, intellectual media, training young people in their life skills, mental health, and early identification, management and follow-up, are some of measures the UN health agency recommended.

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