MES ABASAHEB GARWARE COLLEGE
Department of statistics
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Effect of lockdown/pandemic on mental health

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ABSTRACT

Nationwide lockdown to tackle the COVID-19 outbreak in India is anticipated to have psychological impact on the population. The covid-19 pandemic and lockdown has created havoc around the globe. This has led to many psychological problems in all age groups. Everyone has to go through different problems. Children have to go through a major change in their way of learning. People who are working have problems in their jobs, they have fear of losing their jobs. Old aged people have their own problems. Everyone is going through a financial crisis. All this is leading to many psychological problems.

Keywords-COVID-19, lockdown, mental health ,depression ,financial crisis

AIM

The aim of the project is to focus on measuring the effect of lockdown / pandemic on mental health using various statistical tools.

METHODOLOGY

The study was conducted through online survey platform. The invitation link for the survey was shared on various social networking platforms like Whatsapp, Instagram etc. The participants from age group 0-90 years who are Indian residence were invited to fill out Google forms for the survey. The entire survey was in English and the time required to fill the form was 2-3 minutes. We conducted a survey of nearly more than 1000 people of various age groups, people of different professions and people living in different parts of the country and tried to find out the problems they had to face during this period by using graphical representations and performing various types of tests.

OBJECTIVE

➢ To create awareness regarding mental health problems faced by the society especially during the lockdown period.

➢ To study the effect of lockdown on students, working people and non- working people.

➢ To study the financial problems people had gone through during the pandemic.

Introduction

COVID-19 outbreak, caused by a novel coronavirus, SARS-CoV-2, which originated from China, has spread worldwide, earning the pandemic status by WHO on March 11, 2020 (WHO, 2020e). As of the 1st week of June, 2020, India has emerged as the fifth hardest hit country .Droplets, contact with the immediate environment around infected persons including direct or indirect and airborne in specific circumstances are the main proposed routes of transmission (WHO, 2020c). The incubation period was found to be longer, up to 14 days (mean 6.4 days)(WHO, 2020a). Fever, dry cough, fatigue, difficulty in breathing, chest pain/pressure, sore throat, headache, diarrhoea, nasal congestion are some of the symptoms noted in COVID-19 infected patients.(WHO, 2020d) In severe cases, the patients developed cardiac injury, pneumonia, acute respiratory distress syndrome and finally death with the fatality rate of the disease being 2.3% (Petrosillo et al., 2020). Older individuals (average 47 to 56 years) and individuals with chronic comorbidities were found to be more susceptible to this infection (Coronavirus, 2019). To tackle this, the Government of India announced a 21-day lockdown on 24th March followed by a second phase from April 14 to May 3, 2020 and third phase from May 4th to 17th 2020 and many more such lockdowns followed after that due to this pandemic. Though quarantine and lockdown have epidemiological advantages like containing the spread of infection, which is critical in the present scenario, it is also accompanied by potential psychological distress in the population. Isolation, fear of contracting the disease, confusion created by rumours, financial strain, apprehension regarding job security, boredom, frustrations, lack of freedom and space due to restrictions, alcohol withdrawal, concerns for the family members that occurs during lockdown period could affect the mental health of the population to varying degrees. Studies prove that depression and anxiety are associated with suicidal tendencies (Sagar et al., 2020).. Studies conducted during earlier epidemics like SARS, equine influenza, Ebola have noted that there was increased psychological distress due to the epidemic and quarantine (Hawryluck et al., 2004; Taylor et al., 2008). Similarly, studies conducted recently in other countries like China, Italy, Iran have noted increased prevalence of mental health disorders like depression, anxiety, stress and sleep disturbances during COVID-19 outbreak(Mazza et al., 2020; Moghanibashi-Mansourieh, 2020; Wang et al., 2020a; Wang et al., 2020b). A recent survey conducted in March 2020 in India, has found that more than three fourth

of the study participants had self-perceived need for help for their mental well-being(Roy et al., 2020). In addition to the already present financial burden related to mental illnesses and the current economic crisis due to the lockdown, addressing, preventing psychological issues due to COVID-19 and providing mental health care to the vulnerable population is of paramount importance to the nation. Till date, very few studies have been conducted on the psychological impact of COVID-19 outbreak & lockdown in India, either focusing on specific areas like perceived mental health care need (Roy et al., 2020) and effect of gender and marital status(Suseela, 2020), or conducted on specific population like healthcare workers(Chew et al., 2020) and pharmacy students(Suryadevara et al., 2020). However, there are no studies conducted to assess the impact of COVID-19 outbreak & lockdown on the mental health status of the general population of India with emphasis on the risk factors and protective factors. Our study aims to assess the prevalence of affective components of mental health viz. depression, anxiety and stress along with identifying the high-risk group of population. We believe our study would help the authorities and mental health professionals in strategizing and delivering mental healthcare to the population targeting the high-risk group and help maintain the psychosocial well-being of the Indian population in these unprecedented and desperate times.

Statistical packages used in project

1] Minitab-Minitab is a statistics package developed at the Pennsylvania State University by researchers Barbara F. Ryan, Thomas A. Ryan, Jr., and Brian L. Joiner in 1972. It began as a light version of OMNITAB 80, a statistical analysis program by NIST. Statistical analysis software such as Minitab automates calculations and the creation of graphs, allowing the user to focus more on the analysis of data and the interpretation of results. It is compatible with other Minitab, LLC software.

2] R Software-R is a programming language and free software environment for statistical computing and graphics supported by the R Foundation for Statistical Computing. The R language is widely used among statisticians and data miners for developing statistical software and data analysis. Polls, data mining surveys, and studies of scholarly literature databases show substantial increases in popularity as of April 2021, R ranks 16th in the TIOBE index, a measure of popularity of programming languages

3] R studio- R Studio is an Integrated development Environment (IDE) for R, a programming language for statistical computing and graphics. It is available in two formats: RStudio Desktop is a regular desktop application while R Studio Server runs on a remote server and allows accessing R Studio using a web browser.

4] Ms-Excel-Microsoft Excel is a spreadsheet developed by Microsoft for Windows, macOS, Android and iOS. It features calculation, graphing tools, pivot tables, and a macro programming language called Visual Basic for Applications (VBA). It has been a very widely applied spreadsheet for these platforms, especially since version 5 in 1993, and it has replaced Lotus 1-2-3 as the industry standard for spreadsheets. Excel forms part of the Microsoft Office suite of software.

5] Ms-Word-Word for Windows is available stand-alone or as part of the Microsoft Office suite. Word contains rudimentary desktop publishing capabilities and is the most widely used word processing program on the market. Word files are commonly used as the format for sending text documents via email because almost every user with a computer can read a Word document by using the Word application, a Word viewer or a word processor that imports the Word format

6] Google Forms-Google Forms is a survey administration software included as part of the free, web-based Google Docs Editors suite offered by Google. The service also includes Google Docs, Google Sheets, Google Slides, Google Drawings, Google Sites, and Google Keep. Google Forms is only available as a web application. The app allows users to create and edit surveys online while collaborating with other users in real-time. The collected information can be automatically entered into a spreadsheet.

GRAPHICAL ANALYSIS

A] Bar graph

A bar chart or bar graph is a chart or graph that presents categorical data with rectangular bars with heights or lengths proportional to the values that they represent. The bars can be plotted vertically or horizontally. A vertical bar chart is sometimes called a column chart.

A bar graph shows comparisons among discrete categories. One axis of the chart shows the specific categories being compared, and the other axis represents a measured value. Some bar graphs present bars clustered in groups of more than one, showing the values of more than one measured variable.

1] Chart of how much the lockdown affected you mentally, were you depressed? Vs. Gender

How much did lockdown affected you mentally? VS. Gender
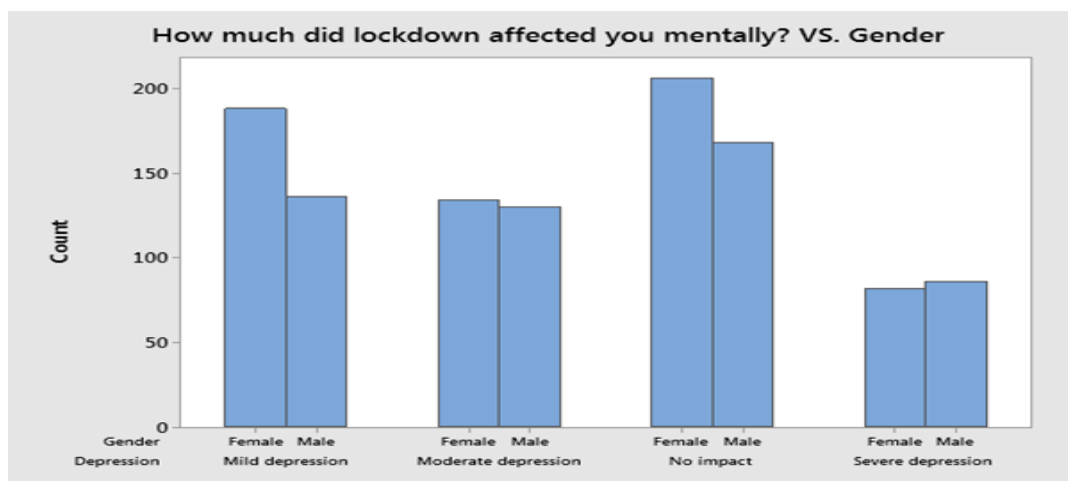
Interpretation: From above bar graph we can observe that many females in comparison with males had no impact on mental health. More males than females faced severe depression.

2] Chart of Area of residence Vs. Were you scared of the pandemic situation?

Area of residence VS. Were you scared of pandemic situation?
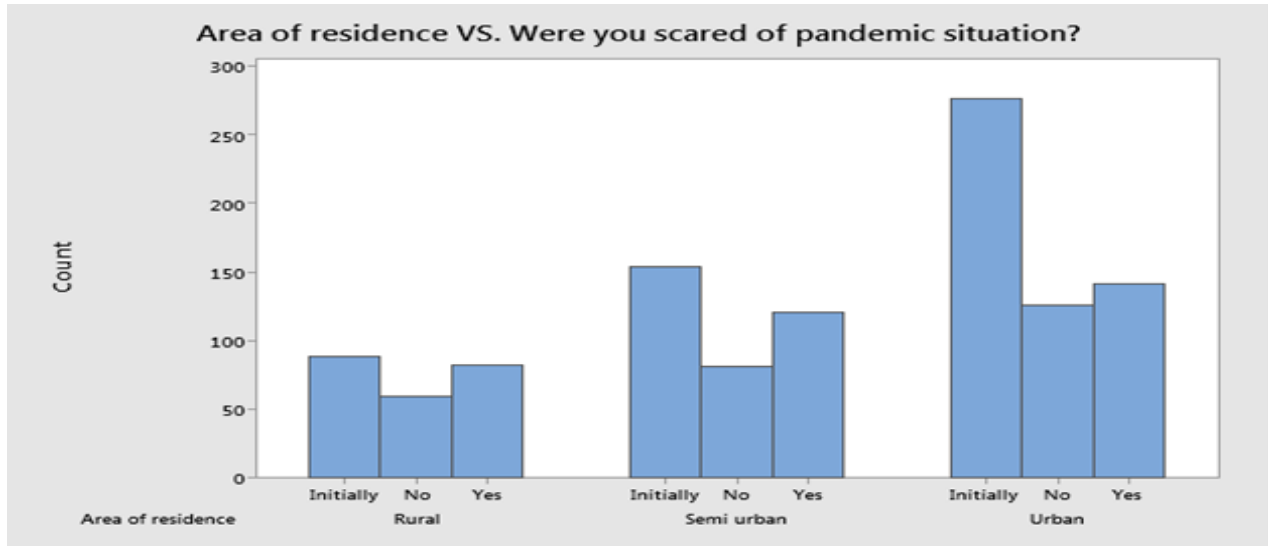
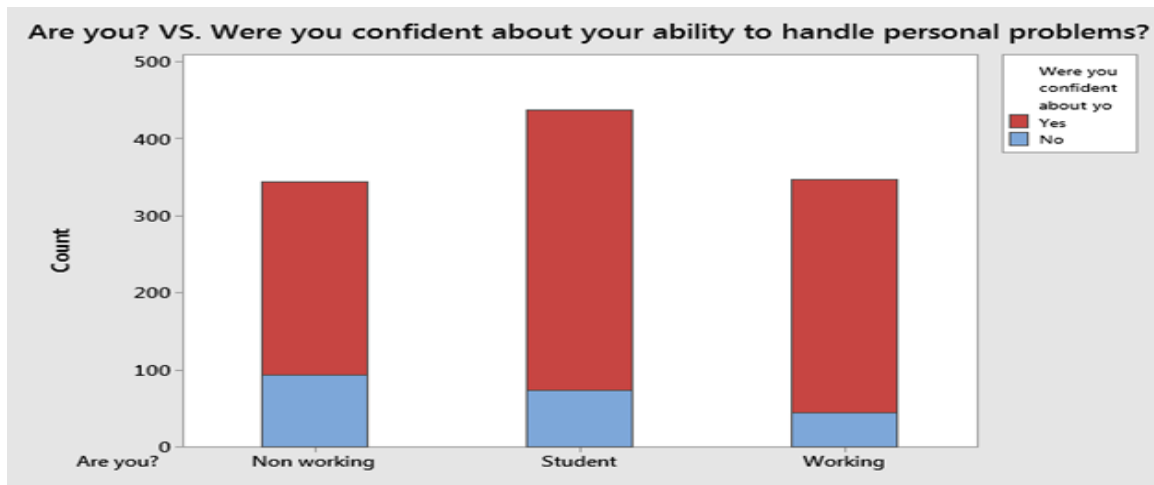**Interpretation**: From the above graph we can see that many people in urban areas were scared during the initial stage of lockdown.

3] Chart of Are *you (working , non- working ,student)* Vs. Did you enjoy having some me time during lockdown?



Are you? VS. Did you enjoyed having some me time?
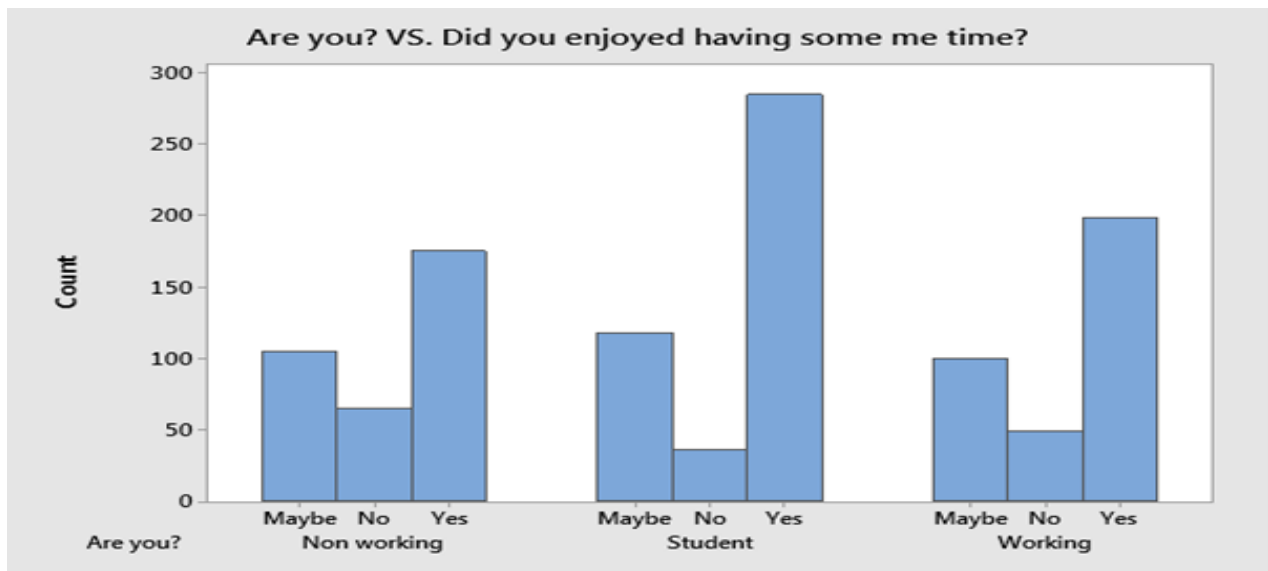
Interpretation: We can observe that the majority of students enjoyed having me time during lockdown.

4] Chart of Are you (working, non -working, student) Vs. Were you confident about your ability to handle your personal problems?

Are you? VS. Were you confident about your ability to handle personal problems?

Interpretation: From the above graph we can conclude that the majority of students were confident about their ability to handle personal problems.

5] Chart of area of residence Vs. Are you comfortable talking to your family about your mental health?


Area of residence VS. Are you comfortable talking to your family about your mental health?
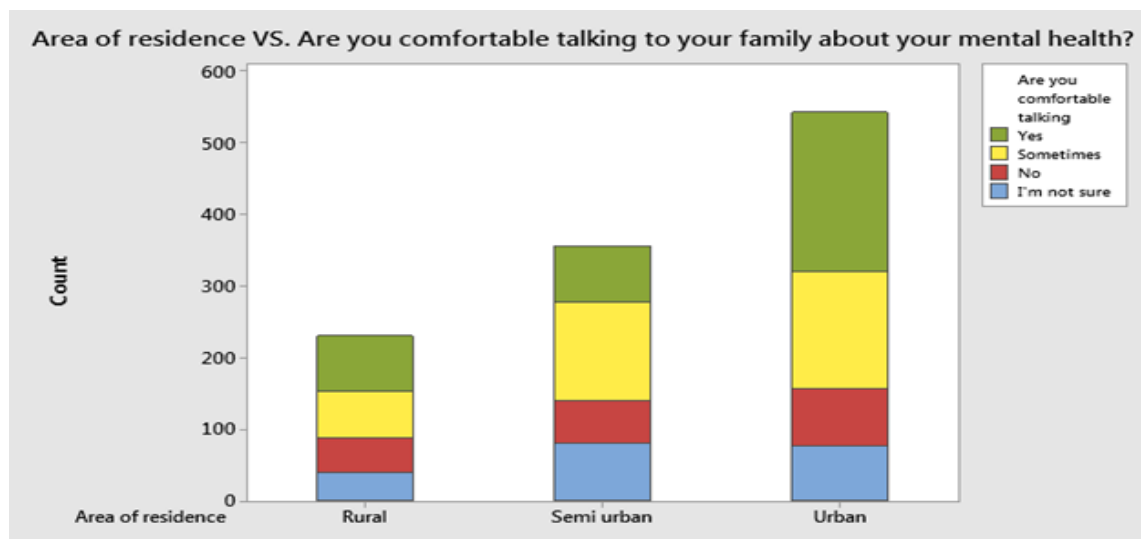
Interpretation: We can see that people in urban areas are more confident talking to their family members regarding mental health problems.

B] PIE CHARTS

A **pie chart** (or a **circle chart**) is a circular statistical graphic, which is divided into slices to illustrate numerical proportion. In a pie chart, the arc length of each slice (and consequently its central angle and area), is proportional to the quantity it represents. While it is named for its resemblance to a pie which has been sliced, there are variations on the way it can be presented.

1] Pie Chart of how much did lockdown affect you mentally, were you depressed?
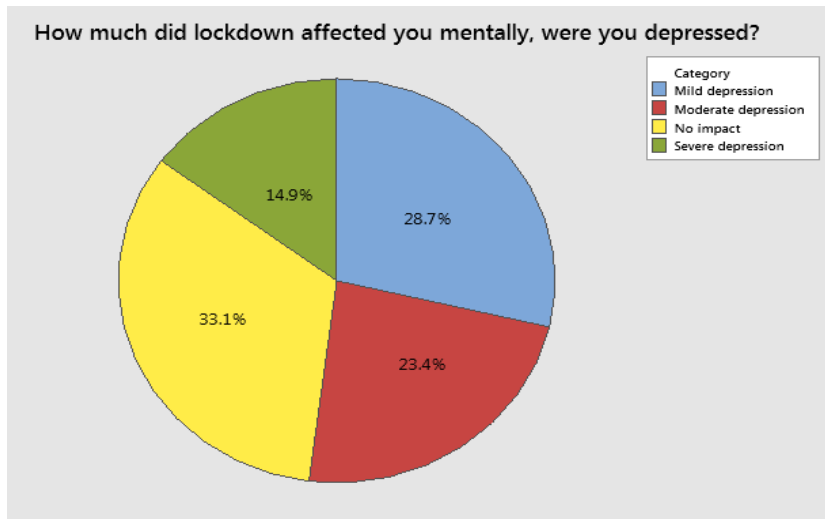
Interpretation: From the pie chart we see that nearly 33.1% faced mild depression.

2] Pie Chart did you enjoy having some me time during lockdown?
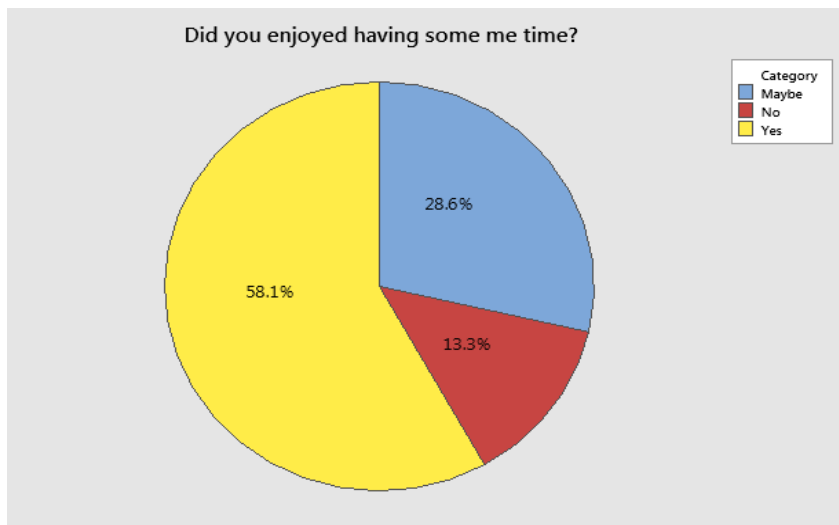
Interpretation: We can observe that nearly 58.1% people enjoyed having me time.

3] Pie Chart: Were you scared of a pandemic situation?

Were you scared of pandemic situation?

Category
- During initial stage
- No
- Yes

30.4%

45.9%

23.4%
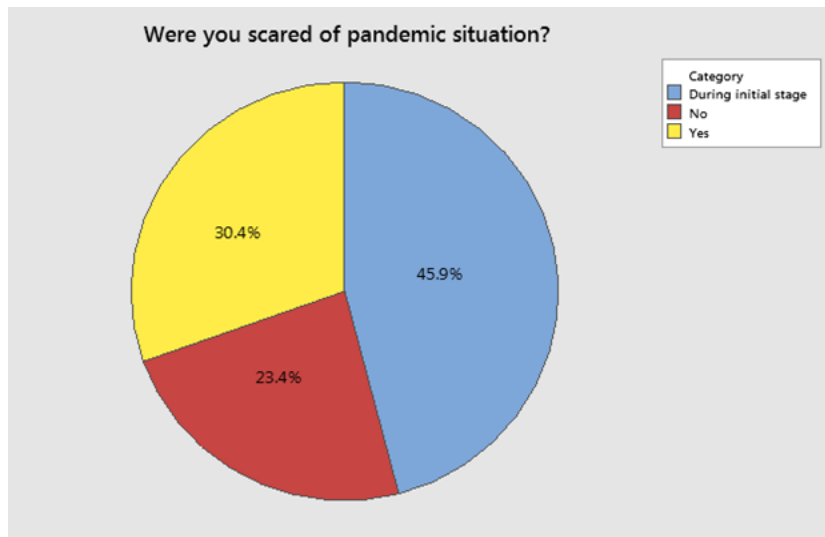
Interpretation: We can observe that nearly 45.9% people were scared of a pandemic situation during the initial stage.

4] Pie chart of did you lose your motivation towards your career during this period?

Did you lose your motivation towards your career during this period?

Category
- Maybe
- No
- Not applicable
- Yes

20.3%

20.9%

30.5%

28.3%
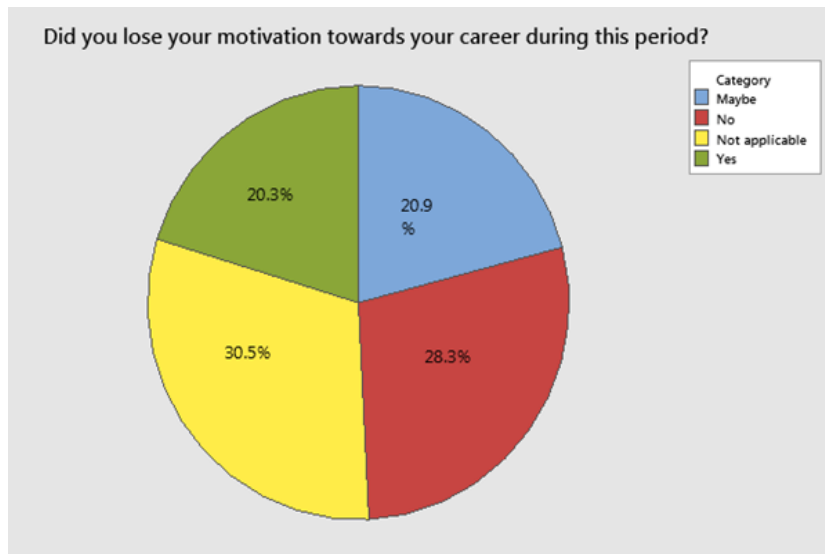
Interpretation: We can conclude that 20.3% people lose their motivation during the lockdown period.

TESTING OF HYPOTHESIS

A] Chi-square test for goodness fit

Chi-square goodness of fit test is a non-parametric test that is used to find out how the observed value of a given phenomenon is significantly different from the goodness of fit. Sample data is divided into intervals.

Uses:-

When one find positive result for chi-square test, i.e. When p-value is <0.05 it indicates that the impact of "x" on "y" is statistically significant. Then one needs to find out which sublevel of "x" has a significant impact on "y".

Chi-square goodness of fit test validates which sublevel of "x" has significant impact upon "y".

Formula $= \chi^2 = \sum (Oi-Ei)^2 / Ei$

Where Oi denote the observed frequencies and Ei denotes the expected frequencies

Assumptions

1. One categorical variable (the variable can be dichotomous, nominal or ordinal)

2. The groups of the categorical variable must be mutually exclusive.

3. There must be at least 5 expected frequencies in each group of your categorical variable.

4. You should have independence of observations which means that there is no relationship between any of the cuses.

1] How much did lockdown affect you mentally?

Ho: Mild depression = Moderate depression = No impact = Severe depression

Ha: Ho: Mild depression $\neq$ Moderate depression $\neq$ No impact $\neq$ severe depression

Observed and Expected Counts

Category	Observed	Test Proportion	Expected	Contribution to Chi-Square
Mild depression	324	0.25	282.5	6.0965
Moderate depression	264	0.25	282.5	1.2115
No impact	374	0.25	282.5	29.6363
Severe depression	168	0.25	282.5	46.4080

Chi-Square Test

N	DF	Chi-Sq	P-Value
1130	3	83.3522	0.000

Chart of Observed and Expected Values
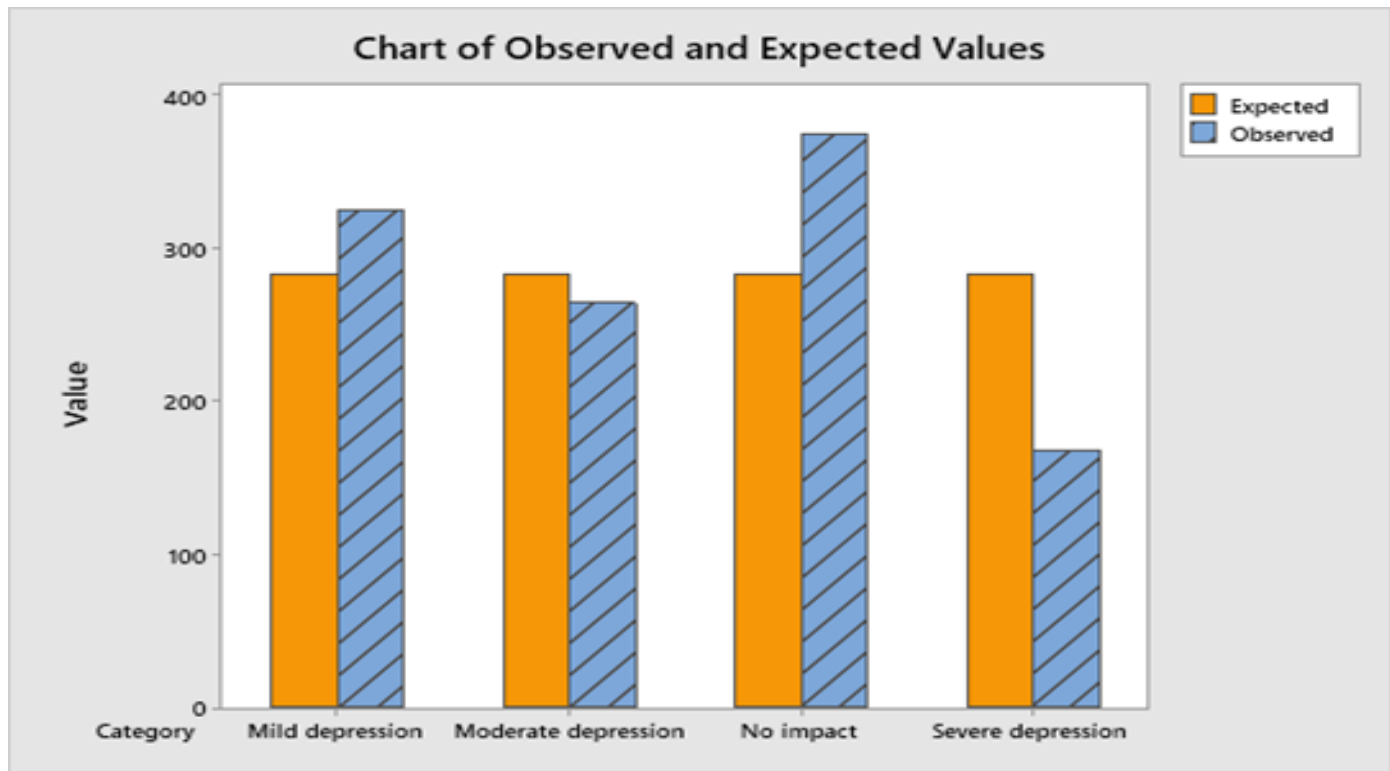
Interpretation: We can observe that many people had no impact on mental health than expected and the   number of people facing severe depression is less than expected.

2] Did you enjoy having some me time during lockdown?

Ho: Maybe = No = Yes

Ha: Maybe ≠ No ≠ Yes

Observed and Expected Counts

Category	Observed	Test Proportion	Expected	Contribution to Chi-Square
Maybe	323	0.333333	376.667	7.646
No	150	0.333333	376.667	136.401
Yes	657	0.333333	376.667	208.637

Chi-Square Test

N	N*	DF	Chi-Square	P-Value
11 30	0	2	352.685	0.000

Chart of Observed and Expected Values
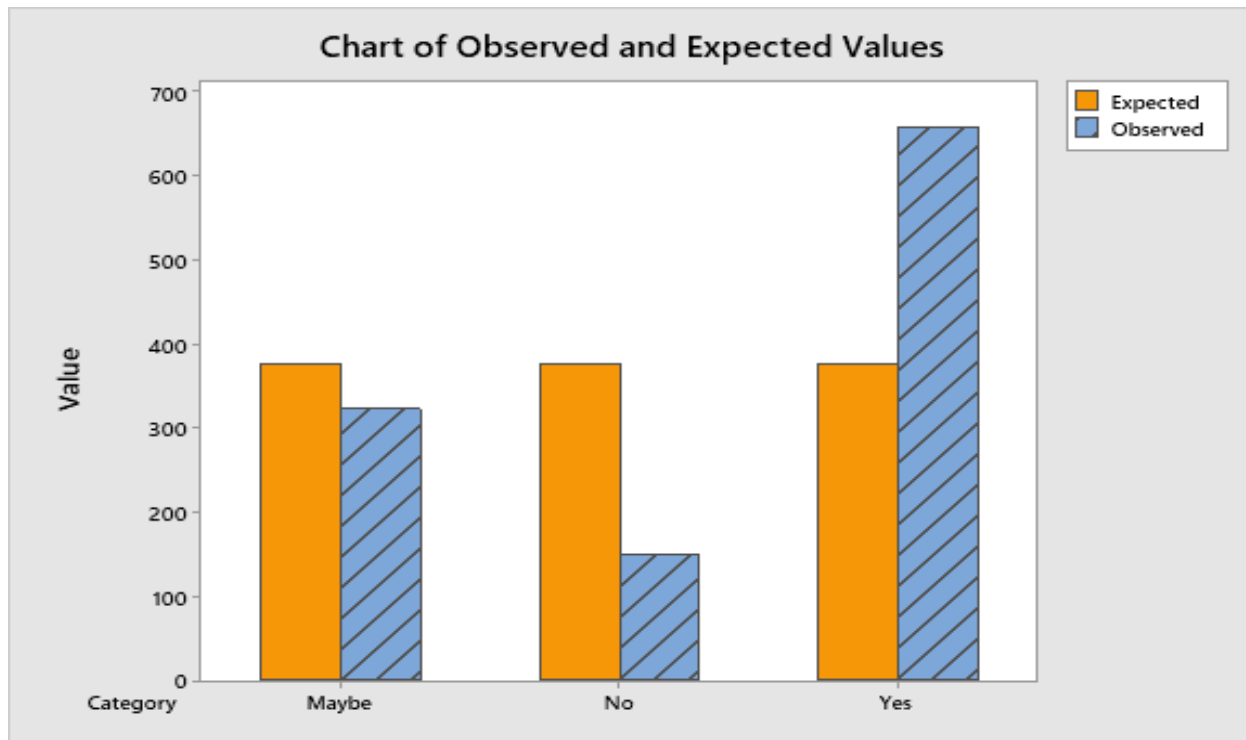
Interpretation: We can observe that more people enjoyed having there me-time than expected
frequency

3] Were you confident about your ability to handle your personal problems?

Ho: No = Yes

Ha: No ≠ Yes

Observed and Expected Counts

Category	Observed	Test Proportion	Expected	Contribution to Chi-Square
No	213	0.5	565	219.299
Yes	917	0.5	565	219.299

Chi-Square Test

N	N*	DF	Chi-Sq	P-Value
1130	0	1	438.598	0.000

Chart of Observed and Expected Values
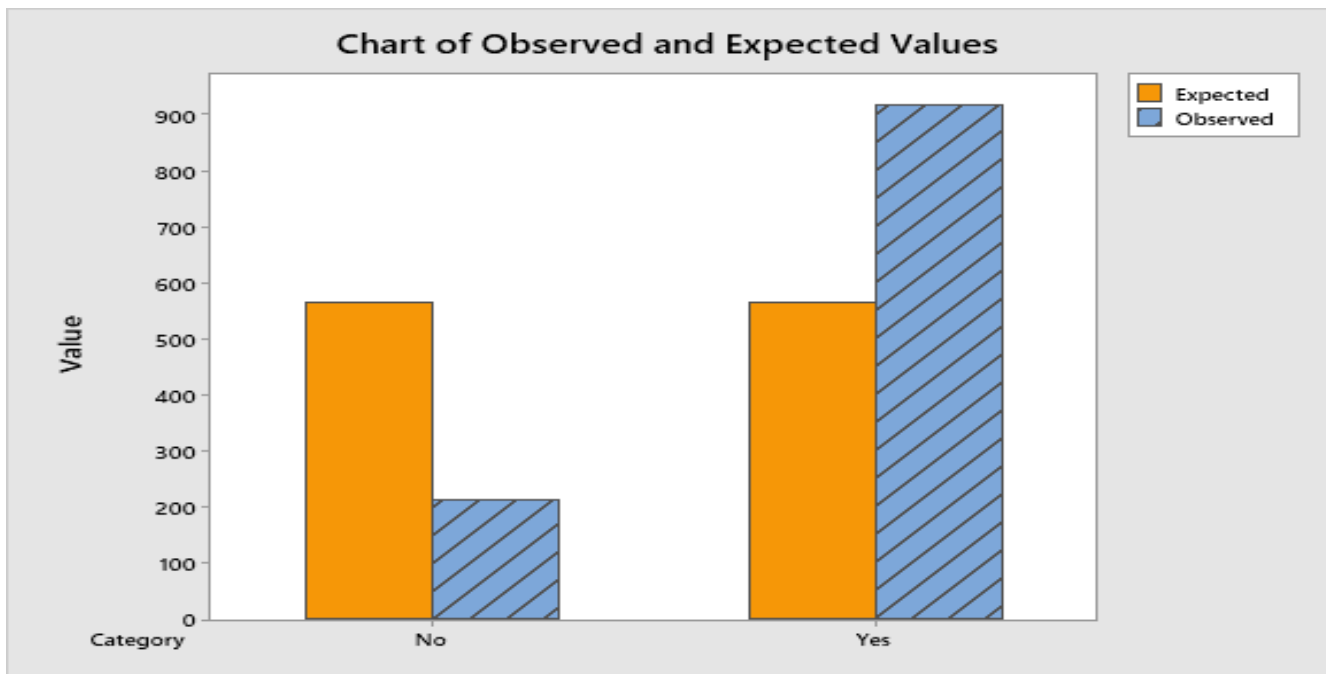
Interpretation: From the above graph we can observe that many people were more confident about their ability to handle their personal problems than expected frequency.

4] Did your family face any financial crisis?

Ho: Yes, we had to face huge financial problem = we had to bear slight losses = No loss= No, we were profited due to this situation

Ha: Yes, we had to face huge financial problem ≠ we had to bear slight losses ≠ No loss ≠ No, we were profited due to this situation

Observed and Expected Count

Category	Observed	Test Proportion	Expected	Contribution to Chi-Square
No loss.	371	0.25	282.5	27.725
No, we were profited due to this situation	77	0.25	282.5	149.488
We had to bear slight losses.	456	0.25	282.5	106.557
Yes, we had to face huge financial problem	226	0.25	282.5	11.300

Chi-Square Test

N	N*	DF	Chi-Sq	P-Value
1130	0	3	295.069	0.000

Chart of Observed and Expected Values
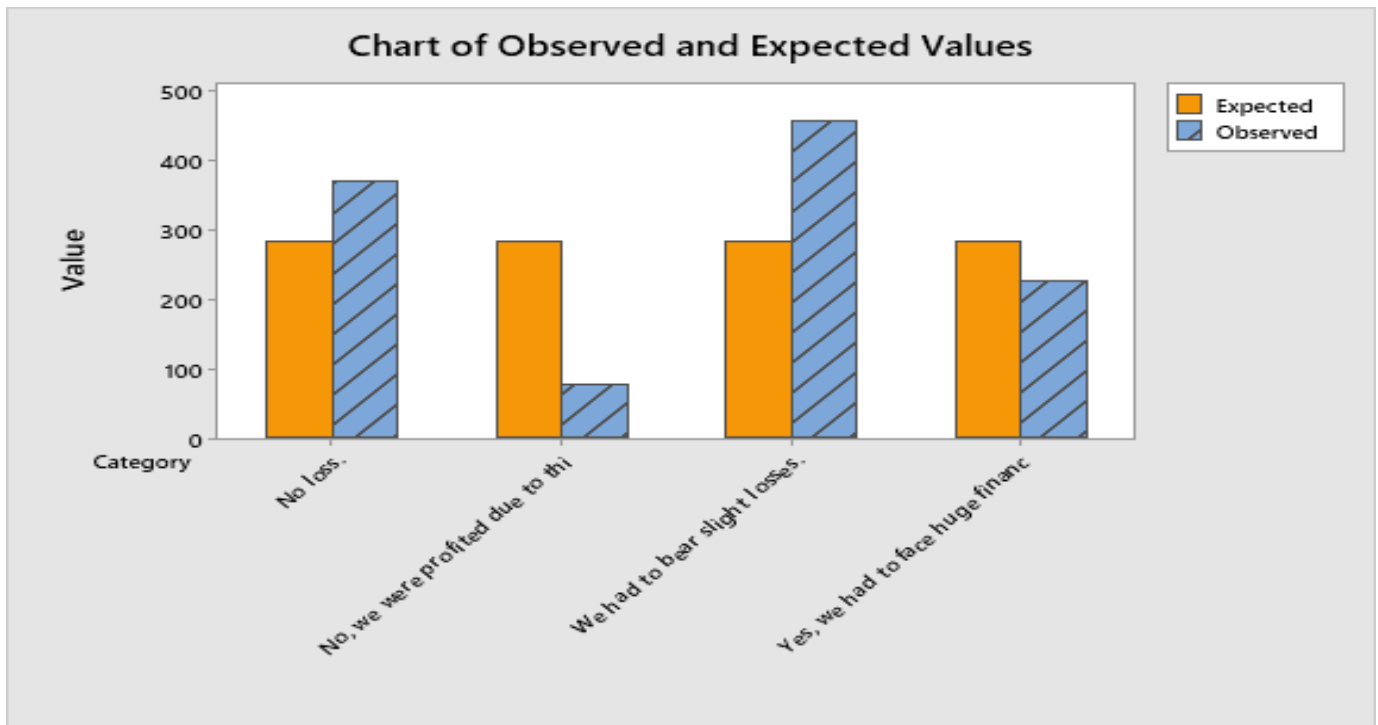
Interpretation: We can observe that more people had to face slight losses during lockdown than expected frequency.

5] Are you comfortable talking to your family members regarding mental health problems?

Ho: I'm not sure = No = Sometimes = Yes

Ha: I'm not sure ≠ No ≠ Sometimes ≠ Yes

Observed and Expected Counts

Observed	Test Proportion	Expected	Contribution to Chi-Square
198	0.25	282.5	25.2752
187	0.25	282.5	32.2841
367	0.25	282.5	25.2752
378	0.25	282.5	32.2841

Chi-Square Test

N	N*	DF	Chi-Sq	P-Value
	0	3	115.119	0.000
1130				

Chart of Observed and Expected Values
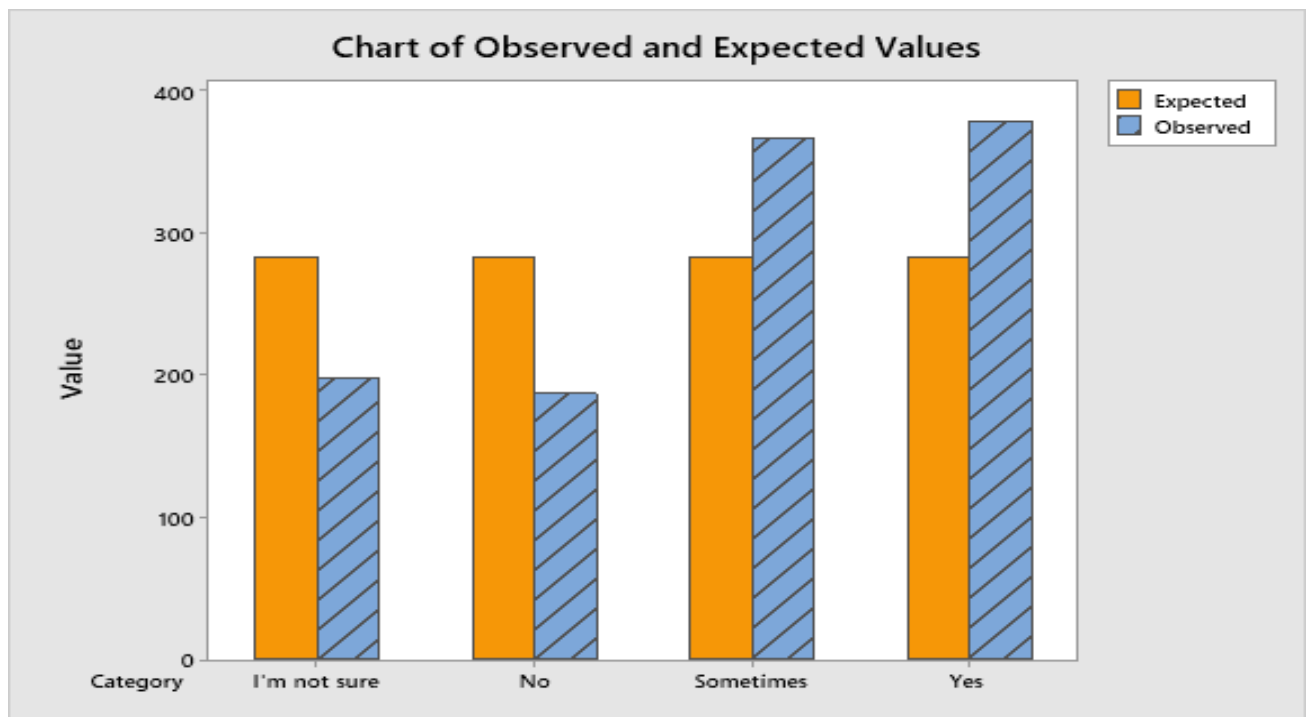
Interpretation: We can observe that more people are comfortable talking to family members as compared to expected frequency.

B] Chi-square test:-

Chi-square statistic is a test that measures how a model compares to actual observed data. It is used to determine whether there is a statistically significant difference between the expected frequencies in one or more categories of a contingency table.

Uses:-

The chi-square test of independence determines whether there is an association between categorical variables. It is a non-parametric test. This test is also known as the chi-square test of association.

A chi-square test compares the proportion of discrete 'y' responses for multiple levels of 'x'.

Formula - $\chi^2 = \sum\sum (O_{ij} - e_{ij})^2 / e_{ij}$

Assumptions -

1. The data in the cell should be frequencies or count of cases rather than percentage or some other transformation of the data.

2. The levels (or categories) of the variables are mutually exclusive.

3. Each subject may contribute data to one and only one cell in the

4. The study groups must be independent.

5. The value of the cell expected should be 5 or more in at least 80% of the cell and no cell should have on expected of less than one

SR. NO.	Y	X	P-VALUE	INTERPRETATION
1	How much obstruction to your social life affected you mentally?	Gender	0.476	Here p value is greater than 0.05 therefore we accept the null hypothesis. Therefore two attributes are independent of each other.

2	Were you scared of a pandemic situation?	Gender	0.000	Here p value is less than 0.05 therefore we reject null hypothesis (we accept alternative hypothesis). Therefore you are scared of a pandemic situation and gender is dependent on each other.
3	Are you? (Non-working, Student, Working)	ow much did lockdown affect you mentally, were you depressed?	0.000	Here p value is less than 0.05 therefore we reject null hypothesis (we accept alternative hypothesis). Therefore ou (Non-working, students, working) and how much did lockdown affect you mentally are dependent on each other.
4	Are you? (Non-working, Student, Working)	Did you lose your motivation towards your career?	0.000	Here p value is less than 0.05 therefore we reject null hypothesis (we accept alternative hypothesis). Therefore re you (Non-working, student, working) and did you lose your motivation towards your career during pandemic re dependent on each other

C] Two proportion test:-

A two proportion test allows you to compare two proportions to see if they are the same. The null hypothesis () for the test is that the proportions are the same. The alternate hypothesis () is that the proportions are not the same.

Uses:-

A two proportion test compares the proportion of discrete 'y' for two levels of an 'x'. Difference between the chi-square test and two proportion test is whenever there are more than two levels /categories of Xs, we will use the chi-square test and whenever there are two levels/categories of Xs, we will use proportion test.

Assumption

1] A simple random sample size n, is taken from population 1 and a simple random sample of size n2 is taken from population 2.

2] The samples are independent.

3] The assumptions for the binomial distribution are satisfied for both populations.

4] To determine the sampling distribution of β_1. We need to show that $n_1p_1 \geq 5$ and $n_1p_1 \geq 5$

Where $q_1 = 1-p_1$ and to determine the sampling distribution of $\hat{p}_2$. We need to show that $n_2p_2 \geq 5$ where $q_2 = 1- p_2$

Test statistic is

$$Z=\frac{(\hat{p}_1-\hat{p}_2)-(p_1-p_2)}{\sqrt{(\bar{p}\bar{q}/n_1)+(\bar{p}\bar{q}/n_2)}}$$

where, n_1 = size of sample 1

n_2 = size of sample 2

$\hat{p}_1 = x_1/n_1$ (sample 1 proportion)

$\hat{p}_2 = x_2/n_2$ (sample 2 proportion)

$p = (x_1+x_2) / (n_1+n_2)$

SR. NO.	Y	X	P-VALUE	INTERPRETATION
1	Were you scared of a pandemic situation during the initial stage?	Area of residence (urban or rural)	0.011	Here p value is less than 0.05, we reject null hypothesis (accept alternative hypothesis). Proportion of people in Urban and Rural areas who are scared of pandemic situations during the initial stage may not be the same.
2	Were you scared of a pandemic situation during the initial stage?	Area of residence (urban or semi-urban)	0.076	Here p value is greater than 0.05, we accept null hypothesis. Proportion of people in Urban and Semi urban area who scared of pandemic situation during initial stage may be same
3	Were you scared of a pandemic situation during the initial stage?	Area of residence (rural or semi-urban)	0.387	Here p value is greater than 0.05, we accept null hypothesis. Proportion of people in Rural and Semi urban areas who are scared of pandemic situations during the initial stage may be the same.
4	Were you mildly depressed during lockdown?	Are you (working or non-working)	1.000	Here p value is greater than 0.05, we accept null hypothesis. Proportion of working and non-working who suffer from mild depression may be the same.

5	Were you mildly depressed during lockdown?	Are you (student or non-working)	0.475	Here p value is greater than 0.05, we accept null ypothesis. Proportion of non-working and students who suffer from mild depression may be the same.
6	Were you mildly depressed during lockdown?	Are you (student or working)	0.475	Here p value is greater than 0.05, we accept null hypothesis. Proportion of Working and Students who suffer from mild depression may be the same.
7	Did you lose motivation towards your career?	Are you (working or non-working)	0.000	Since the p value is less than 0.05, we reject the null hypothesis (accept alternative hypothesis). Proportion of Working and Non-working who losed motivation towards career may not be the same.
8	Did you lose your motivation towards your career?	Are you (student or non-working)	0.000	Here p value is less than 0.05, we reject null hypothesis (accept alternative hypothesis). Proportion of Non-working and students who lose motivation towards a career may not be the same.
9	Did you lose your motivation towards your career?	Are you (student or working)	0.004	Here p value is less than 0.05, we reject null hypothesis (accept alternative hypothesis). Proportion of Students and Working who lose motivation towards career may not be the same.

D] Paired t-test:-

- The paired sample t-test is also called the dependent sample t-test, it is the statistical procedure used to determine whether the mean difference between two sets of observations is zero. In a paired sample t-test, each subject or entity is measured twice, resulting in a pair of observations.

· Conditions for paired t-test:-

· The dependent variable must be continuous.

· The observations are independent of one another.

· The dependent variable should be approximately normally distributed.

· The dependent variable should not contain any outliers.

· Uses:-

· A paired t-test is used when we are interested in the difference between two variables for the same subject, often the two variables are separated by time.

Assumption

1. The dependent variable must be continuous (interval / ratio).

2. The observations are independent of one another.

3. The dependent variables should be approximately normally distributed.

4. The dependent variable should not contain any outliers.

Test statistics is

$T = \bar{d}\,\sqrt{n}/s$

SR	Y	X	P- VALUE	INTERPRETATION
1	Time spend on social media during lockdown	Time spend on so social media before lockdown	0.000	Here p value < 0.05 therefore we reject null hypothesis (accept alternative hypothesis) Therefore the average difference in time is not equal to zero.

Covid-19 mentality index

In statistics and research design, an index is a composite statistic – a measure of changes in a representative group of individual data points, or in other words, a compound measure that aggregates multiple indicators. Indexes – also known as composite indicators – summarize and rank specific observations.

Formula for mentality index = (average (sum of all sub questions)) / (5 - 1) * 100

Where (5-1) range of all sub questions

Range of mentality index is always between1 to 100.

Summary statistics of index number

Summary statistics

	Column1
Mean	55.73009
Standard Error	0.253077
Median	55
Mode	55
Standard Deviation	8.507287
Sample Variance	72.37394
Kurtosis	-0.33255
Skewness	0.246882
Range	47.5
Minimum	35
Maximum	82.5
Sum	62975
Count	1130

Interpretation-From the formula we get covid-19 mentality index as 63.5075.

Box Plots

A boxplot is a standardized way of displaying the dataset based on a five-number summary: the minimum, the maximum, the sample median, and the first and third quartiles.

Minimum (Q_0 or 0th percentile): the lowest data point excluding any outliers.

Maximum (Q_4 or 100th percentile): the largest data point excluding any outliers.

Median (Q_2 or 50th percentile): the middle value of the dataset.

First quartile (Q_1 or 25th percentile): also known as the *lower quartile q_n(0.25)*, is the median of the lower half of the dataset.

Third quartile (Q_3 or 75th percentile): also known as the *upper quartile q_n(0.75)*, is the median of the upper half of the dataset

1] Boxplot of Mentality index Vs. Gender.
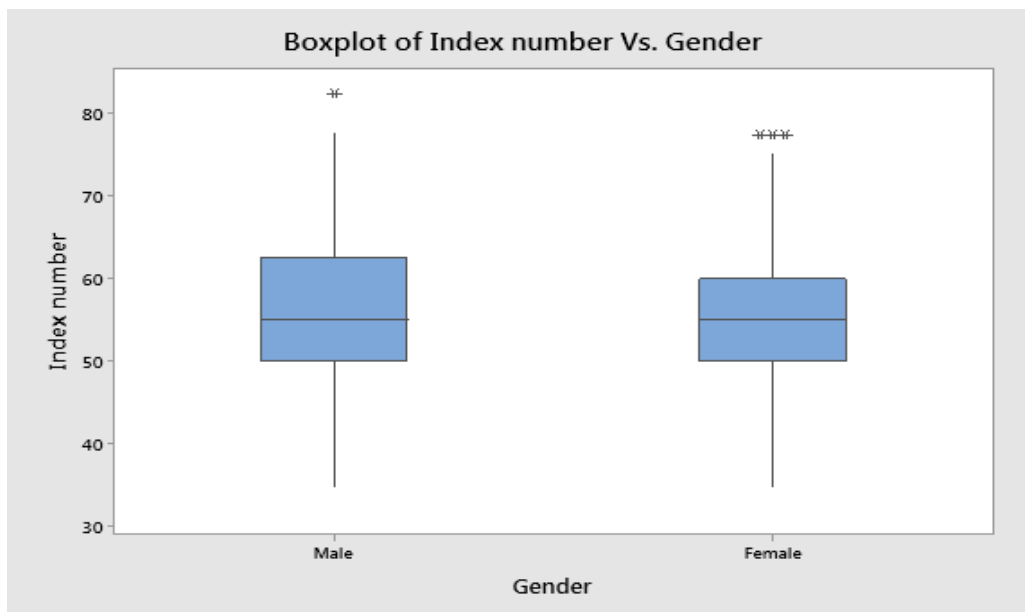
Interpretation: From the above boxplot we can observe that there is no meaningful variation between gender.

2] Boxplot of Mentality index Vs. Age (in years).
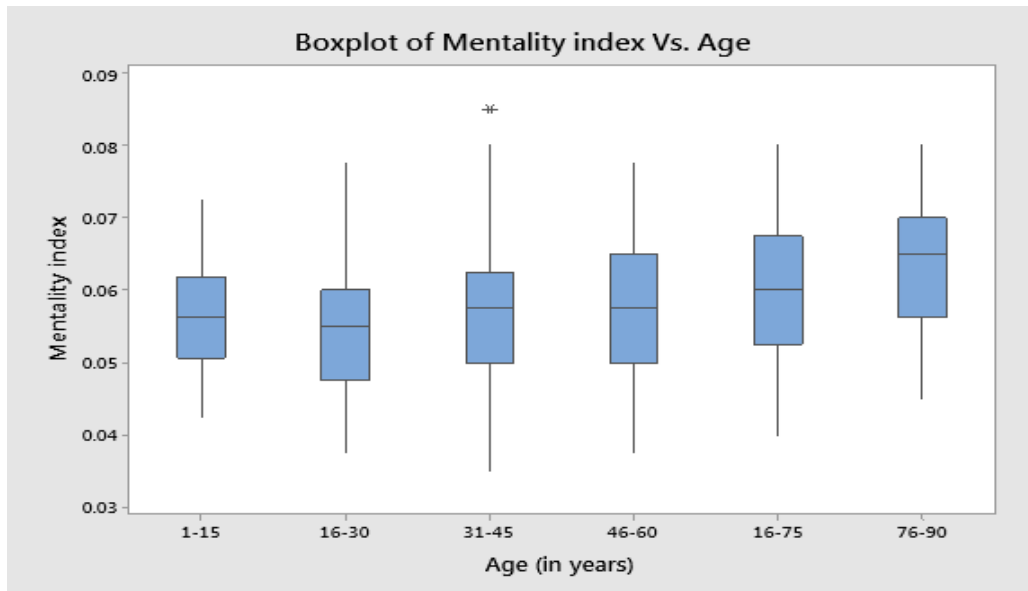
Interpretation:
From the above boxplot we can observe that the median for ages 76-90 is higher than that for other ages.

3] Boxplot of Mentality index Vs. Area of residence.
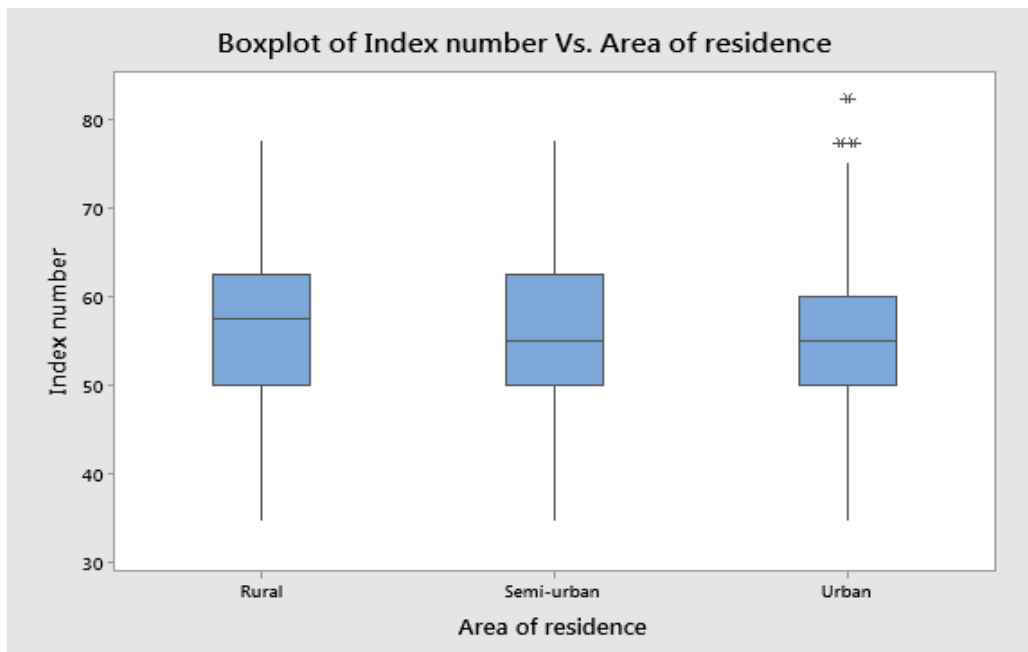
Interpretation:
From the above boxplot we can observe that the median of rural areas is slightly higher than other areas.

4] Boxplot of Mentality index Vs. Are you?
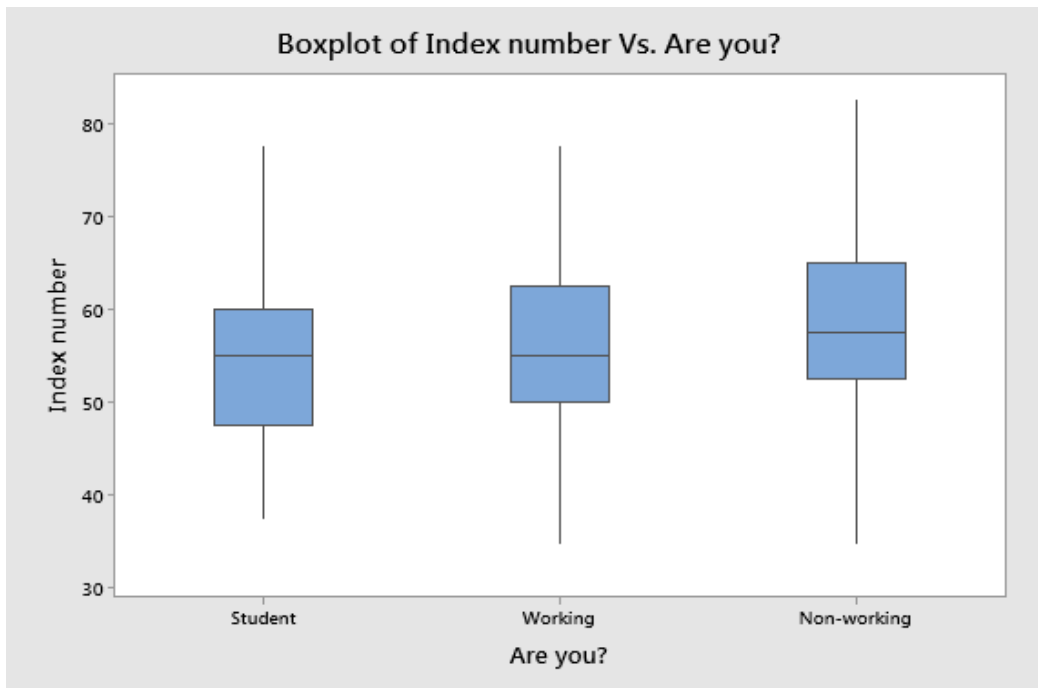
Interpretation:
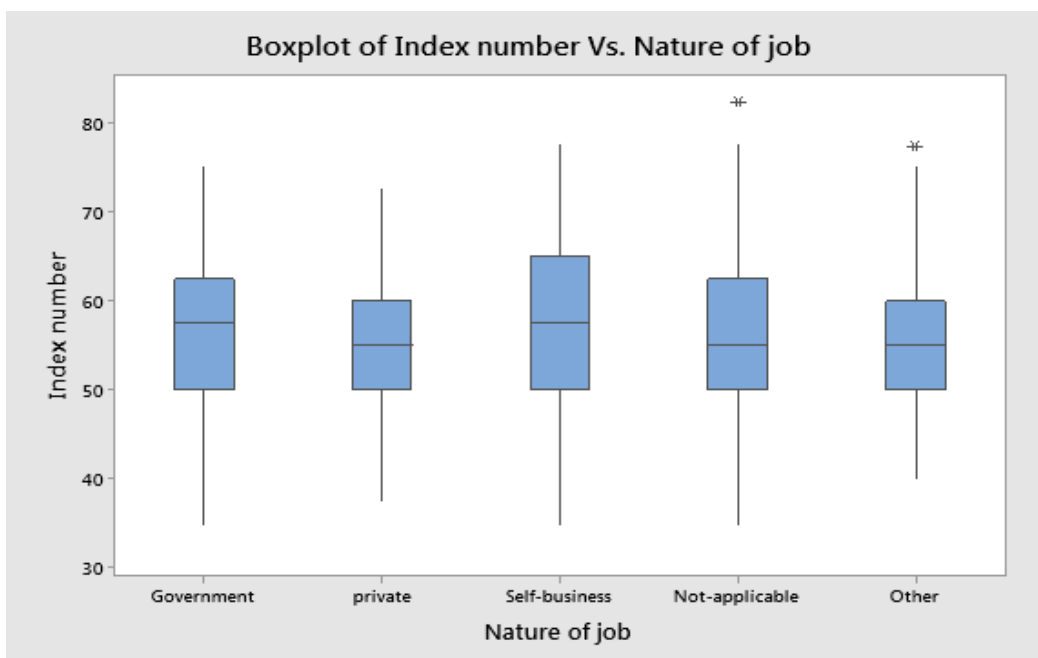From the above boxplot we can observe that the median of non-working is slightly higher than other people.

5] Boxplot of Mentality index Vs. Nature of job.

Interpretation:
From the above boxplot we can observe that the median of the self-business people group is slightly higher than other people's jobs.

ANOVA TEST

Introduction -Analysis of variance (ANOVA) is a statistical technique that is used to check if the means of two or more groups are significantly different from each other. ANOVA checks the impact of one or more factors by comparing the means of different samples

Assumptions-

1] Normality- That each sample is taken from a normally distributed population

2] Sample independence-That each sample has been independent of other samples

3] Variance equality-That the variance of the data is different groups should be same

4] The dependent variable should be continuous.

The One-Way ANOVA is commonly used to test the following

1) Statistical differences among the means of two or more groups.

2) Statistical differences among the means of two or more interventions.

3) Statistical differences among the means of two or more change scores.

SR. NO.	Y	X	hypothesis	p-value	conclusion
1	age (1-15 years,16-30 years,31-45 years, 46-60 years, 61-75 years,76-90 years)	covid-19 mentality index	(h0 : $\mu1=\mu2=\mu3=\mu4=\mu5=\mu6$),(h1: $\mu1\neq\mu2\neq\mu3\neq\mu4\neq\mu5\neq\mu6$)	0	p value < 0.05 we reject ho
2	gender (male and female)	covid-19 mental ity index	(h0 : $\mu1=\mu2$),(h1: $\mu1\neq\mu2$)	0.18183087	p value > 0.05 we accept ho

3	area of residence (urban-semi, urban, rural)	covid-19 mentality index	(h0 : $\mu1=\mu2=\mu3$),(h1: $\mu1\neq\mu2\neq\mu3$)	0.00070887	p value < 0.05 we reject ho
4	are you (working, non-working, student)	covid-19 mentality index	(h0 : $\mu1=\mu2=\mu3$),(h1: $\mu1\neq\mu2\neq\mu3$)	0	p value < 0.05 we reject ho
5	nature of job (government, private, self-,business, other, not applicable)	covid-19 mentality index	(h0 : $\mu1=\mu2=\mu3=\mu4=\mu5$),(h1: $\mu1\neq\mu2\neq\mu3\neq\mu4\neq\mu5$)	0.02541342	p value < 0.05 we reject ho

Conclusion:

1] Covid-19 mentality indexes across all ages are not equal.

2] Covid-19 mentality indexes across all genders (male and female) are equal.

3] Covid-19 mentality indexes across areas of residence are not equal.

4] Covid-19 mentality index across students, working and non-working are not equal.

5] Covid-19 mentality indexes across the nature of jobs are not equal.

BINARY REGRESSION ANALYSIS

A binary regression estimates a relationship between one or more explanatory variables and a single output binary variable. Generally the probability of the two alternatives is modeled, instead of simply outputting a single value, as in linear regression.

Uses-A binary regression is either used for prediction or estimating the association between the explanatory variables and the output.

Assumptions

1. That the outcome must be discrete, otherwise explained as, the dependent variable should be dichotomous in nature.

2. There should be no outliers in the data

3. There should be no high inter correlations (multicollinearity) among the predictors**.**

Regression

Dependent variable- Gender

Independent variable-Area of residence, are you, time spend in home before lockdown,

time spent in home during lockdown, were you scared of pandemic situations, Is it easy or difficult.

Response Information

Variable	Value	Count	
2] Gender	2	610	(Event)
	1	520	
	Total	1130	

Regression Equation

P(2)   =   exp(Y')/(1 + exp(Y'))

Y'   =   -3.255 - 0.2127 3] Area of residence + 0.2795 4] Are you? + 0.1473 5] Nature of job

+ 0.2346 4] Total time spend in home + 0.3469 4] Total time spend in home b_1

+ 0.3068 9] Were you scared of pandemic + 0.2047 13] Is it easy or difficult to

Coefficients

Term	Coefficient	SE Coefficient	VIF
Constant	-3.255	0.476	
3] Area of residence	-0.2127	0.0810	1.02
4] Are you?	0.2795	0.0823	1.16
5] Nature of job	0.1473	0.0570	1.01
4] Total time spend in home	0.2346	0.0745	1.27
4] Total time spend in home b_1	0.3469	0.0824	1.22
9] Were you scared of pandemic	0.3068	0.0744	1.04
13] Is it easy or difficult to	0.2047	0.0879	1.01

Model Summary

Deviance R-Square	Deviance R-Square(adjacent)	AIC	AICc	BIC
6.75%	6.30%	1470.12	1470.25	1510.36

Goodness-of-Fit Tests

Test	DF	Chi-Square	P-Value
Deviance	1122	1454.12	0.000
Pearson	1122	1134.80	0.389
Hosmer-Lemeshow	8	7.24	0.511

Analysis of Variance

Source	DF	Wald Test Chi-Square	P-Value
Regression	7	91.74	0.000
3] Area of residence	1	6.90	0.009
4] Are you?	1	11.53	0.001
5] Nature of job	1	6.68	0.010
4] Total time spend in home between	1	9.91	0.002
4] Total time spend in home b_1	1	17.73	0.000
9] Were you scared of pandemic	1	17.02	0.000
13] Is it easy or difficult to	1	5.42	0.020

Null deviance: 1559.3 on 1129 degrees of freedom

Residual deviance: 1441.4 on 1109 degrees of freedom

Conclusion:-

1. Area of residence, are you, time spend in home before lockdown, time spend in home during lockdown, were you scared of pandemic situation, is it easy or difficult have a significant effect on gender.

Deviance=Null deviance-Residual deviance=1559.3-1441.4=117.9

Deviance follows chi-square distribution with 1 degree of freedom.

Chi-square value at 1 d.f .=3.84145

Thus Deviance > Chi-square at alpha=5 % level of significance. Thus the fitted logistic (binary) regression model is significant.

Multiple linear regressions

Multiple regressions is an extension of simple linear regression. It is used when we want to predict the value of a variable based on the value of two or more variables.

Uses:-

 Multiple linear regressions allows us to obtain predicted values of specific variables under certain conditions.

Assumptions-

1] Linear Relation-There must be a linear relationship between the outcome variable and the independent variables. Scatterplots can show whether there is a linear or curvilinear relationship.

2] Multivariate normality–Multiple regression assumes that the residuals are normally distributed.

3] No Multicollinearity— Multiple regression assumes that the independent variables are not highly correlated with each other. This assumption is tested using Variance Inflation Factor (VIF) values.

4] Homoscedasticity–This assumption states that the variance of error terms are similar across the values of the independent variables. A plot of standardized residuals versus predicted values can show whether points are equally distributed across all values of the independent variables.

Regression

Dependent variable- Index no

Independent variable- Age, Area of residence, On scale of 1 to 5,How much did you spent on social media before lockdown, Did lockdown helped spend quality time with your family, Total time spent in home before lockdown, How much did lockdown affected you mentally, How much family members roommates were present with you during lockdown, How much did obstruction to social life, Were you scared, Were you confident about ability to handle personal problems, Did you enjoyed me time, Are you comfortable talking to family, Did you faced financial crisis, Did you lose motivation toward career.

Regression Equation

Index number = 22.45 + 0.350 1]Age (in years) + 0.653 3] Area of residence

+ 3.183 1] On scale of 1 to 5 how much + 2.042 2] How much time did you spent

+ 2.002 3] Did lockdown really helped y

- 0.762 4] Total time spend in home

- 0.396 5] How much did lockdown affect

+ 0.524 6] How many family members/ - 0.647 8] How much did obstruction to

+ 0.518 9] Were you scared of pandemic + 4.753 10] Were you confident about your

+ 1.914 11] Did you enjoyed having some

+ 1.883 12] Are you comfortable talking

- 1.935 14] Did your family faced any f

+ 1.909 15] Did you lose your motivation

Coefficients

Term	Coefficient	SE Coefficient	T-Value	P-Value	VIF
Constant	22.45	1.34	16.75	0.000	
1]Age (in years)	0.350	0.133	2.63	0.009	1.44
3] Area of residence	0.653	0.184	3.56	0.000	1.07
1] On scale of 1 to 5 how much	3.183	0.121	26.29	0.000	1.16
2] How much time did you spent	2.042	0.322	6.35	0.000	1.12
3] Did lockdown really helped y	2.002	0.131	15.24	0.000	1.18
4] Total time spend in home	-0.762	0.148	-5.15	0.000	1.11
5] How much did lockdown affect	-0.396	0.122	-3.23	0.001	1.16
6] How many family members/	0.524	0.191	2.75	0.006	1.18
8] How much did obstruction to	-0.647	0.210	-3.08	0.002	1.07
9] Were you scared of pandemic	0.518	0.168	3.08	0.002	1.09
10] Were you confident about	4.753	0.389	12.21	0.000	1.21
11] Did you enjoyed having some	1.914	0.167	11.47	0.000	1.13
12] Are you comfortable talking	1.883	0.134	14.05	0.000	1.16
14] Did your family faced any f	-1.935	0.168	-11.52	0.000	1.07
15] Did you lose your motivation	1.909	0.149	12.78	0.000	1.46

Model Summary

S	R-square	R- square (adjusted	R-square (predicted)
4.65793	70.42%	70.02%	69.52%

Conclusion

1]Index number has an significant effect on age, area of residence, on scale of 1 to 5 how much lockdown affected you mentally, How much did you spent on social media before lockdown, Did lockdown helped spend quality time with your family, Total time spent in home before lockdown, How much did lockdown affected you mentally, How much family members roommates were present with you during lockdown, How much did obstruction to social life, Were you scared, Were you confident about ability to handle personal problems, Did you enjoyed me time, Are you comfortable talking to family, Did you faced financial crisis, Did you lose motivation toward career.

2] Residual plots are normally distributed

3] Predicted indices also follow normality

Questionnaire used for survey

Section -1

1] Age (in years)

2] Gender

3] Area of residence

A] Urban   B] Semi-urban   C] Rural

4] Are you?

A] Student   B] Working   C] Non-working

5] Nature of job

A] Private Job   B] Self-business   C] Not-applicable   D] Other

Section-11

1] On scale of 1 to 5 how much lockdown did affected you mentally?

2A] How much time did you spent on social networking sites like Whatsapp,

Instagram, and Facebook before lockdown (in hrs.) during lockdown (in hrs.)?

[Before lockdown (in hrs.)]

A] 0-6 hours   B] 6-12 hours   C]12-18 hours   D] 18-24 hours

2B] How much time did you spent on social networking sites like Whatsapp,

Instagram, and Facebook before lockdown (in hrs.) during lockdown (in hrs.)?

[During lockdown (in hrs.)]

A] 0-6 hours   B] 6-12 hours   C] 12-18 hours   D] 18-24 hours

3] Did lockdown really helped you to spend quality time with your family

members? (On scale of 1 to 5)

4A] Total time spend in home before lockdown (in hrs.) and during lockdown (in hours). [Before lockdown (in hrs.)]

A]0-6 hours   B] 6-12 hours   C] 12-18 hours   D] 18-24 hours

4B] Total time spend in home before lockdown (in hrs.) and during lockdown (in hrs.). [During lockdown (in hrs.)]

A] 0-6 hours   B] 6-12 hours   C] 12-18 hours   D] 18-24 hours

5] How much did lockdown affected you mentally, were you depressed?

A] No impact   B] Mild depression   C] Moderated depression   D] Severe depression

6] How many family members/ roommates were present with you during lockdown? (Excluding you)

A] 0-5 hours   B] 6-10 hours   C]11-15 hours   D] 16-20 hours

7] Annual income (in rupee)

A] Less than 1 lakh   B] 1-5 lakh   C] 6-10 lakh   D] 11-15 lakh   E] 15 lakh and more

8] How much did obstruction to your social life affected you mentally?

A] Not really   B] Sometimes   C] Too much

9] Were you scared of pandemic situation?

A] During initial stage   B] Yes   C] No

10] Were you confident about your ability to handle your personal problems?

A] Yes   B] No

11] Did you enjoy having some me time?

A] Yes   B] No   C] Maybe

12] Are you comfortable talking to your family members regarding mental

health problems?

A] Yes   B] No   C]Sometimes

13] Is it easy or difficult to work/ study from home compare to going to your

School / College / Work place?

A] Its easy   B] Same   C] Quite difficult

14] Did your family face any financial crisis?

A] No loss   B] We have to bear slightly losses

C] Yes we had face huge financial problem   D] No we were profited due to this situation

15] Did you lose your motivation towards your career during this period?

A] Yes   B] No   C] Maybe

LIMITATIONS

 The study of participants included only those who have access to the internet and who could respond in English, this could have limited the participation.

Conclusions

1) Males were more likely to suffer from depression as compared to females.

2) People staying in urban areas are more confident talking to their family members about their mental health problems.

3) Nearly 33.1% people faced mild depression, 23.4% faced moderate depression and 14.9% people had to go through severe depression.

4) During lockdown many people enjoyed there me-time.

5) Many people had to bear slight losses during the lockdown period.

6) Covid-19 mentality indexes across all ages, area of residence, are you, nature of job are not equal.

7) Covid-19 mentality indexes across all genders (male and female) are equal.