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## Anxiety and Depression Among Rural Population Due to Lockdowns During COVID-19 Pandemic.

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### ABSTRACT

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#### Declaration:

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**Background:** The COVID-19 pandemic has been unprecedented both in magnitude and in the fallout. While considerable attention has been given to the mental health of patients, less is known about the effects of mitigation strategies like lockdowns on the general population. We conducted a study in a rural set-up to evaluate anxiety and depression consequent upon the imposition of lockdowns during the epidemic.

**Aims:** To analyze the relation between COVID-19 lockdowns and anxiety and depression among the rural population.

**Materials and methods:** A cross-sectional survey was conducted telephonically and online through e-forms. Two study tools, GAD-7 and PHQ-9, were used to objectively evaluate anxiety and depression, respectively, among the study participants. Data was collected by the snowball sampling technique and subjected to statistical analysis.

**Results:** Adolescents, females, unmarried, students and those living in families with more than four members and hailing from plains were more likely to be depressed, while middle-aged, females, married, private employees, those living in families with more than four members and hailing from plains had higher anxiety levels.

**Conclusion:** COVID-19 mitigation strategies had significant effects on the mental health of the general population, even in rural areas, with some particular groups affected more than others.

**Key Messages: What is already known on this topic** Mental health effects of COVID-19 have been well studied, however predominantly in patients. Some studies have studied the fallout on the general population as well. Less is known about the impact of mitigation strategies on the mental health of the general population.

**What this study adds.** This research finds that specific population groups did experience adverse effects on their mental health due to lockdowns employed during the COVID-19 pandemic.

**How this study might affect research, practice and/or policy.** The study revealed the impacts of mitigation strategies on the general population and identified certain vulnerable groups. This can be used to institute policy changes, not only to cater to the present demands but to have better preparations should such a pandemic befall again.

**Keywords:** Anxiety, Depression, COVID-19, Lockdown, Rural.

## INTRODUCTION

The novel coronavirus disease, or COVID-19, has been the most serious medical challenge in recent history. The World Health Organization declared it a public health emergency of international concern on 30 January 2020<sup>1</sup>. The disease is predominantly mild but can cause severe illness in the older population and people with comorbidities such as diabetes mellitus, cardiovascular disease, chronic respiratory disease, or malignancy<sup>2</sup>. During the last two years, extensive research has been conducted on a multitude of issues related to the disease, ranging from clinical aspects to pharmacological interventions, including anti-viral drugs<sup>3</sup>, preventive strategies including vaccines<sup>4</sup>, etc. An important subject of study has been the mental health of not only the patients but the general population as well. There are various reasons for that. Firstly, the crisis has been enormous and unprecedented, leading to widespread fear and apprehension among the people. Secondly, the mitigation strategies and responses of the administrations contributed to social and economic problems, especially in the developing countries, which had a huge bearing on the mental well-being of the population in general. While several studies have been conducted on the effects of lockdown on the mental health of the general public<sup>5,6</sup> most of these studies have either been conducted in developed countries<sup>7,8</sup> or urban areas of developing countries<sup>9,10</sup>. None of these studies focuses entirely on the mental health of the rural population. As the local social and economic dynamics differ between rural and urban areas, more so in developing countries, the effects on mental health are variable. According to the Centre for Urban Design and Mental Health (UD/MH), mental health problems are more prevalent in cities than rural areas, including a nearly 40% higher risk of depression, a 20% higher incidence of anxiety, and a twofold higher risk of schizophrenia, as well as loneliness, isolation, and stress<sup>11</sup>. Furthermore, rural areas face distinct challenges in terms of connectivity, communication, availability, and access to necessities. The current study was thus conducted in a rural setup and quite interestingly with variable altitudes as well. High altitude produces adverse alterations in human mood states, behavior, and cognitive functioning<sup>12</sup>. This study includes analyses and comparisons between the incidence of anxiety and depression in plain and hilly areas of a rural region in a developing country. Other demographic factors like age, gender, marital status, educational qualifications, and occupation were also studied for possible associations or otherwise.

Most of the mental health intervention strategies were instituted to cater to the urban population. The present research is focused on the rural setup will thus bring rural health management into play, which most of the time it is faced with different constraints in terms of resources and demographic challenges. Effective mental health management interventions can thereby be tailored to the rural landscape and will involve meticulous planning and execution by practitioners and policymakers.

### **Objective:**

To analyze the relation between COVID-19 lockdowns and anxiety and depression among the rural population.

## MATERIALS AND METHODS

### **Study Design:**

This is a cross-sectional survey-based study conducted telephonically and through e-forms wherever feasible.

### **Study Population:**

The study participants included the rural population of India from hilly regions of the country invited to participate in the study via the snowball sampling technique. Active/recovered COVID-19 patients or patients known to be suffering from any psychiatric disorder were excluded.

**Consent:** A verbal consent was taken from all the participants, telephonically explaining to them the methodology and implications of the study. The participants were assured of complete confidentiality, and they could opt out anytime during the survey.

### **Study Tools:**

1. Generalized Anxiety Disorder - 7 (GAD-7) - This is a validated, public domain, scaled questionnaire recommended by the Diagnostic and Statistical Manual-5 (DSM-5) for identifying possible cases of generalized anxiety disorder with a sensitivity of 89% and specificity of 82%. It is composed of 7 questions, each carrying a minimum of 0 and a maximum of 3 points. A GAD-7 score of < 5 indicates no anxiety, 5 - 9 indicates mild anxiety, 10 - 14 indicates moderate anxiety and > 14 indicates severe anxiety.
2. Public health questionnaire - 9 (PHQ-9) - This is a validated, public domain, scaled questionnaire recommended by the Diagnostic and Statistical Manual-5 (DSM-5) for screening and evaluation of the severity of depression with a sensitivity of 88% and specificity of 88%. It is composed of 9 questions, each carrying a minimum of 0 and a maximum of 3 points. A PHQ-9 score of 1-4 indicates minimal depression, 5 - 9 indicates mild depression, 10 - 14 indicates moderate depression, 15-19 indicates moderately severe depression and 20-27 indicates severe depression.

### Methodology:

Data was collected through the snowball sampling technique. We contacted the participants via telephone and before we asked them any questions, we took their verbal consent. The questionnaire included questions regarding:

1. Participant particulars.
2. Anxiety and depression questionnaire.
3. Some voluntary questions

**Setting and Duration of Study:** The data collection took place over two weeks during the initial phases of the COVID-19 lockdown in India. The duration of the study was one year, i.e., from April 2020 to April 2021, during which the number of COVID-19 cases was exponentially increasing in India.

### Statistical analysis:

The demographic distribution of the participants was analyzed by SPSS v20.0 software (IBM Corp., Armonk, NY). Participants' responses to questions of each scaled questionnaire were converted into the discrete interval variables and the total score of the participant in each category, namely anxiety and depression, was calculated. This data was tabulated into Microsoft Excel 2019 and checked for normal distribution by applying the Shapiro-Wilk Test.

Mann-Whitney U Test (also called Wilcoxon Rank Sum Test or Mann-Whitney Wilcoxon test) was used to analyze the correlation of anxiety and depression with marital status, members of a family, hills v/s plains.

Lastly, the Mann-Whitney U test was used to understand the difference in the extent of anxiety and depression in participants who thought they were well-informed or given enough time to prepare for the lockdown, v/s those who didn't feel the same and for the participants who were constantly worried if someone from their family showed symptoms of COVID-19, v/s those who were not. The difference between groups was considered significant if the absolute value of  $Z > 1.96$ , equivalent to  $P < .05$ .

The Kruskal-Wallis H test (also called the "one-way ANOVA on ranks") is a rank-based nonparametric test that can be used to determine statistically significant differences between two or more groups of the independent variable, it was used for the correlation of anxiety and depression with various age groups (ie adolescents, young adults, middle-aged, older), occupation (student, businessmen, govt. employee, private employee, others), qualification (Undergraduate, graduate, post-graduate).

Lastly, the Kruskal-Wallis H test was used to understand the difference in the extent of anxiety and depression in participants regarding the source of information about the lockdown and corresponding events (television, internet, social media, friends and family members, newspaper), and it was also used to determine how difficult lockdown made it for them to do their regular work, take care of things at home or to get along with other people (not difficult at all/ somewhat difficult/ very difficult/ extremely difficult). The difference between groups was considered significant if the absolute value of  $Z > 1.96$ , equivalent to  $P < .05$ .

## RESULTS

The study involved 252 participants (Table 1), the majority of whom, 165 (65.45%), were males with a mean GAD-7 score of 5.13, whereas the number of females was 87 (34.55%) with a mean GAD-7 score of 6.9. Results showed that females had a mean PHQ-9 of 7.97, whereas males had a mean PHQ-9 of 6.38. Most of the participants, that is 147 (58.33 %), were young adults and hence the commonest age group involved was of young adults (18 to 26 years)(Fig 1). The mean GAD-7 and PHQ-9 scores in this age group were 5.66 and 7.4. In our study, there were 30 adolescents, 64 middle-aged and 11 older-aged participants, accounting for 11.90%, 25.39% and 4.36% of the total participants with GAD-7 and PHQ-9 scores of 5.43, 6.30, 4.36 and 8.10, 5.86, 3.64, respectively. Out of all the age groups, adolescents had the maximum mean PHQ-9 score and old people seemed to be the least depressed. Out of the 252 participants, 145 (57.53%) were unmarried and 107(42.47%) were married (Fig. 2). The mean GAD-7 score for unmarried participants was 5.48 and that for married participants was 6.09. Both groups had mild grade anxiety. Unmarried people had a mean PHQ-9 score of 7.65, which was higher than that of married people with a mean PHQ-9 score of 5.95.

In the study, 122 (48.41%) participants were students with a mean GAD-7 score of 5.62 and PHQ-9 score of 8.16, whereas 26 (10.31%) participants were businessmen a mean GAD-7 score of 6.12 and PHQ-9 score of 7.08 (Fig. 3). The number of government employees was 48 (19.04%) with a mean GAD-7 score of 4.54 and a mean PHQ-9 score of 4.44. The number of private sector employees was 44(17.46%) with a mean GAD-7 score of 6.77 and a mean PHQ-9 score of 6.93. The remaining 22 (8.73%) participants belonged to other professions and had a mean GAD-7 score of 6.45 and a mean PHQ-9 score of 5.93. Out of all the occupations, private sector employees reported the highest level of anxiety, whereas students had the highest level of depression.

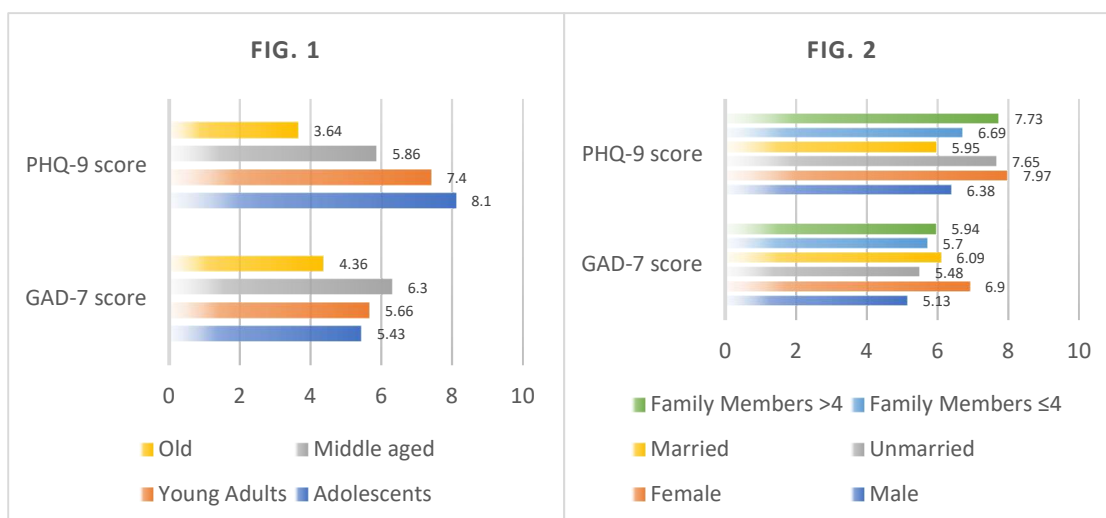
Out of 252 participants, 187 (74.20%) people lived in a nuclear family (family with fewer than equal to 4 members). They had a mean GAD-7 score of 5.70 and a mean PHQ-9 score of 6.69. The remaining 65 (25.79%) participants had more than 4 members in their family and they had a mean GAD-7 score of 5.94 and a PHQ-9 score of 7.73. Lastly, there were participants from the hills and plains. There were 75 (29.76%) participants who resided in hilly areas and they had a mean GAD-7 score of 5.09 and a mean PHQ-9 score of 6.83, whereas the major portion of the study population, 177 (70.23%), was from the plain areas and they had a mean GAD-7 score of 6.01 and a mean PHQ-9 score of 6.97. People living in plain areas had higher levels of anxiety and depression than those in hilly areas (Fig. 4).

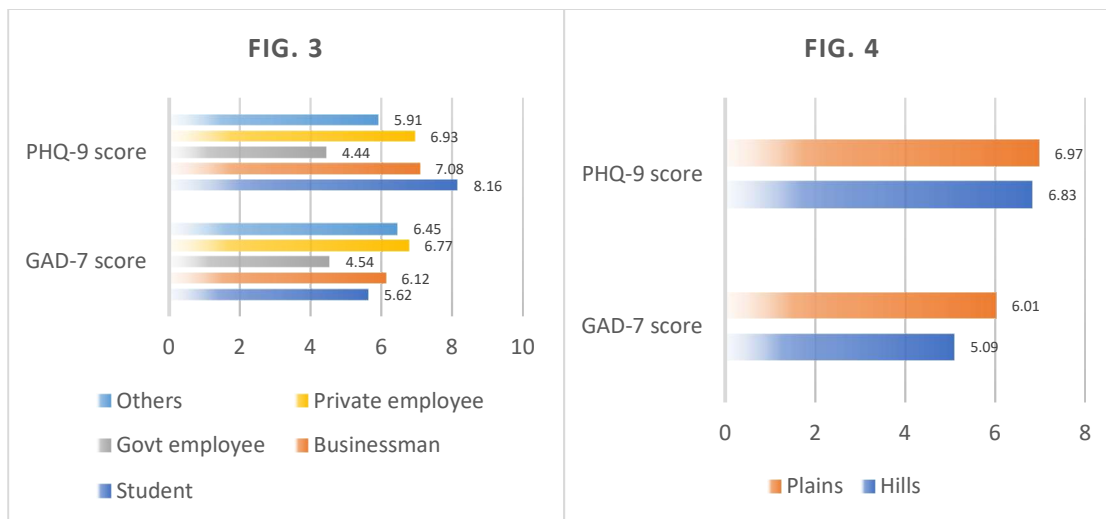
In addition, a voluntary question was asked to evaluate anxiety and depression, furthermore. Of all the participants, 109 (43.3%) did not find it difficult at all to cope with work or personal life, even during lockdown. The mean GAD-7 score for these participants came out to be 3.24, and the mean PHQ-9 score turned out to be 3.80. While 110 (43.7%) people found it somewhat difficult, with a mean GAD-7 score of 6.48 and a mean PHQ-9 score of 7.44. 24 (9.5%) participants found it very difficult, with a mean GAD-7 score of 11.83 and a PHQ-9 score of 15.58. 9 (3.6%) individuals found it extremely difficult to take care of things at home or get along with people, for whom the mean GAD-7 and PHQ-9 scores came out to be 10.67 and 15.56, respectively.

Table 1

<i>Anxiety : GAD-7 Score</i>							<i>Depression : PHQ -9 Score</i>				
	N	Me an	Level	SD	Z	p value	Mea n	Level	SD	Z	p value
<b>Gender</b>											
Male	165	5.13	Mild	4.78 8	- 3.58 3	0.000	6.38	Mild	5.838	- 2.042	0.041
Female	87	6.90	Mild	4.33 5			7.97	Mild	6.347		
<b>Marital status</b>											
Unmarried	145	5.48	Mild	4.34 0	- 0.59 3	0.553	7.65	Mild	5.842	- 2.824	0.005
Married	107	6.09	Mild	5.15 7			5.95	Mild	6.223		
<b>Hills v/s plains</b>											
Hills	75	5.09	Mild	5.07 6	- 2.07 3	0.038	6.83	Mild	6.943	- 1.006	0.315
Plains	177	6.01	Mild	4.52 5			6.97	Mild	5.655		
<b>Members in family</b>											
<=4	187	5.70	Mild	4.62 2	- 0.22 9	0.819	6.69	Mild	5.926	- 1.145	0.252
>4	65	5.94	Mild	4.95 3			7.73	Mild	6.380		
<b>Age group</b>											
Adolescents	30	5.43	Mild	3.62 6	3	0.617	8.10	Mild	6.536	3	0.029
Young adults	147	5.66	Mild	4.61 3			7.40	Mild	5.930		
Middle aged	64	6.30	Mild	5.28 8			5.86	Mild	6.192		
Older	11	4.36	Mild	5.10 4			3.64	Mild	3.776		
<b>Occupation</b>											

Student	122	5.62	Mild	4.35 6	4	0.536	8.16	Mild	6.143	4	0.007
Businessman	26	6.12	Mild	5.96 2			7.08	Mild	6.374		
Govt employee	48	4.54	Mild	3.19 5			4.44	Mild	3.941		
Private employee	44	6.77	Mild	5.70 5			6.93	Mild	6.414		
Others	22	6.45	Mild	5.10 6			5.91	Mild	6.907		
<b>Voluntarily asked question</b>											
<i>How difficult had lockdown made it to do your work/ take care of things at home or get along with people?</i>	<b>N</b>	<b>Me an</b>	<b>Level</b>	<b>SD</b>	<b>Df</b>	<b>p value</b>	<b>Mea n</b>	<b>Level</b>	<b>SD</b>	<b>Df</b>	<b>p value</b>
Not difficult at all	109	3.24	-	3.41 3	3	0.000	3.80	-	4.161	3	0.000
Somewhat difficult	110	6.48	Mild	3.77 0			7.44	Mild	4.796		
Very difficult	24	11.8 3	Moderate	5.71 5			15.58	Moderate/severe	6.283		
Extremely difficult	9	10.6 7	Moderate	4.24 3			15.56	Moderate/severe	6.598		





## DISCUSSION

Almost all countries adopted lockdown as a potentially effective strategy to fight against the COVID-19 pandemic. India was no exception, and in the shortest framework of time, i.e., within two weeks of the declaration of the pandemic by the WHO, a near-total lockdown was imposed by India on March 25th, 2020. This strategy effectively tackled its rapid spread, at least immediately. However, there was a huge impact on the social structure, economy, and mental well-being of the public. In this backdrop, the current study was planned to evaluate the public anxiety and depression levels, particularly among the rural areas of northern India, due to lockdowns during the COVID-19 outbreak. The results of this study show a high incidence of depression among the young adults in the age group 19-24, and the depression score is highest for the adolescent age group of 10-19. This could possibly be because of confinement to homes, as the educational institutes and recreational facilities were largely shut for in-person attendance. Free movement and interaction with friends and classmates did not happen.

The results of our study are consistent with a systematic review of COVID-19 leaving an impact on the mental health of adolescents held in 2021<sup>13,14</sup>. The study found that females were at a higher risk of developing mental health issues like anxiety and depression. The mean score of depression for the females was 7.97, compared to 6.38 for male participants, and the mean anxiety score for female participants was 6.90, compared to 5.13 for male participants. This suggests that females are at greater risk of developing anxiety and depression symptoms. Females are also predisposed to mental health issues. Studies have found that there is a relationship between health anxiety and metacognitive beliefs about the uncontrollability of worry, which means that if an individual thinks that worry is uncontrollable, s/he are affected by health and social anxiety more considerably. Girls have meta worries than boys because metacognitive beliefs about the uncontrollability of worry are more prevalent in girls<sup>15,16</sup>. There are pieces of evidence for pervasive sex differences in pathological conditions, including anxiety and depressive disorders, where females are more than twice as likely to be afflicted. Gonadal hormones are found to be a major factor in this disparity, given that women are more likely to experience mood disturbances during times of hormonal flux, and testosterone may have protective benefits against mental health conditions like anxiety and depression<sup>17</sup>.

Furthermore, females were taking care of family members, including the working members and school-going children, who otherwise would attend normal offices and schools, but are now confined to home due to travel prohibitions. This puts additional stress on the females who are otherwise vulnerable to mental health problems. Our study is in accordance with studies from Italy and China<sup>18,19</sup>, which suggested younger people and females are at greater risk of developing mental health issues. While considering the occupation, the depression score was highest for the students. The closure of educational institutes and the switch over to online mode meant only a limited interaction among students. Also, limited access to gadgets and the lack of familiarity with the online mode of teaching put additional stress on the students, with a sizeable proportion unable to afford smart gadgets for online learning. The only mode of interaction was through mobile phones, on which parents frequently impose restrictions, especially in a relatively conservative rural society. A similar study conducted in Taiwan and China in 2020 found increased incidence of depression among students<sup>20,21</sup>. Followed by students were businessmen, whereas the government and private

employees reported low prevalence of anxiety and depression. The lockdowns had a massive economic fallout, and some sectors, like logistics were badly affected, especially small businesses. Thus, it is quite expected that businessmen would have a higher incidence of anxiety and depression. Employees, particularly those working in the government sector, had more stable income, and this possibly accounts for the lesser risk of anxiety and depression in them. This study suggests that during the pandemic and subsequently imposed lockdowns, the population in the working-age group, particularly those who are involved in some business or people who are exposed to stress-related lifestyles, which includes students & young adults facing the pressures related to career development, are more likely to have mental health problems.

A global study conducted in the year 2020 to assess the impact of COVID-19 on mental health among the general population across 18 countries showed a high prevalence of mental health issues among females, young adults, students and people with low family support<sup>22,23,24</sup>. Due to the COVID-19 pandemic and subsequent lockdowns, there was a disruption of daily routines that had a great impact on mental health<sup>25</sup>. In this study, it was found that unmarried participants reported a high incidence of depression because they did not have a spouse to talk to and share his/ her feelings. Rapp and Stauder (2020) found similar results in their study<sup>26,27</sup>. Whereas when considering the role of the number of members in the family, it was seen that the anxiety and depression scores were similar in the groups with  $\geq 4$  members in the family and those with  $< 4$  members in the family. This could be due to varying family structures in terms of age of family members, marital status of the members and possibly other more important factors like occupation, financial condition, etc.

Our study also revealed that people living in hilly areas had a low mean score of anxiety (5.09) and depression (6.83) when compared to the people living in plains, with a mean score of anxiety being 6.01 and depression being 6.97. The probable reason for such an observation could be the presence of congenial climatic conditions for better health and state of mind, and a closely knit local population in high altitude areas. Similar observation was made in a study done in Germany by Isolde Daig, Andreas Hinz et. al<sup>28</sup>.

Some of the strengths of this study were that it included well-validated scales, which are commonly used for community surveys, such as GAD-7 and PHQ-9<sup>29,30,31</sup>. Apart from the actual survey format, there was a self-designed questionnaire that evaluated the anxiety of people when they could not get along with friends or take care of things at home due to the lockdown. Further, this study deals with the evaluation of the levels of anxiety and depression specifically among the rural population of a mountainous region in India, which no other study has yet evaluated. Since all the communication was done through mobile phones, the study had limitations in reaching a wider segment of the public. The methodology adopted could be exercised through a limited number of people possessing mobile phones, which covers a relatively smaller portion of the rural population.

## CONCLUSION

This study reveals the impact of the pandemic and the mitigation strategies, particularly the lockdowns imposed to counter the spread of the disease, on the mental health of the rural population in a unique setting where comparisons could be made on the basis of altitude as well. Young people, females, unmarried individuals, students and businessmen were more likely to have anxiety and depression due to the lockdowns. There is an urgent need to institute policy changes to cater to mental health challenges in the rural setup as well particularly in the backdrop of the pandemic and the subsequent mitigation strategies. This could help to prepare better for possible future pandemics.

### Figure legends:

Fig 1 : Variation of PHQ-9 and GAD-7 scores with respect to age

Fig 2 : Variation of PHQ-9 and GAD-7 scores with respect to gender, marital status and family composition

Fig 3 : Variation of PHQ-9 and GAD-7 scores with respect to occupation

Fig 4 : Variation of PHQ-9 and GAD-7 scores with respect to topography

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