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4 **Depression, Anxiety and Depression-anxiety comorbidity amid COVID-19 Pandemic: An**
5 **online survey conducted during lockdown in Nepal**

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8 Anil Sigdel^{1¶*}, Anu Bista^{2&}, Navaraj Bhattarai^{3&}, Bimal Chandra Pun^{4&}, Govind Giri^{5&}, Hannah
9 Marqusee^{6&}, Subash Thapa^{7&}

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11

12 ¹Department of Public Health, Chitwan Medical College, Bharatpur, Chitwan, Nepal

13 ²Youth and Comprehensive Sexuality Education, Family Planning Association of Nepal, Lalitpur,
14 Nepal

15 ³Department of Public Health, Little Buddha College of Health Sciences, Kathmandu, Nepal

16 ⁴Program Implementation Department, Nick Simon Institute Nepal, Lalitpur, Nepal

17 ⁵Department of Public Health, Nobel College, Kathmandu, Nepal

18 ⁶Independent Consultant, Washington DC, United States

19 ⁷Research Unit of General Practice, University of Southern Denmark, Odense, Denmark

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21

22 *Corresponding Author

23 Email: sigdel.aanil@gmail.com

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26 ¶These authors contributed equally to this work.

27 &These authors also contributed equally to this work.

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29 **Abstract**

30 **Background:**

31 Little is known about the effect of the COVID-19 pandemic on mental health status during the
32 lockdown period. Therefore, this study was conducted to assess prevalence of depression, anxiety
33 and depression-anxiety comorbidity, and associated factors during the COVID-19 lockdown in
34 Nepal.

35 **Methods**

36 A quantitative cross-sectional study was conducted among the general population of Nepal. Data
37 was collected from April 9 to April 16, 2020 using an e-questionnaire which was shared through
38 different popular social media. A total of 349 participants were included. Self-reported depression
39 and anxiety were assessed using the Patient Health Questionnaire and Generalized Anxiety tools
40 respectively. Logistic regression analysis was conducted to identify the factors associated with
41 depression, anxiety and depression and anxiety co-morbidity.

42 **Results**

43 The prevalence rates of depression, anxiety and depression-anxiety co-morbidity were found to be
44 34.0%, 31.0% and 23.2% respectively. The multi-variate analysis showed that females, those
45 living alone, health professionals and those who spent more time in accessing information about
46 COVID-19 were significantly more likely to have depression, anxiety and depression-anxiety co-
47 morbidity.

48 **Conclusions**

49 High rates of depression and anxiety and co-morbidity were found to be prevailing among the
50 general population during the COVID-19 pandemic lockdown in Nepal. The results suggest that
51 only the scientific, but contextually appropriate messages about the disease should be disseminated
52 to reduce unnecessary fears and anxiety. Awareness interventions to promote mental wellbeing
53 need to be integrated into the response interventions. Community mental health care should be
54 made accessible to at-risk groups.

55 **Introduction**

56 A novel coronavirus, SARS-CoV-2, which was first noted in the Wuhan city of China on
57 December 2019, is rapidly spreading globally (1). The World Health Organization (WHO) has
58 declared this disease as a Public Health Emergency of International Concern (PHEIC) on 30
59 January 2020, which is the sixth time WHO has declared a PHEIC after the International Health
60 Regulations (IHR) that came into effect in 2005. Thereafter has been a rapid increase not only in
61 infections and deaths, but also anxieties, stigma, mistrust, and rumor-mongering among the public
62 (2). WHO has reported a total of 2,436,743 confirmed cases and 165,310 deaths across 206
63 countries/territories by April 22, 2020 (3). The COVID-19 pandemic is on its way to cause
64 historically significant global change (4), as it continues to rise. The World is on high alert; borders
65 are closed and strict measures are being taken to control the spread of COVID-19 (5). At the same
66 time, many countries affected by COVID-19 have implemented temporary lockdowns restricting
67 people's unnecessary movement outside the home and ensuring that people stay safe at home.
68 Multiple biological and behavioral pathways are likely contributing to the linkages between mental
69 health conditions and viral diseases, such as COVID 19 (6). Individuals or communities experience

70 a mental instability along with social and economic losses which might precipitate as mental stress,
71 anxiety and depression (7). It is reported that nearly all people affected by or during such global
72 emergencies will experience some level of psychological distress, which for most will improve
73 over time. The prevalence of common mental disorders are expected to be more than double (8).
74 For instance, the estimated prevalence of mental disorders among the conflict-affected population
75 according to WHO is 13% for mild forms of depression, anxiety, and post-traumatic stress disorder
76 and 4% for moderate forms of these disorders. Depression and anxiety are found to increase with
77 age and are more common in women than in men in a conflict-affected setting (8). The burden of
78 mental problems would be even higher due to the fact that healthcare, and particularly the mental
79 health care system, is severely affected due to COVID-19.

80 Several scholars have provided varied propositions why emergency situations, such as pandemics
81 are associated with the rise of mental and emotional problems. As suggested by Nilamadhav Kar,
82 based on a study conducted after a terrorist initiated bomb blast incident in India in 1996, people
83 go through different negative mental and emotional states, including helplessness, severe stress,
84 severe mood swings and forgetfulness, emotional instability, anxiety, stress reactions, and trauma
85 (9). On the contrary, Wachinger observed such mental changes, during an emergency situation,
86 domain as a protective factor (a coping mechanism) (10) and stated that such changes included
87 willingness to control the emotional extremes, self-regulation of one's emotions, inculcating hope
88 and courage, positive attitude and acceptance of the situation, concern about oneself and family
89 members and ability of the individual to prepare oneself, which could in turn solidify the emotional
90 instability (7). Among the variety of mental and emotional changes that occur during such
91 situations, some of them more strongly improve the general wellbeing of individuals, but anxiety

92 and depression are among the most common problems (global prevalence is estimated to be
93 between 3.6% to 4.4%) (11).

94 Anxiety and depression as medical problems include generalized and acute anxiety, post-traumatic
95 stress disorder (PTSD), phobias, panic disorder, major depressive disorder, bipolar illness, and
96 other mood disorders. (11) There are known effective treatments for such mental disorders, but
97 unfortunately between 76% to 85% of people from low and middle-income countries receive no
98 treatment for their mental illness (12). A study done among physicians in China (the most affected
99 country by COVID19 in early days) has shown that an estimated 25.67% of physicians had anxiety
100 symptoms, 28.13% had depressive symptoms, and 19.01% had both anxiety and depressive
101 symptoms. Poor self-reported physical health, frequent workplace violence, lengthy working hours
102 (more than 60 hours a week), frequent night shifts (twice or more per week), and lack of regular
103 physical exercise were found to be associated with anxiety and depression symptoms among
104 physicians (13). There are various other factors, for instance the displacement of the family, death
105 of a loved one, socio-economic loss, environmental loss, lack of mental preparedness for disaster,
106 lack of social support and negative coping skills, that might lead to the psychological
107 vulnerabilities of those affected (9). Several studies have evaluated the psychological status of
108 people during pre and post emergency, however there are limited studies that assess the mental
109 suffering of people during the course of epidemics. As such, there is an unmet need for greater
110 understanding of the management of anxiety and depression in any epidemic or pandemic situation
111 (14). In any pandemic, the most vulnerable communities are in developing-world cities where
112 there are huge numbers of people, with poor health systems and where millions lack access to
113 services (14).

114 According to Health Emergency Operation Center (HEOC), the first case in Nepal was reported
115 on January 13, 2020 and to date the situation is in control with only 45 reported cases (7 recovered,
116 38 in isolation) (15). With the second case, Nepal announced a complete lockdown from 24 March
117 2020 as a measure to control community transmission of COVID-19. The vulnerability of Nepal
118 increases with its open border with India (with 20,178 reported cases and 645 deaths) and China
119 (being the epicenter for the COVID-19 with 82,788 cases and 4,632 deaths) as of April 22, 2020
120 (3). On one hand, the development of social media and social networking has made it easier to
121 share the severity and extent of the damages while on the other hand it has increased the higher
122 levels of indirect exposure, leading to increased risk for stress, anxiety, and depression from
123 indirect trauma (16). The bombarding of breaking news from the media is also creating havoc on
124 people's mental status. Although the priority is to stop the transmission, provide care to those
125 infected, and to seek a treatment and vaccine for long-term management, management of mental
126 health problems has not received any attention and therefore, there is a need to investigate and
127 explain the increased burden of mental health problems and the factors associated with it. The
128 present study is aimed at generating evidence on the prevalence of anxiety and depression among
129 the general population and the factors associated with anxiety and depression during the COVID-
130 19 pandemic lockdown in Nepal.

131 **Materials and Methods**

132 **Study Design and Study Population**

133 This was a cross-sectional survey study to assess the prevalence and factors associated with
134 depression, anxiety and depression-anxiety comorbidity among the general population of Nepal.

135 The participants of this study were a sample of the general population with access to internet; who
136 were aged 18 years old and above, and who were able to provide written consent.

137 **Sampling and recruitment**

138 As the Government of Nepal recommended the public to minimize face-to-face interactions and
139 isolate themselves at home, snowball sampling method was used to enroll the participants for the
140 survey. Advertisements for the survey were shown to the general people on popular social
141 platforms: Ministry of Health and Population (MoHP) Facebook page, Nepal Public Health
142 Association (NEPHA) Facebook page, Pokhara University Facebook page and Purbanchal
143 University Facebook page. A total of 355 participants participated in the study, where only 350
144 (98.6%) provided consent for the study, and one participant was younger than 18 years and thus
145 was excluded from the study. Hence, the total sample included in the study was 349.

146 **Questionnaire and Measurement**

147 A self-administrated structured questionnaire was developed. The questionnaire was grouped into
148 four sections: (a) socio-demographic section; (b) exposure to media; (c) Anxiety and (d)
149 Depression. The questions related to socio-demography and media exposure were adopted from
150 the Nepal Health and Demographic Survey (NDHS) 2016 (17). Generalized Anxiety Assessment
151 (GAD-7), a self-administered questionnaire having sensitivity of 89% and specificity of 82%,
152 developed by Robert L. Spitzer et al., was used as a tool to measure the anxiety among participants
153 (17). Likewise, the Patient Health Questionnaire (PHQ-9) is a self-administrated questionnaire
154 developed by Drs. Robert L. Spitzer et al. which was used to measure the depression among
155 participants (18). The PHQ-9 tool has a sensitivity of 88% and specificity of 88% for major
156 depression (18).

157 *Outcome variables:* The outcome variables are outlined in **Table I**. Anxiety and depression were
158 the outcome variables for this study. Anxiety was ascertained using the GAD-7 tool. GAD-7
159 consists of a 7 items questionnaire that asked participants how often, during the last 2 weeks, they
160 were bothered by each symptom. Response options were “not at all,” “several days,” “more than
161 half the days,” and “nearly every day,” scored as 0, 1, 2, and 3 respectively (17). The sum of all
162 the items of GAD-7 were used to measure the level of anxiety. A score of up to 5 was considered
163 mild; 6-10 was considered moderate; 11-15 was considered moderately severe anxiety and 15-21
164 was considered severe anxiety. The score was dichotomized for logistic regression as the sum of
165 GAD-7 less than 10 was considered normal and a GAD-7 score greater than or equal to 10 were
166 considered as participants with anxiety.

167 To ascertain depression among the participants, the PHQ-9 questionnaire was used. The PHQ-9
168 consists of nine questions that asked participants how often, during the last 2 weeks, they were
169 bothered by each symptom. Response options were “not at all,” “several days,” “more than half
170 the days,” and “nearly every day,” scored as 0, 1, 2, and 3 respectively. The sum of the scores of
171 all nine items of the PHQ-9 were used to determine the level of depression. A score of up to 5 was
172 considered mild; 6-10 was considered moderate; 11-15 was considered as moderately severe
173 depression and 16 and above were considered as severe depression (19). However, for logistic
174 regression, the score was dichotomized as participants with depression (the PHQ-9 score of more
175 than 10) and normal (the PHQ-9 score of 10 and less).

176 *Independent variables:* Independent variables such as socio-demographic factors (sex, age, place
177 of current residence, caste/ethnicity, educational level, religion, marital status, major occupation,
178 accompanying status and household ownership), and Media Exposure (most used mass media to

179 get information on COVID-19 and average time spent on mass media in a day) were collected
 180 from the participants.

181 **Table 1. Outcome and independent variables of the study**

SN	Variables	Categories of Variables
Outcome Variables		
1	Anxiety among general population	Normal (score of 10 or less) and Anxiety (score of more than 10) based on Generalized Anxiety Assessment. (GAD-7)
2	Depression among general population	Normal (score of 10 or less) and Depression (score of more than 10) based on Patient Health Questionnaire (PHQ-9)
3	Comorbidity of depression and anxiety	Yes (participants with both depression and anxiety); No
Independent Variables		
Socio-demographic Variables		
1	Sex of Participants	Male; Female
2	Age of Participants	Less than 20 years; 20-29 years; 30-39 years; and 40 years and above
3	Place of current residence	Urban (Metropolitan/sub-metropolitan); Semi-Urban (Municipalities) and Rural (Rural Municipalities)
4	Ethnicity	Brahmin/Chhetri; Janajati/Adabasi and Others. Adopted from Health Management Information System (HMIS) of Government of Nepal
5	Educational level	Primary level (Up to grade 5); Secondary level (grade 6-10); Higher Secondary level (grade 11-12) and Graduate and above
6	Religion	Hindu; Buddhist; Muslim; Kirat; Christian; Others. Adopted from NDHS 2016
7	Marital Status	Not in married/not in union; Married; Divorced/separated; Widow/Widower. Adopted from NHDS 2016

8	Major Occupations	Job Holders (Formally employed); Students; Businessperson; Labor/Daily Wages; Agriculture; Others
9	Household ownership	Own house; Rented House
10	Currently accompanying status	Alone; Family
11	Health Professional	Yes; No
Media Exposure		
1	Most used mass media to get information on COVID 19	Television; Radio; Social Media; Online Newspaper; Print Newspaper; Friends; Others
2	Average hours spent on mass media on a day	Time in hours.

182

183 **Data collection**

184 A survey form was developed using a google form and participants for the survey were
185 electronically invited through personal email and Facebook messenger. Data collection for the
186 survey was conducted within the first week of the lockdown in Nepal, i.e. from April 9, 2020 to
187 April 16, 2020. The survey form was set up in such a way that one participant can only submit one
188 form with one google account.

189 **Ethical Considerations**

190 Ethical approval was obtained from Nepal Health Research Council (NHRC), Kathmandu. The
191 objectives, risks, benefits and use of study was shared with each participant in written form prior
192 to administration of the questionnaire. The system was set up in such a way that participants could
193 only answer the questionnaire once consent was provided. Written informed consent was obtained
194 from participants prior to administration of questions. No personal identifiers were collected
195 during the interview and no personal identifiers were disclosed anywhere in the study.

196 **Data Analysis**

197 Data were analyzed using Statistical Software Social Sciences (SPSS) version 20 for windows.
198 Descriptive statistics were calculated for socio-demographic variables, media exposure, anxiety
199 and depression. A chi-square test was applied to test the statistical significance among outcome
200 and independent variables. Binary logistic regression analysis was carried out to identify factors
201 associated with anxiety and depression. All the variables with a p-value of 0.20 in bivariate
202 analysis were entered in a multivariate analysis model. Forward stepwise logistic model was used
203 with a p value of 0.20 for entry and 0.10 for exit. Hosmer and Lemeshow goodness of fit was used
204 to test the fitness of model and Variance Inflation Factors (VIF) was used to measure the multi-
205 collinearity among independent variables. All the predictor variables have VIF less than 2.

206 **Results**

207 More than half (54.2%) of participants were male and the mean age of participants was 27.8 years.
208 Nearly two-third of the participants (62.5%) belong to Brahmin or Chettri ethnic group followed
209 by Janajati/Adhibasi (26.5%). A majority of the participants (91.1%) had completed Bachelor level
210 and were Hindu by religion (90.5%) Nearly two-thirds (62,2%) were single. A majority were job
211 holders (57%), reside in urban areas (65%), were living with family (72.5%), living in their own
212 house (58.2%) and were health professionals (60%) as summarized in **Table 2**.

213 **Table 2. Socio-demographic characteristics of the study participants**

Background Characteristics	Depression		Anxiety		Co-morbidity		Total n (%)
	No n (%)	Yes n (%)	No n (%)	Yes n (%)	No n (%)	Yes n (%)	
Sex							

Male	140 (60.9)	49 (41.2)	157 (65.4)	32 (29.4)	167 (62.3)	22 (27.2)	189 (54.2)
Female	90 (39.1)	70 (58.8)	83 (34.6)	77 (70.6)	101 (37.7)	59 (72.8)	160 (45.8)
Age in completed years							
Less than 20 years	3 (1.3)	3 (2.5)	5 (2.1)	1 (0.9)	5 (1.9)	1 (1.2)	6 (1.7)
20-29 Years	148 (64.3)	83 (69.7)	154 (64.2)	77 (70.6)	169 (63.1)	62 (76.5)	231 (66.2)
30-39 Years	64 (27.8)	30 (25.2)	67 (27.9)	27 (24.8)	79 (29.5)	15 (18.5)	94 (26.9)
40 Years and above	15 (6.5)	3 (2.5)	14 (5.8)	4 (3.7)	15 (5.6)	3 (3.7)	18 (5.2)
Mean (S.D)	27.8 (6.6)						
Ethnicity							
Brahmin/Chhetri	146 (63.5)	72 (60.5)	152 (63.3)	66 (60.6)	168 (62.7)	50 (61.7)	218 (62.5)
Janajati/Adhibasi	59 (25.7)	32 (26.9)	62 (25.8)	29 (26.6)	70 (26.1)	21 (25.9)	91 (26.1)
Others	25 (10.9)	15 (12.6)	26 (10.8)	14 (12.8)	30 (11.2)	10 (12.3)	40 (11.5)
Educational status							
Below Graduate	17 (7.4)	14 (11.8)	23 (9.6)	8 (7.3)	23 (8.6)	8 (9.9)	31 (8.9)
Graduate and Above	213 (92.6)	105 (88.2)	217 (90.4)	101 (92.7)	245 (91.4)	73 (90.1)	318 (91.1)
Religion							
Hindu	213 (92.6)	103 (86.6)	218 (90.8)	98 (89.9)	244 (91.0)	72 (88.9)	316 (90.5)
Others	17 (7.4)	16 (13.4)	22 (9.2)	11 (10.10)	24 (9.0)	9 (11.1)	33 (9.5)
Marital Status							
Single	145 (63.0)	72 (60.5)	150 (62.5)	67 (61.5)	167 (62.3)	50 (61.7)	217 (62.2)
Married	85 (37.0)	47 (39.5)	90 (37.5)	42 (38.5)	101 (37.7)	31 (38.3)	132 (37.8)
Occupation							
Job Holders	129 (56.1)	70 (58.8)	127 (52.9)	72 (66.1)	146 (54.5)	53 (65.4)	199 (57.0)
Students	77 (33.5)	40 (33.6)	87 (36.2)	30 (27.5)	95 (35.4)	22 (27.2)	117 (33.5)
Businessperson	16 (7.0)	5 (4.2)	17 (7.1)	4 (3.7)	18 (6.7)	3 (3.7)	21 (6.0)

Others	8 (3.5)	4 (3.4)	9 (3.8)	3 (2.8)	9 (3.4)	3 (3.7)	12 (3.4)
Place of current residence							
Urban	153 (66.5)	74 (62.2)	153 (63.8)	74 (67.9)	172 (64.2)	55 (67.9)	227 (65.0)
Semi-Urban	59 (25.7)	33 (27.7)	67 (27.9)	25 (22.9)	72 (26.9)	20 (24.7)	92 (26.4)
Rural	18 (7.8)	12 (10.1)	20 (8.3)	10 (9.2)	24 (9.0)	6 (7.4)	30 (8.6)
Current Accompanying Status							
Alone	46 (20.0)	50 (42.0)	48 (20.0)	48 (44.0)	51 (19)	45 (55.6)	96(27.5)
Family	184 (52.7)	69 (58.0)	192 (80.0)	61 (56.0)	217 (81.0)	36 (44.4)	253 (72.5)
Household Ownership							
Rented	88 (38.3)	58 (48.7)	85 (35.4)	61 (56.0)	98 (36.6)	48 (59.3)	146 (41.8)
Own House	142 (61.7)	61 (51.3)	155 (64.5)	48 (44.0)	170 (63.4)	33 (40.7)	203 (58.2)
Health Professional							
Yes	123 (53.3)	87 (73.1)	126 (52.5)	84 (77.1)	142 (53.0)	68 (84.0)	210 (60.2)
No	107 (46.5)	32 (26.9)	114 (47.5)	25 (22.9)	126 (47.0)	13 (16.0)	139 (39.8)

214

215 More than two-thirds (69.3%) used social media for accessing information on COVID-19 followed
 216 by online newspapers (14.6%) and the mean time spent accessing information on COVID-19 was
 217 3.4 hours per day as summarized in **Table 3**.

218 **Table 3. Media Exposure on accessing information on COVID-19**

Background Characteristics	Depression		Anxiety		Co-morbidity		Total n (%)
	No n (%)	Yes n (%)	No n (%)	Yes n (%)	No n (%)	Yes n (%)	
Mostly used Media for accessing information on COVID-19							
Television	31 (13.5)	10 (8.4)	33 (13.8)	8 (7.3)	35 (13.1)	6 (7.4)	41 (11.7)
Social Media	151 (65.7)	91 (76.5)	162 (67.5)	80 (73.4)	182 (67.9)	60 (74.1)	242 (69.3)
Online Newspaper	37 (16.1)	14 (11.8)	35 (14.6)	16 (14.7)	39 (14.6)	12 (14.8)	51 (14.6)

Others	11 (4.8)	4 (3.4)	10 (4.2)	5 (4.6)	12 (4.5)	3 (3.7)	15 (4.3)
Time Spent in Mass media in accessing Information on COVID-19 per day							
0-2 Hours	116 (50.4)	51 (42.9)	129 (53.8)	38 (34.9)	137 (51.1)	30 (37.0)	167 (47.9)
3-4 Hours	60 (26.1)	27 (22.7)	57 (23.8)	30 (27.5)	69 (25.7)	18 (22.2)	87 (24.9)
5-6 Hours	25 (10.9)	19 (16.0)	28 (11.7)	16 (14.7)	30 (11.2)	14 (17.3)	44 (12.6)
7 Hours and Above	29 (12.6)	22 (18.5)	26 (10.8)	25 (22.9)	32 (11.9)	19 (23.5)	51 (14.6)
Mean (SD)	3.4 (3.2)						

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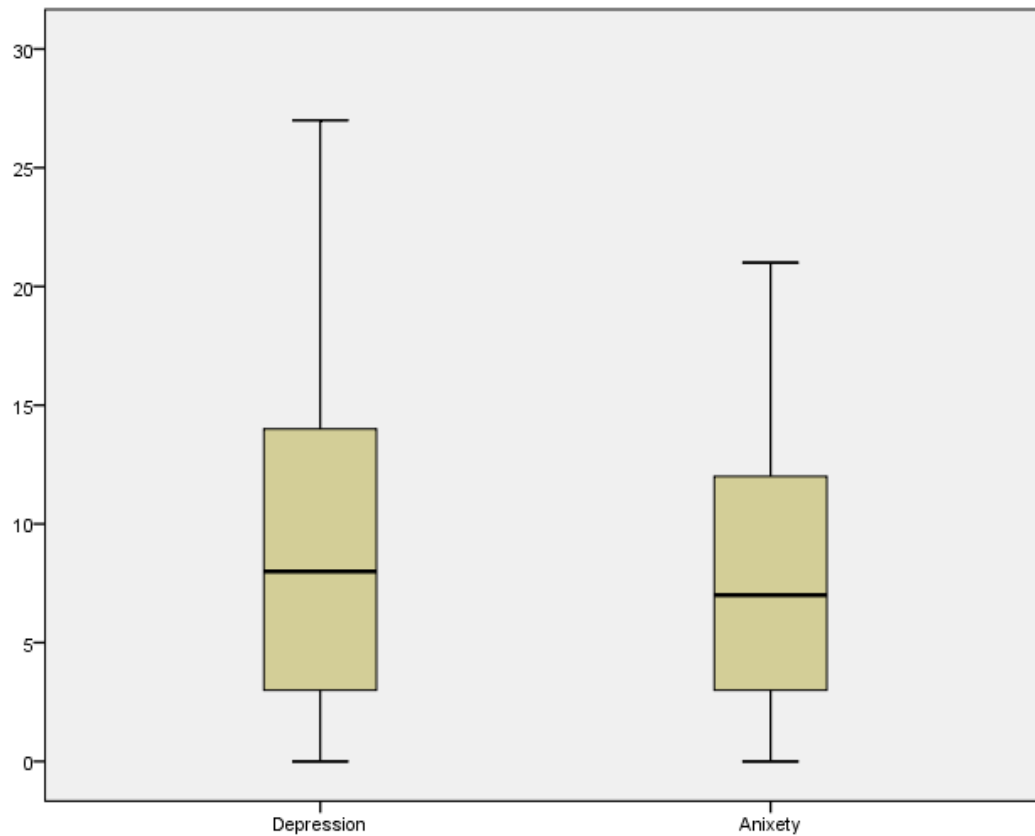
220 The overall prevalence rates of depression, anxiety and depression and anxiety co-morbidity were
 221 found to be 34.1% (95% CI: 28.8-39.5), 31.2% (95% CI: 26.4-36.4) and 23.2% (95% CI: 18.9-
 222 27.5) respectively (see **Table 4**). The prevalence rates of depression, anxiety and depression-
 223 anxiety comorbidity were found to be higher among female participants than male participants (as
 224 see Table 1). **Fig 1 shows** Box and Whisker plot for the mean (depression:0; anxiety: 0), median
 225 (depression: 8, anxiety: 7), quarter 1 (depression: 3, anxiety: 3), quarter 3 (depression: 14, anxiety:
 226 12) and interquartile range (depression: 11, anxiety: 9) of depression, anxiety and depression-
 227 anxiety co-morbidity.**Fig 1**

228 **Table 4. Prevalence of depression, anxiety and co-morbidity of anxiety and depression**

Prevalence of depression	n (%)	95% CI
Normal	230 (65.9)	60.5-71.1
Depression	119 (34.1)	28.9-39.5
Prevalence of anxiety		
Normal	240 (68.8)	63.6-73.6
Anxiety	109 (31.2)	26.4-36.4
Prevalence of depression-anxiety co-morbidity		
Normal	268 (76.8)	72.5-81.1

Co-morbidity	81 (23.2)	18.9-27.5
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231 **Fig 1. Box and Whisker plot**

232 Forward stepwise logistic regression was carried out with depression and co-morbidity of
233 depression and anxiety as outcome variables and five predictor variables with a p value less than
234 0.2. Logistic regression was also carried out with anxiety as an outcome variable and six predictor
235 variables with a p value less than 0.20 in bivariate analysis. The final model is summarized in
236 **Table 5**. Female participants were 2.4 times more likely to be depressed (95% CI: 1.48-3.89); 6.3
237 times more likely to be anxious (95% CI: 3.54-11.18) and 7.4 times more likely to have the co-
238 morbid condition. Those participants who were currently living alone were found to be more
239 depressed (AOR: 3.5; 95% CI: 1.82-6.84), anxious (AOR: 3.3; 95% CI: 1.65-6.74) and have the

240 co-morbid condition (AOR: 8.8, 95% CI: 3.85-20.12) compared to those who were accompanied
 241 by their family. Likewise, health professionals compared to others had 1.7 times, 2 times and 3.4
 242 times higher odds of being depressed (95% CI: 1.04-2.90), anxious (95% CI: 1.16-3.69) and having
 243 co-morbid condition (95% CI: 1.62-6.97) respectively. Also, time spent in mass media in accessing
 244 COVID-19 information was found to be significantly associated with depression (AOR: 1.1, 95%
 245 CI: 1.01-1.16), anxiety (AOR: 1.1, 95% CI: 1.08-1.27) and depression and anxiety co-morbidity
 246 (AOR:1.2, 95% CI: 1.06-1.26). However, place of current residence of participants and household
 247 ownership were not found to be significantly associated with depression, anxiety and depression
 248 and anxiety comorbidity.

249 **Table 5. Factors associated with depression, anxiety and depression-anxiety co-morbidity**

Background Variables	Depression AOR (95% CI)	Anxiety AOR (95% CI)	Co-morbidity AOR (95% CI)
Sex			
Male	1	1	1
Female	2.4 (1.48-3.89)	6.3(3.54-11.18)	7.4 (3.73-14.81)
Currently Accompanying Status			
Family	1	1	1
Alone	3.5 (1.82-6.84)	3.3 (1.65-6.74)	8.8 (3.85-20.12)
Health Professionals			
No	1	1	1
Yes	1.7 (1.04-2.90)	2.0 (1.16-3.69)	3.4 (1.62-6.97)
Household Ownership			
Rented House	1	1	1
Own House	1.4 (0.80-2.72)	0.8 (0.44-1.62)	1.38 (0.64-2.98)

Hours spent in mass media in accessing COVID-19 information	1.1 (1.01-1.16)	1.1 (1.08-1.27)	1.2 (1.06-1.26)
Place of Current Residence			
Rural		1	1
Urban		0.8 (0.31-2.15)	1.5 (0.48-5.02)
Semi-Urban		0.6 (.23-1.88)	1.3 (0.37-4.51)

250 AOR= Adjusted Odds Ratio; CI= Confidence Interval; Reference Category=1

251 **Discussions**

252 Along with socio-economic distress, psychological distress also occurs simultaneously in the
 253 victims of emergency. Depression and anxiety, the most common mental disorders are assumed to
 254 increase as an outcome of negative impact on mental health (9). The lockdown policies in response
 255 to COVID19 have been understood as the world's biggest psychological experiment. For instance,
 256 a study conducted in China after the declaration of COVID-19 emergency situation clearly relates
 257 the theory of Behavioral Immune System (BIS), as most people showed negative emotions (such
 258 as anxiety, depression, and indignation) and less people showed positive emotions (Oxford
 259 happiness) which means more people did produce negative emotions for their self-protection
 260 (20,21). These results are consistent with previous studies as well, which found that public health
 261 emergencies (e.g., SARS) and the circumstances created by such emergencies, such as forced
 262 quarantine and lockdown, may generate a series of stress emotional responses including higher
 263 levels of anxiety and other negative emotions (22,23).

264 A study done in Indonesia shows that the prevalence rates of PTSD, depression, and anxiety were
 265 58.3%, 16.8% and 32.1%, respectively following the earthquake in 2016(24). Another study done

266 in China after the declaration of COVID-19 as a public health emergency of international concern
267 (PHEIC) by WHO shows that 53.8% of respondents classified the psychological impact of the
268 outbreak as moderate or severe; 28.8% of respondents reported moderate to severe anxiety
269 symptoms whereas 16.5% and 8.1% reported moderate to severe depressive symptoms and stress
270 levels respectively(25). These findings are in line with the findings of the present study.

271 A recent study showed that 63.4% of victims with psychiatric disorders had comorbidity after
272 Orissa super-cyclone in India (10) and another study showed that the prevalence of comorbid
273 conditions was 14.3% between PTSD and depression, 24.9% between PTSD and anxiety and
274 13.1% between depression and anxiety in adolescents following earthquake in Indonesia (24). The
275 prevalence of depression and anxiety comorbidity was found to be 23.2% (95% CI: 18.9-27.5) in
276 this study, and this reasonably high rate of comorbidity justifies that the amount of damage to the
277 general population caused by COVID-19 disease pandemic is similar to other emergencies.
278 However, some differences in the prevalence of depression, anxiety and comorbid depression-
279 anxiety might be due to the differences in tools used for assessing depression and anxiety and the
280 study setting and study design.

281 In a previous study, the risk factors of depression and anxiety in survivors of an earthquake were
282 reported to be age, pre and post-disaster traumatic incident, persisting violence, peri-traumatic
283 distress, family and street violence (22). A study conducted among college students in South
284 Korea found that female students (2.98) were more stressed than male students (2.84); also female
285 students (0.66) had higher levels of anxiety compared to male students (0.50). Existing studies
286 rigorously show that there were statistically significant differences in the risk of anxiety by sex,
287 residence type, economic status, and Body Mass Index (BMI) (16). This is in line with the findings

288 of the present study that females, compared to males, were 2.4 times (95% CI: 1.48-3.89) and 6.3
289 (95% CI: 3.54-11.18) more likely to have depression and anxiety.

290 One study found that women, who are often the main caregivers for injured, sick, elderly and
291 family members with long-term disabilities, are worried about the future, and with husbands
292 unemployed, and children out of school, they are mostly worried about feeding and taking care of
293 their families (26). Another study reported that social, cultural and existing gender norms tend to
294 make women relatively more vulnerable than men to mental health problems. Yet, women and
295 girls have less access to or control over assets/resources such as information, education, health and
296 wealth, which is necessary for the response to hazardous events (27). These might explain why
297 women have a higher risk of depression and anxiety than men, and this is exacerbated especially
298 due to the COVID-19 disease pandemic and the circumstances created by the lockdown in Nepal.

299 Accurate and up-to-date health information like treatment, local outbreak situation and
300 precautionary measures (e.g., hand hygiene, wearing a mask) were associated with a lower
301 psychological impact of the outbreak and lower levels of stress, anxiety, and depression ($p < 0.05$)
302 (25). Likewise, another study reported that an individual with longer exposure to disaster-related
303 news showed more symptoms of stress than those with less news exposure (16). This finding
304 resembled the current study where the individuals who have higher exposure to media in accessing
305 COVID-19 information have higher risk of depression, anxiety and comorbidity. Hence, emphasis
306 should be given to provide correct and appropriate information on disaster events rather than
307 describing the ravages caused by events, which could lead to an increase in unnecessary
308 anxieties/fears related to transmission, testing positive, quarantine and stigma associated with
309 COVID-19 disease, (16).

310 A prospective study conducted among a working-age population living alone and who used anti-
311 depressant medications in Finland found that, during the 7-year follow-up, those who lived alone
312 had an 80% higher risk of initiating antidepressant use compared to those who lived with family
313 (28). Similarly, it was found that poor housing conditions were associated with increased use of
314 antidepressants (28). In line with the findings of these studies, the present study also reported that
315 living alone was found to be associated with depression (AOR: 3.5; 95% CI: 1.82-6.84) and anxiety
316 (AOR: 3.3; 95% CI: 1.65-6.74) and the comorbid condition (AOR: 8.8, 95% CI: 3.85-20.12)
317 compared to those who were living with their family during the lockdown period.

318 Likewise, participants with a health professional background had 1.7 times, 2 times and 3.4 times
319 higher odds of having depression (95% CI: 1.04-2.90), anxiety (95% CI: 1.16-3.69) and
320 depression-anxiety comorbidity (95% CI: 1.62-6.97) respectively. This finding resembled a meta-
321 analysis which showed that one in three medical students have anxiety globally- a prevalence rate
322 which is substantially higher than general population(29). This might be because health
323 professionals perceive a higher level of risk associated with the COVID-19 disease, since they
324 have easy access to information compared to the general population. Besides being fully aware of
325 the risks, health professionals are known as the first responders to COVID-19 disease and thus,
326 are more at risk for transmission.

327 **Conclusions**

328 Depression, anxiety and depression and anxiety comorbidity are prevalent among the general
329 population during the COVID-19 pandemic lockdown in Nepal. We identified the specific sub-
330 groups of the general population at higher risk of depression, anxiety and the comorbid condition
331 are females, those living alone during the COVID-19 pandemic lockdown, health professionals

332 and those who spent more time accessing COVID-19 information. Governments should focus on
333 disseminating appropriate knowledge about the disease using appropriate methods, and special
334 interventions to promote the mental well-being need to be immediately implemented, with
335 particular attention paid to high-risk groups. For instance, health workers are known to be at higher
336 level of risk and thus should be prioritized when such interventions are implemented. Moreover,
337 community mental health care should be made accessible to people who are at increased risk.

338 **Study Limitations**

339 This study had several limitations that should be considered when interpreting the data. First, the
340 use of an online survey imposes potential limitations. It is probable that the study findings under-
341 represent the responses of those in certain demographics, e.g. those who are less educated, those
342 less affluent, and elder age populations. Also, the online survey is relatively uncontrolled. The
343 sample was self-selected and therefore there might be a high chance of response bias compared
344 with a sample that had been randomly selected. Finally, this study does not rule out the association
345 among COVID-19 lockdown and outcome variables but only assesses the prevalence and
346 predictors during lockdown in Nepal.

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352 **Author Contributions**

353 Conceptualization: Anil Sigdel, Anu Bista, and Navaraj Bhattarai

354 Formal Analysis: Anil Sigdel and Navaraj Bhattari

355 Investigation: Bimal Chandra Pun, Govind Giri and Anu Bista

356 Methodology: Anil Sigdel, Bimal Chandra Pun, Anu Bista and Subash Thapa

357 Software: Anil Sigdel, Navaraj Bhattarai and Govind Giri

358 Writing- Original Draft Preparation: Anil Sigdel, Anu Bista, Subash Thapa and Hannah Marqusee

359 Writing- Reviewing & Editing: Anil Sigdel, Subash Thapa, Anu Bista and Hannah Marqusee

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445 **Competing Interests**

446 The authors have declared that no competing interest exists.

447 **Supporting Information**

448 **S1 Appendix. Questionnaire for the survey**

449