

Assessing Mental Health Status among COVID-19 Recovery Patients in Bangladesh- A Pilot Study

Nahid Salma¹, Md. Moyazzem Hossain¹, Sabina Yasmin^{1*}, Muhammad Khairul Alam¹,
K.M. Rafiqul Alam¹

¹Department of Statistics,
Jahangirnagar University, Savar, Dhaka-1342, Bangladesh

¹Email author : nahidsalma@juniv.edu

²Email author : hossainmm@juniv.edu

^{3*} Email Corresponding Author : sabina.ju88@gmail.com

⁴Email author : alamstat228@gmail.com

⁵Email author : kmrafiqulalam2007@gmail.com

ABSTRACT

The impact of the COVID-19 pandemic has the potential to have long-lasting profound repercussions on the mental health of surviving patients from COVID-19. The main goal of this study is to assess the mental strength among post-COVID-19 recovery patients. A pilot survey study was conducted with 60 participants who willingly completed the questionnaire consisting of PCL-5, GAD-7, PHQ-9, and relevant questions. Univariate, bivariate analysis, and multivariate logistic regression were conducted to find the significant risk and protective factors associated with the mental health of recovery patients. The result found that 48.33% of the patients had PTSD symptoms, 30% identified to have severe anxiety, and 53.33% of them had gone through severe depression. The severity of illness, hospitalization, ignorance by family members, people staying away from them even after recovery were significant risk factors, and eating nutritious food, wearing masks were significant protective factors for PTSD, anxiety, and depression ($p < 0.05$). This study's findings can guide policymakers as well as family members to take proper initiatives towards COVID-19 recovery patients, such as providing counseling, ensuring rehabilitation, reducing social stigma, which may bring consequential relief from psychological illness.

Keywords: Mental health, PTSD, Anxiety, Depression, COVID-19; Bangladesh

Mathematics Subject Classification: 62P15

Journal of Economic Literature (JEL) Classification Number: I18

1. INTRODUCTION

The coronavirus disease (COVID-19) at first named (2019-nCoV) outbreaks as a cluster of severe pneumonia cases of unrevealed cause among adults in Wuhan, Hubei province, China, in December 2019 (Huang et al., 2020; Zhu et al., 2020). On March 11, 2020, COVID-19 was declared as a global pandemic by the World Health Organization because of the speed at which it has spread globally (Cucinotta and Vanelli 2020). The first confirmed cases of COVID-19 in Bangladesh was identified on

March 8, 2020 by IEDCR (Banik et al. 2020), and to date, January 21, 2022, the total number of confirmed case spiked slowly, and unfortunately, it reached 1,664,616 with a death toll of 28,192. Among infected people, the total number of recovered cases is 1,555,597 (W. INFO, 2022).

COVID-19 affects psychological health and induces a wide variety of emotional depression and mental problems such as stress, depressive symptoms, and anxiety progressively (Brooks et al. 2020). Previous studies show that severe mental health problems affect children, students, bankers healthcare people, and other professional people, too (Yeasmin et al., 2020, Yasmin et al. 2021, Alam et al. 2021, S Yasmin et al. 2021, Muller et al., 2020). Another study shows that 60 percent of physicians, nurses, and medical residents were affected by anxiety, depression, or other mental health-related problems during the COVID-19 pandemic (Que et al. 2020).

People vastly experience mental health problems after recovering from the COVID-19 pandemic. Mental health problems of medical staff have been studied, and the results confirm the significant mental health problems of recovering patients during COVID-19 (Liu et al. 2020). Research has shown that for every five patients of COVID-19, one patient is affected by mental health-related problems (Reuters, 2021). Patients had to deal with social conditions as well as related to financial and health problems. As a result, the patient's regular standard of living becomes distressed, and this long period psychologically affects people with fundamental causes such as greater than before media reporting with an incursion of most recent transmissions (Rubin and Wessely 2020). The landscape of cognitive function and post discharged symptoms of recovered patients were studied by Zhou et al., 2020 and Halpin et al., 2020. Several studies were also conducted for the management or consideration of post-acute rehabilitation for survivors of COVID-19 infection (Greenhalgh et al., 2020, Sheehy, 2020, Simpson & Robinson, 2020). Adverse psychological health consequences of COVID-19, including stress, anxiety, and depression, have been widely predicted but not yet accurately measured, even for surviving patients (Taquet et al. 2020)

However, longitudinal cohort studies of patients with COVID-19 with adequate control groups and follow-up with proper counseling are urgently needed to quantify and alleviate the relative risks of psychological illness after recovery. There are a range of physical health risk factors for COVID-19 patients, but it is unknown if there are also psychiatric risk and protective factors. This circumstance encouraged us to conduct a pilot survey study on post-COVID-19 recovery patients with a view to assessing psychological health status. The study aims to address risk and protective factors against the potential to develop psychiatric disorders (PTSD, anxiety, and depression) among COVID-19 recovery patients.

2. METHODOLOGY

2.1 Sampling procedures and study population

To address the mental health assessment of the people who already recovered from COVID-19, this pilot survey was conducted among the adult people of Bangladesh from October 12, 2021, to December 17, 2021, through an online survey (Google Form). In this current pandemic situation, as well as considering the health condition of the respondents, it is not feasible to conduct a face-to-face survey; that's why the data is collected online with the help of the link of the designed google form. Before participation in this survey, the authors inform them about the purpose of this study and ensure that the information they provide will be kept confidential and oral consent is taken. Respondents who gave consent to participate in this survey were then sent a link to the questionnaire and accompanying instructions to complete it. The link to the online form was shared with participants through social media (Facebook, WhatsApp, and Instagram). The participants have given approval for their data to be used in the research.

2.2 Sample Size

There are several guidelines available to determine the appropriate sample size for a pilot study such that different parameters of interest can be estimated with sufficient precision (e.g., effect size, the standard deviation of the outcome measure, its reliability, or confidence level) (Hertzog, 2008; Johanson & Brooks, 2010; Julious, 2005; Thabane et al., 2010). However, Viechtbauer et al., 2015 described a simple formula to calculate the needed sample size for a pilot study, with a chosen level of confidence and a given probability. Considering, 95% confidence level ($\gamma = 0.95$) with probability ($\pi = 0.05$), the required sample size for this pilot survey has been determined by the following formula,

$$n = \frac{\ln(1-\gamma)}{\ln(1-\pi)}$$

Hence, the required sample size for this study was 59. After excluding the incomplete responses (5), a total of 60 respondents were included in the final analysis.

2.3 Instruments

The questionnaire consists of three sections: (i) the socio-demographic information of the respondents; (ii) post-covid-19 related information; and (iii) assessing mental health status by using several scales.

2.4.1 Socio-demographic related information

Demographic data were self-reported by the respondents, including age, marital status, gender, education status, wealth index, occupation, place of residence, living with whom.

2.4.2 Post covid-19 related information

This part of the questionnaire consists of post-covid-19 related information where most of the questions were answered by two options (Yes/No), including suffering time, the severity of illness, hospitalized, how long stay in the hospital, expenditure on treatment, other family members affected, any member of workplace affected, any member died from covid-19, measures are taken to prevent from disease, transportation use, source of infected, responsible for getting infected, disclose infected news, ignorance by family members, rejected by relatives or community, people fear or stay away from patients.

2.4.3 Mental health assessment

Post-traumatic stress disorder PTSD symptoms were measured by using a 20 item PTSD checklist for DSM-5 (Blevins et al., 2015), 9-item Patient Health Questionnaire (PHQ-9) (Kroenke, Spitzer, and Williams 2001). Generalized Anxiety Disorder (GAD-7) was used to evaluate the anxiety of patients (Budikayanti et al. 2019). The score of each scale is measured by a 4-point scale (0=Not at all, 1= several days, 2= More than half the days, and 3= nearly every day), where total scores are categorized as 5-9=mild, 10-14= moderate, 15+= severe anxiety or depression. Cronbach's Reliability coefficient of PCL-5, GAD-7, and PHQ-9 was respectively 0.971, 0.924, and 0.905.

2.5 Statistical analysis

To analyze the data, a set of statistical tools has been applied. To begin with, descriptive data analysis consisting of frequencies and percentages is performed for social demographic information, post covid-19 related information, and mental health assessment. After that, significant categorical variables were identified by using Fisher's exact test and chi-square test. The level of confidence was set at $p < 0.05$. Thereafter, statistically significant variables were applied in multivariate logistic regression analysis.

Finally, the estimate of the strength of association between predictor variables and post covid-19 related information of patients were measured by using odds ratio (OR) with a 95% confidence interval (CI) for expected OR. Statistical package for social science (IBM SPSS version 26) and MS Excel 2013 was used to carry out all statistical analysis.

3. RESULTS

3.1 Socio-demographic information

Among the respondents who completed the survey, the median age of the respondents was 29 years, 36 (60%) of people recovered from COVID-19 were married, 39 (65%) were male. Most of the respondents, 49(81.67%), were finished their graduation, and 49 (81.67%) of them were financially stable. Almost 32% of respondents were students, and 50 percent of them are performing government jobs. However, most of the respondents were from urban areas 50 (83.33%), among the respondents, 29 (48.33%) of patients were living with their family members [Table 1].

3.2 Post COVID-19 related information

Out of 60 respondents, 29 (48.33%) patients were suffering from COVID-19 for 7-14 days, 40% had suffered more than two weeks. Among patients, 23.33% had suffered mild illness, 36.67% had suffered a severe illness, and 10% of the patients were in extremely severe illness. Exactly 20 percent of participants stayed at the hospital during the time of infection. Among hospitalized patients, 25% of them stayed 7-15 days in the hospital. The median expenditure was 5000. Among 60 respondents, 42 patients' family members were infected by COVID-19, whereas 16.67% of them died. In addition to that, 31 (51.67%) of colleagues were infected due to this virus. However, 58 (98.33%) of people used masks for considering as preventive measures, one-third of them were eaten nutritious food, and 30 (50%) of them used public transportation for their regular workout. Also, 61.67% of patients knew the source of infection, and 38.33% of them thought that it was spread out by going to the office. Among the respondents, 45 (75%) people disclosed the news of getting affected, but 46.67% of participants were feared exposing the news due to fear of being defamed or fear of being ignored by others. Moreover, 14 (23.33%) of patients were ignored by family members, 45% were rejected by their relatives and community, and 30 (50%) of the reported people stayed away from them during the time of recovery or even after recovery [Table 1].

3.3 Distribution of mental health outcomes

About 29 (48.33%) patients were identified with significant symptoms of PTSD for COVID-19. Almost one-third (30%) were identified as having severe anxiety, and more than half (53.3%) of them had severe depression. At the same time, 43.3% had identified mild symptoms of anxiety and 17% for depression. The median score with ranges for PCL-5, GAD-7, and PHQ-9 was 32 [10, 61], 11 [5, 21] and 15 [5, 27], respectively. More inspection found that 32% of patients had both severe anxiety and depression symptoms. Around 37% had significant symptoms of PTSD and severe depression; 30% had significant symptoms of PTSD and severe anxiety [Figure 1].

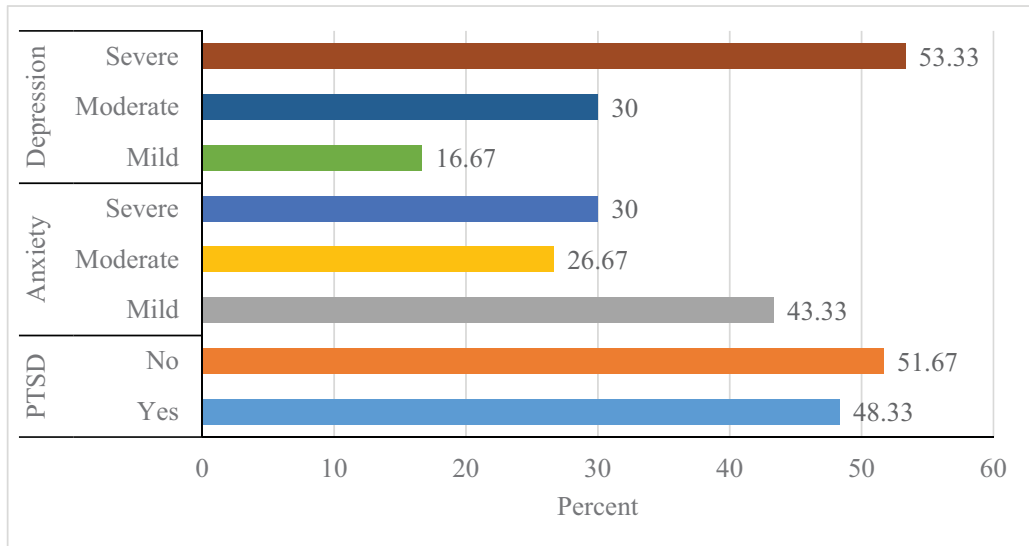


Figure 1: Descriptive analysis of mental health outcomes

3.3 Factors related to mental health outcomes

All the demographic information related to PTSD was given insignificant results. However, most of the information about post-COVID-19 was given significant results. The severity of illness, patients were hospitalized, days of staying at the hospital, wearing a mask, eat nutritious food, a family member died, ignorance by the family members, rejected by relatives and community, and stay away from patients after recovering from diseases were a significant factor ($p < 0.05$) for PTSD due to COVID-19. On the other hand, the severity of illness provided significant results for anxiety. Moreover, eating nutritious food, knowing the source of infection, by using public transportation to get infected, being ignored by family members, being rejected by relatives and community, and staying away from patients after recovering from diseases were significant factors ($p < 0.05$) for anxiety due to COVID-19. In addition to that, the severity of illness, whose family members died, infected, wearing a mask, eat nutritious food, disclose the news of getting infected, fear of being defamed, ignorance by family members, and staying away from patients after recovering from diseases were significant factors ($p < 0.05$) for depression due to COVID-19. However, for preventive factors, patients used hand sanitization, maintaining social distance, using soap provided insignificant ($p > 0.05$) results for PTSD, anxiety, and depression due to COVID-19 [Table 1].

Table 1: Characteristics of COVID-19 Patients, PTSD, Anxiety and Depression outcomes

Characteristics	All (%)	No (%)	Yes (%)	P- value	Mild (%)	Moderate (%)	Severe (%)	P- value	Mild (%)	Moderate (%)	Severe (%)	p-value
Age, median	29											
Marital Status												
Married	36 (60)	16 (51.61)	20 (68.97)	0.13	14 (53.84)	11 (68.75)	11 (57.89)	0.618	3 (30)	11 (61.11)	22 (68.75)	0.09
Unmarried	24 (40)	15 (48.39)	9 (31.03)		12 (46.15)	5 (31.25)	7 (36.84)		7 (70)	7 (38.89)	10 (31.25)	
Gender												
Male	39 (65)	19 (61.29)	20 (68.97)	0.36	15 (57.69)	11 (68.75)	13 (68.42)	0.571	6 (60)	13 (72.22)	20 (62.5)	0.74
Female	21 (35)	12 (38.71)	9 (31.03)		11 (42.31)	5 (31.25)	5 (26.32)		4 (40)	5 (27.78)	12 (37.5)	
Educational status												
Higher secondary	11 (18.33)	6 (19.35)	5 (17.24)	0.55	4 (15.38)	2 (12.5)	5 (26.32)	0.452	1 (10)	3 (16.67)	7 (21.87)	0.69
Graduated and above	49 (81.67)	25 (80.65)	24 (82.76)		22 (84.62)	14 (87.5)	13 (68.42)		9 (90)	15 (83.33)	25 (78.13)	
Wealth index												
Middle class	49 (81.67)	26 (83.87)	23 (79.31)	0.45	23 (88.46)	14 (0.875)	12 (63.16)	0.144	9 (90)	15 (83.33)	25 (78.13)	0.63
Rich	11 (18.33)	5 (16.13)	6 (20.69)		3 (11.54)	2 (12.5)	6 (31.58)		1 (10)	3 (16.67)	7 (21.87)	
Occupation												
Student	19 (31.67)	12 (38.71)	7 (24.14)	0.22	11 (42.31)	2 (12.5)	6 (31.58)	0.189	7 (70)	4 (22.22)	8 (25)	0.09
Housewife	4 (6.67)	2 (6.45)	2 (6.90)		1 (3.84)	1 (6.25)	2 (10.52)		-	-	4 (12.5)	
Service	30 (50)	13 (41.94)	17 (58.62)		10 (38.46)	12 (75)	8 (42.11)		2 (20)	12 (66.67)	16 (50)	
Business	4 (6.67)	1 (3.22)	3 (10.34)		1 (3.84)	1 (6.25)	2 (10.53)		-	1 (5.56)	3 (9.36)	

Characteristics	PTSD				Anxiety				Depression			
	All (%)	No (%)	Yes (%)	P-value	Mild (%)	Moderate (%)	Severe (%)	P-value	Mild (%)	Moderate (%)	Severe (%)	p-value
Others	3 (5)	3 (9.67)	0		3 (11.54)	0	0		1 (10)	1 (5.56)	1 (3.13)	
Place of residence												
Urban	50 (83.33)	25 (80.65)	25 (86.21)	0.41	20 (76.92)	15 (93.75)	15 (78.95)		9 (90)	14 (77.78)	27 (84.38)	0.69
Rural	10 (16.67)	6 (19.35)	4 (13.79)		6 (23.08)	1 (6.25)	3 (15.79)		1 (10)	4 (22.22)	5 (15.63)	
Living with												
Family	29 (48.33)	17 (54.84)	12 (41.38)		12 (46.15)	10 (62.5)	7 (38.84)		7 (70)	10 (55.56)	12 (37.5)	
Family and children	27 (45)	12 (38.71)	15 (51.72)	0.57	11 (42.31)	6 (37.5)	10 (52.63)		2 (20)	7 (38.89)	18 (56.25)	0.33
Alone	4 (6.67)	2 (6.45)	2 (6.90)		2 (7.69)	0	1 (5.26)		1 (10)	1 (5.56)	2 (6.25)	
Suffering days												
Less than a week	7 (11.67)	6 (19.35)	1 (3.44)		4 (15.38)	1 (6.25)	2 (10.52)		3 (30)	1 (5.56)	3 (9.38)	
7-14 days	29 (48.33)	14 (45.16)	15 (51.72)	0.16	11 (42.31)	9 (56.25)	9 (47.37)		5 (50)	7 (38.89)	17 (53.12)	0.18
More than 2 Weeks	24 (40)	11 (35.48)	13 (44.82)		11 (42.31)	6 (37.5)	7 (36.84)		2 (20)	10 (55.56)	12 (37.5)	
Severity of illness												
Mild	14 (23.33)	13 (41.93)	1 (3.49)		10 (38.46)	3 (18.75)	1 (5.26)		7 (70)	4 (22.22)	3 (9.38)	
Moderate	18 (30)	10 (32.29)	8 (27.59)	<0.001	8 (30.77)	6 (37.5)	4 (21.05)		1 (10)	7 (38.89)	9 (28.12)	<0.001
Severe	22 (36.67)	8 (25.80)	14 (48.28)		7 (26.92)	6 (37.5)	9 (47.37)		1 (10)	6 (33.33)	12 (43.75)	
Extremely severe	6 (10)	0	6 (20.69)		1 (3.85)	1 (6.25)	4 (21.05)		1 (10)	1 (6.66)	4 (18.75)	
Hospitalized	12 (20)	2 (6.45)	10 (34.48)	0.01	2 (7.69)	5 (31.25)	5 (26.32)		0.107	3 (16.67)	9 (28.13)	0.14
Stay in hospital												
1-7 days	7 (58.33)	1 (50)	6 (60)	0.05	2 (100)	2 (40)	3 (60)		-	3 (16.67)	4 (12.5)	0.23
7-15 days	3 (25)	1 (50)	2 (20)		0	2 (40)	1 (20)		-	-	3 (9.38)	

Characteristics	PTSD				Anxiety				Depression			
	All (%)	No (%)	Yes (%)	P-value	Mild (%)	Moderate (%)	Severe (%)	P-value	Mild (%)	Moderate (%)	Severe (%)	p-value
16 and more days	2 (16.67)	0	2 (20)		0	1 (20)	1 (20)		-	-	2 (6.25)	
Expenditure	5000											
Family members infected	42 (70)	20 (64.51)	22 (75.86)	0.25	16 (61.54)	11 (68.75)	15 (78.95)	0.298	5 (50)	10 (55.56)	27 (84.38)	0.04
Colleagues Infected	31 (51.67)	14 (45.16)	17 (58.62)	0.57	12 (46.15)	10 (62.5)	9 (47.37)	0.627	5 (50)	11 (61.11)	15 (46.86)	0.78
Family members died	10 (16.67)	2 (6.45)	8 (27.59)	0.03	3 (11.53)	3 (18.75)	4 (21.05)	0.389	1 (10)	2 (11.11)	7 (21.88)	0.03
Preventive measures taken												
Wearing mask	59 (98.33)	31 (100)	28 (96.55)	<0.001	26 (100)	14 (87.5)	18 (100)	0.334	10 (100)	18 (100)	31 (96.88)	0.04
Use hand-sanitizer	17 (28.33)	14 (45.16)	3 (10.34)	0.83	8 (30.77)	6 (37.5)	3 (15.79)	0.378	6 (60)	5 (27.78)	6 (18.75)	0.64
Maintain Social distance	45 (75)	26 (83.87)	19 (65.52)	0.09	19 (73.08)	11 (68.75)	15 (78.95)	0.598	9 (90)	11 (61.11)	25 (78.13)	0.28
Eat nutritious food	19 (31.67)	14 (45.16)	5 (17.24)	0.02	12 (46.15)	4 (25)	3 (15.79)	0.017	6 (60)	7 (38.89)	6 (18.75)	0.03
Using soap	12 (20)	12 (38.71)	0	0.4	8 (30.77)	3 (18.75)	1 (5.26)	0.12	5 (50)	4 (22.22)	3 (9.38)	0.22
Types of transportation used												
Public	30 (50)	12 (38.71)	18 (62.07)		11 (42.31)	8 (50)	11 (57.89)		3 (30)	10 (55.56)	17 (53.13)	
Personal	18 (30)	11 (35.48)	7 (24.14)	0.19	11 (42.31)	4 (25)	3 (15.79)	0.436	3 (30)	7 (38.89)	8 (25)	0.23
Both	12 (20)	8 (25.80)	4 (13.79)		4 (15.38)	4 (25)	4 (21.05)		4 (40)	1 (5.56)	7 (21.875)	
Know the sources of infection	37 (61.67)	20 (64.51)	17 (58.62)	0.42	13 (50)	14 (87.5)	10 (52.63)	0.04	6 (60)	11 (61.11)	20 (62.5)	0.98
Sources of infection												
Via market	14 (23.33)	5 (16.13)	9 (31.03)	0.15	4 (15.38)	4 (25)	6 (31.58)	0.22	1 (10)	4 (22.22)	9 (28.13)	0.49
Via office	16 (38.33)	6 (19.35)	10 (34.48)	0.15	4 (15.38)	7 (43.75)	5 (26.32)	0.129	1 (10)	5 (27.78)	10 (31.25)	0.41

Characteristics	PTSD				Anxiety				Depression			
	All (%)	No (%)	Yes (%)	P-value	Mild (%)	Moderate (%)	Severe (%)	P-value	Mild (%)	Moderate (%)	Severe (%)	p-value
Via office places	23 (23.33)	13 (41.93)	10 (34.48)	0.37	8 (30.77)	7 (43.75)	8 (42.11)	0.553	4 (40)	5 (27.78)	14 (43.75)	0.53
Via transportation	14 (23.33)	5 (16.12)	9 (31.03)	0.15	1 (3.84)	5 (31.25)	8 (42.11)	0.005	1 (10)	2 (11.11)	11 (34.38)	0.09
Disclose infected news to others	45 (75)	23 (74.19)	22 (75.86)	0.56	19 (73.08)	13 (81.25)	13 (68.42)	0.664	4 (40)	15 (83.33)	6 (32)	0.02
Reasons for not disclosing the news												
Fear of being defamed	2 (13.33)	1 (12.5)	1 (14.29)		1 (3.84)	1 (6.25)	0		1 (10)	1 (5.56)	-	
Fear of being ignored by others	6 (40)	4 (50)	2 (28.57)	0.86	2 (7.69)	1 (6.25)	3 (15.79)	0.89	3 (30)	-	3 (9.38)	0.09
Both	7 (46.67)	3 (37.5)	4 (57.14)		4 (15.38)	1 (6.25)	2 (10.52)		2 (20)	2 (11.1)	1 (3.125)	
Ignorance by a family member	14 (23.33)	4 (12.90)	10 (34.48)	0.04	2 (7.69)	4 (25)	8 (42.11)	0.001	1 (10)	1 (5.56)	12 (37.5)	0.02
Rejected by relatives and community	27 (45)	10 (32.25)	17 (58.62)	0.04	9 (34.62)	7 (43.75)	11 (57.89)	0.22	2 (20)	8 (44.44)	17 (53.13)	0.18
People stay away from you even after recovery	30 (50)	11 (35.48)	19 (65.52)	0.02	6 (23.08)	12 (75)	12 (63.16)	<0.001	1 (10)	7 (38.89)	22 (68.75)	<0.001

The significant predictors for PTSD identified using binary logistic regression (likelihood forward selection method) which were presented in **Table 2**. We have found that the severity of illness (OR: 4.412, 95% C.I.: 2.008, 9.693), hospitalized (OR: 0.13, 95% C.I.: 0.03, 0.66), Hospital days (OR: 3.389, 95% C.I.: 1.075, 10.689), family member died (OR: 0.181, 95% C.I.: 0.035, 0.941), ignorance by family members (OR: 3.561, 95% C.I.: 1.032, 10.57), rejected by relatives and community (OR: 2.974, 95% C.I.: 0.965, 8.756), and people stay away from patients after recovery (OR: 3.455, 95% C.I.: 0.837, 9.558) were all significant risk factors for PTSD symptoms with ($p < 0.05$). On the other hand, wearing mask (OR: 0.140, 95% C.I.: 0.035, 0.562), eating nutritious food (OR: 0.253, 95% C.I.: 0.077, 0.836), were significant protective factors for PTSD symptoms with ($p < 0.05$).

Using ordinary logistic regression, we have found the following risk factors were significantly associated with mild to severe depression: severity of illness (Mild) (OR: 7.69, 95% C.I.: 3.663, 13.911), severity of illness (severe) (OR: 2.91, 95% C.I.: 0.096, 3.995), hospitalized (OR: 3.39, 95% C.I.: 1.018, 6.428), family members infected (OR: 3.98, 95% C.I.: 2.331, 9.434), family members died (OR: 3.56, C.I.: 1.038, 7.577), disclose infected news to others (OR: 3.504, 95% C.I.: 1.156, 7.352), ignorance by family members (OR: 7.221, 95% C.I.: 4.87, 12.557), people stay away even after recovery (OR: 3.743, 95% C.I.: 3.743, 9.91). Moreover, wearing mask (OR: 0.284, 95% C.I.: 0.03, 2.707), eat nutritious food (OR: 0.267, 95% C.I.: 0.019, 2.352) were significant protective factors for depression [**Table 2**].

The following risk factors were significantly associated with mild to severe anxiety: severity of illness (Mild) (OR: 7.92, 95% C.I.: 3.82, 14.922), severity of illness (severe) (OR: 2.895, 95% C.I.: 0.758, 4.885), sources of infection (transportation) (OR: 6.404, 95% C.I.: 3.076, 9.999) ignorance by family members (OR: 5.285, 95% C.I.: 1.869, 8.861), people stay away even after recovery (OR: 5.129, 95% C.I.: 1.613, 8.657). Moreover, eat nutritious food (OR: 0.267, 95% C.I.: 0.019, 2.352) was significant protective factor for anxiety [**Table 2**].

Table 2: Significant Factors Associated with Mental Health Outcomes Identified by Binary and Ordinary Logistic Regression Analysis

Variables	B (S.E.)	Odds ratio (95% C.I.)	P-value
PTSD variables			
Severity of illness	1.484 (0.402)	4.412 [2.008, 9.693]	<0.001
Hospitalized	2.032 (0.829)	7.623 [3.665, 12.635]	0.014
Hospital days	1.221 (0.586)	3.389 [1.075, 10.689]	0.037
Family members died	1.709 (0.841)	5.523 [0.941, 9.890]	0.042
Wearing mask	-1.965 (0.709)	0.140 [0.035, 0.562]	0.006
Eat nutritious food	-1.374 (0.61)	0.253 [0.077, 0.836]	0.024
Ignorance by family members	1.268 (0.663)	3.561 [1.032, 10.572]	0.004
Rejected by relatives and community	1.09 (0.538)	2.974 [0.965, 8.756]	0.043
People stay away from you even after recovery	1.24 (0.542)	3.455 [0.837, 9.558]	0.022
Moderate to Extremely Severe Depression			
The severity of illness (Mild)	2.04 (1.084)	7.69 [3.663, 13.911]	<0.001
Severity of illness (Moderate)	1.07 (0.995)	2.91 [0.096, 3.995]	0.04
Severity of illness (Severe)	0.923 (1.012)	2.51 [0.778, 3.745]	0.003
Hospitalized	1.223 (0.615)	3.392 [1.018, 6.428]	0.04

Variables	B (S.E.)	Odds ratio (95% C.I.)	P-value
Family members COVID-19 infected	1.382 (0.537)	3.987 [2.331, 9.434]	0.01
Family members died	1.27 (0.667)	3.563 [1.038, 7.577]	0.03
Wearing mask	-1.257 (0.554)	0.284 [0.030, 2.707]	0.02
Eat nutritious food	-1.32 (0.526)	0.267 [0.019, 2.352]	0.008
Disclose infected news to others	1.254 (0.56)	3.504 [1.156, 7.352]	0.02
Ignorance by family members	1.977 (0.807)	7.221 [4.878, 12.557]	0.01
People stay away from you even after recovery	1.82 (0.553)	6.171[3.743, 9.917]	0.001

Moderate to Severe Anxiety			
The severity of illness (Mild)	2.071 (1.046)	7.932 [3.825, 14.922]	0.006
Severity of illness (Moderate)	1.757 (0.958)	5.795 [3.634, 7.890]	0.007
Severity of illness (Severe)	1.063 (0.929)	2.895 [0.758, 4.885]	0.003
Sources of infection (transportation)	1.857 (0.622)	6.404 [3.076, 9.999]	0.003
Eat nutritious food	-1.176 (0.552)	0.308 [0.090, 2.257]	0.033
Ignorance by family members	1.665 (0.61)	5.285 [1.869, 8.861]	0.006
People stay away from you even after recovery	1.635 (0.521)	5.129 [1.613, 8.657]	0.002

Ranking of relatively important scores allowed an ordering of the significant factors in terms of their efficiency to predict the outcome. We calculated the importance score, which helps us to identify the significant predictor variables which most likely to influence the outcome. The severity of illness, hospitalization, family members dying, wearing masks, eating nutritious food, ignorance by family members, being rejected by relatives and community, people staying away even after recovery were always important significant variables in predicting anxiety, depression, or PTSD. [Figure 2].

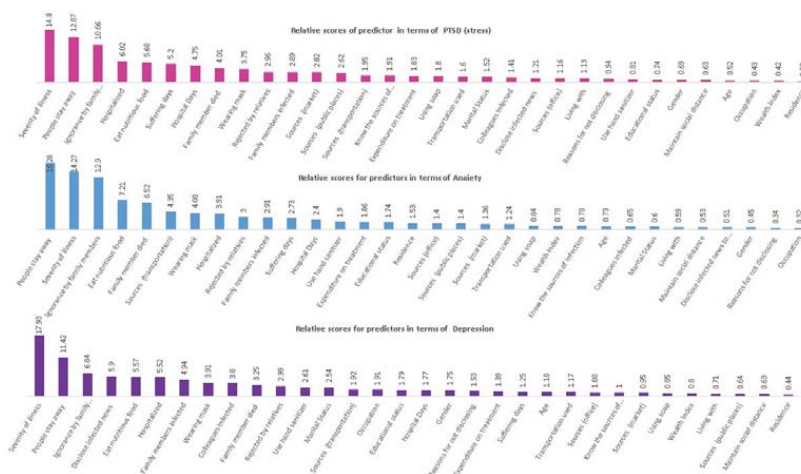


Figure 2: Relative importance of predictor variables in terms of PTSD, Anxiety and Depression

4. DISCUSSION

COVID-19 creates a variety of problems among people all over the world. Its crippling effect has touched on every aspect of people's lives: health, economy, much more on mental health (Begum et al. 2020). In our study, it critically indicates that there are substantial mental health problems among the patients of Bangladesh who have been recovered from COVID-19. An online questionnaire-based survey has been performed to assess the mental illness among COVID-19 patients after recovery. Since it's a pilot survey, we had a relatively small sample to assess the mental health condition which was quite sufficient for our study.

The result of the study identified that almost half (48.33%) of the patients had PTSD symptoms. About 30% of patients identified to have severe anxiety, where more than half (53.33%) of them had gone through severe depression (Table 1). However, these rates are significantly higher than anxiety and depression in studies of the hospital discharged people of China (Huang et al., 2019). In our study, it is observed that 68.97 percent of PTSD patients were married, 82.76 percent of patients were graduated or postgraduate. Among them, 51.72 percent of PTSD patients live with their families and children. Moreover, almost half (48.28%) of PTSD patients were severely ill, which is quite higher than the medical staff (16.7%) who were discharged from the hospital in China (Liu et al. 2020). It seems reasonable to conclude that PTSD symptoms from COVID-19 are quite high among patients, which may overlap between PTSD symptoms and acute illness. Even so, patients who were affected by the virus, ignored by the family members, relatives, and people afraid of them even after recovering from COVID-19. These factors provided significant results ($p < 0.05$) for the PTSD symptoms of patients. In addition to that, eating nutritious foods, wearing a mask regularly seems to work as protective factors provide significant results ($p < 0.05$) for the PTSD symptoms of patients.

Our results of the study do underscore the importance of the post COVID-19 situation of patients, as well as its impact on mental health situations. Both the score analysis and multivariate logistic regression showed that severity of illness, hospitalized, hospital days, family members died, ignorance by family members, rejected by relatives and community, people stay away from patients after recovery was associated with significant PTSD symptoms. However, family members affected by Covid-19, disclose the news of infection were significant with depression, in addition to most of the factors of PTSD except (rejected by relatives and community). Moreover, the severity of illness, eating nutritious food, sources of infection, ignorance by family members, and people staying away from the patients were significant factors for anxiety symptoms [Table 2]. Thus, people are likely perplexed by the fear of death. To prevent this disease, people tried to eat nutritious food, used safety masks. Most of the loveable people are rejected and stay away from the patients during the time of illness or after recovering from diseases. However, the finding of the study provided preventing factors for reducing the mental health problems of the patients.

We also ensure that mental illness may be related to COVID-19 for patients not directly infected by the virus (Tsamakis et al. 2020). Moreover, lockdown creates personal violence (Mazza et al. 2020). People are staying at home for longer periods, so they have fewer options to express their emotions. Several people lose their job due to a pandemic situation, which creates a burden for individual people as well as family members. Most importantly, financially unstable countries like Bangladesh faced several difficulties to ensure the demand of people around the country. Moreover, survivors from COVID-19 disease appear to be at increased risk of long-term prolonged psychological illness, and a psychiatric diagnosis might be an independent risk factor for COVID-19 (Taquet et al. 2020). Balachandar et al., 2020 examined that it is necessary to follow-up COVID-19 recovered patients and perform comprehensive assessments for detection and appropriate management towards their mental, physical, and social establishment. So, it is critically important for the government to follow up the recovered patients from uncalled situations like mental health problems. Basically, in a situation like this, the government needs to work hand to hand with

the general people to provide counseling, mental support as well as a few essential guidelines to the recovered patients and to rehabilitate them with rationality.

5. CONCLUSION

This is the first study on BANGLADESH to assess the psychological impact among the COVID-19 survivors from this kind of fatal COVID-19 disease. Several previous studies concluded that the psychophysical symptoms, including post-traumatic stress disorder, depression, and anxiety, might persist for a longer time. It is concerning that almost half of the survivors in our study were going through PTSD, severe levels of anxiety and depression. The severity of illness, hospitalization, ignorance by family members were working as significant risk factors of mental illness. On the other hand, wearing a mask, eating nutritious food were working as protective factors to reduce stress, anxiety and depression to some extent. Hopefully, this study reveals the extent to which COVID-19 affects the mental health of patients who survived this acute illness.

Acknowledgement

Authors are grateful to the well-wishers as well as their peers to motivate them for doing this research.

Conflict of Interest

Authors declare that they have no competing interests.

Ethics and consent to participate

Before participation in this survey, the authors inform participants about the purpose of this study and ensure that the information they provide is kept confidential and oral consent is taken. The participants were assured about the anonymity of their names and any other identifying information. This study was carried out online in full conformity with the provisions of the Helsinki Declaration on human participant research association.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Data availability statement

All data relevant to the study are included in the article.

6. REFERENCES

- Worldometer INFO. 2022. "COVID-19 Bangladesh Update." (January)
<https://www.worldometers.info/coronavirus/country/bangladesh/>. Accessed January 21 2022.
- Alam, Muhammad Khairul et al. 2021. "Assessing the Mental Health Condition of Home-Confined University Level Students of Bangladesh Due to the COVID-19 Pandemic." *Journal of Public Health (Germany)*.
- Balachandar, Vellingiri et al. 2020. "Follow-up Studies in COVID-19 Recovered Patients - Is It Mandatory?" *Science of the Total Environment* 729: 139021.
<https://doi.org/10.1016/j.scitotenv.2020.139021>.

- Banik, R., M. Rahman, T. Sikder, and D. Gozal. 2020. "COVID-19 in Bangladesh: Public Awareness and Insufficient Health Facilities Remain Key Challenges." *Public Health*.
- Begum, Momotaj, Md. Shaikh Farid, Mohammad Jahangir Alam, and Swarup Barua. 2020. "COVID-19 and Bangladesh: Socio-Economic Analysis towards the Future Correspondence." *Asian Journal of Agricultural Extension, Economics & Sociology* (April): 143–55.
- Brooks, Samantha K. et al. 2020. "The Psychological Impact of Quarantine and How to Reduce It: Rapid Review of the Evidence." *The Lancet*.
- Budikayanti, Astri et al. 2019. "Screening of Generalized Anxiety Disorder in Patients with Epilepsy: Using a Valid and Reliable Indonesian Version of Generalized Anxiety Disorder-7 (GAD-7)." *Neurology Research International*.
- Cucinotta, Domenico, and Maurizio Vanelli. 2020. "WHO Declares COVID-19 a Pandemic." *Acta Biomedica*.
- Greenhalgh, Trisha et al. 2020. "Management of Post-Acute Covid-19 in Primary Care." *The BMJ* 370.
- Halpin, Stephen J. et al. 2020. "Postdischarge Symptoms and Rehabilitation Needs in Survivors of COVID-19 Infection: A Cross-Sectional Evaluation." *Journal of Medical Virology*.
- Hertzog, Melody A. 2008. "Considerations in Determining Sample Size for Pilot Studies." *Research in Nursing and Health*.
- Huang, Chaolin et al. 2020. "Clinical Features of Patients Infected with 2019 Novel Coronavirus in Wuhan, China." *The Lancet* 395(10223): 497–506.
- Huang, Yueqin et al. 2019. "Prevalence of Mental Disorders in China: A Cross-Sectional Epidemiological Study." *The Lancet Psychiatry*.
- Johanson, George A., and Gordon P. Brooks. 2010. "Initial Scale Development: Sample Size for Pilot Studies." *Educational and Psychological Measurement*.
- Julius, Steven A. 2005. "Sample Size of 12 per Group Rule of Thumb for a Pilot Study." *Pharmaceutical Statistics*.
- Kroenke, Kurt, Robert L. Spitzer, and Janet B. W. Williams. 2001. "The PHQ-9." *Journal of General Internal Medicine*.
- Liu, Dong et al. 2020. "Risk Factors Associated with Mental Illness in Hospital Discharged Patients Infected with COVID-19 in Wuhan, China." *Psychiatry Research* 292(June): 113297. <https://doi.org/10.1016/j.psychres.2020.113297>.
- Mazza, Marianna et al. 2020. "Danger in Danger: Interpersonal Violence during COVID-19 Quarantine." *Psychiatry Research*.
- Muller, Ashley Elizabeth et al. 2020. "The Mental Health Impact of the Covid-19 Pandemic on Healthcare Workers, and Interventions to Help Them: A Rapid Systematic Review." *Psychiatry Research*.
- "One in Five COVID-19 Patients Develop Mental Illness within 90 Days - Study | Reuters." https://www.reuters.com/article/health-coronavirus-mental-illness-int-idUSKBN27P35N?fbclid=IwAR0sIEJp9_UxeQHhrqHCMV5mcBTJ1fUmh6anfURjap4rcJyNujWysBieTgU (January 5, 2021).
- Que, Jianyu et al. 2020. "Psychological Impact of the Covid-19 Pandemic on Healthcare Workers: A Cross-Sectional Study in China." *General Psychiatry*.
- Rubin, G. James, and Simon Wessely. 2020. "The Psychological Effects of Quarantining a City." *The BMJ*.

- Sheehy, Lisa Mary. 2020. "Considerations for Postacute Rehabilitation for Survivors of COVID-19." *Journal of Medical Internet Research* 22(5).
- Simpson, Robert, and Larry Robinson. 2020. "Rehabilitation after Critical Illness in People with COVID-19 Infection." *American Journal of Physical Medicine and Rehabilitation* 99(6): 470–74.
- Taquet, Maxime, Sierra Luciano, John R. Geddes, and Paul J. Harrison. 2020. "Bidirectional Associations between COVID-19 and Psychiatric Disorder: Retrospective Cohort Studies of 62 354 COVID-19 Cases in the USA." *The Lancet Psychiatry* 0(0). <https://doi.org/10.1016/S2215-0366> (January 5, 2021).
- Thabane, Lehana et al. 2010. "A Tutorial on Pilot Studies: The What, Why and How." *BMC Medical Research Methodology*.
- Tsamakis, Konstantinos et al. 2020. "[Comment] COVID-19 Pandemic and Its Impact on Mental Health of Healthcare Professionals." *Experimental and Therapeutic Medicine*.
- Viechtbauer, Wolfgang et al. 2015. "A Simple Formula for the Calculation of Sample Size in Pilot Studies." *Journal of Clinical Epidemiology*.
- Yasmin, S, M H Ali, S Rahman, and N Salma. 2021. "Preference and Feasibility of Online Classes among Bangladeshi Students during COVID-19 Pandemic." *International Journal of Ecological Economics & Statistics* 42(1): 26–36.
- Yasmin, Sabina et al. 2021. "Psychological Impact of COVID-19 Among People from the Banking Sector in Bangladesh: A Cross-Sectional Study." *International Journal of Mental Health and Addiction*.
- Yeasmin, Sabina et al. 2020. "Impact of COVID-19 Pandemic on the Mental Health of Children in Bangladesh: A Cross-Sectional Study." *Children and Youth Services Review* 117(May): 105277. <https://doi.org/10.1016/j.chilcyouth.2020.105277>.
- Zhou, Hetong et al. 2020. "The Landscape of Cognitive Function in Recovered COVID-19 Patients." *Journal of Psychiatric Research* 129(April): 98–102. <https://doi.org/10.1016/j.jpsychires.2020.06.022>.
- Zhu, Na et al. 2020. "A Novel Coronavirus from Patients with Pneumonia in China, 2019." *New England Journal of Medicine*.