



Research article

Depression, anxiety and stress among people infected with COVID-19 in Dhaka and Chittagong cities

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ABSTRACT

Background: Covid-19 is an acute respiratory infectious disease caused by novel coronavirus 2019. Many individuals have suffered or are experiencing psychological symptoms due to feelings of isolation, insecurity and instability triggered by Covid-19. This study aimed to explore the perceived psychological distress and associated factors among people infected with Covid-19 in Dhaka and Chittagong cities.

Methods: Using the face-to-face interview method, a survey was conducted from 23 April to 22 May 2021 on a questionnaire on depression, anxiety and stress scale (DASS-21), socio-demographic, economic and health factors. Among those who had ever been infected with Covid-19, a total of 2092 respondents (1180 from Dhaka and 912 from Chittagong) were randomly selected and interviewed. χ^2 test for independence of attributes was employed to observe the association of various socioeconomic, cultural, demographic and health factors with psychological distress. Moreover, multinomial logistic regression analysis was performed to explore the factors that contributed to psychological distress.

Results: Among participants from Dhaka, of three mental health conditions, the prevalence was higher for anxiety (80.0%), followed by stress (64.2%) and depression (59.8%), respectively. Anxiety was also more prevalent (57.3) among respondents in Chittagong, followed by depression (47.7%) and stress (39.5%). As the coexistence of symptoms, 52.8% of respondents in Dhaka, 34.4% in Chittagong experienced depression, anxiety and stress simultaneously. Moreover, in both Dhaka and Chittagong, all three psychological symptoms were strongly correlated in pairs. Multivariate analysis revealed that the most consistent factors associated with mild to moderate (MM), and severe to extremely severe (SES) depression were respondents from Chittagong who were illiterate or primary educated (OR = 0.166, CI: 0.076–0.364 for MM and OR = 0.041, CI: 0.013–0.131 for SES), male (OR = 0.999, CI: 0.666–1.496 for MM and OR = 0.395, CI: 0.249–0.625 for SES), single (OR = 0.393, CI: 0.157–0.982 for MM and OR = 0.121, CI: 0.049–0.303 for SES) and married (OR = 0.403, CI: 0.177–0.916 for MM and OR = 0.075, CI: 0.033–0.167 for SES), had a family of size ≤ 4 (OR = 0.253, CI: 0.140–0.458 for MM and OR = 0.114, CI: 0.059–0.218 for SES) and a family of size 5–6 (OR = 0.151, CI: 0.084–0.272), and no family members at risk being infected with Covid-19 (OR = 0.699, CI: 0.487–1.002 for MM and OR = 0.332, CI: 0.199–0.522 for SES). The analysis yielded similar findings for the other two mental health subscales, such as anxiety and stress. For respondents in Dhaka, the effect of factors other than sex on psychological distress was the opposite in Chittagong. Overall, psychological distress during the outbreak was greater among respondents in Dhaka than in Chittagong if respondents were not classified based on various characteristics.

Conclusion: This study showed that in both Dhaka and Chittagong, a substantially large portion of Covid-19-infected respondents experienced all three psychological distress (e.g., depression, anxiety and stress). Regardless of the dissimilarity between the results in Dhaka and Chittagong, better mental health support was needed for women in both cities.

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1. Introduction

Any natural or man-made disaster can damage human lives and livelihoods to a great extent. It can increase the risk of underlying psychological and emotional problems in people infected and those living in the infected areas (Mamun et al., 2019; Mamun and Griffiths, 2020). There is a heated debate over whether the coronavirus disease (Covid-19) is natural or manmade. However, no one can deny that Covid-19 is the deadliest global pandemic in the last hundred years, following the horrific number of infections (e.g., 500 million people worldwide were infected) and deaths (e.g., died an estimated 20 million to 50 million victims) caused by the Spanish flu, also known as the 1918 influenza pandemic, lasting from February 1918 to April 1920 (Rosewald, 2020).

The new coronavirus disease was first detected in early December 2019 in Wuhan, the capital of China's Hubei province. The virus was named "severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)" (Gorbalenya et al., 2020). What gives rise to Covid-19 is its being extremely contagious, as it spreads rapidly from individual to individual through close contact and small droplets produced by coughing, sneezing or talking. From the first detection of Covid-19, it took 67 days to infect 100,000 individuals, 11 days for the second 100,000 and only 4 days for the third 100,000 (WHO, 2020a). Over time, it has taken a terrible turn. As of 23 April 2021, there are more than 146 million cases of confirmed Covid-19, resulting in more than 3,231,654 deaths (Worldometer, 2021). Apparently, the coronavirus pandemic spreads faster though has a lower mortality rate than those attributed to the severe acute respiratory syndrome (SARS) and the Middle Eastern respiratory syndrome (MERS) (Abir et al., 2021).

This rapid rise in confirmed cases and deaths has created various psychological crises such as depression, anxiety and stress among susceptible and affected individuals and the general population. There are numerous causes of psychological distress during an infectious disease outbreak. These are fears and concerns about one's health and the health of one's family members, financial condition or employment status, or loss of support services and facilities that are relied upon, changes in eating habits, difficulty sleeping or concentrating, worsening of chronic health diseases, etc. (Khan et al., 2020). As stated by Luo et al. (2020), viral respiratory epidemics that have a common mode of transmission via respiratory droplets, include H1N1, H7N9, SARS, MERS, and Covid-19 represent significant psychological morbidity across many population groups, particularly the general public, healthcare workers, students and patients of the epidemics. Major psychosocial effects were observed among the general population during the Ebola outbreak in Guinea, Liberia, and Sierra Leone in 2013–2016 (Van Bortel et al., 2016). While some emergency public health actions such as lockdown, social distancing, and quarantine can reduce the spread of a pandemic like Covid-19, these can make people feel lonely and isolated and can increase anxiety and stress.

Li et al. (2020) assessed the immediate psychological impact of Covid-19 among the Chinese population and reported dominant negative feelings such as anxiety and depression, as well as increased sensibility towards social risks and decreased happiness and contentment in life. Other studies have also found that most of the Chinese have been more or less psychologically damaged by Covid-19 (Huang and Zhao, 2021; Wang et al., 2020a; Bareeqa et al., 2021). Like the Chinese, a considerable portion of Italians suffered from moderate to severe psychological symptoms due to the Covid-19 pandemic (Mazza et al., 2020). In addition, a systematic review of Covid-19 on mental health has found relatively high levels of depression, anxiety and stress and post-traumatic stress disorder (PTSD) in the general population during the Covid-19 pandemic in China, Italy, Spain, Iran, the US, Turkey, Denmark, and Nepal (Xiong et al., 2020). The impact of Covid-19 on three continents (e.g., Asia, Europe and North American) has been substantial and the perceived impact of the pandemic between physical symptoms and mental health symptoms such as anxiety, depression and stress has been

significant (Wang et al., 2021a). A survey of seven middle-income Asian countries demonstrated that the most common physical symptoms during the Covid-19 outbreak reported by the general population were headache, cough and sore throat, and these symptoms were significantly associated with higher scores of all mental health problems (Wang et al., 2021b).

During the outbreak of Covid-19, extensive research was conducted on the mental health problems of people from different groups in addition to the general population. In the early stage of the Covid-19 outbreak, avoidance among the Spaniards was the most cited symptom, with consistently higher psychological distress for young people and women compared to men (Rodriguez-Rey et al., 2020). Among individuals of all ages, Covid-19 related fear, such as anxiety and stress symptoms were more prevalent among older Iranians (Ahorsu et al., 2022). A systematic review involving more than 91 million people worldwide revealed that individuals with preexisting mental disorders were more at risk of Covid-19 infection, hospitalization, severe complications, and death compared with those without mental disorders (Ceban et al., 2021). Healthcare professionals including doctors, nurses, allied healthcare workers, administrators, clerical staff and maintenance workers have experienced a wide range of physical symptoms associated with psychological distress during the Covid-19 pandemic (Chew et al., 2020). A high frequency of clinically significant depression associated with post Covid-19 syndrome was observed mainly in women and those with a previously psychiatric history (Renaud-Charest et al., 2021). Pregnant women faced a significant burden of mental illnesses, such as depression or anxiety as well as various pregnancy complications such as preterm delivery, preeclampsia, premature rupture of fetal membranes, or venous thromboembolism during the Covid-19 pandemic (Nguyen et al., 2022; Benhamou et al., 2020; Kajdy et al., 2020). Profound mental and behavioral changes have shown among college students and young adults during the Covid-19 pandemic (Alemany-Arrebola et al., 2020; Huckins et al., 2020; Ma et al., 2020; Zhai and Du, 2020; Ren et al., 2021). The prevalence of clinically approved depressive symptoms was significantly lower in countries where governments promptly implemented strict policies and vice-versa (Lee et al., 2021). Above all, Covid-19 has caused a lot of mental distress to people around the world (Alamri et al., 2020; De Boni et al., 2020; Ramón-Arbués et al., 2020; Salari et al., 2020a, 2020b; Yang et al., 2020; Gasteiger et al., 2021; Khademian et al., 2021).

As in other parts of the world, Bangladesh, a densely populated (about 170 million people) and limited resourced country, has gone through a widespread crisis and enormous challenges in addressing the coronavirus pandemic due to its rapid rise in both confirmed cases and deaths (WHO, 2020b). In response, the government of Bangladesh at several times imposed numerous restrictions on the movement of people, including local or nationwide lockdowns (Islam et al., 2020a). Although people in Bangladesh are still suffering from the Covid-19 pandemic, at the beginning the situation was too much worse in all respects. For instance, a substantial number of hospitals, clinics, and private practitioners in suburban and rural areas, even in cities stopped working due to the fear of Covid-19 infection. Consequently, many non-Covid patients, in addition to Covid patients, failed to receive regular treatment in private clinics and hospitals as well.

Conversely, the healthcare workers who served the patients during the pandemic and became infected were socially criticized and hated. It is even more tragic that in some places, the deceased Covid-19 patients were refused burial in local graveyards, although this is a basic human right and, in most cases, the government authority handled the situation (TBS, 2020). Besides, the price of goods and services needed on daily basis has been increased due to limited supply; vendors and suppliers stopped working fearing Covid-19 infection. Not only the daily wage earners but also the lower-income and even middle-income workforces ran into severe financial shortfalls due to job losses or reduced income. By spending their last savings, they were rushed to become ultra-poor. Basically, there is a significantly considerable proportion of

Bangladeshis who are daily wage earners and spend days without food. While Bangladesh has passed the first and second waves of the Covid-19 pandemic and Covid-19 vaccination activities are continuing rapidly there in Bangladesh, people are still terrified in the sense that the third wave could hit worse than the first and second waves. All of these outcomes designate that the Covid-19 pandemic harms the mental health and psychological happiness of people.

Some research has already been conducted on the psychological damages that the Covid-19 pandemic has caused to the people of Bangladesh. Most of these studies have concluded that Covid-19 has had a reverse impact on individuals' lives and livelihoods, regardless of age, sex, economic status, and any other characteristics (see, Banna et al., 2022; Bodrud-Doza et al., 2020; Islam et al., 2020b; Zubayer et al., 2020; Abir et al., 2021; Faisal et al., 2022; Mamun et al., 2021). All of the above studies have focused on the entire population of Bangladesh or a specific group of people, for example, university students. There is no research on the psychological crisis of people in two big cities like Dhaka and Chittagong, where the damage due to Covid-19 has been much higher than in other parts of Bangladesh. Furthermore, all previous studies are based on online surveys; as a result, a large group of people (e.g., illiterate or lower educated) who have no access to internet have been neglected by those studies. Emphasizing these issues, the current study aimed to explore the psychological distress of people in Dhaka and Chittagong cities during the Covid-19 pandemic.

2. Methods

In Bangladesh, the Bangladesh Institute of Epidemiology, Disease Control and Research (IEDCR) identified the first Covid-19 case in Dhaka on 8 March 2020. Besides, Bangladesh Institute of Tropical and Infectious Diseases (BITID) reported the first confirmed Covid-19 case in Dhaka on 8 March and in Chittagong on 3 April 2020. As of 23 April 2021, according to IEDCR, there are 739,709 confirmed Covid-19 cases in Bangladesh, including 10,869 dead subject. The highest number of infected people was found in Dhaka city, followed by Chittagong city. Hence, we planned to consider these two cities as the area of study. This study received ethical approval from the Review Board of Research and Publication Cell, University of Chittagong, Bangladesh. Verbal consent of the respondents was sought by informing them about the research procedures and its risks.

Initially, we made a pilot survey to finalize the questionnaire focusing on the project title in general and the objectives, in particular. To calculate the sample size based on the sample required to estimate a proportion with an approximately 98% confidence level, we used the following formula:

$$n = \frac{(1.96)^2 pq}{d^2}$$

where n = required sample size.

- p = proportion of the population having the characteristic
- q = 1- p , and
- d = the degree of precision.

The proportion of the population (p) may be known from prior research or other sources; here we considered $p = 0.321$ as the daily average infected people for the last two months (e.g., till April 23, 2021, when the survey launched) in Bangladesh was 0.321. It should be noticed that the survey was conducted during the period when the second wave of Covid-19 was at its peak; thus, we obtained a high value of p . The degree of precision (d) is the margin of error that is acceptable. Setting $d = 0.02$, which implies that the survey has given a margin of error of plus or minus 2%.

Then the required sample size is 2094. Since the data were collected through a face-to-face questionnaire method and the response rate was

noted almost 95% based on the pilot survey, considering 5% non-responsive rate, the total number of respondents was about 2250 to get 2094. The population of Dhaka city is two times higher than that of Chittagong city (<https://populationstat.com>). In addition, the number of confirmed cases of Covid-19 in Dhaka is higher than that of in Chittagong. Hence, out of 2250, 1250 respondents were from Dhaka city and 1100 from Chittagong city. To select the respondents, we followed the Covid-19 infected list provided by IEDCR in Dhaka and BITID in Chittagong. After finalizing all the potential respondents by simple random sampling technique, the enumerators made an appointment over the telephone and collected the information by face-to-face interview methods. The survey was conducted from 23 April to 22 May 2021 in a questionnaire on demographic aspects, social situations, economic conditions or economic crises, health status or health hazards with depression, anxiety and stress scale (DASS-21) of respondents during the pandemic. Of 2250 randomly selected respondents, 2145 were successfully interviewed. After completing the data collection, each respondent's information was carefully recorded in an Excel spreadsheet. Through the data cleaning process, some respondents were excluded from the sample due to a few missing and irrelevant information from respondents or misreported information by enumerators. Finally, we obtained a sample of 2092 individuals (1180 from Dhaka and 912 from Chittagong). The data analysis was done by using R programming, STATA and SPSS.

In this study, our main focus was on respondents' psychological distress, although respondents were asked questions about various socio-demographic, economic and health issues. The psychological impact was assessed using the Bangla version of Depression, Anxiety, and Stress Scale (DASS-21), a reliable and valid measure for assessing the mental health status of individuals included in this study (Alim et al., 2014). It is worth mentioning that DASS-21 was used in many countries around the world, such as in China (Wang et al., 2020b), Spain (Wang et al., 2021c), Poland (Wang et al., 2020c), Iran (Wang et al., 2021d), the Philippines (Teo et al., 2020), Vietnam (Le et al., 2020) and in the US (Wang et al., 2021e), during the Covid-19 pandemic. DASS-21 is a self-reported questionnaire containing 21 items, seven items per subscale: depression, anxiety and stress. Respondents were asked to score every item on a 4-point Likert scale ranging from 0 (did not apply to me at all) to 3 (applied to me very much). Depression, anxiety and stress scores were computed by adding up the scores of the items in each subscale and multiplying them by 2 since DASS-21 is a short-form version of DASS (42 items). Scores for each subscale were categorized based on their severity rating indices, proposed by Lovibond and Lovibond (1995). The results are shown in Table 1.

According to the DASS-21 scale, we found three symptoms, referred to as depression, anxiety and stress as an individual's psychological distress. These three symptoms were used as dependent variables in this study. Based on previous literature, these psychological symptoms during the Covid-19 pandemic were influenced by a variety of socio-cultural, economic, demographic, and health factors. The following sixteen factors were considered in this study.

Socio-economic and cultural factors: Religion, Education, Employment status, Family income (in Taka), Salary reduced, and Marital status.

Demographic factors: Sex, Age (in years), Family size, Children below 5 or going to school/college, and Family member(s) aged ≥ 40 years.

Table 1. Cutoff points for DASS-21 scale.

Severity level	Depression	Anxiety	Stress
Normal	0–9	0–7	0–14
Mild	10–13	8–9	15–18
Moderate	14–20	10–14	19–25
Severe	21–27	15–19	26–33
Extremely severe	28+	20+	34+

Health factors: Self-quarantined, Admitted hospital, Relative(s) died by Covid-19, Suffered from chronic diseases, and Family member(s) at risk of being infected with Covid-19.

3. Result

The prevalence of the three mental health conditions, sampled from participants of Dhaka and Chittagong, is shown in Figure 1. In Dhaka, the prevalence was higher for anxiety by 80.0% (911 participants total, including 53 participants (4.7%) with mild anxiety, 86 participants (7.5%) with severe and 484 participants (42.5%) with extremely severe anxiety), followed by stress 64.2% (730 participants total, including 101 participants (8.9%) with mild stress, 202 participants (17.8%) with severe and 237 participants (20.8%) with extremely severe stress). The prevalence of depression was nearly equal to the stress level. For instance, 63.8% (726 participants total from Dhaka) reported depression symptoms, including the highest level of extremely severe depression (281 participants, 24.7%). In Chittagong, the prevalence was also higher for anxiety 57.3% (547 participants total, including 50 participants (5.2%) with mild anxiety, 68 participants (7.1%) with severe and 254 participants (26.6%) with extremely severe anxiety), followed by depression 47.7% (455 participants total, including 130 participants (13.6%) with mild depression, 54 participants (5.7%) with severe and 110 participants (11.5%) with extremely severe depression), while 39.5% reported stress symptoms including the lowest level of extremely severe stress, which is 3.9% (e.g. 37 participants).

In addition to assessing the symptoms of depression, anxiety and stress separately, it is important to assess the coexistence of symptoms, shown in Figure 2, among participants in the cities of Dhaka and Chittagong. Of the participants from Dhaka, 17.4% experienced two symptoms of mental disorders according to the DASS-21 questionnaire and 52.8% experienced symptoms of anxiety, depression and stress simultaneously. The relevant values for participants from Chittagong were 13.0% and 34.4% respectively. In contrast, there were only 15% of participants in Dhaka and 37.0% in Chittagong who had no symptoms of depression, anxiety and stress. Separate and simultaneous assessments of the three mental health conditions, shown in Figures 1 and 2, indicate that participants in Dhaka had more psychological distress than those in Chittagong.

Previously, it was mentioned that each of the three symptoms of mental disorders is an aggregate of seven questions on a 4-point Likert

scale ranging from 0 to 4. Thus, they named depression, anxiety and stress produced as continuous data. According to Figure 2, a large number of respondents, regardless of the place of residence, experienced two or more symptoms simultaneously. For more precise information, scatter plots with pairwise correlations between the symptoms of depression, anxiety and stress of the respondents in Dhaka and Chittagong are shown in Figure 3. Scatter plots indicate that there is a positive relationship between depression and anxiety, depression and stress, and anxiety and stress of respondents in both Dhaka and Chittagong cities and the value of correlation coefficients indicates that each pair of symptoms is strongly correlated. According to the histograms, presented diagonally in Figure 3, the distribution of each symptom is positively skewed. Furthermore, the quantile-quantile (Q-Q) plot for the DASS score among the given population (Dhaka vs. Chittagong) indicates that a significant number of points in each plot fall outside the reference line (see Figure 4). Hence, the distribution of DASS score based on both histogram and Q-Q plot is not normal. In this situation, the median DASS score should be considered instead of its mean. According to median DASS scores, in Table 2, psychological distress among respondents in Dhaka were much higher (moderate depression (14) and stress (22), and severe anxiety (16)) than in Chittagong (no depression (6) and stress (10), and mild anxiety (10)).

For bivariate and multivariate analysis, each of the three psychological symptoms such as depression, anxiety and stress were recorded as normal, mild to moderate (MM) and severe to extremely severe (SES). In general, the χ^2 test for independence was used to observe the association between each of the selected factors and each of three psychological distress. It should be noted that there were one or more cell frequencies in the cross-tables between religion and depression, marital status and depression in Dhaka, family members aged ≥ 40 and depression, and work status and stress in Chittagong are less than 5. In these cases, the MM and SES categories are merged (results not shown) and then we applied the χ^2 test. Also, Yate's correction was used for cross-table between children under 5 or going to school/college and stress in Chittagong since the frequency obtained 0 even after combining the MM and SES categories.

In Table 3, the value of the χ^2 test for independence of attributes and its p-value indicates that all selected factors are strongly associated with depressive symptoms in Chittagong, while in Dhaka, employment status, salary reduction, self-quarantine, admitting in hospital and death relatives from Covid-19 have no association with depressive symptoms. In

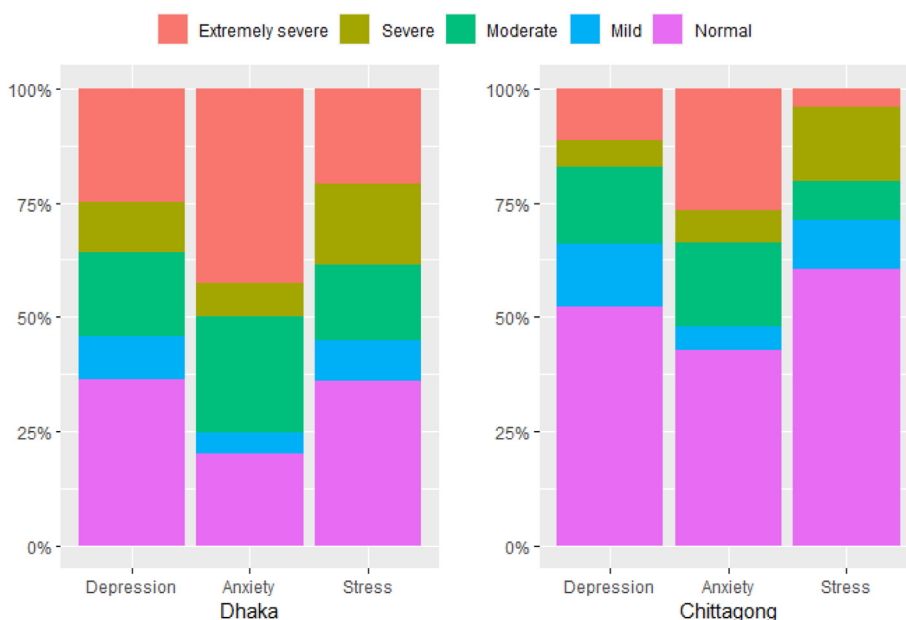


Figure 1. Prevalence of depression, anxiety, and stress levels based on results of DASS-21 respondents from Dhaka and Chittagong during the COVID-19 pandemic.

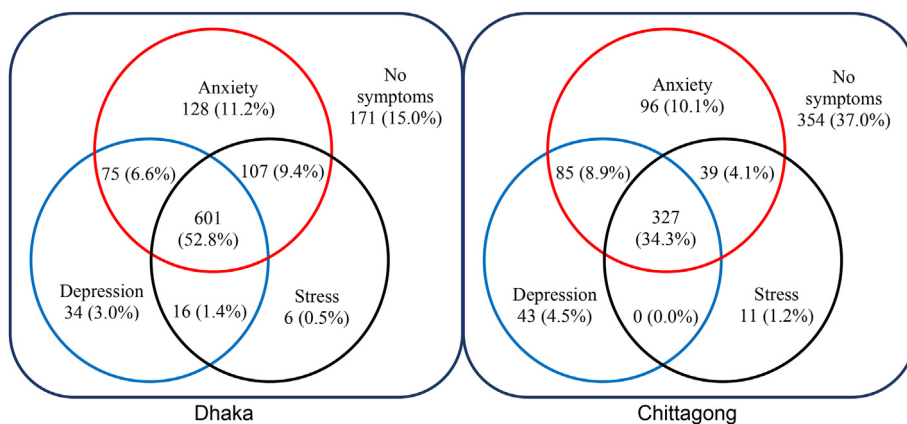


Figure 2. Coexistence of symptoms of depression, anxiety and stress among participants from Dhaka and Chittagong.

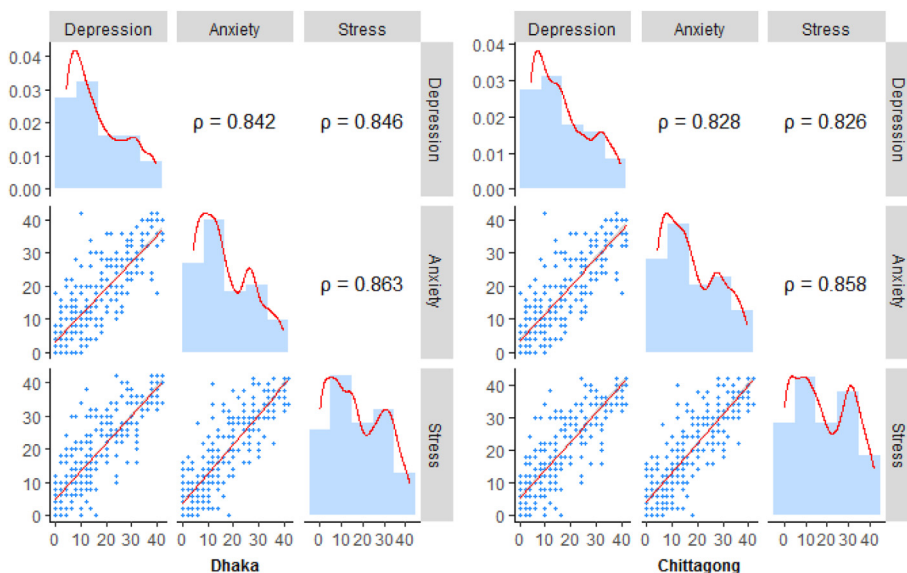


Figure 3. Scatter plot with correlations in the upper triangle, smoothing lines in the lower triangle, and histograms on the diagonal of symptoms of depression, anxiety and stress among respondents in Dhaka and Chittagong.

Dhaka, the percentage of Muslims with depressive symptoms was higher (33.1% MM and 35.7% SES) than that of non-Muslims (0.0% MM and 49.1% SES). There were opposite findings for respondents in Chittagong (Muslims: 28.7% MM and 15.1% SES vs. non-Muslims: 14.6% MM and 36.0% SES).

In Dhaka, the prevalence of depression symptoms was higher among respondents with no education or primary education (22.5% MM and 55.4% SES) than other groups. Conversely, in Chittagong, respondents with secondary or higher education had a higher prevalence of depression (29.8% MM and 24.5% SES). Symptoms of depression were more prevalent among temporary employees in Dhaka (32.4% MM and 45.7% SES) and permanent employees in Chittagong (31.7% MM and 17.4% SES). Respondents with a household income of 35,001–75,000 Taka experienced a high prevalence of depression in both Dhaka (28.9% MM and 46.0% SES) and Chittagong (28.4% MM and 24.2% SES). Also, in Dhaka (33.7% MM and 37.6% SES) and in Chittagong (23.7% MM and 27.2% SES), respondents whose salaries had reduced during the epidemic experienced higher depression. Females rather than males had a higher prevalence of depressive symptoms (Dhaka: 30.1% MM and 42.8% SES vs. Chittagong: 20.9% MM and 32.5% SES). The prevalence of depression was highest among respondents aged 40 to 49 in Chittagong (39.8% MM and 15.0% SES) and aged 50 to 59 in Dhaka (32.6% MM and 41.9% SES). The symptom of depression was more common among

unmarried respondents in Dhaka (26.5% MM and 47.6% SES), while in Chittagong it was more common among divorced or widowed respondents (16.9% MM and 41.0% SES). The highest proportion of depression was reported among respondents with family members of 5–6 in Dhaka (37.1% MM and 38.4% SES) and among respondents with family members of 8 or more in Chittagong (30.6% MM and 43.3% SES).

In Chittagong, depression was more prevalent among respondents with 3 or more children (26.6% MM and 8.6% SES), but in Dhaka, it was even more prevalent among respondents with 1–2 children (29.4% MM and 41.8% SES). Respondents in Dhaka with 1–2 family members (32.7% MM and 38.8% SES) and in Chittagong with 3 or more family members aged 40 and over (31.3% MM and 27.9% SES) experienced a high incidence of depression. In Chittagong, the prevalence of depression was greater among respondents who were self-quarantined (27.6% MM and 23.0% SES), hospitalized (12.0% MM and 33.4% SES) and whose relatives died from Covid-19 (30.3% MM and 26.9% SES) compared to their counterparts. For the same factors, no significant difference was found in the depressive symptoms of respondents in Dhaka. In both cities, the symptom of depression was more frequent among respondents with one or more chronic illnesses (Dhaka: 26.0% MM and 38.7% SES vs. Chittagong: 18.0% MM and 27.7% SES) and with one or more family members at risk of being infected with Covid-19 (Dhaka: 37.1% MM and 35.3% SES vs. Chittagong: 29.9% MM and 27.5% SES).

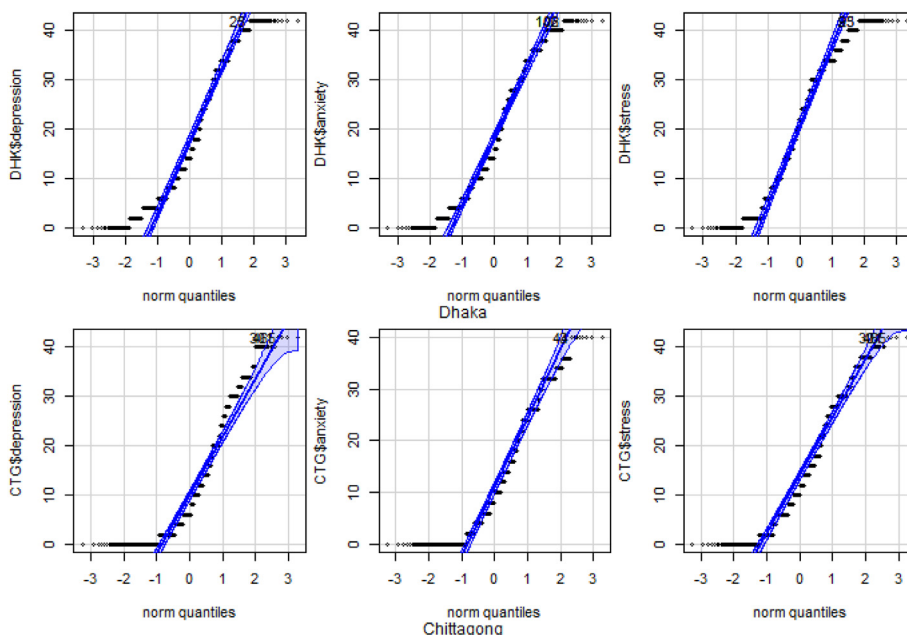


Figure 4. Quantile-Quantile (Q-Q) plot for depression, anxiety and stress among respondents in Dhaka and Chittagong.

Table 2. Median score of depression, anxiety and stress among respondents in Dhaka and Chittagong.

Psychological Symptoms	Dhaka	Chittagong
Depression	14	6
Anxiety	16	10
Stress	22	10

In Tables 4 and 5, all factors are significantly associated with anxiety and stress among respondents in Chittagong (see p-value). However, in Dhaka, age, and wage reduction during the pandemic have no association with anxiety. Also, wage reduction and hospitalization for being infected with Covid-19, and one or more chronic diseases have no association with stress. Considering some exceptions, in both cities, the prevalence of anxiety and stress among respondents as assessed by socio-economic, cultural, demographic and health factors followed the prevailing pattern of depression.

A multivariate analysis should be used when it is required to examine the effects of two or more characteristics simultaneously on a response variable. In the multivariate analysis, only those factors were used that proved to be significant in the χ^2 -test for the respondents in both Dhaka and Chittagong cities. Since there were three individual categories of depression, anxiety, and stress symptoms: normal, mild to moderate (MM) and severe to extremely severe (SES), and all selected factors were categorized, a multinomial logistic regression could be used appropriately. Of the three categories of response variables, the first category “respondents with normal depression, anxiety and stress” was considered the reference category.

The adjusted odds ratios (OR) with 95% confidence intervals (CI) of MM and SES depression, anxiety and stress of respondents by selected characteristics are shown in Tables 6, 7, and 8, respectively. In Table 6, the effect of respondents' education in both Dhaka and Chittagong is partially significant on symptoms of depression. Compared to undergraduates or postgraduates, respondents with a secondary or higher education level were 0.520 (OR = 0.480, CI: 0.327–0.706) and 0.708 (OR = 0.292, CI: 0.196–0.434) times less likely to suffer from depression at MM and SES levels, respectively. With two exceptions, family income has no influential impact on depression. Of respondents whose household income was between 35,001 and 75,000 Taka, in Dhaka were 0.654 (OR

= 2.654, CI: 1.847–3.813) times and in Chittagong were 0.036 (OR = 2.036, CI: 1.141–3.634) times more likely to suffer from SES depression than those whose household income was greater than 75,000 Taka.

Gender has a major impact on depression, apart from MM depression of respondents in Chittagong. In Dhaka, male respondents were significantly less likely to suffer from depression (OR = 0.643, CI: 0.467–0.887 for MM and OR = 0.559, CI: 0.334–0.629 for SES) than their female counterparts. Moreover, in Chittagong, male respondents were 0.605 (OR = 0.395, CI: 0.249–0.625) times less likely to be severely or extremely severely depressed than female respondents. The effect of marital status on depression was significant only for respondents in Chittagong. With respect to divorced or widowed respondents, unmarried (or single) respondents were 0.607 (OR = 0.393, CI: 0.157–0.982) and 0.597 (OR = 0.403, CI: 0.177–0.916) and married respondents were 0.879 (OR = 0.121, CI: 0.049–0.303) and 0.925 (OR = 0.075, CI: 0.033–0.167) times less likely to experience depression at MM and SES levels, respectively. Conversely, both single and married respondents in Dhaka were negligibly more likely to suffer from MM and SES depression than those who were divorced or widowed. Family size significantly affects a respondent's level of depression. Unexpectedly, respondents from a small family in Dhaka were more likely to suffer from depression. For example, respondents in families of size 4 or below and of size 5–6 were more likely to experience MM (OR = 2.025, CI: 1.246–3.292 for family size ≤ 4 and OR = 2.991, CI: 1.801–4.966 for family size 5–6) and SES (OR = 3.069, CI: 1.829–5.151 and OR = 3.419, CI: 1.985–5.889, respectively) depression than those in families of size 7 or above (the reference category). In contrast, in Chittagong, respondents in households of size 4 or below and of size 5–6 were extremely less likely to suffer from MM (OR = 0.253, CI: 0.140–0.458 and OR = 0.482, CI: 0.282–0.826) and SES (OR = 0.114, CI: 0.059–0.218 and OR = 0.151, CI: 0.084–0.272, respectively) depression than the reference category.

In Dhaka, respondents whose family members were not at risk of infection were significantly less likely to suffer from MM depression (OR = 0.246, CI: 0.165–0.365) than those with one or more family members at risk of Covid-19 infection. In Chittagong, ORs associated with MM and SES depression for respondents whose family members were at risk of Covid-19 infection were 0.699 (CI: 0.487–1.002) and 0.332 (CI: 0.199–0.522), respectively.

In Table 7, education had no effect on the anxiety of respondents from Dhaka. In case of respondents in Chittagong, illiterate or primary school

Table 3. Percentage of respondents with Normal, mild to moderate (MM) and severe to extremely severe (SES) symptoms of depression in Dhaka and Chittagong based on socioeconomic and cultural, demographic and health factors.

Characteristics	Category	Dhaka				Chittagong			
		Normal	MM	SES	Chi-square	Normal	MM	SES	Chi-square
Religion	Islam	338 (31.2)	358 (33.1)	386 (35.7)	47.45***	412 (56.1)	211 (28.7)	111 (15.1)	44.59***
	Others	50 (51.0)	0 (0.0)	48 (49.1)		88 (49.4)	26 (14.6)	64 (36.0)	
Education	Illiterate or primary	15 (23.1)	14 (21.5)	36 (55.4)	43.70***	112 (86.8)	11 (8.5)	6 (4.7)	64.74***
	Secondary or higher secondary	116 (47.3)	74 (30.2)	55 (22.4)		104 (45.6)	68 (29.8)	56 (24.6)	
	Undergraduate or above	257 (29.5)	270 (31.0)	343 (39.4)		284 (51.2)	158 (28.5)	113 (20.4)	
Employment status	Permanent	205 (34.9)	177 (30.2)	205 (34.9)	12.04	239 (50.9)	149 (31.7)	82 (17.4)	53.83***
	Temporary	38 (22.0)	56 (32.4)	79 (45.7)		75 (59.5)	44 (34.9)	7 (5.6)	
	No work/student	145 (34.5)	125 (29.8)	150 (35.7)		186 (58.9)	44 (13.9)	86 (27.2)	
Family income (in Taka)	Upto 35,000	123 (38.4)	104 (32.5)	93 (29.1)	41.77***	207 (68.8)	51 (16.9)	43 (14.3)	43.21***
	35,001–75,000	135 (25.1)	155 (28.9)	247 (46.0)		204 (47.4)	122 (28.4)	104 (24.2)	
	75,001 or above	130 (40.2)	99 (30.7)	94 (29.1)		89 (49.2)	64 (35.4)	28 (15.5)	
Salary reduced	Not reduced	308 (34.2)	264 (29.3)	329 (36.5)	3.39	307 (59.2)	144 (27.7)	68 (13.1)	28.80***
	Reduced	80 (28.7)	94 (33.7)	105 (37.6)		193 (49.1)	93 (23.7)	107 (27.2)	
Sex	Male	221 (39.1)	173 (30.6)	171 (30.3)	25.35***	364 (58.7)	176 (28.4)	80 (12.9)	49.49***
	Female	167 (27.2)	185 (30.1)	263 (42.8)		136 (46.6)	61 (20.9)	95 (32.5)	
Age (in years)	≤ 39	137 (29.1)	158 (33.6)	175 (37.2)	30.52***	224 (54.9)	105 (25.7)	79 (19.4)	47.09***
	40–49	118 (42.3)	75 (26.9)	86 (30.8)		102 (45.1)	90 (39.8)	34 (15.0)	
	50–59	77 (25.6)	98 (32.6)	126 (41.9)		93 (58.1)	34 (21.3)	33 (20.6)	
	≥ 60	56 (43.1)	27 (20.8)	47 (36.2)		81 (68.6)	8 (6.8)	29 (24.6)	
Marital status	Unmarried	43 (25.9)	44 (26.5)	79 (47.6)	30.64***	87 (53.4)	40 (24.5)	36 (22.1)	31.59***
	Married	307 (33.2)	305 (33.0)	312 (33.8)		378 (56.8)	183 (27.5)	105 (15.8)	
	Divorced/widowed	38 (42.2)	9 (10.0)	43 (47.8)		35 (42.2)	14 (16.9)	34 (41.0)	
Family size	Upto 4	230 (35.1)	174 (26.5)	252 (38.4)	34.10***	255 (68.9)	66 (17.8)	49 (13.2)	99.07***
	5–6	97 (24.5)	147 (37.1)	152 (38.4)		210 (51.5)	130 (31.9)	68 (16.7)	
	7 or more	61 (47.7)	37 (28.9)	30 (23.4)		35 (26.1)	41 (30.6)	58 (43.3)	
Children below 5 or going to school/college	No child	63 (40.1)	20 (12.7)	74 (47.1)	43.89***	52 (82.5)	3 (4.8)	8 (12.7)	175.99***
	1-2 children	211 (30.1)	259 (37.0)	230 (32.9)		367 (64.7)	151 (26.6)	49 (8.6)	
	3 or more children	114 (35.3)	79 (24.5)	130 (40.2)		81 (28.7)	83 (29.4)	118 (41.8)	
Family member(s) aged ≥ 40 years	No member	82 (47.1)	45 (25.9)	47 (27.0)	38.22***	53 (71.6)	21 (28.4)	0 (0.0)	34.88***
	1-2 members	260 (28.5)	298 (32.7)	354 (38.8)		374 (56.8)	160 (24.3)	125 (19.0)	
	3 or more members	46 (48.9)	15 (16.0)	33 (35.1)		73 (40.8)	56 (31.3)	50 (27.9)	
Self-quarantined	No	17 (28.3)	19 (31.7)	24 (40.0)	0.61	142 (75.9)	37 (19.8)	8 (4.3)	49.86***
	Yes	371 (33.1)	339 (30.3)	410 (36.6)		358 (49.4)	200 (27.6)	167 (23.0)	
Admitted hospital	Not admitted	249 (33.5)	238 (32.0)	257 (34.5)	4.76	299 (55.0)	193 (35.5)	52 (9.6)	111.89***
	Admitted	139 (31.9)	120 (27.5)	177 (40.6)		201 (54.6)	44 (12.0)	123 (33.4)	
Relative(s) died by COVID-19	Not died	285 (33.9)	259 (30.8)	296 (35.2)	3.09	373 (60.7)	147 (23.9)	95 (15.4)	28.63***
	Died	103 (30.3)	99 (29.1)	138 (40.6)		127 (42.8)	90 (30.3)	80 (26.9)	
Suffered from chronic diseases	No	108 (28.1)	151 (39.2)	126 (32.7)	21.46***	237 (55.4)	150 (35.0)	41 (9.6)	64.33***
	Yes	280 (35.2)	207 (26.0)	308 (38.7)		263 (54.3)	87 (18.0)	134 (27.7)	
Family member(s) at risk being infected with COVID-19	No	156 (45.7)	47 (13.8)	138 (40.5)	69.25***	288 (69.6)	88 (21.3)	38 (9.2)	76.17***
	Yes	232 (27.7)	311 (37.1)	296 (35.3)		212 (42.6)	149 (29.9)	137 (27.5)	
Total		388 (32.9)	358 (30.3)	434 (36.8)		500 (54.8)	237 (26.0)	175 (19.2)	

Figures in bracket indicates the percentage of respondents; *** indicates $p \leq 0.001$, ** indicates $p \leq 0.01$, * indicates $p \leq 0.05$.

graduates were significantly less likely to have MM (OR = 0.481, CI: 0.254–0.911) and SES (OR = 0.042, CI: 0.015–0.121) anxiety than those with undergraduate or above education. However, secondary or higher secondary graduates were 0.492 (OR = 1.492, CI: 0.915–2.433) and 1.327 (OR = 2.327, CI: 1.481–3.656) times more likely to have MM and SES anxiety, respectively, with respect to the reference category.

Family income did not have a noticeable impact on anxiety, with the exception that respondents from Dhaka with a family income of \leq 35,000 Taka and those from Chittagong with a family income of 35,001–75,000 Taka were significantly more likely to suffer from anxiety at MM (OR = 2.222, CI: 1.342–3.682) and SES (OR = 1.773, CI: 1.098–2.864) levels, respectively, compared to those whose family income was $>$ 75,000 Taka. Male respondents from Dhaka were signifi-

cantly less likely to suffer from anxiety (OR = 0.491, CI: 0.335–0.718 for MM and OR = 0.311, CI: 0.219–0.441 for SES) than their female counterparts. Compared to female respondents, male respondents in Chittagong were 0.490 (OR = 0.610, CI: 0.406–0.917) times less likely to experience SES anxiety. The effect of marital status on respondents' anxiety in Dhaka was opposite to that of Chittagong.

For instance, married respondents in Dhaka were 11.534 (OR = 12.534, CI: 5.344–29.398) and 1.964 (OR = 2.964, CI: 1.650–5.323) times more likely to experience MM and SES anxiety, respectively, than those who were divorced or widowed. Similar ORs for unmarried respondents were also higher than the reference category. Conversely, in Chittagong, both single and married respondents were less likely to suffer from MM (OR = 0.322, CI: 0.129–0.803 for unmarried and OR = 0.579,

Table 4. Percentage of respondents with Normal, MM and SES symptoms of anxiety in Dhaka and Chittagong based on socioeconomic and cultural, demographic and health factors.

Characteristics	Category	Dhaka				Chittagong			
		Normal	MM	SES	Chi-Square	Normal	MM	SES	Chi-Square
Religion	Islam	206(19.0)	318 (29.4)	558 (51.6)	28.50***	322 (43.9)	195 (26.6)	217 (29.6)	29.02***
	Others	41 (41.8)	23 (23.5)	34 (34.7)		80 (44.9)	17 (9.6)	81 (45.5)	
Education	Illiterate or primary	5 (7.7)	24 (36.9)	36 (55.4)	21.07***	103 (79.8)	20 (15.5)	6 (4.7)	99.83***
	Secondary or higher secondary	51 (20.8)	92 (37.6)	102 (41.6)		70 (30.7)	49 (21.5)	109 (47.8)	
	Undergraduate or above	191 (22.0)	225 (25.9)	454 (52.2)		229 (41.3)	143 (25.8)	183 (33.0)	
Employment status	Permanent	115 (19.6)	174 (29.6)	298 (50.8)	11.51*	161 (34.3)	153 (32.6)	156 (33.2)	75.59***
	Temporary	27 (15.6)	62 (35.8)	84 (48.6)		65 (51.6)	33 (26.2)	28 (22.2)	
	No work/student	105 (25.0)	105 (25.0)	210 (50.0)		176 (55.7)	26 (8.2)	114 (36.1)	
Family income (in Taka)	Upto 35,000	62 (19.4)	139 (43.4)	119 (37.2)	51.92***	174 (57.8)	48 (15.9)	79 (26.2)	39.89***
	35,001–75,000	112 (20.9)	115 (21.4)	310 (57.7)		151 (35.1)	125 (29.1)	154 (35.8)	
	75,001 or above	73 (22.6)	87 (26.9)	163 (50.5)		77 (42.5)	39 (21.5)	65 (35.9)	
Salary reduced	Not reduced	181 (20.1)	260 (28.9)	460 (51.1)	1.89	243 (46.8)	128 (24.7)	148 (28.5)	9.47**
	Reduced	66 (23.7)	81 (29.0)	132 (47.3)		159 (40.5)	84 (21.4)	150 (38.2)	
Sex	Male	155 (27.4)	183 (32.4)	227 (40.2)	48.04***	287 (46.3)	162 (26.1)	171 (27.6)	24.46***
	Female	92 (15.0)	158 (25.7)	365 (59.3)		115 (39.4)	50 (17.1)	127 (43.5)	
Age (in years)	≤39	102 (21.7)	144 (30.6)	224 (47.7)	4.54	180 (44.1)	102 (25.0)	126 (30.9)	67.11***
	40–49	60 (21.5)	71 (25.4)	148 (53.0)		79 (35.0)	81 (35.8)	66 (29.2)	
	50–59	55 (18.3)	89 (29.6)	157 (52.2)		64 (40.0)	25 (15.6)	71 (44.4)	
	≥60	30 (23.1)	37 (28.5)	63 (48.5)		79 (66.9)	4 (3.4)	35 (29.7)	
Marital status	Unmarried	58 (34.9)	37 (22.3)	71 (42.8)	54.08***	80 (49.1)	29 (17.8)	54 (33.1)	8.00*
	Married	155 (16.8)	295 (31.9)	474 (51.3)		287 (43.1)	169 (25.4)	210 (31.5)	
	Divorced/widowed	34 (37.8)	9 (10.0)	47 (52.2)		35 (42.2)	14 (16.9)	34 (41.0)	
Family size	Upto 4	156 (23.8)	191 (29.1)	309 (47.1)	28.79***	208 (56.2)	80 (21.6)	82 (22.2)	108.36***
	5–6	60 (15.2)	100 (25.3)	236 (59.6)		165 (40.4)	118 (28.9)	125 (30.6)	
	7 or more	31 (24.2)	50 (39.1)	47 (36.7)		29 (21.6)	14 (10.4)	91 (67.9)	
Children below 5 or going to school/college	No child	44 (28.0)	12 (7.6)	101 (64.3)	57.44***	46 (73.0)	9 (14.3)	8 (12.7)	125.21***
	1-2 children	159 (22.7)	234 (33.4)	307 (43.9)		290 (51.1)	147 (25.9)	130 (22.9)	
	3 or more children	44 (13.6)	95 (29.4)	184 (57.0)		66 (23.4)	56 (19.9)	160 (56.7)	
Family member(s) aged ≥ 40 years	No member	65 (37.4)	56 (32.2)	53 (30.5)	44.71***	47 (63.5)	21 (28.4)	6 (8.1)	63.97***
	1-2 members	165 (18.1)	253 (27.7)	494 (54.2)		305 (46.3)	160 (24.3)	194 (29.4)	
	3 or more members	17 (18.1)	32 (34.0)	45 (47.9)		50 (27.9)	31 (17.3)	98 (54.7)	
Self-quarantined	No	20 (33.3)	16 (26.7)	24 (40.0)	6.06*	154 (82.4)	23 (12.3)	10 (5.3)	144.07***
	Yes	227 (20.3)	325 (29.0)	568 (50.7)		248 (34.2)	189 (26.1)	288 (39.7)	
Admitted hospital	Not admitted	209 (28.1)	175 (23.5)	360 (48.4)	70.72***	228 (41.9)	173 (31.8)	143 (26.3)	60.72***
	Admitted	38 9 (8.7)	166 (38.1)	232 (53.2)		174 (47.3)	39 (10.6)	155 (42.1)	
Relative(s) died by COVID-19	Not died	189 (22.5)	251 (29.9)	400 (47.6)	8.18*	332 (54.0)	141 (22.9)	142 (23.1)	95.22***
	Died	58 (17.1)	90 (26.5)	192 (56.5)		70 (23.6)	71 (23.9)	156 (52.5)	
Suffered from chronic diseases	No	100 (26.0)	103 (26.8)	182 (47.3)	8.81*	200 (46.7)	133 (31.1)	95 (22.2)	49.65***
	Yes	147 (18.5)	238 (29.9)	410 (51.6)		202 (41.7)	79 (16.3)	203 (41.9)	
Family member(s) at risk being infected with COVID-19	No	95 (27.9)	98 (28.7)	148 (43.4)	15.38***	256 (61.8)	76 (18.4)	82 (19.8)	100.45***
	Yes	152 (18.1)	243 (29.0)	444 (52.9)		146 (29.3)	136 (27.3)	216 (43.4)	
Total	–	247 (20.9)	341 (28.9)	592 (50.2)	–	402 (44.1)	212 (23.2)	298 (32.7)	–

Figures in bracket indicates the percentage of respondents; *** indicates $p \leq 0.001$, ** indicates $p \leq 0.01$, * indicates $p \leq 0.05$.

CI: 0.266–1.259 for married respondents) and SES (OR = 0.211, CI: 0.091–0.491 and OR = 0.237, CI: 0.113–0.500 respectively) anxiety than respondents who were divorced or widowed.

In the case of respondents in Chittagong, those with a family size of 4 or less were 0.986 (OR = 0.124, CI: 0.067–0.227) times and with a family size of 5–6 were 0.838 (OR = 0.162, CI: 0.091–0.288) times less likely to suffer from SES anxiety than those with a family size of 7 or more. Moreover, in Dhaka, the OR for SES anxiety experienced by respondents with a family size of 5–6 was significantly higher than the reference category. Respondents in Chittagong whose family members were not at risk of Covid-19 were 0.695 (OR = 0.415, CI: 0.282–0.611) and 0.783 (OR = 0.327, CI: 0.222–0.482) times less to have MM and SES anxiety,

respectively, than those whose family members were at risk of being infected with it. The analogous ORs for respondents in Dhaka were 0.891 (CI: 0.596–1.332) and 0.673 (CI: 0.465–0.974) respectively.

In Table 8, with few exceptions, respondents with lower education were less likely to suffer from stress and vice versa. For instance, based on the significant ORs, respondents in Chittagong who had no education or primary education and who had secondary or higher secondary education were 0.370 (CI: 0.172–0.796) and 0.059 (CI: 0.018–0.193) times less likely to experience MM and SES stress, respectively, than those with undergraduate and higher education. Moreover, in Dhaka, illiterate or primary educated respondents and respondents with secondary or higher secondary education were significantly less likely to suffer from MM (OR

= 0.272, CI: 0.097–0.760) and SES (OR = 0.423, CI: 0.288–0.621) stress, respectively, with respect to the reference category.

Respondents in Dhaka with a family income of \leq 35,000 Taka were significantly less likely to suffer from SES stress (OR = 0.648, CI: 0.429–0.976) than those with a family income $>$ 75,000 Taka. Respondents in both Dhaka and Chittagong with a household income of 35,001–75,000 Taka were significantly more likely to suffer from MM (OR = 1.518, CI: 0.994–2.319 and OR = 2.401, CI: 1.416–4.070, respectively) and SES (OR = 1.508, CI: 1.075–2.116 and OR = 1.730, CI: 1.016–2.944, respectively) stress with respect to the reference category. In both Dhaka and Chittagong, male respondents were significantly less stressed at the SES level than their female counterparts.

Marital status had less or no impact on the mental stress of respondents in Dhaka. It is also important to note that single and unmarried respondents felt more stress than those who were divorced or widowed. In contrast, in Chittagong, both single and unmarried respondents were incredibly less likely to suffer from MM (OR = 0.158, CI: 0.060–0.416 for single and OR = 0.204, CI: 0.090–0.463 for married women) and SES (OR = 0.086, CI: 0.034–0.219 and OR = 0.067, CI: 0.030–0.153, respectively) stress than those who were divorced or widowed.

Family size had a strong effect on stress. It is surprising that, in Dhaka, respondents with a family of size 4 or less and of size 5–6 were significantly more likely to experience MM and SES stress than those with families of size 7 or more. However, in Chittagong, respondents with a small family were less likely to suffer from stress. For example, the ORs for respondents with a family size of \leq 4 affected by MM and SES stress were 0.068 (CI: 0.035–0.133) and 0.095 (CI: 0.048–0.185) respectively. The corresponding ORs for those with a family size of 5–6 were 0.165 (CI: 0.094–0.290) and 0.167 (CI: 0.093–0.301), respectively.

According to the significant ORs, respondents whose family members were not at risk of being infected with Covid-19 and lived in Dhaka were 0.791 (OR = 0.319, CI: 0.208–0.488) times less likely to be stressed at MM level, and lived in Chittagong were 0.940 (OR = 0.160, CI: 0.095–0.272) times less likely to be stressed at SES level than those whose family members were at risk of being infected with it.

4. Discussion

This study aimed to assess the prevalence of mental health problems and related factors among the people in Dhaka and Chittagong cities during the Covid-19 pandemic in Bangladesh. Only those respondents who were ever infected with Covid-19 were included in our study. As mental health problems or psychological distress, this study has used an internationally recognized scale, called DASS-21, and found a high prevalence of mental health problems among participants. Out of 1597 respondents from Dhaka, 63.8% reported depression, which was the lowest of the three symptoms. Among 911 respondents in Chittagong, depression was also less common or equal to the stress symptom (55.3%). More precisely, 39.4%, 50.2% and 41.9% of respondents in Dhaka and 34.3%, 50.2% and 27.2% in Chittagong experienced moderate to higher levels of depression, anxiety and stress, respectively. Respondents in this study were incredibly more likely to report experiencing any of three psychological symptoms compared to other international studies, such as those from Saudi Arabia (Alamri et al., 2020), where the prevalence of depression symptoms was the highest, which was only 29.9% and China, where moderate to severe anxiety and stress were 28.8% and 29.6% respectively (Wang et al., 2020a). Furthermore, in a study of seven middle income countries in Asia, Wang et al. (2021b) reported that Thailand, Pakistan and Philippines were the top three countries in terms of average anxiety scores of 21.94, 14.02 and 10.60 as well as average depression scores of 19.74, 11.33 and 9.72 respectively. They also noted that the average anxiety scores were highest among Thais (18.66), followed by Pakistanis (8.23) and Malaysians (7.80). Excluding the Thai population, the mental suffering during the Covid-19 pandemic was greater among citizens of Dhaka and Chittagong. The present study obtained more or less similar results to a study conducted on the population of Bangladesh by Abir et al. (2021).

As coexistence of symptoms, it shows that a substantial portion of respondents (52.8% in Dhaka and 34.3% in Chittagong) experienced depression, anxiety and stress simultaneously. In the early stage of the Covid-19 epidemic, a similar analysis was performed among undergraduates enrolled at San George University (SJU) in Zaragoza (Spain) by Ramon-Arbues et al. (2020) who observed that only around 10% of students suffered from three symptoms at the same time. Additionally, compared to the pairwise correlation between anxiety, stress and depression among the elderly in Iran studied by Hosseini et al. (2021), the current study found a much stronger pairwise relationship for the same psychological symptoms among the respondents from Dhaka and Chittagong. The higher prevalence of mental health symptoms among Bangladeshis could indicate an unfulfilled need in the country's healthcare system fired by the pandemic and a lack of psychiatrists to meet these needs (Lim et al., 2018).

In the bivariate analysis, most of the selected factors, except for religion and education or with some other exceptions, changed in the same direction with mental health problems in both Dhaka and Chittagong. The exception is that in Dhaka, respondents who were Muslim and illiterate or only with primary education had more mental health problems than their counterparts, while in Chittagong it was the other way around. In terms of the impact of religion on mental health, the results for respondents in Dhaka were consistent with a cross-country study conducted by Wang et al. (2021d) who revealed that Iranians, where 99.4% of the population is Muslim, had significantly higher levels of anxiety and depression as compared to the Chinese, where only 2.85% are Muslims. The fact is that healthcare services and the government's response to the outbreak have been much better in China than in Iran. It is quite natural that the greater the civic amenities of the people of a country, the greater the mental fortitude of the people of that country. Besides, religious practices help to cope with anxiety, frustration, fears, inferiority complex, dejection and isolation (Moreira-Almeida et al., 2006; Behere et al., 2013). This indicates that there are more practicing Muslims in Chittagong than in Dhaka as the present study noticed lower mental distress among Muslims in Chittagong than among non-Muslims in Chittagong and even Dhaka.

In a study of Covid-19's knowledge, attitudes, and fears among Bangladeshis, Hossain et al. (2020) observed an inverse correlation of knowledge scores with fear scales. Not only the bivariate analysis, but also the multivariate analysis of this study disclosed the lowest level of psychological distress in illiterate or primary educated respondents compared to respondents in all other education groups in Chittagong. Multivariate analysis also reported the lowest stress among illiterate or primary educated respondents in Dhaka.

A strong relationship between sex and mental health problems was found in all of our analyses. Previous epidemiological research identified that women were at a higher risk of depression and greater susceptibility to stress and post-traumatic stress disorder than men (Lim et al., 2018; Sareen et al., 2013). These findings were substantiated in recent studies in which symptoms of depression, anxiety and stress during the Covid-19 pandemic were appreciably higher among women than men (Liu et al., 2020; Talevi et al., 2020; Abir et al., 2021). The present study also confirmed that the incidence of mental distress was significantly higher among women than in men in both Dhaka and Chittagong. This could be due to the greater involvement of women in various economic sectors such as selling, manufacturing, healthcare and service, which have been severely affected by the current pandemic (Abir et al., 2021).

Sociologists identified a link between job loss and depression (Brand et al., 2008; Burgard et al., 2007). Conversely, depression is associated with low work performance, including absenteeism, reduced productivity at work, and decreased job retention (Beck et al., 2014). Work-related disability and productivity loss are two critical factors for people with major depressive disorder to lead a quality life. Antidepressant treatment provided in clinical trials are associated with improvements in subjective assessments of work-related impairment (Lee et al., 2018). This means that antidepressant treatment reduces depressive symptoms and improve workplace performance.

Table 5. Percentage of respondents with Normal, MM and SES symptoms of stress in Dhaka and Chittagong based on socioeconomic and cultural, demographic and health factors.

Characteristics	Category	Dhaka				Chittagong			
		Normal	MM	SES	Chi-Square	Normal	MM	SES	Chi-Square
Religion	Islam	379 (35.0)	250 (23.1)	453 (41.9)	26.71***	473 (64.4)	136 (18.5)	125 (17.0)	35.6***
	Others	54 (55.1)	3 (3.1)	41 (41.8)		82 (46.1)	30 (16.9)	66 (37.1)	
Education	Illiterate or primary	27 (41.5)	5 (7.7)	33 (50.8)	32.61***	105 (81.4)	18 (14.0)	6 (407)	50.69***
	Secondary or higher secondary	105 (42.9)	72 (29.4)	68 (27.8)		125 (54.8)	50 (21.9)	53 (23.2)	
	Undergraduate or above	301 (34.6)	176 (20.2)	393 (45.2)		325 (58.6)	98 (17.7)	132 (23.8)	
Employment status	Permanent	228 (38.8)	129 (22.0)	230 (39.2)	9.37*	269 (57.2)	117 (24.9)	84 (17.9)	39.54***
	Temporary	48 (27.7)	44 (25.4)	81 (46.8)		94 (74.6)	4 (3.2)	28 (22.2)	
	No work/student	157 (37.4)	80 (19.0)	183 (43.6)		192 (60.8)	45 (14.2)	79 (25.0)	
Family income (in Taka)	Upto 35,000	153 (47.8)	81 (25.3)	86 (26.9)	49.17***	233 (77.4)	27 (9.0)	41 (13.6)	58.89***
	35,001–75,000	156 (29.1)	116 (21.6)	265 (49.3)		214 (49.8)	107 (24.9)	109 (25.3)	
	75,001 or above	124 (38.4)	56 (17.3)	143 (44.3)		108 (59.7)	32 (17.7)	41 (22.7)	
Salary reduced	Not reduced	317 (35.2)	193 (21.4)	391 (43.4)	4.51	357 (68.8)	92 (17.7)	70 (13.5)	44.56***
	Reduced	116 (41.6)	60 (21.5)	103 (36.9)		198 (50.4)	74 (18.8)	121 (30.8)	
Sex	Male	246 (43.5)	159 (28.1)	160 (28.3)	84.06***	411 (66.3)	113 (18.2)	96 (15.5)	36.96***
	Female	187 (30.4)	94 (15.3)	334 (54.3)		144 (49.3)	53 (18.2)	95 (32.5)	
Age (in years)	≤ 39	182 (38.7)	87 (18.5)	201 (42.8)	31.76***	264 (64.7)	71 (17.4)	73 (17.9)	37.33***
	40–49	86 (30.8)	53 (19.0)	140 (50.2)		129 (57.1)	36 (15.9)	61 (27.0)	
	50–59	100 (33.2)	88 (29.2)	113 (37.5)		86 (53.8)	50 (31.3)	24 (15.0)	
	≥ 60	65 (50.0)	25 (19.2)	40 (30.8)		76 (64.4)	9 (7.6)	33 (28.0)	
Marital status	Unmarried	74 (44.6)	20 (12.0)	72 (43.4)	32.17***	105 (64.4)	23 (14.1)	35 (21.5)	27.54***
	Married	316 (34.2)	229 (24.8)	379 (41.0)		418 (62.8)	126 (18.9)	122 (18.3)	
	Divorced/widowed	43 (47.8)	4 (4.4)	43 (47.8)		32 (38.6)	17 (20.5)	34 (41.0)	
Family size	Upto 4	233 (35.5)	157 (23.9)	266 (40.5)	52.87***	292 (78.9)	32 (8.6)	46 (12.4)	140.21***
	5–6	119 (30.1)	79 (19.9)	198 (50.0)		234 (57.4)	85 (20.8)	89 (21.8)	
	7 or more	81 (63.3)	17 (13.3)	30 (23.4)		29 (21.6)	49 (36.6)	56 (41.8)	
Children below 5 or going to school/college	No child	54 (34.4)	18 (11.5)	85 (54.1)	33.32***	55 (87.3)	0 (0.0)	8 (12.7)	157.85***
	1-2 children	285 (40.7)	165 (23.6)	250 (35.7)		408 (72.0)	92 (16.2)	67 (11.8)	
	3 or more children	94 (29.1)	70 (21.7)	159 (49.2)		92 (32.6)	74 (26.2)	116 (41.1)	
Family member(s) aged ≥ 40 years	No member	78 (44.8)	49 (28.2)	47 (27.0)	27.05***	74 (100.0)	0 (0.0)	0 (0.0)	110.43***
	1-2 members	309 (33.9)	189 (20.7)	414 (45.4)		413 (62.7)	132 (20.0)	114 (17.3)	
	3 or more members	46 (48.9)	15 (16.0)	33 (35.1)		68 (38.0)	34 (19.0)	77 (43.0)	
Self-quarantined	No	22 (36.7)	22 (36.7)	16 (26.7)	10.32**	163 (87.2)	16 (8.6)	8 (4.3)	69.98***
	Yes	411 (36.7)	231 (20.6)	478 (42.7)		392 (54.1)	150 (20.7)	183 (25.2)	
Admitted hospital	Not admitted	276 (37.1)	162 (21.8)	306 (41.1)	0.45	353 (64.9)	130 (23.9)	61 (11.2)	88.57***
	Admitted	157 (36.0)	91 (20.9)	188 (43.1)		202 (54.9)	36 (9.8)	130 (35.3)	
Relative(s) died by COVID-19	Not died	336 (40.0)	194 (23.1)	310 (36.9)	29.53***	425 (69.1)	87 (14.1)	103 (16.7)	54.06***
	Died	97 (28.5)	59 (17.4)	184 (54.1)		130 (43.8)	79 (26.6)	88 (29.6)	
Suffered from chronic diseases	No	147 (38.2)	79 (20.5)	159 (41.3)	0.61	300 (70.1)	75 (17.5)	53 (12.4)	39.73***
	Yes	286 (36.0)	174 (21.9)	335 (42.1)		255 (52.7)	91 (18.8)	138 (28.5)	
Family member(s) at risk being infected with COVID-19	No	155 (45.5)	42 (12.3)	144 (42.2)	28.67***	317 (76.6)	71 (17.2)	26 (6.3)	109.06***
	Yes	278 (33.1)	211 (25.1)	350 (41.7)		238 (47.8)	95 (19.1)	165 (33.1)	
Total		433 (36.7)	253 (21.4)	494 (41.9)		555 (60.9)	166 (18.2)	191 (20.9)	

Figures in bracket indicates the percentage of respondents; *** indicates $p \leq 0.001$, ** indicates $p \leq 0.01$, * indicates $p \leq 0.05$.

A recent study found an association between temporary job loss and stress during the Covid-19 pandemic (Mimoun et al., 2020). The economic downfall of Covid-19 in South Africa resulted in unprecedented job losses and job furlough, which significantly impaired mental happiness (Posel et al., 2021). Conversely, returning to work can improve self-esteem and financial status, which in turn improves living standards and reduces depression and stress (Lu et al., 2017; Modini et al., 2016). According to Tan et al. (2020), personal psychoneuroimmunity prevention measures, including wearing masks and hand hygiene, as well as organizational measures, including social distancing and good ventilation in workplace, served to protect the mental health of Chinese workers when the risk for contracting Covid-19 remained unknown. Also, as precautions against

coronavirus and other similar diseases, researchers cited other psychoneuroimmunity measures for the workforce, including nutritional meals, regular exercise, scheduled rest periods, flexible staffing resources and strengthening peer support in the workplace (McAlonan et al., 2007; Kim and Su, 2020; Tan et al., 2020). Tan et al. (2020) observed that psychoneuroimmunity prevention measures were associated with less severe psychiatric symptoms. These findings were consistent with the employment status of the current study, where temporary employees were at greater risk for mental health problems than permanent employees and even those who were unemployed. Basically, most of the respondents in the unemployed group were students, housewives, or retirees who had no responsibility for the family's earnings.

Table 6. Odds ratio (OR) of respondents with MM and SES symptoms of depression in Dhaka and Chittagong based on some selected covariates.

Covariates	Category	Dhaka		Chittagong	
		MM	SES	MM	SES
Education	Illiterate or primary	0.587 (0.259, 1.332)	1.390 (0.687, 2.811)	0.166 (0.076, 0.364)***	0.041 (0.013, 0.131)***
	Secondary or higher secondary	0.480 (0.327, 0.706)***	0.292 (0.196, 0.434)***	1.325 (0.870, 2.018)	1.179 (0.705, 1.972)
	Undergraduate or above (RC)				
Family income (in Taka)	Upto 35,000	1.405 (0.905, 2.182)	1.247 (0.805, 1.931)	0.798 (0.412, 1.236)	1.635 (0.798, 3.346)
	35,001–75,000	1.339 (0.959, 2.041)	2.654 (1.847, 3.813)***	0.984 (0.646, 1.500)	2.036 (1.141, 3.634)*
	75,001 or above (RC)				
Sex	Male	0.643 (0.467, 0.887)**	0.459 (0.334, 0.629)***	0.998 (0.666, 1.496)	0.395 (0.249, 0.625)***
	Female (RC)				
Marital status	Unmarried	2.035 (0.798, 5.188)	1.793 (0.888, 3.620)	0.393 (0.157, 0.982)*	0.121 (0.049, 0.303)***
	Married	2.107 (0.933, 4.761)	0.904 (0.517, 1.581)	0.403 (0.177, 0.916)*	0.075 (0.033, 0.167)***
	Divorced/widowed (RC)				
Family size	Upto 4	2.025(1.246, 3.292)**	3.069 (1.829, 5.151)***	0.253 (0.140, 0.458)***	0.114 (0.059, 0.218)***
	5–6	2.991 (1.801, 4.966)***	3.419 (1.985, 5.889)***	0.482 (0.282, 0.826)**	0.151 (0.084, 0.272)***
	7 or more (RC)				
Family member(s) at risk being infected with COVID-19	No	0.246 (0.165, 0.365)***	0.756 (0.541, 1.056)	0.699 (0.487, 1.002)*	0.332 (0.199, 0.522)***
	Yes (RC)				
-2 Log Likelihood		1267.309		804.044	
LRT		Chi-square = 238.301***		Chi-square = 295.558***	

RC = Reference category; Figures in bracket indicates the 95% confident interval of OR; *** indicates $p \leq 0.001$, ** indicates $p \leq 0.01$, * indicates $p \leq 0.05$.

There are mixed findings on the relationship between income and mental illness in the literature. Most of the studies have found that lower socioeconomic status is associated with mental illness (Fryers et al., 2003; Lorant et al., 2003; Sareen et al., 2011), while few studies have not found this relationship (McMillan et al., 2010). In the early phases of the Covid-19 pandemic, low-income US adults experienced substantial negative impacts concerning their finances and access to basic needs such as food and mental health treatment (Hall et al., 2022). Moreover, a cross-sectional study among 11,342 Japanese during the Covid-19 pandemic was conducted and reported that psychological distress was more prevalent among people with lower income than other groups (Nagasu et al., 2021). Although the findings of this study were not entirely consistent with previous studies, the odds ratios that were significant indicated that respondents in both Dhaka and Chittagong with low levels of household income were at increased risk of suffering from depression, anxiety and stress than those with a higher household income.

Researchers found mixed results for the age variable concerning the mental health of people in different age groups during the Covid-19 pandemic (Taylor et al., 2008; Qiu et al., 2020; Jiménez et al., 2020; Tian et al., 2020). Some literature in the field of disaster revealed that elder population is particularly susceptible to the adverse psychological consequence of critical situations, such as post-traumatic stress disorder (PTSD) (Jia et al., 2010). However, in agreement with the current study's results, most of the studies have shown a protective tendency among the elderly. This may be due to their greater life experience, exposure to the previous disaster, or facing less responsibilities as they are aged now (Ngo, 2001). Like some researchers, we have observed higher depression, anxiety and stress among young people which may be explained by their greater access to information via social media, which can easily aggravate stress (Cheng et al., 2014; Nagasu et al., 2021).

This study identified marital status as one of the most widely investigated factors in relation to mental health status during the Covid-19 pandemic. Similar to a study in the USA (Ettman et al., 2020), we found that the likelihood of experiencing symptoms of depression, anxiety and stress increased among respondents in Chittagong who were separated from family or widowed/divorced. Not only married respondents but also unmarried respondents in Chittagong fared better psychologically and emotionally than respondents who were divorced/widowed. Since marriage is virtually universal in Bangladesh (Zahangir and Nahar, 2021), most of the unmarried respondents are students or, those engaged in earning, are mostly young. The results of the marital status relating to mental health problems in Dhaka were opposite to those in Chittagong as well as other international studies (Vaingankar et al., 2020; Picco et al., 2016).

Although the results obtained by the respondents in Dhaka did not support the hypothesis that family size and mental health problems are positively allied, the corresponding results for respondents in Chittagong supported this hypothesis and were also consistent with a previous study. For example, respondents from smaller families were less likely to be stressed and anxious, while those from larger families were more likely to be distressed (Lateef et al., 2021). In addition to that, respondents, with one or more family members at risk of being infected by Covid-19 were found to experience higher levels of depression, anxiety and stress; and this is because the disease can spread to other family members. Like other studies, this study also found that self-quarantine, number of children, and chronic health problems were associated with respondents' experience of psychological problems during the pandemic (Alamri et al., 2020; Brooks et al., 2020).

As stated by Heckendorf et al. (2022), worry-focused interventions could reduce mental anguish and positively affect symptoms of depression and anxiety. Cognitive behavioral therapy (CBT) has emerged as one

Table 7. OR of respondents with MM and SES symptoms of anxiety in Dhaka and Chittagong based on some selected covariates.

Characteristics	Category	Dhaka		Chittagong	
		MM	SES	MM	SES
Education	Illiterate or primary	2.597(0.878, 7.680)	1.787 (0.643, 4.962)	0.481 (0.254, 0.911)*	0.042 (0.015, 0.121)***
	Secondary or higher secondary	1.213 (0.775, 1.901)	0.697 (0.456, 1.065)	1.492 (0.915, 2.433)	2.327 (1.481, 3.656)***
	Undergraduate or above (RC)	.	.	.	.
Family income (in Taka)	Upto 35,000	2.222 (1.342, 3.682)**	1.179 (0.733, 1.896)	0.861 (0.464, 1.595)	1.286 (0.721, 2.292)
	35,001–75,000	0.778 (0.505, 1.201)	1.154 (0.787, 1.692)	1.773 (1.098, 2.864)*	1.395 (0.873, 2.230)
	75,001 or above (RC)	.	.	.	.
Sex	Male	0.491 (0.335, 0.718)***	0.311 (0.219, 0.441)***	1.387 (0.889, 2.163)	0.610 (0.406, 0.917)***
	Female (RC)	.	.	.	.
Marital status	Unmarried	3.429 (1.317, 8.927)*	1.067 (0.532, 2.140)	0.322 (0.129, 0.803)*	0.211 (0.091, 0.491)***
	Married	12.534(5.344,29.398)***	2.964 (1.650, 5.323)***	0.579 (0.266, 1.259)	0.237 (0.113, 0.500)***
	Divorced/widowed (RC)	.	.	.	.
Family size	Upto 4	0.757 (0.435, 1.317)	1.261 (0.731, 2.177)	0.993 (0.467, 2.108)	0.124 (0.067, 0.227)***
	5–6	0.811 (0.445, 1.477)	2.036 (1.143, 3.625)*	1.196 (0.587, 2.437)	0.162 (0.091, 0.288)***
	7 or more (RC)	.	.	.	.
Family member(s) at risk being infected with COVID-19	No	0.891 (0.596, 1.332)	0.673 (0.465, 0.974)*	0.415 (0.282, 0.611)***	0.327 (0.222, 0.482)***
	Yes (RC)	.	.	.	.
-2 Log Likelihood		1132.779		856.660	
LRT		Chi-square = 208.096***		Chi-square = 315.211***	

RC = Reference category; Figures in bracket indicates the 95% confident interval of OR; *** indicates $p \leq 0.001$, ** indicates $p \leq 0.01$, * indicates $p \leq 0.05$.

of the most commonly practiced and widely researched forms of psychotherapy since its development in the early 1960s (Beck, 1967; Ellis, 1962; DeRubeis et al., 2010). However, the use of CBT remains limited due to the lack of therapists, limited accessibility in remote areas, higher costs, stigmatization, and the lack of awareness among healthcare workers and patients (Kang and Kim, 2019; Sateia et al., 2017). Consequently, CBT which is delivered via internet (iCBT) and mindfulness-based cognitive therapy (MBCT) have been shown to be effective in treating co-morbid depressive symptoms among individuals with early-stage PTSD (Sijbrandij et al., 2016; Zhang and Ho, 2017; Ho et al., 2020). Furthermore, digital CBT (dCTB) instead of CTB has been strongly recommended for insomnia treatment which typically includes cognitive restructuring, stimulus control, sleep restriction, sleep hygiene education, and relaxation (Soh et al., 2020). Based on the current and

other similar studies, viral respiratory outbreaks such as Covid-19 have a profound effect on individuals' mental and physical health. Hence, we are proposing online psychological intervention (e.g., internet CBT) in reducing worry of general people during the pandemic.

According to worldometer's coronavirus update (worldometer, 2022), the number of Covid-19 infections and deaths worldwide, including Bangladesh has decreased over time. An important reason could be that a large portion of the world's population have been vaccinated against Covid-19. As of May 18, 2022, Bangladesh ranks 16th in the world in terms of vaccination against coronavirus diseases, with over 70% of people receiving more than one dose of the vaccine (<https://ourworldindata.org/covid-vaccinations>). If the government of Bangladesh had not encouraged as well as compelled people in various ways, including providing free vaccinations, the reality might have been

Table 8. OR of respondents with MM and SES symptoms of stress in Dhaka and Chittagong based on some selected covariates.

Characteristics	Category	Dhaka		Chittagong	
		MM	SES	MM	SES
Education	Illiterate or primary	0.272 (0.097, 0.760)*	0.767 (0.415, 1.419)	0.370 (0.172, 0.796)*	0.059 (0.018, 0.193)***
	Secondary or higher secondary	0.956 (0.638, 1.433)	0.423 (0.288, 0.621)***	1.422 (0.875, 2.310)	0.930 (0.556, 1.554)
	Undergraduate or above (RC)	.	.	.	.
Family income (in Taka)	Upto 35,000	1.356 (0.834, 2.207)	0.648 (0.429, 0.976)*	0.881 (0.431, 1.800)	1.384 (0.696, 2.755)
	35,001–75,000	1.518 (0.994, 2.319)	1.508 (1.075, 2.116)*	2.401 (1.416, 4.070)***	1.730 (1.016, 2.944)*
	75,001 or above (RC)	.	.	.	.
Sex	Male	1.197 (0.842, 1.703)	0.331 (0.245, 0.448)***	0.932 (0.585, 1.484)	0.426 (0.271, 0.672)***
	Female (RC)	.	.	.	.
Marital status	Unmarried	1.452 (0.432, 4.879)	1.298 (0.680, 2.480)	0.158 (0.060, 0.416)***	0.086 (0.034, 0.219)***
	Married	4.259 (1.430, 12.688)**	1.423 (0.845, 2.396)	0.204 (0.090, 0.463)***	0.067 (0.030, 0.153)***
	Divorced/widowed (RC)	.	.	.	.
Family size	Upto 4	4.325 (2.411, 7.759)***	3.402 (2.077, 5.573)***	0.068 (0.035, 0.133)***	0.095 (0.048, 0.185)***
	5–6	3.115 (1.690, 5.739)***	4.501 (2.710, 7.475)***	0.165 (0.094, 0.290)***	0.167 (0.093, 0.301)***
	7 or more (RC)	.	.	.	.
Family member(s) at risk being infected with COVID-19	No	0.319 (0.208, 0.488)***	0.869 (0.628, 1.204)	0.881 (0.578, 1.341)	0.160 (0.095, 0.272)***
	Yes (RC)	.	.	.	.
-2 Log Likelihood		1116.380		807.648	
LRT		Chi-square = 276.380***		Chi-square = 355.614***	

RC = Reference category; Figures in bracket indicates the 95% confident interval of OR; *** indicates $p \leq 0.001$, ** indicates $p \leq 0.01$, * indicates $p \leq 0.05$.

different. Although vaccines are effective against Covid-19, there are risks for vaccine-related side effects, including inflammation at the injected area, agitation, headache, dizziness, and fever (Desai et al., 2021; Gee et al., 2021), which, especially in the early stages, has created an anti-vaccination mindset. Nevertheless, one study reported the lack of trust and readiness as potential barriers for Covid-19 vaccination in people with substance use disorder (Mellis et al., 2021). Also, Hao et al. (2021) found people with depression or anxiety disorder were less likely to voluntarily receive the Covid-19 vaccine compared to health-conscious people in China. Therefore, even after successfully completing a vaccination program in Bangladesh, further research into the attitudes of people with psychological distress in Dhaka and Chittagong towards vaccination could be important.

5. Limitations and strengths

This study had some limitations. First, its participants came only from the metropolitan areas of Dhaka and Chittagong, limiting the generalization of our findings as two divisional results to rural areas. Second, we had no pre-epidemic DASS-21 baseline data and data during the first wave; therefore, from the data collected in the second wave alone, it was not possible to know whether there was any increase in distress levels, or any increase (if confirmed) related to Covid-19. Since this is a cross-sectional study, we have not been able to measure the impact of individual mental health problems over time. Third, the findings of this study, particularly the prevalence of symptoms of depression, anxiety, and stress may differ significantly from the actual picture as only Covid-19-infected respondents were more likely to exhibit mental health problems. Fourth, the mental health status of respondents who were suffering from Covid-19 at the time of the interview may be much worse than that of respondents who had already recovered from the disease, so the results that we have generalized to the mental anguish of people infected with Covid-19 are not entirely impartial. Despite these limitations, this study has several strengths. As far as we know, this study is unique in its field when it comes to data collection techniques. That is, the data was collected through a face-to-face interview which gave more accurate results than all similar previous research based on online surveys. Another strength of this study is due to the use of the face-to-face survey technique to almost all types of respondents such as literate and illiterate, respondents of any socioeconomic background, especially ultra-poor respondents, respondents who have or have not access to the internet and may or may not respond to online surveys, etc.

6. Conclusion

This study explored the psychological distress of people in Dhaka and Chittagong—two major cities of Bangladesh—during the second wave of the Covid-19 pandemic when it peaked. Respondents included in the survey reported high rates of symptoms of depression, anxiety, and stress; this can be attributed to the fact that the number of confirmed cases and deaths in the second wave was too high which increased the risk of mental health outcomes. Although we considered various socioeconomic, cultural, demographic, and health factors to examine their impact on psychological distress, we found specific subgroups of respondents with few exceptions in both cities, especially in Dhaka, at higher risk: secondary or high school graduates, females, divorced/widowed respondents, respondents with lower wage, large families, and any family member at risk of being infected by Covid-19. Undoubtedly, Covid patients got more accurate and improved treatments in the second wave than the first one; and before the second wave launched, the first dose of the Covid-19 vaccine was given to people 60 or older, including special profession such as doctors, nurses, policemen, and journalists as a priority basis. Despite these immediate successes of medical science against coronavirus, no improvement or insignificant improvement in mental health outcomes was reported in the current study compared to another study conducted among Bangladeshis by Abir et al. (2021). This means

that till the end of the second wave and even then, the Covid-19 outbreak was a major concern for the population of Bangladesh, not only because of its rapid spread from person to person but also because of its limiting our day-to-day life activities in many ways. It cannot be denied that during the pandemic our education sector was severely damaged, followed by economics, health, and other sectors.

Declarations

Author contribution statement

Mohammad Salim Zahangir: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Md. Rokonzaman: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

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Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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