Perceived stress, depression, and associated factors among people in Northeastern Bangladesh

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ABSTRACT

This study explores the socioeconomic correlates of depressive symptoms and perceived stress using 622 items of cross-sectional data collected by survey interviews from adults living in Sylhet City, Bangladesh using random sampling. The study uses the Center for Epidemiologic Studies Depression (CES-D) scale to assess the intensity of depression and Cohen's Perceived Stress Scale (PSS) to measure the level of perceived stress. The study applies both simple linear and multivariate analysis. The CES-D scale of 21.6 and the PSS score of 18.79 confirm that the people in the study area are generally depressed while their stress level is moderate. Both the univariate and multivariate analyses indicate that having a profession as a day laborer, having a loan burden, occupying a lower position on the community ladder, and making household decisions are highly associated with both depressive symptoms and perceived stress. In contrast, having more family expenditure and regular jobs like public service are linked with lower levels of stress and depression. The findings of the study may contribute to the formation of stress and depression mitigation policies in the country, eventually increasing the working efficiency of the people.

Keywords:
Bangladesh; depressive symptoms; perceived stress; socioeconomic

INTRODUCTION

Depression is the most extensive form of mental illness, encompassing low mood, lack of pleasure, sleep disturbance, weight fluctuation, fatigability, impaired attention and concentration, guilt, suicidal thoughts, and impaired daily functioning.[1,2] Although stress and depression are sometimes used synonymously, there is a theoretic difference in intensity between these forms of emotional feelings. Stress is not a mental health condition but can lead to mental health problems like depression. Depression, also known as distress, causes the body to react negatively and can eventually lead the body to break down, while stress, known as eustress, results from challenges in daily life.[3] Stressful life events can trigger a depressive episode.[4] Depression has been defined as an alarming public health issue by WHO.[5] It is responsible for low living standards and placing a burden on individuals, their families, and society.[6]

According to WHO statistics, globally, 280 million people of all ages suffer from depression[5,] which is the leading cause of disease and health burden. Low and middle-income countries are more likely to suffer from mental illness than high-income countries.[7] Depression is linked to low monthly income levels, tobacco use, and chronic diseases.[8] Othman (2019) studied the severity of stress among young adults and observed that political, social, and family factors, as well as self-reported health, are positively associated with more stress. Lack of motivation is also a crucial factor contributing to depression.[10] The study concluded that the socio-demographic and socioeconomic status of the respondents leads to mental stress and depression.[11,12] Another study found that depressive symptoms and perceived stress were positively linked to lower subjective social status, large family size, and lower educational attainment in South Africa.[13] Along with the neglect of the healthcare

management system, depression remains a health issue in Bangladesh, as in other lower and lower-middle-income countries.[14]

Existing studies on stress and depression in Bangladesh mainly focus on the younger population, such as adolescents and students.[15,16,17] A recent study revealed that 25% to 71% of university students experience mild to severe depression, anxiety and stress.[18] The prevalence of depression, stress and anxiety was observed to be 17.9%, 30.3% and 12%, respectively, with breathing issues being the most severe risk factors among the construction workers.[19] The prevalence of depression and anxiety is high among Bangladeshi first-year university and medical students, and the determinants of depression include lack of physical exercise, sleep deprivation, and excessive use of the internet and social media.[16,17,20] Again, parents' educational attainment, occupation, family size, and bonding were not the ultimate predictors of depression.[22] Evidence suggests that depressive symptoms are more prevalent among females than males (30% vs. 19%).[16,17,21]

Studies focus on the relationship between stress and depression and their impact on different domains of individuals and society. However, to extract the impact of stress and depression individually and collectively, it is crucial to address the socioeconomic determinants. Existing studies were based on psychological factors, mental health problems, and help-seeking behavior, with a particular focus on young people.[22,23,24,25] Depression is more prevalent in the northeast region of Bangladesh, especially among the elderly, females, unmarried individuals, medical students, women of reproductive age, and wives left behind by migrant workers.[26,27,28] The associated factors were sex, poor living conditions, household consumption, and low socioeconomic conditions.[26,27,28,29] Since stress and depression are supposed to be closely linked, it is worth exploring the

correlations of both stress and depression in a single study. Moreover, the factors contributing to stress and depression are heterogeneous and vary in accordance with a region's socioeconomic structure. The paucity of studies on Northeastern Bangladesh creates a valid ground for observing the scenario of stress and depression and the factors associated with them, in Sylhet City. The current study focuses on the socioeconomic correlation of stress and depression by applying two different scales to the northeastern region of Bangladesh. Thus, this study aims to investigate the prevalence of stress and depression in Sylhet City and the factors associated with them.

METHODOLOGY

Population, sample, and data collection

This study was conducted on adults in the Sylhet City Corporation. Therefore, individuals older than 18 were eligible to participate, while those diagnosed with a mental health condition were excluded. The multistage cluster sampling technique was used to reach the respondents. Among 27 wards within Sylhet City Corporation, seven were randomly selected. The wards were defined with specific numbers. The wards were selected by a random number generator. The number of clusters was selected based on the proportion of households within each ward. Each mahalla (a small part of a ward, typically centered around a mosque or temple) was considered one cluster, with clusters randomly selected from the wards. The number of mahallas varied according to the ward area. A specific number was assigned for each mahalla, which was finally selected by the random number generator, with 20 households from each cluster being selected accordingly. This study used Population and Housing Census (2022) data to find information on wards,

mahallas, and the number of households within each mahalla.[30]

The sample size was calculated using the following formula:

n = Z² p (1-p) / d^2

Where,

> Z=95% confidence interval
> P=0.5 (requirement for minimum sample)
> d=Absolute precision is 5 percentage points (0.05)

The required minimum sample size is $[(1.96^2) (0.5) (1- 0.5)] / (0.05)^2$=384.

However, we opted for a larger sample size for more generalized results. Based on the funding and timeframe of the project, we interviewed 670 respondents and 48 of them were somehow incomplete and inconsistent. So, we ended up with 622 samples with a 92.8 percent response rate.

This cross-sectional study used primary data for quantitative analysis. The preliminary data were collected directly from face-to-face interviews with the target respondents using a structured questionnaire conducted at their residences and workstations.

Measurements

Depressive symptoms measured by the CES-D scale and perceived stress measured by the PSS scale represent the outcome variables of the study. The CES-D is a brief self-report scale developed to assess depression symptomatology in the general population.[31] CES-D includes 20 questions to help understand the severity of depression[32]. We asked the respondents how often they felt different depression-related feelings during the last 7 days. The score varies from 0 to 3 with a higher value indicating it happened most frequently. Thus, the overall CES-D score ranges from 0 to 60. The greater the score, the more severe the level of depression. The CES-D

scale is reliable and valid for a variety of demographic properties.[31] The Cohen's PSS includes ten items designed to explore how often an individual experienced different stressful events in the past month with a score range of 0-4 where a greater value indicates that the respondent experienced the stressful situations with greater frequency[33]. So, the overall PSS score ranges from 0 to 40, where a higher score suggests a more stressful condition. PSS-10 is considered a reliable and valid measure of perceived stress in Bangladesh.[17] Moreover, the estimated Cronbach's alpha value for the CES-D scale of .89 and .79 for PSS-10 indicate that these indexes are reliable for use in Bangladesh.

The explanatory variables used in this study were categorized into five segments based on the questions asked. Socio-demographic variables such as gender, age, marital status, educational qualifications, ethnicity, number of members in a household, and income-related factors like the respondent's expenditure, family expenditure, non-employment income sources, and amount of loan or savings were the prime explanatory variables. Variable events indicating major life events in the respondent's household during the last year were included. The explanatory variables included the respondent's social status and decision-making criteria. The social status of the respondents was assessed out of 10 points based on their perception of how the community valued them. The respondent is at a lower level if the score is between 0 and 3, at a medium level if the score is between 4 and 6, and at a higher level with a score between 7 and 10. The decision-making category included a question about who makes decisions on various family issues.

Data Analysis

At first, we performed a Chi-square test to assess the significance level between dependent and independent variables. The data were analyzed in two steps using the STATA software for Windows (v.15). In the first step, a simple linear regression model was used to determine the unadjusted association between the outcome variables and explanatory variables.[17] The outcome variables were regressed on the explanatory variables separately in this bivariate analysis. The second step follows a multiple linear regression model, using the variables of theoretical importance and significant variables in the simple linear regression. Five different multiple linear regression models were used against each outcome variable. This study obtained ethical approval from the Shahjalal University Research Center. Informed consent was confirmed for each interview. Privacy and confidentiality of participants and their data were also ensured.

RESULTS

Characteristics of the Participants

Data were collected from 622 respondents: 378 males and 244 females. Among them, 492 participants were Muslims, and the remainder were Hindu. The majority of the respondents were aged between 26 and 35 years, with those aged 65 years being the lowest in number. Of the 622 participants, 395 were married, 197 were single, and the remaining participants were either divorced or widowed. Among the respondents, 378 were from families with four to six members, while 36 belonged to a family with more than nine members. Over half of the participants had experienced major life events in the past year. Among the participants, 272 had a monthly income range of Tk 20,000 to Tk 40,000, 137 received an income ranging from Tk 40,000 to 60,000, while 156 earned less than Tk 20000. In terms of education, 190 participants were graduates, 96 had a primary level education, 120 had a secondary level, 142 had a higher secondary level of education, and 74 were

illiterate. Respondents with loans equated to 89, while 433 had no loans. Among 166 participants, the majority of the participants ranked themselves in the medium range of social status, while 117 and 114 respondents ranked themselves in the lower and higher range, respectively. Among the participants, 215 reported that they make household decisions by consensus with their partners, 141 of the respondents took such decisions themselves, and in 243 cases, other members of the family took the decision. Table 1 presents the characteristics of the respondents along with the Chi-square test of dependency.

Table 1. Variables of interest by gender of the respondents

Variables	Gender		Chi-square test
	Male (n)	Female (n)	P value
Demographic Characteristics			
Age			
≤ 25	109	50	
26 to 35	95	65	.229
36 to 45	71	54	
46 to 55	57	36	
56 to 65	33	30	
>65	13	9	
Religion			
Islam	297	193	.875
Hindu	81	51	
Marital Status			
Single	142	45	.000
Married	232	163	
Divorced	1	5	
Widow/ Widower	3	31	
Total Family Member			
1 to 3	60	58	
4 to 6	232	146	.020
7 to 9	58	32	
> 9	28	8	
Socio-economic characteristics			
Education			
Illiterate/ No education	35	39	
Primary Level	57	39	.057
Secondary Level	69	51	
Higher Secondary Level	93	49	
Graduate equivalent or more	124	66	
Occupation or Income Source			
Public service	37	14	
Private service	72	18	
Business	102	07	
Day labor	45	17	.000

Variables	Gender		Chi-square test
	Male (n)	Female (n)	P value
Unemployed	15	07	
Student	73	31	
House-wife	0	134	
Others	34	16	
Family Member Employed			
0 to 1	205	157	
2	111	59	
3	40	16	.136
4	12	07	
> 4	10	5	
Total family monthly expenditure			
<20,000	109	57	
20,000 to 40,000	161	111	.660
40,000 to 60,000	80	57	
60,000 to 80,000	19	12	
>80,000	9	7	
Loan			
Yes	134	55	
No	244	189	.001
Alternative Earning			
Yes	84	61	
No	294	183	.424
Social Status			
Status rating by the respondent			
Lower range (1 to 3)	65	52	
Medium range (4 to 6)	241	150	.421
Higher range (7 to 10)	72	42	
Life Event			
Major life event of the respondent			
Yes	195	118	.432
No	183	126	
Household decision making			
Decision making			
Decision is made by			
I myself	103	38	
My partner	0	23	
Me and my partners	151	64	.000
Other members	124	119	

CES-D and PSS Scores

The overall CES-D score was 21.6, with a mean score of 21.37 (SD 9.6) for men and 21.96 (SD 9.5) for women. The proposed cut-off score for the CES-D scale was 16, as used in the US population, and 18.8 for South Africa.[14] The score for the CES-D scale corroborates that the people in the region under study are generally depressed. Though there is no established cut-off score for the PSS scale, the findings reveal an overall score of 18.4. For men, the perceived stress score was 18.79 (SD 6.7) and 17.94 (SD 7.5) for women. Table 2

summarizes the calculated CES-D score and perceived stress score. The score for the PSS scale indicates that the people in the Sylhet City Corporation area are moderately stressed in general.

Table 2. Summary of mental health indicators

Indicator	Overall	Mean Score	
		Male	Female
CES-D	21.6 (9.579)	21.37 (9.6)	21.96 (9.5)
PSS	18.4 (7.060)	18.79 (6.7)	17.94 (7.5)

Note: Standard deviations are in parenthesis

Correlation of Depressive Symptoms and Perceived Stress

Table 3 presents the results of the univariate analysis. Findings suggest that a higher level of depressive symptoms was experienced by individuals who are day laborers, have loans, are in lower social status, and take household decisions, with coefficients 7.96, 5.74, 4.38, -4.30, and 4.74 respectively. Since indebted people often experience mental pressure related to loan repayment. Day laborers face the challenge of getting to work daily and maintaining the daily needs of their families. Those placed lower on the community ladder may suffer from an inferiority complex, and experience higher levels of stress. Conversely, lower depressive symptoms are correlated with a higher level of education, monthly family expenditure, and good occupational status (correlation coefficients -1.77, -1.70, and -

3.46 respectively). Employment status is correlated with stress and depression because some jobs are more secure than others; for example, a public sector job may create less stress. In PSS, the correlation coefficients for day laborers, indebted people, major life events, and household decision-making were 5.99, 2.68, .97, and 4.37 respectively which indicates that these variables are linked with more stressful experiences. Consistent with previous results, individuals with higher levels of education, more family expenditure, and a higher placement on the community ladder tend to experience lower levels of stress. All the significant variables followed the 5% significance level except for single marital status, experiencing major life events and making decisions with partners, which were significant at the level of 1%.

Table 3. Factors associated with depressive symptoms and perceived stress: univariate analysis

Variables	Coefficients	
	CES-D	PSS
Demographic Characteristics		
Gender		
Female	.587	-.848
Male	0[a]	0[a]
Age	.020	-.017
Religion		
Hindu	1.105	.611

Variables	Coefficients	
	CES-D	PSS
Islam	0[a]	0[a]
Marital Status		
Single	.88	1.22*
Divorced	7.96**	3.54
Widow/ Widower	4.14**	1.87
Married	0[a]	0[a]
Total Family Member	-.17	-.038
Socio-economic characteristics		
Education	-1.10**	-.86**
Occupation or Income Source		
Public service	-3.46**	-1.24
Private service	-.69	.325
Day labor	5.74**	5.99**
Unemployed	-1.71	.971
Student	-.735	.524
House-wife	-2.63**	-1.85**
Others	3.36**	.90
Business	0[a]	0[a]
Family Member Employed	-.33	.006
Total family monthly expenditure	-1.77**	-1.33**
Loan		
Yes	4.38**	2.68**
No	0[a]	0[a]
Alternative Earning		
Yes	-1.03	.068
No	0[a]	0[a]
Social Status		
Status rating by the respondent	-4.30**	-2.95**
Life Event		
Major life event of the respondent		
Yes	1.02	.97*
No	0[a]	0[a]
Household decision making		
Decision is made by		
I myself	4.74**	4.37**
My partner	6.39**	5.43**
Me and my partners	1.62*	1.89**
Other members	0[a]	0[a]

*Note: *p<0.1; **p<0.05; 0[a] indicates the reference value*

Table 4 presents the results of the multivariable analysis with depressive symptoms as the dependent variable. In the first model D1, we regressed the CES-D scale on demographic variables. In the following models, in addition to the demographic variables, we incorporated economic variables, loan status, social ratings, and decision-making variables in model D2 to model D5 respectively. The findings of the D1 model indicate that depression is not correlated with age, gender, and religion. However, divorced people experience more depression

compared to their counterparts, with a coefficient of 8.2. Models D2 to D5 confirm that day laborers, debt-ridden people, and decision-makers are more likely to experience more depressive symptoms. In contrast, people experience fewer depressive symptoms if they have a regular job such as public service, higher family expenditure, and higher status on the social ladder, with coefficients -3.96, -.84, and -4.35 respectively.

Table 4. Factors associated with CES-D: multivariate analysis

	Model D1	Model D2	Model D3	Model D4	Model D5
Observations	622	622	622	622	622
Gender					
Female	.173	3.735**	.28	.21	.52
Male	0ª	0ª	0ª	0ª	0ª
Age	.038	.0312	.06*	.04	.04
Religion					
Hindu	1.362	1.60*	1.66*	1.5	1.72*
Islam	0ª	0ª	0ª	0ª	0ª
Marital Status					
Single	1.84	2.73**	2.83**	1.85*	2.41**
Divorced	8.26**	3.56	5.70	8.46**	6.73**
Widow/ Widower	3.53*	1.81	2.39	3.42*	.76
Married	0ª	0ª	0ª	0ª	0ª
Total Family Member	-.17	-.16	-.12	-.186	-.12
Education		.05			
Occupation or Income Source					
Public service		-3.96**			
Private service		-1.08			
Day labor		3.91**			
Unemployed		-5.391**			
Student		-1.53			
House-wife		-4.81**			
Others		1.64			
Business		0ª			
Family Member Employed		.137			
Total family monthly expenditure		-.84*			
Loan					
Yes		3.99**			
No		0ª			

	Model D1	Model D2	Model D3	Model D4	Model D5
Alternative Earning					
Yes		.326			
No		0ᵃ			
Status rating by the respondent			-4.35**		
Major life event of the respondent					
Yes				1.21	
No				0ᵃ	
Decision is made by					
I myself					4.17**
My partner					6.83**
Me and my partners					.75
Other members					0ᵃ
Constant	19.85**	20.02**	27.22**	19.28**	17.67

Note: *p<0.1; **p<0.05; 0ᵃ indicates the reference value

Table 5 provides the correlates of perceived stress based on the results of the multivariable analysis. In model S1, the PSS score was regressed on the demographic variables, whereas in models S2 to S5 we added the economic variables, major life events, social status, and decision-making variables respectively. The S1 model corroborates the link between perceived stress and being widowed. Findings from S2 to S5 suggest that day labor, having loans, and experiencing major life events are linked to higher perceived stress. However, higher monthly family expenditure and higher social rating are significantly associated with lower perceived stress, as their coefficients are -.59 and -3.07, respectively.

Table 5. Factors associated with PSS: multivariate analysis

	Model S1	Model S2	Model S3	Model S4	Model S5
Observations	622	622	622	622	622
Gender					
Female	-1.06*	.963	-.98*	-1.03*	-.69
Male	0ᵃ	0ᵃ	0ᵃ	0ᵃ	0ᵃ
Age	-.009	-.014	.005	-.008	-.006
Religion					
Hindu	.83	1.21*	1.04	.95	1.16*
Islam	0ᵃ	0ᵃ	0ᵃ	0ᵃ	0ᵃ
Marital Status					
Single	.94	1.672*	1.64**	.95	1.58
Divorced	4.06	.45	2.25	4.22	2.61
Widow/ Widower	2.54*	1.15	1.74	2.45*	.72

	Model S1	Model S2	Model S3	Model S4	Model S5
Married	0[a]	0[a]	0[a]	0[a]	0[a]
Total Family Member	-.06	-.08	-.023	-.07	-.0056
Education		-.24			
Occupation or Income Source					
Public service		-.94			
Private service		.31			
Day labor		4.81**			
Unemployed		.28			
Student		-.21			
House-wife		-2,08*			
Others		.24			
Business		0[a]			
Family Member Employed		.263			
Total family monthly expenditure		-.59*			
Loan					
Yes		2.24**			
No		0[a]			
Alternative Earning					
Yes		1.05			
No		0[a]			
Status rating by the respondent			-3.07**		
Major life event of the respondent					
Yes				1.02*	
No				0[a]	
Decision is made by					
I myself					3.94**
My partner					5.96**
Me and my partners					.49
Other members					0[a]
Constant	18.89**	18.74**	24.08**	18.40**	16.91**

Note: *$p<0.1$; **$p<0.05$; 0[a] indicates the reference value

Furthermore, indebted individuals, lower social status ratings, and recent major life events like birth, death, or catastrophe were associated with high perceived stress. A decreased level of perceived stress was associated with having a secondary level of education compared to no education and making family decisions jointly with their partner.

DISCUSSION

This study aims to assess the correlates of depressive symptoms and perceived stress in the northeastern region of Bangladesh. The CES-D scale was used to measure the severity of depression by exploring the present depression symptoms of individuals over the past month, with the perceived stress measured by the PSS scale

based on their stressful experiences. The score values on both scales indicate that the higher the score, the more depressed the person (group). The average CES-D score was 21.6, with males scoring 21.37 and women scoring 21.96. The PSS score was 18.79 for men and 17.94 for women, equating to a total mean of 18.4. Setting the cut-off score is important, as changing the threshold alters the number of depressed people.[34] Similar findings of a total score of 16 or more suggested subthreshold depression[31] and the threshold score of 18 is identified for elderly people living in residential homes.[35] However, cut-off scores also vary in different studies. A meta-analysis screening of 28 studies indicates that the optimal cut-off score for CES-D should be 20 with a sensitivity of 0.83.[34] Consequently, the mean and overall CES-D scores for both men and women were higher than the threshold. A PSS score of up to 13 indicates a low level of stress and becomes moderate if the score ranges from 13 to 26, while beyond that, the stress level is considered severe.[36] Results indicated that the average person in the Sylhet region experiences depression along with a moderate level of stress.

Findings from the univariate and multivariate analyses indicate that factors associated with higher levels of depression and stress include having an irregular job such as day labor, having a loan, staying at the bottom of the social ladder, and making decisions for the household. The day laborers experience more stress and depression because they face challenges in securing work daily and meeting their daily necessities. Those who have loans always feel pressure to repay the debt which, in turn, creates more stress. Decision-making may be linked with stress because people who make decisions need to brainstorm more than others. Similarly, those who stay at the bottom of the social ladder may suffer from an inferiority complex, potentially creating more stress for them. People who experienced significant life events in the previous month, such as a death, birth, or accident, were more prone to depression. Some life events are stress-prone by nature, such as death and accidents, while some life events, such as birth and marriage, may eventually create stress since they are linked with more responsibility, as noted in several studies.[12,14,27,28] Using both perceived stress and depressive symptoms in a single analysis for all people older than 18 years is the main strength of this study. However, jobs in public service, higher family expenditure, and social ratings are associated with less stress and depression. People in public service may suffer from less stress and depression because they have comparatively more secure jobs, which indirectly confirms that higher income than other groups helps to manage the family needs more smoothly, aligning with past studies.[12,14,27,28] The results regarding the link between socioeconomic factors and depression demonstrated different findings from a past study.[17] However, the sample size could be larger to represent the population and generalize the findings. Since this is a cross-sectional study, it was not possible to estimate the causal link between socioeconomic correlates and stress and depression.

RECOMMENDATIONS

The findings of the study may contribute to the formation of stress and depression mitigation policies in the country, eventually increasing the working efficiency of the people. This study further recommends enhancing consciousness about mental health and wellbeing among community people. The government and the relevant authorities should introduce the mental health issue into the national curriculum. This study opens an avenue for studying the underlying issue covering distinct regions of Bangladesh and checking if there are any differences in stress and depression status.

CONCLUSION

The study determined the socioeconomic determinants of depressive symptoms and perceived stress in Sylhet City, Bangladesh. Using the CES-D scale and PSS, both simple linear regression and multivariable regression models were applied to determine the correlates of stress and symptoms. As expected, people with irregular jobs like day labor, lower family expenditure, financial debt, decision-making responsibility, and lower placement on the community ladder were more likely to experience stress and depression than their counterparts. Similarly, higher family expenditure, secure occupational status, and a higher rank of social status were associated with lower anxiety and depression. Policymakers may consider intermediary steps, such as increasing educational attainment, enhancing income and expenditure, and strengthening the scope to enhance the secured job options to frame effective stress and depression-reducing policies in Bangladesh.

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CONFLICT OF INTEREST

None

AUTHOR CONTRIBUTION

Md. Gias Uddin Khan: Conceptualization, Methodology, Data collection, Formal analysis, Validation, Drafting manuscript, Review and editing. Tarik Aziz: Conceptualization, Methodology, Data Curation. Ayatullah Al Musabi Akanda: Conceptualization, Methodology, Data analysis. Md. Shahgahan Miah: Conceptualization, Methodology, Formal Analysis, Supervision.

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