Research Article

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Impact of Covid-19 stress on urban poor in Sylhet Division, Bangladesh: A perception-based assessment

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Abstract

Introduction – This study addresses a gap in understanding psychological stress, perceptions as well as its determinants among urban poor populations during the Covid-19 pandemic in Sylhet, Bangladesh.

Methodology – Data were collected through structured questionnaires administered to a total of 408 respondents and focused on the participants' perceptions of Covid-19 and their levels of psychological stress. Logistic regression analysis was employed to determine the factors contributing to elevated psychological stress levels among the urban poor.

Results – The survey revealed significant economic vulnerabilities among the urban poor. Specifically, unemployment rates were 18.45% in Sylhet, 18.45% in Moulvibazar, 16.67% in Habiganj, and 23.53% in Sunamganj. A substantial proportion reported very low monthly household incomes (less than 5,000 Tk): 25.24% in Sylhet, 23.30% in Moulvibazar, 10.78% in Habiganj, and 15.38% in Sunamganj. A majority reported having no alternative source of income: 71.84% in Sylhet, 66.02% in Moulvibazar, 63.73% in Habiganj, and 70.19% in Sunamganj. Regarding perceptions of Covid-19 mitigation, belief in the effectiveness of isolation and treatment of infected individuals varied across districts: 81.55% in Sylhet, 54.08% in Moulvibazar, 22.55% in Habiganj, and 35.58% in Sunamganj. The logistic regression analysis indicated that urban poor individuals without alternative income sources experienced significantly higher levels of psychological stress compared to those with alternative income.

Conclusion – The findings suggest that the absence of alternative income sources is a significant predictor of increased psychological stress and government interventions prioritize mental health support and economic safety nets for urban poor, focusing on addressing stress within this study group.

Keywords: perceptions, psychological stress, Covid-19, logistic regression analysis, Sylhet, Bangladesh

1 Introduction

In the contemporary twenty-first century, the world has experienced one of its most overwhelming events in terms of the number of infections and deaths caused by the COVID-19 virus. Initially identified on December 31, 2019, in Wuhan, Hubei Province, China, COVID-19 rapidly spread worldwide [1,2]. The Institute of Epidemiology, Disease Control and Research (IEDCR) in Bangladesh reported the first three cases of COVID-19 on March 8, 2020, followed by the first death on March 18, 2020. As of May 1, 2021, Bangladesh had a total of 759,132 confirmed cases of COVID-19 and 11,450 deaths. Sylhet division ranked fourth in terms of the total attack rate (AR) at 1,040 per 1,000,000, with the highest AR recorded in Sylhet district (1,629 per 1,000,000), followed by Sunamganj (783), Maulvibazar (730), and the lowest AR in Habiganj district (690) [3].

The overlap of socio-economic vulnerability and public health emergencies, particularly during pandemics like COVID-19, has attracted significant research interest. The Social Determinants of Health framework indicates that health outcomes are influenced by factors such as income, education, and access to services. Marginalized communities, especially the urban poor, experience heightened stress due to scarce resources and precarious employment situations. This chronic stress can deteriorate both mental and physical health, underscoring the psychological ramifications of economic instability. In Sylhet Division, where many urban poor rely on insecure informal jobs, it is vital

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to comprehend the stressors induced by the pandemic through perception-based assessments.

The ongoing COVID-19 pandemic has significantly impacted individuals worldwide, both physically and mentally. The specific effects of COVID-19 on the mental health of urban poor individuals in Bangladesh are inadequately understood, primarily due to their heightened vulnerability to stress and psychological health issues. Given the low level of public awareness regarding the complexities of COVID-19 and the scant literature on psychological stress and its determinants during the pandemic, the aim of this study is to investigate the psychological stress factors affecting the urban poor in Bangladesh, particularly in Sylhet.

The fear of infection, anxiety over losing loved ones, inadequate medical responses, and a lack of resources to treat patients have compounded the psychological distress associated with the lockdown, characterized by prolonged home confinement, social isolation, food insecurity, fear of job loss, and income reduction. These factors are critical in understanding psychological sufferings such as depression, anxiety, phobias, insomnia, and trauma [4–13]. As the global community struggles to combat COVID-19 through physical health interventions, the neglect of mental health has resulted in increased suicide rates [14–18]. The anxiety surrounding the threats of starvation and contagion has led to an increase in the occurrence of suicides [19–21]. Given the existing global anxiety over the COVID-19 outbreak, individuals face numerous constraints that negatively affect their mental health.

Research indicates that psychological and physical health conditions among marginalized populations are precarious, transcending geographical boundaries and professions, from healthcare workers to the general public [2,4,5,22,23]. During the lockdown in Bangladesh (March 26 to May 31, 2020), and with continued social isolation since March 2020, it is likely that direct or indirect psychiatric distress has intensified, as evidenced by reported suicide rates associated with COVID-19 in Bangladesh [23,24]. Since then, a range of lockdown measures have been implemented to mitigate the spread of the virus, disproportionately impacting the poor – who often work in the informal sector and rely on daily wages. The pandemic has profoundly affected not only the economic circumstances of the urban poor but also their mental well-being, an aspect that warrants closer examination in future research [25].

While most global studies focus on infection control, vaccination, and public health responses, a few have addressed the psychological aspects, and those conducted in Bangladesh [4,14,26,27]. Although certain studies have explored students' mental health during the pandemic in countries like Bangladesh [28–30]; China [31,32]; Turkey [32,33]; and Italy [34,35], research addressing the broader mental health impacts among other populations, particularly the urban poor, is scarce. Slum settlements have garnered substantial attention due to vulnerability to the spread of COVID-19 in India [36–39] and in Africa [40].

Understanding the impact of COVID-19 stress is essential for formulating effective policies that promote economic recovery and strengthen public health initiatives. In addition to the economic and health-related challenges, a significant mental health crisis has emerged in tandem with the pandemic. Initial research indicates a marked increase in anxiety, depression, and stress-related disorders among the urban poor, underscoring the pressing need for targeted mental health interventions. While a multitude of national and global studies have examined the consequences of the pandemic, there remains a critical lack of localized research that specifically addresses the unique stressors faced by urban poor populations in Bangladesh, particularly in Sylhet Division. This study endeavors to fill that void by offering a comprehensive analysis of the socio-economic conditions in the region during the pandemic.

2 Methodology

This study administered a questionnaire to elicit information and conducted interviews with urban poor households in the Sylhet division of Bangladesh during the fiscal year 2021–2022. This questionnaire was designed to collect data for the research and we obtained consent from the respondents, ensuring that all information would be used solely for the aforementioned research and treated with the strictest confidentially.

2.1 Survey area

To understand the Covid-19 situation, this study conducted a survey in four districts: Habiganj, Moulvibazar, Sunamganj, and Sylhet. The data collection, supported by the Directorate General of Health Services, the Ministry of Health and Family Welfare, and the IEDCR, aimed to establish a clear understanding of the prevalence of the disease, as well as the perceptions and stress levels in the study area. Data collection was performed in four selected sites within the Sylhet division, and their locations are illustrated in Figures 1–4. These figures describe the study

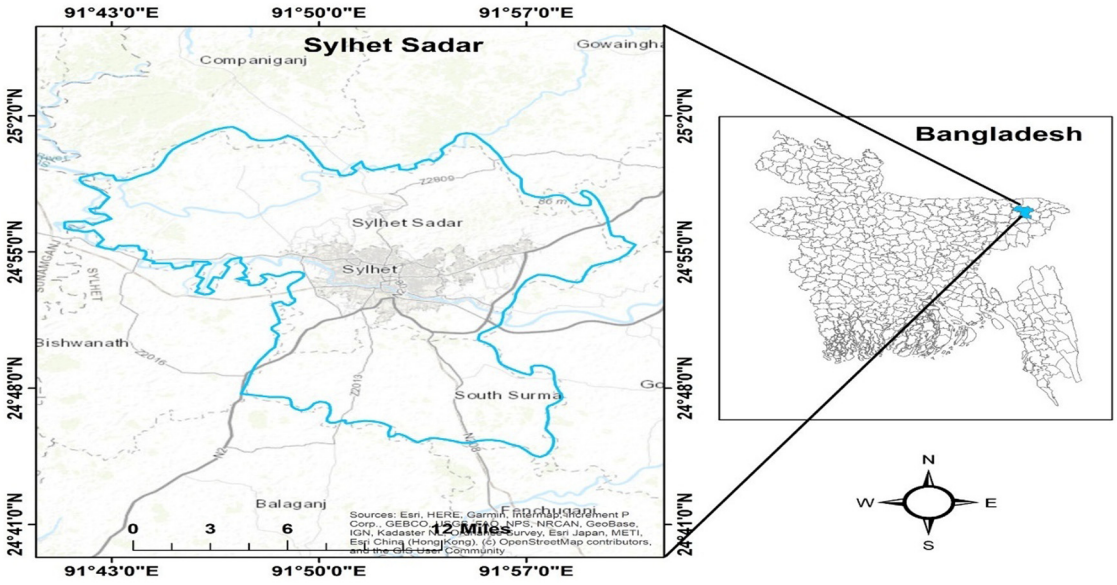

Figure 1: The study area located in Sylhet city corporation [41].

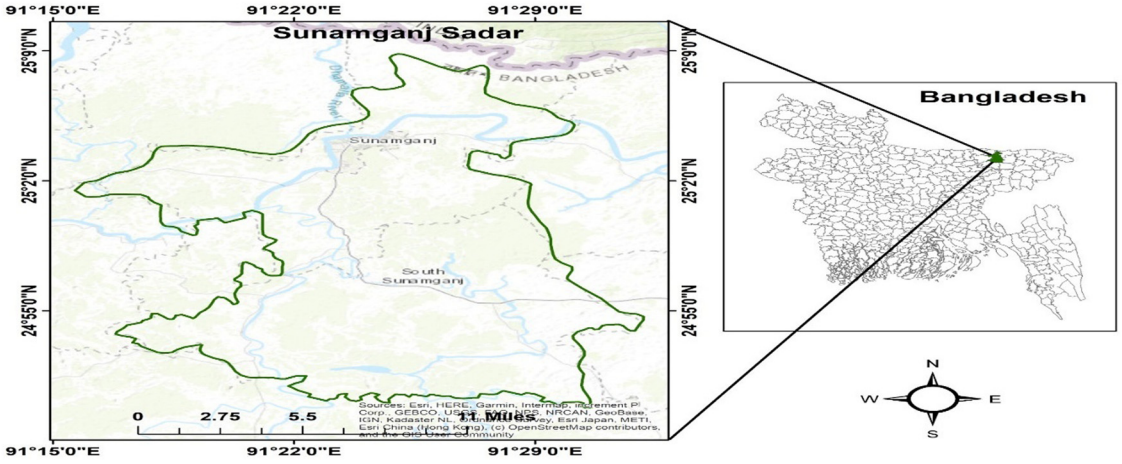

Figure 2: The study area located in Sunamganj Sadar [42].

area. The study sites include the Sylhet City Corporation area, with coordinates of 24°51′ and 24°55′ north latitudes, and 91°50′ and 91°54′ east longitudes, located in the Sylhet Division of Bangladesh. Sunamganj, the largest town in the Sylhet division, is situated on the banks of the Surma River, with coordinates of 24°34′ and 25°12′ north latitudes, and 90°56′ and 91°49′ east longitude. The study was also conducted in the Moulvibazar and Habiganj districts. Moulvibazar is a town in northeastern Bangladesh, located just south of Sylhet and serves as the capital of the Moulvibazar Sadar Upazila. The study was carried out in a region with the coordination within the Sylhet Division of Bangladesh.

2.2 Sampling design

This study is conducted with poor or lower income people in urban areas of the Sylhet division through physical meetings, maintaining a distance of at least 2 m, as the respondents have restricted access to the Internet. A number of field supporters were employed and briefed on the meeting procedures (e.g., maintaining safe distancing, wearing masks). The respondents were selected at random to create a representative sample of the population of Sylhet division. Cluster sampling was adopted to conduct a comparative study on the measurement of perceptions and psychological

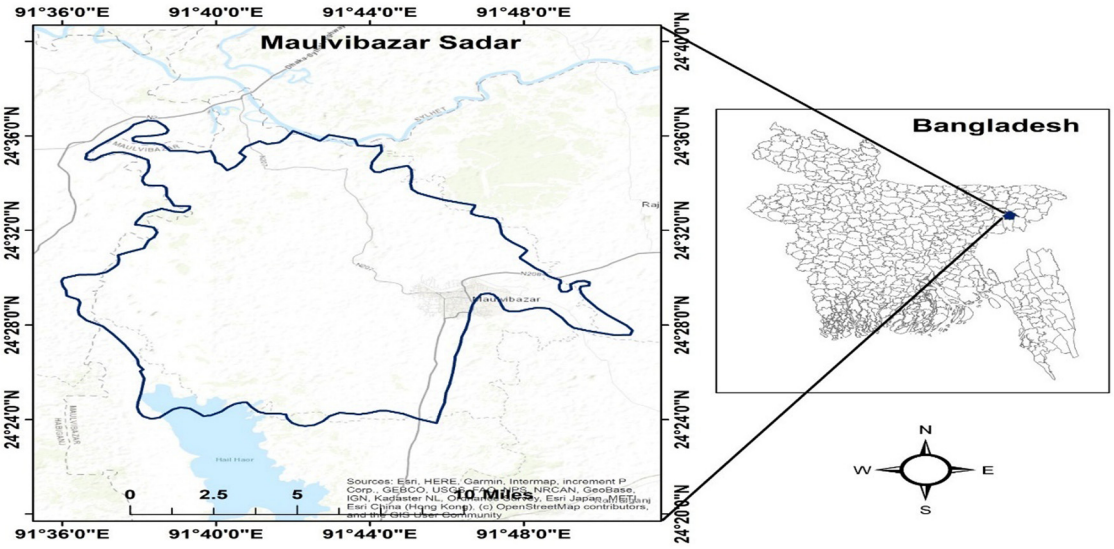

Figure 3: The study area located in Maulvibazar Sadar [43].

stress regarding COVID-19 in clustered areas of Sylhet division. The study is designed to gather data from four cluster areas within the Sylhet division.

2.3 Sample size estimation

Data were collected from four cluster areas within the Sylhet division. The sample size is estimated using the following formula: $n = z^2[P(1-P)/d^2] \times D_{\text{eff}}$, where n = sample size, z = two-sided normal variate at the 95% confidence level (1.96), indicating that this study aims to be 95% confident that the results reflect the true values in the larger population. P = indicator percentage (0.5), a value often used when there are no similar studies related to COVID-19 or no prior information about the population [45]. d = relative precision (0.075P), indicating how precise the estimate should be, expressed as a fraction of P, with the sample estimate being within about 7.5% of the true value. D_{eff} = design effect (1.19), considered to adjust for any complexity. B plugging these factors into a sample size estimation formula, the required sample size (408) is estimated to ensure that the findings are reliable and accurate. A total of four cluster areas were measured, and the required sample

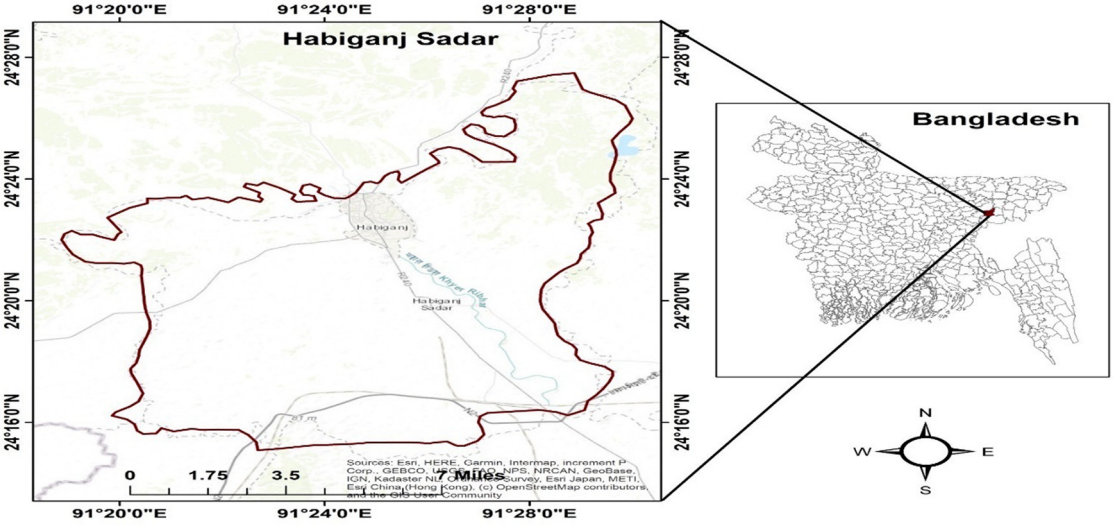

Figure 4: The study area located in Habiganj Sadar [44].

for each cluster area is 102 (408/4), a method extensively used by the Bangladesh Bureau of Statistics and UNICEF for conducting Multiple Indicator Cluster Surveys [46].

2.4 Primary data

Primary data collection was conducted within the COVID-19 affected cluster areas in the Sylhet division to meet the objectives of this study, using a structured questionnaire. A preliminary phase was conducted to assess the validity and reliability of the questionnaire through a pilot survey before its use. A structured questionnaire was divided into three portions:

(i) Socio-demographic information of the respondents (e.g., gender, age, education, and occupation).
(ii) Perception-based pandemic-related factors, which were further divided into two parts: (a) perception towards COVID-19, and (b) perception about the impact of COVID-19.
(iii) Psychological distress assessment factors (e.g., stress, level of stress, and panic).

Occupation was used as a proxy to identify lower income individuals, as urban poor people may be reluctant to disclose their income. To measure the level of stress, a 4-point Likert-type scale was applied, where 1 = little, 2 = moderate, 3 = high, and 4 = extreme [47–51].

2.4.1 Reliability assessment

To ensure the internal consistency of the measurement scale utilized in this study, Cronbach's alpha was calculated. The questionnaire assessed various dimensions related to emotional stress, cognitive stress, physiological symptoms, behavioral responses, and environmental stressors. The calculated overall Cronbach's alpha value was 0.82, indicating a high level of reliability. According to established standards, a Cronbach's alpha of 0.70 or higher is deemed acceptable in research, affirming that the items within the scale are measuring the same underlying construct [52]. This finding suggests that the questionnaire items effectively captured the intended constructs, thereby confirming the instrument's reliability for subsequent analyses.

2.5 Respondents

Interviews of the respondents (urban poor people) were conducted at roadside locations, small bazaars, agro-farms, street vendors, and tea stalls. Respondents aged 18 years and older were approached at random.

2.6 Descriptive statistical analysis

Descriptive statistical analysis was conducted to calculate frequencies, percentages, means, and standard deviations. The normality of the data was checked by Kolmogorov-Smirnov test.

2.7 Logistic regression analysis

Logistic regression was used to assess the factors significantly related to different stress levels regarding COVID-19, employing the stepwise backward Likelihood Ratio method. This approach aligns seamlessly with the study presented by Pandey et al. [39]. This analysis aimed to identify factors affecting the psychological stress of urban poor individuals concerning COVID-19, using the dummy dependent variable represented as

$$P_i = \frac{1}{1 + e^{-(\beta_0 + \beta_i x_i)}}. \tag{1}$$

For simplicity (1), this can be expressed as

$$P_i = \frac{1}{1 + e^{-z_i}}, \tag{2}$$

where P_i is the probability of stress of the ith respondent, e^{z_i} stands for the irrational number raised to the power of Z_i, and Z_i is a function of n-explanatory variables (e.g., age, marital status, education, income) and expressed as

$$Z_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n + \mu_i, \tag{3}$$

where β_0 is a constant term and $\beta_1, \ldots, \beta_n$ are regression coefficients.

2.8 Hypothesis to be tested

To test the significance effect of the predictors, such as age, marital status, education, income etc., on COVID stress (medium or high), the following null hypotheses are considered in this study:

H_{1o}: $\beta = 0$, i.e., all coefficients of the predictor variables do not have a significant effect on the response variable (Covid stress).

H_{2o}: The logistic regression model fits the observed data well [51–54].

2.8.1 Wald statistic

The Wald test is obtained by comparing the maximum likelihood estimate of the slope parameter β to an estimate of its standard error. For any large sample and under H_o, the test statistic is $Z = \frac{\hat{\beta}}{\text{ASE}}$ (ASE = asymptotic standard error), which has a standard normal distribution. For the two-sided alternative, the test statistic is $Z^2 = \frac{\hat{\beta}^2}{\text{ASE}^2}$ and has a large-sample χ^2_{df} distribution.

2.8.2 Hosmer–Lemeshow goodness of fit

If there is a continuous covariate or the model has many covariates such that very few subject have the same pattern, then the Hosmer–Lemeshow goodness of fit is performed. Among the various tests available for judging the goodness of fit of a logistic regression model, the Homer–Lemeshow test has proven to be one of the most effective. Suppose, there is a continuous covariate x_j.

The following model was checked which provides a good fit to the data,

$$\text{logit}(\pi_j) = \alpha + \beta x_j, \tag{4}$$

where j = 1, 2, ..., n observations in the dataset. The Hosmer–Lemeshow's statistic is approximately distributed as $\chi^2_{\text{HL}} \sim \chi^2_{G-2}$. Low p-values suggest rejection of the current model.

2.8.3 Ethical compliance, privacy, and informed consent

This study adhered to rigorous ethical research principles, prioritizing voluntary participation, informed consent, and data confidentiality. Recognizing the absence of a formal institutional review board, we grounded our ethical framework in the principles of the Helsinki Declaration of 1975, as revised in 2008. Before participation, all respondents received comprehensive information regarding the research objectives, the voluntary nature of their contribution, data privacy protocols, and their unconditional right to withdraw at any point. Informed consent was obtained digitally via Google Forms before participants commenced the survey. The collection of personally identifiable information was strictly limited to instances where explicit consent was granted. While formal institutional ethical approval was deemed unnecessary due to the non-medical and non-interventional nature of the study, all obligatory ethical considerations – including the protection of privacy, assurance of confidentiality, and facilitation of voluntary participation – were meticulously observed throughout the research process.

3 Results and discussion

3.1 Descriptive data analysis

The analysis exhibits the socio-demographic and socioeconomic condition of the people living in the Sylhet division and the consequences of COVID-19 toward the stress in the surveyed areas, using descriptive statistics and frequency distributions.

3.1.1 Results of socio-demographic and socioeconomic characteristics for Sylhet division

Table 1 shows the socioeconomic characteristics of the surveyed individuals living in Covid affected areas in the Sylhet division. In the Sylhet district, the age distribution of respondents reveals that 18.45% fall within the 18–25 age category, while the 26–35 age group comprises 29.13%. The largest segment is found in the 36–45 age category, representing 40.78%, followed by those aged above 45 years at 11.65%. In the Moulvibazar district, the age distribution is slightly different: 20.39% of respondents are in the 18–25 age range, followed closely by 26–35 year olds at 28.16%. The 36–45 age group accounts for 38.83% of the respondents, while those over 45 years make up 10.68%. Regarding gender in the Sylhet district, there is a significant disparity, with males representing 86.41% of the respondents and females 13.59%. Similarly, in the Moulvibazar district, male respondents constitute 88.35%, while females account for only 9.71%.

On the subject of marital status, in the Sylhet district, 68.93% of respondents are married, while 31.07% are unmarried. In Moulvibazar, the trend is similar: 66.02% of respondents are married and 32.04% unmarried. Analyzing the occupational status of the respondents in the Sylhet district, 11.65% are self-employed, while regular employees make up 12.62%. A larger portion, 55.34%, are irregular employees, and 18.45% are unemployed, with others comprising just 1.94%. In Moulvibazar district, the distribution shows 12.62% self-employed, 9.71% as regular employees, 53.40% as irregular employees, 18.45% unemployed, and 3.88% in other occupations.

In terms of monthly household income, data from the Sylhet district indicate that 25.24% of respondents earn less than 5,000 Tk. The largest segment, comprising 51.46%, earns between 5,000 and 10,000 Tk, followed by 11.65% who earn between 10,000 and 15,000 Tk, and 8.74% in the 15,000–20,000 Tk range. Only 2.91% report earning 20,000 Tk or more. Furthermore, a significant 71.84% of respondents do not have alternative sources of income, while

28.16% do. In Moulvibazar district, the income distribution shows that 23.30% earn less than 5,000 Tk, followed by 42.72% who earn between 5,000 and 10,000 Tk, 17.48% in the 10,000–15,000 Tk range, 10.68% from 15,000 to 20,000 Tk, and 3.88% earning 20,000 Tk or more. Additionally, 32.04% of respondents have alternative sources of income, while 66.02% do not.

In the Habiganj district, a detailed analysis of the respondents revealed the following demographic characteristics. Among the respondents, 12.75% were in the 18–25 age category. The largest group was aged 36–45, comprising 45.10%, followed by those aged 26–35 at 32.35%. Only 9.80% of the respondents were over the age of 45. The gender breakdown indicated a significant male predominance, with males representing 90.20% of the respondents, while females accounted for just 9.80%. Of those surveyed, married individuals made up 66.02%, compared to 32.04% who were identified as unmarried. When examining occupational levels, 22.55% of respondents were self-employed. This was followed by 15.69% who were regular employees, 42.16% classified as irregular employees, and 16.67% were identified as unemployed. A small fraction, 2.94%, reported other types of employment. When it came to income, 10.78% of respondents had monthly household earnings of less than 5,000 Tk. The income distribution was as follows: 38.24% earned between 5,000 and 10,000 Tk, 23.53% earned between 10,000 and 15,000 Tk, 18.63% earned between 15,000 and 20,000 Tk, and 8.82% reported earnings of 20,000 Tk or more. A noteworthy finding was that 36.27% of respondents had an alternative source of income, whereas a significant 63.73% reported having no alternative income.

Similarly, in the Sunamganj district, the following demographic trends were observed. The 14.42% of respondents were in the 18–25 age bracket. The 26–35 age category represented 37.50%, while those aged 36–45 comprised 42.31%. Only 5.77% of respondents were over 45 years old. The gender distribution showed that males accounted for 85.58% of the respondents, while females represented 14.42%. Here 73.08% of the respondents were married, while 26.92% were identified as unmarried. In terms of occupation, 22.55% of respondents were self-employed, followed by 17.65% were regular employees, 36.27% were irregular employees, and 23.53% were unemployed. A minor 1.96% reported other employment types. Regarding income, 15.38% of respondents reported a monthly household income of less than 5,000 Tk. The income distribution further included 47.12% earning between 5,000 and 10,000 Tk, 17.31% earning between 10,000 and 15,000 Tk, 11.54% earning between 15,000 and 20,000 Tk, and 8.65% earning 20,000 Tk or more. Finally, only 29.81% of respondents reported having an alternative source of income, while a significant 79.19% indicated that they do not have any additional income sources.

Table 1: Frequency distribution of socio-demographic and socioeconomic characteristics for Sylhet division's respondents

Variables	Subcomponent	Sylhet *N* (%)	Moulvibazar *N* (%)	Habiganj *N* (%)	Sunamganj *N* (%)
Age	18–25 Years	19 (18.45)	21 (20.39)	13 (12.75)	15 (14.42)
	26–35 Years	30 (29.13)	29 (28.16)	33 (32.35)	39 (37.5)
	36–45 Years	42 (40.78)	40 (38.83)	46 (45.1)	44 (42.31)
	>45 Years	12 (11.65)	11 (10.68)	10 (9.8)	6 (5.77)
Gender	Male	89 (86.41)	91 (88.35)	92 (90.2)	89 (85.58)
	Female	14 (13.59)	10 (9.71)	10 (9.8)	15 (14.42)
Marital status	Married	71 (68.93)	68 (66.02)	68 (66.02)	76 (73.08)
	Unmarried	32 (31.07)	33 (32.04)	33 (32.04)	28 (26.92)
Occupation	Self-employed	12 (11.65)	13 (12.62)	23 (22.55)	23 (22.55)
	Regular employee	13 (12.62)	10 (9.71)	16 (15.69)	18 (17.65)
	Irregular employee	57 (55.34)	55 (53.4)	43 (42.16)	37 (36.27)
	Unemployed	19 (18.45)	19 (18.45)	17 (16.67)	24 (23.53)
	Others	2 (1.94)	4 (3.88)	3 (2.94)	2 (1.96)
Monthly income	<TK 5,000	26 (25.24)	24 (23.3)	11 (10.78)	16 (15.38)
	TK 5,000–10,000	53 (51.46)	44 (42.72)	39 (38.24)	49 (47.12)
	TK 10,000–15,000	12 (11.65)	18 (17.48)	24 (23.53)	18 (17.31)
	TK 15,000–20,000	9 (8.74)	11 (10.68)	19 (18.63)	12 (11.54)
	>TK 20,000	3 (2.91)	4 (3.88)	9 (8.82)	9 (8.65)
Alternate source of income	Yes	29 (28.16)	33 (32.04)	37 (36.27)	31 (29.81)
	No	74 (71.84)	68 (66.02)	65 (63.73)	73 (70.19)

3.1.2 Results on Covid-19 perception of urban poor people in Sylhet division

In a survey conducted among the urban poor populations of Sylhet, Moulvibazar, Habiganj, and Sunamganj districts, participants were questioned about their perceptions related to Covid-19, with the results summarized in Table 2. When asked about the main clinical symptoms of Covid-19 – fever, fatigue, dry cough, and breathing difficulty – responses varied significantly across the districts. In Sylhet, 52.43% recognized these symptoms, while Moulvibazar reported a positive response of 44.9%. In contrast, lower recognition rates were noted in Habiganj (27.45%) and Sunamganj (31.73%).

Regarding the vulnerability of elderly individuals with chronic illnesses or health complications, awareness also differed. In Sylhet, 24.27% acknowledged this concern, while 26.53% from Moulvibazar reported similar views. Notably, Habiganj (44.12%) and Sunamganj (45.19%) had higher percentages recognizing the increased risks faced by this group.

The perception of Covid-19 transmission via respiratory droplets from the infected population also varied, with 70.87% of respondents in Sylhet affirming this, compared to 57.14% in Moulvibazar. However, fewer individuals in Habiganj (20.59%) and Sunamganj (46.15%) recognized this mode of transmission. A significant portion of respondents expressed their beliefs regarding preventive measures. For instance, 81.55% of Sylhet residents, 54.14% in Moulvibazar, 22.55% in Habiganj, and 35.58% in Sunamganj perceived that isolation and treatment are effective strategies to curtail the virus's spread. Additionally, concerning the timing of symptom onset, 33.01% of urban poor in Sylhet and 57.14% in Moulvibazar believed that Covid-19 symptoms could appear between 2 and 14 days post-exposure, while 38.24% in Habiganj and 38.46% in Sunamganj held similar beliefs.

Perceptions of the virus's severity varied widely. While 74.77% of those surveyed in Sylhet and 54.90% in Habiganj viewed Covid-19 as fatal, only 45.19% of respondents in Sunamganj shared this belief. An interesting finding was that a considerable percentage of respondents perceived flu vaccination as insufficient for preventing Covid-19 – 68.3% in Sylhet, 80.61% in Moulvibazar, 54.90% in Habiganj, and 64.42% in Sunamganj. On preventive practices, a notable majority of participants recognized the importance of handwashing with soap and water, with 78.64% in Sylhet, 77.55% in Moulvibazar, 33.33% in Habiganj, and 61.54% in Sunamganj affirming that this practice helps prevent Covid-19 transmission. Implementing these measures poses a significant challenge due to the densely populated conditions of slums and the limited access to safe water and basic sanitation [37,38]. Nevertheless, there were misconceptions about the likelihood of contracting the virus, with 34.95% in Sylhet, 46.94% in Moulvibazar, 54.90% in Habiganj, and 43.27% in Sunamganj believing there was no possibility of infection. Furthermore, anxiety regarding the potential of becoming infected was evident, with responses indicating nervousness among the urban poor in Sylhet (33.01%), Moulvibazar (37.76%), and mixed feelings in Habiganj (19.61% experienced anxiety and 22.55% did not) and Sunamganj (22.12% experienced anxiety, while 59.62% did not).

In terms of government initiatives to combat the virus, only 28.16% of respondents from Sylhet, 44.9% from Moulvibazar, 33.33% from Habiganj, and 24.04% from Sunamganj expressed satisfaction with these efforts. Dissatisfaction with governmental responses was reflected in the findings, with 39.81% in Sylhet, 41.84% in Moulvibazar, 53.92% in Habiganj, and 60.58% in Sunamganj indicating they were not satisfied with the government's handling of the Covid-19 pandemic.

3.1.3 Results of the urban poor people's Covid-19 stress assessment in Sylhet division

Emerging evidence indicates that the pandemic has led to heightened levels of emotional stress globally, stemming from both physical isolation and fundamental concerns related to health and financial stability [55]. Table 3 presents the results of the logistic regression model for factors associated with stress related to Covid-19 among urban poor people. Here categorical variables such as age, marital status, education level, alternative income, and staying home were used as explanatory variables. These variables were utilized to assist in comparing the factors causing the stress among urban poor individuals affected by Covid-19 in the Sylhet, Moulvibazar, Habiganj, and Sunamganj districts.

In case of medium level stress of Sylhet district, the marginal effect of middle age showed that an increase of 1 year in the age of urban poor individuals increases the probability of them experiencing medium stress related to Covid-19 by 3.08%. Older urban poor individuals were found to be significantly associated with medium level stress due to Covid-19. Based on the value of the marginal effect (−0.277), it can be stated that the older urban poor individuals 27.7% were less stressed compared to their younger counterparts. In Moulvibazar district, both the middle aged and older urban poor individuals were found to have negative effect on medium level stress, which was significant. The marginal effects indicated that an increase

Table 2: Frequency distribution of Covid-19 perception about Sylhet division's respondents

Perception	Sylhet			Moulvibazar			Habiganj			Sunamganj		
	Yes *N* (%)	No *N* (%)	May be *N* (%)	Yes *N* (%)	No *N* (%)	May be *N* (%)	Yes *N* (%)	No *N* (%)	May be *N* (%)	Yes *N* (%)	No *N* (%)	May be *N* (%)
The main clinical symptoms of Covid-19 are fever, fatigue, dry cough, and breathing difficulty	54 (52.4)	17 (16.5)	32 (31.0)	44 (44.9)	15 (15.3)	39 (39.8)	28 (27.4)	27 (26.4)	45 (44.1)	33 (31.7)	25 (24.0)	46 (44.2)
Only elderly people having chronic illnesses and other health complications are more likely to be seriously affected	25 (24.2)	49 (47.5)	29 (28.1)	26 (26.5)	39 (39.8)	33 (33.6)	45 (44.1)	31 (30.3)	26 (25.4)	47 (45.1)	26 (25.0)	31 (29.8)
The Covid-19 spreads via respiratory droplets (from coughing, sneezing) of infected people	73 (70.8)	19 (18.4)	11 (10.6)	56 (57.1)	26 (26.5)	16 (16.3)	21 (20.5)	45 (44.1)	36 (35.2)	48 (46.1)	35 (33.6)	21 (20.1)
Isolation and treatment of Covid-19 infected people are effective ways to reduce the spread of the virus	84 (81.5)	11 (10.6)	8 (7.7)	53 (54.0)	19 (19.3)	26 (26.5)	23 (22.5)	45 (44.1)	34 (33.3)	37 (35.5)	23 (22.1)	44 (42.3)
Covid-19 symptoms appear in 2–14 days	34 (33.0)	15 (14.5)	54 (52.4)	56 (57.1)	15 (15.3)	27 (27.5)	39 (38.2)	25 (24.5)	38 (37.2)	40 (38.4)	12 (11.5)	52 (50.0)
Covid-19 is fatal	77 (74.7)	12 (11.6)	14 (13.5)	35 (35.7)	35 (35.7)	28 (28.5)	56 (54.9)	31 (30.3)	15 (14.7)	34 (32.6)	47 (45.1)	23 (22.1)
Flu vaccination is sufficient for preventing Covid-19	14 (13.5)	71 (68.9)	18 (17.4)	9 (9.1)	79 (80.6)	10 (10.2)	12 (11.7)	56 (54.9)	34 (33.3)	21 (20.1)	67 (64.4)	16 (15.3)
Washing hands with soap and water can help in prevention of Covid-19 transmission	81 (78.6)	12 (11.6)	10 (9.7)	76 (77.5)	12 (12.2)	10 (10.2)	34 (33.3)	41 (40.2)	27 (26.4)	64 (61.5)	26 (25.0)	14 (13.4)
I am concerned about the possibility that I or another family member can get infected with the virus	41 (39.8)	36 (34.9)	26 (25.2)	31 (31.6)	46 (46.9)	21 (21.4)	26 (25.4)	56 (54.9)	20 (19.6)	35 (33.6)	45 (43.2)	24 (23.0)
Thinking that I could become infected with Covid-19 makes me nervous/anxious	34 (33.0)	56 (54.3)	13 (12.6)	37 (37.7)	44 (44.9)	17 (17.5)	20 (19.6)	23 (22.5)	59 (57.8)	23 (22.1)	62 (59.6)	19 (18.2)
The government has/is doing enough to stop the global pandemic in Bangladesh	29 (28.1)	49 (47.5)	25 (24.2)	44 (44.9)	24 (24.4)	30 (30.6)	34 (33.3)	24 (23.5)	44 (43.1)	25 (24.0)	45 (43.2)	34 (32.6)
You are satisfied with government's response against the Covid-19 pandemic	56 (54.3)	41 (39.8)	6 (5.8)	45 (45.9)	41 (41.8)	12 (12.2)	34 (33.3)	55 (53.9)	13 (12.7)	29 (27.8)	63 (60.5)	12 (11.5)

Table 3: Results on logistic regression of factors influencing urban poor people's stress toward Covid-19 in Sylhet division

Variable			Sylhet		Moulvibazar		Habiganj		Sunamganj	
			Coeff.	ME (odds ratio)	Coeff.	ME (odds ratio)	Coeff.	ME (odds ratio)	Coeff.	ME (odds ratio)
Medium	Constant		3.11***		2.16***		2.823**		2.716*	
	Age	Young age	—	—	—	—	—	—	—	—
		Middle age	−2.19	0.0308	−1.34**	−0.050	−1.483	−0.004	−4.75***	−0.191
		Old age	−3.12***	−0.277	−2.26**	−0.241	−0.698	−0.081	−6.72***	−0.361
	Marital status (married)		−0.79	9.39×10^{-7}	−0.39	−0.067	−0.68	0.108	−2.13	−0.103
	Education (literate)		−1.98	−0.051	−1.47**	−0.159	−2.24**	−0.11	−2.13**	−0.114
	Alternate income (no)		1.39*	−0.295	0.636	−0.134	1.50	−0.140	3.48	0.028
	Staying home (no)		−1.71***	−0.023	−1.12**	−0.151	−1.88**	−0.284	−1.98*	−0.179
High	Constant		1.86		0.682		1.421		1.82**	
	Age	Young age	—	—	—	—	—	—	—	—
		Middle age	4.93	−0.288	−2.58***	−0.235	−4.51**	−0.340	−1.56	−0.258
		Old age	3.21**	−0.185	−1.98	−0.113	−0.577	−0.014	−1.28	−0.216
	Marital status (married)		−0.92**	−0.007	−0.13	0.014	−1.783	0.017	−2.63*	−0.084
	Education (literate)		−2.93***	−0.138	−1.60*	−0.090	−4.70***	−0.390	−2.38**	−0.165
	Alternate income (no)		4.13	0.289	2.91***	0.379	5.620***	0.661	2.91***	0.309
	Staying home (no)		−1.82*	−0.020	−0.94	−0.035	−1.072	−0.029	−1.74	−0.008
Omnibus test			Chi- square = 23.458 df = 6 Sig = 0.005		Chi-square = 20.117 df = 6 Sig = 0.018		Chi-square = 18.118 df = 6 Sig = 0.014		Chi-square = 22.171 df = 6 Sig = 0.016	
Hosmer–Lemeshow test			Chi-square = 11.479 df = 4 Sig = 0.176		Chi-square = 14.79 df = 4 Sig = 0.167		Chi-square = 17.49 df = 4 Sig = 0.194		Chi-square = 19.94 df = 4 Sig = 0.199	

Note: ME = Marginal effect; ***indicates significant at the 0.1 level, **indicates significant at the 0.05 level and *indicates significant at the 0.10 level.

of 1 year in age would decrease the probability of them experiencing medium stress during Covid-19. In Habiganj district, both middle-aged and older urban poor individuals were found to have a negative effect on medium-level stress, but this was not significant. The results of the marginal effects for middle-aged and older urban poor individuals indicated that an increase of 1 year in age would decrease the probability of experiencing medium stress during Covid-19 by 0.004 and 0.081 times, respectively. In Sunamganj district, both middle-aged and older urban poor individuals were found to be significantly associated with medium-level stress due to Covid-19 with negative values. The marginal effects demonstrated that an increase of 1 year in age would decrease the probability of experiencing medium stress related to Covid-19 by 19.1% and 36.1%, respectively. This suggests that older urban poor individuals experienced more stress compared to middle-aged individuals.

In Sylhet district, the urban poor individuals who were married and educated experienced comparatively less stress, with stress levels of 9.39×10^{-7} and 0.051 times lower than those who were married and uneducated. This finding indicates that married and educated urban poor individuals were insignificantly and negatively associated with stress during the Covid-19 pandemic in Sylhet district. The marginal effect of education showed that it would decrease the probability of experiencing medium-level stress related to Covid-19 among urban poor individuals by 5.1%. In Moulvibazar district, both marital status and education were recorded as negatively associated with medium-level stress related to Covid-19. Married urban poor individuals experienced 6.7% less stress compared to unmarried individuals. Literate urban poor individuals reported 15.9% less stress compared to illiterate individuals. In Habiganj district, marital status was also recorded as negatively associated with medium-level stress related to Covid-19, though insignificant, which implies that married urban poor individuals experienced 10.8% more stress compared to unmarried individuals. The literate urban poor individuals were significantly and negatively associated with medium-level stress related to Covid-19, indicating that they experienced 11.0% less stress compared to their illiterate counterparts. The findings in Habiganj district displayed that married urban poor individuals were insignificantly and negatively associated with stress, meaning they experienced relatively less stress than unmarried individuals. The literate urban poor individuals were found to be negatively and significantly associated with medium stress, suggesting they experienced comparatively less stress than illiterate urban poor individuals. The marginal effect of literate or educated urban poor individuals showed that it would decrease the probability of experiencing medium-level stress related to Covid-19 by 11.4%.

In Sylhet district, the urban poor individuals who had no alternative income were positively associated with stress related to Covid-19, showing an increase of 29.5% in stress levels compared to those who had alternative income. In Moulvibazar district, urban poor individuals without alternative income also showed a positive association with medium-level stress, with a marginal effect value of −0.134 indicating they experienced 13.4% less stress at a medium level compared to those with alternative income. In Habiganj district, urban poor individuals with no alternative income were positively associated with medium stress during Covid-19, which increased the probability of experiencing medium-level stress by 2.8%. The absence of alternative income may be a contributing factor to the medium-level stress experienced by urban poor individuals during the coronavirus disease (Covid-19) in the Sunamganj district of Bangladesh.

In Sylhet district, the urban poor people who did not stay home during Covid-19 were found to be significantly but negatively associated with medium-level stress, experiencing a 2.3% worse condition than others. In Moulvibazar district, the urban poor who did not stay home were noted to have a significant negative association with medium-level stress during Covid-19, resulting in a 15.1% decrease in medium-level stress. The urban poor who did not stay home during Covid-19 were found to be significantly but negatively associated with medium-level stress, with a 17.9% probability of their medium level of stress worsening compared to others. Factors such as old age, lack of alternative income, and not staying home may contribute to the urban poor experiencing medium-level stress during the coronavirus disease (Covid-19) in the Sylhet district area of Bangladesh.

In the case of high-level stress in Sylhet district, middle-aged and older urban residents were observed to have a positive association, particularly among older urban poor people who were significantly affected during Covid-19. Based on the marginal effect value of −0.185, it can be stated that older urban poor people were comparatively under stress by 91.5%.

In Moulvibazar district, both middle-aged and older individuals were observed to have a negative effect on high levels of stress related to Covid-19. The values of the marginal effect for middle-aged and older individuals indicated that an increase of 1 year in age would decrease the probability of high levels of stress among urban poor people during Covid-19 by 23.5 and 11.3%, respectively. In Habiganj district, both middle-aged and older individuals

were found to have negative and positive effects on high levels of stress related to Covid-19, respectively. The values of the marginal effect for middle-aged (−0.340) and older individuals (−0.014) demonstrated that an increase of 1 year in the age of urban poor individuals would reduce the probability of experiencing high levels of stress during Covid-19 by 34.0 and 1.4%, respectively. Therefore, it can be stated that older individuals experience more stress compared to middle-aged individuals. In Sunamganj district, both middle-aged and older urban poor individuals were observed to be inversely associated with high levels of stress during Covid-19.

In Sylhet district, married and literate urban poor individuals were found to have comparatively significantly less stress, with rates of 0.007 and 0.138 times better than those who are unmarried and illiterate. This means that married and literate urban poor individuals were significantly but negatively associated with high levels of stress during the coronavirus disease (Covid-19) in Sylhet district. In Moulvibazar district, both married and literate urban poor individuals had a negative relationship with high levels of stress related to Covid-19. The marginal effect of marital status (married) showed that there was a 1.4% increase in the probability of experiencing high levels of stress among urban poor individuals related to Covid-19. Additionally, literate urban poor individuals were found to have a significant but negative effect on high levels of stress, showing a 9% decrease in high levels of stress compared to illiterate individuals. In Habiganj district, married individuals were noted to have a negative and insignificant relationship with high levels of stress related to Covid-19, experiencing a 1.7% increase in high levels of stress compared to unmarried individuals during Covid-19. Furthermore, literate urban poor individuals were found to have a significant negative effect on high levels of stress, with literate individuals experiencing a 39% decrease in high levels of stress compared to illiterate individuals. In Sunamganj district, married and literate or educated urban poor individuals were significantly and negatively associated with high levels of stress, exhibiting a lower association between being married and literate and high levels of stress compared to both unmarried and illiterate individuals.

In Sylhet district, urban poor individuals without alternative income were found to be positively associated with high levels of stress during Covid-19, experiencing 71.1% more stress compared to those with alternative income. In Moulvibazar district, urban poor individuals without alternative income exhibited a positive and significant effect on high levels of stress comparatively. The value of the marginal effect (37.9) implied that 37.9% of urban poor individuals experienced high levels of stress due to a lack of alternative income. In Habiganj district, urban poor individuals without alternative income were also positively associated with medium levels of stress. Moreover, urban poor individuals who were not staying home were noted to have a significant but negative effect on medium levels of stress during Covid-19. In Habiganj district, urban poor individuals without alternative income were found to have a positive and significant effect on high levels of stress; the value of the marginal effect (66.1) showed that they experienced 66.1% more high levels of stress than individuals with alternative income. In Sunamganj district, urban poor individuals without alternative income were detected as positively and significantly associated with high levels of stress during Covid-19, experiencing 30.9% more stress than those with alternative income.

In Sylhet district, urban poor individuals not staying home during Covid-19 were found to be significantly but negatively associated with high levels of stress, suggesting that those who stayed home might be more stressed. In Moulvibazar district, urban poor individuals not staying home were detected as having a negative effect on high levels of stress during Covid-19, with a 3.5% reduction in high levels of stress. In Habiganj district, urban poor individuals without alternative income were found to have a positive and significant effect on high levels of stress, with a marginal effect value of (66.1), indicating that they experienced 66.1% more high levels of stress than those with alternative income. In Sunamganj district, urban poor individuals not staying home during Covid-19 were found to have an insignificant but inversely associated relationship with high levels of stress, indicating that those staying home may experience lower stress levels in the Sunamganj area of Bangladesh. The factors of middle age, older age, and lack of alternative income may be contributing to the high levels of stress experienced by urban poor individuals during the coronavirus disease (Covid-19) in the Sylhet district of Bangladesh. This finding aligns with the research presented in study [39], which similarly indicates that monthly income is significantly associated with levels of mental stress. The lack of alternative income may also explain why a significant number of urban poor individuals are experiencing high levels of stress due to Covid-19 in Moulvibazar district. Comparatively, urban poor individuals not staying home were found to have a negative effect on high levels of stress during Covid-19 in Habiganj district of Bangladesh.

The Chi-square values of the Omnibus test were found to be significant (p-value <0.05) for different districts within the Sylhet division, indicating that the current model outperforms the null model. This means that the predictor variables such as age, marital status, education, alternative income, and staying home have an effect on

Covid-related stress (medium and high). Since the *p*-values for different districts within the Sylhet division exceeded the significance level of 0.05, the goodness of fit for the logistic regression was confirmed by the Hosmer–Lemeshow test. Therefore, the null hypothesis was accepted, concluding that there is sufficient evidence to show that the hypothesized model fits the dataset used in the logistic regression.

4 Conclusion

This study analyzed the factors causing psychological stress among urban poor individuals due to Covid-19, using primary data collected from four different districts: Sylhet, Moulvibazar, Habiganj, and Sunamganj, in the Sylhet division of Bangladesh. It presented results on both perceptions and stress levels of urban poor people during the Covid-19 pandemic. Factors associated with the stress of urban poor individuals due to Covid-19 were also examined using logistic regression analysis. A total of 408 respondents were interviewed to identify the factors responsible for psychological stress among the people living in the Sylhet division.

The perception of 81.55% of urban poor individuals in Sylhet district is that both isolation and treatment of Covid-19 infected people are effective ways to reduce the spread of the virus. In Moulvibazar district, 57.14% of urban poor individuals believe that Covid-19 spreads via respiratory droplets (from coughing and sneezing) of infected people. Additionally, 54.9% of urban poor individuals in Habiganj perceive Covid-19 as fatal. Furthermore, 61.54% of individuals believe that washing hands with soap and water can help prevent the transmission of Covid-19.

The results from the logistic regression analysis indicated that age and lack of alternative income significantly influenced psychological stress in Sylhet district during the Covid-19 pandemic. The middle-aged and elderly individuals, along with those lacking alternative income sources, are likely experiencing high levels of stress during Covid-19 in Sylhet district. People with no alternative income in Moulvibazar, Habiganj, and Sunamganj districts also reported high levels of stress.

The findings from this study underscore the significant impact of Covid-19 on the urban poor in the Sylhet Division of Bangladesh. The data indicate a distressing unemployment rate of 18.45% in Sylhet, which aligns with similar figures in Moulvibazar (18.45%), Habiganj (16.67%), and Sunamganj (23.53%). This rising unemployment is particularly concerning given that a substantial portion of this population relies on informal employment, which has been heavily affected by the pandemic and associated restrictions. Moreover, the analysis of household income reveals that a considerable percentage of the urban poor have monthly earnings below 5,000 Tk, with records showing 25.24% in Sylhet, 23.30% in Moulvibazar, 10.78% in Habiganj, and 15.38% in Sunamganj. This financial instability has likely contributed to the heightened vulnerability of these communities, making it increasingly difficult for them to cope with the escalating costs of living amidst the pandemic. The absence of alternative income sources further exacerbates the situation, as evidenced by the stark reality that 71.84% in Sylhet, 66.02% in Moulvibazar, 63.73% in Habiganj, and 70.19% in Sunamganj reported having no other means of income. This lack of financial resilience correlates strongly with increased stress levels, as highlighted by the logistic regression analysis, which indicates that urban poor individuals without alternative income experienced significantly higher stress during Covid-19 than those with some form of supplementary income.

In terms of public health perceptions, the study found a broad consensus on the effectiveness of isolation and treatment as strategies to curb the spread of Covid-19, with 81.55% in Sylhet, 54.08% in Moulvibazar, 22.55% in Habiganj, and 35.58% in Sunamganj supporting these measures. While the high level of belief in the effectiveness of these strategies suggests a degree of health literacy among the urban poor, the varying degrees of support across districts may reflect differences in the dissemination of information and the perceived legitimacy of health interventions.

Related research is suggested to assess the psychological stress of rural individuals through perception-based assessments and to identify the factors causing these issues in different regions of Bangladesh. The government should pay more attention to the depression, stress, and anxiety experienced by poor individuals living in both urban and rural areas. Finally, we propose that the public should follow the guidelines issued by the government and health agencies to prevent Covid-19 infections.

4.1 Strengths and limitations of the study

This study offers novel insights into the stress experienced by urban poor communities in the Sylhet division of Bangladesh, examining its connections with various factors on a division-wide scale. Notably, the existing body of research on students' mental health during the pandemic in Bangladesh is scarce, and even fewer studies prioritize the mental wellness of individuals beyond students. By conducting this research across the districts

within the division, a diverse and representative population sample was achieved, with a significant sample size that enhances the robustness and reliability of the findings.

However, the study's geographical scope is limited to urban poor communities in Sylhet during the pandemic. Consequently, the results cannot be generalized to other urban poor populations in other divisions of Bangladesh. Several limitations of the study are worth mentioning, including its cross-sectional design, which relies on a non-representative sample with an overwhelming response from urban poor individuals in the Sylhet division. As a result, causality cannot be established, and the findings may not accurately reflect the consequences of Covid-19. Additionally, the relatively small sample size and limited scope of the study warrant further investigation using more comprehensive measures, including data on Covid-19 tests and other pandemic-related factors. Moreover, the current study only assesses stress levels at a single point in time during the pandemic, while the long-term effects of the pandemic on urban poor communities remain unexplored.

4.2 Implication for policy and future research

Based on the findings of this study addressing psychological stress among urban poor communities in Sylhet Division, Bangladesh, during the COVID-19 pandemic, several targeted policy recommendations emerge.

First, it is imperative for both governmental and non-governmental organizations to establish income support programs that offer immediate financial assistance to those who have experienced job losses and diminished income sources. Such financial aid can mitigate economic instability and alleviate stress levels.

Second, there is a need to enhance access to mental health resources, particularly for middle-aged and elderly individuals, who were disproportionately affected by psychological distress. Community-based mental health initiatives should be introduced to provide essential emotional support and coping strategies.

Third, tailored informational campaigns focused on COVID-19 transmission, prevention, and treatment should be amplified, particularly in regions like Moulvibazar and Habiganj, where perceptions of virus transmission and severity differ significantly.

In addition, further research is warranted to investigate psychological stress among rural populations in Bangladesh using perception and practice-based assessments.

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