

Understanding the impact of socioeconomic and health factors on geriatric depression: A comparative study in rural and urban Bangladesh

Mohammad Kamal Hossain¹ | Md. Nazrul Islam² | Mohammed Taj Uddin² |
Md Sabbir Hossain² 

¹Department of Statistics, Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Gopalganj, Bangladesh

²Department of Statistics, Shahjalal University of Science and Technology, Sylhet, Bangladesh

Correspondence

Md Sabbir Hossain, Department of Statistics, Shahjalal University of Science and Technology, Sylhet, Bangladesh.
Email: bmsabbirhossainsakib@gmail.com

Funding information

University Research Centre (URC), SUST, Grant/Award Number: PS/2018/1/11 & PS/2019/1/35

Abstract

Background and Aims: The prevalence of depression among the elderly is a growing concern, and this study examines the differences between urban and rural areas in terms of geriatric depression.

Methods: Using a two-stage random sampling approach in urban areas and a multistage random sampling approach in rural areas, the study surveyed 944 elderly individuals of both sexes.

Results: The results indicate that the prevalence of depression was high, with 52.5% of the elderly population experiencing mild to severe depression. The study found that increasing age, female gender, nuclear family structure, and involvement of housewives or others were significant factors affecting depression in urban areas, while increasing age and elderly people without spouses were significant factors in rural areas. Additionally, the study identified hearing impairment, asthma, and arthritis as risk factors for depression in rural areas, and bronchitis, heart disease, and thyroid illness as significant factors in urban areas.

Conclusion: These findings highlight the need for policymakers to focus on addressing the mental health needs of older people, particularly women and those without spouses.

KEYWORDS

Bangladesh, depression, elderly, geriatric depression, geriatric depression scale (GDS), rural-urban

1 | INTRODUCTION

Globally, depression has been a leading cause of disability for many years and is a major mental health issue among the geriatric population.¹ Even though, after adjusting for population size, disability, and suicide, they are comparable across nations of all

economic levels, the absolute cost of depression-related disability and suicide are disproportionately felt by low- and middle-income countries.²

Age has a significant role in determining mental health. Old age is a time of transition when one must cope with issues impacting their emotional and social well-being in addition to the physical aging

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2024 The Authors. *Health Science Reports* published by Wiley Periodicals LLC.

process. The total prevalence of mental and behavioral diseases tends to rise with age due to the normal aging of the brain, declining physical health, and cerebral pathology. Other significant risk factors for a higher incidence of mental and behavioral problems include disability brought on by a variety of illnesses, loneliness, a lack of family support, a lack of personal autonomy, and financial dependence.³⁻⁵

Depression is the mental illness that affects the elderly the most out of all others. Depression affects a person's quality of life and makes them more dependent on others. Elderly people may experience major clinical and social consequences from untreated depression.^{6,7} Depression is accompanied by a broad spectrum of symptoms, some of which are unique to each person. Because their symptoms might differ from those of younger people, depression in older people can be challenging to identify. People might be unwilling to discuss their feelings, or they could exhibit other, less evident symptoms of sadness.⁸ Thus, doctors won't be as likely to detect depression in their patients. Occasionally, elderly adults who are depressed have fatigue, difficulty sleeping, or feel stingy and irritable. Also, older people may suffer from more physical diseases, including cancer, heart disease, or stroke, all of which can exacerbate depressive symptoms. Another possibility is that they are taking medication with side effects that aggravate depression.^{9,10}

According to several studies, depression was more common among older females. Aside from advancing age, living in rural areas, being illiterate, having a lower socioeconomic standing, and being jobless, other demographic characteristics associated with depression in the elderly include being single, divorced, or widowed, living alone, and being old. Loneliness, inadequate social and familial support, dependency, a lack of affection in the family, inadequate time spent with children, stressful life events, perceived poor health, a lack of spirituality, and a higher reliance on emotion-based coping are among the many psychosocial factors that have been linked to depression in the elderly. Lack of hobbies, inconsistent eating patterns, substance use/smoking, and insufficient exercise are among the lifestyle and nutritional variables that have been related to depression.^{6,11-13}

The number of elderly persons (those 60 and over) is thought to be around 900 million, or 12% of the world's population. By the year 2050, it is expected that this number will have more than doubled (to two billion), with 80% of those people residing in low- and middle-income nations such as Bangladesh. WHO reports that 7% of old people worldwide are reported to have depression and that 15% of elderly people worldwide suffer from a mental condition.¹⁴ Due to its large population and rising geriatric population, Bangladesh might experience a significant increase in the number of these mental health issues.¹⁵ Elderly people frequently experience various chronic conditions in addition to lacking social networks and support. The elderly frequently eats meals low in vitamins and minerals due to concurrent poverty. They are frequently more susceptible to depressive illnesses because of these impairments. The lack of certain micronutrients in the diet, such as folate and vitamin B12, contributes to the pathophysiology of depression. These nutrients have significant regulatory effects on brain processes.¹⁶⁻¹⁸

Several studies have been conducted on geriatric depression, its symptoms, risk factors, and suicidal thoughts.¹⁹⁻²² This study aims to address the gap in community-based research on depression among the elderly in Bangladesh, specifically by comparing rural and urban populations using a condensed version of the geriatric depression scale (GDS). By identifying socio-demographic factors and health indicators associated with geriatric depression, the study hopes to shed light on the unique challenges faced by elderly individuals in these communities. Ultimately, the findings may inform policymakers and healthcare providers on how best to support the mental health needs of the elderly in Bangladesh.

2 | METHODS

2.1 | Data source

The current study utilized data from a cross-sectional survey of men and women aged 55 years and older, residing in the Sylhet District of Bangladesh. A multi-indicator survey design was employed to gather information on various aspects related to the health of the elderly, using a structured questionnaire. The sampling approach included two-stage random sampling for urban areas and multistage random sampling for rural areas in the Sylhet District, resulting in a sample size of 944 elderly participants, with equal representation from both rural ($n = 472$) and urban ($n = 472$) areas. The data collected for the study included a range of health-related information, such as self-reported health problems, biomarkers, daily activity performance, the GDS for short form, and sociodemographic details of the participants. It is important to note that while other studies may have utilized the same data source, the current study is unique in its research focus and methodology.

2.2 | Study design

2.2.1 | For first phase

In this study, a two-stage cluster sampling approach was employed to select samples from the Sylhet City Corporation regions, specifically targeting individuals aged 55 years and older. It is worth noting that the Sylhet City Corporation is composed of 27 administrative wards. Around half (13) of the 27 wards were chosen at random in the first round. To ensure a minimum sample size of 472 from each chosen ward, at least 35 elders, both male, and female, were randomly chosen in the second stage.

2.2.2 | For second phase

The primary objective is to employ in-person interviewers to gather data on adult health indicators. At least 472 random

samples were taken from several Union Parishads, Union Health Complexes, and religious locations where old people are frequently encountered to accomplish this aim. Aged adults (55 and over) from rural regions in Sylhet District were chosen for the sampling unit using multistage random sampling procedures. The study was conducted in the Sylhet District, which comprises 13 upazilas. To ensure representation from different regions within the district, a simple random sampling (SRS) technique was employed in the first step, and four upazilas were selected at random, which amounts to roughly one-third of the total upazilas in the district. One union parishad has been chosen by SRS from each chosen upazila for the second round. SRS has chosen two wards from each chosen union parishad for the third stage. In the fourth stage, 472 respondents were covered by at least 55 senior citizens, both male, and female, who were picked at random. Eight administrative wards were ultimately chosen. For the subject of research, a list of union councils and religious sites (Mosques, Temples, and Churches) from which samples will be drawn has been prepared at random.

2.3 | Sample size selection

2.3.1 | For first phase

The study's population size was $N = 35,917$, with N_1 representing male elderly and N_2 representing female elderly. The appropriate sample size was determined using the formula,

$$n = \frac{z^2 p(1-p)}{e^2} \approx 381$$

where $z = 1.96$, p is the proportion of male elderly = 0.55, and e is the margin of error = 0.05, resulting in a sample size of approximately 381. The proportional allocation of sample sizes yielded $n_1 = 210$ for male elderly and $n_2 = 171$ for female elderly. The study ultimately gathered information from 472 elderly people residing in the urban areas of Sylhet City Corporation to accommodate for the complexity of the sampling process.

2.3.2 | For second phase

The minimum required sample size can be calculated using the formula,

$$n = \frac{p(1-p)z^2_{\alpha/2}}{d^2} \approx 384$$

where n is the sample size, z is the value of a two-sided normal variate at a 95% confidence level (1.96), p is the estimated proportion (0.5 in cases where the outcome is uncertain), and d is the desired precision (0.05 or a maximum of 0.10). For this study, information on 472 elderly individuals was collected from rural areas of the Sylhet District to account for its complexity.

2.4 | Measurement of GDS

Depression poses a significant public health challenge in Bangladesh, with a higher prevalence among older individuals compared to younger ones. Therefore, there is a pressing need to investigate and address depression among the elderly population. The GDS was specifically developed for use in older adults and has been successfully adapted and validated in various languages and elder populations worldwide.²³⁻²⁶

The GDS is a self-reporting tool designed to assess depressive symptoms in geriatric individuals. It comprises 30 questions (known as the original GDS Long Form) that older adults respond to with "Yes" or "No" based on their feelings over the past week.^{23,27} This widely used instrument simplifies the screening process for depression in older populations. Recognizing the need for a shorter assessment tool, a 15-item version of the GDS (GDS-15) was developed by selecting questions from the original Long Form that exhibited the strongest correlation with depression.²⁴ These 15 items encompass emotional, cognitive, and behavioral aspects related to life satisfaction, feelings of helplessness, reduced activity or interest, and other indicators of depression. Respondents answer with "Yes" or "No," and the total score can range from 0 to 15, with higher scores indicating a higher likelihood of depression. Specifically, when 10 out of the 15 items are answered affirmatively, it suggests the presence of depression, while the opposite is true for the remaining items (question nos. 1, 5, 7, 11, 13). The GDS-15 is particularly suited for physically unwell or mildly to moderately cognitively impaired patients who may have limited attention spans or tire easily. It is a quick assessment, typically taking 5–7 min to complete. Importantly, the GDS-15 is a validated tool for identifying depression in elderly individuals residing in community settings. In our study, we utilized the short form of the GDS-15 to assess geriatric depression (Table 1).

2.5 | Statistical analysis

2.5.1 | Univariate analysis

Univariate analysis has been used to find the frequency distribution of several sociodemographic variables such as the age of the elderly, sex, religion, marital status, literacy, family size, types of families, residence, living arrangement, education, occupation, and so forth. In any study, the frequency distribution is important, and primarily it is used to know the nature of sample data. Some descriptive measures such as means, standard deviations, and so forth were calculated for geriatric depression and frailty in the elderly according to respondents' age, sex, residence, and religion.

2.6 | Bivariate analysis

2.6.1 | χ^2 test of association

To study the relationship between two attributes, the frequency distribution is the first step, although this distribution does not allow

No	Choose the best answer for you have felt over the past week Questions	Answer
1	Are you basically satisfied with your life?	[No = 1, yes = 0]
2	Have you dropped many of your activities and interests?	[No = 0, yes = 1]
3	Do you feel that your life is empty?	[No = 0, yes = 1]
4	Do you often get bored?	[No = 0, yes = 1]
5	Are you in good spirits most of the time?	[No = 1, yes = 0]
6	Are you afraid that something bad is going to happen to you?	[No = 0, yes = 1]
7	Do you feel happy most of the time?	[No = 1, yes = 0]
8	Do you often feel helpless?	[No = 0, yes = 1]
9	Do you prefer to stay at home, rather than going out and doing new things?	[No = 0, yes = 1]
10	Do you feel you have more problems with memory than most?	[No = 0, yes = 1]
11	Do you think it is wonderful to be alive now?	[No = 1, yes = 0]
12	Do you feel pretty worthless the way you are now?	[No = 0, yes = 1]
13	Do you feel full of energy?	[No = 1, yes = 0]
14	Do you feel that your situation is hopeless?	[No = 0, yes = 1]
15	Do you think that most people are better off than you are?	[No = 0, yes = 1]
Total score		15

Note: Bold answers indicate depression. Score 1 point for each bold answer. A score of >5 points suggests depression.

Source: <https://web.stanford.edu/~yesavage/GDS.html>.

quantifying or testing that relationship. For this purpose, it is useful to consider different indexes that measure the extent of association as well as a statistical test (χ^2 test of association) of the null hypothesis that,

H_0 : There is no association

And the alternative hypothesis is,

H_1 : There exists an association

To test the existence of interrelationships among the categories of two qualitative variables, the χ^2 test of association is performed.

2.6.2 | Binary logistic regression

Logistical regression is the appropriate statistical technique when the dependent variable is a categorized (nominal or nonmetric) variable, and the independent variables are metric or nonmetric variables.²⁸ In other words, multinomial analysis is the appropriate procedure if the single dependent variable is multichotomous (e.g., high-medium-low) and therefore nonmetric.

To determine the relationship between response variables and one or more explanatory variables, regression methods have become an integral component. Binary logistic regression analysis

TABLE 1 Variables related to geriatric depression scale (short form).

is the most widely used technique when the dependent variables are categorized into two categories (e.g., yes or no). In this study, we utilized a regression model to determine which sociodemographic factors, daily living activities, and health variables had the most significant impact on the GDS score of older adults. That's why GDS is considered for this model and categorized in the following way:²⁹

$$Y = \begin{cases} 1, & \text{if GDS Score} > 6 \text{ to } 15 \text{ (Depression)} \\ 0, & \text{if GDS Score} < 0 \text{ to } 5 \text{ (Normal)} \end{cases}$$

2.7 | Multiple logistic regression analysis

Furthermore, we used binary logistic regression to assess the influence of explanatory variables of geriatric depression. The variables identified in the univariate analysis ($p < 0.20$) were then included in the final multivariable logistic regression model.

2.8 | Statistical tools for analysis

The study used several descriptive and inferential statistical tools and techniques for data analysis. For this purpose, MS Excel and SPSS (Version-20) software were used.

3 | RESULTS

3.1 | Background characteristics of the elderly concerning place of residence

This study included 944 elderly people both male and female including urban and rural areas from Sylhet District, Bangladesh.

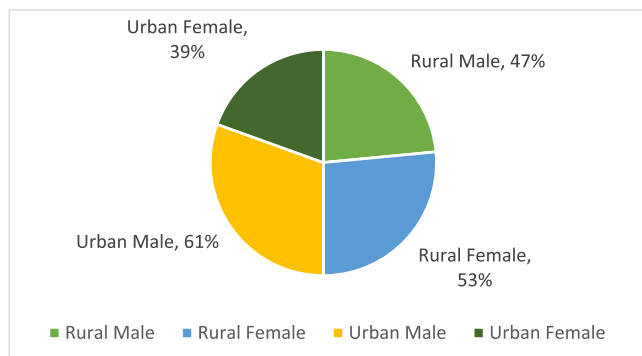


FIGURE 1 Percentage distribution of elderly with respect to sex and locality.

Among them more than half (61%) of the elderly were male and 39% were female in urban areas whereas 47% of the elderly were male and 53% were female in rural areas (Figure 1).

Table 2 represents the background characteristics of the elderly according to sex in urban and rural areas. This table shows that respondents' chronological age (CA) started from 55 years, with an average CA of 62.90 (SD \pm 9.32) years for rural and 62.43 (SD \pm 8.57) years for urban. In the age group 55–59, about 47% were male and 53% were female in rural areas whereas 61% were male and 39% were female in urban areas. Maximum elderly of the age groups 70+ and 55–59 belong to rural and urban, respectively. Due to the fast urbanization happening in Bangladesh, the traditional joint family system is gradually disintegrating. It is found that the significant difference in the rural and urban elderly family structures were 59% joint or extended families in rural and 53% in urban areas. These findings are like many other studies conducted in Sylhet.

From Table 2, it was seen that most of the elderly (80%) were illiterate in rural areas and 55% were in urban areas. Also, among the literate, the urban elderly was more literate than the rural and the figure was 45% and 20%, respectively. It was also found that only 7% of elderly were engaged in different services and businesses in rural areas, on the other hand 35% were engaged in urban areas. Only

TABLE 2 Background characteristics of the elderly concerning place of residence.

Characteristics	Response	Frequency (rural)			Frequency (urban)		
		Male n (%)	Female n (%)	Total	Male n (%)	Female n (%)	Total
		223 (47.2)	249 (52.8)		290 (61.4)	182 (38.6)	
Age	55–59	78 (34.2)	150 (65.8)	228 (48.3)	121 (57.3)	90 (42.7)	211 (44.7)
	60–64	44 (51.2)	42 (48.8)	86 (18.2)	44 (46.8)	50 (53.2)	94 (19.9)
	65–69	25 (54.3)	21 (45.7)	46 (9.7)	53 (79.1)	14 (20.9)	67 (14.2)
	70+	76 (67.9)	36 (32.1)	112 (23.7)	72 (72.0)	28 (28.0)	100 (21.2)
Education	Illiterate	154 (41.0)	222 (59.0)	376 (79.7)	113 (43.8)	145 (56.2)	258 (54.7)
	Literate	69 (71.9)	27 (28.1)	96 (20.3)	177 (82.7)	37 (17.3)	214 (45.3)
Occupation	Service (government/private)	15 (68.2)	7 (31.8)	22 (4.7)	59 (76.6)	18 (23.4)	77 (16.3)
	Business	12 (100.0)	0	12 (2.5)	85 (96.6)	3 (3.4)	88 (18.6)
	Housewife or others	196 (44.7)	242 (55.3)	438 (92.8)	146 (47.6)	161 (52.4)	307 (65.0)
Type of family	Nuclear	96 (35.4)	126 (64.6)	195 (41.3)	150 (68.2)	70 (31.8)	220 (46.6)
	Joint or extended	154 (55.6)	123 (44.4)	277 (58.7)	140 (55.6)	112 (44.4)	252 (53.4)
Marital status	Married	216 (58.2)	155 (41.8)	371 (78.6)	278 (71.6)	110 (28.4)	388 (82.2)
	Unmarried or widowed or divorced	7 (6.9)	94 (93.1)	101 (21.4)	12 (14.3)	72 (85.7)	84 (17.8)
Religion	Muslim	210 (47.6)	231 (52.4)	441 (93.4)	254 (60.5)	166 (39.5)	420 (89.0)
	Non-Muslim	13 (41.9)	18 (58.1)	31 (6.6)	36 (69.2)	16 (30.8)	52 (11.0)
Smoking behavior	Nonsmoker	125 (33.6)	247 (66.4)	372 (78.8)	150 (45.6)	179 (54.4)	329 (69.7)
	Smoker	98 (98.0)	2 (2.0)	100 (21.2)	140 (97.9)	3 (2.1)	143 (30.3)
Living alone	No	212 (52.5)	192 (47.5)	404 (85.6)	247 (60.2)	163 (39.8)	410 (86.9)
	Yes	11 (16.2)	57 (83.8)	68 (14.4)	43 (69.4)	19 (30.6)	62 (13.1)

4.7% were engaged in government and private services in rural areas whereas 16.3% were in urban areas.

Urban and rural smoking behaviors are remarkable. About 30% of urban people smoke whereas 21% were in rural areas. The elderly living alone was found to be the same in both areas. But urban and rural male/female scenario is noticeable. Only 16% of elderly males were living alone in rural areas but 69% were in urban areas.

3.2 | Reliability

The degree of internal consistency of the GDS-15 was assessed using Cronbach α , and the results showed that it was acceptable. Specifically, the Cronbach's coefficient α was found to be 0.63 for overall data, 0.51 for rural areas, and 0.74 for urban areas.³⁰

3.3 | Prevalence of depression concerning locality

The prevalence of depression in participants in rural and urban areas was 54.6% and 50.4%; and the average depression scores were 6.15 (SD = 2.44) and 6.21 (SD = 3.21), respectively. Rural depression scores were higher than in urban areas. According to the survey, the prevalence of depression in rural areas was 49%, with 6% of the population experiencing severe depression and the rest experiencing mild or moderate depression. In urban areas, the prevalence of depression was lower, with 36% of the population experiencing mild or moderate depression and 13% experiencing severe depression (Table 3).

3.4 | Results on binary logistic regression analysis of depression with sociodemographic and health variables concerning locality

Table 4 displays the results of a binary logistic regression analysis that examines the relationship between sociodemographic variables and elderly individuals. It reveals that the age group 70 and above years of elderly had a higher risk of being depressed than the age group 55–59 years in both areas. For example, elderly people of age group 70 and above years were four times (95% CI: 2.20–6.69, $p \leq 0.01$) more likely to

be depressive than the pre-elderly age group (55–59 years) in rural areas whereas this risk is almost doubled in urban areas. Elderly age groups 60–64 and 65–69 years were 1.35 (95% CI: 0.97–2.31, $p = 0.267$) and 2.53 (95% CI: 1.23–5.19, $p = 0.012$) times more likely to be depressive than the pre-elderly (reference group) age group after adjusting the other variables in rural areas but 1.85 times (95% CI: 1.09–3.16, $p = 0.024$) and 1.41 times (95% CI: 0.78–2.54, $p = 0.256$) more depressed than the pre-elderly age group in urban areas, respectively.

The sex of elderly individuals has a significant impact on depression in urban areas, but not in rural areas. Urban female elderly had more likely to become depressive (odds ratio [OR] = 1.93, 95% CI: 1.15–3.22, $p = 0.012$) than the male elderly. The marital status of elderly individuals has a strong and significant impact on depression in rural areas, but not in urban areas. Rural married elderly was less depressive (OR = 0.39, 95% CI: 0.21–0.74, $p = 0.004$) than the unmarried or widowed, or divorced elderly. The occupation of elderly individuals is found to have a strong and significant impact on depression in urban areas, but not in rural areas. Urban housewives or others had a higher risk of being depressive than the government or private service for the elderly. For example, elderly housewives or others were 2.21 times (95% CI: 1.24–3.92, $p = 0.007$) more likely to be depressed than the government or private service for the elderly in urban areas. Business persons were two times (95% CI: 1.07–4.11, $p = 0.032$) more likely to be depressed than the government or private service for the elderly in the urban area.

The respondent's type of family was a significant association with geriatric depression in urban areas but not in rural areas. Joint or extended family members of the elderly were less depressed (OR = 0.63, 95% CI: 0.42–0.95, $p = 0.026$) than the nuclear family of the elderly in urban areas. Respondent's education, religion, and living alone were not significantly associated with geriatric depression in binary logistic regression analysis.

Table 5 the results of a binary logistic regression analysis that examines the relationship between health variables and elderly individuals in both rural and urban areas. It reveals that self-rating health status has a significant impact on geriatric depression in both areas. The average or poor health status of the elderly was about two times more likely to be depressed than good health elderly in both areas. It also reveals that smoking behavior, feeling lonely, heart murmur, and stroke were a strong significant ($p \leq 0.09$) impact on geriatric depression in both areas. In smoking habit, the smoker was less depressed than the nonsmoker of the elderly in both areas. Feeling lonely of the elderly was about eight times more depressed than those who could not feel loneliness in the rural areas but in the urban area, this risk is threefold. Those who had previously had stroke were six times more depressed than those who did not have a stroke in rural areas but in an urban area, this risk is double. In logistic regression analysis, hearing difficulty, asthma, and arthritis were a significant association ($p \leq 0.089$) with geriatric depression in rural areas, but these are neutral in the urban area. On the other hand, bronchitis, heart problem, and thyroid disease of the respondents had no significant association with geriatric depression in rural areas but significant impact on depression in urban areas.

TABLE 3 Classification of elderly based on GDS-15 scores (N = 944, rural = urban = 472).

Locality	Mean (SD)	Moderately depressed N (%)	Severely depressed N (%)	Total N (%)
Rural	6.15 (2.44)	231 (48.9)	27 (5.7)	258 (54.6)
Urban	6.21 (3.21)	177 (37.5)	61 (12.9)	238 (50.4)
Total	6.18 (2.85)	408 (43.2)	88 (9.3)	496 (2.5)

Abbreviation: GDS, geriatric depression scale.

TABLE 4 Binary logistic regression analysis of depression with sociodemographic variables with respect to locality.

Characteristics	Adjusted OR (rural)				Adjusted OR (urban)			
	OR	95% CI for OR		p Value	OR	95% CI for OR		p Value
		Lower	Upper			Lower	Upper	
Age								
55–59 (ref.)								
60–64	1.353	0.794	2.307	0.267	1.853	1.086	3.162	0.024
65–69	2.526	1.229	5.192	0.012	1.408	0.780	2.544	0.256
70 and above	3.836	2.200	6.687	0.000	2.036	1.169	3.545	0.012
Gender								
Male (ref.)								
Female	1.461	0.914	2.334	0.113	1.927	1.154	3.218	0.012
Education								
Illiterate (ref.)								
Literate	0.993	0.579	1.705	0.981	0.768	0.503	1.175	0.224
Marital status								
Unmarried or widowed or divorce (ref.)								
Married	0.390	0.206	0.738	0.004	0.705	0.396	1.255	0.235
Occupation								
Service (government/private) (ref.)								
Business	0.735	0.112	4.843	0.749	2.093	1.066	4.109	0.032
Housewife or others	2.264	0.744	6.887	0.150	2.206	1.241	3.922	0.007
Type of family								
Nuclear (ref.)								
Joint or extended	0.936	0.614	1.426	0.757	0.632	0.422	0.946	0.026
Religion								
Non-Muslim (Ref.)								
Muslim	1.981	0.810	4.848	0.134	1.569	0.828	2.975	0.167
Living alone								
No (ref.)								
Yes	1.648	0.788	3.446	0.184	1.307	0.730	2.340	0.368

Respondent's cataracts, vision difficulty, kidney disease, liver disease, osteoporosis problem, seizure, diabetes, blood pressure, and body mass index were not significantly associated with geriatric depression in binary logistic regression analysis in both areas.

3.5 | Final multiple logistic regression analysis of depression with sociodemographic variables with respect to locality

To gain a deeper understanding of the relationship between sociodemographic variables and depression among elderly

individuals, a multiple logistic regression analysis was conducted, with a particular focus on the distinction between rural and urban localities. The results of this analysis, as presented in Table 6, shed light on the nuanced interplay between various demographic factors and the prevalence of depression in these two settings.

The impact of age on depression risk remained significant in both rural and urban areas. Elderly individuals aged 70 and above continued to exhibit a substantially higher risk of depression, with an OR of 4.212 (95% CI: 2.453–7.232, $p < 0.001$) in rural areas and an OR of 2.211 (95% CI: 1.278–3.825, $p = 0.005$) in urban areas, as compared to the reference group of 55–59 years. This suggests that advancing age is a consistent predictor of depression across localities.

TABLE 5 Binary logistic regression analysis of depression with health variables with respect to locality.

Characteristics	Adjusted OR (rural)				Adjusted OR (urban)			
	OR	95% CI for OR		p Value	OR	95% CI for OR		p Value
		Lower	Upper			Lower	Upper	
Self-rating health status								
Good (ref.)								
Average/poor	2.332	1.021	5.326	0.044	2.440	1.263	4.712	0.008
Smoking habit								
Nonsmoker (ref.)								
Smoker	0.562	0.320	0.990	0.046	0.634	0.397	1.012	0.056
Hearing difficulty								
No (ref.)								
Yes	1.999	1.208	3.310	0.007	1.096	0.675	1.777	0.711
Cataracts								
No (ref.)								
Yes	1.053	0.600	1.850	0.856	0.942	0.585	1.518	0.806
Vision difficulties								
No (ref.)								
Yes	1.378	0.792	2.400	0.257	1.101	0.707	1.713	0.671
Asthma								
No (Ref.)								
Yes	1.685	0.923	3.073	0.089	1.255	0.696	2.262	0.451
Bronchitis								
No (ref.)								
Yes	0.938	0.407	2.159	0.880	1.932	1.129	3.307	0.016
Arthritis								
No (ref.)								
Yes	2.788	1.408	5.521	0.003	1.303	0.835	2.033	0.244
Feeling lonely								
No (ref.)								
Yes	7.623	4.107	14.151	0.000	2.652	1.497	4.700	0.001
Heart murmur								
No (ref.)								
Yes	0.266	0.138	0.511	0.000	1.782	1.149	2.764	0.010
Heart problem								
No (ref.)								
Yes	0.677	0.393	1.167	0.160	2.017	1.242	3.275	0.005
Kidney disease								
No (ref.)								
Yes	0.609	0.185	2.003	0.414	0.633	0.283	1.418	0.267
Liver disease								
No (ref.)								
Yes	0.388	0.110	1.367	0.141	1.730	0.639	4.686	0.281

TABLE 5 (Continued)

Characteristics	Adjusted OR (rural)				Adjusted OR (urban)			
	OR	95% CI for OR		p Value	OR	95% CI for OR		p Value
		Lower	Upper			Lower	Upper	
Osteoporosis problem								
No (ref.)								
Yes	1.185	0.695	2.020	0.534	1.255	0.818	1.925	0.299
Seizure								
No (ref.)								
Yes	2.788	0.764	10.172	0.120	0.495	0.074	3.327	0.470
Stroke								
No (ref.)								
Yes	5.979	1.311	27.275	0.021	2.243	0.880	5.718	0.091
Thyroid disease								
No (ref.)								
Yes	0.156	0.011	2.222	0.170	3.265	1.146	9.305	0.027
Diabetic status								
No (ref.)								
Yes	0.888	0.434	1.818	0.745	1.182	0.738	1.894	0.485
Blood pressure								
No (ref.)								
Yes	0.910	0.516	1.602	0.743	0.725	0.419	1.256	0.252
Body mass index (BMI)								
Well-nourished (ref.)								
Overweight	1.916	0.914	4.018	0.085	1.028	0.621	1.699	0.916
Malnourished	0.811	0.482	1.365	0.431	0.816	0.482	1.380	0.448

In the urban context, gender emerged as a significant predictor of depression. Female elderly individuals in urban areas were notably more susceptible to depression, with an OR of 2.370 (95% CI: 1.514–3.711, $p < 0.01$), while this gender disparity was not observed in rural areas. Marital status continued to exhibit an impact on depression risk in rural areas, where being married was associated with a lower risk of depression (OR: 0.382, 95% CI: 0.202–0.725, $p = 0.003$). However, this effect was not observed in urban areas. Occupational differences persisted as significant predictors of depression in the urban setting. Urban elderly individuals engaged in business activities displayed an increased risk of depression (OR: 2.132, 95% CI: 1.091–4.167, $p = 0.027$), as did housewives or individuals with other occupations (OR: 2.270, 95% CI: 1.283–4.015, $p = 0.005$). In rural areas, occupation did not exhibit a significant association with depression. Living arrangements continued to influence depression risk in urban areas. Elderly individuals residing in joint or extended families were less likely to experience depression compared to those in nuclear families (OR: 0.644, 95% CI:

0.432–0.959, $p = 0.030$). This distinction was not observed in rural areas. The variables of religion and living alone did not show statistically significant associations with geriatric depression in either rural or urban areas (Table 6).

3.6 | Final multiple logistic regression analysis of depression with health variables with respect to locality

To gain deeper insights into the relationship between health-related factors and depression among elderly individuals, a multiple logistic regression analysis was conducted, focusing on both rural and urban localities. The findings presented in Table 7 provide valuable insights into how various health variables are associated with depression in these distinct settings.

Elderly individuals who self-rated their health as “average/poor” were at a significantly higher risk of depression in both rural

TABLE 6 Multiple logistic regression analysis of depression with sociodemographic variables with respect to locality.

Characteristics	Rural				Urban			
	OR	95% CI for OR		<i>p</i> Value	OR	95% CI for OR		<i>p</i> Value
		Lower	Upper			Lower	Upper	
Age								
55–59 (ref.)								
60–64	1.394	0.823	2.363	0.217	1.906	1.122	3.238	0.017
65–69	2.838	1.384	5.818	0.004	1.441	0.802	2.587	0.222
70 and above	4.212	2.453	7.232	0.000	2.211	1.278	3.825	00.005
Gender								
Male (ref.)								
Female	1.607	1.029	2.510	0.037	2.370	1.514	3.711	<0.01
Marital status								
Unmarried or widowed or divorce (ref.)								
Married	0.382	0.202	0.725	0.003				
Occupation								
Service (government/private) (ref.)								
Business					2.132	1.091	4.167	0.027
Housewife or others					2.270	1.283	4.015	0.005
Type of family								
Nuclear (ref.)								
Joint or extended					0.644	0.432	0.959	0.030
Religion								
Non-Muslim (ref.)								
Muslim	2.167	0.913	5.146	0.080	1.623	0.866	3.040	0.131
Living alone								
No (ref.)								
Yes	00.564	0.271	1.175	0.126				

(OR: 2.821, 95% CI: 1.107–7.191, $p = 0.030$) and urban (OR: 3.211, 95% CI: 1.518–6.789, $p = 0.002$) areas compared to those who rated their health as “good.” While there was a trend towards an increased risk of depression among smokers compared to nonsmokers, this association did not reach statistical significance in either rural or urban areas. In rural areas, experiencing hearing difficulty was not significantly associated with depression. However, in urban areas, the association approached significance, suggesting a potential link (OR: 1.713, 95% CI: 0.995–2.948, $p = 0.052$). Several chronic health conditions exhibited significant associations with depression in either rural or urban areas: Elderly individuals with asthma had a significantly higher risk of depression in rural areas (OR: 5.189, 95% CI: 1.724–15.619, $p = 0.003$). In urban areas, having bronchitis was associated with an increased risk of depression (OR: 1.866, 95% CI: 1.043–3.341, $p = 0.036$). Arthritis was associated with a higher

risk of depression in rural areas (OR: 3.627, 95% CI: 1.679–7.835, $p = 0.001$). Having a heart murmur was significantly associated with depression in both rural (OR: 3.099, 95% CI: 1.507–6.374, $p = 0.002$) and urban (OR: 1.641, 95% CI: 1.012–2.660, $p = 0.044$) areas. In urban areas, the presence of a heart problem was linked to a higher risk of depression (OR: 1.826, 95% CI: 1.080–3.087, $p = 0.025$). Lonely had a profound impact on depression risk in both rural (OR: 26.095, 95% CI: 12.700–53.620, $p < 0.001$) and urban (OR: 19.223, 95% CI: 10.110–36.553, $p < 0.001$) areas. Several other health conditions, such as liver disease, seizures, stroke, and thyroid disease, did not exhibit statistically significant associations with geriatric depression in the multiple logistic regression analysis. BMI categories, including overweight and malnourished, did not show statistically significant associations with depression in either rural or urban areas (Table 7).

TABLE 7 Multiple logistic regression analysis of depression with health variables with respect to locality.

Characteristics	Rural				Urban			
	OR	95% CI for OR		p Value	OR	95% CI for OR		p Value
		Lower	Upper			Lower	Upper	
Self-rating health status								
Good (ref.)								
Average/poor	2.821	1.107	7.191	0.030	3.211	1.518	6.789	0.002
Smoking habit								
Nonsmoker (ref.)								
Smoker	1.598	0.851	3.000	0.145	1.439	0.873	2.371	0.154
Hearing difficulty								
No (ref.)								
Yes	1.713	0.995	2.948	0.052				
Asthma								
No (ref.)								
Yes	5.189	1.724	15.619	0.003				
Bronchitis								
No (ref.)								
Yes					1.866	1.043	3.341	0.036
Arthritis								
No (ref.)								
Yes	3.627	1.679	7.835	0.001				
Feeling lonely								
No (ref.)								
Yes	26.095	12.700	53.620	0.000	19.223	10.110	36.553	<0.01
Heart murmur								
No (ref.)								
Yes	3.099	1.507	6.374	0.002	1.641	1.012	2.660	0.044
Heart problem								
No (ref.)								
Yes	0.701	0.400	1.228	0.214	1.826	1.080	3.087	0.025
Liver disease								
No (ref.)								
Yes	0.305	0.082	1.131	0.076				
Seizure								
No (ref.)								
Yes	4.363	1.177	16.176	0.028				
Stroke								
No (ref.)								
Yes	4.211	0.733	24.194	0.107	1.932	0.737	5.068	0.181
Thyroid disease								
No (ref.)								
Yes	0.209	0.011	4.059	0.301	2.816	0.869	9.128	0.084

(Continues)

TABLE 7 (Continued)

Characteristics	Rural				Urban			
	OR	95% CI for OR		p Value	OR	95% CI for OR		p Value
		Lower	Upper			Lower	Upper	
Body mass index (BMI)								
Well-nourished (ref.)								
Overweight	1.117	0.614	2.030	0.717				
Malnourished	1.883	0.822	4.313	0.134				

4 | DISCUSSIONS

The study's findings suggest that depression is more prevalent among elderly individuals living in rural areas as compared to those living in urban areas (54.6% vs. 50.4%). These findings were consistent with some studies^{31,32} and inconsistent with other studies.³³⁻³⁵ The recent economic developments in terms of improved economic conditions, quality of life, and medical services have probably benefited the urban dwellers more than the rural dwellers.³¹ Elderly individuals living in rural areas may be at a higher risk of developing depression due to various factors such as family discrimination, financial instability, and physical or mental disabilities, which can lead to increased responsibilities and stress.³⁶

The study's results indicate that there are distinct risk factors associated with depression among elderly individuals living in urban and rural areas. In the urban sample, risk factors such as advanced age, being female, not being engaged in any work (such as being a housewife or unemployed), and living in a nuclear family were significantly associated with depression. On the other hand, the rural sample showed that advanced age and being unmarried or spouseless were significantly associated with depression.

In logistic regression analysis, the respondent's type of family was a significant association with depression in the urban area but not in rural. Joint or extended family members of the elderly were less depressed than the nuclear type of family in the urban area. Similar findings have been reported by other researchers.^{37,38} As a result of urbanization, families have become less diverse and more nuclear. Data from household surveys conducted in 43 developing countries in the 1990s indicate a tendency to convert primarily to nuclear households.³⁹

Marital status was significantly associated with the risk of depressive symptoms for rural seniors, but it had no significant effect on the urban sample. Marital status and living arrangements were significantly associated with depression for urban and rural samples of Taiwanese seniors.³³ As determined by the authors, the presence of a spouse can help relieve chronic illness and therefore reduce the likelihood of depression.⁴⁰ Moreover, the higher frequency of depression among widows or divorced or unmarried is not only due to the absence of a partner but can also lead to financial difficulties that reduce psychological scarcity;

these consequences of widowhood may be particularly pronounced in the case of older women in rural areas.³³ According to a study comparing depression levels across different regions in Europe, unmarried, widowed, or divorced adults were found to report more symptoms of depression compared to married adults.⁴¹ The study conducted in the Sylhet District found that elderly individuals in urban areas who were not engaged in any work, such as housewives or unemployed individuals, reported a higher prevalence of geriatric depression compared to those who were engaged in work or service. Other studies^{37,42} have also found that the amount of depression is higher among those who do not work and inconsistent with another study.³⁴

The present findings further support the associations between depression and different health conditions. The most noteworthy findings are the specific diseases found to be predictive of depressive symptoms in binary logistic regression analysis. More importantly, different health condition predictions were identified for depressive symptoms in urban and rural samples.

This study showed that self-perceived health status, smoking, feeling lonely, and the presence of different diseases such as heart murmur and stroke were associated with depression in the study area. It is found that hearing difficulty, asthma, and arthritis were independent risk factors influencing depression in rural areas but not in urban areas. On the other hand, the bronchitis, heart, and thyroid diseases of the respondents did not have a significant association with depression in a rural area but significant impact on depression in the urban area.

The results of our study suggest that mild depression is prevalent among elderly individuals in both rural and urban areas of the Sylhet District in Bangladesh. However, comparing these rates with studies conducted in other countries, which use different assessment tools, can be challenging.⁴³ Our study revealed a prevalence of mild depression of 49% in rural areas and 38% in urban areas among elderly individuals. These rates are like those reported in previous studies conducted in the same region.²⁰ Our findings align with previous studies, which have found that mild depression is more common than severe depression among the elderly population.^{44,45} The differences in prevalence rates across studies could be attributed to differences in study instruments, settings, sample sizes, or sampling strategies.

5 | CONCLUSIONS

The objective of this study was to explore the prevalence of depression and identify sociodemographic and health-related risk factors associated with depression among the elderly population in Sylhet District, Bangladesh. The study revealed that more than half of the elderly population in the study reported symptoms of depression, indicating a significant increase in depression among the elderly in Bangladesh. The high prevalence of depression in the study calls for larger-scale research to confirm the findings and advocate for depression screening as a part of geriatric assessment. The study found that rural elderly participants were more likely to experience depression than urban participants (54.6% vs. 50.4%), and different risk factors were identified for each group. For the urban sample, factors such as increased age, female gender, being unmarried or widowed or divorced, involvement in housewife or other nonwork activities, smoking, Muslim religion, living in a nuclear family, and living alone were significantly associated with depression. In contrast, for the rural sample, increased age and being spouseless were the only significant risk factors identified. Health-related risk factors such as hearing difficulties, asthma, and arthritis were found to influence depression in rural areas, while bronchitis, heart disease, and thyroid disorders had a significant impact on the urban sample. The study highlighted that mild depression was prevalent in both rural and urban areas, with 49% and approximately 38% prevalence rates, respectively. The urban sample had a notably higher prevalence of severe depression than the rural sample (13% vs. 6%). These findings underline the importance of further research to understand the differential impact of rural and urban factors on depression among the elderly population. Screening for depression and targeted treatment should be provided to elderly people, particularly females and spouseless elderly individuals. Longitudinal studies are required to establish causal links between depression and associated risk factors. Similar studies are needed from other regions of Bangladesh to develop a comprehensive understanding of geriatric mental health in the elderly population.

AUTHOR CONTRIBUTIONS

Mohammad Kamal Hossain: Conceptualization; formal analysis; methodology; visualization; writing—original draft; writing—review and editing. **Md Nazrul Islam:** Funding acquisition; investigation; project administration; supervision; validation; writing—review and editing. **Mohammed Taj Uddin:** Data curation; investigation; project administration; resources; supervision; writing—review and editing. **Md Sabbir Hossain:** Data curation; formal analysis; software; writing—original draft; writing—review and editing.

ACKNOWLEDGMENTS

The inhabitants of the research region are sincerely thanked for their cooperation and key informant engagement. The University Research Centre (URC), SUST, received funding for this research work from the People's Republic of Bangladesh (project codes: PS/2018/1/11 & PS/2019/1/35).

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data are freely available via request to the corresponding author.

ETHICS STATEMENT

This research has been granted ethical approval by the Shahjalal University of Science and Technology Ethical Review Board.

TRANSPARENCY STATEMENT

The lead author Md Sabbir Hossain affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

ORCID

Md Sabbir Hossain  <http://orcid.org/0000-0001-7216-0925>

REFERENCES

- Ross RE, Van Derwerker CJ, Saladin ME, Gregory CM. The role of exercise in the treatment of depression: biological underpinnings and clinical outcomes. *Mol Psychiatr*. 2023;28(1):298-328.
- WHO. Depression and other common mental disorders. World Health Organization; 2017. <https://www.who.int/publications-detail-redirect/depression-global-health-estimates>
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. American Psychiatric Association; 1994. <https://doi.org/10.1176/ajp.152.8.1228>
- Ingle GK, Nath A. Geriatric health in India: concerns and solutions. *Indian J Community Med*. 2008;33:214-218.
- Nagaraj AKM, Mathew J, Nanjegowda RB, Majgi SM, Sm P. Psychiatric morbidity among elderly people living in old age homes and in the community: a comparative study.
- Skoog I. Psychiatric disorders in the elderly. *Canadian J Psychiatr*. 2011;56:387-397.
- Subedi S, Shrestha P, Thapa DK. Study of depression in elderly: prevalence and factors associated. *J Psychiatrists' Association Nepal*. 2018;7:16-23.
- Jaremka LM, Andridge RR, Fagundes CP, et al. Pain, depression, and fatigue: loneliness as a longitudinal risk factor. *Health Psychol*. 2014;33:948-957.
- Chu L, Valencia IJ, Garvert DW, Montoya JG. Deconstructing post-exertional malaise in myalgic encephalomyelitis/chronic fatigue syndrome: a patient-centered, cross-sectional survey. *PLoS One*. 2018;13:e0197811.
- Tang C-C, Draucker C, Tejani M, Von Ah D. Symptom experiences in patients with advanced pancreatic cancer as reported during healthcare encounters. *Eur J Cancer Care*. 2018;27:e12838.
- Grover S. Depression in elderly: a review of Indian research. *J Geriatr Ment Health*. 2015;2(1):4-15.
- Barua A, Ghosh MK, Kar N, Basilio MA. Socio-demographic factors of geriatric depression. *Indian J Psychol Med*. 2010;32:87-92.
- Brinda EM, Rajkumar AP, Attermann J, Gerdtham UG, Enemark U, Jacob KS. Health, social, and economic variables associated with depression among older people in low and middle income countries: world health organization study on global AGEing and adult health. *Am J Geriatr Psychiatr*. 2016;24:1196-1208.

14. WHO. Mental health of older adults. World Health Organization; 2003. <https://www.who.int/news-room/fact-sheets/detail/mental-health-of-older-adults>
15. Biswas P, Nahar Kabir Z, Nilsson J, Zaman S. Dynamics of health care seeking behaviour of elderly people in rural Bangladesh. *Int J Ageing Later Life*. 2006;1:69-89.
16. Melanson KJ. Nutrition review: relationships of nutrition with depression and anxiety. *American J Lifestyle Med*. 2007;1:171-174.
17. Nguyen PH, Grajeda R, Melgar P, et al. Micronutrient supplementation may reduce symptoms of depression in Guatemalan women. *Arch Latinoam Nutr*. 2009;59:278-286.
18. D'Anci KE, Rosenberg IH. Folate and brain function in the elderly. *Curr Opin Clin Nutr Metab Care*. 2004;7:659-664.
19. Disu TR, Anne NJ, Griffiths MD, Mamun MA. Risk factors of geriatric depression among elderly Bangladeshi people: a pilot interview study. *Asian J Psychiatr*. 2019;44:163-169.
20. Das J. Factors associated with elderly depression among rural Bangladeshi individuals. *American J Psychiatr Neurosci*. 2014;2:1.
21. Malhotra R, Chan A, Østbye T. Prevalence and correlates of clinically significant depressive symptoms among elderly people in Sri Lanka: findings from a national survey. *Int Psychogeriatr*. 2010;22:227-236.
22. Rahman MS, Rahman MA, Ali M, et al. Determinants of depressive symptoms among older people in Bangladesh. *J Affect Disord*. 2020;264:157-162.
23. Yesavage JA, Brink TL, Rose TL, et al. Development and validation of a geriatric depression screening scale: a preliminary report. *J Psychiatr Res*. 1982;17(1):37-49.
24. Sheikh JI, Yesavage JA, Brooks JO, et al. Proposed factor structure of the geriatric depression scale. *Int Psychogeriatr*. 1991;3(1):23-28.
25. Fountoulakis KN, Tsolaki M, Iacovides A, et al. The validation of the short form of the geriatric depression scale (GDS) in Greece. *Ageing Clin Exp Res*. 1999;11:367-372.
26. Ganguli M, Dube S, Johnston JM, Pandav R, Chandra V, Dodge HH. Depressive symptoms, cognitive impairment and functional impairment in a rural elderly population in India: a Hindi version of the geriatric depression scale (GDS-H). *Int J Geriatr Psychiatry*. 1999;14(10):807-820.
27. Brink TL, Yesavage JA, Lum O, Heersema PH, Adey M, Rose TL. Screening tests for geriatric depression. *Clin Gerontol*. 1982;1(1):37-43.
28. Hair JF, Black WC, Babin BJ, Anderson RE. Multivariate data analysis. 2014.
29. Res JP. Geriatric depression scale (short form) geriatric depression scale (short form) self-rated version. *Clin Gerontol: J Aging Ment Health*. 1988;5.
30. Gliem JA, Gliem RR. Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for likert-type scales. Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education. 2003:82-88.
31. Li N, Pang L, Chen G, Song X, Zhang J, Zheng X. Risk factors for depression in older adults in Beijing. *Can J Psychiatry*. 2011;56:466-473.
32. Chong MY, Chen CC, Tsang HY, et al. Community study of depression in old age in Taiwan: prevalence, life events and socio-demographic correlates. *Br J Psychiatry*. 2001;178:29-35.
33. Chiu H-C, Chen C-M, Huang C-J, Mau L-W. Depressive symptoms, chronic medical conditions and functional status: a comparison of urban and rural elders in Taiwan. *Int J Geriatr Psychiatry*. 2005;20:635-644.
34. Sengupta P, Benjamin A. Prevalence of depression and associated risk factors among the elderly in urban and rural field practice areas of a tertiary care institution in Ludhiana. *Indian J Public Health*. 2015;59:3-8.
35. Atram ARAI. Prevalence of psychiatric disorders in a sample of elderly residents in rural and urban population of Zulfi Region—Saudi Arabia. *J Psychol Psychother*. 2015;5(1).
36. Karel MJ. Aging and depression: vulnerability and stress across adulthood. *Clin Psychol Rev*. 1997;17:847-879.
37. Taqui AM, Itrat A, Qidwai W, Qadri Z. Depression in the elderly: does family system play a role? A cross-sectional study. *BMC Psychiatry*. 2007;12:1-12
38. Jhingan HP, Sagar R, Pandey RM. Prognosis of late-onset depression in the elderly: a study from India. *Int Psychogeriatr*. 2001;13:51-61.
39. Bongaarts J. Household size and composition in the developing world in the 1990s. *Popul Stud*. 2001;55:263-279.
40. Black SA, Markides KS, Miller TQ. Correlates of depressive symptomatology among older community-dwelling Mexican Americans: the Hispanic EPESE. *J Gerontol B Psychol Sci Soc Sci*. 1998;53B:S198-S208.
41. Copeland JR, Beekman AT, Braam AW, et al. Depression among older people in Europe: the EURODEP studies. *World Psychiatr*. 2004;3:45-49.
42. Pracheth R, Mayur SS, Chowti JV. Geriatric depression scale: a tool to assess depression in elderly. *Int J Med Sci Public Health*. 2013;2:31.
43. Blazer DG. Depression in late life: review and commentary. *J Gerontol A Biol Sci Med Sci*. 2003;58:M249-M265.
44. Papadopoulos FC, Petridou E, Argyropoulou S, et al. Prevalence and correlates of depression in late life: a population based study from a rural Greek town. *Int J Geriatr Psychiatry*. 2005;20:350-357.
45. Chen C-S, Chong M-Y, Tsang H-Y. Clinically significant non-major depression in a community-dwelling elderly population: epidemiological findings. *Int J Geriatr Psychiatry*. 2007;22:557-562.

How to cite this article: Hossain MK, Islam MN, Uddin MT, Hossain MS. Understanding the impact of socioeconomic and health factors on geriatric depression: a comparative study in rural and urban Bangladesh. *Health Sci Rep*. 2024;7:e1849. doi:10.1002/hsr2.1849