

ORIGINAL ARTICLE

Change in prevalence over time and factors associated with depression among Bangladeshi older adults during the COVID-19 pandemic

Sabuj K. MISTRY^{1,2,3,4}, ARM Mehrab ALI¹, Uday N. YADAV^{2,5}, Md. Nazmul HUDA^{1,6}, Fouzia KHANAM⁷, Satyajit KUNDU^{8,9}, Jahidur R. KHAN¹⁰, Md. Belal HOSSAIN^{3,11}, Afsana ANWAR¹² and Saruna GHIMIRE¹³

¹ARCED Foundation, ³BRAC James P Grant School of Public Health, BRAC University, ⁴Department of Public Health, Daffodil International University and ⁷Department of Public Health and ⁸Global Health Institute, North South University, Dhaka and ¹²Health and Nutrition, Social Assistance and Rehabilitation for the Physically Vulnerable (SARPV), Cox's Bazar, Bangladesh, ²Centre for Primary Health Care and Equity and ¹⁰School of Clinical Medicine, University of New South Wales, Sydney, ⁵National Centre for Epidemiology and Population Health, The Australian National University, Canberra and ⁶School of Medicine, Western Sydney University, Campbelltown, Australia, ⁹School of Public Health, Southeast University, Nanjing, China, ¹¹School of Population and Public Health, University of British Columbia, Vancouver, British Columbia, Canada and ¹³Department of Sociology and Gerontology and Scripps Gerontology Centre, Miami University, Oxford, Ohio, USA
Correspondence: Mr Sabuj Kanti Mistry MPH, ARCED Foundation, 13/1 Pallabi, Mirpur-12, Dhaka, Bangladesh. Email: smitra411@gmail.com

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Abstract

Background: Globally, the COVID-19 pandemic seriously affected both physical and mental health conditions. This study aims to assess changes in the prevalence of depression among older adults during the COVID-19 pandemic in Bangladesh and explore the correlates of depression in pooled data.

Methods: This study followed a repeated cross-sectional design and was conducted through telephone interviews on two successive occasions during the COVID-19 pandemic (October 2020 and September 2021) among 2077 (1032 in 2020-survey and 1045 in 2021-survey) older Bangladeshi adults aged 60 years and above. Depression was measured using the 15-item Geriatric Depression Scale (GDS-15). The binary logistic regression model was used to identify the factors associated with depression in pooled data.

Results: A significant increase in the prevalence of depression was noted in the 2021 survey compared to the 2020 survey (47.2% versus 40.3%; adjusted odds ratio (aOR): 1.40, 95% confidence interval (CI): 1.11–1.75). Depression was significantly higher among participants without a partner (aOR 1.92, 95% CI 1.45–2.53), with a monthly family income of <5000 BDT (aOR: 2.65, 95% CI 1.82–3.86) or 5000–10 000 BDT (aOR: 1.30, 95% CI 1.03–1.65), living alone (aOR 2.24, 95% CI 1.40–3.61), feeling isolated (aOR 3.15, 95% CI 2.49–3.98), with poor memory/concentration (aOR 2.02, 95% CI 1.58–2.57), with non-communicable chronic conditions (aOR 1.34, 95% CI 1.06–1.69), overwhelmed by COVID-19 (aOR 1.54, 95% CI 1.18–2.00), having difficulty earning (aOR 1.49, 95% CI 1.15–1.92) or obtaining food (aOR 1.56, 95% CI 1.17–2.09) during COVID-19 pandemic, communicating less frequently (aOR 1.35, 95% CI 1.07–1.70) and needing extra care (aOR 2.28, 95% CI 1.75–2.96) during the pandemic.

Conclusions: Policymakers and public health practitioners should provide immediate mental health support initiatives for this vulnerable population during the COVID-19 pandemic and beyond. Policymakers should also invest in creating safe places to practise mindful eating, exercise, or other refuelling activities as a means of preventing and managing depression.

BACKGROUND

Depression, a globally recognised public health problem, is more common in older adults.^{1,2} Data from the Global Burden of Diseases and the World Health Organisation indicate that about 264 million older adults, aged 60 years and above, have prevalent depressive symptoms.³ In Bangladesh, one in three older adults showed depressive symptoms before the COVID-19 pandemic.⁴ However, despite its surging prevalence, depression has received very little attention in many low- and middle-income countries (LMICs), including Bangladesh. Notably, LMICs have a much higher prevalence of depression among older adults than similar estimates from high-income countries.⁵

The emergence of COVID-19 globally disrupted citizens' physical and mental health.^{6,7} The unpredictable nature of the disease, the fear of getting sick or dying, being stereotyped by others, restricted movements and home confinement for indefinite periods, minimised social connectedness, and substantial and growing financial losses could aggravate the psychological impact on the general population.^{8,9} A recent systematic review found that confinement due to several pandemics, such as ebola, H1N1 influenza pandemic, Middle East respiratory syndrome, and equine influenza, have adverse psychological effects, including post-traumatic stress symptoms, anger, and confusion.¹⁰ Studies also confirmed that older adults experienced disproportionately higher adverse impacts from the pandemic, including more severe complications and higher mortality which exacerbated depression and anxiety.¹¹

The COVID-19 pandemic has not ended yet in Bangladesh, and the situation may worsen.¹² Despite government efforts, COVID-19 has reached all 64 administrative districts in Bangladesh, with more than 1.5 million confirmed cases and 26 794 deaths,¹³ with the highest death rate (45%) in the older population.¹² Evidence from the first wave of the pandemic suggested that COVID-19 resulted in several psychological disorders among the Bangladeshi population.^{14–18} Research also documented a high prevalence of mental health issues, such as anxiety, depression, stress, and fear during the pandemic, especially among older adults and individuals with low incomes.^{16,19} Notably, the growth in the ageing population is also high in Bangladesh; in 2011 older adults comprised 8% of

the total population which is projected to increase 11.5% in 2030 and 21.5% in 2050.²⁰

Studies worldwide have found a steady rise in anxiety and depression cases after the second wave than the first wave of COVID-19.^{21–23} Undoubtedly, Bangladesh is experiencing a critical time in the second wave of the pandemic.²⁴ The pervasiveness of the disease increased hopelessness and despair among people, irrespective of whether they had personally contracted the infection or not.²⁵ People either experienced illness themselves, saw their loved ones battle COVID-19, or mourned the losses of their loved ones, which led to an immense toll on the psychological well-being of the population.²⁶ The shortage of hospital beds and intensive care units, lack of oxygen supply, an increased risk of job loss, and loss of livelihoods have turned this wave into a collective trauma for many people.^{22,27,28} Despite the high burden of mental health disorders amid the pandemic, it is largely an unrecognised and under-researched area in Bangladesh. The existing fragile health systems with extremely limited resources¹² and disproportionate distribution of mental health services are not armed to fight the additional burden of the psychological impact of COVID-19 in Bangladesh.²⁹

Hence, there is an urgent need to pay more attention to mental health during the COVID-19 pandemic. To fill this need, during the first wave of the pandemic in 2020, we surveyed 1032 Bangladeshi older adults to assess the prevalence of depression,¹⁷ and in 2021 a second survey was conducted to observe changes in prevalence. Therefore, using the pooled data from two repeated cross-sectional surveys, we aimed to assess changes in the prevalence of depression in the two timeframes during the COVID-19 pandemic in Bangladesh and evaluate the correlates of depression.

METHODS

Study design and participants

Repeated cross-sectional surveys were conducted on two successive occasions, that is, October 2020 and September 2021, to coincide with the first and second waves of the COVID-19 pandemic in Bangladesh. These surveys were conducted through telephone interviews among older adults aged 60 years and above. We utilised our pre-established registry,³⁰

Table 1 Characteristics of the participants (*N* = 2077)

Characteristics	2020 survey		2021 survey	
	<i>n</i>	%	<i>n</i>	%
Overall	1032	100.0	1045	100.0
Administrative division				
Barishal	149	14.4	146	14.0
Chattogram	137	13.3	98	9.4
Dhaka	210	20.4	172	16.5
Mymensingh	63	6.1	69	6.6
Khulna	158	15.3	198	19.0
Rajshahi	103	10.0	145	13.9
Rangpur	144	14.0	161	15.4
Sylhet	68	6.6	56	5.4
Age (years)				
60–69	803	77.8	790	75.6
≥70	229	22.2	255	24.4
Gender				
Male	676	65.5	620	59.3
Female	356	34.5	425	40.7
Marital status				
Married	840	81.4	799	76.5
Without partner	192	18.6	246	23.5
Formal schooling				
Without formal schooling	602	58.3	540	51.7
With formal schooling	430	41.7	505	48.3
Family size				
≤4	318	30.8	347	33.2
>4	714	69.2	698	66.8
Family monthly income (BDT)				
<5000	145	14.1	121	11.6
5000–10 000	331	32.1	469	44.9
>10 000	556	53.9	455	43.5
Residence				
Urban	269	26.1	182	17.4
Rural	763	73.9	863	82.6
Current occupation				
Employed	419	40.6	407	39.0
Unemployed/retired	613	59.4	638	61.1
Living arrangement				
Living with family	953	92.3	992	94.9
Living alone	79	7.7	53	5.1
Walking distance to the nearest health centre				
<30 min	503	48.7	581	55.6
≥30 min	529	51.3	464	44.4
Memory or concentration problem				
No problem	782	75.8	676	64.7
Low memory or concentration	250	24.2	369	35.3
Suffering from non-communicable chronic conditions [†]				
No	424	41.1	447	42.8
Yes	608	58.9	598	57.2
Feeling concerned about COVID-19				
Hardly	299	29.0	348	33.3
Sometimes/often	733	71.0	697	66.7
Feeling overwhelmed by COVID-19				
Hardly	370	36.4	334	32.1
Sometimes/often	647	63.6	706	67.9
Difficulty obtaining food during COVID-19				
No	553	55.3	514	49.7
Yes	447	44.7	521	50.3

Table 1 Continued

Characteristics	2020 survey		2021 survey	
	<i>n</i>	%	<i>n</i>	%
Difficulty obtaining medicine during COVID-19				
No	733	75.3	764	74.8
Yes	240	24.7	258	25.2
Difficulty in earning during COVID-19				
No	340	37.4	274	27.7
Yes	570	62.6	714	72.3
Difficulty receiving routine medical care during COVID-19				
No	644	69.6	709	71.0
Yes	281	30.4	290	29.0
Frequency of communication during COVID-19				
Same as previous	598	58.0	656	62.8
Less than previous	434	42.1	389	37.2
Feeling isolated from others				
Hardly	636	61.6	718	68.7
Sometimes/often	396	38.4	327	31.3
Perceived that family members are non-responsive				
No	687	66.6	738	70.6
Yes	345	33.4	307	29.4
Perceived needing additional care during the pandemic				
No	769	74.5	770	73.7
Yes	263	25.5	275	26.3

1 USD = 85.75 BDT. † Indicates suffering from at least one of the nine non-communicable chronic conditions: arthritis, hypertension, heart diseases, stroke, hypercholesterolemia, diabetes, chronic respiratory diseases, chronic kidney disease, and cancer.

having the contact information of households (with the mobile number of the household head) covering all eight administrative divisions of Bangladesh, as a sampling frame. Considering an unknown prevalence (50%) with a 5% margin of error, 90% power of the test, 95% confidence interval and 95% response rate, a sample size of 1096 was calculated. However, the final sample sizes for the 2020 and 2021 surveys were 1032 and 1045, with an overall response rate of 94% and 95%, respectively. We adopted a probability proportionate to size strategy based on the population distribution of older adults for selecting the number of participants from each division.²⁰

Measures

Outcome measure

The primary outcome variable of interest was depression, measured by the 15-item Geriatric Depression Scale (GDS-15), a widely used scale for detecting depressive symptoms among older adults in clinical and community settings.³¹ Each item was measured using the yes (0) /no (0) question. Five of the 10 GDS-15 items were then reverse coded (assigned '1' for 'no' and '0' for 'yes'), and a cumulative score ranging from 0 to 15 was calculated by summing the values of

all 15 items.³¹ The GDS-15 scale was previously validated and used among older adults in Bangladesh⁴ and the city of Kolkata in neighbouring India.³² Based on these two studies,^{4,32} the total score was then classified into the absence (score ≤ 5) or presence (score > 5) of depression. This variable was named 'Depression,' with a value of '0' indicating the absence of depression and '1' indicating the presence of depression. Notably, we found the GDS-15 scale reliable, as shown by the high internal consistency (Cronbach's alpha of 0.76) in the pooled data.

Explanatory variables

An extensive review of available studies on depression guided the selection of explanatory variables.^{2,14,16,17,25,26} Explanatory variables included sociodemographic characteristics, access to health facilities, self-reported memory or concentration problems, non-communicable chronic condition status, and COVID-19-related features, administrative division (Barishal, Chattogram, Dhaka, Mymensingh, Khulna, Rajshahi, Rangpur, Sylhet), age in years (categorised as 60–69, and ≥ 70), gender (male/female), marital status (married/without a partner), formal schooling (without formal schooling/with formal

schooling), family size (≤ 4 or > 4), family monthly income (BDT) (< 5000 , 5000 – $10\,000$, $> 10\,000$), residence (urban/rural), current occupation (employed/unemployed or retired), and living arrangement (living alone or with family).

Self-reported walking distance to the nearest health centre (< 30 min/ ≥ 30 min) was used to evaluate access to health services. Self-reported memory or concentration problems (no problem/low memory or concentration), and suffering from non-communicable chronic conditions (yes/no) were also assessed. We collected self-reported data from respondents on non-communicable chronic conditions, such as arthritis, hypertension, heart diseases, stroke, hypercholesterolemia, diabetes, chronic respiratory diseases, chronic kidney disease, and cancer. A new variable, 'suffering from non-communicable chronic conditions,' was created from these variables, where a value of '0' was assigned if they did not have any of these diseases and a value of '1' was assigned if they had at least one of these diseases.

Information on a list of COVID-19-related variables was also collected: feeling concerned about COVID-19 (hardly, sometimes/often), feeling overwhelmed by COVID-19 (hardly, sometimes/often), difficulty in getting food, medicine, and routine medical care during COVID-19 (no/yes), difficulty in earning during COVID-19 (no/yes), feeling isolated from others (hardly, sometimes/often), frequency of communication with friends and family during COVID-19 (less than previous/same as previous), perceived that family members are non-responsive (yes/no), and perceived that they required additional care during COVID-19 (yes/no).

Data collection tools and techniques

Data were collected through telephone (mobile phone) interviews using a pre-tested semi-structured questionnaire. The SurveyCTO mobile app (<https://www.surveyccto.com/>) was used to administer the data collection by trained research assistants who had previous experience in conducting health surveys on the electronic platform. The research assistants were trained extensively before the data collection remotely in the Zoom platform by the research team.

The questionnaire was first translated from English to Bangla and then back-translated to English. In the

next step, the Bangla questionnaire was piloted among 10 older adults to refine the language in the final version. We received no corrections from the participants on the piloted tool. We carried out the data collection with this final tool, and each interview took around half an hour.

Statistical analysis

Descriptive analyses were undertaken to present the distribution of the variables for each round of survey data. Bivariate analyses were conducted to estimate the prevalence of depression within the categories of the explanatory variables. These two survey datasets were pooled, and a binary logistic regression model was performed on the pooled data to explore the factors associated with depression. We first ran an initial model with all explanatory variables (listed in Table 1). Then, using a variable selection technique (i.e. backward elimination), we chose the variables for the final model. The variables presented in Table 3 were retained in the final model based on the criteria. The final logistic regression model was then fitted, including these variables, and the adjusted odds ratio (aOR) and associated 95% confidence interval (95% CI) were reported. The Hosmer-Lemeshow test was used to assess the goodness of fit for this final model, and the model's discriminating accuracy was assessed using the area under the receiver operating characteristic (AUROC) curve. Furthermore, the variance inflation factor (VIF) was used to test for multicollinearity among variables included in the final model. All analyses were performed using the statistical software package Stata (Version 14.0).

RESULTS

Characteristics of the participants

Table 1 shows the characteristics of the study participants by survey year. In terms of survey participant coverage, there was a significant difference across geographic areas; for example, the highest coverage was from the Dhaka division in the 2020 survey, while the highest coverage was from the Khulna division in the 2021 survey. In both surveys, most participants were 60–69 years old, male, married, without formal schooling, unemployed/retired, lived with family and in rural areas (Table 1). However, characteristics such as gender, marital status, education, and income were significantly different across the survey years.

Table 2 Prevalence of depression over time and bivariate analysis (*N* = 2077)

Characteristics	2020 survey			2021 survey		
	<i>n</i>	% Depressed	<i>P</i> ¹	<i>n</i>	% Depressed	<i>P</i> ²
Overall	1032	40.3		1045	47.2	0.002
Administrative division						
Barishal	149	40.9	0.048	146	40.4	0.417 46.9
Chattogram	137	36.5		98		
Dhaka	210	45.2		172	44.8	
Mymensingh	63	41.3		69	49.3	
Khulna	158	47.5		198	50.0	
Rajshahi	103	30.1		145	44.1	
Rangpur	144	40.3		161	51.6	
Sylhet	68	29.4		56	55.4	
Age (years)						
60–69	803	37.0	<0.001	790	44.4	0.002
≥70	229	52.0		255	55.7	
Gender						
Male	676	36.5	0.001	620	42.4	<0.001
Female	356	47.5		425	54.1	
Marital status						
Married	840	38.5	0.011	799	42.7	<0.001
Without partner	192	48.4		246	61.8	
Formal schooling						
Without formal schooling	602	43.2	0.026	540	52.8	<0.001
With formal schooling	430	36.3		505	41.2	
Family size						
≤4	318	40.9	0.803	347	47.6	0.865
>4	714	40.1		698	47.0	
Family monthly income (BDT)						
<5000	145	61.4	<0.001	121	71.1	<0.001
5000–10 000	331	37.8		469	50.1	
>10 000	556	36.3		455	37.8	
Residence						
Urban	269	36.8	0.173	182	43.4	0.262
Rural	763	41.6		863	48.0	
Current occupation						
Employed	419	39.1	0.527	407	40.3	<0.001
Unemployed/retired	613	41.1		638	51.6	
Living arrangement						
Living with family	953	37.7	<0.001	992	45.7	<0.001
Living alone	79	72.2		53	75.5	
Walking distance to the nearest health centre						
<30 min	503	37.8	0.105	581	49.6	0.083
≥30 min	529	42.7		464	44.2	
Memory or concentration problem						
No problem	782	33.9	<0.001	676	38.0	<0.001
Poor memory or concentration	250	60.4		369	64.0	
Suffering from non-communicable chronic conditions [†]						
No	424	29.3	<0.001	447	37.8	<0.001
Yes	608	48.0		598	54.2	
Feeling concerned about COVID-19						
Hardly	299	25.8	<0.001	348	37.9	<0.001
Sometimes to often	733	46.3		697	51.8	
Feeling overwhelmed because of COVID-19						
Hardly	370	26.8	<0.001	334	35.0	0.067
Sometimes to often	647	47.6		706	53.0	
Difficulty in getting food during the pandemic						
No	553	28.6	<0.001	514	34.8	<0.001
Yes	447	52.8		521	59.1	

Table 2 Continued

Characteristics	2020 survey			2021 survey		
	<i>n</i>	% Depressed	<i>P</i> ¹	<i>n</i>	% Depressed	<i>P</i> ²
Difficulty in getting medicine during the pandemic						
No	733	32.1	<0.001	764	42.9	<0.001
Yes	240	59.2		258	57.8	
Difficulty in earning during the pandemic						
No	340	22.9	<0.001	274	28.8	<0.001
Yes	570	49.7		714	53.9	
Difficulty receiving routine medical care during the pandemic						
No	644	31.7	<0.001	709	43.0	<0.001
Yes	281	57.3		290	57.6	
Frequency of communication during the pandemic						
Normal	598	36.5	0.003	656	44.2	0.013
Less than previous	434	45.6		389	52.2	
Feeling isolated from others						
Hardly	636	24.4	<0.001	718	35.5	<0.001
Sometimes to often	396	65.9		327	72.8	
Perceived that family members are non-responsive						
No	687	39.2	0.286	738	44.7	0.013
Yes	345	42.6		307	53.1	
Perceived needing additional care during COVID-19						
No	769	31.2	<0.001	770	41.4	<0.001
Yes	263	66.9		275	63.3	

*P*¹: *P*-value from Pearson Chi-square test comparing participants with and without depression in 2020; *P*²: *P*-value from Pearson Chi-square test comparing participants with and without depression in 2021. 1 USD = 85.75 BDT. † Indicates suffering from at least one of the nine non-communicable chronic conditions: arthritis, hypertension, heart diseases, stroke, hypercholesterolemia, diabetes, chronic respiratory diseases, chronic kidney disease, and cancer.

Compared to the 2020 survey, a considerably lower proportion of participants in the 2021 survey were male (59% versus 66%), married (77% versus 81%), and without formal education (52% versus 58%). The proportion of participants living with family (92% in 2020 versus 95% in 2021), in rural areas (74% in 2020 versus 83% in 2021) and in proximity to health facilities (49% in 2020 versus 56% in 2021) increased significantly between the survey years. We also noted a significant increase in the reported psychological characteristics, that is, a higher proportion of participants reported poor memory or concentration, isolation, being overwhelmed with COVID-19, and having difficulty earning and obtaining food during COVID-19 in 2021 compared to 2020 (Table 1).

Prevalence of depression

Table 2 shows the changes in the prevalence of depression over time and their variation across different categories of explanatory variables. We found a significant rise in the prevalence of depression between the two survey years (40.3% versus 47.2%; *P* = 0.002). With the exception of those living in the Barishal and Dhaka divisions, and those reporting problems acquiring medicine and a perceived need for greater care

during the pandemic, the proportion of participants feeling depression increased for all variables.

Overall, depression was higher and increased over time among females rather than males, among relatively older adults, participants without a partner, participants with no formal education, and those in the lowest income category. Even though there was no statistically significant difference in the prevalence of depression between rural and urban participants, older rural adults reported a higher prevalence of depression than urban older adults, and this difference grew over time. Depression was more prevalent and increased between the two surveys among those living alone, communicating less frequently during the pandemic, feeling isolated, having poor memory or concentration, and chronic non-communicable conditions, overwhelmed by and concerned about COVID-19, and reporting difficulty obtaining food (Table 2).

Factors associated with depression

Table 3 shows the correlates of depression in the pooled data based on the adjusted regression model. Compared to the 2020 survey, the odds of depression were significantly higher in the 2021 survey (aOR

Table 3 Factors associated with depression among the participants ($N = 2077$)

Characteristics	aOR [†]	95% CI	<i>P</i>
Survey year			
2020	<i>Ref</i>		
2021	1.40	1.11–1.75	0.004
Age (years)			
60–69	<i>Ref</i>		
≥70	1.30	1.00–1.70	0.054
Marital status			
Married	<i>Ref</i>		
Without partner	1.92	1.45–2.53	<0.001
Formal schooling			
Without formal schooling	<i>Ref</i>		
With formal schooling	0.83	0.66–1.03	0.094
Family monthly income (BDT [‡])			
>10 000	<i>Ref</i>		
5000–10 000	1.30	1.03–1.65	0.029
<5000	2.65	1.82–3.86	<0.001
Living arrangement			
Living with family	<i>Ref</i>		
Living alone	2.24	1.40–3.61	0.001
Memory or concentration problem			
No problem	<i>Ref</i>		
Poor memory or concentration	2.02	1.58–2.57	<0.001
Suffering from non-communicable chronic conditions [§]			
No	<i>Ref</i>		
Yes	1.34	1.06–1.69	0.013
Feeling overwhelmed by COVID-19			
Hardly	<i>Ref</i>		
Sometimes/often	1.54	1.18–2.00	0.001
Difficulty obtaining food during COVID-19			
No	<i>Ref</i>		
Yes	1.49	1.15–1.92	0.002
Difficulty in earning during COVID-19			
No	<i>Ref</i>		
Yes	1.56	1.17–2.09	0.003
Frequency of communication during COVID-19			
Same as previous	<i>Ref</i>		
Less than previous	1.35	1.07–1.70	0.010
Feeling isolated from others			
Hardly	<i>Ref</i>		
Sometimes/often	3.15	2.49–3.98	<0.001
Perceived needing additional care during the pandemic			
No	<i>Ref</i>		
Yes	2.28	1.75–2.96	<0.001

Hosmer-Lemeshow test: *P*-value 0.238. Area under the receiver operating characteristic curve: 0.80. Sensitivity: 63.37%. Specificity: 80.09%. [†]The adjusted model included all variables listed in Table 3. [‡]USD = 85.75 BDT. [§]Indicates suffering from at least one of the nine non-communicable chronic conditions: arthritis, hypertension, heart diseases, stroke, hypercholesterolemia, diabetes, chronic respiratory diseases, chronic kidney disease, and cancer.

1.40, 95% CI 1.11–1.75). Compared to their respective counterparts, the odds of depression were significantly higher among those without a partner (aOR 1.92, 95% CI 1.45–2.53), who lived alone (aOR 2.24, 95% CI 1.40–3.61), communicated less frequently with others (aOR 1.35, 95% CI 1.07–1.70), and perceived isolated (aOR 3.15, 95% CI 2.49–3.98). Older adults with poor memory or concentration (aOR 2.02, 95% CI 1.58–2.57) and non-communicable chronic

conditions (aOR 1.34, 95% CI 1.06–1.69) were more likely to experience depression than those without such conditions. Various COVID-19-related characteristics such as being overwhelmed by COVID-19 (aOR 1.54, 95% CI 1.18–2.00), difficulty earning (aOR 1.49, 95% CI 1.15–1.92), and obtaining food during COVID-19 (aOR 1.56, 95% CI 1.17–2.09) were associated with significantly higher odds of depression. Compared to the highest income category (>10 000

BDT), those at lowest (<5000 BDT) and middle-income (5000–10 000) categories had 165% (aOR 2.65, 95% CI 1.82–3.86) and 30% (aOR 1.30, 95% CI 1.03–1.65) higher odds of depression, respectively (Table 3). Older adults perceiving needing additional care during the pandemic (aOR 2.28, 95% CI 1.75–2.96) were twice more likely to have depression. The Hosmer-Lemeshow test indicated that the goodness of fit for the final model was appropriate (the *P*-value of this test was 0.238). According to the AUROC curve (Supplementary file 1 in Appendix S1), the model had moderate discrimination accuracy (about 80%). There was no serious multicollinearity among the final set of explanatory variables (VIF <5).

DISCUSSION

Our study examined the prevalence of depression among older adults in Bangladesh and the factors associated with the symptoms during the first and second waves of the COVID-19 pandemic. Findings showed an increased prevalence of depression between two surveys, from 40% during the first wave of COVID-19 to 47% during the second wave. Our results regarding increased prevalence during the second wave of COVID-19 might be explained by the negative impacts of lockdown during the pandemic, including psychological distress, with limited social interaction and social support.³³ Our study's finding is moderately consistent with a study on older adults in Japan, which indicated that depressive symptoms increased from 39% to 42%.³⁴ To our knowledge, this study's finding is novel in Bangladesh as there is no study on the trend of depression during the COVID-19 pandemic among the Bangladeshi older population. However, a Bangladeshi study found that around 40% of older adults had depressive symptoms during the COVID-19 pandemic.¹⁷ Furthermore, depressive symptoms among older Irish adults increased two-fold during the pandemic.³⁵ Thus, our study contributed to the existing body of knowledge about depression among older adults in Bangladesh during the COVID-19 pandemic and beyond.³⁵ Our study emphasises the importance of developing mental health interventions for older adults during major epidemics.

Studies on depression among South Asian older adults (specifically from Bangladesh, India, and Pakistan) suggest a higher depression prevalence

during the pandemic¹⁷ than those conducted before the pandemic.^{36–39} For example, a study among 1470 US adults comparing pre-post COVID-19 reported a three-fold higher prevalence of depression symptoms during COVID-19 than before the COVID-19 pandemic in every category (mild: 24.6% versus 16.2%; moderate: 14.8% versus 5.7%; moderately severe: 7.9% versus 2.1%; severe: 5.1% versus 0.7%).⁴⁰ Furthermore, existing studies found an increased level of depression among 150 young Italian students⁴¹ and 451 adolescents and young adults⁴² during the pandemic compared to the pre-COVID-19 situation, due to the higher COVID-19 infections and concerns about academic studies.

In our study, lower family income was associated with higher odds of depression. This finding aligns with previous studies from Bangladesh¹⁷ and India,⁴³ where the ORs of depression were lower among participants from higher income groups in both Bangladesh (aOR = 0.42; 95% CI: 0.23–0.76) and India (aOR = 0.36; 95% CI: 0.29–0.44).^{17,43} A plausible explanation could be that high income may reduce the stress of daily living by ensuring better access to daily necessities and health care, including affordability and mental health services.^{17,44} Further, financially self-sufficient individuals have the resources to minimise or equalise the effects of stress on depression.¹⁷ Previous evidence suggested that when we encourage older adults to take COVID-19 precautionary measures to reduce their levels of depression, we need to pay particular attention to older adults in economically disadvantaged conditions. This finding also enhances the importance and necessity of providing relief funds to socio-economically disadvantaged groups to curbe the pandemic effects.⁴⁵

The importance of social networks and familial support on mental well-being is well-established and evident in our study. Consistent with previous studies, we found that participants without a partner, those living alone, who perceived themselves to be isolated, and those communicating less frequently with others had significantly higher odds of depression.^{45–49} Social support from spouse, family members, friends, and relatives buffers the psychological stress to promote mental health.⁵⁰ Social networks provide the necessary support, help combat social isolation, and promote mental health service utilisation and therapy compliance.^{46,50} Furthermore,

support from a spouse or family members can be important for mental health in late life, given increased dependence in old age.³⁶ Despite the importance of social connections in effectively protecting and promoting mental health,⁵¹ the lack of social interaction and family visits due to the lockdowns and social restrictions posed by the Government of Bangladesh to curve the spread out of coronavirus impacted mental health, especially of the older population.^{17,52,53} As social isolation increases, feelings of loneliness also increase,⁵⁴ which is strongly linked to depression.⁴⁶

The presence of chronic conditions was associated (aOR: 1.34, 95% CI 1.06–1.69) with higher depression among our study participants. This finding is aligned with previously documented evidence.^{17,36,55–57} Higher odds of depression were found when participants had any chronic condition compared to those having no chronic condition among 400 older adults in Bangladesh (aOR = 2.25, 95% CI 1.26–3.97),³⁶ 5830 older adults from Spain (aOR = 1.48, 95% CI 1.27–1.72),⁵⁸ and 752 older adults from China (aOR = 2.02, 95% CI 1.13–3.60).⁵⁶ Given the complex interconnectedness between physical and mental health, a Bangladeshi study among 400 people aged ≥65 years recommended that older adults with chronic conditions should be screened for depression in the early stages and given the best possible care.³⁶ Some common lifestyle factors such as smoking, physical activity, and sleep quality⁵⁹ may describe the interconnectedness between physical and mental health.^{60,61} Moreover, people with non-communicable chronic conditions need routine medical check-ups and medications and may be stressed about inaccessibility to those needs during the pandemic due to transportation restrictions, closure of health facilities, subsequent shortage of medicines, and overwhelmed healthcare centres with COVID-19 patients in Bangladesh.^{17,62,63} These results highlight the importance of screening for depression among older adults with non-communicable chronic conditions and suggest that managing those chronic conditions might be an effective strategy for reducing psychological distress among Bangladeshi older adults, especially during pandemics.

Several COVID-19-induced life stressors, such as being overwhelmed by COVID-19, experiencing difficulty earning and obtaining food during the

pandemic, and perceiving needing additional help, were associated with significantly higher odds of depression. Support for our findings comes from a recent Bangladeshi study among 1876 adult people aged ≥18 years by Kundu *et al.*, which found that over 70% of their respondents' income was reduced during the COVID-19 pandemic, while about 45% of Bangladeshi households did not receive the same amount of food as before the epidemic.⁶⁴ Given that one of the effects of nationwide lockdown may be financial fragility,^{46,65} these findings agree with the existing literature, which suggests that having fewer assets and more exposure to life stressors is associated with more depression during times of social distress.^{40,66}

Implications for policy and practice

Our findings portrayed that depression is on the rise and that the policy responses for addressing depression among older adults are insufficient. Therefore, it is crucial to invest more to develop people-centred interventions or programs operating at the preventive and management levels to address this problem. If the decision-makers ignore this problem, it will impose a considerable cost on the country's health system. It would also be interesting to investigate whether tailoring interventions focusing on depression in the community setting is more effective than in clinical settings regarding health outcomes and cost-effectiveness. The findings generated from such research would provide evidence to policymakers, clinicians, and other healthcare professionals to make evidence-based decisions to select the setting for depression screening and management during any emergency, including the COVID-19 pandemic and beyond. Importantly, policymakers should invest in creating safe places to practise mindful eating, exercise, or other refuelling activities as means of preventing and managing depression.

Strengths and limitations of the study

To the best of our knowledge, this is the first study reporting the change in the prevalence of depression among the older population during the COVID-19 pandemic in Bangladesh. However, the study was subjected to several limitations as well. First, we could not develop a panel; instead, we followed a repeated cross-sectional design. Thus, the change suggests a trend observed in a population and does

not indicate changes experienced by an individual. Second, our study is limited to quantitative analysis and points to potential factors, but a qualitative study may shed better light on the underlying reasons for the change. These limitations highlight the need for further studies with longitudinal measurement and a mixed-method approach among the older population in Bangladesh during this pandemic and beyond.

CONCLUSION

The present study highlighted an increased prevalence of depression over time among the older population during this pandemic in Bangladesh. The pooled data also identified subgroups and characteristics associated with significantly increased prevalence. The findings are particularly crucial for policymakers and public health practitioners to emphasise providing an immediate mental health support package targeting the most vulnerable segment of the community.

AUTHORS CONTRIBUTIONS

SKM, AMA and UNY conceived and designed the study. SKM carried out the data analysis and interpretation of results. SKM, AMA, UNY, MNH, FK, SK, JRK, MBH and AA contributed to writing the first draft of the manuscript. SG commented extensively on the draft of the manuscript to finalise it. All authors read and approved the final version of the manuscript.

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DISCLOSURE

The authors declare they have no conflicts of interest to disclose.

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ETHICS APPROVAL

All the procedures pertaining to the study have been performed in accordance with the ethical standards laid down in the Declaration of Helsinki (Version 2013), and the study protocol was approved by the Institutional Review Board of the Institute of Health Economics, University of Dhaka, Bangladesh (Ref: IHE/2020/1037), and the guidelines of the Declaration of Helsinki were followed in every stage of the study.

CONSENT TO PARTICIPATE

Verbal informed consent was sought from the participants before administering the survey. Participation was voluntary, and the identity of the participants was not disclosed.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article at the publisher's website: <http://onlinelibrary.wiley.com/doi/supinfo>.

Appendix S1. Supporting information