Perception and Practice of Bangladeshi Adults Towards the Prevention of COVID-19: A Statistical Analysis

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Abstract: *Background*: The coronavirus disease 2019 (COVID-19) has continued to spread across the world with increasing numbers of confirmed cases and deaths. Due to outbreaks of new variants of the virus and limited treatment options, positive perception and good practice of preventive guidelines have remained essential measures for the prevention of the disease and slowing down its transmission. We aimed to study perception towards COVID-19 and the practice of guidelines for preventing the disease among Bangladeshi adults during the early stage of the rapid rise of the outbreak.

Methods: Data was collected data from 320 participants. For measuring their level of practice, we asked a general question: "Are you properly following the WHO-recommended guidelines to avoid COVID-19?" The frequency distribution, Chi-square (χ^2) test and binary logistic regression model were used in this study.

Results: The average risk perception among the participants was 3.05±0.75 (median, 3.00) (95% CI of mean: 2.96-3.13) where the score ranges from 0 (no risk) to 4 (high risk). More than 27% of participants showed high-risk perceptions. Males ($p<0.05$), high educated ($p<0.05$), rich ($p<0.01$), service holders ($p<0.05$), and younger adults ($p<0.05$) had higher odds of high-risk perception. More than 71% of participants had a good practice of always following the WHO guidelines to prevent COVID-19 and living locations in urban areas ($p<0.01$), high education ($p<0.01$), rich ($p<0.01$), and joint family ($p<0.01$) had the most contributions to good practice.

Conclusions: The study findings revealed that special attention should be given to rural areas, and individuals of low literacy, education and socioeconomic level to more effectively prevent COVID-19.

Keywords: COVID-19, Perception, Practice, Prevention, Bangladeshi adults, Logistic regression.

BACKGROUND

The coronavirus disease 2019 (COVID-19) is highly infectious with the main clinical symptoms of sore throat, fever, dry cough, difficulty breathing, myalgia, and fatigue [1]. Its causative agent, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), is a newly emerged zoonotic coronavirus that transmits from animal to human and human to human by the droplet and feco-oral route, and direct contact and has an incubation period of 2 to 14 days [2, 3]. It has been reported that 80% of people in high- and upper-middle-income countries have received the first dose of the vaccine while only 20% of people in low- and lower-middle-income countries got their first dose of vaccine. The global picture of access to COVID-19 vaccines is unacceptable. However, COVAX has already achieved significant progress, it has been a commitment for up to 4.5 billion doses of vaccine; 240 million doses have been delivered to 139 countries in just six months [1, 4].

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The COVID-19 outbroke first in the city of Wuhan in China in December 2019 [5]. Since then, it has continued to spread with an increase in the numbers of confirmed cases and death worldwide. The outbreak has appeared as the biggest disaster in the 21st century. The World Health Organization (WHO) declared it as a Public Health Emergency of International Concern on January 30, 2020 [6] and pandemic on 11 March 2020 [7]. The pandemic is still now out of control, and as of August 5, 2021, 200,193,983 cases and 4,256,252 deaths were recorded worldwide [8].

A poor or lack of understanding about the transmission, control, and prevention of the disease may cause easy and rapid spread and delayed treatment of it. No specific and definitive antiviral treatment is available until now [1]. Protecting oneself from being exposed to COVID-19 is the easiest and effective measure of controlling the spread of the virus. This can be achieved by vaccination and following preventive guidelines. Although effective and safe COVID-19 vaccines are available, many countries like Bangladesh are facing difficulties in collecting and

administering these vaccines and moreover, new variants of the virus are creating newer threats [9, 10]. Re-infection of recovered patients and breakthrough infections of vaccinated people are also creating problems [11, 12]. Under these circumstances, people's knowledge, perception, attitude, and practice regarding the disease are the keys to ensuring success in the battle against the deadly disease. WHO prescribed some general guidelines for all sections of people to remain protected from COVID-19: (i) being well-informed about the mode of transmission and the signs and symptoms of the disease; (ii) washing hands frequently with soap for at least 20 seconds or disinfecting hands with sanitisers; (iii) avoiding touching of the face, nose, mouth, and eyes without washing or sanitizing hands properly; (iv) maintaining a social distance of at least one meter from one another; (v) staying home; (vi) avoiding crowds and gatherings; (vi) practicing respiratory etiquettes such as wearing masks, using handkerchiefs, tissue papers or flexed elbows to cover nose and mouth during coughing and sneezing, and so on [1]. In 2003, during the outbreak of SARS, knowledge and attitude toward the disease were found to be associated with panic and emotional breakdown among the population, which further complicated the control and prevention of the infection [13, 14].

Like many other countries in the world, Bangladesh is also trying to expand its controlling measures by imposing countrywide lockdowns and urging people to maintain the preventive guidelines of the WHO. Extensive campaigns in print, electronic, social, and other media by government and non-government organizations have supposedly increased the knowledge level about the causation, spread, control, and prevention of COVID-19 among the general population. The government has also started vaccination though at a slow pace. Despite all these measures, the pandemic has continued to flare up in the country due to mismanagement of the government bodies and the indifference of the general population. The numbers of cases of COVID-19 and deaths have continued to rise since the identification of the first confirmed case on March 8, 2020. As of August 5, 2021, 1,309,910 confirmed cases and 21,638 deaths were recorded in the country [15]. The situation demands studies on the perception and practice of preventive guidelines of the general population regarding the COVID-19 at different stages of the outbreak. To the best of our knowledge, there are very few published studies available until now on this issue. One study has assessed the knowledge, attitude, practice, and perception toward COVID-19 among students in Bangladesh [16]. Another article studied the perception and knowledge towards COVID-19 among the Bangladeshi population [17]. The researchers conducted both studies in the early stage of the pandemic in Bangladesh.

We, therefore, aimed to study the perception towards COVID-19 and the practice of preventive guidelines among Bangladeshi adults during the early stage of the outbreak.

The study was based on the following two hypotheses:

H_{01}: Socio-economic factors are significantly associated with good practice of following the guidelines recommended by WHO to prevent COVID-19.

H_{02}: Socio-economic factors are significantly associated with risk perception toward COVID-19.

METHODS

Population and Sample

A total number of 320 participants were selected from the Bangladeshi adult population for this cross-sectional study. Data were collected from April 10 to April 20, 2020, through an online survey. Sex, different socioeconomic backgrounds and professions, and different living locations were considered while selecting samples.

Sample Size Determination and Sampling

We used the following formula to calculate the sample size $n = z^2 p(1-p)/d^2$, where n is the number of samples, z is the value from the standard normal distribution for the selected confidence level (we considered z=1.96 for 95% confidence level), p = the proportion of prevalence =0.269 (26.9% was the perception for getting COVID-19), 1-p=0.731, and d= the margin of error=0.05 (considered). This sample size information was taken from a previous study [18]. The mathematical formula provided that 297 samples would be sufficient for this study. However, data was collected from 320 samples.

Our four data collectors collected data from their acquaintances and friends and colleagues. They initially tried to contact 420 samples using their

telephone numbers, but they were able to contact 402 and discussed our study. Among 402 adults, 351 agreed to provide their information.

Questionnaire

All necessary information of the respondents was collected using a self-developed questionnaire, which was designed according to the Survey Tool and Guidance (Rapid, simple, flexible behavioral insights on COVID-19) of WHO [19]. We took the suggestions of three infectious disease specialists before finalizing the questionnaire. The original English version of the questionnaire was then translated into Bangla (the mother tongue of Bangladesh) to make it easily understandable for the participants. We could not conduct a pilot survey for the shortage of budget and time. The Cronbach's Alpha value (0.792) revealed that the internal consistency (reliability) of the questionnaire was above the acceptance level (good).

Data Collection Procedure

Due to the ongoing lockdown, face to face interview was not possible. The questionnaire was distributed to the participants through online media like e-mail, messenger, and WhatsApp using personal computers, laptops, and cell phones. Four authors of the present study collected information from the participants, and the repetition of the responses was strictly checked. We sent the questionnaire to 351 participants but 320 of them responded with the completely filled-up questionnaire and written consent. The filled-up questionnaires were checked and found valid.

Measurement of Perception and Practice

The risk of perception was measured by four types of perceptions toward COVID-19 such as (i) seriousness of the disease; question: how serious do you think COVID-19 is?, (ii) susceptibility to the disease; question: what do you think about your chance of getting COVID-19?, (iii) efficacy and self-efficacy; question: do you think that you will manage to carry out prevention measures currently recommended by the authority?, (iii) intention to carry out the measures; question: are you willing to carry out prevention measures currently recommended by the authority? Four categorical scales were used to determine the risk perception level such as for perception (i) (a) very serious, (b) serious, (c) slightly serious and (d) not serious; for perception (ii) (a) very much chance, (b) much chance, (c) slightly chance and (d) no chance; for perception type (iii) and (iv) (a) most certainly, (b) probably yes, (c) probably not and (d) certainly not. Then (a) and (b) were considered as risk perception (code, 1), and (c) and (d) were indicated as (ii) no risk perception (code, 0) for each type of perception. The total perception score ranged from 0 (no risk) to 4 (high risk). We added all scores of four types of perception ((i) to (iv)) for calculating the actual level of total scores for measuring high-risk perception. A cut-off level of score ≤3 (code, 0) was evaluated as low risk, and score 4 (code, 1) was indicated as high risk.

The practice of the WHO guidelines to avoid COVID-19 was measured using a general question based on WHO-recommended guidelines [1]. In the questionnaire, we asked the participants "Are you following COVID-19 prevention guidelines suggested by WHO?" The preventive guidelines were; (i) washing hands frequently with soap, (ii) wearing masks, (iii) maintain social distancing (>1 meter), (iv) avoid group gathering, (v) covering mouth and nose with a tissue or handkerchief when coughing or sneezing, and (vi) avoiding the touch of the mouth, nose, and eyes without washing hands with soap. Five measurement scales were used to understand the level of practice: (i) never, (ii) occasionally, (iii) sometimes, (iv) often, and (v) always. For further statistical analysis, samples were classified into two classes: (i) the participants answering "always" were considered as good practice (code, 1), and (ii) the participants answering other categorical scales (never to often), indicated as poor practice (code, 0).

Outcome Variable

There were two outcome variables for this study: (i) risk perception: (a) high risk perception (code, 1), and (b) low risk perception (code, 0); (ii) level of the practice: (a) good practice (code, 1), and (b) poor practice (code, 0).

Independent Variables

Some socioeconomic and demographic factors were considered as independent variables for examining the associations with good practice and high risk of perception toward COVID-19. Most of the socioeconomic and demographic factors were selected based on a related study [20]. These variables, their categories, codes, and definition are mentioned in Table **1**.

Table 1: Variables and their Categories with Codes and Definition

Variable	Group	Definition	Code	Variable	Group	Definition	Code
Gender	Male		1	Residence	Urban		1
	Female		2		Rural		2
Marital status	Currently married		1	Age group (year)	<40	Young adult	1
	Unmarried		2		≥40	Adult	2
Education level	Uneducated or primary		1	Occupation	Service holder		1
	Secondary		2		Student		2
	Higher		3		Housewife		3
					Others		4
Family member	≤4	Small family	1	Family monthly income (Taka)	≤15000	Poor	1
	≥5	Large family	2		15001-30000	Lower middle	2
Type of family	Nuclear		1		30001-45000	Upper middle	3
	Joint		2		>45000	Rich	4

Statistical Analysis

Frequency distribution was used for determining the frequency with the percentage of samples corresponding to each question and level. Chi-square (χ^2) test was utilized to examine the association between (i) nature of practice and independent variables; (ii) risk of perception and independent variables. The binary logistic regression model was applied to assess the effect of demographic and socioeconomic factors on (i) nature of practice and (ii) risk of perception. Only significantly ($p<0.05$) associated factors provided by χ^2-test were used in the logistic model as independent variables.

The binary logistic regression model corresponding to variable used was:

$$\log [p/ (1 - p)] = \beta x \quad (1)$$

where p is the probability of good practice (coded as y=1), β is the vector of regression coefficients, and x is the corresponding vector of independent variables. Similarly, the logistic regression model was used to model the second outcome, namely high risk of perception (coded as y=1)."

We used SPSS (IBM Version 22.0) for statistical analysis. Statistical significance was accepted at $p < 0.05$.

RESULTS

Baseline Characteristics

The mean and median age of the participants was 40.99±14.99 years (95% CI: 39.34-42.64) and 42.00 years respectively. The male and female participants were 64.4% and 35.6%, whereas 60.0% and 40.0% of the participants came from urban and rural environments, respectively. Of the participants, 72.5% were currently married, 44.1% young adults (age<40 years), and 60% were highly educated. The majority of the participants (78.1%) were living in nuclear families and 53.4% of the families were small (family member ≤4). More than 22% of the respondents were living in rich families (family monthly income>45000 Taka) while 29.4% living in poor families (income≤15000 Taka), and 32.8% of the participants were service holders (Table **2**).

Perception Towards COVID-19

Of the respondents, a little more than 71% and 23% believed COVID-19 was a very serious and serious disease respectively. Only 9.7% of them believed they had very much chance to get COVID-19 while 31.6%, 45.6%, and 13.1% were supposed to have much chance, slight chance, and no chance of contracting the disease. About 72% of the participants said they would be able to maintain prevention measures

Table 2: Association between Practice and Different Characteristics of Participants

		Are you properly following the guidelines recommended by WHO to avoid COVID-19?	
Variable	**Group, N (%)**	**Yes**	**p-value**
Gender	Male, 206 (64.40)	147 (71.4)	0.954
	Female, 114 (35.60)	81 (71.1)	
Residence	Urban, 192 (60.00)	151 (78.6)	p<0.001
	Rural,128 (40.00)	77 (60.2)	
Marital status	Currently married, 232 (72.50)	163 (70.3)	0.525
	Unmarried, 88 (27.50)	65 (73.9)	
Age group (year)	Young adult (age>40), 141 (44.1)	105 (74.5)	0.259
	Adult (age≥40), 179 (55.9)	123 (68.7)	
Education level	Uneducated or primary, 53 (16.6)	26 (49.1)	p<0.001
	Secondary, 73 (22.8)	52 (71.2)	
	Higher, 194 (60.6)	150 (77.3)	
Family member	Small (≤4), 171 (53.40)	114 (66.7)	0.052
	Large (≥5), 149 (46.60)	114 (76.5)	
Family monthly income (Taka)	Poor (≤15000), 94 (29.4)	55 (58.5)	0.008
	Lower middle (15001-30000), 125 (39.1)	92 (73.6)	
	Upper middle (30001-45000), 28 (8.8)	22 (78.6)	
	Rich (>45000), 73 (22.8)	59 (80.8)	
Occupation	Service holder, 105 (32.80)	79 (75.2)	0.501
	Student, 66 (20.60)	49 (74.2)	
	Housewife, 63 (19.70)	42 (66.7)	
	Others, 86 (26.90)	58 (67.4)	
Type of family	Nuclear, 250 (78.10)	169 (67.6)	0.006
	Joint, 70 (21.90)	59 (84.3)	

recommended by the authority. More than 96% of people had the intention to carry out prevention measures currently recommended by the authority (Table **3**).

The average risk perception among the participants was 3.05±0.75 (median, 3.00) (95% CI of mean: 2.96-3.13). More than 51.5% of the respondents provided 3 risk perceptions followed by all (4) risk perceptions (27.8%), 2 risk perceptions (18.4%), 1 risk perception (1.9%), and no risk perception (0.3%) respectively (Table **4**).

Chi-square test showed that gender (p<0.05), age group (year) (p<0.05), an education level (p<0.05), family monthly income (Taka) (p<0.01), and occupation (p<0.01) were significantly associated factors of high-risk perception among Bangladeshi people (Table **5**).

The effect of demographic and socio-economic factors on high-risk perception was described in Table **6**. The statistical model demonstrated that males had 1.729-fold higher risk perception than females (OR=1.729, 95% CI: 1.01-2.96; p<0.05), and the high risk was diminished by 65.2% among lower educated (no or primary) adults compared to higher educated people (OR= 0.348, 95% CI: 0.149-0.816; p<0.05). High-risk perception was decreased by 73.4% among poor people compared to rich people in Bangladesh (OR= 0.266, 95% CI: 0.127-0.554; p<0.01). Housewife (OR=0.362, 95% CI: 0.165-0.794; p<0.05) and other professionals (OR=0.472, 95% CI: 0.243-0.919; p<0.05) had low-risk perception towards COVID-19 than service holders respectively. The high-risk perception of young adults was 1.737 times higher than that of people aged ≥40 years (OR=1.737, 95% CI: 1.061-2.844; p<0.05) (Table **6**).

Table 3: Perception of Participants Toward COVID-19

Type of perception	Questions				
Perception of seriousness of the disease	How serious do you think COVID-19 is?	Very serious, 229 (71.6)	Serious, 76 (23.8)	Slightly serious, 15 (4.7)	Not serious, 0 (0.0)
Perception of susceptibility to the disease	What do you think about your chance of getting COVID-19?	Very much chance, 31 (9.7)	Much chance, 101 (31.6)	Slight chance, 146 (45.6)	No chance, 42 (13.1)
		Most certainly	Probably yes	Probably not	Certainly not
Perception of efficacy and self-efficacy	Do you think that you will manage to carry out prevention measures currently recommended by the authority?	48 (15.0)	182 (56.9)	76 (23.8)	14 (4.4)
Perception/Intention to carry out the measures	Are you willing to carry out prevention measures currently recommended by the authority?	243 (75.9)	65 (20.3)	12 (3.8)	

Table 4: Level of Risk of Perception

Mean ± SD=3.05 ± 0.75	Median =3.00	95% CI of mean: 2.96-3.13	
Number of questions	**Risk of perception, N (%)**	**Number of questions**	**Risk of perception, N (%)**
0	1 (0.3)	3	165 (51.6)
1	6 (1.9)	4	89 (27.8)
2	59 (18.4)		

Table 5: Association between Perception Toward COVID-19 and Different Characteristics of Participants

Variable	Group	Perception toward COVID-19		p-value
		Low risk	High risk	
Gender	Male	141 (68.4)	65 (31.6)	0.045
	Female	90 (78.9)	24 (21.1)	
Residence	Urban	134 (69.8)	58 (30.2)	0.241
	Rural	97 (75.8)	31 (24.2)	
Marital status	Currently married	172 (74.1)	60 (25.9)	0.206
	Unmarried	59 (67.0)	29 (33.0)	
Age group (year)	Young adult (>40)	93 (66.0)	48 (34.0)	0.027
	Adult (≥40)	138 (77.1)	41 (22.9)	
Education level	Uneducated or primary	46 (86.8)	7 (13.2)	0.034
	Secondary	50 (68.5)	23 (31.5)	
	Higher	135 (69.6)	59 (30.4)	
Family member	Small (≤4)	123 (71.9)	48 (28.1)	0.912
	Large(≥5)	108 (72.5)	41 (27.5)	
Family monthly income (Taka)	Poor (≤15000)	80 (85.1)	14 (14.9)	0.004
	Lower middle (15001-30000)	87 (69.6)	38 (30.4)	
	Upper middle (30001-45000)	20 (71.4)	8 (28.6)	
	Rich (>45000)	44 (60.3)	29 (39.7)	
Occupation	Service holder	69 (65.7)	36 (34.3)	0.003
	Student	40 (60.6)	26 (39.4)	
	Housewife	53 (84.1)	10 (15.9)	
	Others	69 (80.2)	17 (19.8)	
Type of family	Nuclear	183 (73.2)	67 (26.8)	0.445
	Joint	48 (68.6)	22 (31.4)	

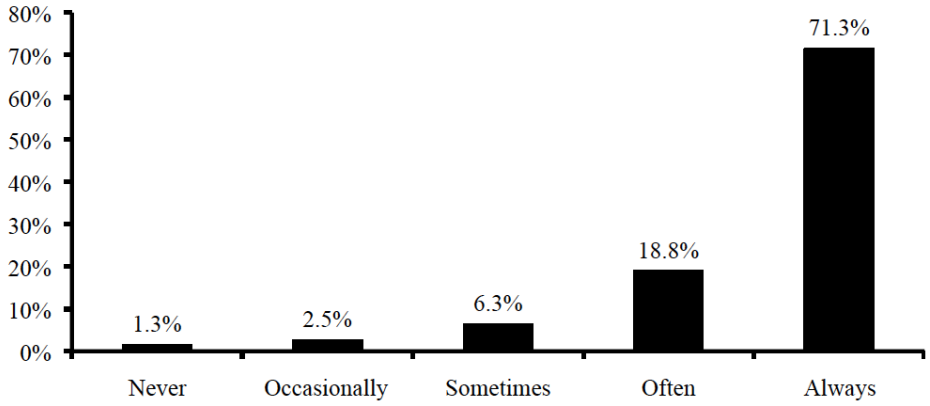

Figure 1: Level of practice to follow the guidelines recommended by WHO.

The Practice of Preventive Guidelines to Avoid COVID-19

The study revealed that 71.3% of the participants always followed the guidelines of WHO to prevent COVID-19 (Figure **1**).

Chi-square test demonstrated that type of residence (p<0.01), an education level (p<0.01), family's monthly income (p<0.01), type of family (p<0.01), and a number of family members (p=0.052) were significantly associated with the practice of preventive guidelines (Table **2**). The logistic model revealed that the urban people had a 2.439-fold higher-good practice than rural people (OR=2.439, 95% CI: 1.488-3.999; p<0.01). Good practice was decreased by 71.8% among uneducated or primary educated people compared to higher educated people (OR=0.282, 95% CI: 0.150-

Table 6: Effect of Socio-Economic and Demographic Factors on Practice to Avoid and Perception Toward COVID-19 among Bangladeshi Adults

Practice			Perception		
Covariates	OR (95% CI for OR)	p-value	Covariates	OR (95%CI for OR)	p-value
Residence			**Gender**		
Urban vs Rural	2.439(1.488-3.999)	p<0.001	Male vs Female	1.729 (1.01-2.96)	0.046
Education Level			**Education Level**		
Uneducated or Primary vs Higher	0.282(0.150-0.533)	p<0.001	Uneducated or Primary vs Higher	0.348 (0.149-0.816)	0.015
Secondary vs Higher	0.726(0.395-1.334)	0.303	Secondary vs Higher	1.053(0.589-1.882)	0.863
Family Monthly Income (Taka)			**Family Monthly Income (Taka)**		
Poor vs Rich	0.335(0.164-0.682)	0.003	Poor vs Rich	0.266(.127-.554)	p<0.001
Lower middle vs Rich	0.662(0.327-1.339)	0.251	Lower middle vs Rich	0.663(.362-1.213)	0.182
Upper middle vs Rich	0.870(0.297-2.548)	0.800	Upper middle vs Rich	0.607(0.236-1.561)	0.300
Family member			**Occupation**		
Small family vs Large family	0.614(0.374-1.007)	0.053	Student vs Service holder	1.246(0.659-2.356)	0.499
Type of family			Housewife vs Service holder	0.362(0.165-0.794)	0.011
Nuclear vs Joint	0.389(0.194-0.780)	0.008	Others vs Service holder	0.472(0.243-0.919)	0.027
			Age Group		
			Young adults vs Adults	1.737(1.061-2.844)	0.028

0.533; p<0.01). Poor participants showed less likeliness to follow WHO's guidelines properly (good practice) than rich ones (OR=0.335, 95% CI: 0.164-0.682; p<0.01). Adults living in small (OR=0.614, 95% CI: 0.374-1.007; p=0.053) and nuclear families (OR=0.389, 95% CI: 0.194-0.780; p<0.01) showed less likeliness to having good practice than joint and large families respectively (Table **6**).

DISCUSSION

COVID-19 has become a hot topic in all kinds of media and among people across the world including Bangladesh. Though the facts about the causation, transmission, control, treatment, and prevention of the disease are the same, perceptions and practices towards it differ in different countries due to differences in levels of socioeconomic status, demographic backgrounds, and measures taken by the governments. This demands specific studies for specific populations. To our knowledge, this study is the first attempt of this kind of research in Bangladesh.

The majority of the participants (71.3%) in this study were practicing the guidelines of WHO to prevent COVID-19 though the level of practice is lower than that found in some other countries. A study conducted by Zhong *et al.* (2020) reported that about 98% of Chinese residents had an appropriate practice of measures for the prevention of COVID-19 [21]. Another study also reported a higher rate of practice (over 90%) among the US people [22]. An Indian study found almost the same findings regarding the practice of preventive guidelines [23]. However, the level of good practice of our participants was found higher than that (65.04%) of other populations such as the general population in Nigeria [24]. A study conducted in May 2020 found more than 90% of general people in Bangladesh had good practice of preventive measures [25]. Extensive campaigns about the higher rate of infectivity and fatality of the disease might make people conscious and careful about their health and life ultimately pushing them to practice preventive guidelines. Differences in patterns, trends, and levels of socioeconomic condition, religious beliefs, practices and culture, family and social bonding, population density, political culture, etc. might contribute to the different levels of practice in different countries. High education, living in urban areas, and high family income, the most contributory factors for the good practice among Bangladeshi people that we have found in this study are inter-related. These subgroups of people may be more knowledgeable, and more conscious about health and personal hygiene. This might help increase their practice of following the preventive measures to avoid COVID-19. The Chinese and US people with high socioeconomic status were found to have a higher percentage of good practice [21, 22]. A larger family is also helpful in acquiring knowledge and practicing preventive guidelines with discussion and exchange of views among the family members and correcting and inspiring one another. In our study, the urban people were reported to have a 2.439-fold higher-good practice than rural people. Higher educated participants are good in practice of prevention of COVID-19 compared to the uneducated or primary educated participants. Furthermore, also it was found that the participants from the poor community are less likely to follow WHO's guidelines properly than rich adults.

In our study, we also analyzed the individual perception towards COVID-19 regarding the severity of the disease, susceptibility to the disease, and self-efficacy and intention of the participants to carry out the preventive measures to avoid the disease. In this study, the associated demographic and socio-economic factors of these perceptions were also identified. Near about two-thirds of the participants (71.6%) were knowledgeable about the severity of the disease; more than 50% and 75% thought they had the capacity and will of continuing preventive measures respectively. Only 9.7% feared getting the infection certainly. All these findings reveal that the attitude, perception, and practice of the participants were more or less positive. Huge campaigns and publicity about the rapid spread of the disease, high death rates, and preventive measures might make them knowledgeable and conscious and have accurate perceptions towards the disease. These perceptions would hopefully help people take measures to avoid and prevent COVID-19. However, the perception of our respondents is not of the expected level. It is of a lower level compared to that of the Chinese [21] and Egyptian [26] people. An almost similar finding was found in a study conducted in Bangladesh [17]. The comparatively low level of positive perception among our respondents might be for their religious beliefs, moral insights, family cultures, and social customs. The high-risk perception of younger adults, males, high educated people, rich ones, and service holders might be explained by a hypothesis that these people of higher socioeconomic status are usually more conscious about their health and practice personal hygiene at a higher rate than their counterparts. Gender (p<0.05), age group (year)

($p<0.05$), an education level ($p<0.05$), family monthly income (Taka) ($p<0.01$), and occupation ($p<0.01$) are found significantly associated factors of the high risk of perception among Bangladeshi people (Table **5**).

This study revealed that 23.8% and 71.6% of respondents believed COVID-19 was a serious and very serious disease respectively. Only 9.7% of them believed they had very much chance to get COVID-19 while 31.6%, 45.6%, and 13.1% were supposed to have much chance, slight chance, and no chance to get this disease. More than 50% of the participants would be able to manage to carry out prevention measures recommended by the authority and more than 75% of the people were willing to carry out prevention measures currently recommended by the authority (Table **3**). Similar to many other countries, the government of Bangladesh is applying aggressive non-therapeutic measures for the prevention of the disease such as enforcing countrywide and regional lockdowns, banning travel on the road, water, rail, and air routes, etc. All kinds of educational institutions have remained closed since the outbreak. Most importantly, the practice of preventing measures such as social distancing, wearing face masks, and practicing hand hygiene are being encouraged to control the spread of COVID-19. The government also set up temporary quarantine sites for all travellers who entered the country and improve the healthcare facilities to minimize the impact of the COVID-19 pandemic [27].

The present study had several limitations. Firstly, the sample size of this convenience study cohort likely is not representative of the Bangladeshi population and this cohort's practice and perception may not generalize to the population. Another related limitation is the selection bias resulting from the convenience subject selection (from the acquaintances of the authors and their friends and colleagues). Secondly, data collected by the online survey were partly dependent on the participants' honesty and recalls ability; thus, they may be subject to recall bias. Thirdly, the study period was short, during a certain point of the peak of the pandemic in its early stage. The changes in practice and perception were not monitored. Fourthly, the population group of family monthly income ≤15000 (Taka) was not explored enough. The low-income population might be uneducated or have low education levels due to low socioeconomic background and this might affect their practice and perception towards COVID-19. The socioeconomic factors were found to be significantly associated with practice and perception in this study. Fifthly, due to online survey, some other vulnerable populations such as un/low-educated people, older adults, adults with comorbid conditions, rural, and working people at the grass-root level could have not taken part in the study in sufficient numbers although they are more likely to have poor knowledge and perception, negative attitudes, and inappropriate preventive practices towards COVID-19.

CONCLUSIONS AND RECOMMENDATIONS

In summary, this study revealed that the Bangladeshi population with a high socioeconomic status had, though not up to the expected level, appropriate practices for the prevention of COVID-19 during the early stage of the outbreak. Also, risk perception about the disease was not up to the desired level. The findings suggest that proper health education programs are urgently needed to improve the perception of the people and maintain safe practices. In the face of the aggravating situation of the COVID-19 pandemic in Bangladesh, the government and non-government stakeholders should pay special attention to the vulnerable groups such as uneducated or low educated, aged, rural, and poor people. More studies are also warranted for investigating the knowledge, attitude, perception, and practice towards COVID-19 among the Bangladeshi population of low socioeconomic status.

ABBREVIATIONS

SARS-CoV-2 = Severe Acute Respiratory Syndrome Coronavirus 2

CI = Confidence Interval

COVID-19 = Coronavirus Disease 2019

IBM = International Business Machines

OR = Odds Ratio

SARS = Severe Acute Respiratory Syndrome

SPSS = Statistical Package for the Social Sciences

WHO = World Health Organization

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The ethical clearance was obtained from the Ethical Committee, Institute of Biological Sciences (IBSc), Rajshahi University, Rajshahi-6205, Bangladesh to

study infectious diseases. The written consent of every participant was taken and they sent it to us with the filled-up questionnaire.

CONSENT FOR PUBLICATION

Not applicable to this study.

AVAILABILITY OF DATA AND MATERIAL

Data will be available on request.

COMPETING INTERESTS

The authors have no conflict of interests.

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AUTHORS' CONTRIBUTIONS

MAW, MGH, and LLL conceptualized and designed the study. MAW, MGH, MMH, and ASMM collected data. MAW, MGH, MMH, LLL, and SM interpreted data and findings. MAW, MGH, and LLL wrote the manuscript. All authors reviewed and approved the manuscript.

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