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Individual-level preventive measures during the first wave of COVID-19 pandemic among Bangladeshi residents

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Abstract

COVID-19 causes mild to severe respiratory illness in humans. Government and non-government authorities along with telecommunication, print and electronic media undertook extensive advertising campaign regarding protective measures against COVID-19 to raise the public awareness. Therefore, this web-based cross-sectional study was conducted to evaluate peoples' responses towards COVID-19 during the first wave of COVID-19 in Bangladesh. We performed univariate and multivariate analyses to estimate the association between demographic characteristics, awareness, and individual preventive measures. The overall awareness level of the majority of the respondents (89%, n=920) was good, but the overall score for individual-level preventive measures during lockdown was poor to moderate. The relation between a good level of awareness and a higher level of educational status was found statistically significant (aOR 5.87, 95% CI: 1.58-21.86). Service holders were two times more likely to follow COVID-19 prevention practices than students (aOR 2.08, 95% CI: 1.24-3.51). Despite having adequate knowledge on awareness, many respondents were reluctant to follow preventive measures during the lockdown. The outcomes of this study highlight the requirement for stringent execution of preventative measures by law enforcement agencies to stop the transmission of the COVID-19 virus.

Key word: COVID-19, preventive measure, Bangladesh.

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Introduction

The novel coronavirus disease 2019 (COVID-19) is a highly contagious disease in humans caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (1-3). Respiratory distress is the most characteristics clinical symptom (4). The SARS-CoV-2 was first detected in late December 2019 and the first epi-center was in Wuhan, China (5, 6). Eventually, the virus spreads rapidly in every corner of the world (7). The World Health Organization (WHO) declared the outbreak situation as a "global pandemic" on 11 March, 2020 (1, 8). As of 12 July 2023, there have been 767.97 million confirmed cases of COVID-19 and 6.95 million deaths reported in more than 200 countries and territories by WHO globally. The overall case fatality rate was 2.2% (7).

The COVID-19 is likely the zoonotic origin, and the SARS-CoV-2 virus was genetically close to the bat coronavirus (9). People working in seafood and animal wholesale markets in Wuhan were the first identified occupational group. It was speculated that the virus first originated from wildlife and jumped to humans through an intermediate animal host (10). There are several reports claimed that some animals including dogs, cats, and tigers, have been proven to have the SARS-CoV-2 virus infection after being in close contact with sick infected people in multiple countries (11-13). In the human population, the virus is mainly transmitted through respiratory droplets of infected persons (4, 14, 15). The persons who are infected with the virus need 1 to 14 days of incubation period to develop symptoms and where 98% of infected people express symptoms within 11-12 days (4, 14, 16, 17). Besides, a large number of people with COVID-19 cases were found asymptomatic or had only one symptom and acted as a carrier (18-20). The older people with preexisting chronic diseases like chronic respiratory disease, chronic kidney disease, cardiovascular disease, diabetes and cancer were reported to

be in greater risk for severity (8, 21). WHO recommended a series of preventive measures to stop the spread of COVID-19, including handwashing, wearing mask, keeping social distance, and maintaining quarantine and isolation (22). The first mass vaccination against COVID-19 was introduced on 8 December 2020 in humans in the United Kingdom (23). Now every country is administering vaccine against COVID-19. So far, WHO has approved eight vaccines for human use, such as Moderna mRNA-1273, Pfizer/BioNTech BNT162b2, Janssen (Johnson & Johnson) Ad26.COV2.S, Oxford/AstraZeneca AZD1222, Serum Institute of India Covishield, Sinopharm (Beijing) BBIBP-CorV (Vero Cells), Sinovac CoronaVac and Bharat Biotech Covaxin (24, 25).

The first COVID-19 was detected in Bangladesh on 8 March 2020 (26, 27). As of 2 December 2021, a total of 27,986 deaths have been reported out of 1,576,827 confirmed cases (28). Currently, the country is facing the second wave of this pandemic (29). The country has already ascertained the presence of nine COVID-19 variants since August 2021, with the lambda variant being the latest. The circulating variants are alpha (20I), beta (20H), delta (21A), eta (21D) kappa (20A), iota (20B), epsilon (20C), 20D and lambda variant where highly transmissible delta variant is the most reported in Bangladesh (29, 30). A mass vaccination campaign is going on throughout the country from 27 January 2021 using Oxford-AstraZeneca (30). Earlier, the Government of Bangladesh (GoB) took several measures to reduce the spread of COVID-19.

All educational institutions were closed from 16 March 2020 to prevent the outbreak of COVID-19. On 26 March 2020, the Government of Bangladesh first declared a nationwide lockdown all over the country for 66 days to reduce transmission (31). During the lockdown, all people suggested to avoid gathering, maintain six feet social distance, wearing mask, frequent hand washing, staying at home, restricting public transport, limiting working hours at offices, isolating infected people and mandatory 14 days quarantine for suspected cases (27, 32, 33). Even, all government and private entities along with telecommunication, print and electronic media undertook massive advertising regarding protective measures against COVID-19 to raise the awareness of the general public (26). Despite of several preventive measures taken by the Government and other relevant authorities, COVID-19 continues to spread throughout the country. Therefore, we designed the current study to evaluate the responses by people towards the official preventive measures, guidelines, and orders during the first wave of COVID-19 in Bangladesh.

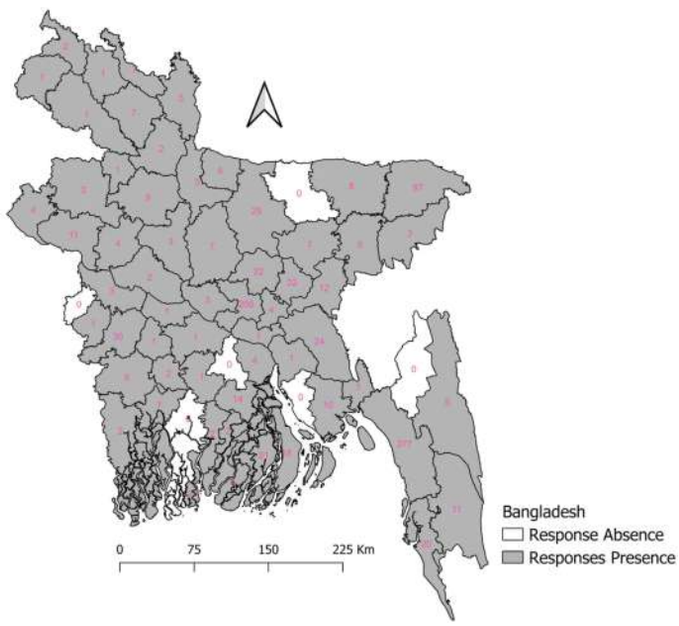
Materials and methods

Study Design and Respondents

This cross-sectional study was conducted from April 2020 to September 2020 with an online-based self-reported questionnaire survey using Google Forms. A group of researchers prepared a semi-structured questionnaire and shared unanimously to the general people through Facebook messenger application. We included people aged over 18 years currently living in Bangladesh. The distribution of respondents and studied areas in Bangladesh were illustrated in the following figure 1.

Figure 1

Distribution of respondents and studied areas in Bangladesh



Ethical consents

This study was approved by the Ethics Committee of Xishuangbanna Tropical Botanical Garden, Chinese Academy of Science. Respondents participating in the study were informed about the entire methodology and aims of the study and confidentiality of information provided. All respondents consented willingly to be a part of the study during the data collection periods. All data were collected anonymously and analyzed using the coding scheme.

Statistical analysis

We performed a descriptive analysis to estimate the proportion, mean, median, standard deviation, 95% confidence interval, and p-value for categorical data. We performed univariate and multivariate analyses to estimate the association between demographic characteristics, awareness, and individual preventive measures. Odds ratios (ORs) and adjusted odds ratios were calculated to measure the association. We used STATA 13 version for data analysis.

Results

Sociodemographic Characteristics

A total of 1034 study participants were participated in this survey. The mean age of respondents was 27.2 years (Standard deviation, SD =7.8, range: 13-72). The majority of the participants were student and >80% were completed graduation. Most of participant lived in Dhaka and Chattogram during the data collection (Table 1). The half of the respondents had family number five to eight. Thirty

percent of respondents said that at least one family member previously infected with COVID-19.

Table 1

Demographics characteristics of the study participants (n= 1034), April-September 2020, Bangladesh

Characteristics	Number of participants (%)	95% CI
Sex		
Male	678 (66)	63-68%
Female	356 (34)	32-37%
Age		
<18 years	20 (2)	1-3%
18-24 years	446 (43)	40-46%
25-40 years	496 (48)	45-51%
>40 years	72 (7)	5-9%
Occupation		
Student	551 (53)	50-56%
Job	378 (37)	34-40%
Business	41 (4)	3-5%
Housewife	37 (4)	3-5%
Others	27 (3)	2-4%
Education level		
Primary	15 (1)	1-2%
Secondary	40 (4)	3-5%
Higher Secondary	116 (11)	9-13%
Graduation	536 (52)	49-55%
Post-graduation	327 (32)	29-35%
Present living areas		
Dhaka	290 (28)	25-31%
Chattogram	372 (36)	33-39%
Sylhet	82 (8)	6-10%
Rajshahi	53 (5)	4-7%
Khulna	61 (6)	5-8%
Rangpur	52 (5)	4-7%
Barishal	73 (7)	6-9%
Mymensingh	51 (5)	4-6%

Participants' awareness and perception towards COVID-19

The overall awareness level of the majority of the respondents (89%, n=920) was good. Participants who answered more than seven out of 10 questions correctly were considered as "good awareness level". Ten percent (n=110) of the respondent had medium-level awareness getting a score between 4 and 6. More than 90% of respondents were aware of the clinical symptoms of COVID-19, social distancing, and isolation (Table 2). Most of them (>95%) reported that fever, coughing, difficulty breathing, and sore throat are the common clinical manifestations of COVID-19. The majority (86%, n=893) of the respondents defined social distancing as a set of measures including six feet distance, avoiding pubic gathering, and avoiding public transport. Most of the respondents (70%, n=722) defined "quarantine" as a set of measures including separation of suspected COVID-19 patients from healthy people, 14 days mandatory stay within the home, and stay under health inspection. Ninety-nine percent of the respondents understood "isolation" as the separation of COVID-19 infected persons from the healthy population. More than 90% of the respondents believed that countrywide lockdown, early diagnosis, and early reporting are useful to control the spread of COVID-19.

Table 2

Participants' awareness and perception towards COVID-19, April-September 2020, Bangladesh

Variables	Number of participants (%)	95% CI
Awareness		
Aware about the clinical symptoms of COVID-19	1030 (100)	99-100
Aware about the possible transmission of COVID-19 through direct contact with wild animals or consumption of wild animals' meat	575 (56)	53-59
Aware about the possible source (wild animal markets) of SARS-CoV-2 virus	711 (69)	66-72
Aware about the possible transmission of SARS-CoV-2 virus from humans to pet animals	432 (42)	39-45
Aware about social distancing, quarantine and isolation	1023 (99)	98-99
Aware about the duration of quarantine period (14 days)	989 (96)	94-97
Aware about asymptomatic infection in humans	849 (82)	80-84
Aware about COVID-19 testing and treatment centre	989 (96)	94-97
Aware about the severity of COVID-19	832 (80)	78-83
Aware about the usefulness of WHO guidelines to prevent and control COVID-19	985 (95)	94-96
Perception		
Lockdown declared by Government is effective to contain COVID-19 outbreak	995 (96)	95-97
Believe that early diagnosis and reporting to the health authority can prevent further transmission of COVID-19	1020 (99)	98-99
Agree to work as a frontline worker to fight against COVID-19	770 (74)	72-77
Willing to learn more about COVID-19	936 (91)	89-92
Willing to follow 14 days quarantine	1004 (97)	96-98

Individual level personal preventive measures during lockdown

The overall score for individual-level preventive measures during lockdown was poor to moderate. Participants who followed appropriate preventive measures and scored more than seven out of 10 practices were considered as "good level of preventive measures". Two-thirds of the respondents scored between 5 and 6, whereas only 17% (n=173) of the respondents took good preventive measures during the lockdown. The majority of the respondents reported that they wore facemasks, but 98% of the respondents visited nearby public places during the lockdown (Table 3).

Table 3

Individual level personal protective measures during lockdown, April-September 2020, Bangladesh

Variables	Number of participants (%)	95% CI
Wore a mask while going outside the home during lockdown	984 (95)	94-96
Most of the time stayed inside the home during lockdown	45 (4)	3-06
Practiced hand-washing frequently during lockdown	963 (93)	91-95
Prayed at home during lockdown	1005 (97)	96-98
Travelled birthplace during lockdown	202 (20)	17-22
Did not smoke during lockdown	831 (80)	78-83
Exercised regularly during lockdown	243 (24)	21-26
Tried to eat nutritious food during lockdown	582 (56)	53-59
Visited nearby public places within last 14 days	1014 (98)	97-99
Took drugs as prophylactic against COVID-19	116 (16)	9-13

Relationship between demographic characteristics, level of awareness and preventive measures towards COVID-19 prevention

The univariate analysis showed that female respondents over 18 years of age, higher education and living at Sylhet were more likely to have a good level of awareness on COVID-19 compared to respondents who did not have these characteristics (Table 4). In multivariate logistic regression analysis, the relation between a good level of awareness and a higher level of educational status was found statistically significant (aOR 5.87, 95% CI: 1.58-21.86).

Regarding individual-level preventive measures, female respondents were 0.99 times less likely to follow COVID-19 prevention practices than male respondents. The respondents who had higher education degrees and lived in Sylhet and Barishal were more likely to follow COVID-19 prevention practices than other respondents who had not these characteristics (Table 5). The multivariate analysis showed that service holders were two times more likely to follow COVID-19 prevention practices than students, and the association was found statistically significant (aOR 2.08, 95% CI: 1.24-3.51).

Table 4

Association between individual awareness towards COVID-19 and demographic characteristics

Variables	n (%)	Good level of awareness n (%)	OR (95% CI)	Adjusted OR (95% CI)
Sex				
Male	678 (66)	593 (57)	Ref.	Ref.
Female	356 (34)	327 (32)	1.62 (1.03-2.52)	1.62 (0.98-2.68)
Age				
<18 years	20 (2)	16 (2)	Ref.	Ref.
18-24 years	446 (43)	397 (38)	2.03 (0.65-6.3)	0.64 (0.16-2.63)
25-40 years	496 (48)	451 (44)	2.5 (0.8-7.82)	1.7 (0.37-7.9)
>40 years	72 (7)	56 (5)	0.87 (0.26-2.99)	1.16 (0.23-5.8)
Occupation				
Student	551 (53)	498 (48)	Ref.	Ref.
Job	378 (37)	339 (33)	0.92 (0.59-1.43)	0.53 (0.26-1.07)
Business	41 (4)	28 (3)	0.22 (0.11-0.47)	0.19 (0.07-0.52)
Housewife	37 (4)	32 (3)	0.68 (0.25-1.82)	0.45 (0.12-1.66)
Others	27 (3)	23 (2)	0.61 (0.2-1.83)	0.48 (0.13-1.74)
Education level				
Primary	15 (1)	10 (1)	Ref.	Ref.
Secondary	40 (4)	28 (3)	1.16 (0.33-4.15)	1.22 (0.29-5.1)
Higher Secondary	116 (11)	97 (9)	2.55 (0.78-8.31)	3.27 (0.85-12.51)
Graduation	536 (52)	491 (47)	5.45 (1.78-16.65)	5.87 (1.58-21.86)
Post-graduation	327 (32)	294 (28)	4.45 (1.43-13.82)	3.82 (1.02-14.26)
Present living areas				
Dhaka	290 (28)	265 (26)	Ref.	Ref.
Chattogram	372 (36)	333 (32)	0.8 (0.48-1.37)	0.7 (0.4-1.22)
Sylhet	82 (8)	75 (7)	1.01 (0.42-2.42)	1.1 (0.43-2.75)
Rajshahi	53 (5)	45 (4)	0.53 (0.22-1.24)	0.42 (0.17-1.05)
Khulna	61 (6)	53 (5)	0.62 (0.26-1.46)	0.68 (0.28-1.64)
Rangpur	52 (5)	45 (4)	0.6 (0.24-1.48)	0.55 (0.22-1.39)
Barishal	73 (7)	63 (6)	0.59 (0.27-1.3)	0.54 (0.23-1.22)
Mymensingh	51 (5)	41 (4)	0.38 (0.17-15.97)	0.37 (0.16-0.85)

Discussion

This cross-sectional study assessed the level of peoples' responses towards the government official guidelines, suggestions, instructions, and orders during the first wave of COVID-19 in Bangladesh. Our results showed that major participants (about 99%) had aware of the common clinical symptoms of the COVID-19, social distancing, quarantine, and isolation in the country. Similar findings were documented in Bangladesh (94%) and some other countries like USA (80%), Iran (85-90%), China (90%) (27, 34-36). The variation among knowledge of awareness is due to the higher education level among participants in mentioned countries and the high level of access to information through electronic

and social media (27, 36). A previous study reported that 18% of people had no knowledge about the possibility of SARS-CoV-2 virus transmission from asymptomatic cases. Five to ten percent of respondents claimed that the knowledge gap occurred due to limited access to social media, television and newspapers in the low resources countries like Bangladesh (37). In this study, many respondents believed that the transmission of the SARS-CoV-2 virus from humans to pet animals is possible. Another study also reported that more than 80% of the study participants had similar beliefs on this aspect (37).

Table 5

Association between individual level preventive measures and demographic characteristics

Variables	n (%)	Good level of practices n (%)	OR (95% CI)	Adjusted OR (95% CI)
Sex				
Male	678 (66)	116	Ref.	Ref.
Female	356 (34)	57	0.92 (0.65-1.3)	0.99 (0.68-1.44)
Age				
<18 years	20 (2)	4	Ref.	Ref.
18-24 years	446 (43)	75	0.8 (0.26-2.49)	0.45 (0.1-1.98)
25-40 years	496 (48)	81	0.78 (0.25-2.39)	0.32 (0.06-1.49)
>40 years	72 (7)	13	0.88 (0.25-3.07)	0.38 (0.07-1.93)
Occupation				
Student	551 (53)	84	Ref.	Ref.
Job	378 (37)	76	1.39 (0.99-1.97)	2.08 (1.24-3.51)
Business	41 (4)	4	0.6 (0.2-1.73)	0.87 (0.27-2.87)
Housewife	37 (4)	4	0.67 (0.23-1.95)	1.15 (0.34-3.87)
Others	27 (3)	5	1.26 (0.46-3.42)	1.83 (0.62-5.46)
Education level				
Primary	15 (1)	1	Ref.	Ref.
Secondary	40 (4)	5	2 (0.21-18.68)	1.8 (0.16-19.13)
Higher Secondary	116 (11)	19	2.74 (0.34-22.11)	3.41 (0.39-29.13)
Graduation	536 (52)	95	3.01 (0.39-23.21)	3.6 (0.43-30.06)
Post-graduation	327 (32)	53	2.7 (0.34-21.03)	2.78 (0.33-23.25)
Present living areas				
Dhaka	290 (28)	40	Ref.	Ref.
Chattogram	372 (36)	66	1.34 (0.88-2.06)	1.33 (0.86-2.05)
Sylhet	82 (8)	18	1.75 (0.94-3.26)	1.82 (0.97-3.43)
Rajshahi	53 (5)	11	1.63 (0.78-3.44)	1.78 (0.83-3.8)
Khulna	61 (6)	12	1.53 (0.74-3.12)	1.68 (0.81-3.47)
Rangpur	52 (5)	6	0.81 (0.32-2.03)	0.77 (0.3-1.93)
Barishal	73 (7)	16	1.75 (0.91-3.35)	1.74 (0.9-3.36)
Mymensingh	51 (5)	4	0.53 (0.18-1.55)	0.52 (0.18-1.55)

The use of face masks can prevent the spread of COVID-19. Our study found that 90% of the respondents wore a face mask when they left their home, but some studies showed that 82-96% of respondents usually wore face masks in crowded places, and 52% wore masks outdoors (27, 37). The individual level awareness about the use of face masks was found very common in many places (38). The differences of using the mask varies among people because of their educational status and attitude (39). Frequent handwashing with soap is one of the preventive measures to reduce SARS-CoV virus transmission. The reported handwashing practice reported by a couple of studies in Bangladesh (97%) and India (87%) was similar to our study finding (93%) (27, 40). The variation of soap usage for hands washing could depend on socio-economic status in the countries and strict preventive and control measures taken by government (27). To increase handwashing frequency and encourage people to handwash, government and non-government organizations of Bangladesh can establish adequate fixed and portable handwashing stations in public gathering places like offices, markets, restaurants and educational institutes.

In developing countries like Bangladesh, women take care of each family member and strictly follow individual protective measures against COVID-19. In the current study, female participants were 1.6 times more likely to have a good level of awareness towards COVID-19 than male participants, which is similar with some previously conducted studies (27, 36). The age group among 25-40 years followed a good level of practice towards COVID-19 than other age groups, which is similar to other studies from Bangladesh (26, 27). Youth were reported as reluctant to obey the government of Bangladesh official guidelines as they feel less susceptible to COVID-19 than children and older men as stated by WHO (21). Studies reported that negligence to maintain COVID-19 protective protocols occurred due to a low level of awareness about the high infectivity and transmissivity of the virus. The study also revealed that undergraduate students follow poor protective practices against COVID-19 than graduate and post-graduate students, which have similarities with some previous studies (21, 26, 41). Educational qualification encourages people to maintain personal hygiene and improve their attitudes and practices toward COVID-19 prevention (26). Our study showed that respondents from Chattogram were more likely to follow good practices than other districts. However, a previous study showed that respondents from Dhaka were likely to follow good practices towards COVID-19 (26). Findings of these studies suggest that people from these two districts can follow good practices towards COVID-19. These two districts are the most developed with modern facilities that help citizen to follow COVID-19 protocol. Along with the individual awareness, the government should actively implement protective guidelines among people of other districts. Mass awareness campaigns are needed to target specific demographic groups such as housewives, business people, youth, and primary and secondary level people to improve the practicing attitudes toward COVID-19 in Bangladesh.

This online-based study had few limitations. All information was collected from respondents through online. The majority of the respondents were students as this group of people had more access to internet. This study cannot be generalized to the whole country's population because of the nature of the study, respondent group and self-reporting. The information we collected from respondents has been

affected by social desirability bias, which might have underestimated the prevalence of practices.

Conclusion

The overall score for individual-level preventive measures during lockdown was poor to moderate. Despite adequate awareness level, people were reluctant to follow preventive measures during the lockdown. The findings of this study warrant the necessity of strict implementation of preventive measures by law enforcement authorities to reduce the spread of SARS-CoV-2 virus transmission.

Author Contribution

The authors confirm their contribution to the paper as follows: study conception and design: Delower Hossain, Nasir Uddin, Sukanta Chowdhury; data collection: Delower Hossain, AHM Musleh Uddin, Tanjila Hasan, Sabiha Zarin Tasnim Bristi, Abeer Olive; analysis and interpretation of results: Sukanta Chowdhury, Md. Injamul Haq Methun; draft manuscript preparation: Delower Hossain, Nasir Uddin, Md. Injamul Haq Methun, Sumon Ghosh, Sukanta Chowdhury. All authors reviewed the results and approved the final version of the manuscript. All authors agreed to be responsible for all aspects of the work to ensure the accuracy and integrity of the published manuscript.

Ethics statement

The authors declare that the published work reflects an investigation and analysis carried out truthfully and completely.

Conflict of interest

The authors declare no conflict of interest.

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Data availability statement

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

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