Knowledge, attitude and practices (KAP) towards COVID-19 and assessment of risks of infection by SARS-CoV-2 among the Bangladeshi population: An online cross sectional survey

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Abstract
The COVID19 pandemic has been transmitted worldwide rapidly. The best ways of preventing this virus are to know about and act accordingly. An online cross sectional survey was conducted to know the knowledge, attitude and practices towards COVID19 and to assess the risks of infections among Bangladeshi population. Among 2045 respondents, 54·87% respondents kept good knowledge. Knowledge was significantly diverged across age, gender, education levels, residences, income groups, and marital status. Despite the knowledge, the attitude and practices of Bangladeshi people are not impressive. Among population, 32·08%, and 44·30% people were in high, and in medium risk of infection respectively. Everybody is in risk. Reasons for the mediocre attitude and practices could be the poor knowledge, nonscientific and orthodox religious believe. Government and policy makers must consider these knowledge levels, attitude & practices and the risk of infection assessment to implement productive interventions for preventing the COVID19.

Introduction:
COVID-19 is a contagious disease caused by newly identified coronavirus called severe acute respiratory syndrome coronavirus 2 [1]. SARS-CoV-2 is first identified in Wuhan city of China in 2019 and has subsequently spread worldwide, ensuing in the current 2019–20 coronavirus pandemic[2,3]. Till 8th April 2020, total cases of infection reach 1,536,652 and death toll is 89,907 and the trend is going up, however, so far 340,349 persons were recovered from COVID-19 [4]. The lungs are the most affected organs in this disease as the virus enters via the enzyme called angiotensin converting enzyme 2 (ACE2) which is mostly profuse in the type II alveolar cells of the lungs [5]. COVID19 patients may be asymptomatic or progress flu-like symptoms, with fever, dry cough, tiredness and shortness of breath[6]. Immediate medical attention is advised when severe symptoms including persistent chest pain or pressure, difficulty of breathing, confusion, and bluish face or lips arises [6]. Upper respiratory symptoms i.e. runny nose, sneezing or sore throat, vomiting, diarrhea, nausea, chest tightness, palpitations etc. have been witnessed in varying percentages [7,8]. During March 2020, anosmia (loss of the sense of smell) was reported in some cases[9,10]. In severe cases,
the disease may develop pneumonia, multi organ failure and death [2,11], and requires onset to necessitating ventilations minimum for 8 days[12]. Gastrointestinal organs are also affected as ACE2 is expressed in the glandular cells of duodenal, gastric and rectal epithelium [13] as well as enterocytes of the small intestine and endothelial cells [14].

The SARS-CoV-2 belongs to the wide-ranging family of virus, coronavirus containing positive-sense single stranded RNA, and genetically close to bat coronavirus[15].Family of these viruses is known for developing human sickness including common cold to more severe diseases such as Sever Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS)[16].Persons infected with the virus need 2 to 14 days of incubation period to develop symptoms and 97.5% of patients express symptoms within 11.5 days [17].SARS-CoV-2 virus is predominantly spread between persons via respirational droplets from coughs and sneezes[12]. Studies demonstrated that this virus is live on copper for 4 to 18 hours, on cardboard for 24 to 55 hours, on plastics for 72 to 100 hours, stainless steels for 72 to 90 hours and in aerosol for three hours although the detection rates varies between surface materials types [18]. The virus also been isolated from human faeces, however, spread through it is being investigated [13]. Airborne characterizes of COVID-19 virus are not expressed yet[19].Infections can be prevented as per recommendations including repeated hand washing with soaps or alcohol based sanitizers, maintain social distances from others, covering coughs and sneezes to protect others, and avoiding hands away from mouth, nose, and eyes [11,20].

Public Health Emergency of International Concern (PHEIC) was declared on 30 January by the World Health Organization (WHO) for the coronavirus outbreak[21] and a pandemic on 11 March 2020.³ Bangladesh is one of the small but most populated (162.9 million and 8th in the World)[22] and densely (1,169 per km²) populated country [23].It is difficult to manage these large numbers of population especially in the pandemic conditions. The first coronavirus infection was found on 7 March 2020 and till 9th April 2020, 330 people are infected and the deaths are seventeen[4]. Bangladesh
Government has declared lockdown all over the countries except some emergency services instructing staying at home to avoid contacting with others, with the deferral of public transport, the closing of public spaces, close managing of communities, and isolation and care for infected people and suspected cases. To ensure the ultimate success, citizen's devotion to these control measures are important, which is generally affected by their knowledge, attitudes, and practices (KAP) to COVID-19 according to KAP theory[24,25]. Previous information and lessons from the world outbreak recommend that knowledge and attitudes towards contagious diseases are linked with level of sentiment among the population, which can further confuse efforts to stop the spread of the disease [26,27]. To ease the pandemic controlling of COVID-19 in Bangladesh, there is a crucial need to understand the citizen's consciousness of COVID-19 at this complex situation. In this study, the knowledge, attitudes and practices (KAP) regarding COVID-19 outbreak among Bangladeshi population and its associated risks were investigated through online survey.

Methodology:

**Study Design, Setting and Participants**

The current study was designed to obtain the information regarding knowledge, attitude and practice towards COVID-19 and to assess the risk of infection through their daily practices. Online cross-sectional questionnaires were used to obtain data. Questionnaires consisted of three parts. Demography, COVID-19 Knowledge Test (C19KT), and last part were to assess attitude and practices. Demographic variables included administrative divisions, age, gender, education, occupation, residence (urban/rural), monthly family income, and marital status. Data were obtained from all the eight administrative divisions of Bangladesh according to the proportion of population. The latest population census, 2011 was used to obtain the percentages of total people living in different Divisions of the country. According to 2011 census [23], the distributions of population and the collected data numbers was considered (Supplementary Table 01). Online cross-sectional questionnaires were made available to all the social media users and provided extensively towards 10 volunteers. Volunteers and all the authors were associated regarding the online survey. The survey
was launched on 14 March 2020 and closed on 30 March 2020. There was no specific exclusion criterion for participating in this survey except age. Anyone who were 16 years of old and above, were eligible to participate in this survey. A total of 2343 participants responded. A total of 2045 filled questionnaire were selected for the data analysis.

**C19KT questionnaires and their assessment**

Forty questions (Supplementary Table 02) were included in the questionnaire to test the knowledge of the respondents. Every question had three possible answers, true, false and not sure; however, only one was the right answer. Every question carried one point. Respondents who scored more than 30 were identified as keeping “good knowledge” regarding COVID-19.

**Assessments of attitude and practices of respondents**

Attitude and practices were measured by respondent’s regular lifestyles and knowledge regarding COVID-19 in this pandemic situation. To assess the attitude and practices of respondents towards COVID-19, twenty four questions (Supplementary Table 03) was used. Total 24 questions out of 22 had options to answer yes/no.

**Assessments of risk of infection**

Besides the answers of selected questions regarding attitude and practices, risk of infections was also measured. To perform this, 13 questions were selected from attitude and practice questions. The scores were calculated individually and cumulative scores were obtained for all. Based on the acquired scores out of total score thirty nine, the risk of infections was distributed accordingly (Supplementary Table 04 and Supplementary Table 05). Risk scores were then assessed using demographic classifications and C19KT to know the status of risk group.

**Handling of variables and processing for analysis**

Selected 2045 questionnaire were checked and re-checked several times carefully with the authors.
Ages were divided into three groups, 16 to 30 years old, 31 to 55 years old and 55+ years old.

Education data were ranged as up to HSC/Diploma and above HSC/Diploma; occupations data were ranged as unemployed (no job, house wife and students) and employed (Govt. job, NGO/private job and business); residences were divided as village/rural (village/rural and Upazila level) and urban (capital city, Divisional city and District towns). Non numeric data were coded with numbers for analysis.

**Statistical Analysis**

Multivariable linear regression and binary logistic regression analysis was used to identify factors associated with knowledge. Binary logistic regression analysis was conducted where Risk assessment was dependent variables. Regression coefficients (β) and odds ratios (ORs) and their 95% confidence intervals (CIs) were used to quantify the associations between variables. Data were analyzed using SPSS version 26.0.

**Results:**

A total 2343 participants accomplished the online questionnaires. Data of 298 participants regarding unspecified answers, confusing responses and missing parameters were discarded. The final sample involved 2045 participants. Among the respondents, 512 (25·04%) were from Dhaka Division, the average age was 27·82 years of which (SD: 1.36, range 16-65); 1667 (81·52%) were between 16 and 30 years old; 1085 (53·06%) were man; 1057 (51·69%) were graduates, 843 (41·22%) were students, 439 (21·47%), 504 (24·65%), and 575 (28·12%) were from Capital city, Divisional cities, and District towns, respectively, 838 (40·98%) were from middle income group whose monthly family income were between Taka 25,000/00 to 60,000/00, and 1320 (64·55%) never married (See Table 01).

| Table 01: Demographic classification of respondents on the basis of overall and good knowledge on |
## COVID19

Demographic classification of all respondents and the good knowledge keeping respondents.

**COVID19= Coronavirus disease 19, GKP= Good Knowledge Person, C19KT=COVID19 Knowledge Test.**

Among the 40 questions on the COVID-19, those answered 30+, was considered them having good knowledge. Among 2045 respondents, 1122 (54.87%) respondents kept good knowledge (mean score 30.41±3.55). On the basis of demographic classifications, good knowledge participants (GKP) were
309 (15·11%) among total respondents and 27·54% of GKP were from Dhaka Division, average age were 27·24±6·61, 643 (31·44% of overall and 57·31% of GKP) were man,590 (28·85% of overall and 52·58% of GKP) were graduates. For detail demographic classification of good knowledge towards COVID-19 please see Table 01.

The average C19KT score suggested that most of the participants had good knowledge on COVID-19. Multivariable linear regression and binary logistic regression analysis demonstrated that C19KT scores significantly diverged across age, gender, education level, residence, monthly family income and marital status. However, occupation did not show significant association. Detail association of demographic characters towards knowledge was shown in Table 02.

**Table 02: Multivariable linear and binary logistic regressions regarding poor knowledge factors associated with COVID-19**

| Variables                                      | Multivariable linear regression | Binary logistic regression |
|------------------------------------------------|---------------------------------|----------------------------|
| Age Range (16 to 13 years old vs 31+ years old) | Coefficient (β) = -0·128        | Odds Ratio (OR) = 0·497     |
| Gender (male vs female)                        | Standard error = 0·034          | 95% Confidence Intervals   |
| Education Range (up to HSC/Diploma vs above HSC/Diploma) | t = -4·813                     | 0·372-0·663                |
| Occupation (Non employed vs Employed)          |                                 | P = 0·001                  |
| Residence (Village/Rural and Upazila vs-0·162 Urban) | t = -4·269                     | 0·450                      |
| Monthly Family Income (Low and medium vs High) | t = 5·016                       |                                |
| Marital Status (Never married vs Ever Married) | t = 4·483                       |                                |

The most of the respondents frequently washed their hands (95·45%) in this pandemic conditions.

Around 1545 (75·55%) respondents wore masks when going out, however, the patterns of cleaning of used masks were not impressive. Around 8·17% respondents did not use masks even in this alarming
situations. Among 686 respondents, 33·55% respondents cleaned their mask every day. Rest of the respondents wore from 2 to 60 days without proper cleaning. The rates of disposing used cloths and shoes after returning from outside were 68·12% and 29·63%, respectively, suggesting people are less concern about transmission of viruses through dresses and shoes. About 87·97% respondents maintained social distances and 67·73% were not spending times with friends and colleagues after work or classes. In leisure time, among 2045 respondents, 1400 (68·46%) and 295 (14·43%) were not going to roadside shops for tea/coffee and snacks, respectively. Though, in average 4·75±2·61 days in a week, respondents were taking roadside snacks. In total 661 (32·32%) respondents dealt with sick people. Very few participants visited corona infected areas (2·98%) and met with the people who came from corona infected areas (1·91%). Ten respondents reported that their family members were affected with coronavirus. Among common practices, 62·15% participants sneezed between elbows, and 62·93% did not touch mouth, nose or eyes with dirty hands (Table 03).

Table 03: Attitude and practices of respondents based on overall and good knowledge

| Frequentely washed hands with soap or sanitizer | Overall (n=2045) | Good Knowledge (n=1122) |
|------------------------------------------------|-----------------|------------------------|
| No                                              | 93              | 4·55%                  |
| Yes                                             | 1952            | 95·45%                 |
| No                                              | 500             | 24·45%                 |
| Yes                                             | 1545            | 75·55%                 |
| Mean and SD                                     | 167             | 8·17%                  |
| Do not use mask Mean and SD                     | 4·61            | 8·43%                  |
| 1 Day                                           | 314             | 15·35%                 |
| 3 Days                                          | 249             | 12·18%                 |
| 4 Days                                          | 36              | 1·76%                  |
| 5 Days                                          | 82              | 4·01%                  |
| 6 Days                                          | 6               | 0·29%                  |
| 7 Days                                          | 368             | 18·00%                 |
| 10 Days                                         | 45              | 2·20%                  |
| 12 Days                                         | 2               | 0·10%                  |
| 15 Days                                         | 12              | 0·57%                  |
| 20 Days                                         | 6               | 0·29%                  |
| 30 Days                                         | 42              | 2·05%                  |
| 60 Days                                         | 30              | 1·47%                  |
| Do not wash or Wear next day                    | 652             | 31·88%                 |
| Washed or Left for wash                         | 1393            | 68·12%                 |
| Washed or Wear next day                         | 1439            | 70·37%                 |
| Washed or Left for wash                         | 606             | 29·63%                 |
| Generally you use mass transport                | 789             | 38·58%                 |
| Yes                                             | 1256            | 61·42%                 |
| No                                              | 1385            | 67·73%                 |
| Yes                                             | 660             | 32·27%                 |
| No                                              | 246             | 12·03%                 |

What usually you do with your dress when you come from outside?

What usually you do with your shoes when you come from outside?
| Attitude and practices  | Yes | No | Mean and SD |
|-------------------------|-----|----|-------------|
| Sneezed between elbows  | 1799| 774| 87·97% | 32 |
| Yes                     | 1271| 758| 62·15% |
| No                      | 1400| 645| 31·54% |
| Frequently touched mouth or eyes or nose | 955 | 324 | 95·7% | 4|
| Yes                     | 1287| 68·46% |
| No                      | 1400| 645| 31·54% |
| Usually drink tea/coffee from road side tea shops | 878 | 798 | 95·7% |
| Yes                     | 1287| 68·46% |
| No                      | 1400| 645| 31·54% |
| Days in a week usually eat roadside snacks | 774 | 758 | 77·79% |
| Yes                     | 1271| 758| 62·15% |
| No                      | 1400| 645| 31·54% |
| Usually touch mobile phone with unwashed hands | 774 | 758 | 77·79% |
| Yes                     | 1271| 758| 62·15% |
| No                      | 1400| 645| 31·54% |
| Regularly deal with sick people or health worker | 878 | 798 | 95·7% |
| Yes                     | 1287| 68·46% |
| No                      | 1400| 645| 31·54% |
| Usually share food or water pot with others | 878 | 798 | 95·7% |
| Yes                     | 1287| 68·46% |
| No                      | 1400| 645| 31·54% |
| Usually eat half or semi cooked fish, meat, eggs or vegetables | 878 | 798 | 95·7% |
| Yes                     | 1287| 68·46% |
| No                      | 1400| 645| 31·54% |
| Recently visited corona virus infected area | 373(18·24%) | 906(44·30%) | 37·85% |
| Yes                     | 1287| 68·46% |
| No                      | 1400| 645| 31·54% |
| Recently met with people came from abroad (corona affected area) | 373(18·24%) | 906(44·30%) | 37·85% |
| Yes                     | 1287| 68·46% |
| No                      | 1400| 645| 31·54% |
| COVID-19 symptoms at your work places or near work place | 373(18·24%) | 906(44·30%) | 37·85% |
| Yes                     | 1287| 68·46% |
| No                      | 1400| 645| 31·54% |
| Family member(s) caught corona infection | 373(18·24%) | 906(44·30%) | 37·85% |
| Yes                     | 1287| 68·46% |
| No                      | 1400| 645| 31·54% |
| Quarantine facilities near your home or workplace | 373(18·24%) | 906(44·30%) | 37·85% |
| Yes                     | 1287| 68·46% |
| No                      | 1400| 645| 31·54% |
| Home or work places clean everyday with sanitizer | 373(18·24%) | 906(44·30%) | 37·85% |
| Yes                     | 1287| 68·46% |
| No                      | 1400| 645| 31·54% |

Attitude and practices were measured according to the answer given by the respondents. In this table, attitude and practices were compared between all respondents and good knowledge respondents to assess the association of good knowledge and practices.

Assessments of risks of infection were analyzed among all the respondents based on the thirteen selected attitude and practices questions. According to the risks categories among all respondents, 373 (18·24%) did belong to low risk category with average risk score 8·05±1·18, 906 (44·30%) were in medium risk category ( risk score 12·07±1·32), 656 (32·08%) were in high risk category (risk score 16·58±1·48), and 110 (5·38%) were in extreme high risk category (risk score 21·77±1·45). However, no respondents were found risk free and this is the dangerous characteristics of COVID-19. Among extreme high risk (HER) category, 46 (41·82% of HER and 2·25% of all) were from Dhaka Division, 87
(79.09% of HER and 4.25% of all) were in age group between 16 to 30 years old, 63 (57.27% of HER and 3.08% of all) were female, 98 (89.09% of HER and 4.79% of all) had education levels above HSC/Diploma, 51 (46.36% of HER and 2.49% of all) were private job holder, 39 (35.45% of HER and 1.91% of all) lives in the Capital city, 47 (42.73% of HER and 2.30% of all) were from high income group, 58 (52.73% of HER and 2.84% of all) never married and 75 (68.18% of HER and 3.67% of all) kept good C19KT score. Respondents from Barishal Division were not in extreme high risk. In high risk (HR) group, trends were like as HER except residence, income group and C19KT score. Detail demographic characteristics of n of infection are shown in Table 04.

**Table 04: Risks of infections according to demographic classification**
with demographic classification and C19KT score to know the diversity of risks.
Binary logistic regression analysis on the basis of selected attitude and practices towards Knowledge has shown Table 05.

Table: 05: Binary logistic regression analysis based on selected attitude and practices towards knowledge

| Practice                                           | Odds Ratio (OR) | 95% Confidence Intervals |
|----------------------------------------------------|-----------------|--------------------------|
| Wash hands with soap frequently (no vs yes)       | 0.391           | 0.228-0.671              |
| Always use mask (no vs yes)                        | 0.944           | 0.737-1.209              |
| Maintain the rules of using mask (no vs yes)       | 0.568           | 0.456-0.709              |
| Meet friends regularly in these days (no vs yes)   | 2.139           | 1.683-2.719              |
| Maintain social distance (no vs yes)               | 0.991           | 0.735-1.337              |
| Drink tea/coffee from roadside shops (no vs yes)  | 0.870           | 0.692-1.094              |
| Eat snack from roadside shops (no vs yes)          | 1.152           | 0.857-1.548              |
| Work with sick people or health worker (no vs yes) | 2.121           | 1.657-2.715              |
| Recent visit of corona virus infected area (no vs yes) | 2.500         | 1.374-4.545              |
| Recent meeting with people came from abroad (no vs yes) | 0.498         | 0.247-1.003              |
| Corona infection symptoms at work places or near work place (no vs yes) | 0.412         | 0.285-0.596              |
| Family member(s) caught corona infection (no vs yes) | 0.984         | 0.724-1.372              |
| Frequently touching mouth or eyes or nose or all frequently (no vs yes) | 1.260         | 1.007-1.577              |
| Risk of being infected with corona virus (low and medium risk vs high and extreme high risk) | 0.631         | 0.477-0.888              |

Selected practice questions that were used in the analysis of risks of infections. These questions were then used to do the multiple binary logistic regression analysis with C19KT scores for identifying the association. First category of each independent variable was the reference category and C19KT score was dependent category (poor knowledge was reference).

Among thirteen selected attitudes/practices and risk score, eight were significantly associated with knowledge. Multiple binary logistic regression analysis on demographic factors and C19KT score towards risk of infections (risk score) has shown in Table 06. Among the independent variables, education levels (OR: 3.164, P = 0.001), residence (OR: 2.056, P=0.03) and C19KT score (OR: 0.356, P<0.001) were significantly associated with risk of infections.

Table 06: Binary logistic regression based on demographic factors towards risks of
Multiple binary logistic regression analysis was conducted to find the association of demographic characters and C19KT score with Risk of Infection. The first category of each independent variable was reference category. Risk score was dependent variables and Low and Medium Risk score was the reference category over high and extreme high risk category.

Discussion:
According to a leaked inter-agency UN memo dated 26 March 2020 [28], due to the odd population densities in Bangladesh, globally recognized modeling techniques and parameter assumptions, the COVID-19 situations can be as worsen and up to 2 million people may die if no fruitful intervention is taken. The message is clear, people of Bangladesh need to know the coping strategy regarding the pandemic and should take necessary measures accordingly. To our best knowledge, this is the first study in Bangladesh regarding KAP investigation towards COVID-19 among Bangladeshi residents. The study results indicate that nearly half of the populations of Bangladesh are not well aware about the COVID-19 and the upcoming hazardous situation as warned by the UN memos. To prevent or reduce the infection rates, people need to get information and act accordingly.

Despite lack of knowledge regarding COVID-19, the Bangladeshi residents are careful to avoid potential problems or dangers of it. Nearly all person washes their hands frequently, nearly three fourth of the people wear masks, around 87·97% people avoid social gatherings, and nearly one third of the online participants sneezed between their elbows in this pandemic. Due to socioeconomic

| Character                          | Odds ratio (OR) | 95% Confidence Intervals | P    |
|------------------------------------|-----------------|--------------------------|------|
| Age                                | 1·058           | 0·789-1·419              | 0·708|
| Gender (male vs female)            | 3·493           | 2·847-4·284              | 0·000|
| Education (up to HSC vs above HSC) | 1·405           | 1·059-1·865              | 0·018|
| Occupation (unemployed vs employed)| 2·175           | 1·730-2·736              | 0·000|
| Residence (village/rural vs urban) | 0·818           | 0·645-1·038              | 0·099|
| Monthly Family Income (low and medium income vs high income) | 0·862 | 0·697-1·065 | 0·169 |
| Marital Status (never married vs ever married) | 1·227 | 0·964-1·563 | 0·097 |
| C19KT Score (poor knowledge vs good knowledge) | 0·789 | 0·649-0·960 | 0·018 |

infections
conditions and other unspecified reasons, very few Bangladeshi people repeatedly washed their hands with soaps and alcohol based sanitizers before, but scenarios have been changed now. The features of KAP towards COVID-19 were evaluated and some demographic determinants associated with KAP were identified. Significant positive association between education levels and C19KT scores make hopes for the better situations. As expected majority of the GKP are from Dhaka Division (27.54% of GKP), and the lowest GKP was surprisingly observed from Sylhet Division (4.01%). The reasons behind this perhaps could be the availability and the price of internet. Likewise, people of village/rural (17.11% of GKP) and Upazila towns (13.81% of GKP) are less knowledgeable compared to Urban (Capital city: 21.03% of GKP, Divisional cities: 20.32% of GKP, District towns: 27.72% of GKP) for the similar reasons.

In this pandemic situation, attitude and practices towards COVID-19 did depend on the information they got and subsequently acted accordingly. Studies [18] showed that coronavirus can be transmitted through clothes and shoes. However, people of Bangladesh have less concern about it. Most of the people did not clean their mobile phone (60.00%) or touched mobile phone with unwashed hands (50.86%). Due to massive spreading news, most of the people are avoiding for going to corona affected areas (97.02%) and also avoiding to come in touch of the people who are coming from abroad or corona affected areas (98.09%). Total 10 respondents informed that their family members were infected with coronavirus that made them in extreme risk categories of infection. People who are above 55 years olds are in high risk categories. Among thirteen respondents, five (38.46% of this age group) were in extreme high risk categories and seven (53.85% of this age group) were in high risk group.

The present study indicates that 12.03% people did not maintain social distances as well as 32.27% regularly met with friends and colleagues and 24.45% did not wear masks when went outside. These potentially precarious activities were associated to males, students, marital status, residents, and poor knowledgeable people regarding COVID-19. As advised by outcomes from earlier studies
about age and gender patterns of risk-taking manners [29], men and late adolescents are more prone to get involved in risk-taking performances. The strength of this study lies in its initiation of this online survey at the early stage of the COVID-19 outbreak in Bangladesh. Comparing the recent work on KAP towards COVID19 of Chinese population [30], the knowledge of Bangladeshi population is low and the attitude and practices were also not that level because of socioeconomic and health care systems.

The findings of the present study suggest that half of the Bangladeshi peoples have good knowledge, however, their attitude and practices towards COVID-19 during the pandemic were not impressive. In addition, COVID-19 knowledge and practices are associated with demographic characteristics. Proper health education and mass awareness programs would be helpful for improving attitudes and maintaining safe practices. Appropriate preventive measures, healthy practices, and instructions must be strictly implemented by the government with the help of concerned agencies and organizations. Moreover, the WHO and UNICEF guidelines must comply by all the section of the people. The outcomes of the study would be very much useful for public health policy-makers and health workers. Moreover, preventive and coping strategy would be enriched along with overall health education updates from the elementary level of education. Hopefully, under the combined efforts of Bangladesh Government and the people of Bangladesh, the country certainly will win the battle against COVID-19 pandemic.

**Limitation of the study**

Due to limited access to internet and other logistic support, it was not possible to bring a large number of people of the country under this study.

**Declarations**

**Contributors**

TH and MMR conceived the study with input from MMRB and SA. TH and MMR developed questionnaires and study design. TH led the project regarding volunteer recruitments, data collections
to writing with the help of MMRB and SA. MMR led the analysis of individual-case data and estimation of the onset-to-outcome distributions, with input from TH, KMH, MMRB, AA and MRI. TH coordinated management of the team, including the data collection, analysis and processing. TH and MMR produced the first draft of the manuscript, KMH did put efforts regarding writings and corrections of the manuscripts; SHC, AA and KMH added additional points in discussions. TH, KMH, MRI, AA and MMR finalized the manuscripts after necessary corrections and obtaining suggestions from all authors. MMR supervised all the works from the beginning to the end. All authors did read and agreed unanimously to submit the manuscripts.

**Declaration of interests**

This study has not yet received any funds from any institute, organizations or government. All authors declare that there is no conflict of interests among them.

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**Ethics**

This work is approved by the Ethics Committee of Bangladesh University of Health Sciences. In addition, data from all respondents were collected through an online survey where they had to made consent by clicking "yes" to the questions mentioning they understood the theme of study and are willing to participate in this survey without being forced by anyone.

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