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 1,536,652and death toll is 89,907and the trend is going up, however, so far 340,349persons 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 km^2) 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 2343participants 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 olds and 55+ years old. Education data ware 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 298participantsregarding 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 to60,000/00, 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

	Overall		Good Knowledge		
	Number	Percentages	Number	Percentages of total respondents	Percentages (within GKP)
Respondents	2045	100%	1122	54·87%	100%
Divisional classification					
Barishal	117	5·72%	77	3·77%	6·86%
Chittagong	400	19·56%	209	10·22%	18·63%
Dhaka	512	25·04%	309	15·11%	27·54%
Khulna	240	11·74%	132	6·45%	11·76%
Mymensingh	120	5·87%	30	1·47%	2·67%
Rajshahi	269	13·15%	188	9·19%	16·76%
Rangpur	252	12·32%	132	6·45%	11·76%
Sylhet	135	6·60%	45	2·20%	4·01%
Age (Mean St. Dev.)	27·82	1·36	27·24	6·61	NA
Age Range					
16 to 30 Years Old	1667	81·52%	892	43·62%	79·50%
31 to 55 Years Old	365	17·85%	223	10·90%	19·88%
55+ Years Old	13	0·64%	7	0·34%	0·62%
Gender					
Male	1085	53·06%	643	31·44%	57·31%
Female	960	46·94%	479	23·42%	42·69%
Education					
Class Five	6	0·29%	4	0·20%	0·36%
SSC	68	3·33%	0	0·00%	0·00%
HSC/Diploma	990	48·41%	155	7·58%	13·81%
Graduates	1057	51·69%	590	28·85%	52·58%
Masters	576	28·17%	331	16·19%	29·50%
Doctoral and over	52	2·54%	42	2·05%	3·74%
Education Range					
Up to HSC/Diploma	360	17·60%	159	7·78%	14·17%
Above HSV/Diploma	1685	82·40%	963	47·09%	85·83%
Occupation					
Students	843	41·22%	407	19·90%	36·27%
House Wife	101	4·94%	41	2·00%	3·65%
Govt· Job	211	10·32%	126	6·16%	11·23%
Private Job	607	29·68%	365	17·85%	32·53%
Business	96	4·69%	25	1·22%	2·23%
No Jobs	187	9·14%	158	7·73%	14·08%
Residence					
Capital City	439	21·47%	236	11·54%	21·03%
Divisional City	504	24·65%	228	11·15%	20·32%
District Town	575	28·12%	311	15·21%	27·72%
Upazila (Sub District) Town	266	13·01%	155	7·58%	13·81%
Village or Rural	261	12·76%	192	9·39%	17·11%

Monthly Family Income					
Less than Taka 25,000/00	571	27·92%	283	13·84%	25·22%
Taka 25,000/00 to Taka 60,000/00	838	40·98%	462	22·59%	41·18%
Over Taka 60000	636	31·10%	377	18·44%	33·60%
Marital Status					
Never Married	1320	64·55%	704	34·43%	62·75%
Ever Married	725	35·45%	418	20·44%	37·25%
C19KT Score (Mean, SD)	30.41	3.55	NA	NA	NA
C19KT					
Poor Knowledge	923	45·13%	NA	NA	NA
Good Knowledge	1122	54·87%	NA	NA	NA

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 COVID19 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

	Multivariable linear regression			Binary logistic regression		
Variables	**Coefficient (β)**	**Standard error**	**t**	**Odds Ratio (OR)**	**95% Confidence Intervals**	**P**
Age Range (16 to 13 years old vs 31+ years old)	-0·128	0·034	-4·813	0·497	0·372-0·663	<0·001
Gender (male vs female)	-0·097	0·023	-4·269	0·666	0·551-0·805	<0·001
Education Range (up to HSC/Diploma vs above HSC/Diploma)	0·116	0·030	5·016	1·921	1·485-2·486	<0·001
Occupation (Non employed vs Employed)	0·012	0·026	0·466	1·054	0·848-1·310	0·636
Residence (Village/Rural and Upazila vs Urban)	-0·162	0·026	-7·017	0·450	0·358-0·566	<0·001
Monthly Family Income (Low and medium vs High)	0·051	0·025	2·219	1·251	1·018-1·536	0·033
Marital Status (Never married vs Ever Married)	0·122	0·028	4·483	1·720	1·351-2·189	<0·001

The reference category of the both analysis was the first category of each independent variable. C10KT score was the dependent variables in both cases (poor knowledge was reference).

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

		Overall (n=2045)		Good Knowledge (n=1122)	
		Number/ Mean	Percentages/ SD	Number/ Mean	Percentages/ SD
Frequently washed hands with soap or sanitizer	No	93	4·55%	21	1·87%
	Yes	1952	95·45%	1101	98·13%
Regular use of mask	No	500	24·45%	231	20·59%
	Yes	1545	75·55%	891	79·41%
Number of days used mask without proper cleaning	Mean and SD·	4·61	8·43	1·59	0·32
	Do not use mask	167	8·17%	32	2·85%
	1 Day	686	33·55%	595	53·03%
	2 Days	314	15·35%	298	26·56%
	3 Days	249	12·18%	197	17·56%
	4 Days	36	1·76%	0	0·00%
	5 Days	82	4·01%	0	0·00%
	6 Days	6	0·29%	0	0·00%
	7 Days	368	18·00%	0	0·00%
	10 Days	45	2·20%	0	0·00%
	12 Days	2	0·10%	0	0·00%
	15 Days	12	0·57%	0	0·00%
	20 Days	6	0·29%	0	0·00%
	30 Days	42	2·05%	0	0·00%
	60 Days	30	1·47%	0	0·00%
What usually you do with your dress when you come from outside?	Do not wash or Wear next day	652	31·88%	313	27·90%
	Washed or Left for wash	1393	68·12%	809	72·10%
What usually you do with your shoes when you come from outside?	Do not wash or Wear next day	1439	70·37%	836	74·51%
	Washed or Left for wash	606	29·63%	286	25·49%
Generally you use mass transport	No	789	38·58%	453	40·37%
	Yes	1256	61·42%	669	59·63%
Usually spend times with friends regularly	No	1385	67·73%	831	74·06%
	Yes	660	32·27%	291	25·94%
Maintained social distances	No	246	12·03%	167	14·88%
	Yes	1799	87·97%	955	85·12%
Sneezed between elbows	No	774	37·85%	324	28·88%
	Yes	1271	62·15%	798	71·12%
Frequently touched mouth or eyes or nose	No	758	37·07%	671	59·80%
	Yes	1287	62·93%	451	40·20%
Usually drink tea/coffee from road side tea shops	No	1400	68·46%	818	72·91%
	Yes	645	31·54034	304	27·09%
Days in a week usually eat roadside snacks	Mean and SD	4·75	2·61	3·79	1·22%
	Do not eat snacks from roadside	295	14·43%	248	22·10%

	1	30	1·47%	29	2·58%
	2	98	4·79%	67	5·97%
	3	211	10·32%	187	16·67%
	4	193	9·44%	125	11·14%
	5	211	10·32%	118	10·52%
	6	421	20·57%	211	18·81%
	7	586	28·66%	137	12·21%
Regularly clean work or home or classroom table	No	536	26·21%	293	26·11%
	Yes	1509	73·79%	829	73·89%
Usually clean mobile with sanitizer	No	1227	60·00%	608	54·19%
	Yes	818	40·00%	514	45·81%
Usually touch mobile phone with unwashed hands	No	1040	50·86%	583	51·96%
	Yes	1005	49·14%	539	48·04%
Regularly deal with sick people or health worker	No	1384	67·68%	718	63·99%
	Yes	661	32·32%	404	36·01%
Usually share food or water pot with others	No	1448	70·81%	778	69·34%
	Yes	597	29·19%	344	30·66%
Often eat half or semi cooked fish, meat, eggs or vegetables	No	1720	84·11%	953	84·94%
	Yes	325	15·89%	169	15·06%
Recently visited corona virus infected area	No	1984	97·02%	1080	96·26%
	Yes	61	2·98%	16	1·43%
Recently met with people came from abroad (corona affected area)	No	2006	98·09%	1106	98·57%
	Yes	39	1·91%	16	1·43%
COVID-19 symptoms at your work places or near work place	No	1874	91·64%	1049	93·49%
	Yes	171	8·36%	73	6·51%
Family member(s) caught corona infection	No	2035	99·51%	1118	99·64%
	Yes	10	0·49%	4	0·36%
Quarantine facilities near your home or workplace	No	1714	83·81%	989	88·15%
	Yes	331	16·19%	138	12·30%
Home or work places clean everyday with sanitizer	No	146	7·14%	34	3·03%
	Yes	1899	92·86%	1088	96·97%

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

	Extreme High Risk (HER)			High Risk (HR)			Medium Risk (MR)			Low Risk (LR)	
	Number	Percentages of total Population	Percentage (within HER)	Number	Percentages of total Population	Percentage (within HR)	Number	Percentages of total Population	Percentage (within MR)	Number	Pe of Po
Respondents	110	5·38%	100·00%	656	32·08%	100·00%	906	44·30%	100·00%	373	18
Risk Score (Mean, SD)	21·77	1·45	NA	16·58	1·48	NA	12·07	1·32	NA	8·05	1·1
Divisional classification											
Barishal	0	0·00%	0·00%	24	1·17%	3·66%	53	2·59%	5·85%	40	1·9
Chittagong	6	0·29%	5·45%	115	5·62%	17·53%	220	10·76%	24·28%	59	2·8
Dhaka	46	2·25%	41·82%	169	8·26%	25·76%	230	11·25%	25·39%	67	3·2
Khulna	19	0·93%	17·27%	79	3·86%	12·04%	99	4·84%	10·93%	43	2·1
Mymensingh	7	0·34%	6·36%	50	2·44%	7·62%	45	2·20%	4·97%	18	0·8
Rajshahi	19	0·93%	17·27%	99	4·84%	15·09%	106	5·18%	11·70%	45	2·2
Rangpur	12	0·59%	10·91%	90	4·40%	13·72%	107	5·23%	11·81%	43	2·1
Sylhet	1	0·05%	0·91%	30	1·47%	4·57%	46	2·25%	5·08%	58	2·8
Age (Mean, SD)	28·54	7·65%	NA	27·14	6·69%	NA	26·43	6·48	NA	26·49	6·8
Age Range											
16 to 30 Years Old	87	4·25%	79·09%	506	24·74%	77·13%	756	36·97%	83·44%	318	15
31 to 55 Years Old	18	0·88%	16·36%	143	6·99%	21·80%	149	7·29%	16·45%	55	2·6
55+ Years Old	5	0·24%	4·55%	7	0·34%	1·07%	1	0·05%	0·11%	0	0·0
Gender											
Male	47	2·30%	42·73%	232	11·34%	35·37%	553	27·04%	61·04%	253	12
Female	63	3·08%	57·27%	424	20·73%	64·63%	353	17·26%	38·96%	120	5·8
Education											
Class Five	0	0·00%	0·00%	2	0·10%	0·30%	3	0·15%	0·33%	1	0·0
SSC	6	0·29%	5·45%	39	1·91%	5·95%	18	0·88%	1·99%	1	0·0
HSC/Diploma	6	0·29%	5·45%	48	2·35%	7·32%	175	8·56%	19·32%	61	2·9
Graduates	69	3·37%	62·73%	340	16·63%	51·83%	434	21·22%	47·90%	214	10
Masters	28	1·37%	25·45%	220	10·76%	33·54%	255	12·47%	28·15%	73	3·5
Doctoral and over	1	0·05%	0·91%	7	0·34%	1·07%	21	1·03%	2·32%	23	1·1
Education range											
Up to HSC/Diploma	12	0·59%	10·91%	89	4·35%	13·57%	196	9·58%	21·63%	63	3·0
Above HSC/Diploma	98	4·79%	89·09%	567	27·73%	86·43%	710	34·72%	78·37%	310	15
Occupation											
No Jobs	4	0·20%	3·64%	36	1·76%	5·49%	95	4·65%	10·49%	52	2·5
House Wife	6	0·29%	5·45%	45	2·20%	6·86%	41	2·00%	4·53%	9	0·4
Students	31	1·52%	28·18%	227	11·10%	34·60%	410	20·05%	45·25%	175	8·5
Govt· Job	15	0·73%	13·64%	72	3·52%	10·98%	54	2·64%	5·96%	70	3·4
Private Job	51	2·49%	46·36%	231	11·30%	35·21%	269	13·15%	29·69%	56	2·7
Business	3	0·15%	2·73%	45	2·20%	6·86%	37	1·81%	4·08%	11	0·5

Residence											
Capital City	39	1·91%	35·45%	133	6·50%	20·27%	185	9·05%	20·42%	82	4·(
Divisional City	28	1·37%	25·45%	159	7·78%	24·24%	260	12·71%	28·70%	57	2·7
District Town	13	0·64%	11·82%	226	11·05%	34·45%	219	10·71%	24·17%	117	5·7
Upazila (Sub District) Town	25	1·22%	22·73%	106	5·18%	16·16%	87	4·25%	9·60%	48	2·3
Village or Rural	5	0·24%	4·55%	32	1·56%	4·88%	155	7·58%	17·11%	69	3·3
Monthly Family Income											
Less than Taka 25,000/00	26	1·27%	23·64%	117	5·72%	17·84%	272	13·30%	30·02%	96	4·6
Taka 25,000/00 to 60,000/00	37	1·81%	33·64%	263	12·86%	40·09%	387	18·92%	42·72%	151	7·3
Over Taka 60,000/00	47	2·30%	42·73%	216	10·56%	32·93%	247	12·08%	27·26%	126	6·1
Marital Status											
Never Married	58	2·84%	52·73%	371	18·14%	56·55%	611	29·88%	67·44%	280	13
Ever Married	52	2·54%	47·27%	285	13·94%	43·45%	295	14·43%	32·56%	93	4·5
COVID-19 Knowledge Test											
Poor Knowledge	35	1·71%	31·82%	342	16·72%	52·13%	393	19·22%	43·38%	153	7·4
Good Knowledge	75	3·67%	68·18%	314	15·35%	47·87%	513	25·09%	56·62%	220	10

Risks of infections were measured with selected questions from practices. Risk score then analyzed 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

	Odds Ratio (OR)	95% Confidence Intervals	P
Wash hands with soap frequently (no vs yes)	0·391	0·228-0·671	0·001
Always use mask (no vs yes)	0·944	0·737-1·209	0·649
Maintain the rules of using mask (no vs yes)	0·568	0·456-0·709	<0·001
Meet friends regularly in these days (no vs yes)	2·139	1·683-2·719	<0·001
Maintain social distance (no vs yes)	0·991	0·735-1·337	0·955
Drink tea/coffee from roadside shops (no vs yes)	0·870	0·692-1·094	0·234
Eat snack from roadside shops (no vs yes)	1·152	0·857-1·548	0·349
Work with sick people or health worker (no vs yes)	2·121	1·657-2·715	<0·001
Recent visit of corona virus infected area (no vs yes)	2·500	1·374-4·545	0·003
Recent meeting with people came from abroad (no vs yes)	0·498	0·247-1·003	0·050
Corona infection symptoms at work places or near work place (no vs yes)	0·412	0·285-0·596	<0·001
Family member(s) caught corona infection (no vs yes)	0·984	0·248-3·912	0·982
Frequently touching mouth or eyes or nose or all frequently (no vs yes)	1·260	1·007-1·577	0·043
Risk of being infected with corona virus (low and medium risk vs high and extreme high risk)	0·651	0·477-0·888	0·007

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 infections

	Odds ratio (OR)	95% Confidence Intervals	P
Age (16 to 30 years old vs 30+ years old)	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

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 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 cloths 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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