| RESEARCH PAPER |

Preventive Behaviour of Adults and Its Predictors in Response to COVID-19 Pandemic in Rural Bangladesh: Findings from a Community Survey

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Abstract

Background: Bangladesh with its large population is highly vulnerable to the devastating blows of coronavirus disease 2019 (COVID-19) and rural people are more at risks due to demographic characteristics and unequal health facilities. Currently, focuses are more on testing and clinical management of COVID-19 but initiatives or innovations on behavioural changes are almost unseen to prevent the spread of the disease which is more urgent until getting specific treatment or vaccine.

Objective: The study was aimed to determine significant predictors in the preventive health practices during COVID-19 pandemic.

Methods: The study was conducted among 810 rural adults of Bangladesh in 2020. Multistage sampling method was done and data were collected through face-to-face interview using a pretested questionnaire. Significant factors of COVID-19 prevention behaviour were determined through hierarchical regression and path relationships were explained through causal model.

Results: Almost half of the rural adults showed poor COVID-19 prevention behaviour during the pandemic crisis. Poor knowledge and attitude regarding COVID-19 prevention were also common scenarios in rural areas. Majority of the rural adults were not well motivated and lack of seriousness made them more vulnerable for COVID-19. Socio-demographic and regional variation showed significance predicting health practices of rural adults regarding COVID-19 prevention. Information, attitude, motivation and intention were also found significant in hierarchical regression to predict the outcome. The causal model of preventive health behaviour was justified through all the significant direct and indirect path relationships (p<0.001).

Conclusion: Socio-economic disparity should be reduced for behavioural changes of rural adults to ensure healthy practices during the pandemic. This study has great implications regarding designing health programs by emphasizing significant predictors to improve community behaviour to prevent the spread of coronavirus.

Keywords: COVID-19, Prevention, Predictor, Rural adult

Introduction

The global population witnessed coronavirus disease 2019 (COVID-19) as the deadliest one in the 21st century due to its unprecedented and long lasting effects on health and economy.[1] Prevention is the best defense in the current global crisis and with individual preventive measures, nationwide lockdowns across the world is also being implemented to control the spread of coronavirus.[1-3] COVID-19 is a communicable respiratory disease caused by a novel coronavirus and originated as a zoonotic disease.[4,5] Till now no specific drug has been found to be effective against COVID-19 and treatment is essentially supportive and symptomatic. In the absence of any specific treatment, prevention is very crucial at this moment.[2,3]

The world needed only around 10 months to cross 50 million COVID-19 cases at the beginning of November, 2020 and global death toll due to pandemic continued its rise towards 1.3 million within one year of its journey starting from Wuhan, China.[6] USA was the epicenter of novel coronavirus since April, 2020 and it reported

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the highest number of cases and deaths so far. Although cases started to decline from the middle of May, 2020 in Europe but the second wave continued its more devastating effects there.[7] Russia saw the high rise of COVID-19 cases in the second half of 2020 but they were more in talk with their early registration of COVID-19 vaccine in the middle of August, 2020.[7,8] Latin America was another hot spot for many months. Among the Asian countries India suffered most and it was just overloaded with COVID-19 cases.[6]

COVID-19 started its journey in Bangladesh on 8th March, 2020 and it took less than 8 months to confirm more than 400,000 COVID-19 cases with at least 6000 deaths.[6] COVID-19 situation of Bangladesh remained almost unchanged after the daily infection rate dropped slightly in September-October, 2020 and health experts alerted to be prepared to face the second wave of coronavirus.[9] Bangladesh government started to take preventive as well as restrictive measures to control the spread of coronavirus soon after the global crisis.[10] Despite these measures, it was difficult to ensure social distancing and mass gatherings were reported in many occasions.[11] COVID -19 impacts both on health and economy, and third world countries like Bangladesh can't continue lockdown for a long time to save their economy.[12-15] Urban-rural disparity in healthy practices regarding COVID-19 prevention was also an important issue in the pandemic management. Although cases are more in urban areas but the poor socioeconomic condition of the rural people and urban-rural migration consequent of the initial lockdown posed almost similar risk of infections during the pandemic crisis.[16-18]

Preventive measures can be at various levels from individual measures of using face mask and frequent hand washing to government-imposed lockdowns and restrictions of public movement.[2,3] Vaccines can play the key role to control the spread of coronavirus and the world is running for development of vaccine since COVID-19 started its journey. Countries like UK and USA have already booked COVID-19 vaccines way before their probable market launch and third world countries are struggling to afford it.[19,20] The old but trusted public health concept of prevention by maintaining healthy practices is the only option now to reduce morbidity and mortality in this pandemic crisis until getting vaccines or specific treatments.[2]

The study was conducted to determine the significant predictors in Covid-19 prevention behavior of rural adults

of Bangladesh. Prevention of COVID-19 is actually a package of safe and healthy practices.[2,3] Theoretical approach might be better to describe the sudden behavioral change due to COVID-19 pandemic. Knowledge, attitude and practice (KAP) model is the commonest theory that gives emphasis on knowledge and attitude to describe the behavior in a survey.[21-23] The theory of reasoned action approach (RAA) states that attitude towards the behavior and motivation can influence on behavior or practice through intention, and background issues can't be avoided to describe the total scenario.[24-26] Information or knowledge was added with the core components of RAA model to make it more effective to describe the prevention behavior. Not only the outcome, all the major determinants should be focused in planning to ensure healthy practices regarding COVID-19 prevention in rural community.

Materials and Methods

This cross-sectional study was conducted among 810 adults from rural areas of Dhaka and Mymensingh divisions of Bangladesh between July and October months of 2020. Multi-stage sampling technique was used for random selection of respondents. Quantitative data were collected through face-to-face interviews using a pretested questionnaire with six parts. Part 1 included socio-demographic characteristics and other background information of respondents comprising 14 items like age, sex, income, education, number of family members etc. Part 2 included 16 items regarding information about disease transmission, symptoms, treatment and prevention to assess COVID-19 prevention knowledge. Part 3 was constructed to assess attitude using 6 items. Social influence or motivation was described by 7 items in part 4. Intention to healthy practices was assessed in part 5 using 5 items. Part 6 was used to describe COVID-19 prevention behavior of rural adults using 8 items related to use of face masks, hand washing and maintaining social distancing. Likert scale was used from part 3 to part 6 and dichotomous type was used only in part 2. Positive and negative questions were included in the scales to get more valid results. Cronbach's Alpha (α) for the scales of COVID-19 prevention behaviour and its predictors were more than 0.80 in each case. Total scores of all latent variables were categorised into three groups: poor ($\leq$60%), fair (61-80%) and good (>80%). Hierarchical regression model was used to determine the significant predictors in

COVID-19 prevention behavior of rural adults. Finally, a casual model was formed combining the determinants based on knowledge, attitude and practice (KAP) model and the theory of reasoned action approach (RAA) to describe their path relationships in COVID-19 prevention behavior using maximum likelihood estimation (MLE) through analysis of moment structures (AMOS). The first block included information, attitude and motivation, and the second block of the causal model was for intention. COVID-19 prevention behavior was in third block as the final outcome. Prior to conduct the study ethical clearance was taken from the National Ethics Review Committee of Bangladesh Medical Research Council (BMRC) [Ref: BMRC/Revenue-Grant/2019-20/753(1-31)].

Results

Average age of the respondents was 29.5 years with standard deviation (SD) of 7.4 years. More than two-thirds (66.9%) of the respondents were males and the rest of them were females. Majority (88.1%) of the respondents were Muslims and the rest of them were Hindus. The average monthly family income was BDT 13,351 with SD of ±6,564. Only around half of them had above primary level education. Majority of the women were housewives and among the male respondents, agriculture worker and day laborer were the main occupations. Respondents got health information mainly from different media and only one-third were informed by health workers in the pandemic crisis (table I).

Majority of them (68.0%) always avoided hand shake or hug during the pandemic crisis. Nearly two thirds of the respondents (60.4%) were irregular to avoid gatherings to maintain social distancing during COVID-19 pandemic. Less than one-third (27.9%) of the respondents regularly used face mask during the pandemic crisis. Among them 42.5% used face mask sometimes or irregularly during the corona crisis and rest of them (29.6%) never used face mask to prevent the spread of coronavirus. Among the non-users, most of them were housewives who were usually domestically bound and they did not move outside during the COVID-19 pandemic. Less than one-third of the participants (31.6%) regularly washed hands with soap water. Majority of them (74.2%) were irregular to follow the government health guidelines during the pandemic. Only 11.2% strictly followed all the government health guidelines. More than half of the rural adults were irregular to avoid visiting other's house

Table I: Distribution of age, sex, religion and family income of the respondents (n=810)

Socio-demographic characteristics	Number	Percentage
Age of respondents (years)		
≤25	264	32.6
26-35	411	50.7
≥36	135	16.7
Mean±SD=29.5±7.4 years (min-max:18-55 years)		
Gender		
Male	542	66.9
Female	268	33.1
Religion		
Islam	714	88.1
Hindu	96	11.9
Monthly family income (Taka)		
≤10000	327	40.4
10001-15000	250	30.8
>15000	233	28.4
Mean±SD=13,351±6,564(min-max: 5,000-80,000)		
Educational level of respondents		
Illiterate	85	10.5
Primary	303	37.4
Junior School Certificate	272	33.6
Secondary School Certificate and above	150	18.5
Occupational status of respondents		
Agricultural worker	179	22.1
Day laborer	166	20.5
Housewife	189	23.3
Student	37	4.6
Factory worker	61	7.5
Business	75	9.3
Government/private employee	60	7.4
Others	43	5.3
Informed by health workers		
Yes	305	37.7
No	505	62.3

during the pandemic crisis and 44% strictly avoided courtesy visit to other's home. Majority of them (67.3%) took shower irregularly after returning home from outside and only around 24% took shower regularly after visiting outside. Majority (66.3%) of the respondents always avoided spitting in public places but nearly one-third of them were irregular to maintain the manner of spitting (table II).

Mean score of health practice was 10.3 (SD±3.2) with minimum score of 4 and maximum of 16. Nearly half of them (48.1%) showed poor practice regarding COVID-19 prevention and only 22.0% showed good level of health practice. Average information score was 8.7 (SD±4.4) with minimum score of 0 and maximum of 16. Majority of them (55.6%) showed poor knowledge and only 19.0% showed good level of knowledge. Mean score of attitude was 22.8 (SD±3.1) with minimum score of 16 and maximum of 30. Nearly half of them

Table-II: Distribution of indicators of health practices regarding COVID-19 prevention (n=810)

Health practices	Always		Sometimes		Never	
	Number	Percentage	Number	Percentage	Number	Percentage
Avoid hand shake/hug	551	68.0	228	28.2	31	3.8
Avoid gathering	292	36.1	490	60.4	28	3.5
Using face mask	226	27.9	344	42.5	240	29.6
Hand wash with soap	256	31.6	455	56.2	99	12.2
Follow all health rules	91	11.2	601	74.2	118	14.6
Avoid courtesy visit	356	44.0	418	51.6	36	4.4
Shower after returning	195	24.1	545	67.3	70	8.6
Spitting properly	537	66.3	254	31.4	19	2.3

(49.6%) showed fair attitude regarding COVID-19 prevention and only 15.6% showed poor attitude. Average score of motivation was 21.6 (SD±3.6) with minimum score of 13 and maximum of 30. Among the respondents 52.7% were found with poor motivation and only 21.6% shared good level of motivation. Average score of intention was 18.3 (SD±4.0) with minimum score of 10 and maximum score of 25. Less than one-third (31.1%) showed poor intention and more than one-third (36.3%) showed good intention regarding COVID-19 prevention (table III).

In the first model of hierarchical multiple regression background issues like gender, age, monthly family income, educational level, marital status and regional variation showed significance predicting health behavior of rural adults regarding COVID-19 prevention. In the second model all the predictors of first model persisted as significant predictors. Information, attitude, motivation and intention in the second model were also significant to predict the outcome. Among the latent variables of second model, information and intention were very highly significant ($p<0.001$) and attitude was found with high significance ($p<0.01$) (table IV). Motivation was just significant to predict the outcome ($p<0.05$).

Table III: Level of scores of preventive behaviour in COVID-19 control and its predictors

| Variables	Level of scores (%)			Mean±SD	Min-Max
	Poor (≤60%)	Fair (61-80%)	Good (>80%)		
Practice	48.1	29.9	22.0	10.3(3.2)	4-16
Information	55.6	25.4	19.0	8.7(4.4)	0-16
Attitude	15.6	49.6	34.8	22.8(3.1)	16-30
Motivation	52.7	29.8	17.5	21.6(3.6)	13-30
Intention	31.1	32.6	36.3	18.3(4.0)	10-25

x = Mean, SD = Standard deviation

Table-IV: Hierarchical regression for predicting COVID-19 prevention behavior

Variable	Model 1			Model 2		
	B	SE(B)	β	B	SE(B)	β
Constant	5.92	0.25		-0.93	0.64	
Age	0.53	0.15	0.08**	0.28	0.12	0.04*
Gender	-0.77	0.15	-0.11***	-0.98	0.12	-0.14***
Family income	0.00	0.00	0.25***	4.99×10^{-5}	0.00	0.10***
Educational status	3.80	0.16	0.59***	1.04	0.18	0.16***
Marital status	0.45	0.19	0.06*	0.55	0.15	0.07***
Region	1.24	0.14	0.19***	1.32	0.12	0.20***
Information				0.20	0.03	0.27***
Attitude				0.13	0.04	0.13**
Motivation				0.06	0.03	0.07*
Intention				0.19	0.03	0.23***
R^2	0.631			0.772		
F for R^2 change	228.67***			123.82***		

Up to primary level education was the reference group and for regional effect Gazaria Upazila of Munshiganj was the reference group. Female was the reference for gender and unmarried group was the reference and young and elderly were taken together as reference group against middle age group. One star (*) for just significant ($p<0.05$), two stars (**) for highly significant ($p<0.01$) and three stars (***) for very highly significant ($p<0.001$).

The casual model was formed using three blocks combining the determinants based on KAP and RAA models. The model was good fit [$\chi^2=2.90$, $p>0.05$, GFI>0.90, AGFI>0.90, CFI>0.90, RMSEA<0.05, SRMR<0.05] to describe the path relationships in the COVID-19 prevention behavior.
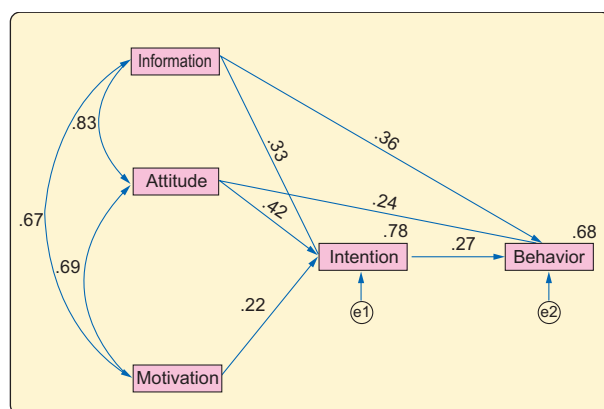
Figure 1: Causal model of COVID-19 prevention behavior

Information and attitude had both direct and indirect effects on health practices regarding COVID-19 prevention. In the model, $\hat{a}$ in the path relationships of information with intention was 0.33 ($p<0.001$) and β in the path relationships of information with behavior was 0.36 ($p<0.001$). Attitude showed significant path

relationships with intention (β=0.42, $p<0.001$) and behavior (β=0.24, $p<0.001$). Motivation also showed very highly significant result (β=0.22, $p<0.001$) with intention in the causal model (figure 1). Health behavior regarding COVID-19 prevention was significantly influenced by intention (β=0.27, $p<0.001$).

Discussion

This cross-sectional community survey found poor practice regarding COVID-19 prevention among nearly half of the respondents (48.1%), and poor knowledge regarding transmission, symptoms, prevention and management of COVID-19 among the majority (55.6%). The causal model well explained the significance of various background issues on predicting health practices among the rural adults along with significant effects of information, attitude, motivation and intention. Socio-demographic characteristics of the respondents like age, income, religion, family size, education, etc. showed conformity with the national level demographic and health survey of Bangladesh, 2017-18 with few exceptions.[27] The differences may be due the regional variation, sample size and recruitment process.

Various online and field survey studies conducted in Bangladesh and other Asian countries found association of socio-economic characteristics, attitude

and knowledge with COVID-19 prevention behavior.[28-31] All these major determinants have also been justified significantly in this study through the causal model. The majority respondents of the current study had poor knowledge on COVID-19 which is similar to an online survey conducted in Bangladesh.[31] However, there are studies suggesting higher knowledge about COVID-19 among the general population.[28,32-34] The variation may be due to the online nature of the surveys where the respondents were mostly educated urban people.

The current study showed a muddled result on use of masks among the respondents. Less than one-third of the respondents reported to use the face masks regularly, but majority did not use the face masks on regular basis. Various explanations can be projected to this situation. Although Bangladesh government made mask mandatory in public places, there were reluctances in government indications for usage of masks in the beginning along with acute shortage of personal protection equipment (PPE) in the country.[35,36] Other factors like culture, humidity and temperature of Bangladesh could also make it uncomfortable to use.

Similarly, less than one-third of the respondents practiced regular strict hand washing which is a very important preventive behavior against COVID-19. However, a similar community survey conducted in an urban city of Iran found 80% of the respondents were practicing proper hand hygiene and a Malaysian online survey found 87.8% respondents with proper hand hygiene.[29,30] These attributes to the differences in study place and study respondents. Availability of hand washing facility is still a big concern in rural areas of South Asian countries. United Nations Children's Fund (UNICEF) described hand washing situation as critical in the fight against COVID-19 pandemic as around 3 billion people around the world have no hand washing facility with soap even at home.[37] Hand washing is still a concerning issue in rural Bangladesh where people often don't wash hands properly even after defecation.[38]

'Social distancing' is a novel concept for the Bangladeshi people. More than the 3rd of the respondents strictly avoided social gatherings (36.1%) and courtesy visits (44%), and majority respondents tried social distancing with some efforts. The situation can be compared to the 'half-full half-empty paradox',

as adopting the concept of social distancing so quickly is very difficult for the rural Bangladeshis living in a community where people are too much interlinked culturally and structurally. Even the deployment of law enforcement to implement lockdown and social distancing did not work that much and actually, third world countries like Bangladesh can't afford lockdown for a long period.[18]

With some inherent limitations this study well explained the major determinants of preventive behavior against COVID-19 in a rational way. Multi-stage sampling from two rural areas might not be good enough for a representative sample. Moreover, the cross-sectional nature of the survey might not well establish the causal inference.

Conclusion

Rural adults of Bangladesh were not well prepared for preventive measures in the current pandemic crisis. They had poor health practices regarding COVID-19 prevention associated with poor knowledge, attitude, intention and motivation. The causal model further established the significant effects of major determinants in the COVID-19 prevention behavior in a rational way. The findings suggest that proper dissemination of knowledge resulting better understanding of the situation among the population can bring out desirable healthy practices to prevent COVID-19. A developing country like Bangladesh, can't afford a long lockdown. An appropriate public health initiative to inform and prepare people to protect themselves and the community against the invisible virus while keep steering the economy of the country can only be the key to survival of Bangladesh in this pandemic.

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