

Regional Variation in Preventive Health Practices of Rural Adults of Bangladesh Regarding COVID-19 Prevention During the Pandemic Crisis

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Abstract

Coronavirus disease 2019 (COVID-19) became a global pandemic within a few months. Even though Bangladesh has been badly affected by COVID-19, the pandemic is still a concern across the country. This study was conducted to explore regional variations in preventive health practices of rural adults during the COVID-19 pandemic, and to determine the predictors regarding COVID-19 prevention. A cross-sectional survey was conducted in rural Bangladesh in 2020 among 810 respondents selected by multi-stage random sampling. Data collection was done by face-to-face interviews using a questionnaire. The results showed that almost half of the rural adults (48.1%) had poor health practices regarding COVID-19 prevention. Rural adults of the Mymensingh district showed relatively better health practices during the pandemic ($U = 58,747.5$, $p < 0.001$). Not only the background issues but also information, attitude, motivation, and intention in COVID-19 prevention were significant in predicting the health practices of rural adults in COVID-19 prevention. The significant regional effect was determined in COVID-19 prevention behavior of rural adults ($p < 0.001$) in hierarchical regression, explained through a modified reasoned action approach. Health programs should be strengthened more, not only to improve preventive health practices of rural adults but also to establish regional equity in COVID-19 prevention, ensuring region-specific initiatives on behavioral changes.

Keywords

COVID-19 prevention behavior; hierarchical analysis; regional variation

Introduction

The coronavirus disease 2019 (COVID-19) swept across the globe within a few months taking the lives of hundreds of thousands of people worldwide (Kumar et al., 2020). Although the origin of the initial coronavirus was traced to the local seafood market at Huanan, the spread of the virus in other countries with no history of travel to China suggested and confirmed human-to-human transmission of the virus (Rothe et al., 2020). The Bangladesh government took preventive and restrictive measures soon after the detection of its first confirmed case on March 8, 2020 (World Health Organization, 2020a). Screening for COVID-19 started in the airports, and a nationwide lockdown was imposed. A developing country like Bangladesh cannot afford lockdowns for a long time (Anwar et al., 2020), and it is important to understand the implications of preventive behaviors against COVID-19 in the local context of Bangladesh, with higher and lower regional incidence rates.

Globally regional differences in controlling the current pandemic have been attributed to the state-centric factors like policy implementation and technological and administrative readiness of the country, and contextual factors like demographic profile, family structure, and cultural attributes (Baniamin et al., 2020). A regional difference in the incidence of COVID-19 cases has also been observed within Bangladesh; the highest incidence rate of new cases has continuously been observed in the Dhaka district, whereas Mymensingh showed the lowest incidence rate of new cases (World Health Organization, 2020b). Despite massive center-to-peripheral migration following the initial shutdowns, Dhaka remained the hotspot of COVID-19 in the country.

As the only international airport in Bangladesh is in Dhaka city, no doubt the original coronavirus entered the country through the capital city. As of November 2, 2020, the majority of reported cases were from the Dhaka division, and Mymensingh reported the lowest (World Health Organization, 2020b). Despite massive center-to-peripheral migration following the initial shutdowns, Dhaka remained the hotspot of COVID-19 in the country. Although greater testing facilities and an increasing number of arrivals on international flights could be hypothesized, the exact nature of the difference is yet to be understood.

A developing country like Bangladesh cannot afford lengthy lockdowns. High population density further makes the country highly vulnerable to contagious diseases. No doubt, vaccines can play a key role in controlling the pandemic, but a developing country like Bangladesh cannot afford vaccines for its 180 million population and never can provide them to all, even for a short time. The centuries-old public health concept of personal hygiene, etiquettes, quarantine, and social distancing can save these poor parts of the world in the absence of an effective and affordable vaccine. Preventive measures can be used at various levels, from individual precautions like using masks and gloves to government-imposed lockdowns and curfews. Rural people of Bangladesh are highly vulnerable to this situation, considering their lower socio-demographic characteristics (Anwar et al., 2020). The rural areas of Dhaka and its adjacent Mymensingh district will give a unique opportunity to explain the regional variation in preventive health practices of rural adults of Bangladesh during the pandemic crisis.

This study was designed to explain the regional variation in COVID-19 prevention behaviors and its determinants among the rural adults of high and low incident regions of Bangladesh. Rural areas gave a unique opportunity to conduct the study between homogeneous

communities with limited preconceived knowledge of pandemics and social distancing. The reasoned action approach (RAA) theory was used as the theoretical framework of the study, which allowed for investigating the roles of information, attitude, motivation, and intention as predictors of prevention behaviors against COVID-19 along with socio-demographic determinants (Fishbein, 2008).

Methods

The cross-sectional study was conducted with rural adults of different socioeconomic statuses. Data were collected from June to December 2020.

Population and sample

The samples were adult rural residents of that area willing to participate who met the inclusion criteria and were selected by multi-stage simple random sampling. First, within the eight divisions in Bangladesh, Dhaka and Mymensingh were selected from each stratum by stratified sampling on the basis of the average percentage of face mask use from a recent survey at the national level (Tithila, 2020). Second, one district from each division was randomly selected from each stratum. The Mymensingh district from the Mymensingh division and Munshiganj district from the Dhaka division were randomly selected. Third, one sub-district (upazila) from each district was randomly selected. Gafargaon from Mymensingh district and Gazaria from Munshiganj district were randomly selected. Fourth, after the selection of one sub-district, a union or village was randomly selected from the sub-district. Finally, respondents of both sexes were randomly selected for the survey. Gazaria and Gafargaon each has around 2,500 to 3,000 rural adults at the ward level, according to the recent data from the election commission offices. It would be noted that 384 was the required sample size if a simple random sampling technique was used. Considering 5% nonresponsive and/or missing cases, the calculated sample size in each area was around 404. As it was conducted in two sub-districts, the total of 810 respondents was randomly taken from two areas.

Data collection and study tool

Data were collected through face-to-face interviews using a questionnaire. A total of 810 rural adults were randomly selected through multi-stage sampling, and the first adult person who appeared in each house willing to participate was approached for an interview. A survey questionnaire was designed in Bangla and English, covering socio-demographic characteristics, knowledge, attitude, motivation, and practice regarding protective measures against COVID-19. The items on the knowledge, motivation, and practice on COVID-19 were taken from the course materials of the COVID-19 Awareness and Prevention Online Course, which is being conducted by the Bangladesh Rural Advancement Committee (BRAC) and access to the information program of the Government of Bangladesh, which is free and open to all (<http://www.muktopaath.gov.bd>) (Financial Express, 2020). The questionnaire was validated and tested for reliability before the final survey.

The questionnaire had six parts and was prepared using major determinants from information-motivation-behavioral skills model (IMB) and RAA models to find out their roles in healthy practices regarding COVID-19 prevention. Three major determinants mentioned in

the study were information, attitude, motivation, and intention. As it was a cross-sectional study, the behavioral skill could be replaced by intention or readiness. The information included not only behavior-related information but also myths and/or social stigma. Motivation included personal attitude and family as well as social support. Intention was the self-control and readiness necessary to perform particular healthy behavior regarding COVID-19 prevention.

Items related to socio-demographic characteristics were included in the first part. The second part was items related to information regarding COVID-19 prevention. The third and fourth parts included items to describe attitude and motivation. The fifth part was for intention to healthy practices regarding COVID-19 prevention. The final part was related to preventive health practices. Practice was assessed based on three dimensions using eight questions or indicators. The three dimensions were related to maintaining social distancing, regular hand washing, and cleanliness, and the last one was related to the use of face masks during the pandemic crisis. It was measured separately for each indicator and was also assessed together after summation of the total score of eight items. It could be used continuously and also could be categorized using cut-off points according to the needs of objectives. The Mann-Whitney U test and hierarchical regression model were used to describe the regional variation in preventive health practices of rural adults. The Statistical Package for the Social Sciences (SPSS) (Version 22) was used in this analysis.

Ethical consideration

Prior to conducting the study, ethical clearance was received from the Ethical Review Committee of the Bangladesh Medical Research Council (BMRC) [Ref: BMRC/Revenue-Grant/2019-20/753(1-31)].

Results

The average age of the respondents was 29.5 years, with a standard deviation (*SD*) of 7.4 years. More than two-thirds (66.9%) of the respondents were males, and the rest were females. The majority (88.1%) of the respondents were Muslims, and the rest were Hindus. The average monthly family income was BDT 13,351 (US\$143) with *SD* of \pm BDT 6,564 (US\$70). Only around half of the respondents had above primary level education. The majority of the women were homemakers, and the male respondents were mainly agriculture workers and day laborers. Respondents got health information mainly from different media sources, and only one-third were informed by health workers during the pandemic crisis (Table 1).

Table 1: Distribution of Background Factors (n = 810)

Socio-Demographic Characteristic	Number	Percentage
Age of respondents (years)		
≤ 25	264	32.6
26–35	411	50.7
≥ 36	135	16.7
(<i>M</i> = 29.5, <i>SD</i> \pm 7.4 [18, 55])		
Gender		
Male	542	66.9
Female	268	33.1

Socio-Demographic Characteristic	Number	Percentage
Religion		
Islam	714	88.1
Hindu	96	11.9
Monthly family income (Taka)		
≤ 10,000	327	40.4
10,001–15,000	250	30.8
> 15,000	233	28.4
$(M = 13,351, SD \pm 6,564 [5,000, 80,000])$		
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
Homemaker	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

The majority of respondents (68.0%) always avoided handshaking or hugging during the pandemic. Nearly two-thirds of the respondents (60.4%) did not regularly avoid gathering to maintain social distancing during the pandemic. Less than one-third (27.9%) of the respondents regularly used face masks during the crisis. Among them, 42.5% used face masks sometimes or irregularly during the pandemic crisis, and the rest (29.6%) never used face masks to prevent the spread of the virus. Among the non-users, most of them were homemakers 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 their hands with soap and water. The majority of them (74.2%) did not regularly 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 did not regularly avoid visiting others' houses during the pandemic crisis, and 44% strictly avoided a courtesy visit to others' homes. The majority of them (67.3%) did not regularly take a shower after returning home, and only around 24% took a shower regularly after going outside. The majority (66.3%) of the respondents always avoided spitting in public places, but nearly one-third of them continued spitting (Table 2). Respondents from Gafargaon upazila in the Mymensingh district showed better performance almost in every indicator of preventive health practices regarding COVID-19 prevention (Table 2).

Table 2: Distribution of Indicators of COVID-19 Prevention Behavior (n = 810)

Follow the healthy practices	Upazila	Number	Always		Sometimes		Never	
			Number	%	Number	%	Number	%
Avoid handshake	Gafargaon	406	328	80.8	70	17.2	8	2.0
	Gazaria	404	223	55.2	158	39.1	23	5.7
	Total	810	551	68.0	228	28.2	31	3.8
Avoid gathering	Gafargaon	406	165	40.6	237	58.4	4	1.0
	Gazaria	404	127	31.4	253	52.6	24	6.0
	Total	810	292	36.1	490	60.4	28	3.5
Using face mask	Gafargaon	406	117	28.8	180	44.3	109	26.9
	Gazaria	404	109	27.0	164	40.6	131	32.4
	Total	810	226	27.9	344	42.5	240	29.6
Regular hand wash	Gafargaon	406	149	36.7	213	52.5	44	10.8
	Gazaria	404	107	26.5	242	59.9	55	13.6
	Total	810	256	31.6	455	56.2	99	12.2
Strictly follow rules	Gafargaon	406	45	11.1	360	88.7	1	0.2
	Gazaria	404	46	11.4	241	59.6	117	29.0
	Total	810	91	11.2	601	74.2	118	14.6
Avoid courtesy visit	Gafargaon	406	210	51.7	177	43.6	19	4.7
	Gazaria	404	146	36.1	241	59.7	17	4.2
	Total	810	356	44.0	418	51.6	36	4.4
Regular shower	Gafargaon	406	92	22.6	304	74.9	10	2.5
	Gazaria	404	103	25.5	241	59.6	60	14.9
	Total	810	195	24.1	545	67.3	70	8.6
Spitting properly	Gafargaon	406	322	79.3	75	18.5	9	2.2
	Gazaria	404	215	53.2	179	44.3	10	2.5
	Total	810	537	66.3	254	31.4	19	2.3

Almost half of the rural adults (48.1%) showed poor COVID-19 prevention behavior. More than half (55.6%) of the rural adults were poorly informed, and almost a similar percentage of respondents were poorly motivated to maintain healthy practices. In the case of attitude and intention, rural adults showed relatively better scores. In the case of attitude, only 15.6% showed poor attitude, and less than one-third showed (31.1%) poor intention. Nearly half of them (48.1%) were found with poor COVID-19 prevention behavior (Table 3). The Cronbach's Alpha (α) of the COVID-19 prevention behavior scale was 0.85. All the scales of predictors showed good reliability, with Cronbach's α more than 0.80 in each case.

Table 3: Level of Scores of Preventive Behaviors in COVID-19 Control and Predictors

Variables	Level of scores		
	Poor	Fair	Good
	(≤ 60%)	(61-80%)	(> 80%)
Practice	48.1	29.9	22.0
Information	55.6	25.4	19.0
Attitude	15.6	49.6	34.8
Motivation	52.7	29.8	17.5
Intention	31.1	32.6	36.3

The Mann-Whitney U test was conducted to determine regional variations in COVID-19 behavior along with its few predictors, such as information and intention. Respondents of the Mymensingh district had a higher mean rank on health practices regarding COVID-19 prevention, and significant regional variation in health practices during the Corona crisis was confirmed ($U = 58,747.5$, $p < 0.001$) (Figure 1 & Table 4). In the case of information and intention related to COVID-19 prevention, there was no statistically significant difference found among rural adults in the two areas.

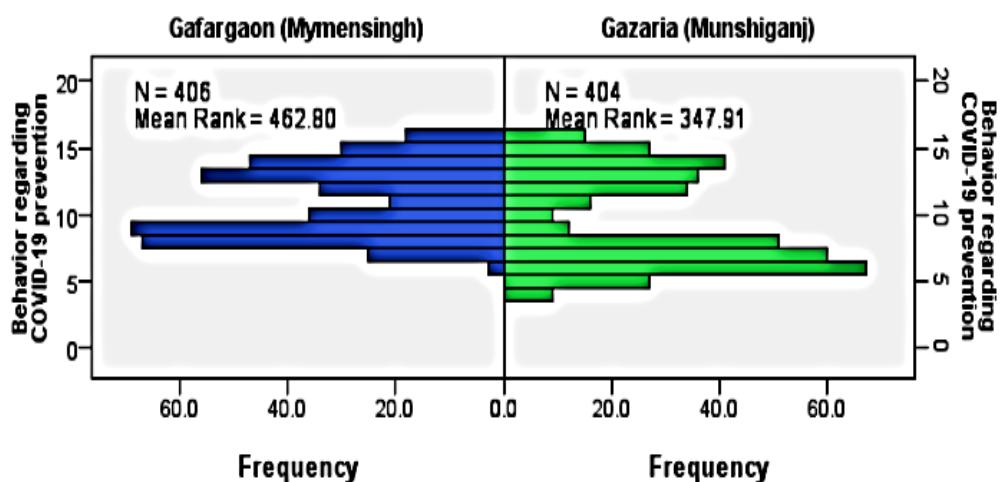
Significant regional variations of attitude, $t(802.6) = -1.96$, $p < 0.05$, and motivation, $t(808) = 7.3$, $p < 0.001$, in COVID-19 prevention were confirmed through independent samples t-tests (Table 4). Although the participants of the Gafargaon upazila showed a better response in attitude, the participants of the Gazaria upazila shared better motivation towards preventive health practices regarding COVID-19 prevention (Table 4).

Table 4: Regional Variation in COVID-19 Prevention Behavior and Related Factors

Characteristics	M (SD)			<i>p</i> value
	National (n = 810)	Mymensingh (n = 406)	Munshiganj (n = 404)	
COVID-19 prevention behavior	10.3(3.2)	11.0(2.7)	9.6(3.6)	<0.001
Information	8.7(4.4)	8.8(4.3)	8.6(4.5)	0.59
Attitude	22.8(3.1)	23.0(3.0)	22.6(3.2)	<0.05
Motivation	21.6(3.6)	20.7(3.5)	22.5(3.6)	<0.001
Intention	18.3(4.0)	18.5(4.1)	18.1(3.8)	0.16

Note: M = Mean, SD = Standard deviation

Figure 1: Regional Variation in COVID-19 Prevention Behavior



The three-stage hierarchical multiple regression revealed that background factors at stage one contributed significantly to the regression (R^2) model, $F(5, 804) = 229.57$, $p < 0.001$, and accounted for 76.7% of the variation in health practices regarding COVID-19 prevention (Table 5). Next, latent variables like knowledge, attitude, motivation, and intention were entered into the second model. Introducing these variables explained an additional 9.2% of the variation in the outcome, and this change in R^2 was significant, $F(4, 800) = 114.10$, $p < 0.001$. Finally, the region was added in the third stage to find out the regional effect on

COVID-19 prevention behavior. Introducing this variable explained an additional 1.9% of the variation in the outcome, and this change in R^2 was significant, $F(1, 799) = 119.15, p < 0.001$. In the first model of background issues: gender, monthly family income, educational level, and marital status showed significance in predicting the health behavior of rural adults regarding COVID-19 prevention. In the second model, all the significant predictors of the first model persisted in the same manner.

Information, attitude, motivation, and intention in the second model were also significant in predicting the outcome. Age was not found to have significance in either the first or second stages. Finally, the regional effect was very highly significant in predicting COVID-19 prevention behavior during the pandemic crisis. Among the latent variables, information and intention were very highly significant ($p < 0.001$), and attitude was found with high significance ($p < 0.01$) (Table 5). Motivation was moderately significant in predicting the outcome ($p < 0.05$). Among the background factors, gender, educational status, and monthly family income were very highly significant ($p < 0.001$) in the final stage and marital status was highly significant ($p < 0.01$), and age was moderately significant ($p < 0.05$) in predicting the outcome.

Table 5: Hierarchical Regression for Regional Effect Predicting COVID-19 Prevention Behavior

Variable	Model 1			Model 2			Model 3		
	B	SE	β	B	SE	β	B	SE	β
Constant	6.49	0.34		-0.31	0.69		-1.27	0.65	
Gender	-0.73	0.16	-0.11***	-1.07	0.14	-0.15***	-1.05	0.13	-0.15***
Age	0.00	0.01	0.00	0.02	0.01	0.04	0.02	0.01	0.04*
Income	0.00	0.00	0.23***	3.58×10^{-5}	0.00	0.07***	4.13×10^{-5}	0.00	0.08***
Education	4.02	0.17	0.62***	1.15	0.19	0.18***	1.12	0.18	0.17***
Marital status	0.77	0.21	0.10***	0.60	0.17	0.07***	0.53	0.16	0.07**
Information				0.20	0.03	0.27***	0.21	0.03	0.28***
Attitude				0.19	0.04	0.18***	0.13	0.04	0.12**
Motivation				-0.06	0.02	-0.07*	0.06	0.03	0.07*
Intention				0.24	0.03	0.30***	0.19	0.03	0.23***
Region							1.34	0.12	0.21***
R^2	0.767			0.859			0.878		
F for R^2 change	229.57***			114.10***			119.15***		

Note: Up to primary level education was the reference group, and for regional effect, Gazaria upazila of Munshiganj was the reference group. Unmarried group was the reference. One star () for just significant ($p < 0.05$), two stars (**) for highly significant ($p < 0.01$) and three stars (***) for very highly significant ($p < 0.001$). SE=standard error*

Discussion

This cross-sectional study found better healthy behavior among the rural adults of the Mymensingh district than the rural population of the Munshiganj district of Dhaka division. The possible explanation is that the rural people of Mymensingh showed a better attitude and intention. Another important component was social distancing other than face mask use. In Dhaka, it is quite difficult to maintain social distance in a huge crowd. In addition, the regional variation was confirmed with statistical significance. Socio-demographic factors significantly determined healthy behavior against COVID-19, along with the latent variables like information, attitude, motivation, and intention. Although the concept of social distancing was alien to the rural population, there were signs of its acceptance in many instances among the respondents.

This current study found a significant difference in healthy practices against COVID-19 among the rural populations of Dhaka and Mymensingh. Huge crowds in Dhaka might be one of the important reasons for the highest weekly and lowest case detection in Dhaka and Mymensingh divisions, respectively (Social Watch, 2012). Although various national and international dynamics can be taken into consideration to explain the situation, the rural communities are more or less homogeneous entities in Bangladesh, which are still quite different and unaffected by urban factors. This can also be attributed to the surprising differences in healthy practices like avoiding hand shaking and spitting on the streets between the two places. This study suggests the importance of healthy preventive behaviors in controlling an epidemic.

Poor knowledge or information was found among the majority (55.6%) of respondents in this study. Similarly, around half of the respondents (48.1%) showed poor practice regarding COVID-19 prevention. However, some of the online studies conducted in Bangladesh and other Asian countries found higher knowledge levels among the respondents (Ferdous et al., 2020; Zhong et al., 2020). The difference could be attributed to the variances in survey methods as respondents through online surveys were educated urban people, unlike the current study. Socio-demographic characteristics were found to be very strong predictors of COVID-19 prevention behavior, along with the latent variables through causal models in the current study. Socio-demographic characteristics have also been associated with knowledge and attitude in other COVID-19-related studies (Hayat et al., 2020; Kartheek et al., 2020; Phoglad, 2021).

Less than one-third of the respondents from both places regularly used face masks while they went out of the home. Although reluctance was shown in government communications at the beginning of the pandemic crisis, mask-wearing was made mandatory in all public places (Financial Express, 2020). Other reasons can also explain the lack of mask-wearing. Acute shortage of PPEs was reported in Bangladesh, along with disruption of the supply chain of essential medicines (World Health Organization, 2020a). In such a situation availability of masks in rural areas can be a matter of further investigation. Moreover, climate conditions, cultural context, and the nature of physical work in rural Bangladesh might make the use of face masks very uncomfortable.

A study conducted in Brazil found regional variation in mortality of COVID-19 due to ethnicity (Baqui et al., 2020). Another study found regional variations in transmission or spread of COVID-19 due to age distribution, comorbidities, household structure, and contact

patterns in China, Italy, and the United States (Wilder et al., 2020). Bangladesh is a relatively homogeneous country, and the study places selected in this study are quite similar in the ethnicity of the residents. However, variations in knowledge and motivation were found between the two places in this study. Further investigations can be done to get a clear picture of population dynamics, health systems, and community structure of the places to formulate proper population-specific policy interventions.

This current study is the first of its kind investigating regional variations in knowledge, attitude, intention, and practice related to COVID-19 prevention during the pandemic in Bangladesh. Although the emphasis was given to environmental factors behind the regional variations, this study found some significant differences in individual factors between the two regions. With some inherent limitations like multi-stage sampling, this study successfully explained the regional differences and their determinants of COVID-19 prevention behavior with a sample that is comparable to the National Level Demographic and Health Survey of BDHS, 2017-2018, with some exceptions (National Institute of Population Research and Training & ICF, 2019).

Conclusions

It is a matter of urgency to ensure the practice of healthy lifestyles regarding COVID-19 prevention due to the lack of availability of vaccines and specific treatments to manage the pandemic crisis. Significant regional variation was observed in COVID-19 prevention behavior of rural adults along with its predictors. Emphasis should be given to regional variations during policy-making in health awareness programs to control the spread of coronavirus. The findings of this research can be helpful for planners to make COVID-19 prevention programs more region-specific, including appropriate strategies, not only to improve the current status of preventive health practices but also to establish regional equity in health practices regarding COVID-19 prevention in rural Bangladesh. In conclusion, information, motivation, and practices are important issues for behavioral changes in the prevention and control of such type of pandemic. The results of the study illustrate that information, attitude, and motivation play the role of predictors for practice.

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