Influence of Socio-Economic Conditions on the Effect of Covid-19 in Some Selected Areas of Bangladesh

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Authors' contributions

This work was carried out in collaboration among all authors. Author MMA designed the study, wrote the first draft after performed the statistical analysis. Authors TM, NM and DD developed the methodology. All authors read and approved the final manuscript.

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ABSTRACT

Aims: The enduring COVID-19 pandemic has resulted in a new era in the efficacy of the agricultural sectors. Farmers in Bangladesh are directly affected by COVID-19. Considering the farmers' condition regarding the pandemic, the study was designed to investigate the influence of socio-economic conditions on the effect of covid-19 in some selected areas of Bangladesh.
Study Design: Descriptive research design.
Place and Duration of Study: Data were collected from the 107 respondents selected from the intervention area (5 villages) of Jhenaidah district, Bangladesh. The duration was between June 2021 and July 2022.

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Methodology: The data obtained from the interview schedule were coded and tabulated in a data sheet. All personal traits were categorized and arranged in simple tables for descriptions. Statistical tools such as frequency distribution, percent, range, mean and standard deviation were used to interpret data. Data analysis was done using the concerned software Microsoft Excel and Statistical Package for Social Science (SPSS) Version 26.0. The effect was measured by different descriptive statistics and multiple regression.

Results: The majority (71.80%) of the farmers faced a medium effect of COVID-19. Among the variables age, source of drinking water, and problems faced by the farmers in crop cultivation during COVID-19 had a positive significant contribution, and sanitation practiced by the farmers had a negative contribution to the effect of COVID-19 on their socio-economic conditions. Among these, problems faced by the farmers in crop cultivation had the highest contribution (42.2%). All the factors cooperatively contribute 51.3% of the variance of the effect of COVID-19 (R^2 =0.513).

Conclusion: It is concluded that the effect of COVID-19 on farmers' socio-economic conditions was moderate and needed further advancement.

1. INTRODUCTION

The recent outbreak of the severe acute respiratory coronavirus 2 (SARS-CoV-2), also called coronavirus 2019 (COVID-19), has evolved into one of the most severe pandemic situations in the past hundred years [1]. COVID-19 was first reported by the World Health Organization (WHO) on the 31st December 2019 from Wuhan, Hubei Province, China, and then around the world. WHO announced it as a global pandemic on 11th March 2020. A Pandemic is an epidemic that has spread to several countries or continents and generally affects many people. Meanwhile, an epidemic is a term to describe the sudden increase in the number of cases of a disease in a population in a specific area. The term pandemic is not used to indicate the severity of a disease, but only the extent of its spread. In the current case, COVID-19 becomes the first pandemic caused by the coronavirus. The surge of COVID-19 in Wuhan, China led to the closure of public places, the halting of public transportation, isolation, and management of infected persons, all in a bid to curb the spread of COVID-19 [2]. The symptoms of COVID-19 include fever, fatigue, dry cough, malaise and breathing difficulty. So far, the disease is characterized by high morbidity and mortality rates [3] alongside other ailments. A pandemic shock can have greater significance on economies due to loss of human lives than another shock such as drought, flood, or a trade embargo. Undoubtedly, all these shocks affect agricultural systems; however, pandemic shocks affect all sectors of an economy. The pandemic disrupts the demand and supply of food impaction the global supply chain as of the prolonged lockdown in nearly everywhere in the world; while droughts tend to be localized affecting only the associated sector or stakeholders [4]. Farmers are compelled to dump milk and vegetables after a significant decrease in supply and closure of processing companies and proper markets. This has led to sudden price hike, black marketing and shortage of products in the local markets [5]. The COVID-19 has affected day to day life and is slowing down the global economy [6]. Fornaro and Wolf [7], using a simple model, show that the coronavirus trigged a negative supply shock. The health crisis transformed into an economic crisis which was amplified through financial channels [8]. The increasing number of lockdown days, monetary policy decisions and international travel restrictions severely affected the level of global economic activities and the closing, opening, lowest and highest stock price of major stock market indices in the world [9].

The ongoing pandemic is a global emergency that has a potentially impacts on the global population. As a part of the world, Bangladesh is also facing a crisis in the different sectors including the agricultural sector. The effect of COVID-19 on agriculture varies from country to country among farmers. The pandemic has created an unprecedented economic and social crisis in Bangladesh [10]. The ongoing pandemic has brought to light the interconnection and interdependencies between agriculture, society, and the economy and expresses the vulnerabilities of agriculture to external disturbances.

About 70 percent of people overall depend on agriculture for their livelihood in Bangladesh [11]. Most of them are marginal to small-scale

farmers. In order to reduce the spread of disease in Bangladesh, several measures were taken by the government such as social distancing that limited large gatherings, lockdown of public and private places, and restrictions of movements that disrupted the agricultural activities of rural farm families, making it difficult for them to access information on agronomic practices, denied them access to inputs and markets, leading to hike in prices of inputs, wastages of harvested produce due to transportation challenges and reduced income to meet their family demand, hence, putting their food security and the food security of the country at risk.

Natural disaster like excessive drought, flooding, cyclone etc. are very common in Bangladesh but COVID-19 is completely different. The pandemic impacted farmers' socio-economic conditions as they had difficulties in accessing inputs, farm labor, and supplies needed for maximum productivity of their farms, and in selling their products due to lockdown policies which are enforced by the government. Moreover, farmers' income was affected because of the result of the decay of perishable products.

From the context of the above circumstances, some questions are raised for the completion of the research. The research purpose is to answer the following questions:

1. What are the socio-economic conditions of the farmers?
2. What are the effects of COVID-19 on the socio-economic conditions of the farmers?

So, in this context, research has been conducted under the title "Effect of COVID-19 on socio-economic conditions of the farmers in some selected areas of Bangladesh".

1.1 Objectives of the Study

Specifically, the study sought to:

1. Describe the socio-economic conditions of farmers and
2. Determine the contribution of farmers' socio-economic characteristics on the effect of COVID-19.

2. MATERIALS AND METHODS

2.1 Locale of the Area

The study was conducted in the Harinakundu, Jorapukuria, Mandartola, Chatkabaria, and Dignogor villages in Harinakundu upazila under Jhenaidah district. This area was selected due to some reasons such as time limitations, financial shortage, easy accessibility, etc.
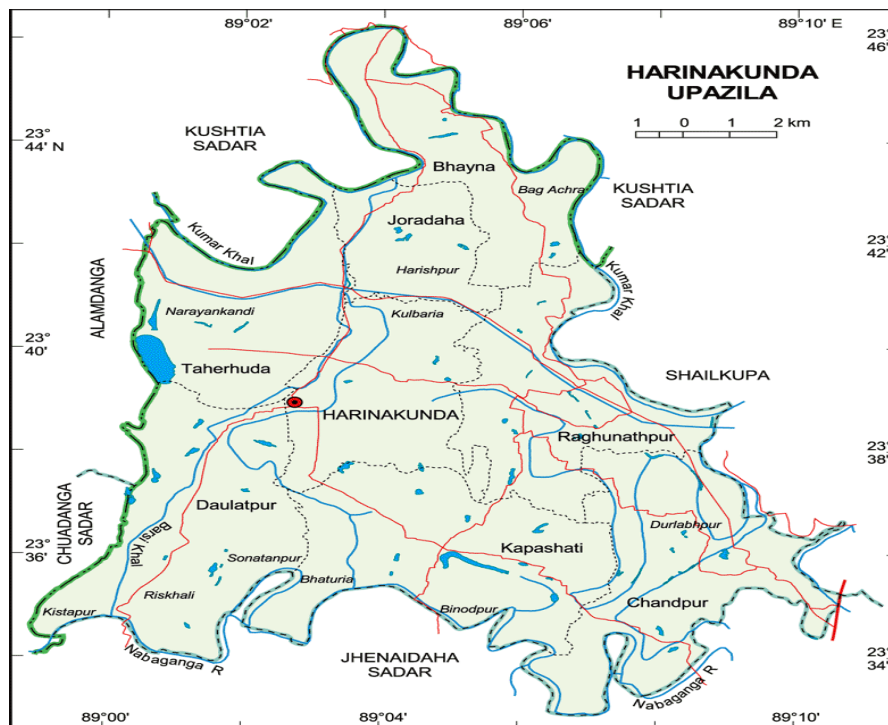

Fig. 1. A map of Jhenaidah district showing the study area by using red borders

2.2 Population and Sampling Techniques

All the farmers in Harinakundu, Jorapukuria, Mandartola, Chatkabaria, and Dignogor villages constituted the population for the study. An updated list of all the farmers in the selected villages was collected from the Upazila Agricultural office, Union Parishad Secretary, and local farmers. The sample size of the study was determined by applying the following formula [12]:

$$n= Nz^2p(1-p)/ Nd^2+z^2p(1-P) \qquad (1)$$

Where,

n= Sample size
N= Total number of farmers (approximately 1291)
z= Confidence level (at 95% level z= 1.96)
p= Estimated population proportion (8.34%)
d= Error limit of 5% (0.05)

From the equation,107 farmers formed the sample size . The sample was randomly and proportionately selected as captured in Table 1 below.

Table 1. No. of farmers from each village

Sl. No.	Village	Population	Sample Size
1	Harinakundu	342	28
2	Jorapukuria	356	30
3	Mandartola	271	22
4	Chatkabaria	211	18
5	Dignogor	111	9
Total		**1291**	**107**

2.3 Data Collection Instrument

Structured interview schedule was used for data collection through face to face medium. Simple and direct questions and different scales were used in order to collect the information. Direct questions were included to collect information like age, education, marital status, etc. Scales were used to measure the effect of COVID-19, problems faced by the farmer, etc.

2.4 Null Hypothesis

"There is no contribution of the selected characteristics of the farmers to effect of COVID-19 on socio-economic conditions of the farmers.

2.5 Measurement of Variables

The methods for measuring the variables are given below:

2.5.1 Measurement of independent variables

The following procedures were followed for the measurement of the independent variables.

Age: The ages of the farmers were measured in terms of the time difference between when they were born and when the interview was conducted. This was extracted on the basis of respondent's statement. A score of one (1) was assigned for each year of one's age.

Marital status: Marital status was measured as married (1), unmarried (2), divorced (3) and widowed (4).

Family type: Family type was measured as nuclear family (1), or a joint family (2).

Family size: Family size of a respondent was measured on the basis of actual number of members who live together under the same roof.

Number of earning members: Number of earning members was measured by the total number of members of the respondent's family who earned money.

Educational qualification: Educational qualification was measured by assigning scores against a respondent's successful year of schooling. The score was given for passing each level in an educational institution (Rashid, 2014).

For example, if a respondent passes the final exam of the fifth class, his score is 5. If the respondent is illiterate, his score is 0, if he can sign only, his score is 0.5.

Serviceability of the farmers:

Condition of house: The condition of the house was measured by giving nominal values of 1 for kacha, 2 for semi-pacca, and 3 for pacca.

Source of drinking water: It was measured by assigning nominal values of 1 if the respondent's uses own tube well, 2 if uses a joint tube well, and 3 if uses another tube well.

Sanitation practice: It was measured by assigning nominal values of 1 for katcha, 2 for sanitary, and 3 for open field.

Knowledge on COVID-19: The farmer's knowledge of COVID-19 was measured by asking 7 questions related to different parts of COVID-19. For instance, Do you know what COVID-19 is? What are the symptom of COVID-19? Who can be infected by COVID-19? It was measured by giving 2 points for each question. Therefore, the total points for all questions became 14. The point was given according to the answer by the respondents. . For a correct answer, 2 points was given, while wrong answer attracted 0 point. A partial score was given for a partially correct answer. So, the respondent's score ranges from 0 to 14, where 0 indicates low knowledge and 14 indicates sound knowledge.

Annual income during COVID-19: Annual income refers to the annual gross income of the farmer and his family members from different sources. It was expressed in Taka. For the measurement of this variable, total earnings Taka was converted into a score. 1 score was assigned for every 1000 Taka.

2.5.2 Measurement of the dependent variable

The dependent variable was treated as the effect of COVID-19 on the socio-economic conditions of the farmer. The dependent variable was measured by asking 10 questions and having 5 alternative responses. The following scores were given for each answer:

Table 2. Effect of socioeconomic conditions of a farmer and their score

Extent of effect	Score
Severe effect	4
High effect	3
Medium effect	2
Low effect	1
Not at all	0

The effect of COVID-19 on the socioeconomic conditions of a farmer was measured by adding the scores of 10 items. So, the effect score could range from 0 to 40. Here, 0 indicates the effect is not at all and 40 indicates the severe effect of COVID-19 on the socio-economic conditions of a farmer.

2.6 Statistical Analysis

Regression analysis was used to determine the contribution of the selected characteristics of the farmers to the effect of COVID-19 on the socio-economic conditions of the farmers. In this study

0.05 percent level of significance was used as the basis for rejecting a null hypothesis.

The model that is used for analysis can be explained as follows:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 + b_9x_9 + e$$

Where,

Y = Effect of COVID-19 on the socio-economic conditions of the farmers
a = Constant value of the equation
X_1 = Farmer's age
X_2 = Marital status
X_3 = Family type
X_4 = Family size
X_5 = Number of earning members
X_6 = Educational qualification
X_7 = Serviceability of the farmers
X_8 = Knowledge on COVID-19
e = Random error, which is normally and independently distributed with 0 mean and constant variance
$b_1, b_2, b_3, b_4, b_5, b_6, b_7$ and b_8 are regression co-efficient of the corresponding independent variables.

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of the Farmers

The behavior of one person is determined by one's personal characteristics. There are various characteristics of the farmers that might have consequences for the socio-economic conditions of the farmers. But in this study, eight (8) characteristics of the farmers were selected as independent variables, which included their age, family type, family size, number of earning members, educational qualification, serviceability of the farmer, knowledge of COVID-19 that might greatly influence the effect of COVID-19 in Bangladesh are presented in a Table 3.

3.2 Contribution of the Selected Characteristics of the Farmer's Socio-economic Conditions

From the hypothesized relationship, five (5) variables namely, age, source of drinking water, sanitation practice, food item intake by the farmer, and problem faced by the farmer in crop cultivation during COVID-19 were found

significantly contribute to the effect of COVID-19 on farmer's socio-economic conditions. Among them, age, and source of drinking water had a positive significant contribution and sanitation practice had a negative significant contribution. All the factors cooperatively contribute 51.3% of the variance of the effect of COVID-19 (R^2 =0.513).

Table 3. Socio-economic conditions of the farmers

Variables	Categorization	Observed Range	Number of farmers	Percent	Mean	SD
Age	Young aged < 32.22 < (Mean-SD)		24	22.30		
	Middle aged 32.22-55.13 (Mean ± SD)	18-70	68	63.30	43.67	11.46
	Old aged > 55.13 > (Mean+SD)		15	14.40		
Family type	1	1-2	77	72		
	2		30	28	-	-
Family size	Up to 3	2-10	27	25.20		
	4-6		75	70.10	4.36	1.40
	Above 6		5	4.70		
Number of earning members	Small (1)	1-3	77	72.00		
	Medium (2)		25	23.40		
	Large (3)		5	4.60	1.33	0.56
Educational qualification	Illiterate (0)		28	26.20		
	Can sign only (0.5)		11	10.30		
	Primary (up to 5)	0-11	37	34.60	4.78	4.14
	Secondary (6-10)		20	18.70		
	Above secondary (above 10)		11	10.30		
Service ability of the farmers: a. Condition of house	Kacha (1)		17	15.90		
	Semi pacca (2)	1-3	67	62.60	-	-
	Pacca (3)		23	21.50		
b. Source of drinking water	Own tube-well (1)		74	69.20		
	Joint tube-well (2)	1-3	32	29.90	-	-
	Others tube-well (3)		1	0.90		
c. Sanitation practice	Katcha (1)		27	25.20		
	Sanitary (2)	1-3	80	74.80	-	-
	Open field (3)		0	0		
Knowledge on COVID-19	Low knowledge (< 3.19)		24	22.40		
	Medium knowledge (3.19-9.11)	1-13	67	62.70	6.15	2.96
	High knowledge (>9.11)		16	14.90		
Effect of COVID-19	Low effect (< 5.87)		14	13.30		
	Medium effect (5.87-16.47)	0-27	77	71.80	11.17	5.30
	High effect (> 16.47)		16	14.90		

Table 4. Multiple linear regression showing the contribution of selected characteristics of the farmers to the effect of COVID-19 on their socio-economic conditions

Dependent variable	Independent variable	β	p	R^2	Adj. R^2	F
Effect of COVID-19	Age	0.217	0.025*			
	Family type	-0.200	0.117			
	Family size	0.213	0.054			
	No. of earning members	0.004	0.977			
	Educational qualification	0.091	0.349	0.513	0.439	6.936
	Condition of house	-0.005	0.959			
	Source of drinking water	0.198	0.039*			
	Sanitation practice	-0.196	0.040*			
	Knowledge on COVID-19	0.097	0.380			

*** Significance at $p < 0.01$;   * Significance at $p < 0.05$*

3.2.1 Contribution of age to the effect of COVID-19 on the socioeconomic conditions of the farmers

Contribution of age was calculated by testing the following null hypothesis, "There is no contribution of age to the effect of COVID-19 on the socio-economic conditions of the farmers".

The p-value of the concerned variable was found 0.025 with β = 0.217.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

I. The contribution of the age was 21.7% at 5% significant level.
II. It was an important contributor to the effect of COVID-19 on the socio-economic conditions of the farmers.
III. The null hypothesis could be rejected.

Age had a positive influence on the effect of COVID-19 on the socio-economic conditions of the farmers. So, it was concluded that more age leads to more effect of COVID-19 on the socio-economic conditions of the farmers.

3.2.2 Contribution of source of drinking water to the effect of COVID-19 on the socio-economic conditions of the farmers

Contribution of the Source of drinking water was calculated by testing the following null hypothesis, "There is no contribution of the source of drinking water to the effect of COVID-19 on the socio-economic conditions of the farmers".

The p-value of the concerned variable was found 0.039 with β = 0.198.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

I. The contribution of the source of drinking water was 19.8% at a 5% significant level.
II. It was an important contributor to the effect of COVID-19 on the socio-economic conditions of the farmers.
III. The null hypothesis could be rejected.

The source of drinking water had a positive influence on the effect of COVID-19 on the socio-economic conditions of the farmers. So, it was concluded that a better source of drinking water lead to more effect of COVID-19 on the socio-economic conditions of the farmers.

3.2.3 Contribution of Sanitation Practice to the Effect of COVID-19 on socio-economic conditions of the Farmers

Contribution of sanitation practice was calculated by testing the following null hypothesis, "There is no contribution of sanitation practice to the effect of COVID-19 on the socio-economic conditions of the farmers".

The p-value of the concerned variable was found 0.040 with β = -0.196.

The following observations were made on the basis of the value of the concerned variable of the study under consideration.

I. The contribution of the sanitation practice was 19.6% at a 5% significant level.
II. It was an important contributor to the effect of COVID-19 on the socio-economic conditions of the farmers.
III. The null hypothesis could be rejected.

Sanitation practice had a negative influence on the effect of COVID-19 on the socio-economic conditions of the farmers. So, it was concluded that better sanitation practices lead to less effect of COVID-19 on the socio-economic conditions of the farmers.

Based on the results some discussion may be drawn as it was found that the majority (85.60%) of the farmers were young to middle-aged due to their physical strength. Most of the farmers (72%) had a nuclear family. Most (70.10%) of the farmers had medium family sizes. Regarding the education level, the majority (34.60%) of the farmers had primary education. Most (62.60%) of the farmers had semi-pucca houses. The majority (69.20%) of them had their own tube-well and use sanitary latrines (74.80%). The majority (62.70%) of the farmers had medium knowledge of COVID-19. The majority (85.60%) of the farmers were young to middle-aged and it had a positive significant contribution to the effect of COVID-19 on their socio-economic conditions. Thus, it can be said that the more age of the farmers, the more effect COVID-19 has on their socio-economic conditions because of their less physical strength. The majority (69.20%) of the farmers had their own tube-well and it had a positive significant contribution to the effect of COVID-19 on their socio-economic conditions. When the source of drinking water quality will be increased the effect of COVID-19 also will be increased. The majority (74.80%) of the farmers had sanitary latrines and it had a negative significant contribution to the effect of COVID-19 on their socio-economic conditions. So, the better sanitation practice of the farmers leads to less effect of COVID-19 on their socio-economic conditions. Finally, the effect of COVID-19 can be decreased by increasing better sanitation practices among the farmers.

4. CONCLUSION

The inclination of the COVID-19 pandemic has gradually reduced now a day but the effects on farmers' socio-economic condition are inevitable. The socioeconomic circumstances of the farmers may have a favorable or negative influence to the COVID-19 pandemic.

In conclusion, this study aimed to investigate the contribution of age, source of drinking water, and sanitation practices to the effect of COVID-19 on the socio-economic conditions of farmers. The results indicated that age, source of drinking water, and sanitation practices are important factors that affect the socio-economic conditions of farmers during the COVID-19 pandemic. The study also found that age had a positive influence on the effect of COVID-19 on the socio-economic conditions of farmers. As farmers age, their physical strength decreases, making them more susceptible to the negative effects of the pandemic on their socio-economic conditions. Similarly, the source of drinking water had a positive influence on the effect of COVID-19 on the socio-economic conditions of farmers, indicating that a better source of drinking water leads to more effect of COVID-19 on the socio-economic conditions of the farmers.

On the other hand, sanitation practices had a negative influence on the effect of COVID-19 on the socio-economic conditions of farmers. Farmers who practiced better sanitation had less effect of COVID-19 on their socio-economic conditions. Overall, the study emphasizes the importance of adopting better sanitation practices to reduce the impact of COVID-19 on the socio-economic conditions of farmers. The findings have significant implications for policymakers and public health officials in developing strategies to reduce the impact of the pandemic on the socio-economic conditions of farmers.

Finally, the study concludes that by adopting better sanitation practices, improving the quality of drinking water, and providing support to older farmers, the negative impact of COVID-19 on the socio-economic conditions of farmers can be reduced.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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