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Research Article

Awareness creation and impact assessment of meat retailers during Covid-19 lockdown in Mymensingh district

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Abstract

The COVID-19 pandemic impacted on meat production and its supply chain, and also meat prices. The research was conducted to evaluate the impact assessment of meat retailers during Covid-19 lockdown in Mymensingh District of Bangladesh. A total number of 50 meat retailers were surveyed

from Mymensingh district for collecting necessary data and information. The experiment was conducted to increase awareness among meat retailers from February-April, 2021. An amalgam of descriptive statistics, mathematical and statistical analyses was used to analyze the data. It was observed that all the meat retailers faced problems in terms of selling meat and lowering return during the period of pandemic lockdown. During Covid-19 situation the income of meat retailers became lower compared to other conditions. Statistics showed that the income of meat retailers decreased about 60% during lockdown period. Results showed that average age, education and family size of meat retailers were 38 years, 5.84, and 5.98, respectively. The price of beef before, during and after lockdown was BDT 546, 512 and 550, respectively. The price of chevon before, during and after lockdown was BDT 804.16, 675 and 800.00, respectively. Similarly, the price of broiler meat and sonali chicken meat before, during and after lockdown was BDT 114.34, 106.52, 128.47; 189.47, 198.42, and 233.15, respectively. During Covid-19 situation the income of meat retailers became much lower as compared to any other critical conditions. About 90% meat retailers faced various problems towards buying and selling of animal, lack of consumers and lack of demand for meat. The prices of all kinds of meat such as beef, goat meat, and chicken meat became lessened during pandemic. During pandemic about 92% meat retailers used face mask for keeping them safe from corona virus. Only 10% people tested for corona virus. During lock down period it was seen that about 60% maintained physical distance at the time of selling of meat. During the time of pandemic lockdown 98% meat retailers did not get any financial support from government organizations or NGOs or any other private organizations. They did not also get any kind of help to create awareness from public health Department or from local authority. Despite facing all these problems, about 100% meat retailers liked to continue their meat business.

Introduction

Corona viruses are a large family of viruses. In humans, several Corona viruses are known to cause respiratory infections ranging from common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The most recently discovered Corona virus causes Covid-19. The Covid-19 is the name of the disease caused by Severe Acute Respiratory Syndrome Corona virus 2 (SARS-Cov-2). There is no evidence that the new corona virus that causes Covid-19 can be transmitted by food. The virus is transmitted primarily by people who are infected through coughing and sneezing droplets which are then picked up by another person (Codex Alimentarius, 2020). The precise origin of COVID-19 remains under investigation, but ongoing research continues to confirm that "domestic livestock production is safe and has not played a role in the spread of Covid-19". With current knowledge of affairs of 2019-nCOV, consumption of poultry and its products may be considered safe. There is no scientific evidence to show that COVID-19 spread through eating chicken, beef, mutton, sea food.

The COVID-19 pandemic adversely affected many sectors of life, taking a huge toll not only on the economy but the livestock industry, such as global meat production and supply chain. Several countries' preventive measures included travel restrictions, border controls, and country lockdowns, developed harsh consequences affecting production and supply chain. Meat production and processing were compromised due to difficulty of purchasing production inputs such as feed for animals, restrictions of transportation of live animals including seasonal border crossing restrictions, accessing professional services and workforce, and restrictions in supplying meat and meat products to the markets (ILO, 2020, EAS, 2020 and IPC, 2020). These problems caused a drop in capacity for meat production and plants' processing, resulting in decreased sales conditions that slowed down market activity (Marchant-Forde and Boyle, 2020). Furthermore, during this COVID-19 pandemic, there was a decrease in governmental capacities to prevent, control and treat

animal diseases. This was mainly due to the reallocation of the resources needed to respond to the pandemic effectively. Particularly, prevention and control of transboundary diseases such as Foot and Mouth Disease, African Swine Fever, Avian Influenza, and other infectious animal diseases have been severely compromised meat production and supply chain (FAO, 2020; Azad et al., 2022).

The COVID-19 pandemic has directly and indirectly impacted overall meat production. Through the infected workforce causing the shutdown of meat plants, there was a decrease in production, processing, distribution, and marketing potential (Hashem et al., 2020). Farmers faced difficulty when searching for a more suitable market to sell their animals. The sale of expensive primal meat cuts was decreased due to the temporary shutdown of food eateries which affected the income coming in from meat and meat products (Attwood et al., 2020). Furthermore, the decreased income status of consumers also affected meat production (Rude, 2020). During these circumstances, a decrease in meat production went from 338.9 million tons (carcass weight) in 2019 to 333.0 million tons in 2020 (FAO, 2020). The pandemic's initial estimated impact on the beef industry is around $13.6 billion, with additional influences that can occur in the future (Peel et al., 2020).

Covid-19 showed a massive impact on the global meat processing sector. Firstly, this sector is labor-intensive, which is why it can be drastically affected by workforce disruptions. Secondly, due to food eateries being shut down, a lot of storage space is required to accommodate all the meat products due to air travel restrictions for international trade, which is not possible for most affected countries. In the US, the shutdown of processing plants began on March 27, 2020, with the closing of poultry processing facilities followed by a cascade of closing of beef, poultry, and pig processing facilities over the next couple of weeks (Hobbs, 2021). These closings led to reduced slaughter and processing capacity and a 45% decline in pig processing, with a similar impact on other meat production species being observed (4, 24), studied the impact of a pandemic on American and Brazilian meat sectors and demonstrated that meat processing was incredibly disruptive during April and May 2020 due to the virus outbreak at slaughtering facilities resulting in an extraordinary rise in livestock prices. Beef processors experienced a decline (21% in April and 19% in May) in production as compared to January- March 2020. In June-August 2020, the production level was near the highest level observed before processing facilities shutdown. Similarly, the pork processing industry declined (18% in April and 19% in May) compared with production in January-March 2020. The USA beef and pork processing industry was declined by 40% during April and May 2020 compared to 2019 (Obese et al., 2021).

The United States meat industry is worth $ 213 billion (Newman et al., 2020). The country's meatpacking industry employs 474,000 workers, of whom 194,000 are categorized as frontline meatpacking workers in slaughterhouses and processing plants. 44.4% of meatpacking workers are Hispanic, and 25.2% are Black, Where 51.5% of the frontline meatpacking workers are immigrants, compared to 17% of the general workforce in the United States (Fremstad et al., 2020). But in Bangladesh our statistics in meat sectors in relation to frontline meatpacking workers are scanty. In fact they are playing major role for processing and selling of meats to the consumers.

There are so many papers have been published among most of them studied epidemiological, demographic, and clinical issues of the virus and its outbreak. Very few studied about the world economy but it is essential to identify the economic impact of corona virus pandemic. This paper attempts to identify the current and future likely economic implications of the corona virus pandemic in Bangladesh. No fruitful research yet been carried out to aware the meat processors against Covid-19 to produce hygienic and clean meat production in Bangladesh. Now more prospective and emerging based studies are needed on the impact of Covid-19 on meat sectors in Bangladesh. Hence, the present study was undertaken to distribute Covid-19 kits and posters to create awareness and to assess the impact of government imposed lockdown on meat retailer's income generation.

Materials and Methods

Selection of region

For the study Mymensingh district was selected purposively. The reason behind selection of aforesaid district was intensity of Covid-19 infection among peoples, density of population, educational institution, migration of mass peoples etc. In terms of infection Mymensingh was red zone which was affected enormously.

Selection of sample respondents

Meat retailers were the target populations for this study. Fifty retailers of meats (red meat and poultry) were selected randomly from the population of retailers in Mymensingh region.

Distribution of Covid-19 kits and posters

A kit comprising of hairnet, reusable mask and alcohol based sanitizer and hand washing liquid soap were distributed in around 50 retail meat shops across Mymensingh district. The printed posters had also been shared and developed with district livestock officials for wider distribution among stakeholders in different places to create awareness.

Assessment of impacts through survey

To have an impact before and after implementation of the project a survey was conducted after distribution of the kits and posters at the end of the project period. To conduct a survey a structured and pre-tested questionnaire was prepared encompassing all factors and actors related to meat hygiene and sanitation and Covid-19 infection. The survey was conducted through direct interview method with the help of trained enumerators with the pre-tested and revised questionnaires.

Statistical analysis

Both descriptive and functional analyses were carried out in this study. As descriptive analysis some descriptive statistics like tables, graphs, average, percentage, standard deviations etc. were calculated. As functional analysis multiple regression and binary logistic regression models were formulated and estimated to have a change in the key dependent variables. Factors affecting income of retailers were estimated using the following multiple linear regression model:

$$Yi = \beta 0 + \beta 1X1i + \beta 2X2i + \beta 3X3i + \beta 4X4i + \beta 5D1i + \beta 6D2i + Ui$$

Where, Y= Yearly income of meat retailers (BDT)

X_1= Investment of meat retailers

X_2= Price per kg of meat (BDT)

X_3= Education of retailers

X_4= Experience of retailers (Year of business)

D_1= Dummy variable which assumes 1 for increase of income and 0 for decrease of income due to Covid-19.

D_2= Dummy variable which assumes 1 for increase of hygiene and sanitation and 0 for decrease of hygiene and sanitation during Covid-19 infection.

Binary Logistic Regression Model: Let Y be a dichotomous dependent variable where Y = 1 for hygienic environment for meat processing and selling and Y = 0 otherwise. Let X be an independent variable, the form of logistic regression model (Gujarati 2007) is

$$F = p(Y = 1/X) = \frac{e^{\beta_o + \beta_1 X}}{1 + e^{\beta_o + \beta_1 X}}$$

$$\text{And } 1 - p = p(Y = 0/X) = \frac{1}{1 + e^{\beta_o + \beta_1 X}}$$

$$\therefore Logit\ L_1 = \log\left[\frac{p}{1-p}\right] = \beta_o + \beta_1 X$$

For more than one independent variables-

$$Logit\ L_1 = \beta_o + \sum_{i=1}^{k} \beta_1 X_{i1} \qquad l = 1, 2, \ldots k, \text{ and } i = 1, 2, \ldots, n$$

Explicit form of binary logistic regression

Logit $L = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + U_i$

Where X_1= Income, X_2=Education, X_3= Experiences (Year of business), X_4=Family size.

SPSS software was mostly used to analyze the data generated by the research project.

Awareness creation

Awareness of meat retailers were created through the distribution of Covid-19 kits and poster exhibition (Figure 1, 2 and 3). Practical demonstration was given by explaining the importance of kit materials and posters. How to wear hair nets, face mask, gloves and use of sanitizer and soap for every selling were demonstrated and ensured those for daily practicing. After periodic visit the use of Covid-19 kit were verified and confirmed that our know-how are working well.

Hand gloves

Hand wash

Hand sanitizer

Hair net

Face mask

Figure 1. Covid-19 kit materials.

Figure 2. Distribution of Covid-19 kit materials**.**

Figure 3. Demonstration of posters to meat retailers.

Impact assessment on income generation of meat retailers

Demographic information of the meat retailers in Mymensingh district is shown in Table 1. From this Table 1 it shows that age of respondent varied from 20 to 70 years and the average was about 38 years. BBS (2020) shows that the average age of Bangladeshi people is 72.6 years which is higher compared to the present findings. Education of the respondent ranged from illiterate to 16 years of schooling and the average education level was 6 years. BBS (2020) shows that the average schooling of Bangladeshi people is 5 years which is almost similar to this study. Family size ranged from 2 to 16 and average family size was about 6 persons. BBS (2020) shows that average family size in Bangladesh are about 4 which are lower than meat retailers family. Average family size was found higher by other studied than the national average value (4.9) (Rahim et al., 2018; Hossain et al., 2018). It implies that meat retailer family shows greater family size.

Table 1. Demographic information of the respondents as meat retailer in Mymensingh district

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Age of respondent	50	20.00	70.00	38.52	13.79
Education of respondent	50	0.00	16.00	5.84	4.27
Family size	50	2.00	16.00	5.98	2.44

Livestock population among meat retailers in Mymensingh district

Livestock population among meat retailers in Mymensingh district is shown in Table 2. This table shows that all retailers in Mymensingh district mostly have cattle and chicken. The maximum number of cattle was 6 and average number of cattle was about 1. BBS (2020) shows that the average number of cattle is about 1 which is similar to our findings. The number of poultry ranged from 0 to 70 and average number was about 6. BBS (2020) shows that the average number of poultry is about 21 which is higher than our study. The number of sheep ranged from 0 to 50 and average was about 1. BBS (2020) shows that the average number of sheep is 0.21 and it is lower compared to our study. The number of goat ranged from 0 to 40 and average was about 1. BBS (2020) shows that the average number of goat is about 1.5 which is higher compared to this study. The number of buffalo ranges from 0 to 2 and average was 0.04. BBS (2020).

Table 2. Livestock population among meat retailers in Mymensingh District

Variables	N	Minimum	Maximum	Mean	Std. Deviation
No. of cattle	50	0.00	6.00	0.42	1.12
No. of sheep	50	0.00	50.00	1.00	7.07
No. of goat	50	0.00	40.00	0.88	5.66
No. of buffalo	50	0.00	2.00	0.04	0.28
No. of poultry	50	0.00	70.00	6.14	11.54

Beef price before, during and after lockdown in Covid-19 pandemic

Beef price before, after and during lockdown Covid-19 in Mymensingh district is shown in Table 3. Price of beef before lockdown of pandemic in Mymensingh district ranged from Tk. 520 to Tk. 550 per kg and average price was about Tk. 546 per kg. A report from tbsnews.net shows that price of beef before lockdown was Tk. 500 which is lower compared to this study. Price of beef during lockdown varied from Tk. 480 to Tk. 550 ta per kg and average price was about Tk. 512 per kg. The report from tbsnews.net shows that price of beef during lockdown was Tk. 600 which is higher compared to this study. Price of beef after lockdown was Tk. 550 per kg and average price was Tk. 550 per kg. The report showed that price of beef after lockdown was Tk. 600. It is also relatively higher compared to this study.

Table 3. Beef price before, during and after lockdown in Covid-19 pandemic

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Price of beef before lockdown of pandemic in BDT/kg	15	520.00	550.00	546.00	10.55
Price of beef during lockdown of pandemic in BDT/kg	15	480.00	550.00	512.66	21.86
Price of beef after lockdown of pandemic in BDT/kg	15	550.00	550.00	550.00	0.00

Broiler meat price before, during and after lockdown in Covid-19 pandemic

Broiler meat price before, after and during lockdown Covid-19 in Mymensingh district is shown in Table 4. Price of broiler meat before lockdown of pandemic ranged from Tk. 100 to Tk. 130 per kg and average price was about Tk. 115 per kg. PPB (2020) reported that the price of broiler meat before lockdown was Tk. 95 per kg which was lower compared to this study. Price of broiler meat during lockdown of pandemic ranged from Tk. 80 to Tk. 120 per kg and average price was about Tk.106 per kg. PPB (2020) reported that the price of broiler meat during lockdown was Tk. 90 per kg which was lower compared to this study. Price of broiler meat after lockdown of pandemic ranges from Tk. 110 to Tk. 140 per kg and average price was about Tk. 128 taka per kg. PPB (2020) reported that the price of broiler meat after lockdown was Tk. 105 per kg which was lower compared to this study.

Table 4. Broiler meat price before, during and after lockdown in Covid-19 pandemic

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Price of broiler meat before lockdown of pandemic in BDT/kg	23	100.00	130.00	114.34	7.58
Price of broiler meat during lockdown of pandemic in BDT/kg	23	80.00	120.00	106.52	13.85
Price of broiler meat after lockdown of pandemic in BDT/kg	23	110.00	140.00	128.47	7.29

Price of Sonali chicken meat before, during and after lockdown in Covid-19 pandemic

Price of Sonali Chicken meat before, after and during lockdown Covid-19 in Mymensingh district is shown in Table 5. Price of Sonali chicken before lockdown of pandemic ranged from Tk. 160 to Tk. 230 per kg and average price was Tk. 189 per kg. Poultry Professionals Bangladesh (2020) reported that the price of Sonali chicken before lockdown Tk. 170 per kg which is lower compared to this study. Price of Sonali chicken during lockdown of pandemic ranged from Tk. 160 to Tk. 220 per kg and average price was about Tk. 198 per kg. Poultry Professionals Bangladesh (2020) reported that the price of Sonali chicken during lockdown Tk. 180 per kg which was lower compared to this study. Price of Sonali chicken after lockdown of pandemic ranged from Tk. 200 to Tk. 280 per kg and average price was about Tk. 233 per kg. Poultry Professionals Bangladesh (2020) reported that the price of Sonali chicken after lockdown Tk. 160 per kg which is lower compared to this study.

Table 5. Price of Sonali chicken meat before, during and after lockdown in Covid19 pandemic

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Price of chicken meat before lockdown of pandemic in BDT/kg	19	160.00	230.00	189.47	18.09
Price of chicken meat during lockdown of pandemic in BDT/kg	19	160.00	220.00	198.42	19.51
Price of chicken meat after lockdown of pandemic in BDT/kg	19	200.00	280.00	233.15	17.33

Chevon price before, during and after lockdown in Covid-19 pandemic

Chevon price before, after and during lockdown Covid-19 in Mymensingh district is shown in Table 6. Price of chevon before lockdown of pandemic ranged from Tk. 750 to Tk. 900 per kg and average price was about Tk. 804 per kg. Noman et al. (2022) showed that the price of chevon before lockdown was Tk. 750 per kg which was lower compared to this study. Price of chevon during lockdown of pandemic ranged from Tk. 600 to Tk. 900 per kg and average price was about Tk. 675 per kg. Noman et al. (2022) stated that the price of chevon during lockdown was Tk. 700 per kg which was higher compared to this study. Price of chevon after lockdown of pandemic ranges from Tk. 750 to Tk. 850 per kg and average price was about Tk. 800 taka per kg. Noman et al. (2022) represented that the price of chevon after lockdown was Tk. 800 per kg. which was similar compared to this study.

Table 6. Chevon price before, during and after lockdown in Covid-19 pandemic

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Price of chevon before lockdown of pandemic in BDT/kg	12	750.00	900.00	804.16	33.42
Price of chevon during lockdown of pandemic in BDT/kg	12	600.00	900.00	675.00	75.37
Price of chevon after lockdown of pandemic in BDT/kg	12	750.00	850.00	800.00	21.32

Response of meat retailers in relation to Covid -19 pandemic

Response of meat retailers in relation to Covid -19 pandemic is shown in Table 6 and 7. Among 50 retailers all were faced problem during buying and selling of animal. The percentage is 100. Among 50 retailers only 5 (10%) tested for corona and rest did not which number was 45 (90%). According to DGHS (2020) average 3.85% people tested for corona in Bangladesh but in our study we found that only 5% meat retailer tested for corona which was higher compared to this study. Number of using mask was 46 (90%) and not using mask was 4 (8%). According to the daily Ittefaq on 3 September, 2020 around 33% people used mask but in our study we found that average 84% meat retailer used mask during pandemic lockdown which is very much higher than the reported news. Among 50 retailers none used sanitizer after every selling (0%). Make aware to meat buyer was 12 (24%) retailers and the rest 38 (76%) did not response to it. Number of retailers who received financial help was 1 (2%) and 49 (98%) did not get any financial support. According to Prime Minister's speech about 4.31% people got financial support during Covid lockdown which is higher than our finding.

Table 7. Response of meat retailers in relation to Covid -19 pandemic

Response	Questions related to Covid-19								
	Problem facing during buying and selling of animal	Testing for corona	Use of mask	Use of sanitizer after every selling	Make aware to meat buyer	Financial support achieved during pandemic	Washing hand with soap after every slaughtering	Any help to create awareness	Like to continue meat business despite Covid -19
Yes	45(90%)	05(10%)	46(92%)	00(0%)	12(24%)	01(2%)	00(0%)	10(20%)	50(100%)
No	05(10%)	45(90%)	04(8%)	50(100%)	38(76%)	49(98%)	50(100%)	40(80%)	0(0%)
Total	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)	50(100%)

Note: Figures in the parentheses indicate percentages

Yearly income before and during Covid-19 and impact of Covid-19 on income

Yearly income before and during Covid-19 and impact of Covid-19 on income is shown in Table 8. Income before pandemic by meat business ranged from Tk. 84000 to Tk. 1440000 and average was Tk. 609190. Yearly income during Covid-19 ranged from Tk. 6000 to Tk. 90000 and average income was Tk. 2999.00. During pandemic situation the income of the retailer is about 60% lower compared before pandemic situation.

Table 8. Yearly income before and during Covid-19 and impact of Covid-19 on income

Yearly income	N	Minimum	Maximum	Mean	Std. Deviation
Income from Meat Processing business last year (BDT)	50	84000.00	1440000.00	609190.0000	1998769.302
Yearly income During Covid-19	50	6000.00	90000.00	2999.0000	18018.83652
Difference in Yearly income during pandemic and previous year	50	-264000.00	108000.00	-93760.0000	63044.70717
			t= -10.52**		

Identification the significance of difference between yearly incomes during and before pandemic with regression model

The following ANOVA model has been estimated for meat retailer's annual income during Covid-19 pandemic in Mymensingh district:

$Yi=ß_0+ ß_1D_i+U_i$

Where,

Y = Income$ß_{0=}$Constant$ß_{1=}$Regression Co-efficient

D_i = 1 for income during pandemic

= 0 for income before pandemic

U_i= Random error component which is assumed to be independently and normally distributed with mean 0 and variance σ^2

$\acute{Y}_i$= 609190.00**-93760.00** D_i

(18204.00) (25744.34)

$\acute{R}^2$ = 0.11, F = 13.26**

The above estimated ANOVA model shows that annual income from meat retailers during Covid-19 pandemic significantly decreased compared to the previous year.

However, significant F value (13.26**) shows that the model was well fitted to data.

Table 9. Education, age, family size and income of meat retailers in relation to maintain hygiene

Variables	Co-efficient	S.E.	Wald	df	Sig.	Odds ratio
Education of meat retailers	-0.90	0.080	1.254	1	0.263	0.914
Age of meat retailers	-0.44	0.027	2.668	1	0.102	0.957
Family size of meat retailers	-0.283	0.179	2.508	1	0.113	0.754
Income of meat retailers	0.000	0.000	2.104	1	0.147	1.000
Constant	3.140	1.628	3.728	1	0.054	23.095

Identification the significance of maintaining hygiene on behalf of education, age, family size and income of meat retailers with binary logistic regression model

Logit $L = \beta_0 + \beta_1X_{1i} + \beta_2X_{2i} + \beta_3X_{3i} + \beta_4X_{4i} + U_i$

Where X_1= Income, X_2= Education, X_3= Age, X_4= Family size.

According to this model, if education of meat retailers increases, the probability of maintaining hygiene is decreased insignificantly by 0.91 time. That means meat retailers lose to eager in continuing meat business. Again, age of meat retailers increases, the probability of maintaining hygiene is decreased insignificantly by 0.95 time. Due to older age they are reluctant to clean their meat processing places. Once again, if family size of meat retails increases, the probability of being hygienic condition is decreased insignificantly by 0.75 time. Due to insufficient income from meat processing business they are unable to continue this business and explore other income generating activities to maintain their livelihoods. Moreover, if income of meat retailers increases, the probability of maintaining hygiene is increased by 1 time. As a result, meat retailers increase their business size and continue in sustainable manner.

Conclusions

In conclusion, awareness of meat retailers' was created through the supplied Covid-19 kits and poster demonstrations. Income of meat retailers drastically reduced during government imposed lockdown. Hence, meat retailers demanded incentives to maintain their livelihood and income in such kind of catastrophes'.

Conflicts of Interest

The authors declare that there are no potential conflicts of interests.

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