

**EFFECT OF COVID-19 PANDEMIC ON MARKET PRICE OF CHICKEN AND
CHICKEN PRODUCTS IN BANGLADESH**

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**EFFECT OF COVID-19 PANDEMIC ON MARKET PRICE OF CHICKEN AND
CHICKEN PRODUCTS IN BANGLADESH**

BY

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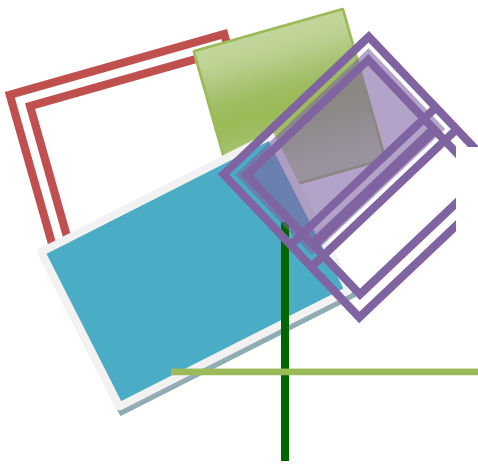
*This is to certify that the thesis entitled “EFFECT OF COVID-19 PANDEMIC ON MARKET PRICE OF CHICKEN AND CHICKEN PRODUCTS IN BANGLADESH” submitted to the faculty of animal science & veterinary medicine, Sher-e-Bangla Agricultural University, Dhaka-1207, in partial fulfillment of the requirements for the degree of **Master of Science in Poultry Science**, embodies the result of a piece of bona fide research work carried out by **Md. Abu Raihan, Registration no. 14-06198** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

I further certify that any help or source of information, received during the course of this investigation has been duly acknowledged.

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*Dedicated
To My
Beloved Parents*

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TABLE OF CONTENT

TITLE	PAGE NO.
ACKNOWLEDGEMENT	i
LIST OF CONTENTS	ii-iv
LIST OF TABLES	v
LIST OF FIGURES	vi-vii
LIST OF APPENDICES	vii-viii
LIST OF ABBREVIATION AND SYMBOL	ix-x
ABSTRACT	xi

LIST OF CONTENTS

NO. OF CHAPTER	CHAPTER TITLE	PAGE NO.
CHAPTER 1	INTRODUCTION	1-4
CHAPTER 2	REVIEW OF LITERATURE	5-16
CHAPTER 3	MATERIALS AND METHODS	17-21
3.1	Preparation of questionnaire	19
3.2	Selection of months to collect the data	19
3.3	Data collection	20
3.4	Collection of wholesale price data of live birds	20
3.5	Collection of wholesale price data of eggs	20
3.6	Collection of wholesale price data of day-old-chicks	20
3.7	Statistical analysis	21

LIST OF CONTENTS (CONT'D)

NO. OF CHAPTER	CHAPTER TITLE	PAGE NO.
CHAPTER 4	RESULTS AND DISCUSSION	
4.1	Wholesale Price of Live Birds	22
4.1.1	Wholesale price of broiler chicken in different divisions in Bangladesh	22-23
4.1.2	Average whole price (Taka) of culled red chicken in different divisions	24-25
4.1.3	Average whole price (Taka) of culled white chicken in different divisions	25-27
4.1.4	Average wholesale price (Taka) of Sonali chicken in different divisions	27-28
4.2	Wholesale Price of Shell Eggs	28-29
4.2.1	Average wholesale price (Taka) of brown shell eggs in different divisions	29-30
4.2.2	Average wholesale price (Taka) of white shell eggs in different divisions	30-31
4.3	Wholesale Price of Day-Old-Chicks	32
4.3.1	Average wholesale price (Taka) of brown layer chicks in different divisions	32-33

4.3.2	Average wholesale price (Taka) of white layer chicks in different divisions	33-35
4.3.3	Average wholesale price (Taka) of broiler chicks in different divisions	35-36
4.3.4	Average wholesale price (Taka) of Sonali chicks in different divisions	37
CHAPTER 5	SUMMARY AND CONCLUSION	38-39
	REFERENCES	40-43

LIST OF TABLES

NO. OF TABLE	TITLE OF TABLE	PAGE NO.
Table 1	Monthly average wholesale price (Taka) of broiler chicken in different divisions	22
Table 2	Monthly average wholesale price (Taka) of culled red chicken in different divisions	24
Table 3	Monthly average whole price (Taka) of culled white chicken in different divisions	26
Table 4	Monthly average wholesale price (Taka) of Sonali chicken in different divisions	27
Table 5	Monthly average wholesale price (Taka) of brown shell eggs in different divisions	29
Table 6	Monthly average wholesale price (Taka) of white shell eggs in different divisions	31
Table 7	Monthly average wholesale price (Taka) of brown layer chicks in different divisions	32
Table 8	Monthly average wholesale price (Taka) of white layer chicks in different divisions	34
Table 9	Monthly average wholesale price (Taka) of broiler chicks in different divisions	36
Table 10	Monthly average wholesale price (Taka) of Sonali chicks in different divisions	37

LIST OF FIGURE

NO. OF FIGURE	TITLE OF FIGURE	PAGE NO.
Figure 1	Existing broiler marketing system in Bangladesh	17
Figure 2	Existing egg marketing system in Bangladesh	18
Figure 3	Existing day-old-chicks marketing system in Bangladesh	18
Figure 4	Comparative study of the average wholesale price of Broiler Chicken in different divisions between pre-COVID and COVID period.	23
Figure 5	Comparative study of the average wholesale price of Culled Red Chicken in different divisions between pre-COVID and COVID period.	25
Figure 6	Comparative study of the average wholesale price of Culled White Chicken in different divisions between pre-COVID and COVID period.	26
Figure 7	Comparative study of the average wholesale price of Sonali Chicken in different divisions between pre-COVID and COVID period.	28
Figure 8	Comparative study of the average wholesale price of Brown Shell eggs in different divisions between pre-COVID and COVID period.	30
Figure 9	Comparative study of the average wholesale price of White Shell eggs in different divisions between pre-COVID and COVID	31
Figure 10	Comparative study of the average wholesale price of Brown Layer Chicks in different divisions between pre-COVID and COVID period.	33
Figure 11	Comparative study of the average wholesale price of White Layer Chicks in different divisions between pre-COVID and COVID.	35

LIST OF FIGURE (CONT'D)

Figure 12	Comparative study of the average wholesale price of Broiler Chicks in different divisions between pre-COVID and COVID period.	36
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LIST OF APPENDICES

NO. OF APPENDIX	TITLE OF APPENDIX	PAGE NO.
Appendix I	A questionnaire which used for collecting data	44-46
Appendix II	Sample of collecting online information data 2019	47-48
Appendix III	Sample of collecting online information data 2020	49
Appendix IV	Monthly Average wholesale price (Taka) of broiler chicken in different divisions /2019	50
Appendix V	Monthly Average wholesale price (Taka) of culled red chicken in different divisions /2019	51
Appendix VI	Monthly Average wholesale price (Taka) of culled white chicken in different divisions /2019	52
Appendix VII	Monthly Average wholesale price (Taka) of Sonali chicken in different divisions /2019	53
Appendix VIII	Monthly Average wholesale price (Taka) of brown shell eggs in different divisions /2019	54
Appendix IX	Monthly Average wholesale price (Taka) of white shell eggs in different divisions /2019	55
Appendix X	Monthly Average wholesale price (Taka) of brown layer chicks in different divisions /2019	56

LIST OF APPENDICES (CONT'D)

Appendix XI	Monthly Average wholesale price (Taka) of white layer chicks in different divisions /2019	57
Appendix XII	Monthly Average wholesale price (Taka) of broiler chicks in different divisions /2019	58
Appendix XIII	Monthly Average wholesale price (Taka) of Sonali chicks in different divisions /2019	59
Appendix XIV	Monthly Average wholesale price (Taka) of broiler chicken in different divisions /2020	60
Appendix XV	Monthly Average wholesale price (Taka) of culled red chicken in different divisions /2020	61
Appendix XVI	Monthly Average wholesale price (Taka) of culled white chicken in different divisions /2020	62
Appendix XVII	Monthly Average wholesale price (Taka) of Sonali chicken in different divisions /2020	63
Appendix XVIII	Monthly Average wholesale price (Taka) of brown shell eggs in different divisions /2020	64
Appendix XIX	Monthly Average wholesale price (Taka) of white shell eggs in different divisions /2020	65
Appendix XX	Monthly Average wholesale price (Taka) of brown layer chicks in different divisions /2020	66
Appendix XXI	Monthly Average wholesale price (Taka) of white layer chicks in different divisions /2020	67
Appendix XXII	Monthly Average wholesale price (Taka) of broiler chicks in different divisions /2020	68
Appendix XXIII	Monthly Average wholesale price (Taka) of Sonali chicks in different divisions /2020	69

LIST OF ABBREVIATIONS AND SYMBOLS

ABBREVIATION	FULL WORD
Approx.	Approximately
Dept.	Department
DLS	Department of Livestock Services
e.g.	for example
et al.	and others
etc.	Etcetera
Fig.	Figure
GDP	Gross Domestic Products
Nos	Numbers
i.e.	that is
kg	Kilogram
DOC	Day-Old-Chick
BPICC	Bangladesh Poultry Industry Central Council
%	Percentage
mnths	Months
SAU	Sher-e-Bangla Agricultural University
SPSS	Statistical Package For The Social Sciences
COVID-19	Corona Virus Disease-19
W.H.O.	World Health Organization
SD	Standard Deviation
Tk	Taka

LIST OF ABBREVIATIONS AND SYMBOLS (CONT'D)

ABBREVIATION	FULL WORD
:	Ratio
+	Plus
<	Less than
>	Greater than

EFFECT OF COVID-19 PANDEMIC ON MARKET PRICE OF CHICKEN AND CHICKEN PRODUCTS IN BANGLADESH

ABSTRACT

The study aims to investigate how the COVID/19 pandemic has impacted the price of chicken and chicken products. The current study was conducted using secondary data collected from a relevant online database of poultry news portals. Data from one year were collected of which six months were from the pre-COVID period (July-December/2019) and six months from the COVID period (July-December/2020). A structural questionnaire was prepared to collect the market price of chicken and chicken products from eight divisions of Bangladesh. To collect the data 4 days of the month were considered randomly taking a day from each week. Total (4 days x 6 months x 8 divisions) 192 days of data were collected taking 48 days each from pre-COVID and COVID periods. Therefore, the plan was to collect a total of (192x2) 384 days of data for the study. The results showed that the average wholesale price of live birds (Broiler chicken, culled white chicken and Sonali chicken), Shell eggs (Brown and White) and Day-Old-Chicks (Brown, White layer and Broiler chicks) fluctuated due to the COVID-19 pandemic, but no significant ($p>0.05$) difference was found in prices except live culled red chicken. The average wholesale price of culled red chicken in Chattogram was 171.12 ± 19.67 from July to December 2019 and 195.34 ± 35.70 from July to December 2020. In Khulna and Rajshahi the wholesale price of brown shell eggs decreased whereas in Dhaka, Barishal and Chattogram the price was upward, but it remained unchanged in Mymensingh, Sylhet and Rangpur during the COVID pandemic. The wholesale price of white shell eggs in Dhaka, Khulna and Rajshahi showed decreasing trend during the pandemic but increased in Chattogram. The wholesale price of white layer chicks was lowered by 21.43Tk, 23.79Tk and 31.03Tk in the COVID period than the pre-COVID period in Dhaka, Barishal and Rangpur, whereas minor price fluctuation was observed in brown layer and broiler chicks. The wholesale price of Sonali chicks was 15.67 ± 3.50 in Rangpur during the pandemic. The study concluded that the COVID-19 pandemic had a negative impact on the poultry industry.

Keywords: Poultry industry, COVID-19, Chicken products, Price of Chicken products.

CHAPTER 1

INTRODUCTION

In Bangladesh, the poultry business is a promising sector for reducing poverty. The majority of the poultry produced in Bangladesh is chickens, but there are also a few other species like duck, pigeon, quail, geese, turkey, and guinea fowl. Two different types of chickens are raised in Bangladesh, one for eggs and the other for meat. There are about 311.8 million chicken and 63.84 million ducks in Bangladesh (DLS, 2021-22). Now the available meat consumption is 147.84g/day/head (DLS, 2021-22) whereas the people of developed country consume above 200g (The US Food and Agricultural Policy Research Institute, 2019). Same time our egg consumption is 136.01Nos./year/head (DLS, 2021-22) and the people of developed country intake above 250 eggs/year (The Business Standard, 2020). The most nutrient-dense foods for humans are regarded to be chicken eggs, which are a common food and used in many dishes around the world as an inexpensive source of protein (Pasquali *et al.* 2014). Consumption of animal-based protein (poultry meat, eggs, and dairy products) has increased as disposable incomes have increased. The primary animal industry in Bangladesh is poultry production, which plays a significant role in the nation's overall food security and economic growth (Hamid *et al.* 2017). This industry employs more than 8.5 million people, making it the second-largest employer behind the apparel sector (Hossain *et al.* 2020). A significant portion of the livestock sector's 1.4 percent contribution to the country's GDP comes from poultry, which provides 22 to 27 percent of the animal protein supply and accounts for 37 percent of the nation's total meat production (DLS, 2020). The livestock and poultry subsector makes for 1.53% of the GDP, whilst the agricultural sector accounts for 10.67%. (BER, 2018). One of the important livestock sub-sectors dedicated to giving the country cheap access to animal protein in the form of eggs and protein is the poultry business (Das *et al.* 2008). Furthermore, it is essential for lowering malnutrition and advancing the country's agricultural industry (Silva and Rankin *et al.* 2014). About 37% of the animal protein meat consumed in Bangladesh is poultry. A total of 65-70 thousand commercial poultry farms produces 170,000 day-old broiler chicks (DOC) and about 3.30 billion commercial eggs each week (Meher *et al.* 2021). On the other hand, Bangladeshi citizens consume roughly 6.3 kg of broiler meat annually per capita,

making up about 40% of overall consumption. About 198 commercial feed mills in Bangladesh with registered status are now generating 5.3–5.4 million metric tons of industrial feeds (DLS, 2020).

On March 8th, 2020, Bangladesh reported its first COVID-19 case (World Health Organization, 2020). The government implemented a statewide lockdown (known as the "General Holiday" from 26 March and 30 May as part of its efforts to stop the virus' spread. Meanwhile the market of poultry products has fallen dramatically because of the corona virus. Unprecedented losses have forced farms to reduce their production of meat and eggs. In addition, the output of eggs has significantly decreased (Sattar *et al.* 2021). People who work in the poultry industry claimed that many of them had shut down their farms because of having to sell hens for cheap. In the meantime, more farms sold their older birds without bringing in a fresh batch of chicks. As hotels, restaurants, bakeries, and fast food outlets have been shut down since March 26 to stop the spread of the corona virus, the demand for poultry meat and eggs has continued to decline. Meanwhile, major events like weddings are not taking place due to the imposition of social distance. However, because of the supply chain disruption caused by the district-wide lock down, producers faced trouble for marketing chickens and eggs. About 50-60% of chicken farms have been temporarily closed, according to the Bangladesh Poultry Industry Central Council (BPICC). According to the BPICC, the country's poultry industry suffered losses of Tk3, 551 crores between March and April/2020 because of the virus's aftermath.

Of fact, COVID-19 is neither the first nor the only difficulty this developing industry encounters. More than half of the nation's poultry farms and hatcheries were forced to close because of the avian influenza epidemic in 2007, and poultry producers are still suffering from the disease's appearance (Gupta *et al.* 2021). The overall productivity has been limited by recurrent outbreaks of various diseases in flocks, placing some farmers in dangerous financial situations (Hamid *et al.* 2017). It seriously threatened the livelihoods of Bangladesh's millions of backyard chicken breeders and small traders (Mahmud *et al.* 2020). The distribution of chicken and poultry products is hampered by market risks such value chain fragmentation, high intermediation costs, and little or poor traceability (MoF-Ministry of Food, 2020). Companies' approaches to producing, marketing, and distributing feed vary, and as a result, they frequently establish pricing on their own and are not subject to government regulation (Hamid *et*

al. 2017). Hatcheries increase the cost of DOC for specific occasions and festivals, which disadvantage farmers (Hg *et al.* 2019. This study evaluates the effects of virus on trade, and marketing of chickens, eggs and chicks during the pre-COVID and COVID period of the COVID-19 pandemic, particularly the nationwide lockdown. The millions of backyard poultry producers and small dealers in Bangladesh were severely harmed by the current scenario in their ability to make a living 2020 (Mahmud *et al.* 2020). With a 15% annual growth rate, this sector has grown quickly. It is crucial for the nation's economic growth as well as for human nourishment. True, human life comes before all other considerations. Livelihood and life go hand in hand. We require food to sustain life, particularly animal products like milk, meat, and eggs that strengthen our defenses against illness. Animal farming is a live industry, unlike other types of business. The supply chain for food is a crucial component in this, along with many other necessities. If the supply chain for the poultry business is disrupted for an hour, a week, a day, or a month, it can have major economic repercussions, as it was happened pandemic time. The Covid-19 has an impact on the industrial supply chain that supports the production, movement, distribution, marketing, and consumption of poultry and poultry products. To overcome the situation like COVID-19 pandemic, we need a well-designed policy package for the sustainability of the chicken sector. Changes in the price of broiler meat, culled birds, eggs, day-old chicks, and eggs have made small and medium-sized farm owners lose their faith in and courage to carry on with their operations. Farmers who manage their operations with bank loans or credit from feed merchants are further in debt. Due to the temporary closure of 70 percent of small to medium-sized broiler farms, farmers have incurred significant financial losses (Mahmud *et al.* 2020). Then the weekly production of day-old chicks dropped from 13 million to 7-8 million. More than 2 million workers in the poultry business will lose their jobs, according to BPICC, if the Covid-19 situation does not improve. A few studies on COVID-19 and poultry have been conducted. To determine the exact extent of price variations for poultry and poultry products during the COVID-19 pandemic, data should be gathered from across the nation. A stimulus program worth Tk5,000 crore (US\$ 595 million) has also been launched by the government to help rural small- and medium-sized farmers increase agricultural output. To tackle COVID-19, policymakers need more up-to-date information about the poultry industry. Taking into account the aforementioned

concerns, the research project set out to determine the market fluctuation scenario for chicken and poultry products.

Objectives

The Present study has been taken to investigate the market fluctuation scenario of poultry and poultry products of Bangladesh before and during pandemic situations to achieve the following objectives:

- To find out the fluctuation of wholesale price of broilers, culled birds, eggs and day-old-chicks;
- To compare pandemic market price of poultry and poultry products with Pre-COVID market and
- To make some suggestions for the stakeholders to continue production sustainability of poultry during Pandemic.

CHAPTER 2

REVIEW OF LITERATURE

In Bangladesh, more than 6 million people are either directly or indirectly involved in the production of poultry. The commercial sector has grown quickly, with commercial poultry farms expanding at a pace of 15% annually, paving the way for the nation's economic development and becoming a more crucial source of nutrition for its citizens. For many, poultry farming has long offered a well-traveled route out of poverty. But the COVID-19 pandemic has caused changes in the market prices of chickens, eggs, and chicks. This is the basic foundation of this investigation. Not much more research works have been conducted focusing market issues of poultry during Corona virus. However some related literatures cited below which were collected from online poultry related journals. The literatures were reviewed to find out the background, drawbacks, justification and prospects of research, understand previous findings and to answer the research status in this field.

Attia et al. (2022); The study goal was to determine the COVID-19 problem and steps taken to make up for the loss in the poultry industries have affected chicken output in developing nations. The lockout has generally had a detrimental influence on the chicken industry, which could worsen world poverty. To enable these farms to return to normal levels of production and marketing, coordinated actions at the private and governmental levels must be done to set up soft loans.

Zamani et al. (2022). This study provides empirical evidence of the COVID-19 pandemic's possible effects on two food value chains' price dynamics and structure. High-frequency panel data on beef and poultry prices in Iran are processed using various proxies. According to the findings, greater markups during the COVID-19 pandemic are linked to decreased cost pass-through along the value chains of beef and poultry in Iran. The findings show that the COVID-19 pandemic causes supply-side and demand-side market frictions, which lower market performance.

Bassyouni et al. (2021); The purpose of this study was to determine how variations in broiler pricing affected the business viability of broiler logistics in Egypt. This study, which covered farms with random cycles of both broiler and layer farms in the three provinces of Menofia, Kaliobia, and Giza, was conducted between 2016 and 2020.

The researcher spoke with the owners and managers of the poultry during the data gathering process, which was based on a cross-sectional study of broilers. The information was gathered from precise records that were kept on poultry farms in the study areas, from structured questionnaires that the researcher developed and that the farmers agreed to fill out during interviews, as well as information from the agricultural directorates of the governorates, the livestock development sector, and the economic affairs sector. Broiler production logistics costs, returns, and net profits are among the variables that were statistically and economically analyzed. The primary factor influencing how profitable broiler production farms are is thought to be the price of chickens. The cost of production, which includes both variable and fixed costs, has an impact on the price of chicken. The findings showed that broiler prices were higher in the winter than in the summer and in the years 2018, 2019, and 2020 than in the years 2016 and 2017. The rise in broiler prices results in rising returns on broiler sales; as a result, the winter season saw greater production expenses than the summer season and the summer season had a higher net profit.

Fang et al. (2021); The objectives of this study was to evaluate the responsiveness and resilience of different chicken and egg farming systems in Myanmar to the shock of COVID-19 and implications of the performance of the chicken and egg sector during COVID-19 for the Sustainable Development Goals. 269 chicken farms nearby Yangon participated in six waves of telephone interviews for this study between June 2020 and November 2020. He used a survey of the same farms done in 2019 as a baseline to assess impacts in two types of production systems—broilers and layers. The findings of the study showed that the COVID-19 pandemic had a significant influence on chicken and egg output. 42% of long-term agricultural workers were laid off, more than 30% of broiler farms and 10% of layer farms closed before June, and indications of business sentiment were substantially more negative than in 2019. Second, the industry underwent a V-shaped recovery up until September 2020, when Myanmar was hit by a second wave of COVID-19. Third, COVID-19 effects differ depending on the production system. Broiler farms were able to quickly change their operational status by closing or reopening, although very few layer farms did so after closing. This is because they have a shorter production cycle than layer farms. Fourth, integrated layer-fish farms outperformed layer farms in terms of resilience to the COVID-19 shock, with 90% of integrated layer-fish farms and 76% of layer farms

still operating in November. Broiler-fish farms performed similarly to broiler farms, however. Fifth, it is more challenging for Myanmar to fulfill the second Sustainable Development Goal of eradicating hunger and malnutrition by 2030 due to the poor supply response of layer farms, which has led to increased egg prices for consumers.

Fouzder et al. (2021); The objective of this study was to determine how a huge number of small farmers were compelled to stop their business due to losses in broiler production events were due to unusual lower market demand attributed to rumors, increased feed price, disease outbreak, etc during COVID-19 pandemic. Interviews were conducted with 100 smallholder farms from ten southern districts of Bangladesh, together with the corresponding feed and chick dealers, and the obtained data were then analyzed using the proper statistical software. The findings showed that owners between the ages of 20 and 55 were involved in these farming activities, with an average farm housing 845 birds. However, almost 3/4 of them had no technological background when they first launched the business. The farmers relied heavily on their respective dealers to obtain various inputs on a credit basis since they used commercial broiler feeds from several manufacturers. The Covid-19 epidemic caused market share losses for all manufacturers. This resulted from a decline in market demand for poultry products and an increase in the price of feed. As a result, a large number of small farmers were forced to cease operations. According to the findings, farmers disposed of live broilers weighing 2.09 kg with a livability rate of 94.25 percent and a market price of BDT 100.50 kg. Only the cost of food contributed to the overall cost of production for the bird, which was followed by the costs of the chicks (11.32%), all fixed costs (7.45%), and medications (3.58%). It was discovered that a 2.09kg bird's average production cost came to BDT 195.99. Farmers made a profit of BDT -33.58 to BDT 68.12 per bird or BDT 13.60 on average.

Kamruzzaman et al. (2021); The study was conducted to determine financial and factor demand analysis of broiler production. The study used data from a farm survey of 210 farmers in Bangladesh's four main broiler-producing regions, namely Dhaka, Rajshahi, Mymensingh, and Chittagong. The study's findings showed that feed was the primary operating expense for broiler farming. Although broiler farming was a financially successful industry, Mymensingh's division performed relatively poorly due to a high per-unit cost of production and lower per-unit selling prices than the others. The Rajshahi division had the highest returns on investment ratio while

Rajshahi division had the highest net return. There was no discernible difference between the research locations in terms of broiler farming's cost (variable) or net return, though. It was negative and inelastic, with values of -0.00249, -0.05718, and -0.13101, respectively, for the price of feed, chicks, and labor. Additionally, whereas day-old chick and labor were substitutes, feed and day-old chick had a complementing connection. The study also showed that the elasticity of cross pricing was very low, and that changes in the prices of inputs did not significantly alter the quantity required of other inputs for broiler farming.

Maples et al. (2021); The objectives of this study to investigate the impacts of COVID-19 on broiler industry in U.S. Massive disruptions were caused by the COVID-19 pandemic in the meat supply systems, especially the US poultry industry. Broiler producers were impacted by changes in supply as a result of negative effects on chicken demand brought on by restaurant closures. The interwoven nature of the broiler industry makes estimating grower losses very difficult. Farmers that grow broiler chickens don't own the animals, so price declines don't have the same immediate impact as they do with other commodities. The purpose of this article is to better understand the effects of COVID-19 on farms by looking at the broiler business and presenting methodologies. Additionally, broiler growers should consider this research when considering policy responses.

Neher et al. (2021); This study showed that the regular practices for poultry farming (PPF) decline at COVID-19 pandemic and some problem faced in poultry farming due to outbreak of COVID-19. But it also showed that training program can enhance the good practices for poultry farming. During the months of October through December 2020, 397 chicken farmers in a particular region of Bangladesh participated in a cross-sectional survey using a questionnaire. According to the findings, the PPF score at the time of the COVID-19 was 7.11 3.25 and 6.53 3.12, respectively, with a significant difference ($p < 0.01$). However, the training in poultry farming can raise the PPF score both before the COVID-19 (7.57 3.20) and during it (6.91 3.13). Additionally, a mean PPF score of 10.67 6.15 was discovered. In a logistic regression study, farmers between the ages of 18 and 29 who had not had any training were shown to be 0.42 (95% CI:0.20-0.88; $p < 0.01$) and 0.58 (95% CI:0.35-0.98; $p < 0.05$) times less likely to have a satisfactory PPF score, respectively. A similar study found that farmers between the ages of 18 and 29 and 40 to 49 were 2.52

(95% CI: 1.36-4.69; p 0.01) and 2.08 (95% CI:1.12-3.87; p 0.05) times more likely to have a significant score on the PFPF than farmers in other age groups. It's interesting to see that internet users were 2.51 (95% CI: 0.95-6.57; p<0.05) times more likely to have a PFPF score that was satisfactory (60%). Additionally, considerably (p <0.01) more farmers who were between the ages of 18 and 29 and had master's degrees and training believed the COVID-19 to be more harmful, as seen by a higher median (median = 8).

Rahman et al. (2021); The study was conducted among the consumers to determine the impact of COVID-19 on the meat consumption pattern and price fluctuation during COVID-19. Meat production in the country is accounted for by 50% poultry. A validated, self-administered electronic questionnaire that was made available through emails and social media websites from May 2020 to June 2020 was used to conduct the cross-sectional study. The purpose of the study was explained to the study's participants. 416 people from various states and union territories participated in the study overall. The findings showed that 70% of those who took part in the poll had changed their consuming habits as a result of the COVID-19 epidemic in India. In the current study, 27% of participants eaten meat once per week, whereas 30% did so twice per week. Overall, more than 80% of those surveyed claimed to routinely consume meat, at least once each week. However, it was discovered that the pattern of meat consumption had shifted throughout the lockdown. 26% of participants said they eat meat once a month or less, while 21% said they eat meat or meat products twice a month. However, only 27% of those surveyed say they consume meat frequently—at least twice a week. According to 60% of the meat-eating populace, less meat was purchased by consumers during the lockdown period. However, in locations where meat and animal products are easily accessible, more meat was purchased since more people were eating during the lockdown. It's possible that the financial hardship caused by the COVID-19 outbreak and the lockdown made it more difficult for some families to afford pricey meat. At the start of the lockdown period, false information about meat consumption and the spread of SARS-CoV-2 caused a sharp decline in the price of meat. The Indian poultry sector was significantly impacted by this price cut (The Economic Times, 2020). The administration did make an effort to dispel these allegations, though. Due to decreased transportation of animals and their feed, there was a significant increase in the price of meat as well as a reduction in the supply of

cattle and poultry. Approximately 80% of those surveyed claimed that the cost of beef had gone up during the lockdown. The majority of responders (71.1%) indicated that the price of meat has increased by 0–40%. However, 22% of the respondents said they anticipated a 10–20% increase in the cost of chicken flesh. About 5% of the participants claimed that the price has grown by more than 80% in various areas of India.

Sain et al. (2021); This study's goal was to ascertain the Covid-19 pandemic's effects on the broiler chicken agricultural industry in Moncongloe District, Maros Regency. August through September of 2020 was used for this study's execution. Interviews, observation, and a review of the literature were employed in the data collection process. Both good and negative effects of the Covid-19 epidemic are being seen by the broiler chicken farming sector and business owners. The rise in people starting enterprises in the food and beverage industry, particularly those that use broiler as a raw material, is a good effect. On the producer side, this will indirectly raise demand for broilers. The drawback is that chicken prices are constantly erratic, and a pretty significant decline in the cost of live chickens has resulted in losses for farmers. Due to widespread societal constraints in Makassar City, restaurants, hotels, and restaurants which are considered intermediate consumers are also affected by the decline in sales.

Sattar et al. (2021); The aim of his study was to investigate how the pandemic has impacted the poultry production and distribution network (PDN), analyses stakeholders' changing circumstances, and provides recommendations for rapid and long-term resilience. Important sources from breeder farms and hatcheries, pharmaceutical manufacturers, feed manufacturers, dealers, farmers, intermediaries, and vendors were among them. This study demonstrates how the COVID-19 pandemic hurt the poultry industry, in part because of the lockdown and in part because of suspicions that the disease could spread through poultry and its products. This study demonstrates that few stakeholders were spared hardship. Numerous farms were forced to permanently close as a result of disrupted production and transportation, falling consumer demand, and uncertain markets.

Sembada et al. (2021); The goal of this study is to determine how Covid-19 has affected the supply chain for broiler chickens. In-depth interviews and focus groups

with representatives of the broiler chicken industry, breeders' associations, academics, industry professionals, and the government were used to gather data. Additionally, secondary data such as production, demand, and balance statistics were gathered. Descriptive analysis, supply chain analysis, and the rich picture technique were all used to analyze the data. The findings demonstrated that activity limitation policies and production control policies limited the availability and supply of production factors, which led to decreased production. Supply and demand are impacted by distribution process disruptions as well. The market for broiler chickens is drastically declining. These elements could have an impact on how much live birds cost to sell and how much production-related costs fluctuate at the farmer level. As part of a mitigation strategy to deal with problems in the future, issues resulting from a pandemic must be properly handled and fully. The appropriate techniques must be implemented thoroughly at all upstream, supply chain, and downstream levels.

Biswa et al. (2020); The current study aims to show how the epidemic and the lockdown affected the nation's livestock and poultry industries, which had recently experienced some of the fastest growth. Lack of adequate national data has been a significant barrier to fully comprehending how the lengthy lockdown has affected various subsectors of livestock and poultry. In this instance, the subject has been thoroughly examined using a combination of information gathered from public sources and published sources that are readily available. The pandemic and the ensuing lockdown have not only greatly impacted the millions of poor and marginal farmers who were trying to save their crops and/or livestock and ensure their livelihoods, but they have also had an impact on the overall production systems for poultry, dairy, and other livestock, as well as the value chains connected to them, as well as on nutrition and health care, as well as labor availability. The study highlights several aspects of the impacts, including a decline in demand for various commodities, food waste as a result of the closure of supply chains for transportation and markets, produce sales at a loss, a labor shortage, and recovery measures taken by the government and related businesses.

The current impact research provides a snapshot of the current situation overall, but it is recommended that a systematic investigation using primary data gathered from around the nation give a comprehensive picture of the impact on each of the subsectors and the related value chains.

Kolluri et al. (2020); The study aims to determine the devastating effects on poultry industry during COVID-19 pandemic in India. A brief structured questionnaire was used to gather data from respondents (N=65) from various poultry industry segments for this study, and pertinent answers were recorded. To prevent bias, primary respondents were chosen at random from various regions, and information was gathered between January and May 2020 via personal voice conversations and social media platforms. In order to evaluate the effects of the pandemic disease on the cost of producing live broiler, table eggs, and chicks, respectively, commercial layer, hatchery, and broiler farms were contacted. In order to determine the pricing trend for chicken goods during the study period, feed and chick dealers, broiler merchants, egg sellers, and retail processors were also polled. Before conducting an interview, respondents were given a clear explanation of the survey's purpose and given their permission. To evaluate the price trend for eggs during the pandemic, secondary data were gathered. From the National Egg Coordination Committee database, the current egg prices for the five highest egg-producing regions—East Godavari (Andhra Pradesh), Hyderabad (Telangana), Namakkal (Tamil Nadu), Pune (Maharashtra), and Kolkata (West Bengal)—were obtained. Daily broiler prices were obtained from real-time market sources for the broiler belt states of Maharashtra, Tamil Nadu, Telangana, Andhra Pradesh, and Uttar Pradesh (poultry bazaar). The poultry industry's broiler segment has been more badly impacted than layers, according to the results, with a sharp decline in farm gate pricing for live broilers. In all of the research locations, broiler prices were significantly ($P < 0.01$) decreased, with the highest and lowest values occurring in the months of January (USD 1.21) and March (USD 0.45), respectively. Results for the % change in price fluctuation indicated a downward trend from January to February, February to March, March to April, and January to April, respectively, with negative trends of 36, 43, 129, and 21.3. The monthly price indices for live broilers showed the highest consumer demand and consumption pattern ($p < 0.05$) in January and a gradual decline in subsequent months. Price index is regarded as a reliable economic indicator of any commodity (till April). Egg prices give an indirect indication of the supply-demand situation in the market and examining their trajectory in relation to time series offers a chance to adapt to shifting market conditions (Yuhuan and Fu, 2018). In the examined regions, the egg price and price index showed a sharp reduction ($P < 0.01$) from January to March, followed by a slight increase in April. Changes in egg consumption have caused the retail price to drop

from USD 5 to USD 1, a significant discount from the egg rates recommended by the National Egg Coordination Committee, although the production cost was still hovering around USD 5. The least expensive egg costs were observed at USD 2.04 compared to a USD 5 production cost. The expected loss to the poultry sector as a result of COVID-19 and the shutdown that accompanied it is USD 3053 million.

Mahmud et al. (2020); Finding out how the pandemic and pandemic control efforts were affecting the production, distribution, and consumption of hens and eggs was one of the goals of this study. From early April to early May of this year, 36 people involved in the chicken production and distribution network in Bangladesh were interviewed for this study, including chicken farmers, traders, feed, medicine, and chick suppliers. According to this study's preliminary research findings, by the end of April, over 70% of small- to medium-sized broiler farms had temporarily ceased production and trade. Despite the fact that by June half of these farms had refilled with day-old chicks, this was done on a limited scale because it was unclear whether there would be any additional losses. Since the outbreak, farm eggs in Bangladesh have been selling for up to BDT 4–5.5 (US\$0.046–0.065) per, with production expenses of at least BDT 6 (US\$0.07). Before the epidemic, a farm egg cost on average BDT 7–8 (US \$0.08–0.09). Broiler meat was produced at a cost per kilogram of BDT 95–100 (US\$1.17–1.18), but post-pandemic producers were forced to sell it at wholesale for only BDT 65–70 (US\$0.77–0.80). Farmers that manage their operations by obtaining feed dealers' credit have accrued higher debt. The hardship of farmers in turn had a big impact on the business of large poultry firms, poultry feed companies, pharmaceutical companies, and poultry traders (intermediaries and feed dealers). In June, the results of our follow-up investigation revealed a 30–45% decrease in day-old chick production, a 35–40% decrease in poultry feed output, and a 40–50% decline in the sale of pharmaceuticals. Due to supply disruptions and demand from Eid-ul-Fitre, one of the largest Muslim holidays, the price of poultry meat and eggs increased in the second week of May. According to the government-run Trading Corporation of Bangladesh (TCB), the situation worsened when Bangladeshi poultry producers stopped production in March and April due to low demand, causing prices to increase by an average of 45% in the four days between May 20 and 23. Farmers and traders are finding it more challenging to manage the situation as a result of the swift price changes for chicken meat and eggs.

Ramsey et al. (2020); The study aims to determine the price fluctuation of U.S meat market during COVID – 19 pandemics. This paper describes the time series behavior and dynamic links of U.S. meat prices prior to the COVID-19 pandemic using weekly data on wholesale and retail prices of beef, pig, and poultry. In this study, vector error correction (VEC) models and both linear and threshold autoregressive (AR) models are used to model vertical price transmission. In this study compare price changes under COVID-19 to model forecasts using the estimated models. In this study notice unexpectedly big price changes in April and May of 2020 across all three of the meat markets, which are all tightly interconnected. Prices are recovering to expected levels at a rate similar with the speed of transmission before the pandemic, suggesting that the early COVID-19-related shocks are only temporary.

Saeque et al. (2020); Over the past five years, the output of DOCs, eggs, and meat has gradually expanded to roughly 1.5 times its previous level. Unwanted effects and uncertainty have been brought on by the recent Covid-19 pandemic scenario in the poultry industry. The Bangladesh Agricultural Research Council (BARC) hosted a consultative session on "effect of COVID-19 on the livestock sector in Bangladesh and its mitigation options" on November 26, 2020, at the BARC auditorium. Participants in this workshop included professors from several universities, researchers, government officials, representatives from the commercial sector, and other interested parties. ACI Animal Health's Chief Technical Advisor gave a presentation on the effect of COVID-19 on the Bangladesh poultry sector. The status of chicken production before to COVID-19, the effects of COVID-19 on the poultry industry, and considerations for the future were highlighted in the article. It is easy to see how COVID-19 has affected the poultry industry in Bangladesh. The Covid-19 has severely upset the system for raising poultry and caused an unwelcome imbalance between the supply and demand for chicken products. The growth of agricultural inputs and finished goods is negative. According to one estimate, it caused our nation's commercial production of day-old chicks (DOC), eggs, and meat to decline by roughly 35%. (BPICC, 2020). According to BPICC (2020), the poultry industry suffered a total loss of almost 7000 crore, and 25–30% of business owners had working capital losses over the previous four to five months as a result of Covid-19. It is anticipated that there is a 20–30% chance of getting credit from traders, farmers, and other sources (BPICC, 2020). Commercial broiler, layer, and Sonali bird

production has been negatively impacted, and it was substantially worse from April to June 2020. During this time, productivity significantly decreased (by about 45% for Day Old Chicks (DOC), 28% for eggs, 45% for chicken meat, and 40% for feed). In some situations, other variables, such as avian flu at the farm level, have also led to lower yield. However, due to the adoption of effective coping mechanisms by the poultry farmers, private sectors, service providers, government, and other stakeholders to address the situation, extremely good recovery (almost 83%) of the sector's negative impact was observed from July to September 2020. Prices for DOC and live birds are still prone to change.

Shen et al. (2020). The objectives of this study were to estimate the impact of the COVID-19 pandemic on firm performance. The study was conducted using the financial data of Chinese enterprises that are publicly traded. The study indicated that through lowering investment sizes and lowering overall income, the COVID-19 epidemic has a considerable negative influence on the performance of listed Chinese enterprises. In the first quarter of 2020, corporate performance significantly decreased for the pandemic-affected businesses, including tourism, catering, and transportation. The pandemic has a detrimental effect on these industries' production, operation, and sales, which ultimately shows in the negative return rate. Due to rigorous quarantine regulations that restrict consumption and production, the negative impact is considerably more noticeable along the regional dimension in high-affected locations, delivering the wrong message to managers and its stakeholders. Financial limitations could make the pandemic operation much more difficult (COVID-19).

Islam et al. (2018); The goal of this study was to analyze customer profiles for chicken, beef, mutton, fish, and eggs in Bangladesh to better tailor the marketing mix for each food category. In this study, 658 questionnaire survey results were used to analyze the mean consumption frequency of chicken, beef, mutton, fish, and eggs. The findings of the study showed that eggs were the most frequently consumed food, with 77% of respondents eating eggs once a day. Fish was the third most popular food, followed by chicken (62%). Mutton ranked fourth in terms of frequency of consumption. However, 24% of those surveyed didn't eat mutton. The same patterns of behavior were shown when it came to beef, which was the least consumed (7%) and was only consumed once daily, once per week, or not at all by 13% of people.

Demir et al. (2007); The goal of this study was to identify the changes in the price of chicken meat and feed that took place between 1994 and 2006, as well as the effects of factors like the economic crisis, some speculative remarks about the broiler sector (hormone usage, antibiotic residual, etc.), and the HPAI outbreak. The study's data came from retail prices for entire chickens and broiler feed, which were gathered from the Turkish Statistical Institute (TÜK) and the Poultry Meat Producers and Breeders Association (BESD-BR). Using the index created to remove the impact of inflation on the price data, the current prices were transformed into real prices. Additionally, seasonal pricing variations that occurred based on consumer demand were looked at. The output of chicken meat climbed by an average of 13.5% per year over this time period, however production levels declined by 10.5% in 2001 and only increased by 1.7% and 2.6% in the 2005–2006 years, respectively, compared to the preceding years. Additionally, it was discovered that the average price of chicken feed and meat has climbed by almost 55 and 53 times, respectively, since the year 2000. But between 1994 and 2006, real prices fell by 30.1% and 32.9%, respectively.

CHAPTER 3

MATERIALS AND METHODS

The marketing channel of poultry meat and eggs in Bangladesh is not so improved like developed country, however our entire marketing channel comprises partly traditional and partly improved. The stakeholders are Producer, Local Bayer (*Foria* or *Bapari*), Wholesaler (Arhatder), Retailer and consumer. The marketing channel of broiler is very wide. Producers, traders, whole sellers, retailer, corner shop, Hawker, processing plant and consumers are involved here.

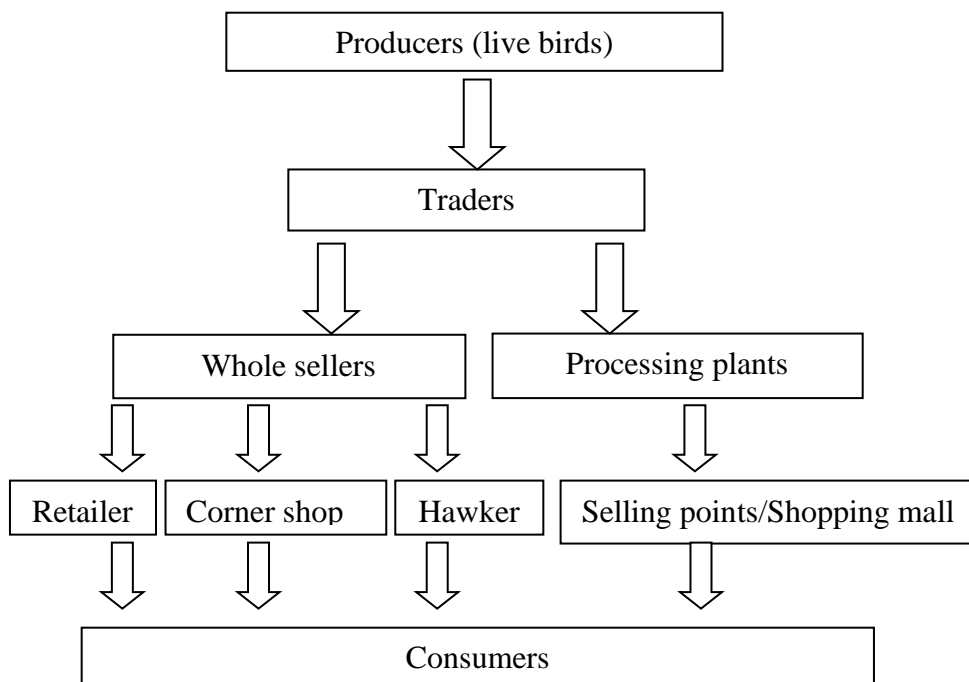


Figure 1. Existing broiler marketing system in Bangladesh

In case of eggs and day-old-chicks commission agent, dealer and sub-dealer may involve here. Sometimes middlemen are unfairly benefited from this type of mixed marketing channel. Improved type of marketing channel allows middlemen to gain marginal profit uniformly in each step. Marketing channel is a long chain, but in the present study our focal point is wholesalers from whom the wholesale price was collected.

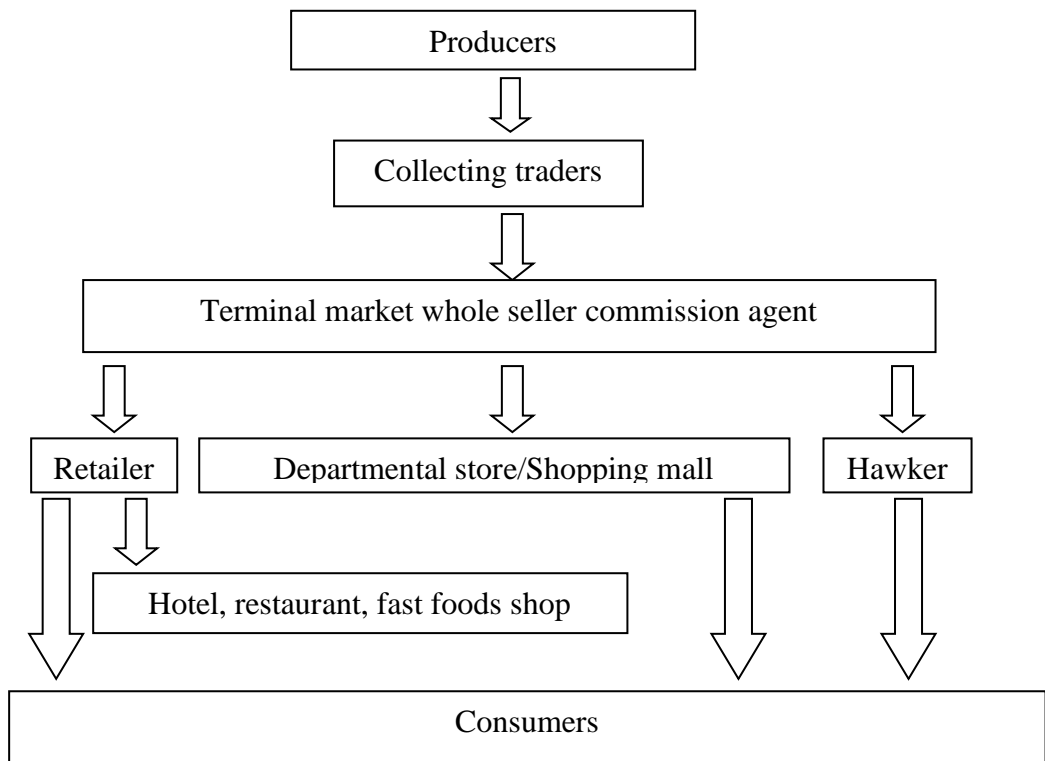


Figure 2. Existing egg marketing system in Bangladesh

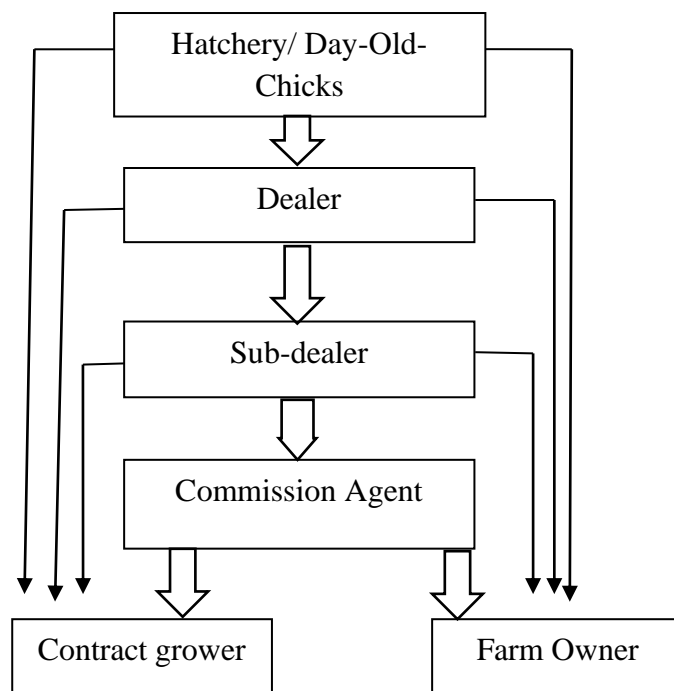


Figure 3. Existing day-old-chicks marketing system in Bangladesh

In the present study secondary data were used only from wholesale market. The current study was conducted using secondary data collected from relevant online database of poultry news portal “**Poultry Desk, Agricare24.com**”. Data of one year were collected of which six months from pre-COVID period (July-December/2019) and six months from COVID period (July-December/2020) to conduct the experiment.

3.1 Preparation of questionnaire

A structural questionnaire (Appendices-) was prepared to collect market price of live chicken and chicken products which includes the following products.

- A. Live Bird price
 - 1. Broiler chicken
 - 2. Culled red chicken
 - 3. Culled white chicken
 - 4. Sonali chicken

- B. Price of Eggs
 - 1. Brown shelled eggs
 - 2. White shelled eggs

- C. Price of Day-Old-Chicks
 - 1. Brown layer chicks
 - 2. White chicks
 - 3. Broiler chicks
 - 4. Sonali chicks

3.2 Selection of months to collect the data

The first known outbreak of COVID-19 started in Wuhan, Hubei, China, in **November 2019**. Many early cases were linked to people who had visited the Huanan Seafood Wholesale Market there, but it is possible that human-to-human transmission began earlier. However, in Bangladesh it was confirmed the first coronavirus case on **8 March 2020**. In response to the COVID-19 pandemic, the

Government of Bangladesh (GoB) declared special “general leave” from 26 March in the name of “lockdown” and extended it up to 30 May 2020 in seven different time slots. So, although it is COVID-19, but 2019 was totally free from COVID pandemic in Bangladesh. Therefore, last six months of 2019 i.e., July to December month was selected to collect pre-COVID data for the study. In Bangladesh lockdown affects the poultry market seriously since July 2020. Therefore July- December/2020 month was selected to collect data during pandemic.

3.3 Data collection

Data were collected from eight divisions (Gazipur from Dhaka division, Khulna, Barishal, Mymensingh, Sylhet, Rangpur, Rajshahi and Chattogram) of Bangladesh. To collect the data 4 days of a month were considered randomly taking a day from each week. Total (4 days x 6month x 8 divisions) 192 days data were collected taking 48 days from pre-COVID and 48 days from COVID period. Therefore, the planning was to collect a total of (192x2) 384 days data for the study.

3.4 Collection of wholesale price data of live birds

All categories of data were not available in all divisions for the pre-COVID and COVID periods. Only those divisions' data were considered which were available in both period. In the case of live broiler, Khulna and Rangpur division's data were not available during pre-COVID and COVID periods. For culled red birds Khulna, Mymensingh, Sylhet, Rangpur's data were not available. For culled white, only Gazipur, Khulna and Rajshahi's data were available in both periods. Khulna, Sylhet, and Rangpur divisions' data were not available for Sonali chicken.

3.5 Collection of wholesale price data of eggs

In the case of brown-shelled eggs, all data were available in all divisions during the COVID and pre-COVID periods. But in the case of white-shelled eggs the divisions of Barishal, Mymensingh, Sylhet and Rangpur's data were not available in both periods.

3.6 Collection of wholesale price data of day-old-chicks

Wholesale chicks price were available in four divisions- Gazipur, Barishal, Rangpur and Chattogram for brown, white and day-old-broiler chicks. Day-old-Sonali chicks'

wholesale price was not available in all divisions of Bangladesh during pre-COVID period. But in COVID period the wholesale price of day-old-Sonali chicks were found in only Rangpur division.

3.7 Statistical analysis

The collected data and information were scrutinized, classified, edited and coded. Information of the questionnaire was transferred into a master sheet for entering the data in the computer. Microsoft Excel computer software package programs were used to find out the average data of live birds, eggs and day-old- chicks. Finally, the SPSS computer package program was used for data analysis. To compare the data of the two divisions paired t-test was used.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Wholesale Price of Live Birds

Generally the price of live birds varied in different market place of Bangladesh. This is due to production cost, seasons, festival and demand of the customers. But during current pandemic it was seriously affected poultry industry and as well as price of live birds.

4.1.1 Wholesale price of broiler chicken in different divisions in Bangladesh

Table 1 gives the mean wholesale price of broiler chicken that was delivered by several agricultural marketplaces of different divisions both before and during COVID-19. Data from 12 months were used in the analysis, representing 6 divisions. The data were gathered from 6 months prior to COVID and 6 months during COVID. The mean wholesale price has increased trend during the COVID-19 period as compared to the same period last year, and it is clear that prices are notably different in these markets before and during the COVID-19.

Table 1. Average wholesale price (Taka) of broiler chicken in different divisions

Division	Pre-COVID Period (July-Dec/19)	During COVID Period (July- Dec/20)	Level of significance
	Mean \pm SD	Mean \pm SD	
Dhaka	93.80 \pm 7.64	96.88 \pm 6.12	0.516 ^{NS}
Barishal	92.92 \pm 3.93	95.00 \pm 7.52	0.565 ^{NS}
Mymensingh	96.63 \pm 8.60	97.18 \pm 5.31	0.907 ^{NS}
Sylhet	97.91 \pm 7.21	97.33 \pm 6.48	0.888 ^{NS}
Rajshahi	98.55 \pm 9.04	97.98 \pm 4.60	0.899 ^{NS}
Chattogram	96.87 \pm 6.22	100.22 \pm 6.13	0.433 ^{NS}

Here,

- ✓ SD = Standard Deviation
- ✓ NS = Non-significance
- ✓ Tested at 5% level of significance ($p < 0.05$)

The mean whole price at Dhaka was 93.80 ± 7.64 in 2019 and 96.88 ± 6.12 in 2020. In comparison to 2019, the price was 3.08Tk more in 2020. The mean wholesale price of other divisions such as Barishal, Mymensingh, Sylhet, Rajshahi and Chattogram was 92.92 ± 3.93 , 96.63 ± 8.60 , 97.91 ± 7.21 , 98.55 ± 9.04 and 96.87 ± 6.22 respectively in 2019 and 95.00 ± 7.52 , 97.18 ± 5.31 , 97.33 ± 6.48 , 97.98 ± 4.60 and 100.22 ± 6.13 respectively in 2020. Although the findings of the current analysis indicated that 2020 was seeing a modest increase in wholesale prices compared to 2019 (Figure 4). However, there was no statistical ($p > 0.05$) difference in the wholesale price of broiler chicken in 2019 and 2020. The result was in agreement with the reports of (The Business Standard, 2020) where monthly broiler production fell to 25000 from 27000 tonnes and around 50% to 60% poultry farms shuttered across the country due to COVID-19 pandemic.

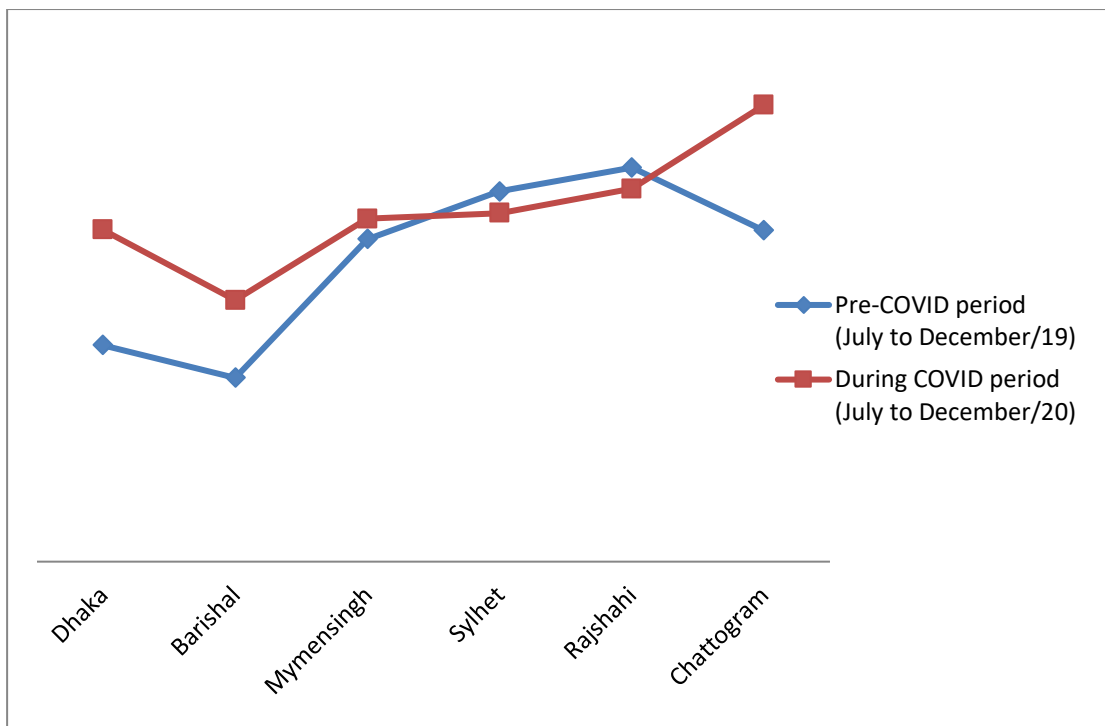


Figure 4: Comparative study of the average wholesale price of broiler chicken in different divisions between pre-COVID and COVID period.

Furthermore, Berkhout *et al.* (2020) reported that these production levels decreased by at least 50% after March 2020. The cause for the rise in the average wholesale price and decreased production could be ascribed to the closure of the poultry farms and a decline in the number of market arrivals.

4.1.2 Average whole price (Taka) of culled red chicken in different divisions

According to Table 2, the mean wholesale price of culled red chicken at Dhaka, Barishal and Rajshahi was 157.86 ± 10.21 , 178.12 ± 10.89 , 160.05 ± 19.77 respectively on July to December 2019 and 172.83 ± 31.92 , 182.08 ± 29.22 , 182.08 ± 31.09 on July to December 2020.

Table 2. Monthly average wholesale price (Taka) of culled red chicken in different divisions

Division	Pre-COVID Period (July-Dec/19)	During COVID Period July- Dec/20)	Level of significance
	Mean \pm SD	Mean \pm SD	
Dhaka	157.86 ± 10.21	172.83 ± 31.92	0.160 ^{NS}
Barishal	178.12 ± 10.89	182.08 ± 29.22	0.659 ^{NS}
Rajshahi	160.05 ± 19.77	182.08 ± 31.09	0.083 ^{NS}
Chattogram	171.12 ± 19.67	195.34 ± 35.70	0.044 [*]

Here,

- ✓ SD = Standard Deviation
- ✓ NS= Non-significance
- ✓ *means significant at 5% level of significance ($p < 0.05$)

The results revealed that there was no significant ($p > 0.05$) difference between the whole price of culled red chicken in 2019 and 2020. But, the wholesale price of culled red chicken at Chattogram in 2019 was 171.12 ± 19.67 and 195.34 ± 35.70 in 2020.

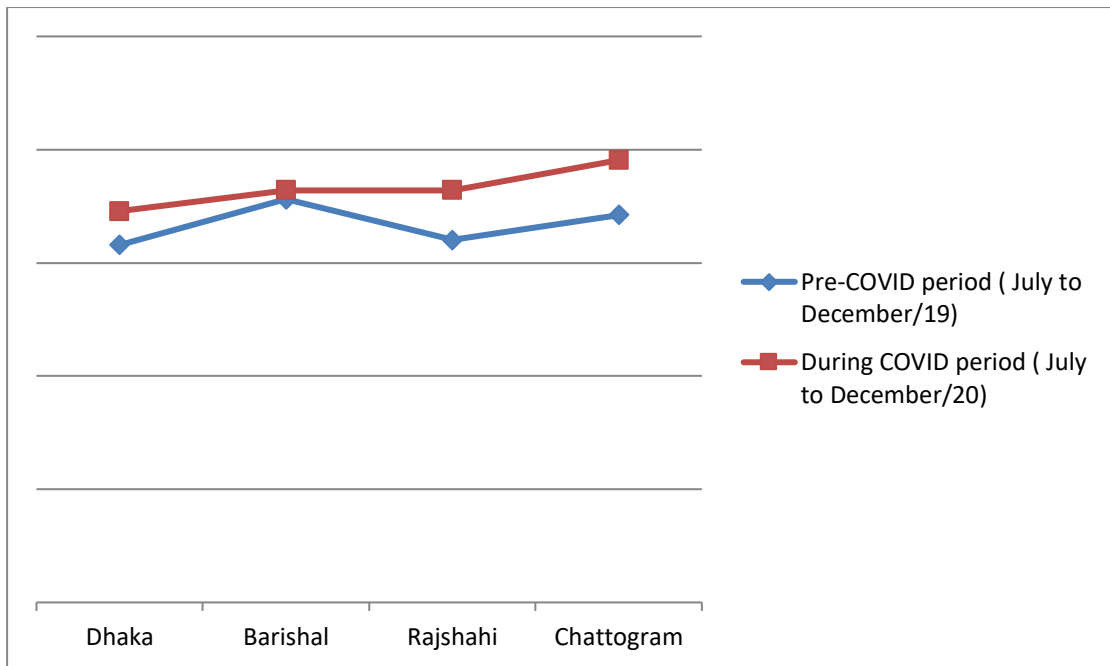


Figure 5: Comparative study of the average wholesale price of culled red chicken in different divisions between pre-COVID and COVID period

According to the study indicated that there was significant ($p < 0.05$) difference between the wholesale price of Culled Red Chicken at Chattogram division in 2019 and 2020. Disruption of poultry supply chain and state lockdown severely affects poultry industries and this is the main cause of increasing price of culled red chicken during COVID in 2020 compared to pre-COVID.

4.1.3 Average wholesale price (Taka) of culled white chicken in different divisions

From Table 3, it is noted that the mean wholesale price of culled white chicken at Dhaka, Khulna and Rajshahi was 115.34 ± 12.12 , 146.64 ± 13.28 and 135.77 ± 12.92 on July to December 2019 and 130.56 ± 26.25 , 136.69 ± 25.72 and 135.91 ± 27.09 , respectively on July to December 2020. The result revealed that the wholesale price of culled white chicken was fluctuated between pre-COVID and during COVID period among these divisions (Figure 6) but, there was no significant ($p > 0.05$) difference between the whole price of culled white chicken in 2019 and 2020.

Table3. Monthly average whole price (Taka) of culled white chicken in different divisions

Division	Pre-COVID Period (July-Dec/19)	During COVID Period (July-Dec/20)	Level of significance
	Mean \pm SD	Mean \pm SD	
Dhaka	115.34 \pm 12.12	130.56 \pm 26.25	0.09 ^{NS}
Khulna	146.64 \pm 13.28	136.69 \pm 25.72	0.310 ^{NS}
Rajshahi	135.77 \pm 12.92	135.91 \pm 27.09	0.988 ^{NS}

Here,

- ✓ SD = Standard Deviation
- ✓ NS= Non-significance
- ✓ Tested at 5% level of significance (p<0.05)

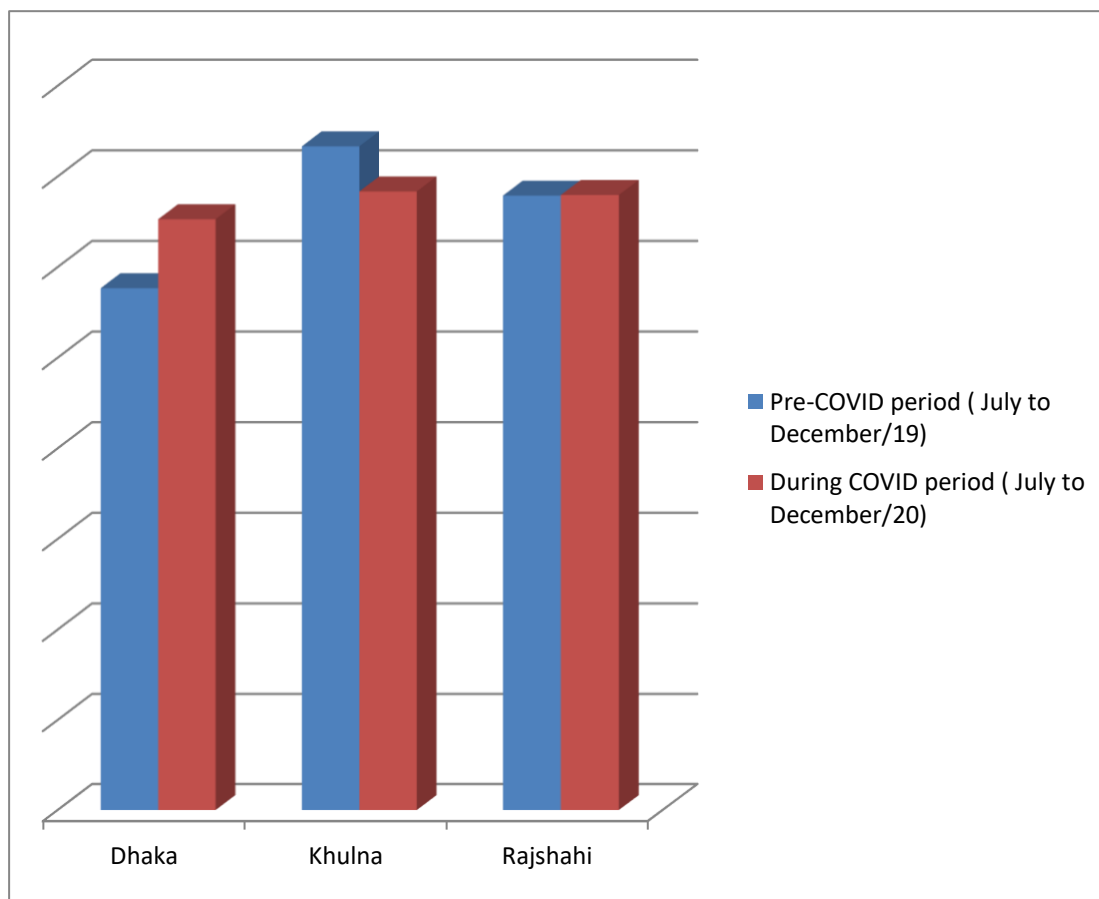


Figure 6: Comparative study of the average wholesale price of culled white chicken in different divisions between pre-COVID and COVID period

This finding was an agreement with Sattar *et al.* (2021); a notable COVID-19 effect on the poultry industry was a change in live chicken and egg prices before, during, and after the lockdown from January to June 2020. As a major factor in the decline in consumer demand, the rumors were also cited in other news papers (Sharma *et al.* 2020).

4.1.4 Average wholesale price (Taka) of Sonali chicken in different divisions

Compared to broilers, Sonali chickens make up a lower percentage of the chicken products marketed, and they fetch a higher price from (mainly) richer buyers (Sattar *et al.* 2020). In pre-COVID period, the highest wholesale price of Sonali chicken was found in Chattogram (184.79±14.99) and the lowest at Gazipur (171.32±15.19). The mean wholesale price of Sonali chicken in Barishal and Mymensingh was 173.12±7.57 and 173.96±14.15 in pre-COVID period and 166.66±24.48 and 173.29±30.17 in during COVID period (Table 4).

Table 4. Monthly average wholesale price (Taka) of Sonali chicken in different divisions

Division	Pre-COVID Period (July-Dec/19)	During COVID Period(July-Dec/20)	Level of significance
	Mean ±SD	Mean ±SD	
Dhaka	171.32±15.19	171.04±30.45	0.988 ^{NS}
Barishal	173.12±7.57	166.66±24.48	0.621 ^{NS}
Mymensingh	173.96±14.15	173.29±30.17	0.970 ^{NS}
Rajshahi	175.79±15.61	143.33±75.53	0.412 ^{NS}
Chattogram	184.79±14.99	176.09±29.11	0.608 ^{NS}

Here,

- ✓ SD = Standard Deviation
- ✓ NS= Non-significance
- ✓ Tested at 5% level of significance (p<0.05)

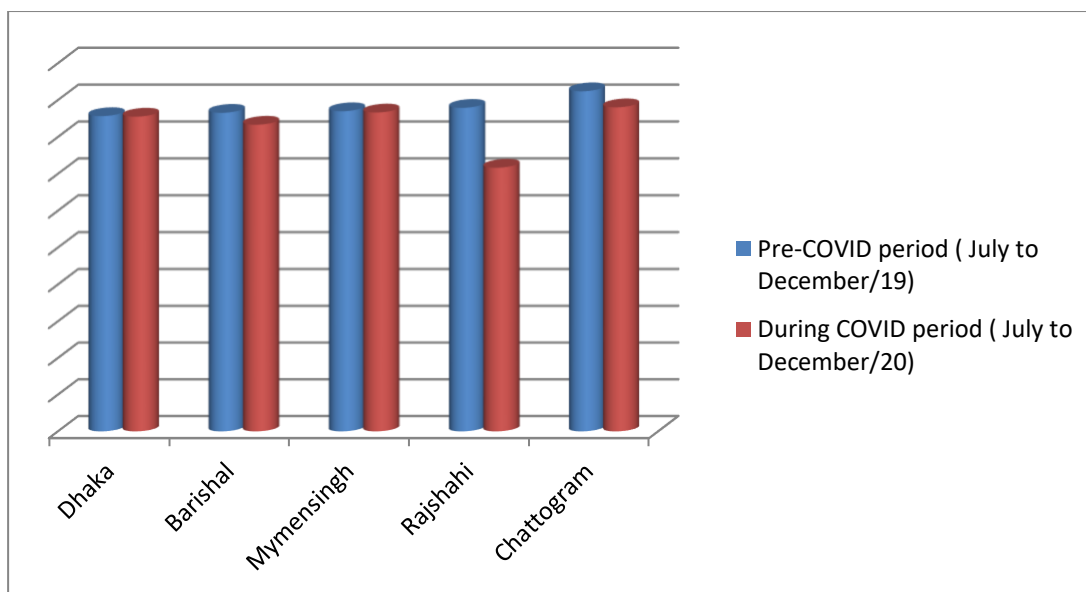


Figure 7: Comparative study of the average wholesale price of Sonali chicken in different divisions between pre-COVID and COVID period

There was minor fluctuation in the wholesale price of Sonali chicken between pre-COVID and COVID period. In case of Rajshahi division, the mean wholesale price of Sonali chicken was 175.79 ± 15.61 in pre-COVID period and 143.33 ± 75.53 in during COVID period. Comparatively the price of Sonali chicken was lowest in Rajshahi during COVID period than other divisions, but there was no significant ($p > 0.05$) difference between the wholesale price of Sonali chicken in pre-COVID and during COVID condition. Sonali pricing tracking for both years revealed no significant variations (Figure 7).

The result is an agreement with Sattar *et al.* (2020) and showed that Sonali's price swings were noticeably less pronounced than those of broilers, and they remained at or below pre-lockdown levels even throughout lockdowns.

4.2 Wholesale Price of Shell Eggs

Whereas one-third of the world's population is undernourished, eggs in the country provide a feasible supply of nutrient-dense food (Singh *et al.*, 2019). Egg is the most vital source nutrient for Bangladeshi people and this country's people get sufficient eggs supply due to improving poultry industry. But the devastating impact of COVID-19 on poultry industry, egg supplying channel was broken down and egg price fluctuated after and before COVID pandemic. Here the goal is to determine the

fluctuation of the wholesale price of shell eggs in different divisions in Bangladesh after COVID and during COVID-19 pandemic condition.

4.2.1 Average wholesale price (Taka) of brown shell eggs in different divisions

The mean wholesale price of brown eggs at Dhaka, Khulna, Barishal, Mymensingh, Sylhet, Rangpur, Rajshahi and Chattogram was 7.28 ± 0.54 , 7.61 ± 0.71 , 7.01 ± 0.78 , 7.37 ± 0.53 , 7.50 ± 0.57 , 7.17 ± 0.49 , 7.11 ± 0.51 and 7.46 ± 0.61 respectively on July to December 2019 and 7.39 ± 0.76 , 7.45 ± 0.96 , 7.31 ± 0.85 , 7.37 ± 0.79 , 7.53 ± 0.81 , 7.17 ± 0.66 , 7.03 ± 0.60 and 7.55 ± 0.81 correspondingly on July to December 2020 (Table 5). In Khulna and Rajshahi the wholesale price was decreased whereas in Dhaka, Barishal and Chattogram the wholesale price was upward, but it was remained unchanged in Mymensingh, Sylhet and Rangpur divisions during pre-COVID and COVID pandemic period. According to BPICC data due to the closure of 32–35 egg-producing farms, egg output had also dramatically decreased during the pandemic. The study is relevant with the report of BPICC.

Table 5. Monthly average wholesale price (Taka) of brown shell eggs in different divisions

Division	Pre-COVID Period (July-Dec/19)	During COVID Period (July-Dec/20)	Level of significance
	Mean \pm SD	Mean \pm SD	
Dhaka	7.28 ± 0.54	7.39 ± 0.76	0.496 ^{NS}
Khulna	7.61 ± 0.71	7.45 ± 0.96	0.438 ^{NS}
Barishal	7.01 ± 0.78	7.31 ± 0.85	0.10 ^{NS}
Mymensingh	7.37 ± 0.53	7.37 ± 0.79	0.988 ^{NS}
Sylhet	7.50 ± 0.57	7.53 ± 0.81	0.896 ^{NS}
Rangpur	7.17 ± 0.49	7.17 ± 0.66	0.964 ^{NS}
Rajshahi	7.11 ± 0.51	7.03 ± 0.60	0.566 ^{NS}
Chattogram	7.46 ± 0.61	7.55 ± 0.81	0.476 ^{NS}

Here,

- ✓ SD= Standard Deviation
- ✓ NS= Non-significance
- ✓ Tested at 5% level of significance ($p < 0.05$)

Although the wholesale price of brown shell eggs fluctuated between after and during COVID-19 (Figure 8), but there were no significant ($p>0.05$) difference of the wholesale price of brown shell eggs between pre-COVID and during COVID pandemic.

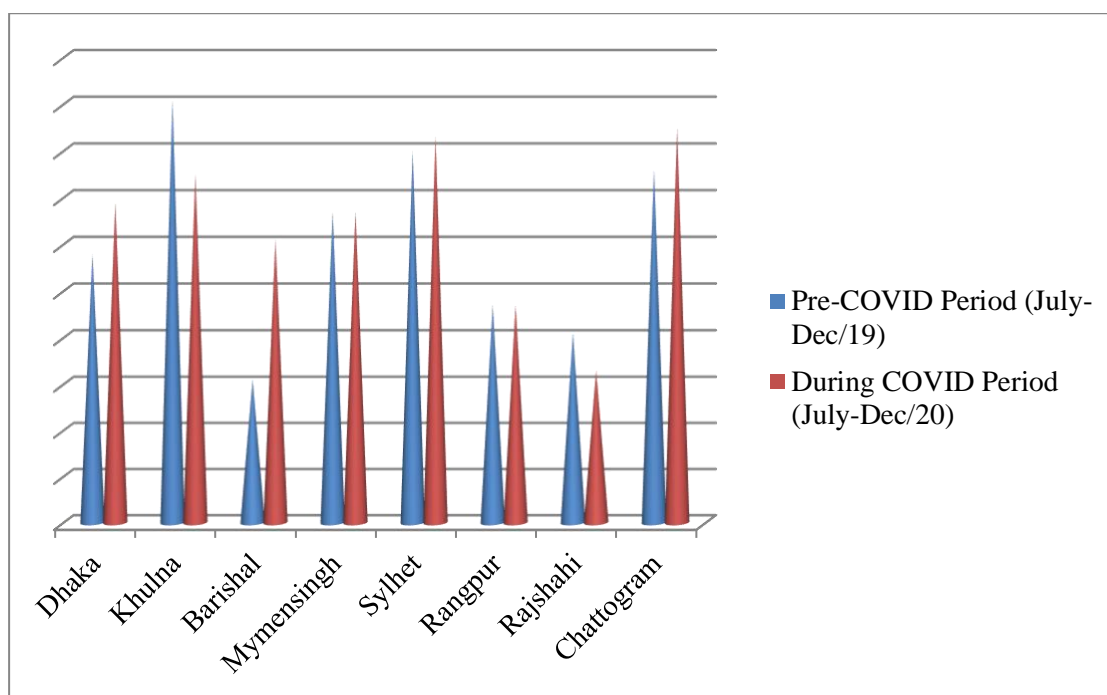


Figure 8: Comparative study of the average wholesale price of brown shell eggs in different divisions between pre-COVID and COVID period

4.2.2 Average wholesale price (Taka) of white shell eggs in different divisions

The mean wholesale price of white shell eggs at Dhaka, Khulna, Rajshahi and Chattogram was 7.05 ± 0.56 , 7.42 ± 0.67 , 6.88 ± 0.64 and 7.12 ± 0.60 on July to December 2019 and 7.01 ± 0.84 , 7.23 ± 0.74 , 6.48 ± 0.63 and 7.43 ± 0.92 was on July to December 2020 (Table 6). The results revealed no significant difference ($p>0.05$) of wholesale price of white shell eggs between pre-COVID and COVID period. The wholesale price in the division of Dhaka, Khulna and Rajshahi were decreasing trend during pandemic, but it was observed to increase at Chattogram division (Figure 9). The findings of this study in an agreement with the previous researcher (Gautham Kolluri *et al.* 2020) reported that the lowest egg prices were observed during the COVID-19 pandemic at USD 2.04 compared to a USD 5 manufacturing cost. Furthermore, Egg prices are an indirect indicator of the supply-demand situation in the market, and

examining their trajectory in relation to time series offers a chance to adapt to shifting market conditions (Yuhuan and Fu, 2018).

Table 6. Monthly average wholesale price (Taka) of white shell eggs in different divisions

Division	Pre-COVID Period (July-Dec/19)	During COVID Period (July-Dec/20)	Level of Significance
	Mean \pm SD	Mean \pm SD	
Dhaka	7.05 \pm 0.56	7.01 \pm 0.84	0.885 ^{NS}
Khulna	7.42 \pm 0.67	7.23 \pm 0.74	0.369 ^{NS}
Rajshahi	6.88 \pm 0.64	6.48 \pm 0.63	0.067 ^{NS}
Chattogram	7.12 \pm 0.60	7.43 \pm 0.92	0.119 ^{NS}

Here,

- ✓ SD= Standard Deviation
- ✓ NS= Non-significance
- ✓ Tested at 5% level of significance ($p < 0.05$)

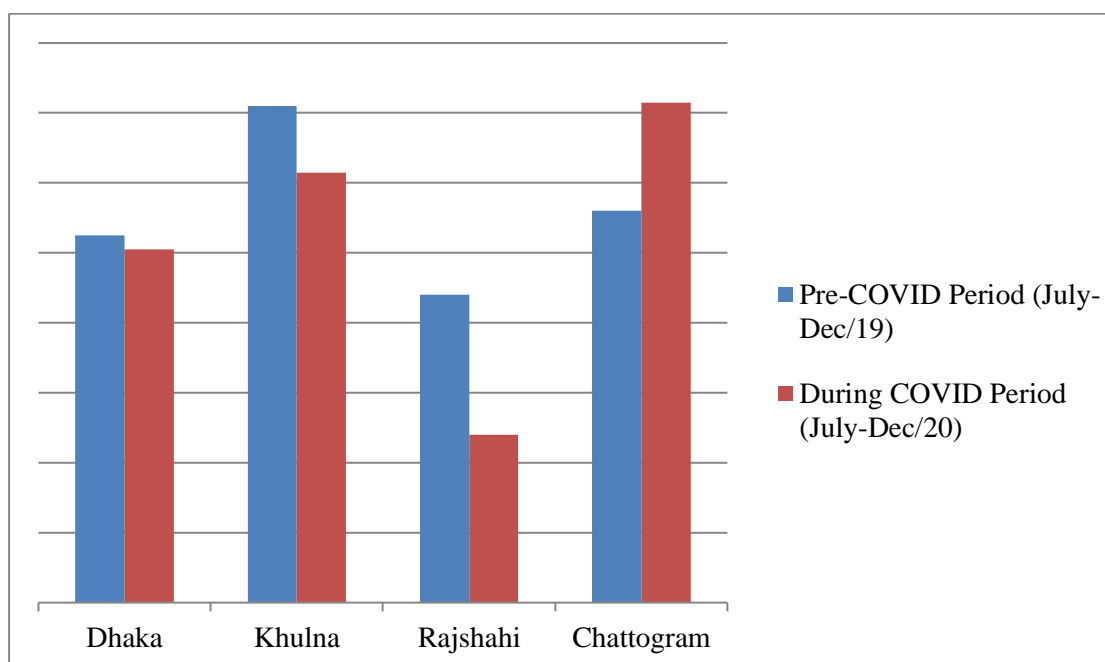


Figure 9: Comparative study of the average wholesale price of white shell eggs in different divisions between pre-COVID and COVID period

4.3 Wholesale Price of Day-Old-Chicks

People avoided consumption of chicken and egg as the COVID-19 outbreak had started. Besides, consumers were unable to go to the markets due to the lockdown which significantly reduced demand for meat, egg, and other processed food. As a result, a large number of poultry farmers shuttered down their poultry farm which effected on the price of Day-Old-Chicks.

4.3.1 Average wholesale price (Taka) of brown layer chicks in different divisions

From the table 7, it is illustrated that the non- significant ($p>0.05$) mean wholesale price of brown layer chicks at Barishal, Rangpur and Chattogram was 37.00 ± 7.06 , 38.70 ± 6.90 and 41.58 ± 12.04 respectively on July to December 2019 and 36.20 ± 7.54 , 36.91 ± 5.90 and 35.31 ± 6.60 was on July to December 2020. The study revealed that the average wholesale price of brown layer chicks in 2020 was declined by 0.8Tk, 1.79Tk and 6.27Tk respectively at Barishal, Rangpur and Chattogram divisions. The minor price hike (1.59Tk) was found at Dhaka division between pre-COVID and COVID period (Figure 10).

According to (FAO, 2020) reports, the prices of day-old layer chicks dropped by 75% and 40–50% of newly born DOCs get unsold due to COVID-19 pandemic.

Table 7. Monthly average wholesale price (Taka) of brown layer Chicks in different divisions

Division	Pre-COVID Period (July-Dec/19)	During COVID Period (July-Dec/20)	Level of Significance
	Mean \pm SD	Mean \pm SD	
Dhaka	38.12 ± 9.70	39.71 ± 6.60	0.476 ^{NS}
Barishal	37.00 ± 7.06	36.20 ± 7.54	0.748 ^{NS}
Rangpur	38.70 ± 6.90	36.91 ± 5.90	0.559 ^{NS}
Chattogram	41.58 ± 12.04	35.31 ± 6.60	0.223 ^{NS}

Here,

- ✓ SD= Standard Deviation
- ✓ NS= Non-significance
- ✓ Tested at 5% level of significance ($p<0.05$)

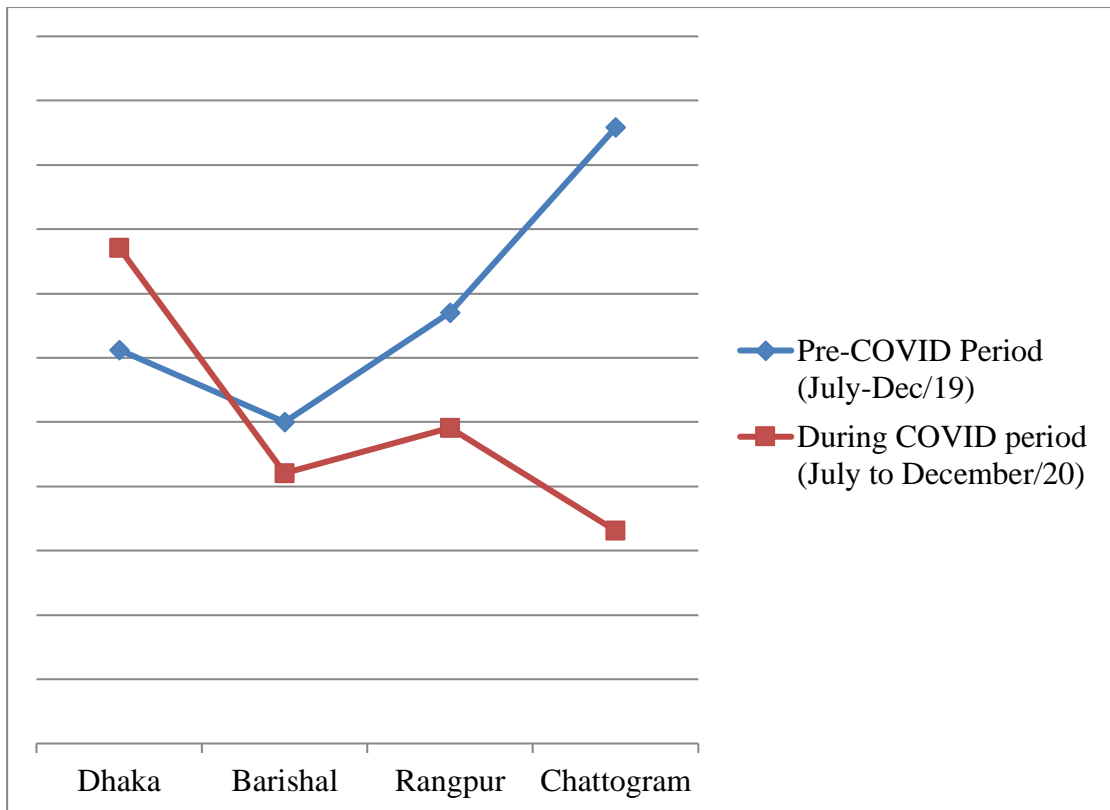


Figure 10: Comparative study of the average wholesale price of brown layer chicks in different divisions between pre-COVID and COVID period

Breeders in chick hatcheries have also been hampered by the decline in chicken agricultural production. The number of day-old chicks produced has decreased by the breeders. According to the report of (BPICC, 2020); over 50% of hatcheries have reportedly ceased producing.

4.3.2 Average wholesale price (Taka) of white layer chicks in different divisions

The mean wholesale price of white layer chicks in Dhaka, Barishal and Rangpur was 66.41 ± 12.98 , 66.14 ± 14.20 and 66.55 ± 19.23 , respectively on July to December 2019 and 44.98 ± 7.27 , 42.35 ± 5.41 and 35.52 ± 6.68 was on July to December 2020. The values showed no significant ($p > 0.05$) difference between in pre-COVID and COVID period (Table 8 & Figure 11). The results revealed that the wholesale price of white layer chicks was lower by 21.43Tk, 23.79Tk and 31.03Tk in COVID period than pre-COVID period in Dhaka, Barishal and Rangpur divisions. In COVID-19, it was a great impact on poultry industry, basically on the price of white layer chicks. Due to

COVID-19 pandemic the wholesale price of white layer chicks was fluctuated dramatically in different division of Bangladesh.

Table 8. Monthly average wholesale price (Taka) of white layer chicks in different divisions

Division	Pre-COVID Period (July-Dec/19)	During COVID Period (July-Dec/20)	Level of Significance
	Mean \pm SD	Mean \pm SD	
Dhaka	66.41 \pm 12.98	44.98 \pm 7.27	0.08 ^{NS}
Barishal	66.14 \pm 14.20	42.35 \pm 5.41	0.08 ^{NS}
Rangpur	66.55 \pm 19.23	35.52 \pm 6.68	0.05 ^{NS}

Here,

- ✓ SD= Standard Deviation
- ✓ NS= Non-significance
- ✓ Tested at 5% level of significance (p<0.05)

The result is an agreement with the previous researcher Sattar *et al.* (2021) showed that March and April, 2019 was a beneficial time of year for chicks traders and producers, because chicks prices are often slightly higher during these months. The situation, however, dramatically changed on March 26 when the pandemic hit the nation and the authorities declared a state of lockdown. As a result of the price of white layer chicks reduced from 66 Tk to 35 Tk per chick during pandemic.

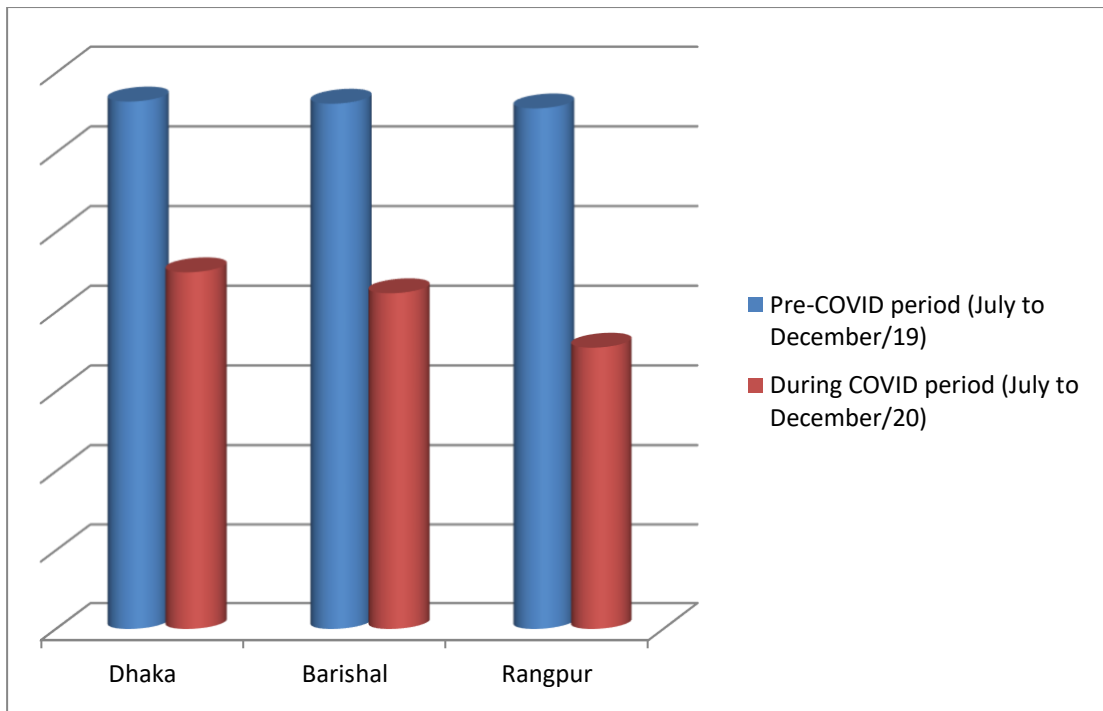


Figure 11: Comparative study of the average wholesale price of white layer chicks in different divisions between pre-COVID and COVID period

4.3.3 Average wholesale price (Taka) of broiler chicks in different divisions

The mean wholesale price of broiler chicks at Dhaka, Barishal, Rangpur and Chattogram was 25.96 ± 4.80 , 26.27 ± 5.12 , 26.27 ± 5.12 and 27.90 ± 6.17 , respectively on July to December 2019 and 23.34 ± 4.02 , 21.38 ± 4.47 , 23.33 ± 3.77 and 22.52 ± 3.08 on July to December 2020. No significant ($p > 0.05$) difference was observed between pre-COVID and COVID period among divisions (Table 9 & Figure 12). The wholesale price of Dhaka, Barishal, Rangpur and Chattogram was lower in 2020 than 2019 by 2.62Tk, 4.89Tk, 7.92Tk and 5.38Tk, respectively. Many poultry farmers shuttered down their poultry farms due to decline of consumers demand in COVID period were the main causes of increasing the price of broiler chicks. The study is an agreement with the (IDLC, 2020) reported that for many farmers, the business was unprofitable due to the difference between production costs and wholesale prices. Consequently, by April, around 70% of small to medium-sized broiler farms had shut down.

Table 9. Monthly average wholesale price (Taka) of broiler chicks in different divisions

Division	Pre-COVID Period (July-Dec/19)	During COVID Period (July-Dec/20)	Level of Significance
	Mean \pm SD	Mean \pm SD	
Dhaka	25.96 \pm 4.80	23.34 \pm 4.02	0.269 ^{NS}
Barishal	26.27 \pm 5.12	21.38 \pm 4.47	0.139 ^{NS}
Rangpur	31.25 \pm 7.73	23.33 \pm 3.77	0.079 ^{NS}
Chattogram	27.90 \pm 6.17	22.52 \pm 3.08	0.135 ^{NS}

Here,

- ✓ SD= Standard Deviation
- ✓ NS= Non-significance
- ✓ Tested at 5% level of significance ($p < 0.05$)

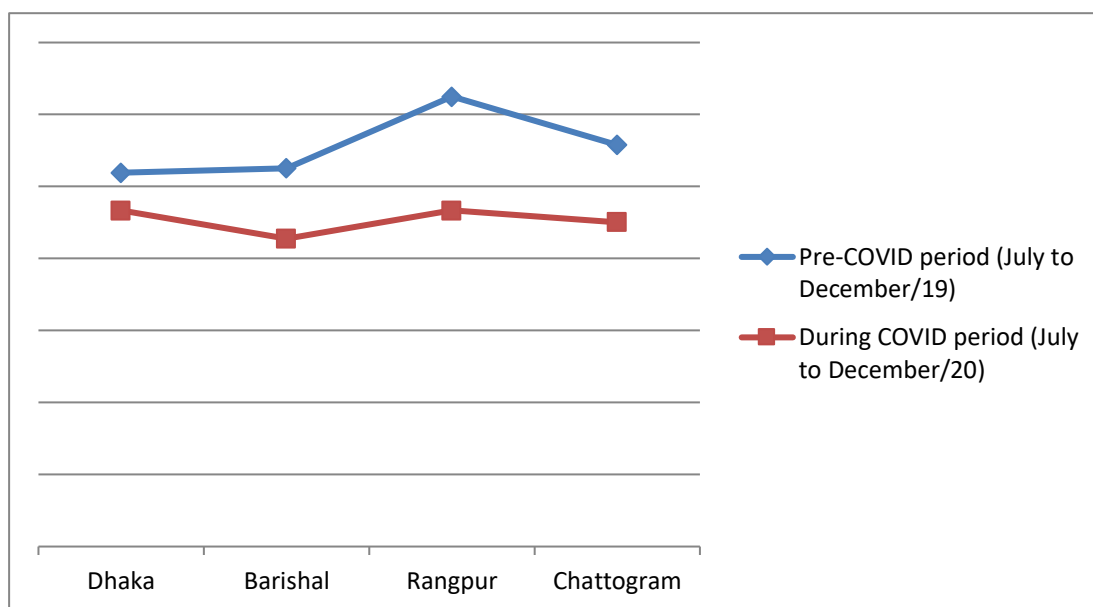


Figure 12: Comparative study of the average wholesale price of broiler chicks in different divisions between pre-COVID and COVID period

Ali *et al.* (2020) also reported that the production of chicken meat dropped quickly from 90,000 to 25,000 to 27,000 tons/month with small-scale farms being particularly badly impacted while many large-scale farms cut their flock size. So at that time demand of chicks naturally decreased as well as chick's price was decreased.

4.3.4 Average wholesale price (Taka) of Sonali chicks in different divisions

Table 10. Monthly average wholesale price (Taka) of Sonali chicks in different divisions

Division	Pre-COVID Period (July-Dec/19)	During COVID Period (July-Dec/20)	Level of significance
	Mean \pm SD	Mean \pm SD	
Dhaka	NF	NF	-
Khulna	NF	NF	-
Barishal	NF	NF	-
Mymensingh	NF	NF	-
Sylhet	NF	NF	-
Rangpur	NF	15.67 \pm 3.50	-
Rajshahi	NF	NF	-
Chattogram	NF	NF	-

Here,

- ✓ SD= Standard Deviation
- ✓ NF= Not Found

The data of the wholesale price of Sonali chicks was not available in 2019 at different divisions of Bangladesh, but it was available only at Rangpur division in 2020. So the value was not comparable. However, in Rangpur the average mean wholesale price of Sonali chicks was 15.67 \pm 3.50 on July to December 2020.

CHAPTER 5

SUMMARY AND CONCLUSION

Following the initial outbreak in the Chinese city of Wuhan, this pneumonia-like disease spread to other nations and eventually became a pandemic that has now afflicted 212 countries and territories worldwide. The first case was reported in Bangladesh on 8 March 2020. After outbreak of COVID-19 pandemic, it has a great impact on agricultural sectors, specially the poultry sector which is the most promising sector of Bangladesh. . The Covid-19 epidemic has had a devastating effect on the poultry industry by causing significant price fluctuations. Farmers suffered losses as a result of the live bird price's very slight fall. The number of restaurants, the number of restaurants that have closed, and the occupancy rate of hotels have all fallen, which has resulted in a sharp decline in the demand for broiler chicks

A total of (192x2) 384 days data were collected from eight divisions (Gazipur from Dhaka division, Khulna, Barishal, Mymensingh, Sylhet, Rangpur, Rajshahi and Chattogram) of Bangladesh. To collect the data 4 days of a month were considered randomly taking a day from each week. Total (4 days x 6month x 8 divisions) 192 days data were collected taking 48 days from pre-COVID and 48 days from COVID period for the study. For performing the study data were collected through news portal, online database, Newspaper and poultry magazine from different divisions of Bangladesh which selected randomly. The study was conducted to investigate the marketing price fluctuation of poultry and different poultry products such as live chicken, eggs and Day-Old-Chick (DOC) between Pre-COVID and during COVID period among different Divisions in Bangladesh.

The study revealed that the market price of different poultry and poultry products was fluctuated from pre-COVID to during COVID period. No significant difference was found at compared p-test except culled red chicken at Chattogram. The wholesale market price of broiler chicken was higher in COVID period than pre-COVID period. The wholesale price of culled white chicken and Sonali chicken remarked no significant ($p < 0.05$) difference. The wholesale of brown shell eggs was fluctuated up and down with no significant difference, whereas the wholesale price of white shell eggs was decreased in COVID pandemic except Chattogram division. Although the

wholesale price of brown layer chicks, white layer chicks and broiler chicks showed no significant difference between pre-COVID and COVID period, but the price of white layer chicks was decreased dramatically during COVID in the division of Dhaka, Barishal and Rangpur. The average mean wholesale price of Sonali chicks was 15.67 ± 3.50 on July to December 2020 in Rangpur division.

It is urgent for the Government policy makers to take action plan for mitigating stakeholders suffering in poultry markets. It's also necessary to maintain a database of poultry and poultry products demand and supply. The poultry producers should have knowledge about the price and supply of DOC and consumer's demand of poultry products at different season and festival which is responsible for fluctuating price of poultry and poultry products.

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APPENDICES

Appendix I

A questionnaire which used for collecting data



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Faculty of Animal Science and Veterinary Medicine
Sher-e-Bangla Agricultural University, Dhaka-1207.

For research
purpose

The collected information is for research purpose under the Department of Poultry Science, Sher-e-Bangla Agricultural University, which reserves all the rights for the information in this questionnaire.

Questionnaire-

1.Data related to information

- (a) Source : Primary Newspaper Journal Online
- If online : Article Agri. magazine News Portal Others
- (b) District : (c) Division :

2. Poultry Product Data

- (a) Type of Product: Live bird(go to no. b)
- Egg (go to no. c)
- DOC (go to no. d)

(b) Type of Live bird:

- Broiler Chicken Culled White Chicken Culled Red Chicken Sonali chicken

Appendix 1 (Cont'd)

(c) Type of Egg:

Brown Shelled

White shelled

(d) Type of DOC:

Broiler

Brown Layer

White Layer

(e) Price of Product (Taka per kg chicken/dozen egg/piece DOC)

(a) Pre-COVID

	1 st week	2 nd week	3 rd week	4 th week	Average
Month/Year	Date: Day:	Date: Day:	Date: Day:	Date: Day:	
July/2019					
August/2019					
September/2019					
October/2019					
November/2019					
December/2019					

Appendix 1 (Cont'd)

(b)During-COVID

Month/Year	1 st week	2 nd week	3 rd week	4 th week	Avera ge
	Date:	Date:	Date:	Date:	
	
	
	Day:	Day:	Day:	Day:	
	
	
July/2020					
August/2020					
September/20 20					
October/2020					
November/20 20					
December/20 20					

Enumerator

Appendix II

A sample of collecting online information data 2019

পোল্ডি ডেস্ক, এগ্রি কেয়ার২৪.কম: আজ বুধবার (৪ডিসেম্বর, ২০১৯) সারাদেশের প্রধান প্রধানবাজারের পোল্ডি পণ্য ডিম, মুরগি ও একদিনের বাচ্চার পাইকারি দাম নিচে তুলে ধরা হলো।

ইউনাইটেড এগ(সেল পয়েন্ট) লাল ডিম=৭.৫০, সাদা ডিম=৭.২০ টাকা। **ডাম্পিং মার্কেট=** লাল(বাদামী) ডিম=৬.৫৫, সাদা ডিম=৬.২০ টাকা। **গাজীপুর/মা ওনা :-** লাল (বাদামী) ডিম=৬.৫০, সাদা ডিম=৬.১৫, ব্রয়লার মুরগী =৯০/কেজি, কালবার্ড লাল=১৪৫/কেজি, কালবার্ড সাদা=১০৫/কেজি, সোনালী মুরগী =১৭০/কেজি, প্যারেন্টস=১২০/কেজি টাকা। **বাচ্চার দর:-** লেয়ার লাল =২৭-২৮, লেয়ার সাদা =৭০-৭৫, ব্রয়লার = ২২-২৩ টাকা। **চট্টগ্রাম:-** লাল (বাদামী) ডিম=৬.৬০, ব্রয়লার মুরগী =৮৭/কেজি, কালবার্ড লাল=১৬০/কেজি, সোনালী মুরগী =১৭০/কেজি টাকা। **রাজশাহী :-** লাল (বাদামী) ডিম=৬.৭০, সাদা ডিম=৬.৩০, ব্রয়লার মুরগী =৯০/কেজি টাকা। **বাচ্চার দর:-** লেয়ার লাল =২৮-৩০, লেয়ার সাদা =৭৫-৮৫, ব্রয়লার =২৪-২৬ টাকা। **খুলনা :-** লাল (বাদামী) ডিম=৬.৬০, সাদা ডিম=৬.৪০, ব্রয়লার মুরগী =৯৫/কেজি, কালবার্ড লাল=১৮০/কেজি, সোনালী মুরগী =১৯০/কেজি টাকা।

বরিশাল:- লাল (বাদামী) ডিম=৬.০০, ব্রয়লার মুরগী =৯০/কেজি, কালবার্ড লাল=১৮০/কেজি, সোনালী মুরগী =১৮০/কেজি টাকা। **বাচ্চার দর:-** লেয়ার লাল =৩০-৩১, লেয়ার সাদা =৭০, ব্রয়লার=২২-২৩ টাকা। **ময়মনসিংহ:-** লাল (বাদামী) ডিম=৬.৫০, ব্রয়লার মুরগী =৯০/কেজি, কালবার্ড লাল=১৪৫/কেজি, সোনালী মুরগী =১৭০/কেজি টাকা। **রংপুর:-** লাল (বাদামী) ডিম=৬.৬০ টাকা। **কাজী (রংপুর) :-** লাল (বাদামী) ডিম= ৬.৯৭ টাকা। **বগুড়া :** লাল (বাদামী) ডিম=৬.৯০, ব্রয়লার মুরগী =৯০/কেজি, সোনালী মুরগী =১৭৫/কেজি টাকা। **সিপি (বগুড়া):** লাল (বাদামী) ডিম=৬.৬০ টাকা।

টাংগাইল (কালিহাতি): লাল (বাদামী) ডিম=৬.৪৫, ব্রয়লার মুরগী =৯২/কেজি, কা লবার্ড
লাল=১৬৫/কেজি, সোনালী মুরগী =১৮০/কেজি টাকা। **(সখিপুৰ):** বাচ্চাৰ দৰ:- লেয়ার
লাল=২৮-২৯, লেয়ার সাদা =৮০, ব্রয়লার=২৪-২৬ টাকা।

কিশোরগঞ্জ:- লাল (বাদামী) ডিম=৬.৫০ টাকা। **নবসিংদী:** লাল (বাদামী) ডিম=৬.৫০, ব্রয়লার
মুরগী =৯১/কেজি, কালবার্ড লাল=৩২০/পিছ টাকা। **বাচ্চাৰ দৰ:-** লেয়ার লাল =২৮-৩০,
ব্রয়লার=২২-২৪ টাকা।

1/26/22, 12:59 PM বুধবারের (৪ ডিসেম্বর) পোল্ট্রি পণ্য ডিম, মুরগি ও বাচ্চাৰ পাইকারি দাম
Agricare24.com

ফরিদপুর: লাল (বাদামী) ডিম=৭.০০, ব্রয়লার মুরগী =৯২/কে জি টাকা। **কুমিল্লা :-** লাল
(বাদামী) ডিম=৬.৫০, সাদা ডি ম=৬.৩০, ব্রয়লার মুরগী =৯২/কেজি, কালবার্ড
লাল=১৭০/কেজি, সোনালী মুরগী =১৭০/কেজি টাকা। **যশোর:-** লাল (বাদামী) ডিম=৬.৭০,
ব্রয়লার মুরগী =৯০/কেজি টাকা। **পাবনা :-** লাল (বাদামী) ডিম=৬.৪৫, সাদা ডিম=৬.২৫, ব্রয়লার
মুরগী =৯০/কেজি, সোনালী মুরগী =১৫৫/কেজি টাকা।

কক্সবাজা র:- লাল (বাদামী) ডিম=৬.৪০, সাদা ডিম=৬.২০, ব্রয়লা র মুরগী =১০০/কেজি,
কালবার্ড লাল=১৮০/কেজি, কালবার্ড সাদা =১৪০/কেজি, সোনালী মুরগী =২২০/কেজি টাকা

পিরো জপুৰ (স্বৰূপকা ঠা:- লাল (বাদামী) ডিম=৬.০০, সাদা ডিম=৫.৮০, ব্রয়লা র
মুরগী=৯০/কেজি টাকা। সূত্র: বাং লাদেশ পোল্ট্রি ইন্ডাস্ট্রি জ এসোসিয়েশন (বি .পি .আই.এ), বাং
লাদেশ পোল্ট্রি খাম্মাৰ রক্ষা জাতীয় পরিষদ (বি. পি. কে.আর.জে. পি.) এবং পো ল্ট্রি প্রফেশনা ল'স
বাংলাদেশ (পিপিবি)।

Appendix III

A sample of collecting online information data 2020

Poultry Desk, Agricare24.com: Wholesale prices of poultry eggs, chickens and chicks collected from various farms across the country on Friday (23 October 2020) are highlighted below.

Here the price is given in Bangladeshi currency. The price of each piece of egg has been taken as.

United Egg (Cell Point): Red Egg =8.60 taka, White Egg = 8.30 taka. Dumping market: Red (brown) egg =8.30 taka, white egg = 8.10 taka.

Gazipur: Red (brown) egg =8.25 taka, white egg =8.05 taka, broiler chicken =100/ taka kg, culvert red = taka kg, culvert white = taka kg, golden chicken =160 taka kg.

Chicks price: Layer red= 47-48, Layer white= 45-55, Broiler= 25-30

Chattogram: Red brown eggs= 8.35 Tk, broiler chicken= 105 Tk, culled red chicken= 205tk/kg

Rajshahi : Red brown egg= 7.70 Tk, white egg= 7.40 Tk, broiler chicken= 105 Tk/kg, Sonali chicken= 155Tk/kg

Khulna : Red brown egg= 8.40 Tk, white egg= 8.20Tk

Barishal : Red brown egg= 8.10 Tk, broiler chicken = 100Tk/kg, culled red chicken= 190 Tk/kg, Sonali chicken= 220Tk/kg

Chicks price: Layer chicks brown= 40-45 Tk. White chicks= 25-28Tk

Mymensingh: Red brown egg= 8.30 Tk/piece, broiler chicken= 105 Tk/kg, Sonali chicken= 160 Tk/kg

Sylhet : Red brown egg= 8.30Tk/piece, broiler chicken= 102Tk/kg

Rangpur: Red brown egg= 7.70Tk/kg, broiler chicken= 110Tk/kg,

Chicks price: Layer brown= 45-70Tk/piece, Layer white= 28-30Tk/piece, broiler= 25Tk/piece, Sonali= 50-55Tk/piece

Appendix IV

Monthly average wholesale price (Taka) of broiler chicken in different divisions /2019

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	93.0	0	95.0	96.25	95.5	0	100.0	100.0
August	90.0	0	87.5	91.25	91.66	0	91.0	90.25
September	107.5	0	98.75	112.5	103.33	0	113.33	108.0
October	97.0	0	93.75	99.0	110.0	0	103.25	95.75
November	86.5	0	90.0	92.0	94.0	0	95.0	93.75
December	88.75	0	92.5	88.75	93.0	0	88.75	93.5

Appendix V

Monthly average wholesale price (Taka) of culled red chicken in different divisions /2019

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	171.25	0	195.0	0	0	0	166.66	190.0
August	161.66	0	187.5	0	0	0	171.66	182.5
September	155.0	0	168.75	0	0	0	170.0	165.0
October	165.5	0	177.5	0	0	0	165.0	183.0
November	150.0	0	170.0	0	0	0	167.0	170.75
December	143.75	0	170.0	0	0	0	120.0	135.5

Appendix VI

Monthly average wholesale price (Taka) of culled white chicken in different divisions /2019

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	127.5	152.5	0	0	0	0	143.33	0
August	113.33	167.5	0	0	0	0	145.0	0
September	110.0	151.66	0	0	0	0	140.0	0
October	132.5	140.0	0	0	0	0	138.33	0
November	107.5	130.0	0	0	0	0	138.0	0
December	101.25	138.5	0	0	0	0	110.0	0

Appendix VII

Monthly average wholesale price (Taka) of Sonali chicken in different divisions /2019

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	153.75	0	165.0	160.0	0	0	153.33	170.0
August	156.66	0	170.0	160.0	0	0	166.66	173.75
September	177.5	0	166.25	180.0	0	0	180.0	190.0
October	195.0	0	185.0	196.25	0	0	196.25	208.75
November	176.25	0	177.5	180.0	0	0	188.5	192.5
December	168.75	0	175.0	167.5	0	0	170.0	173.75

Appendix VIII

Monthly average wholesale price (Taka) of brown shell eggs in different divisions /2019

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	7.87	8.3	7.86	7.92	8.22	7.62	7.83	8.08
August	7.26	8.2	7.52	7.4	7.76	7.16	7.17	7.6
September	7.51	7.62	6.95	7.61	7.25	7.45	7.26	7.71
October	7.71	8.05	7.55	7.82	7.91	7.6	7.35	7.95
November	6.91	6.9	6.25	6.96	7.18	6.77	6.7	6.88
December	6.42	6.62	5.92	6.52	6.68	6.42	6.37	6.55

Appendix IX

Monthly average wholesale price (Taka) of white shell eggs in different divisions /2019

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	7.75	8.1	0	0	0	0	7.63	7.70
August	6.79	8.0	0	0	0	0	7.12	7.22
September	7.37	7.4	0	0	0	0	7.06	7.40
October	7.53	7.85	0	0	0	0	7.15	7.67
November	6.65	6.7	0	0	0	0	6.55	6.52
December	6.21	6.47	0	0	0	0	5.75	6.25

Appendix X

Monthly average wholesale price (Taka) of brown layer chicks in different divisions /2019

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	45.0	0	40.0	0	0	40.0	0	48.0
August	43.0	0	40.0	0	0	42.0	0	50.0
September	43.0	0	42.0	0	0	45.0	0	55.0
October	44.0	0	40.65	0	0	42.0	0	40.25
November	33.5	0	36.25	0	0	37.66	0	34.0
December	20.25	0	23.13	0	0	25.5	0	22.25

Appendix XI

Monthly average wholesale price (Taka) of white layer chicks in different divisions /2019

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	75.0	0	72.0	0	0	72.0	0	81.0
August	75.0	0	75.0	0	0	75.0	0	75.0
September	75.0	0	72.0	0	0	75.0	0	80.0
October	45.5	0	42.75	0	0	27.5	0	40.0
November	73.25	0	80.0	0	0	77.33	0	74.66
December	54.75	0	55.13	0	0	72.5	0	55.25

Appendix XII

Monthly average wholesale price (Taka) of broiler chicks in different divisions /2019

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	29.0	0	30.0	0	0	36.0	0	30.0
August	27.0	0	28.0	0	0	35.0	0	32.0
September	28.0	0	32.0	0	0	42.0	0	35.0
October	27.5	0	25.25	0	0	27.5	0	25.5
November	28.0	0	25.0	0	0	26.0	0	27.66
December	16.25	0	17.38	0	0	21.0	0	17.25

Appendix XIII

Monthly average wholesale price (Taka) of Sonali chicks in different divisions /2019

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	NF	NF	NF	NF	NF	NF	NF	NF
August	NF	NF	NF	NF	NF	NF	NF	NF
September	NF	NF	NF	NF	NF	NF	NF	NF
October	NF	NF	NF	NF	NF	NF	NF	NF
November	NF	NF	NF	NF	NF	NF	NF	NF
December	NF	NF	NF	NF	NF	NF	NF	NF

Here,

NF= Not Found

Appendix XIV

Monthly average wholesale price (Taka) of broiler chicken in different divisions /2020

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	107.0	0	109.0	105.25	108.5	0	100.66	108.33
August	90.75	0	90.0	93.33	92.0	0	92.0	95.0
September	90.75	0	87.5	91.25	90.25	0	93.0	92.25
October	100.0	0	93.75	101.75	99.75	0	103.75	104.25
November	96.5	0	96.25	95.0	96.75	0	98.5	98.0
December	96.25	0	93.5	96.5	96.75	0	100.0	103.5

Appendix XV

Monthly average wholesale price (Taka) of culled red chicken in different divisions /2020

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	216.25	0	215.0	0	0	0	218.75	232.5
August	197.5	0	212.5	0	0	0	207.5	228.33
September	175.0	0	182.5	0	0	0	185.0	203.75
October	182.5	0	182.5	0	0	0	191.25	202.5
November	143.75	0	160.0	0	0	0	145.0	160.0
December	128.75	0	140.0	0	0	0	145.0	145.0

Appendix XVI

Monthly average wholesale price (Taka) of culled white chicken in different divisions /2020

M/D	Gazipur	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	173.75	178.5	0	0	0	0	180.5	0
August	132.5	140.0	0	0	0	0	135.5	0
September	130.0	135.5	0	0	0	0	140.0	0
October	140.0	146.0	0	0	0	0	144.0	0
November	107.66	112.0	0	0	0	0	110.5	0
December	99.5	107.5	0	0	0	0	105.0	0

Appendix XVII

Monthly average wholesale price (Taka) of Sonali chicken in different divisions /2020

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	216.25	0	200	219.25	0	0	212.5	218.25
August	197.5	0	192.5	200	0	0	195	203.33
September	172.5	0	165	170	0	0	166.25	175
October	155	0	155	158.75	0	0	0	163.75
November	143.75	0	147.5	145.25	0	0	143.75	148.75
December	141.25	0	140	146.5	0	0	142.5	147.5

Appendix XVIII

Monthly average wholesale price (Taka) of brown shell eggs in different divisions /2020

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	7.58	7.95	7.87	7.6	7.76	7.35	7.35	7.9
August	7.73	7.8	7.65	7.76	7.9	7.51	7.225	7.93
September	7.98	8.0	7.72	7.96	8.06	7.65	7.525	8.1
October	8.17	8.3	8.0	8.15	8.41	7.82	7.575	8.32
November	6.67	6.86	6.92	6.55	6.70	6.5	6.40	6.71
December	6.27	6.28	5.75	6.22	6.35	6.21	6.15	6.36

Appendix XIX

Monthly average wholesale price (Taka) of white shell eggs in different divisions /2020

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	7.13	7.4	0	0	0	0	6.57	7.9
August	7.31	7.35	0	0	0	0	6.55	7.95
September	7.63	7.8	0	0	0	0	7.05	8.16
October	7.95	8.1	0	0	0	0	7.2	8.075
November	6.475	6.666	0	0	0	0	6.025	6.38
December	5.6125	6.075	0	0	0	0	5.5	6.125

Appendix XX

Monthly average wholesale price (Taka) of brown layer chicks in different divisions /2020

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	44.66	0	43.0	0	0	42.0	0	40.0
August	46.5	0	42.75	0	0	41.5	0	42.0
September	36.75	0	29.75	0	0	29.75	0	28.0
October	44.0	0	40.625	0	0	42.25	0	40.25
November	37.37	0	36.5	0	0	35.87	0	34.87
December	29.0	0	24.62	0	0	30.12	0	26.75

Appendix XXI

Monthly average wholesale price (Taka) of white layer chicks in different divisions /2020

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	52.66	0	49.0	0	0	43.0	0	0
August	53.0	0	47.0	0	0	42.0	0	0
September	40.0	0	41.0	0	0	37.66	0	0
October	46.37	0	43.12	0	0	27.50	0	0
November	43.5	0	40.25	0	0	35.0	0	0
December	34.37	0	33.75	0	0	28.0	0	0

Appendix XXII

Monthly average wholesale price (Taka) of broiler chicks in different divisions /2020

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	26.33	0	23.5	0	0	26.5	0	24.0
August	20.0	0	18.33	0	0	20.0	0	20.0
September	18.5	0	16.75	0	0	21.0	0	19.0
October	26.88	0	25.0	0	0	26.5	0	25.12
November	27.62	0	27.38	0	0	27.12	0	26.5
December	20.75	0	17.38	0	0	18.88	0	20.5

Appendix XXIII

Monthly Average wholesale price (Taka) of Sonali chicks in different divisions /2020

M/D	Dhaka	Khulna	Barishal	Mymensingh	Sylhet	Rangpur	Rajshahi	Chattogram
July	NF	NF	NF	NF	NF	18	NF	NF
August	NF	NF	NF	NF	NF	17	NF	NF
September	NF	NF	NF	NF	NF	18	NF	NF
October	NF	NF	NF	NF	NF	18.25	NF	NF
November	NF	NF	NF	NF	NF	13.0	NF	NF
December	NF	NF	NF	NF	NF	9.75	NF	NF

Here,

NF=Not Found