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Impacts of COVID-19 on Market Access and Pricing of Fisheries Value Chain in the Coastal Region of Bangladesh

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Abstract: The present study analyzes the market access of the biggest fish market at Chattogram coastal region of Bangladesh affected by COVID-19. The food chain was reduced locally, regionally, and globally as supply chains were disturbed and international seafood exports were halted for a certain period. For data collection several qualitative data collection tools, such as individual interviews as well as secondary document analysis were employed. To realize the overarching aim of this research the whole market system was analyzed including the supplier, wholesaler, retailer, as well as the consumer of the domestic market in the Chattogram district. The result shows that the pandemic slowed the supply and demand in the domestic fish market, and as a consequence the price of fish was distinctly reduced in the whole market system. The result highlights that the most affected stages of the supply chains are the supply quantity, the interval of the supply, and the quantity of fish sales. Furthermore, the principally affected stages of the demand chains are consumer demand and alternation in the preference of the consumer. To overcome such situation, this study recommends governmental financial support to trades to ensure the smooth flow of the supply and demand and create an alternative market system for the consumer. The pandemic and the measures to address the pandemic have created significant new challenges for market access and controlling pricing in domestic markets. Regularly engage of the policymakers are thus the prerequisite to overcome the compensation of trades and ensure food security in this sector.

Keywords: COVID-19; coastal; fish market; price; supply; value chain; impacts



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1. Introduction

The coronavirus disease of 2019 (COVID-19) crisis has affected the world in an unprecedented way [1], and also directly and indirectly affected the fisheries and aquaculture food systems [2] in various ways, such as disruptions to food production, distribution, and market access [3]. Fish and fish products are highly traded food products [4], both globally [5] and regionally [6], which have been greatly impacted by the disruption of the supply chains [7]. The crisis particularly had a severe impact on the fisheries sector of Southeast Asian countries which are the major producers of fish and fishery products, as well as major suppliers of fish to the global market. The prime cause behind this is the delays in aquaculture activities like fish seed stocking, feeding, and other operations, reducing potential production [3], as well as hatchery operations and processing facilities due

to logistic-, labor-, and input-related constraints [8] which eventually resulted in delayed marketing. The crisis becomes severe for fish products due to sharp decrease in the number of interested buyers willing to purchase products, particularly for perishable items [3]. Moreover, fishing operations were greatly hampered by national lockdown measures that prevented fishermen from going out to sea for fishing operations [9].

Bangladesh has vast biodiversity in coastal and marine ecosystems such as 475 bony fish species, 50 cartilaginous (soft-boned) fish species, and 25 shrimp species, among others [10,11]. Marine resources contribute approximately 15.05% of the total fish production, and its growth rate is 0.80% [12]. However, unfortunately, that was almost collapsed in January 2020, when the world's largest producer, consumer, and exporter of seafood markets shut down [13]. China's seafood market closure occurred at the beginning of the pandemic [14] but quickly spread to the whole world [15] though the seafoods provides food and nutrition security for hundreds of millions of people [16]. Additionally, fish provides essential micronutrients, vitamins, and essential fatty acids that became deficient in diets during the pandemic [17–21].

In case of Bangladesh similar incidents occurred when the government declared a “lockdown” throughout the nation from 23 March to 30 May, which influenced market access and the prices of accommodation due to restrictions on transportation and the reduction in consumer demand. On the other hand, export restrictions also directly hit the shrimp industry of Bangladesh, with a total of 290 export orders worth BDT 4.6 million being cancelled in the span of a month [22]. However, to date, no study is available on the disruption to small-scale fisheries in Bangladesh, particularly to assess the impacts of the COVID-19 pandemic on the fisheries value chain. Fishing communities may be indirectly and directly impacted by COVID-19 cases through trade disruptions, infected people unable to work, and government response policies. Therefore, this research aims to assess the impacts of COVID-19 on the fisheries value chain, specifically focusing on the market access and price of fishery products throughout the value chain.

2. Materials and Methods

This research was conducted at seven fish markets (Steel Mill Bazar, Kathgor Bazar, Navy Hospital Gate Bazar, Fishery Ghat, Reazuddin Bazar, Pahartoli Bazar, and Karnaphuli Gate Bazar) in the Chattogram district (Figure 1). Here, it could be mentioned that the term market is Bazar in Bengali language as used in the names of some markets names in this study. The Fishery Ghat is one of the largest fish landing stations and wholesale fish markets of Bangladesh. The Fishery Ghat and Pahartoli Bazar used to serve both purposes of supply and wholesale of fish inside and outside the Chattogram district. The Reazuddin Bazar is one of the largest retailer markets in the Chattogram district and also has some wholesale fish activity occurring in the market. These are also the common characteristics of other market of this study, namely the Karnaphuli Gate Bazar. In this study, the retail markets assessed were Steel Mill Bazar, Kathgor Bazar, Navy Hospital Gate Bazar, Karnaphuli Gate Bazar; Reazuddin Bazar, and Pathertoli Bazar. The fish marketing system in Bangladesh is traditional, complex, and crucial in connecting fish farmers and purchasers, considerably enhancing the “value-added” process of fish [23]. The COVID-19 pandemic had a significant impact on numerous fisherman's livelihoods in both inland and coastal areas as well as food processing and trading activities across the supply chain [9]. Therefore, this study will provide a comprehensive monitoring system for prioritizing and designing interventions that respond to food system disruptions from COVID-19 and preemptively avoid further cascading negative effects [3].

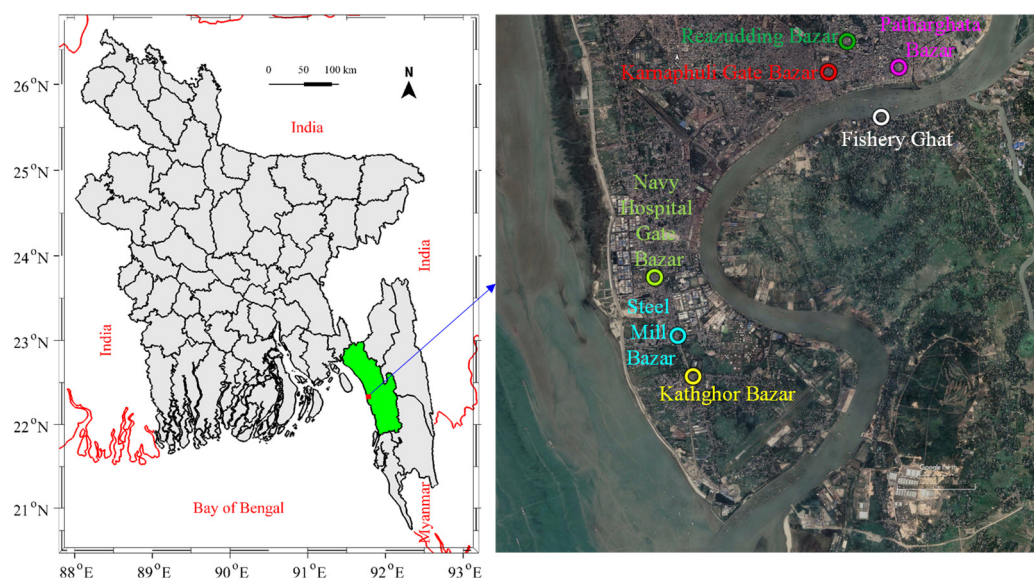


Figure 1. Geographical location of the selected fish markets in Chattogram.

In this study data were collected from both primary and secondary sources. Primary data were collected by individual interviewing the associated stakeholders such as suppliers, wholesalers, retailers, and customers at the seven fish markets in the Chattogram district. The questionnaire was developed with the aim of achieving the research objectives. A total of 179 individual interviews were conducted with suppliers, wholesalers, retailers, and consumers (Tables 1 and 2). Individual interviews were conducted at the market sites as well as shops and public transport, mainly for the consumer interviews. The data were collected by filled out questionnaire and tape recorder which were finally transcribed. After transcription of the data, the content was analyzed and themes were identified and classified into variables. All the collected information were accumulated and analyzed by Microsoft Excel 2016 and then presented in textual, tabular, and graphical forms. The secondary data were gathered from scholarly published articles on the impacts of COVID-19 on fish marketing systems and prices through an online search.

Table 1. Characteristics of respondents interviewed in seven selected fish markets.

Respondent Category	Frequency Respond	% Frequency
Supplier (<i>aratdar</i>)	14	7.82
Wholesaler	15	8.38
Wholesaler and supplier (both)	20	11.17
Retailer	85	47.49
Consumer	45	25.14
Total	179	100

Table 2. Respondents' characteristics across different market locations.

Serial No.	Market Name	Respondents Type Interviewed
1.	Fishery Ghat	Supplier, wholesaler
2.	Pahartoli Bazar	Supplier, wholesaler, retailer
3.	Reazuddin Bazar	Wholesaler, retailer
4.	Karnaphuli Gate Bazar	Wholesaler, retailer
5.	Navy Hospital Gate Bazar	Retailer
6.	Steel Mill Bazar	Wholesaler, retailer
7.	Kathghor Bazar	Retailer

3. Results

3.1. Impacts of COVID-19 on Different Value Chains

3.1.1. Supply Chain

The supply interval was influenced throughout the country due to the decline in wholesalers' demand. Approximately 59% of respondents perceived that the intervals of fish supply were “strongly reduced”, and approximately 26% perceived them as “moderately reduced” during the pandemic compared to before. Usually, these markets supply fish throughout the country, specifically Khulna, Bagerhat, Barisal, Dhaka, Comilla, etc. However, the supply volume did not undergo any change according to 97% of the respondents. Moreover, the supply and price of ice were not much affected by the pandemic according to the respondents. Due to the delay in sales of fish, fish were stored for longer than normal. The cold storage units were rented from the owner for 6 months to 1 year, and as a result the effect of the pandemic on cold storage facilities was not direct but may occur in time. Fish were mainly transported throughout the country by truck. The transportation rates were reported as “reduced” by 59% of respondents and “no change” by the rest. On the contrary, transportation scarcely occurred during the lockdown of the country. Circumstantially, transportation expenditure was “reduced” according to 65% of respondents and “slightly reduced” according to 29% of the respondents. Moreover, the demand for marine fish became remarkably altered. The demand for large and high-value fish was altered by small and low-value fish. Results show that the demand for marine fish was agreed to have “changed” according to 97% of respondents. Inversely, fish prices in the supply market were “reduced” according to 62% of respondents. The results show that the demand and prices of high-value fish were “reduced” according to 91% of respondents. High-value fish were mainly *Scomberoides commersonianus*, *Scomberomorus commerson*, *Auxis rochii*, *Thunnus obesus*, *Tenualosa ilisha*, *Penaeus monodon*, *Lates calcarifer*, *Pampus argenteus*, *Pampus chinensis*, etc., because the regular customers purchasing high-value fish were food services (restaurants), tourist, indoor and outdoor programs, which were not allowed during this period. Inversely, the demand for low-value fish increased according to 79% of respondents. Low-value fish were *Atropus atropus*, *Decapterus macrosoma*, *Selaroides leptoplepis*, *Coilia neglecta*, *Coilia dussumieri*, *Harpadon neherus*, *Lactarius lactarius*, *Setipinna taty*, *Dussumieria acuta*, *Priacanthus tayenus*, etc. (Figure 2).

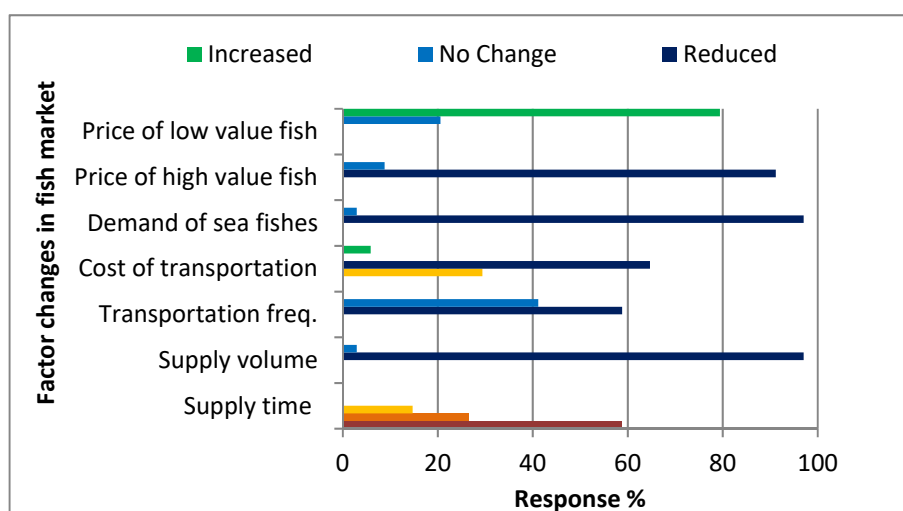


Figure 2. Perception of impacts of COVID-19 on supply chain of fish markets.

3.1.2. Wholesale Chain

Wholesalers indicated decreased sales of fish due to the lack of buyers. Following this, 60% of respondents suggested sales were “strongly reduced” and 20% indicated they were moderately reduced”, while the rest perceived them to be “slowly reduced”

at approximately 20% in the wholesale market. Furthermore, the transportation of fish also underwent no change according to 46%, was ‘slightly increased’ by 11%, and was ‘reduced’ by 43%. The respondents claim that the fluctuations in transportation remained normal compared to regular market fluctuation. The wholesalers usually carry their goods by head loading, pushcarts, and rickshaws. However, the transportation expenditure in the wholesale markets due to the COVID-19 pandemic was perceived to be “reduced” by 46%, “slightly increased” by 17%, and “increased” by 6%. Similarly, the prices of fish fluctuated, namely “slightly increased” by approximately 14%, “slightly reduced” by approximately 29%, “reduced” by approximately 34%, and “no change” by approximately 23% in wholesale markets. The percentage of demand for fish was “reduced” as opposed to any other changes. Consequently, the demand for low-value fish increased sharply in the wholesale market compared to high-value fish. The demand for low-value fish was perceived as “increased” by 83% and “no change” by 17% in the wholesale markets. At the same time, the prices of high-value fish in the wholesale markets due to the pandemic were perceived as “reduced” sharply due to the closure of food services (Figure 3).

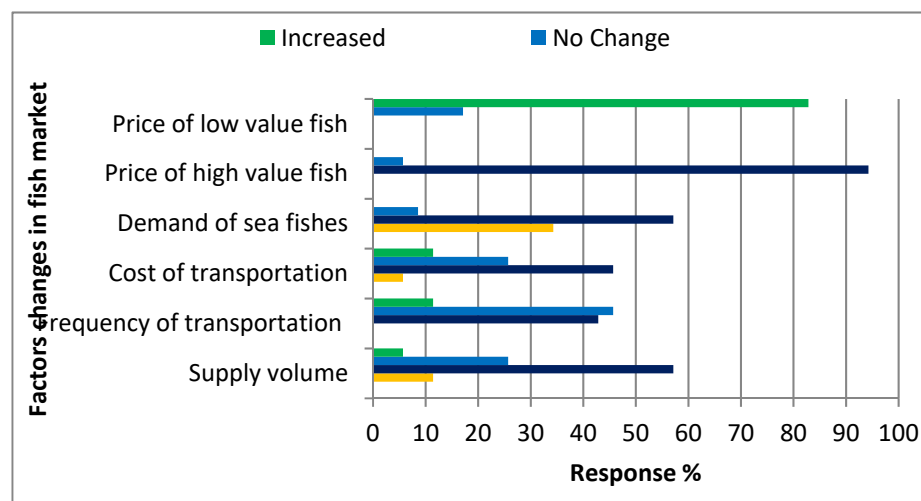


Figure 3. Perception of impacts of COVID-19 on wholesale chain of fish markets.

3.1.3. Retailer Fish Market

The pandemic affected the quantity of fish sales in the retail market. The quantity of fish sales was perceived as “strongly reduced” in the retail market due to the lack of consumers. The graph illustrates that the sales of fish were perceived as “strongly reduced” by 64%, “moderately reduced” by 19%, and “slowly reduced” by 18% in the retail market. The transportation status was perceived to have “no change” by 86% and a “slight increase” by 14% in the retail market. The retailers mainly carried their fish by van or rickshaw. The retailers claim that the abundance and availability of vans or rickshaws were increased compared to usual. Results show that the demand for fish was understood to be “slightly reduced” by approximately 68%, have “no change” by approximately 26%, and “reduced” by approximately 6%. The demand for high-value fish declined due to the lack of an indoor and outdoor program. Additionally, the price of fish fluctuated and was perceived as “slightly reduced” by 74%. The demand for low-value fish improved, perceived as “increased” by 82% and “no change” by 18%. The demand for low-value fish increased notably in retail markets due to the low price compared to high-value fish. The demand and price of high-value fish clearly declined in the retail market due to the lack of customers. Results show that prices of high-value fish were perceived as “reduced” by 88% and “no change” by 12% (Figure 4).

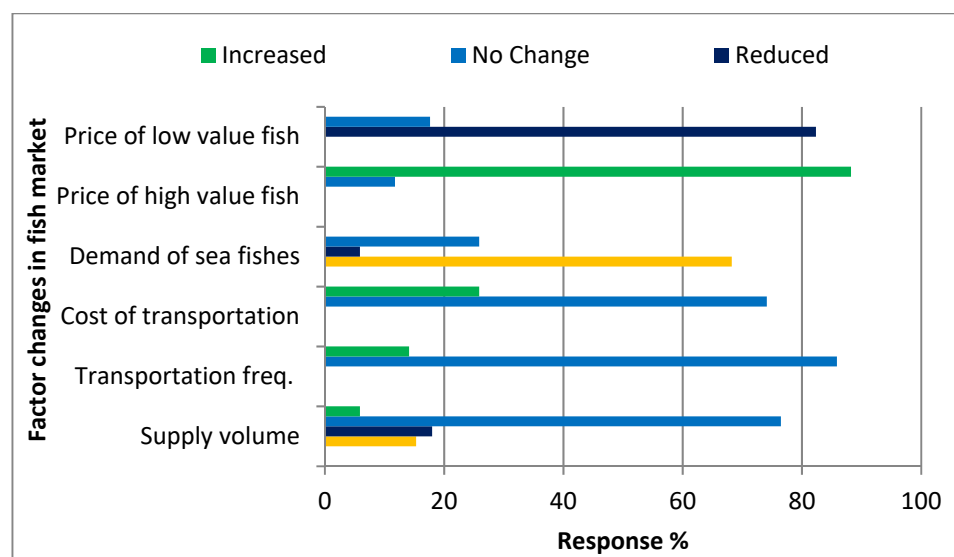


Figure 4. Perception of impacts of COVID-19 on retailer fish market.

3.1.4. Consumer Fish Market

Consumers changed their marine food habits by reducing the volume and frequency of buying fish compared to usual due to the economic crisis, fear of COVID-19, and restrictions on movement. Results demonstrate that the preferences of consumers were perceived to have undergone “no change” by 51% and “changed” by 49%. Some consumers changed their seafood habits to freshwater fish (*Labeo rohita*, *Catla Catla*, *Wallgo attu*, *Cirrohinus cirrhosis*, etc.). Most consumers reduced their quantity of high-value seafood and increased their low-value sea fish consumption weekly. From this graph it is vivid that the percentage of fluctuation in the price of fish had no remarkable change due to the pandemic. The price of fish was perceived to fluctuate as “slightly increased” by 60% and “no change” by 40%, according to the consumer. Some consumers recommended that the government needs to be aware of the fish market system with a *Hilsha* management strategy (Figure 5).

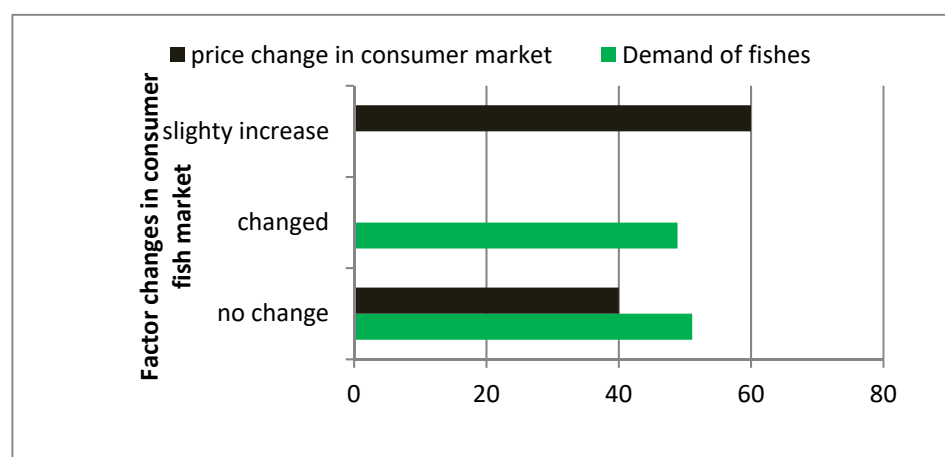


Figure 5. Perception of impacts of COVID-19 on consumer fish market.

3.2. Response to Changes Due to COVID-19 Impacts on Fish Market

The coping strategy found varied among the respondents, with 24% of stakeholders reporting that they reduced the frequency and size of meals compared to usual. Approximately 56% reduced their fish consumption, and ate more rice and vegetables instead. Approximately 19% of people reported that they diverted to other jobs such as rickshaw pulling, day laborer, earth workers, etc. Furthermore, some people migrated from one

place to another, e.g., some migrated to their village home and some to the city, forgetting any such type of job. A lack of work caused approximately 45% to become indebted for a prolonged period. Many fishermen and traders (28%) reported trying to adjust by reducing household expenses. However, a very negligible percentage of people (26%) reported receiving support via food and money from the government, despite the need for more holistic support (Tables 3 and 4).

Table 3. Responses of fish farmers and traders as a result of the effects of COVID-19 pandemic.

Respondent	Coping Strategy	Response %	Response Type
Fishery stakeholders	Reducing frequency and size of meal	67%	Short term
	Reduce fish consumption	56%	Short term
	Diverted to other jobs	19%	Short term
	Migrated from one place to another	36%	Short term
	Indebted for prolonged period	45%	Short term
	Reduce household expenses	28%	Short term
Government	Support with food and money	26%	Short term

Table 4. Summary of the changes in market system due to COVID-19 on different chains.

Chain	Major Disturbing Stage in the Market	Opinion of the Respondents
Supply	<ul style="list-style-type: none"> Reduction in supply quantity and the supply interval Transportation rate and cost of transportation are reduced Depletion of the wholesaler demand Price of the high-value fish is lower than the price of low-value fish Market facilities (ice, cold storage, labor, etc.) are slightly hampered 	Harvesting was continuous but fishing can be influenced by recent floods, 65-day ocean ban, and <i>Hilsha</i> ban season. Besides, the demand for fish throughout the country is reduced steeply.
Wholesale	<ul style="list-style-type: none"> The sales of goods are greatly reduced Declination of the demand for high-value fish is greater than low-value fish Sales of low-value fish are greater than high-value fish Aggravation of the demand of the retail market Market facilities (ice, storage, transportation) are slightly affected. 	The foremost customers of seafood are restaurants, hotels, public factions, indoor and outdoor programs, and tourists, and those activities were almost halted due to the pandemic. As a result, the demand for seafood was reduced steeply in the wholesale market.
Retail	<ul style="list-style-type: none"> Reduction in the quantity of sales Escalation of the demand for low-value fish The attendance of customers at the market are reduced due to fear of COVID-19 	The leading causes of the reduction of demand are fear of coronavirus, rumors, economic crisis, reduction in income, closure of tourism.
Consumer	<ul style="list-style-type: none"> Alteration of the consumer preference of seafood 	

4. Discussion

The findings from this study suggest that the marine domestic fish markets were thoroughly affected by the COVID-19 pandemic. Usual market access did not occur in domestic markets due to the restrictions on movement, as well as the fear of COVID-19. Market access and price were considerably slowed in the fish market by disturbing the demand and supply chain. The demand for marine fish had dropped steeply across the whole market system, which posed a risk to food and nutrition security and led to economic scarcity. The study found that the causes of the reduction in demand were the closure of food services and restrictions on tourists who are the principal consumer of marine fish.

The study demonstrates a correlation between the demand of the consumer and market access to fish. This analysis supports the theory that the prices of goods were reduced due to the reduction in the demand for the products. Therefore, the study claims that the declination of the demand for marine fish was the main obstacle in market access and demand and altered the whole food system.

The results might suggest that the demand for marine fish was altered across the whole food system as a result of the change in consumer food habits. However, most studies claim that the causes of the declination in demand were the restriction on movement, tourists, closure of restaurants, cease of indoor and outdoor programs, etc., who are the leading buyers of marine fish. These findings are consistent with [24] who claimed that the pandemic created a global problem by squeezing out the demand and supply. The author also claims that fish and food supply chains faced difficulties in marketing due to the COVID-19 pandemic. The study demonstrates that, despite uncertainties posed by the pandemic, the market facilities, including ice and cold storage, were not significantly affected. The findings contradict those of [25], who claimed that ice demand in Uganda was reduced as a result of dealers providing households directly rather than small-scale market traders. Fish farmers and fishermen identified food aid, financial assistance, and institutional livelihood support as the three types of social support that were crucial during the lockdown. Food aid in the form of relief goods was mobilized by both public and private actors throughout the country [26]. However, the study results are in accordance with global research on the impact of COVID-19 on the seafood market. Previous studies and reports claim that the consumer changed their food habits worldwide, which also occurred in this study of the coast of Bangladesh. The consumers altered their seafood habits from fresh, chilled seafood to frozen, canned seafood products from the USA [27]. This study finds that the consumer modified their marine fish consumption habits from high-value fish to low-value fish due to the economic crisis and closure of food services. Due to lower sales volumes and clients, suppliers reduced their supply intervals and the number of products they supplied, while wholesalers and retailers cut their input products. Furthermore, the study observed that the price of fish decreased steeply in the whole market chain. In [28], it was claimed that the COVID-19 pandemic impacts the supply chain by decreasing the buying input and selling products of the trader. The author also observed difficulty in accessing transportation, decreases in buyers, and a reduction in fish prices.

The COVID-19 pandemic has caused heavy impacts on the fisheries sector, especially on the socio-economic conditions of stakeholders, e.g., fishers, fish farmers, traders, as well as consumers, as the shutdown of food services along the supply chain placed significant stress on them, not only on the production aspect but also in marketing and trade [9]. Changes in the regular flow of life, even to a small extent, may adversely affect the entire well-being of already-marginalized classes [29,30]. The records of global epidemics show severe negative impacts on food and nutrition security, particularly in developing countries, affecting vulnerable populations, especially children, the elderly, and women [31]. Small-scale fisheries communities, especially in coastal regions where job opportunities are scarce, need massive relief packages from the government to minimize the negative economic impact and sustain this dynamic agribusiness sector. This investigation has provided an initial assessment of the pandemic based on stakeholders' perspectives. However, the situation is dynamic, and further follow-up assessment is required at the national level to understand the impacts of the pandemic as a whole. However, there are still unanswered questions as to whether the alterations in food habits of consumers are temporary or permanent, how to overcome the compensation of small-scale trades, how to respond to the food security and economy of countries, and how to influence the domestic market via the restriction of exports. The number of respondents and study area were limited due to lockdowns and social actions taken throughout the country.

5. Conclusions

The global and national food markets suffer more uncertainty, significance, and difficulties due to restrictions on movement to halt the spread of the COVID-19 disease. The supply chain of the marine fish market has been altered by the rules and restrictions of pandemic outbreak prevention. The COVID-19 pandemic inflicts damage on seafood markets, particularly on the market access and demand for marine fish due to the closure of food services, tourism, and social programs. The study determined the impacts on market access throughout the supply chain, which includes suppliers, wholesalers, retailers, consumers, and food service providers. The study also finds that the most affected stages of the value chain are the supply quantity and interval, sales quantity of products, and demand for marine fish. However, the study shows that the effects of COVID-19 on market access are considerable in the demand chain and supply chain. Finally, to ensure market access and the pricing of the fish correlate, the government should come forward to secure food security and smooth the economic growth of the country. The study also provides a set of recommendations for the improvement of market access and pricing of coastal fisheries in Bangladesh for future pandemic impacts:

- Providing financial support to small-scale traders.
- Assuring the smooth flow of products and inputs.
- Assuring consistent demand.
- Encourage purchasing of seafood for institutional use such as in hospitals and schools and promote increased domestic demand.
- Online sales of seafood products.

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