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## Availability of fish species in fish markets and fish marketing in Noakhali district, Bangladesh

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### Abstract

The present study was conducted to know the fish markets and marketing practices in Noakhali district for a period of 5 months; November 2014 to March, 2015. Five types of marketing channels were found in this study and most were similar in nature as marketing places were in same town and not far apart. The average cost by a retailer to trade fish was estimated at Tk. 171.6 /day. This cost included rent of trading spot, ice and local transportation. The average income of retailers in three markets was estimated at Tk. 640/day/retailer. It was found that 21% of fish supplied in the markets were carps (Indian and Exotic), 17.3% marine fish, 15.7% hilsa, 12.7% catfish, 11.3% small fish, 11% Tilapia and pungus, 7% others mix species and 4% prawn. It was reported that availability fish species in three different markets round the year ranged from 55 to 72. However, during the study period, a total of 39 fish species under 24 families were found in three markets. It was found that marine fish comprises average 33% and freshwater fish comprises average 67% in the three markets. The price of fish depends on market structure, species quality, size, weight and season. The price of galda and bagda were varied from 580±10 to 560±8 Tk. /kg, and 370±10 to 350±5 Tk. /kg respectively. The price of catla, tilapia, ilish, Thai pangus and silver carp were varied from 390±10 to 360±8 Tk. /kg, 165±5 to 150±8 Tk. /kg, 900±10 to 860±5 Tk. /kg, 140±10 to 125±5 Tk. /kg, and 160±8 to 155±5 Tk./kg, respectively. In Noakhali, around 50-180 retailers were involved in each market. It was found that the daily supply of fish in Municipal market, Datter hat and Sonapur was about 12-13, 7-8 and 2.5-3ton, respectively. Inadequate infrastructure, transportation, shortage of ice in peak season, hygienic condition and packaging facilities were cited as main constraints. It was found that 80% of the fish retailers have improved their livelihood status through fish trading to a certain degree.

**Keywords:** Fish species, fish markets, marketing, Noakhali district

### 1. Introduction

Bangladesh has vast water resources and is also rich in biological diversity with approximately 300 fresh and brackish water fish species. Fish and fisheries resources play a vital role in the socio-economic development of Bangladesh. But recent estimates suggest that worldwide 20% of all freshwater species and 5-10% of the marine fish species are extinct, endangered or vulnerable. Decline of natural fish population and extinction of fish species is largely due to over exploitation for consumption as foods and/or industrial uses. Most of the fishes used as foods are usually sell through fish markets of different forms. In Bangladesh, fish marketing is almost exclusively maintained by the private sector. Four distinct tiers viz. primary, secondary, higher secondary and consumer market of marketing systems are observed in the process of distribution of fishes in Bangladesh. Fish collectors commonly known as *Mahajans* or *Aratdars* procure fish from the catchers, with the help of local brokers who get a profit margin or commission from the *Mahajans*. However, the most serious marketing difficulties seem to occur in the remote communities which lack of transport ice, poor road facilities and where the farmers are in a particularly weak position in relation to intermediaries. A new marketing chain have settled by the middlemen based on the extreme exploitation of the fish farming communities by setting up an illogical artificial pricing policy through intermediaries' at different levels. As a result dissatisfaction to consumers, farmers, fishers and poor traders occur due to high marketing margin and high price. Noakhali region is recognized as one of the most densely populated areas where significant amount of fishes are traded. Though the region is also famous for fish farming, but it is known that many fishes also enters in fish markets of *Noakhali* from elsewhere. Previously, like other parts of the country, people in *Noakhali* were used to depend on natural fish coming from diverse sources.

Bangladesh is rich in both of water and fishery resources. It has about 40, 24,934 ha of closed water bodies (capture based), 10, 31,563 ha open water bodies (rivers and estuaries), 28, 10,410 ha floodplains and *beels* are 1, 14,161 ha. She has 2640 sq. nautical miles of territorial water, 41,040 sq. nautical miles of exclusive economic zone including territorial water and 2680 sq. nautical miles of continental shelf excluding internal and territorial water. The length of coastline is 710 km<sup>[11]</sup>. The physical features, climate and natural resource constraints have made the country predominantly rural, which accounts for 85% of the total population. About a half (44%) of the population is considered to be below the poverty line. The share of agriculture to GDP is 25% and that of industries sector contribution to GDP is 17%. Agriculture still employs 63.2% of the total population. With the annual growth rate (1.48%) of population in Bangladesh, the per capita cultivated land is only 0.25 acres which is not a good size when economies of scale are taken into account. The intensity of cropping is only 185% and rice economy still dominates the crop sector<sup>[32]</sup>. As the middlemen have established a marketing chain based on extreme exploitation of the fish farming communities by setting up an artificial pricing policy through intermediaries at different levels, therefore, in order to make fish available to consumers at the right time and in the right place, an effective marketing system shall have to be evolved to safeguard the fish producers from exploitation by the network of intermediaries. The marketing system and structure is one of the main circumstances of socio economic condition of the local people and production system of any area. With intra-linkage and inter-linkage from production sector to consumer sector, it is a chain of various systems involved in marketing. As fish and fishery products are highly traded commodities, fish production is a necessary part of the

marketing process to make a whole complete. The total fish production in Bangladesh was estimated to near about 2.56 million tons in 2007-08, of which near about 2.07 (80.59%) and 0.5 (19.41%) million tons came from inland and marine waters respectively<sup>[9, 10]</sup>. The marketing system comprises a market, marketing channel along with packaging, transportation and storage facilities. The highest quality loss of 35% occurs due to longer exposure of fish at high temperature followed by 25% rough handling and excessive pressure<sup>[31]</sup>. Though fish farming is regarded as an industry and fish marketing system is well practiced in many countries of the world, the fish farmers in Bangladesh hardly get any chance to communicate directly with the consumers. Fish is highly perishable with unpredictable supply; analysis of fish marketing is essential considering the fact that fish is the main protein source in the diet of Bangladeshi people, which supplements 60% of total animal protein<sup>[12]</sup>. According to<sup>[4]</sup> almost all fish trades internally move through the private sector where a large number of people are dealing with fish distribution and marketing system. However, The main concern of the present study is to know availability of different fish species in some selected market places in *Noakhali* district; the supply chain, prices and marketing procedure and to know the socio-economic conditions of retailers and fish traders.

## 2. Materials and Methods

### 2.1 Study area and periods

The study was carried out in three markets, namely Municipal market, *Datter hat* and *Sonapur bazar* under *Noakhali* district (Figure 1). The study was guided for a period of 5 months from November, 2014 to March 2015.





**Fig 1:** Map of Noakhali district and aerial view of three market places (a) Municipal (b) Datter hat (c) Sonapur.

**2.2 Methodology**

The study was based on market survey obtaining information through a sample survey among fish traders, fish farmers, operators (middlemen), consumers. In order to study the variety of fishes of the studied area, the research functions were based on fish market visit, capture photograph, interview of spot people, sample collection, and secondary data collection.

**2.3 Target groups**

**2.3.1 Fish retailers**

All activities of fish retailers are involved in selling goods or services directly to final consumers. The function of retailers is to instigate supplies and exhibit them in forms and at times compatible for consumers. Generally retailers buy fishes

through open market.

**2.3.2 Intermediaries**

Intermediaries are also fish retailers but they do not sell fishes directly to consumers and the intermediaries are fishermen, *aratdar*, wholesaler/ *paiker*, local agent (*dalal*) and *bepari*.

**2.4 Sample number**

A total of 15 fish retailers and wholesalers were selected for questionnaire interviews in three different markets from Noakhali districts and (Table 1). It is noted that about 180 retailers are involved in Municipal market, 50 in Datter hat, and 115 in Sonapur market. Among them a total of 15 retailers (5 from each market) were interviewed in different fish markets.

**Table 1:** Sample sizes in different markets in Noakhali district.

Study Area	Market	No. of retailers	Data collection methods
Noakhali district	Municipal market	5	Questionnaire interview method
	Datter hat	5	
	Sonapur market	5	
Total number of interviewed retailers		15	

**2.5 Data collection method**

The data were collected by using questionnaire-based interviews, Participatory Rural Appraisals (PRA) and cross-check interviews with key informants. Cross-check interviews were conducted with key informants such as Upazila Fisheries Officer (UFO), District Fisheries Officers (DFO) and relevant GO and NGO officers and staffs.

**2.6 Questionnaire interviews**

The questionnaire interviews were carried at the market place during trading time. For questionnaire survey, fish retailers and wholesalers were selected through simple random sampling method. Fish retailers attend in interview together with their fish selling actions result there was a chance to inspect the marketing functions. The questionnaire was normal and focusing only marketing information.

**2.7 Data processing and analysis**

The collected data were anatomized and summarized cautiously before the actual tabulation. Data from different relevant sources were coded and recorded into a database system with the help of Microsoft Excel 10 software.

**3. Results**

**3.1 Fish marketing systems**

The supply chain from landing center to market from fishermen to consumers passes through a number of intermediaries; local fish traders, agents, wholesalers and retailers (Figure 2). Five types of supply chain for marketing were found in this study. The first one was fishermen - *aratdars* - *bepary* - *Paiker* - retailer - consumer, second one was fisherman-*aratdars* - *Paiker* - retailer - consumer, third one was *aratdar* - *Paiker* - retailer - consumer, fourth one was *bepary*- *aratdar* - *Paiker* - retailer - consumer and fifth one was *aratdar* - retailer - consumer. The all five supply chain is almost similar except number of intermediaries (Figure 2).



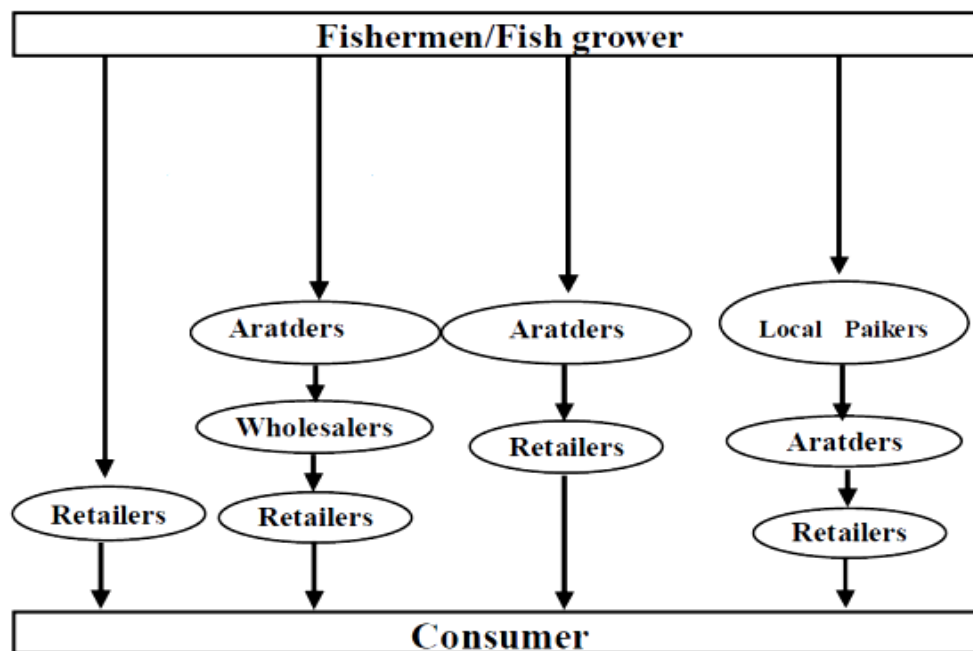


Fig 2: Fish distribution chain from fisherman to consumers in Noakhali district

### 3.1.1 Sources of fish

The wholesalers of *Noakhali* usually bought fish from the *aratdar* of *Chairman Ghat, Hatiya, Boiar Char, Char Langanya, Char Jabbar, Ziar Char, Sandwip, Chandpur* and *Barisal*. These fish are carried by boats, buses trucks or trawlers and were sold them to wholesalers with the help of commission agents. Wholesalers sold their fish to the retailers through open auction. Retailers sold their fish to the local consumers. Local retailers usually sold the fish to consumers in village markets and also wholesale markets. Agents or suppliers also carried fish from remote villages to the wholesalers in market center. It was learned that suppliers occasionally take small amounts of *dadon* (credit) from wholesalers to ensure the supply of fish. The mode of transport commonly used by supplier to wholesale market mentioned earlier for locals and transport time varies from 35 minutes to 2 hours depending on distances and mode of transport. Most of the traded fish (80%) were brought from different areas of the district and the remaining part (20%) from *Chittagong, Baroyaarhat, Cox' bazaar, Comilla, Dawdkaandi, Mymensingh, Satkhira, Barisal* and *Chandpur* region and some also from *India*.

### 3.1.2 Capital in operation

Retailers typically operate with capital of around Tk. 12,000 to 20,000 per day. The wholesalers possess more capital (around Tk. 22,000 to 100,000 per day) than suppliers and have certain degree of control on retailers, especially when retailers purchase fish on credit. It was also found that some small wholesalers (10%) also act as retailers and have stall in retail fish markets. It was found that 80% of retailers used their own money for fish trading while the rest 20% received loans. By survey, it was found that the demand for following fishes; *Indian major carps, small indigenous fishes (SIS), local catfishes* and some marine *Lotia, Tulardandi, Poamach,*

*Churi Shrimp, Hilsha* are very high in *Noakhali* fish markets among the natural fishes. Prawns are low availability in markets. It was observed that a strong network has developed with brokers and traders intervening between suppliers at one end and the consumer at the other end.

### 3.1.3 Human resources involved in market

In *Noakhali*, around 50-180 retailers are related in each of the markets. A number of people also found to work with the retailers as day labors. It was also observed that the children were massively involved in fish markets. No women involvements were observed in wholesale or retail marketing in *Noakhali* fish market. They also reported that price differs according to daily demand, incidental festivals, particular events and there are usually seasonal variations in prices with the highest in summer (March to May) and the lowest in winter (November to January).

### 3.2 Supply of fish in markets

As shown in carp (*Indian and Exotic*) dominated the list at roughly 21%, followed by *Tilapia* and *pungus* 11% contributed of the total fish marketed on the day of observation. In study area the market shares of main group of fishes varied according to the demand and availability in that area. From the survey, it was observe that consumers still prefer indigenous fish. In the three markets, *catfish* 12.66%, *small fish* 11.33%, *marine fish* 17.33%, *hilsha* 15.66%, *prawn* 4%, *others* 7%, and *carps ( Indian and Exotic)* comprises average 21% and *pungus* and *tilapia* 11%.

*Small fish (mixed)* dominated the list at roughly 11.33%, followed by *local catfish* 12.66% comprising 6 species, *Marine fish (diverse species)* 17.33%, *others* 7%. However, as single species *hilsha* contributed 15.66% and *prawn* contributed 4% (Figure 3, 4 and 5).

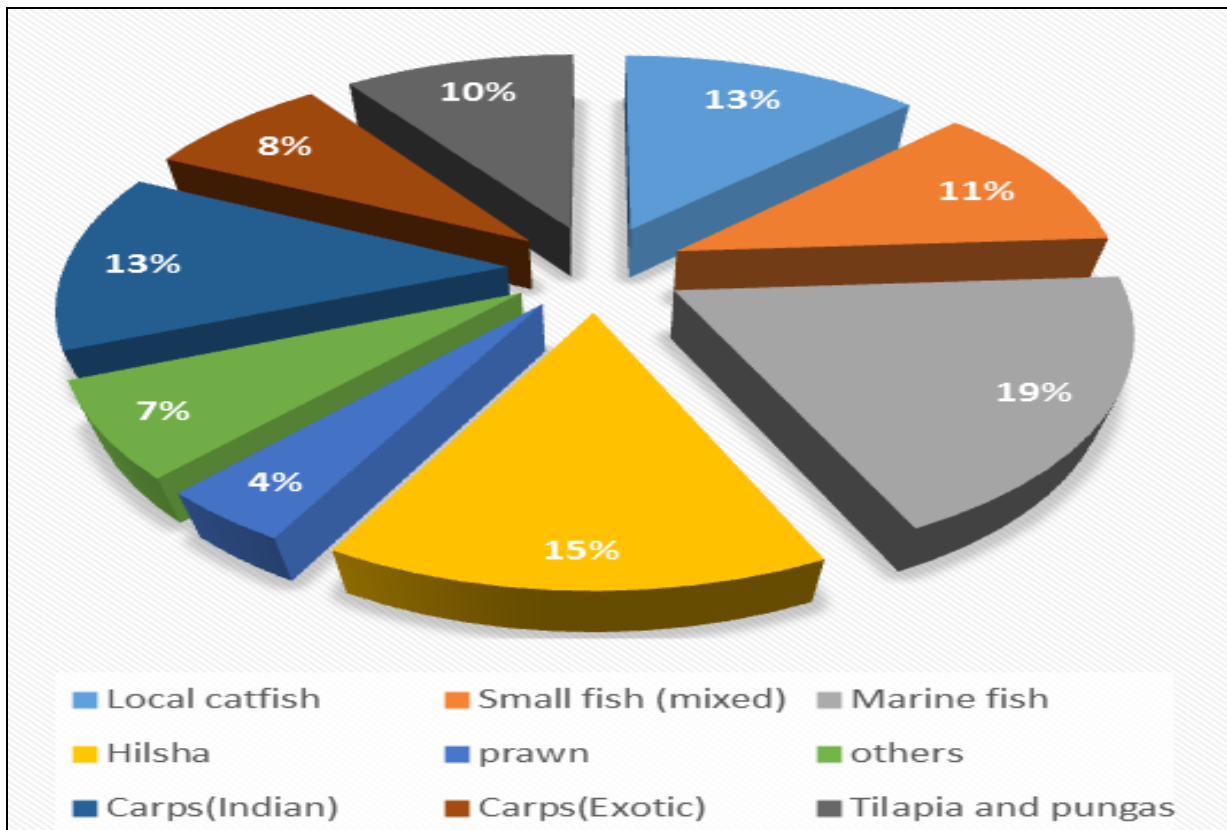


Fig 3: Market share of fish market in Municipal market.

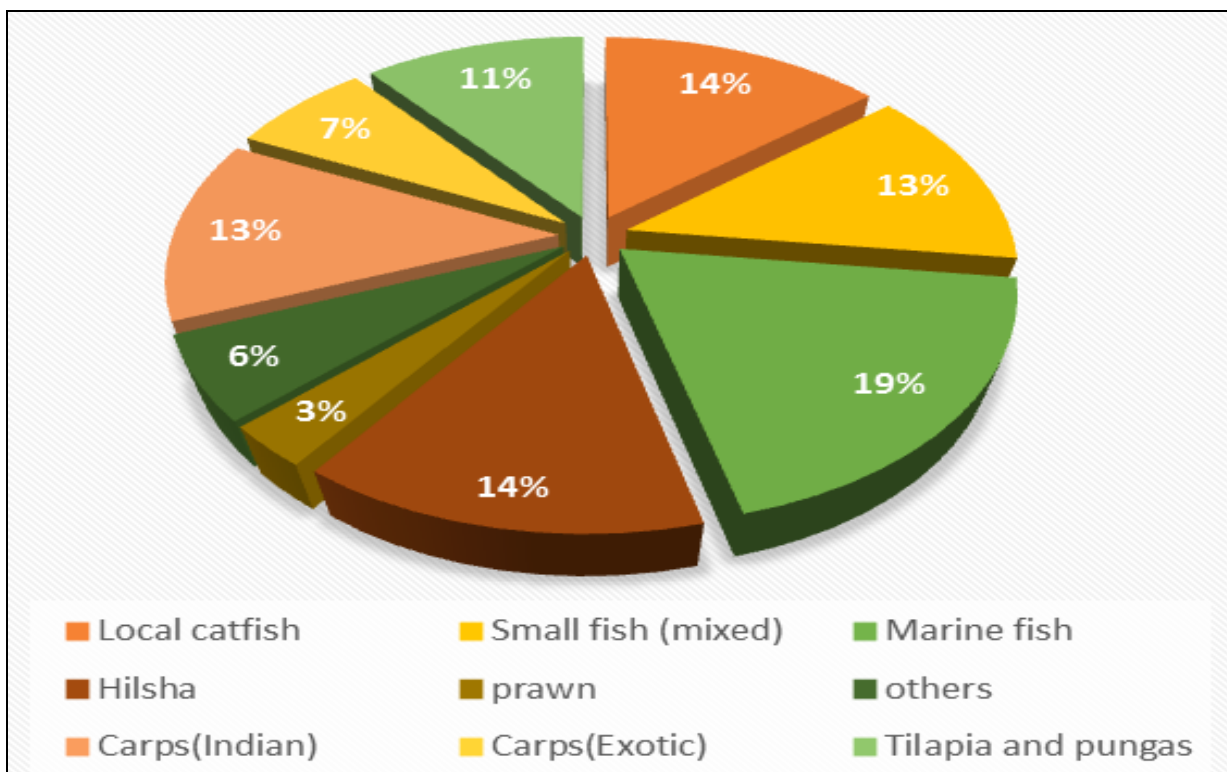


Fig 4: Market share of fish market in Datter hat.

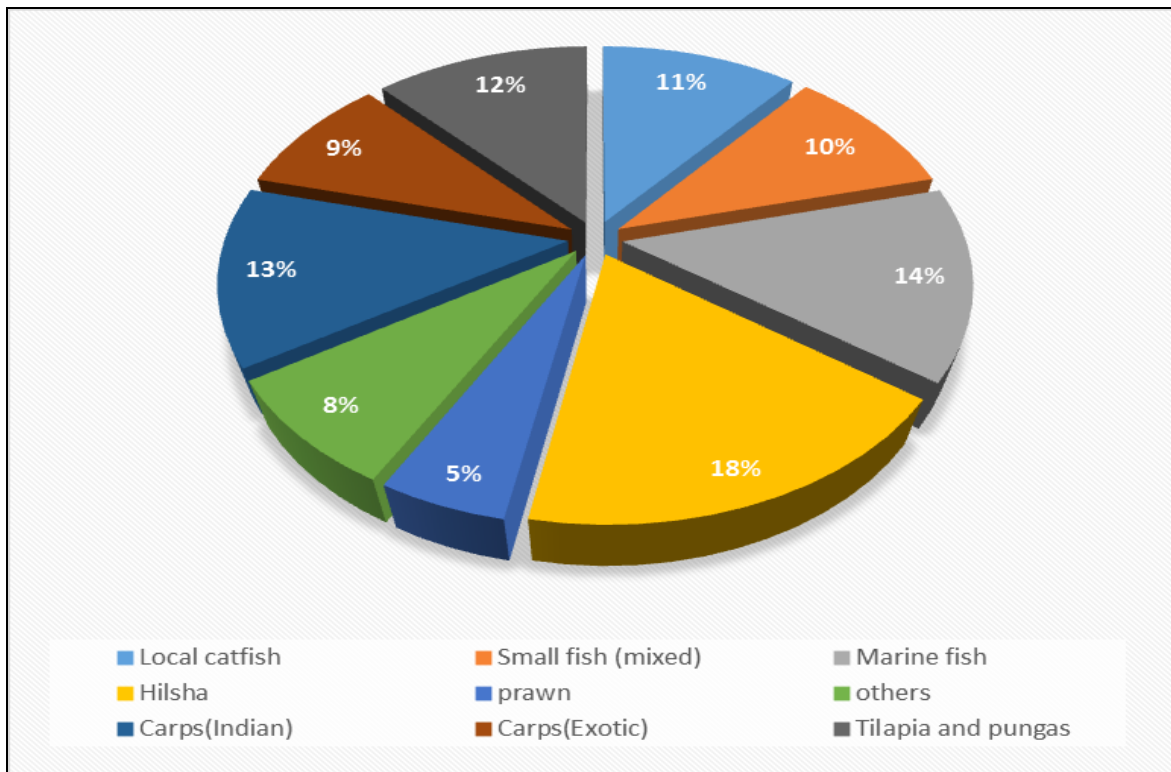


Fig 5: Market share of fish market in Sonapur market

**3.3 Comparative market shares of freshwater and marine fish**

According to the present study, it was found that marine fish comprises average 33% in the three markets. In the markets,

freshwater fish comprises average 67% (Figure 6). Large number of marine fish was found in the markets of the district due to the vicinity of the area to the Bay of Bengal.

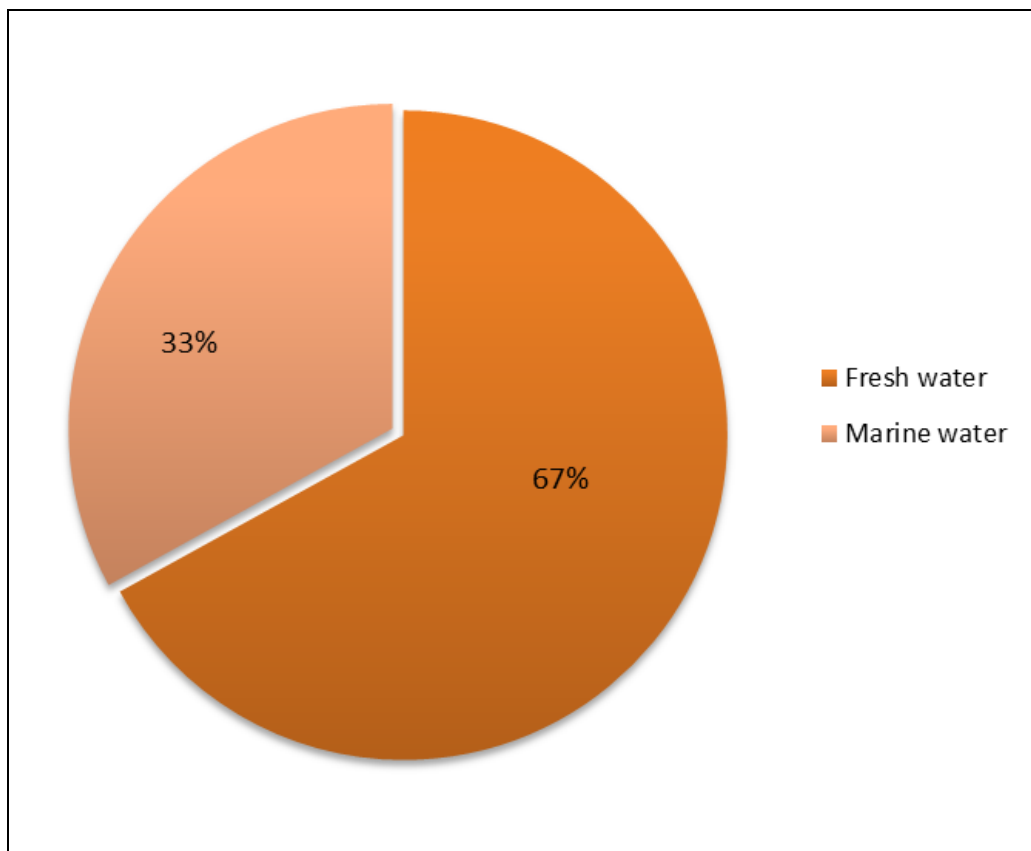
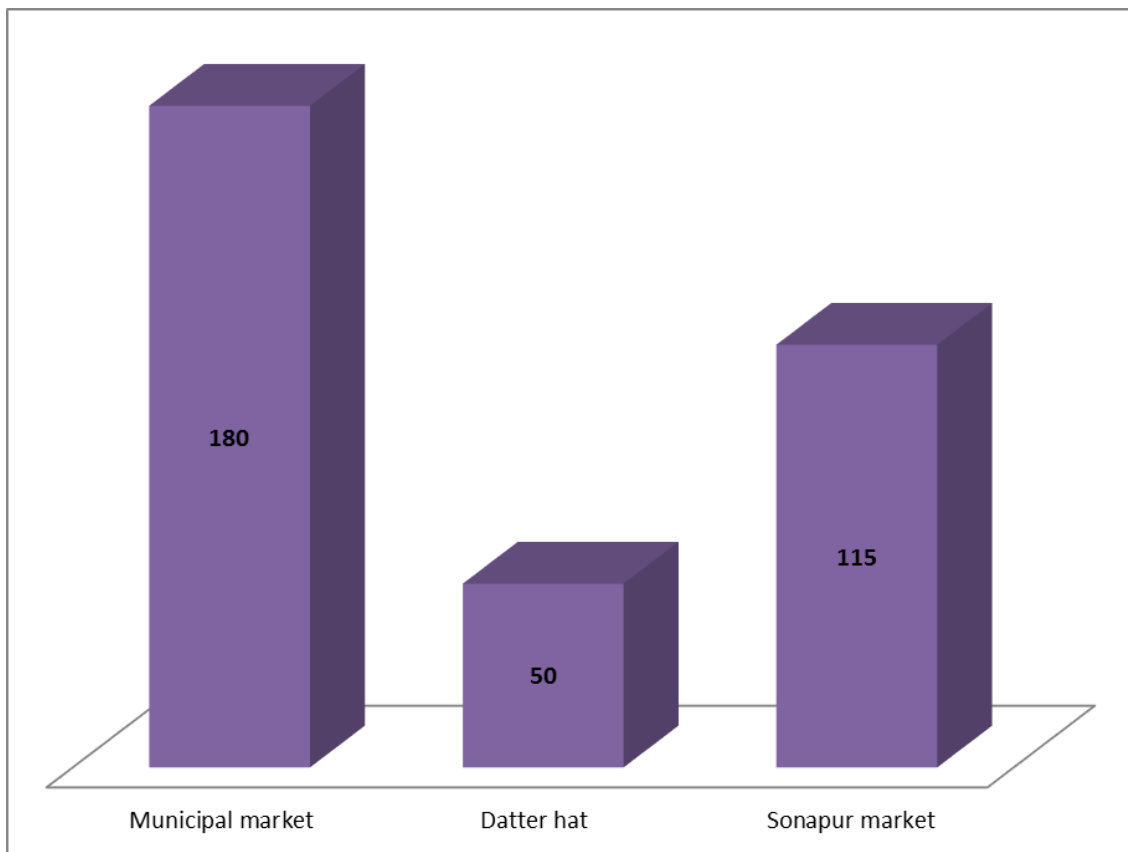


Fig 6: Market shares of available fishes in markets.

**3.4 Number of fish retailers**

In Noakhali, around 50-180 retailers were involved in each

market. Around 50 retailers were involved in Datter hat, 115 in Sonapur, and 180 in Municipal market (Figure 7).



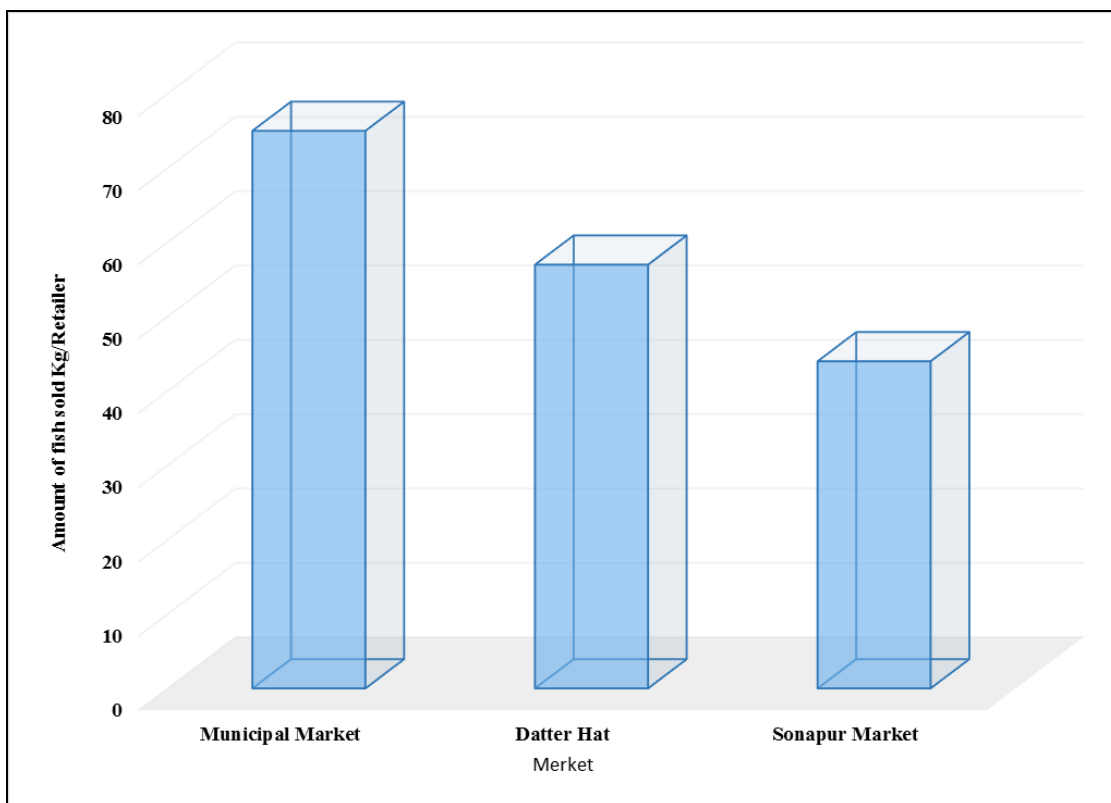
**Fig 7:** Average Number of fish retailers in different markets of *Noakhali* district.

**3.5 Amount of fish landing**

According to the survey, it was found that the daily supply of fish in Municipal market, *Datter hat* and *Sonapur* was about 12-13 mt, 7-8 mt and 2.5-3 mt respectively.

**3.6 Amount of fish sold**

According to the present survey, it was found that a fish retailer of Municipal market, *Datter hat*, *Sonapur* bazar, sold an average 75 kg, 57 kg and 44kg fish daily respectively (Figure 8).



**Fig 8:** Amount of fish sold in different markets of *Noakhali* district

### 3.7 Price of some important fish species

There are different groups of fishes such as carps, catfish, small indigenous species (SIS), tilapia, prawn and shrimp, hilsa and some limited secondary data; it has not been

possible to do any proper price analysis. The prices of fish mostly depend on the supply and demand of fish. The price of fishes was comparatively higher in the Municipal market than other markets (Table 2).

**Table 2:** Average Price of Different group of Fishes in three markets.

Major fishes	Municipal Market	Datter Hat	Sonapur Market	Average
Cat fish	286.5	290.5	305	294
Small fish	190.5	186.7	183.1	186.76
Hilsa	410	376	380	388.66
Prawn	690	680	675	681.66
Tilapia	150	140	160	150
carps	135.6	136.76	133.87	135.41
Others: Mixed; Fresh water and marine fish	165.4	163	160.66	163.02

### 3.8 Availability of fish and their sources in the markets

The number of species landed in the three different markets was ranged from 55 to 72 (Table 3).

**Table 3:** Number of fish species in three different markets of Noakhali district

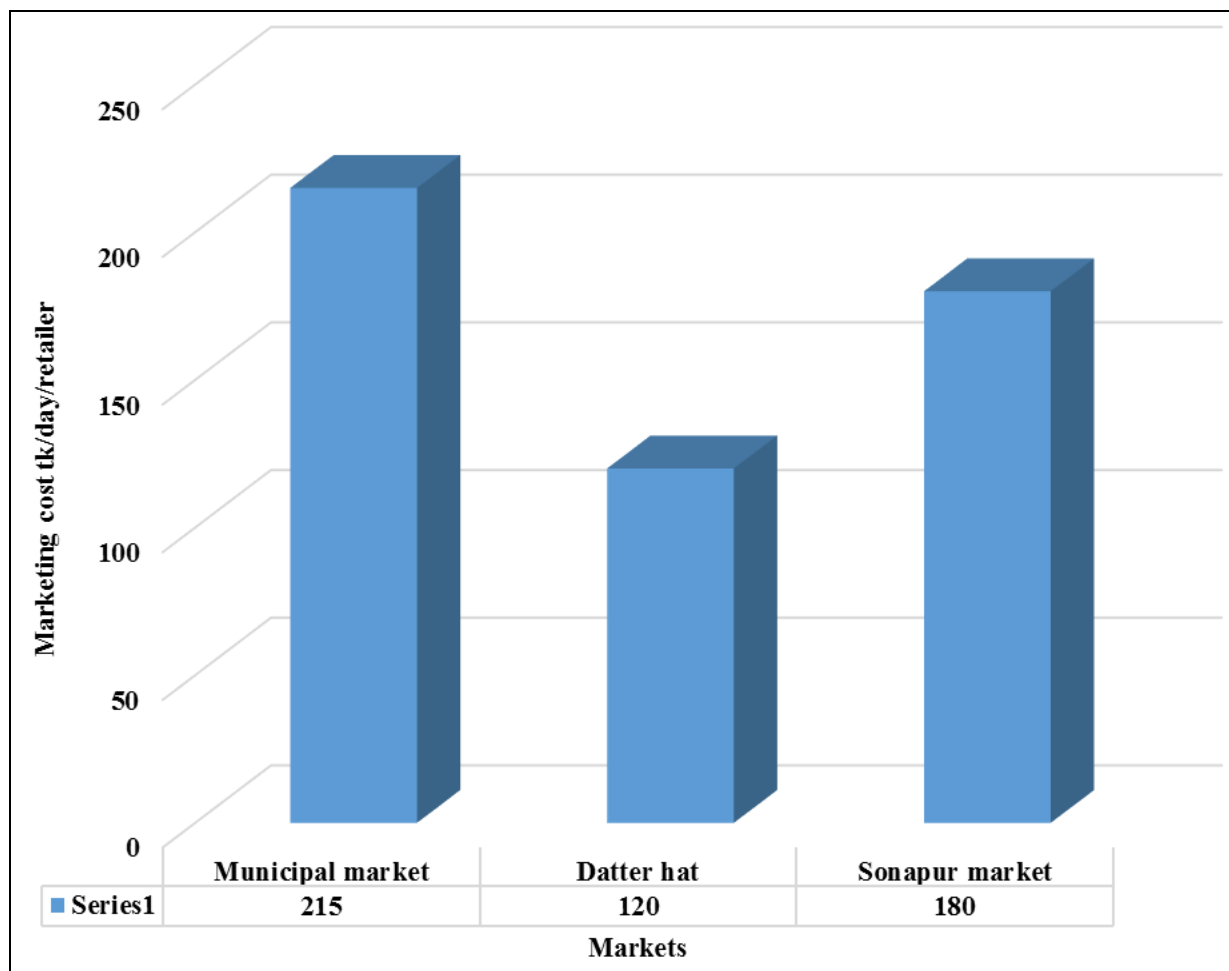
Name of the markets	Species number		
	Natural	Farmed	Marine
Municipal market	37	24	11
Datter hat	32	23	-
Sonapur market	31	25	10

commercial fishes like Rui, Catla, Thai pangus, Silver carp, Ilish, Bata, Tilapia, has the highest demand in these markets. It was found that some species such as Baim, Titputi, Pabda, Baspata, Aor, Shing, Magur, Gajar, Rita, Koi, Chitol, Surma, Meni, Surputi, Koral, Chanda, Lalchanda, and Khalisa were very uncommon and not available in these markets.

### 3.9 Marketing cost of fish traders at market

The average marketing cost of retailers was estimated at Municipal market Tk. 215/day, Datter hat Tk. 120/day and Sonapur market at 180/day (Figure 9). The average marketing cost of retailers in three markets was estimated at Tk. 171.6 /day/retailer.

By the survey it was found that Lotya, Tengra, Taki, Shol, Koral, Cuchia, Chewa, Prawn and Shrimp and some other

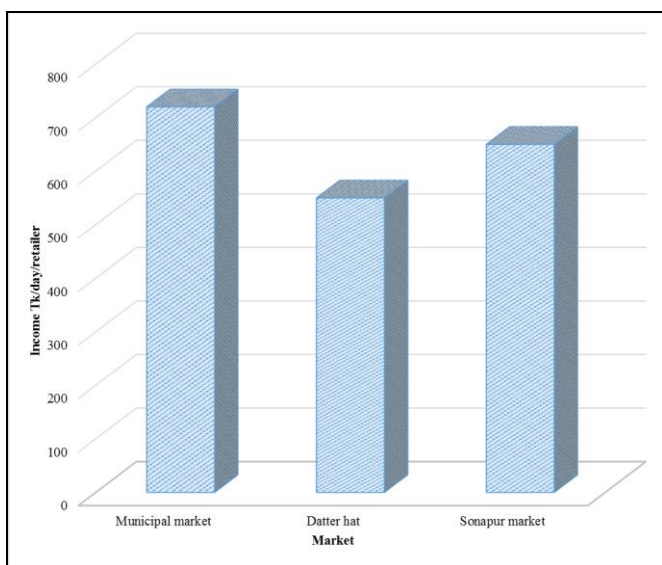


**Fig 9:** Average marketing cost of retailers in three different markets of Noakhali district



### 3.10 Income of fish retailers

In the present study, it was found that the average gross profit of fish retailers was estimated at Tk. 720 /day in Municipal market, Tk. 550/day in *Datter hat*, and Tk.650/day in *Sonapur* market. The average income of retailers in three markets was estimated at Tk. 640/day/retailer (Figure 10).



**Fig 10:** Average daily income (Tk. /day) of retailers in three markets of *Noakhali* district

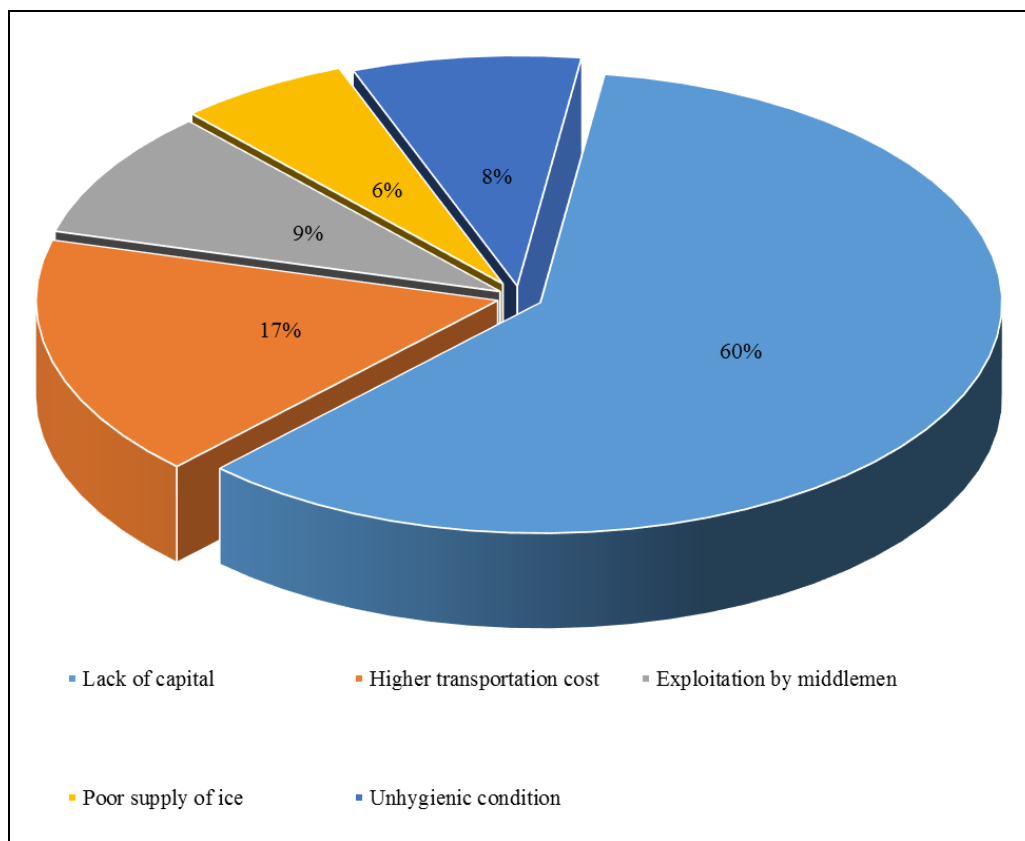
### 3.11 Constraints of fish marketing

There are some constraints which were found in the three fish markets in *Noakhali* District namely Municipal market, *Datter hat*, and *Sonapur* market. These constraints created some imbalance in marketing system and hampered real situation of the market (Table 4).

**Table 4:** Number and level of constraints found in the market.

Facilities	Fish market		
	Municipal	<i>Datter hat</i>	<i>Sonapur</i>
Infrastructure	Not very well	Not well	Not well
Poor sanitary conditions	present	present	present
Long marketing channel	Existing	Existing	Existing
Higher transport cost	More	More	More
Drainage system	Not well	Absent	Not well
Packaging facilities	Not well	Not well	Not well
Ice mill	Insufficient	Absent	Insufficient
Toilet facility	Not well	Absent	Absent
Unstable Supply and price	Present	Present	Present

These numbers of constraints for fish marketing were reported by retailers during survey. The highest proportion of respondents i.e. 60% identified lack of capital, and 17% of respondents identified as higher transport cost as the single most constraints of fish marketing. About 9% respondents identified getting lower price as a result of exploitation by middlemen, 6% mentioned poor supply of ice and 8% respondents identified unhygienic market place (Figure 11).



**Fig 11:** Constraints faced by fish market at *Noakhali* district

### 3.12 Hygienic condition of market

Hygienic condition of studied market is so poor. At the market time these place become so muddy and walking become very difficult. There is no source of hygienic water

for ice making and cleaning of fish. There is no good drainage system and Sanitation receives a low priority at all stages of marketing.

### 3.13 Ice supply

In Municipal market, there are two ice plants in the market and ice storage facilities exist. There are 4 ice plants in *Sonapur* market. In *Datter* hat there are no ice plants. In this study area, especially at peak season, there is clearly a deficiency of ice and this is reflected in the prices charged for the same.

### 3.14 Handling and transport of fish

The transportation system of fish determines the demand and purity or hygienic condition of it, because with the change of time, fish will perish rapidly. Also its value decreases, if it requires too much time to transport this fish from the collection point to the market. Two types of fishes are found here as dead fish and live fish. Normally Shol, Taki, Pangus, Koi, Shing, Magur are transported here as live form. Dead fish carried to the market in box or cages but live fish by drum or tray. Mainly small Pangus are carried by tray. Each drum contains 35-40 kg of fish with water. Mainly this type of fish is transported by truck. Fishes from other districts like Barisal, Khulna, Chittagong, *Shatkira*, *Feni*, *Bagerhat*, *Comilla*, *Mymensingh*, *Luxmipur*, and *Hatiya* comes by truck. In Municipal market, come 20-25 trucks of fishes, 5-6 trucks in *Sonapur* market and 1-2 trucks in *Datter* hat fish market. Fish has carried into and out of the market by head-load; baskets involve unnecessary handling as there is no unnecessary vehicles.

### 3.15 Improved socio-economic conditions

Although fish retailers were comparatively poor, but the survey result showed that they have improved their socio-economic conditions through fish trading, as confirmed by 80% of fish retailers (Figure 12). Some retailers (20%) have not obtained any specific benefits due to taking loan from moneylenders or banks and large family size, poor education and lack of capital for this business.

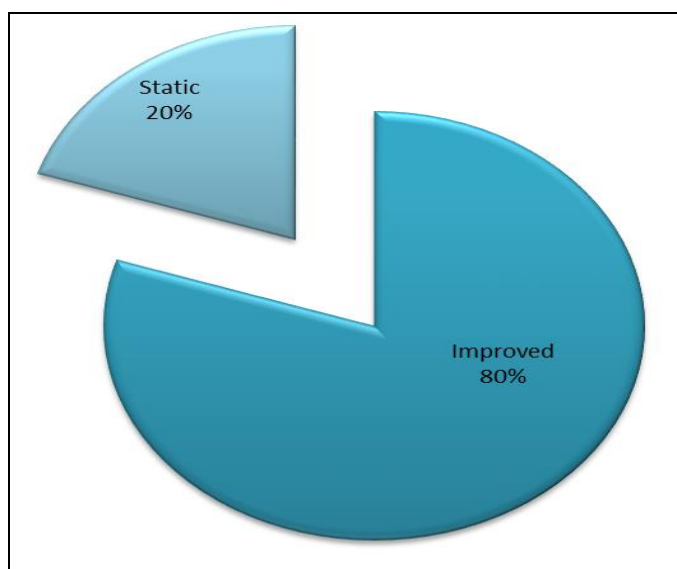


Fig 12: Status of socio-economic condition of fish retailers.

### 3.16 Availability of fish species of three different markets in Noakhali district

It was observed that Rui, Catla, Thai pangus, Silver carp, Ilish, Bata, Tilapia, Tengra, Taki, Shol, Koral, Chewa, Prawn and Shrimp has the highest demand in these markets. Abundance of fish also varies from season to season

depending on demand and production (Table 5). Abundance of natural fish in winter was comparatively higher than the rest of the year as the water level in freshwater bodies' decreases in this season. All the species were not readily available in the markets of *Noakhali* district.

Table 5: Availability of fish species of three different markets in *Noakhali* district

Species	Availability		
	Year round	Seasonally	Partial
<i>Tilapia mossambica</i>	√		
<i>Tenualosa ilisha</i>	√		√
<i>Labeo calbasu</i>	√		
<i>Macrobrachium rosenbergii</i>	√		√
<i>Hypophthalmichthys molitrix</i>	√		
<i>Wallago attu</i>		√	√
<i>Anabas testudineus</i>	√		
<i>Labeo gonius</i>		√	√
<i>Gudusia chapra</i>	√	√	
<i>Puntius chola</i>		√	
<i>Amblypharyngodon mola</i>	√	√	
<i>Channa punctatus</i>	√	√	
<i>Channa striatus</i>	√	√	
<i>Labeo rohita</i>	√		
<i>Catla catla</i>	√		
<i>Cirrhinus cirrhossus</i>	√		
<i>Pangasius pangasius</i>	√		
<i>Lates calcarifer</i>	√		√
<i>Clarias batrachus</i>	√		√
<i>Mystus tengara</i>	√	√	
<i>Silliaginopsis panijus</i>	√	√	
<i>Chitala chitala</i>		√	√
<i>Corica subarna</i>	√		√
<i>Harpadon nehereus</i>	√		√
<i>Jhoniua coiter</i>	√		√
<i>Parapocryptes batoides</i>	√		√
<i>Heteropneustes fossilis</i>	√	√	
<i>Macrogathus aculeatus</i>	√	√	
<i>Penaeus monodon</i>	√		
<i>Hypophthalmichthys nobilis</i>	√		
<i>Cyprinus carpio</i>	√		
<i>Ctenopharyngodon idella</i>	√		
<i>Systemus sarana</i>	√		√
<i>Sperata aor</i>	√		√
<i>Ompok pabda</i>	√		√
<i>Nandus nandus</i>		√	√
<i>Liza parsia</i>	√		√
<i>Chanda nama</i>	√	√	√
<i>Colisa faciata</i>		√	√

## 4. Discussions

The supply chain from landing center to market from fishermen to consumers passes through a number of intermediaries; local fish traders, agents, wholesalers and retailers. Five types of supply chain for marketing were found in *Noakhali* district. [24] Found similar findings in *Mymensingh* district. The existence of four types of marketing channels in *Jessore* district [23, 25] Identified three marketing channels in *Mymensingh* district, all of which involved *aratters* and *bebaries* like intermediaries [5, 7, 14, 15, 21, 29, 36] found the similar marketing channel in different part of Bangladesh. However their findings are more or less similar with the present study. Retailers typically operate with capital of around Tk. 12,000 to 20,000 per day. The wholesalers possess more capital (around Tk. 22,000 to 100,000 per day) than suppliers and have certain degree of control on retailers,

especially when retailers purchase fish on credit This finding is similar to the investigation in *Gazipur* district where traders typically operated with capital of about Tk. 10,000 to 25,000 per day<sup>[32]</sup>. The daily income and profit margin are more or less similar with the study of<sup>[7, 8, 15, 29, 30, 40, 41]</sup>. According to the survey, it was found that the daily supply of fish in Municipal market, *Datter hat* and *Sonapur* was about 12-13 mt, 7-8 mt and 2.5-3 mt respectively. The daily supply of fish in municipal market and *Maijdee* bazar were estimated at 3-3.2 mt and 1-1.1 mt respectively<sup>[33]</sup>. The daily supply of fish in *Gazipur Sadar* and *Sripur* markets was estimated at 2-3 mt and 1-2 mt respectively<sup>[32]</sup>. More than 1000 kg of fishes are landed and sold every day in respective districts<sup>[15, 29]</sup>. Present study reveals, a total of 39 fish species under 24 families were found. Among them 7 species are found on marine environment, and others are freshwater. Most of the species were available in rivers, streams, canals. All fish species were not available in all the seasons. Seasonal fluctuation in the fish species is a normal phenomenon<sup>[2]</sup>. More than 50 fish species are available year round in the respective research area<sup>[15, 19, 35]</sup>. In the three markets, catfish 12.66%, small fish 11.33%, marine fish 17.33%, hilsha 15.66%, prawn 4%, others 7%, and carps ( Indian and Exotic) comprises average 21% and pungus and tilapia 11%. During the survey, it was observed that Rui, Catla, Thai pangus, Silver carp, Ilish, Bata, Tilapia, Tengra, Taki, Shol, Koral, Chewa, Prawn and Shrimp has the highest demand in these markets.<sup>[2]</sup> found that about half of the fish supplied in the two markets of *Gazipur* were Indian and exotic carps and also found that the main fish species available for consumption was supplied from rural carp culture of indigenous (Rui, Mrigal, Catla) and exotic carp species (silver carp, grass carp, common carp). The average number of species landed in the three different markets was 64.<sup>[27, 42]</sup> found that 143 species of small indigenous fish in which Mola, Puti, Tengra, Chapila, Bata, Kholisha, Kakila, Golchanda, Bela, cuchia Gutum, Gochi baim were common in fish market. On the other hand, the average number of species that occurred in *Mechua* bazar, *Natun* bazar and *Railway* market of *Mymensingh* town was about 30<sup>[1]</sup>. In *Noakhali*, around 50-180 retailers were involved in each market. Around 50 retailers were involved in *Datter hat*, 115 in *Sonapur*, and 180 in Municipal market. According to the survey more retailers were involved in Municipal market than *Sonapur* and *Datter hat* fish market. Around 80 retailers were involved in *Maijdee* bazar, 90 in *Chaumuhani* bazar, 40 in *Khaser hat* and 30 retailers in *chairman ghat* under *Noakhali* district<sup>[3]</sup>. It was also observed that the children were massively involved in fish markets. This statement is goes to<sup>[15]</sup>. No women involvements were observed in wholesale or retail marketing in *Noakhali* fish market but<sup>[39]</sup> revealed the opposite position in which women used to do different farm and marketing work to develop their family condition. According to the present survey, it was found that a fish retailer of Municipal market, *Datter hat*, *Sonapur* bazar, sold an average 75 kg, 57 kg and 44 kg fish daily respectively. Amount of fish sold was higher in Municipal market than *Sonapur* and *Datter hat* fish market. The price of fish was comparatively higher in the Municipal market than others market. Rui, catla, tilapia, ilish, Thai pangus and silver carp was identified as six important fish species in the markets. It was found that the price of same fish was almost similar in all the markets. The price of rui in Municipal market, *Datter hat* and *Sonapur* was varied from 340±10 to 330±5 Tk. /kg. The price of galda and bagda were

varied from 580±10 to 560±8, and 370±10 to 350±5 Tk. /kg respectively. The price of catla, tilapia, ilish, Thai pangus and silver carp were varied from 390±10 to 360±8, 165±5 to 150±8, 900±10 to 860±5, 140±10 to 125±5, and 160±8 to 155±5 Tk. /kg respectively.<sup>[28]</sup> also found similar seasonality for the price of fish market in *Mymensingh*.<sup>[32]</sup> found rohu as the most valuable among the Indian major carps and Grass carp among exotic carps in *Gazipur* district.<sup>[13]</sup> mentioned that Rohu was found to be the most expensive followed by Catla, Mrigal, Grass carp, Common carp and Silver carp in southwest Bangladesh. But in the present study, the price catla was found higher than rohu.<sup>[15]</sup> stated, price of fish depends on market structure, species, and freshness, supply demand of fish and size of fishes.<sup>[29]</sup> revealed the price rate of tilapia in *Jessore* district and the result is similar with the present study.<sup>[13]</sup> also mentioned that the price of per kg of carp increases with size for both Indian major carps and exotic carps. According to<sup>[1]</sup>, the demand of fish became higher during Ramadan that leads the price of fish to be higher than other months. The demand of hilsha becomes higher than other month during *Pahela Boishakh* in April. The average marketing cost of retailers was estimated at Municipal market Tk. 215/day, *Datter hat* Tk. 120/day and *Sonapur* market at 180/day. The average marketing cost of retailers in three markets was estimated at Tk. 171.6 /day/retailer.<sup>[26]</sup> found that the marketing cost per quintal of fish for *aratdar*, *beparies* and retailers was as BDT 12.45, BDT 61.32 and BDT 26.32 respectively. According to<sup>[25]</sup>, the average marketing cost per quintal of fish incurred by these intermediaries in *Muktagachha*, *Fulpur* and *Mymensingh* were 555.14, 209.91, and 660.53 Tk. /kg, respectively. From the survey, it was found that the average gross profit of fish retailers was estimated at Tk. 720 /day in Municipal market, Tk. 550/day in *Datter hat*, and Tk.650/day in *Sonapur* market. The average income of retailers in three markets was estimated at Tk. 640/day/retailer. Similar income were also observed by<sup>[7, 8, 15, 29, 30, 40, 41, 33]</sup> mentioned that the average income retailers in two markets were estimated at Tk. 300 per day. Number of constraints for fish marketing was reported by retailers during survey. The highest proportion of respondents i.e. 60% identified lack of capital, and 17% of respondents identified as higher transport cost as the single most constraints of fish marketing. About 9% Respondents identified getting lower price as a result of exploitation by middlemen, 6% mentioned poor supply of ice and 8% respondents identified unhygienic market place.<sup>[6, 15, 29, 40, 41]</sup> revealed similar constrain in their study as, poor road and transport facilities, higher transport costs, insufficient supply of ice, unhygienic conditions, lack of credit facilities and poor infrastructure of markets as well as political disturbances such as strikes and road blocks also affect fish marketing. Similar fish marketing problems were found by<sup>[25, 34]</sup>.<sup>[23]</sup> described several problems of fishermen and intermediaries in *Mymensingh*, such as poor transportation, lower price of fish, lack of storage facilities, lack of weighing system, assessment of market tolls, lack of marketing facilities as well as political instability. Hygienic condition of studied market is so poor. Municipal market is more unhygienic than *Sonapur* and *Datter hat* fish market. There are 2 ice plants in Municipal market and 4 ice plants in *Sonapur* market. Because the supply of amount of river fish is more in *Sonapur* than Municipal market. Amount of cultured fish is more in Municipal market than *Sonapur*. In *Datter hat* there are no ice plants. Marketing organizations should have fish freezing and

storage facilities as well as ice plants to ensure effective fish marketing systems [32]. In Municipal market, come 20-25 trucks of fishes, 5-6 trucks in *Sonapur* market and 1-2 trucks in *Datter* hat fish market every day. [38] who noted that the intermediaries in *Mymensingh* district used rickshaw, van, train, pushcart etc. who stated that trucks, which carry consignments, mostly handle fish distribution in *Rajshahi* [34]. Fish retailers were comparatively poor, but the survey result showed that they have improved their socio-economic conditions, through fish trading, as confirmed by 80% of fish retailers in three different markets under *Noakhali* district. Some retailers (20%) have not obtained any specific benefits due to taking loan from moneylenders or banks and large family size, poor education and lack of capital for this business. Socio-economical uplifting and continuous development occurred in their respective study area [5, 6, 8, 15, 16, 17, 18, 20, 37, 40, 41, 22] reported that, in spite of socio-economic constraints, most of the households of the traders (80%) have improved their status through fish marketing activities in *Gopalpur upazila* of *Tangail* district.

### 5. Recommendations

After completion of successful research on fish market and marketing system in *Noakhali* district the team would like to suggest some recommendation for further development of markets and marketing channel through establishment of modern wholesaling facilities through government or NGO's; improvement of existing fish market structure; improvement of fish transport, handling facilities by proper consciousness and training; improvement of sanitation, hygienic condition, drainage, and washing facilities; establishment of more ice-plants, cold-storage and preservation facilities; to initiate a team approach to research among the scientists of research institutes and universities concerned on the breeding and culture of threatened natural fish; provision of governmental, institutional and banking assistance including insurance facilities; introduction of fish quality control measure through HECCAP achievement; to ensure our protein demand which are almost being replaced by cultured fish now a day and also for their conservation and rehabilitation aspects too; and training of natural fish market operators in areas of fish preservation, handling, icing and curing.

### 6. Conclusion

Fish marketing plays an important role in the economy of Bangladesh, contributing to increased food production, diversification of the economy, increased employment opportunities, and maintained rural communities. All the species were not readily available in the markets of *Noakhali* district. In marketing terms, there were a number of middlemen involved. The middlemen usually buy the fish from the fishermen but do not seem to have formal agreements with particular producers. In contrast, hygienic condition of studied market is so poor and with regard to hygiene and fish quality aspects, the present facilities could be considerably improved. Markets in *Noakhali* district often lack basic infrastructure such as clean water supply, adequate drainage system, flooring etc. as well as availability of good quality of ice on the premises will facilitate the enhancement of appropriate fish handling. A positive policy at government level should be considered for sustainable natural fish marketing systems. This situation has created awareness among fishery biologists, ecologists and politicians of the need for better conservation of diversity of valuable fish and

the need to protect such fish from being extinction in this country. It is now crucial time to initiate a team approach to research among the scientists of research institutes and universities concerned on the breeding and culture of threatened small indigenous species of fish to ensure their conservation and exoneration.

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