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A study on fish marketing system in Kolkata and adjoining areas

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Abstract

The present study was aimed to assess the marketing system and fish diversity in West Bengal, India. The survey was carried out from March, 2023 to October, 2023 from three fish markets in Kolkata and adjoining districts namely Patipukur fish market in Kolkata district, Krishnapur fish market in North 24 Parganas district and Bantala fish market in South 24 Parganas. A total of 45 fish sellers were directly interviewed through focused questionnaire which showed availability of 58 fin fishes and shell fishes of 32 families from those markets. Cyprinidae was the most diverse family with 12 species followed by Engraulidae (04 species) and Sciaenidae (03 species). The variations in fish prices were linked with the seasons, size, quality, quantity of available fishes and demand, the affordability of the people living around the market. Marine fishes were high priced than the fresh water species due to using cold storage and ice preservation.

Keywords: Fish diversity, marketing system, fin fishes, shell fishes

1. Introduction

India is the home for more than 10% of the fish diversity globally (Abdurrahman *et al.*, 2017) ^[1]. In 2021-2022, total fish production in India is 162.48 lakh tonnes, where marine fisheries contribute 41.27 lakh tonnes and inland fisheries contributes about 121.21 lakh tonnes. In West Bengal, fish production from marine fisheries is about 1.91 Lakh Tonnes and from inland fisheries is around 16.52 Lakh Tonnes in 2021-2022 (DOF, 2022) ^[2]. Fisheries are an essential sector in India, accounting for around 5.15% of agricultural GDP and 1.1% of total GDP (Vala *et al.*, 2020) ^[3]. In 2020, global fish production has reached 177.8 million tonnes, with 33.1 million tonnes from marine fisheries and 54.4 million tonnes from inland fisheries (FAO, 2022) ^[4]. The fisheries and aquaculture sector in India has been identified as a major income generator since it provides 1.07% GDP and it encourages the growth of various subsidiary companies (Tofler, 2023) ^[5]. In India, the fisheries and aquaculture sector provide inexpensive food, nutrition, income and is a principal source of livelihood for a large section of those population of the country who are economically underprivileged, especially in the rural areas. The development of fishery sector and the expansion of fish production rely heavily on an effective fish marketing system (Chourey *et al.*, 2014) ^[6]. About 60% of India's population prefer fish as food in their daily diet and the demand is rising due to health beneficial facts (Shyam, 2013) ^[7].

West Bengal is known for its substantial inland fish production, supported by vast water bodies. Inland aquaculture has rapidly expanded, offering a stable alternative to the declining capture fisheries sector (Dutta *et al.*, 2016; Paul and Chakraborty, 2016) ^[8, 9]. West Bengal's inland fisheries surpass marine fisheries due to higher consumer demand for freshwater fish, which are costlier than marine fishes (Bhathal, 2005) ^[10]. West Bengal is dependent on neighbouring states, particularly Andhra Pradesh, Bihar, and Tamil Nadu, for its fish consumption, even though it is the largest producer and consumer of fish (Rahaman *et al.*, 2013) ^[11]. The productivity of the fisheries sector is declining despite West Bengal's annual growth in fish output, because of overfishing, a shortage of high-quality fish seed in the right proportions, a lack of marketing infrastructure, and socioeconomic and environmental limitations (Rahaman *et al.*, 2013) ^[11].

A successful marketing system is required to make the fish accessible to consumers at affordable prices at the right moment and location through proper fish supply penetration method. Thus, fish marketing is essential for suppliers, consumers, and other facilitating organisations, such as the Government (Roy, 2008) [12]. Several researchers have reported the fish diversity and the marketing system in Kolkata and other parts of West Bengal (Das *et al.*, 2011, Mogalekar *et al.*, 2017, Ahmed and Hossain, 2021) [13, 14, 15]. The present survey was conducted to examine three fish markets in Kolkata and its neighbouring districts: Patipukur, Krishnapur, and Bantala fish market with the objectives to assess fish diversity, threatened species, market pricing, to compare prices across rural, urban, and semi-urban markets, and to identify constraints within these markets. The study aimed to propose suggestions for improvements based on the

findings.

2. Materials and method

2.1 Study area

Three fish markets were chosen in Kolkata city along with its adjoining areas as the study area namely: Patipukur fish market, located in Patipukur, Kolkata city, West Bengal (Latitude 22.6079° N, Longitude 88.3932° E), was mainly a large wholesale fish market with many wholesale shops, a few fish cutting shops, and very few retail shops for local customers, Krishnapur fish market, situated in Krishnapur, North 24 Parganas (Latitude 22.5859° N, Longitude 88.4373° E), featured both wholesale and retail shops and Bantala fish market located in Bantala, South 24 Parganas (Latitude 22.5255° N, Longitude 88.4417° E), was exclusively a wholesale market (Figure 1).

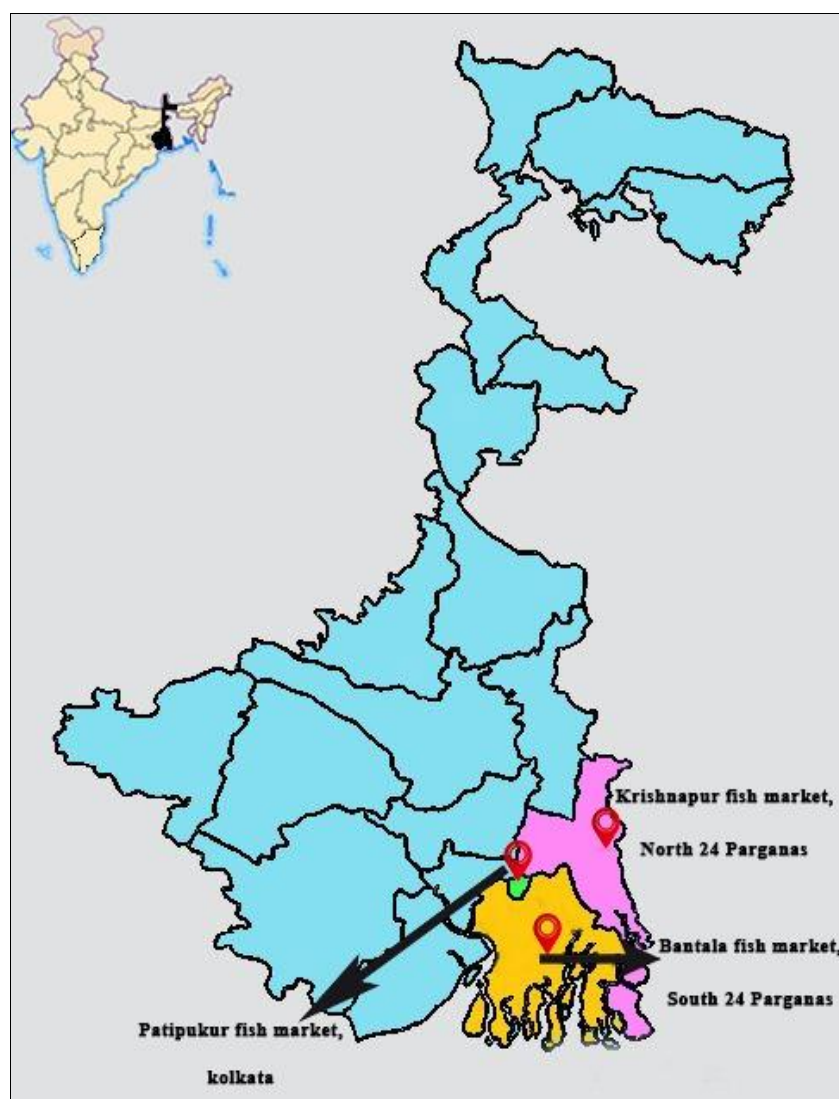


Fig 1: District map of West Bengal showing locations of three markets

2.2 Methodology

The investigation was conducted from March to October, 2023, involved surveying three fish markets twice monthly, using direct observation, interviews, and questionnaires to gather primary data (Vala *et al.*, 2020) [3]. A total of 45 fish sellers were interviewed to analyse the fish marketing system, species availability, preservation methods, price structures, and market conditions. Finally, the data was entered and statistically analysed using Microsoft Excel software (version

2011).

3. Results and Discussion

3.1 Availability of edible fish species in the studied fish markets

Our survey identified 58 fin and shell fish species from 32 families in three West Bengal markets, supporting previous findings by Das *et al.* (2011) [13] and Saha *et al.* (2017) [16], who reported 52 and 37 species in Kolkata and Burdwan.

Datta *et al.* (2017) ^[17] noted 52 species in Punjab, while Salim *et al.* (2021) ^[18] found 25 and 22 species in Telangana and Andhra Pradesh, respectively. Cyprinidae was the most diverse family with 12 species followed by Engraulidae (04 species) and Sciaenidae (03 species). Penaeidae shellfish were abundant in all three studied markets. In terms of conservation status, 65.5% of species were classified as least concern,

10.34% as near threatened, about 7% as vulnerable, 12% as not evaluated, and 5% as data deficient (IUCN, Ver. 2022-23) ^[19]. The study showed that, the Patipukur fish market had a high availability of marine fish due to good storage facilities. Krishnapur market offered both fresh and stored fish, while Bantala market primarily had live freshwater fish, lacking preservation facilities. (Table 1).

Table 1: Availability of edible fish species recorded from three selected fish markets in Kolkata and its adjoining areas

Sl. No.	Family	Scientific name	Patipukur fish market		Krishnapur fish market		Bantala fish market		IUCN Status
			Dry	Wet	Dry	Wet	Dry	Wet	
1	Anabantidae	<i>Anabas testudineus</i> (Koi)	+	++	++	++	+	+	LC
2	Channidae	<i>Channa striata</i> (Shol)	+	+	+	+	+	++	LC
		<i>Channa punctata</i> (Lata)	-	+	+	+	+	++	LC
3	Siluridae	<i>Ompok pabda</i> (Pabda)	+++	+++	+++	+++	-	+	NT
		<i>Wallago attu</i> (Boal)	+++	+++	++	+++	-	+	VU
4	Chichlidae	<i>Oreochromis mossambicus</i> (Tilapia)	++	++	+++	+++	++++	++++	VU
		<i>Oreochromis niloticus</i> (Nilontica)	++	+	++	+++	+++	++++	LC
5	Cyprinidae	<i>Catla catla</i> (Katla)	++++	++++	++++	++++	++++	++++	LC
		<i>Labeo rohita</i> (Rui)	++++	++++	++++	++++	++++	++++	LC
		<i>Amblypharyngodon mola</i> (Mourula)	+	+	+	++	-	+	LC
		<i>Labeo calbasu</i> (Kalbose)	++	+	++	++	+++	++	LC
		<i>Labeo bata</i> (Bata)	-	+	++++	++++	++++	++++	LC
		<i>Cirrhinus cirrhosis</i> (Mrigel)	-	+	++++	++++	++++	++++	VU
		<i>Cyprinus carpio</i> (Golden carp)	-	+	+++	+++	++++	++++	VU
		<i>Ctenopharyngodon Idella</i> (Grass carp)	-	+	+	++	++	++	LC
		<i>Puntius sophore</i> (Puti)	++	+	-	+	-	++	LC
		<i>Puntius sarana</i> (Puti)	++	+	++	+	-	++	LC
		<i>Puntius javanicus</i> (Japani puti)	+	+	+	++	++	++	LC
6	Bagridae	<i>Mystus aor</i> (Aar)	+++	+++	++	++	-	-	LC
		<i>Mystus gulio</i> (Tangra)	+++	++	++	++	+	++	LC
7	Pangasiidae	<i>Pangasius sp.</i> (Pangas)	++	++	+++	++++	+++	++++	LC
8	Clariidae	<i>Clarias batrachus</i> (Magur)	++	+	++	+	+	+	LC
9	Mugilidae	<i>Liza parsia</i> (Parshe)	++	+++	++	+++	+	++	NE
10	Heteropneustidae	<i>Heteropneustes fossilis</i> (Shingi)	++	+	++	+	+	+	LC
11	Notopteridae	<i>Chitala chitala</i> (Chitol)	+	+	+	++	+	+	NT
		<i>Notopterus notopterus</i> (Folui)	+++	+	++	+++	+	++	LC
12	Anguillidae	<i>Anguilla bengalensis</i> (Kalo ban)	+	+	-	+	-	-	NT
13	Nandidae	<i>Nandus nandus</i> (Nadosh)	+	+	-	+	-	-	LC
14	Belonidae	<i>Xenentodon cancila</i> (Gangdhara)	+	+	-	+	-	-	LC
15	Gobiidae	<i>Glossogobius giuris</i> (Bele)	+	++	-	+++	-	+	LC
16	Serrasalimidae	<i>Piaractus brachypomus</i> (Rupchand)	-	+	++	++++	+++	++++	NE
17	Ailiidae	<i>Ailia coila</i> (Kajoli)	-	++	+	+	-	-	NT
18	Palaemonidae	<i>Macrobrachium rosenbergii</i> (Golda chingri)	++	++	++	+	++	+++	LC
19	Penaeidae	<i>Penaeus monodon</i> (Bagda chingri)	++	++	++	++	+	++	NE
		<i>Litopenaeus vannamei</i> (Bhenami chingri)	+++	+++	++	++++	+	+++	NE
		<i>Fenneropenaeus indicus</i> (Chapra chingri)	+++	++	++	+	+	++	NE
20	Muraenesocidae	<i>Muraenesox cinereus</i> (Sada ban)	+	+	-	+	-	-	LC
21	Latidae	<i>Lates calcarifer</i> (Bhetki)	+++	+++	++	+++	-	-	LC
22	Clupeidae	<i>Tenulosa Ilisha</i> (Ilish)	++	++++	++	++++	-	++	LC
		<i>Gudusia Chapra</i> (Khoira)	+	++	+	++	-	-	LC
23	Stromateidae	<i>Pampus argenteus</i> (Pomphret)	+++	+++	++	+++	-	-	NE
24	Synodontidae	<i>Harpadon nehereus</i> (Lote)	++	+++	+	+++	-	+	NT
25	Sciaenidae	<i>Otolithoides pama</i> (Poa bhola)	++	+++	++	++	+	-	DD
		<i>Larimichthys polyactis</i> (Bhoot bhola)	+	++	-	+	-	-	LC
		<i>Boesemania microlepi</i> (Sandy)	++	++	+	++	-	-	DD

		bhola)							
26	Scombridae	<i>Rastrelliger kanagurta</i> (Aila)	+	++	-	++	-	-	DD
27	Datnioididae	<i>Datnioides polota</i> (Rekha bhetki)	+	+	+	++	-	-	LC
28	Dorosomatidae	<i>Sardinella longiceps</i> (Sardine)	++	++	+	++	-	-	LC
		<i>Gonialosa manmina</i> (Chapla)	-	+	+	++	-	-	LC
29	Polynemidae	<i>Eleutheronema tetradactylum</i> (Gurjali)	++	+	+	++	-	-	NE
		<i>Polynemus paradiseus</i> (Topshe)	++	+++	-	+++	-	-	LC
30	Engraulidae	<i>Coilia dussumieri</i> (Choto amudi)	+	++	-	++	+	-	LC
		<i>Coilia reynaldi</i> (Boro amudi)	+	++	-	+	-	-	LC
		<i>Stolephorus indicus</i> (Gang mourula)	++	++	-	+++	-	-	LC
		<i>Setipinna phasa</i> (Patua)	+	+	-	++	-	-	LC
31	Mastacembelidae	<i>Macrognathus pancalus</i> (Pankal)	-	-	-	-	-	LC	
32	Synbranchidae	<i>Monopterusuchia</i> (Kuche)	-	-	-	-	+	LC	

*Symbol used: “++++” = Highly available; “+++” = Available; “++” = Moderately available; “+” = Less available; “-” = Not available
 *VU = Vulnerable; NT = Near Threatened; LC = Least Concern; DD = Data Deficient; NE = Not Evaluated

3.2 Price and demand of edible fish species available in the studied markets

Sathiadhas and Narayana Kumar (1994) [20] noted that fish prices vary significantly based on market location and local

affordability. In Patipukur fish market, species such as *Ompok pabda*, *Wallago attu*, *Catla catla*, *Labeo rohita*, *Mystus aor*, *Lates calcarifer*, *Tenulosa ilisha*, and *Pampus argenteus* were highly available due to strong demand (Figure 2).

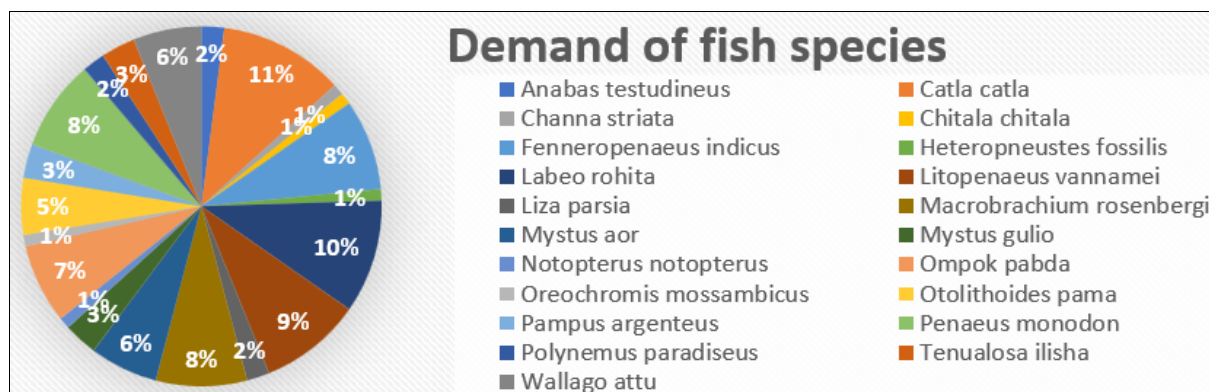


Fig 2: Demand of fish species in Patipukur fish market, Kolkata

In Krishnapur fish market, as it was a semi-urban area and different community of people live there, both indigenous

carps and exotic carps had a great demand than other fishes and other marine fishes as well had a large demand (Figure 3).



Fig 3: Demand of fish species in Krishnapur fish market, North 24 Parganas

Bantala fish market primarily offered local freshwater fish due to limited storage facilities, with only small quantities of marine or brackish species like pomfret, amude, perse, poa

bhola, and hilsa being imported. Indian and exotic carps were abundant year-round, favored for their low price and good taste (Figure 4).

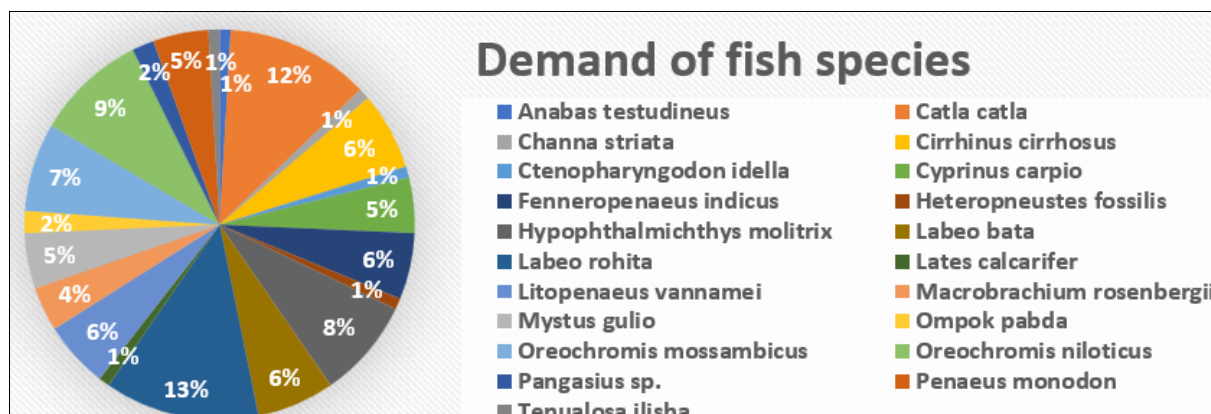


Fig 4: Demand of fish species in Bantala fish market, South 24 Parganas

It was very important to note that whole sale price in the markets were slightly variable but the retail price was highly varied (Salim *et al.*, 2023) [21]. Marine fish were generally more expensive than freshwater species. (Table 2).

Table 2: Cold-heat map of marketwise price (in INR) of different species

Sl. No.	Family	Scientific name	Patipukur fish market		Krishnapur fish market		Bantala fish market	
			Dry	Wet	Dry	Wet	Dry	Wet
1	Anabantidae	<i>Anabas testudineus</i>	490	575	370	625	325	325
2	Channidae	<i>Channa striata</i>	220	300	350	425	325	350
		<i>Channa punctata</i>	-	120	130	220	130	160
3	Siluridae	<i>Ompok pabda</i>	250	325	250	400	-	600
		<i>Wallago attu</i>	210	190	250	210	-	600
4	Chichlidae	<i>Oreochromis mossambicus</i>	80	80	105	180	140	105
		<i>Oreochromis niloticus</i>	80	60	80	125	110	127
5	Cyprinidae	<i>Catla catla</i>	220	215	170	220	190	245
		<i>Labeo rohita</i>	160	140	120	200	120	155
		<i>Amblypharyngodon mola</i>	160	350	120	375	-	325
		<i>Labeo calbasu</i>	120	70	110	200	130	145
		<i>Labeo bata</i>	-	145	120	165	110	140
		<i>Cirrhinus cirrhosus</i>	-	100	120	115	120	110
		<i>Cyprinus carpio</i>	-	100	110	105	110	115
		<i>Ctenopharyngodon idella</i>	-	100	-	160	120	155
		<i>Puntius sophore</i>	200	200	-	425	-	200
		<i>Puntius sarana</i>	200	220	100	425	-	200
		<i>Puntius javanicus</i>	150	60	120	125	120	110
6	Bagridae	<i>Hypophthalmichthys molitrix</i>	-	90	90	110	90	90
		<i>Mystus aor</i>	440	375	280	525	-	-
7	Pangasiidae	<i>Mystus gulio</i>	170	290	100	525	160	100
		<i>Pangasius sp.</i>	120	100	90	95	80	105
8	Clariidae	<i>Clarias batrachus</i>	560	625	750	700	800	650
9	Mugilidae	<i>Liza parsia</i>	240	275	190	400	250	140
10	Heteropneustidae	<i>Heteropneustes fossilis</i>	600	650	700	700	800	600
11	Notopteridae	<i>Chitala chitala</i>	600	350	400	425	400	375
		<i>Notopterus notopterus</i>	180	90	110	155	210	150
12	Anguillidae	<i>Anguilla bengalensis</i>	80	300	-	210	-	-
13	Nandidae	<i>Nandus nandus</i>	220	375	-	325	-	-
14	Belonidae	<i>Xenentodon cancila</i>	130	225	-	175	-	-
15	Gobiidae	<i>Glossogobius giuris</i>	150	300	-	200	-	200
16	Serrasalimidae	<i>Piaractus brachypomus</i>	-	95	100	100	100	105
17	Ailiidae	<i>Ailia coila</i>	-	700	750	700	-	-
18	Palaemonidae	<i>Macrobrachium rosenbergii</i>	600	625	450	700	530	375
19	Penaeidae	<i>Penaeus monodon</i>	800	675	450	650	460	350
		<i>Litopenaeus vannamei</i>	230	300	250	250	260	250
		<i>Fenneropenaeus indicus</i>	230	300	250	375	260	235
20	Muraenesocidae	<i>Muraenesox cinereus</i>	60	100	-	155	-	-
21	Latidae	<i>Lates calcarifer</i>	570	475	550	575	-	350
22	Clupeidae	<i>Tenualosa ilisha</i>	1050	1350	1200	1550	-	950
		<i>Gudusia Chapra</i>	70	100	75	110	-	-
23	Stromateidae	<i>Pampus argenteus</i>	480	450	550	575	-	-
24	Synodontidae	<i>Harpadon nehereus</i>	130	60	100	90	-	50
25	Sciaenidae	<i>Otolithoides pama</i>	120	200	130	190	120	-
		<i>Larimichthys polyactis</i>	120	225	-	180	-	-

		<i>Boesemania microlepis</i>	120	235	120	190	-	-
26	Scombridae	<i>Rastrelliger kanagurta</i>	100	90	-	110	-	-
27	Datnioididae	<i>Datnioides polota</i>	100	200	120	180	-	-
28	Dorosomatidae	<i>Sardinella longiceps</i>	90	90	90	120	-	-
		<i>Gonialosa manmina</i>	-	300	50	300	-	-
29	Polynemidae	<i>Eleutheronema tetradactylum</i>	390	350	100	250	-	-
		<i>Polynemus paradiseus</i>	450	650	-	750	-	-
30	Engraulidae	<i>Coilia dussumieri</i>	70	140	-	150	50	-
		<i>Coilia reynaldi</i>	120	240	-	200	-	-
		<i>Stolephorus indicus</i>	80	80	-	90	-	-
		<i>Setipinna phasa</i>	70	450	-	300	-	-
31	Mastacembelidae	<i>Macrognathus pancalus</i>	-	-	-	-	-	-
32	Synbranchidae	<i>Monopterusuchia</i>	-	-	-	-	-	90

3.3 Fish marketing system and fish transportation in the studied markets

A marketing system encompasses all procedures related to the transit of goods from their source to the ultimate customer. The marketing system consists of the trade activities related with transferring commodity property rights, physically acquiring and allocating resources, managing goods, providing information to participants, and institutional systems to regulate these operations (Debnath *et al.*, 2019) [22]. The marketing channel in Patipukur fish market (Figure 5) Krishnapur fish market and Bantala fish market (Figure 6) differed notably. Patipukur, as Kolkata's largest wholesale market, sourced fish from various regions, including West Bengal such as, Digha, Diamond harbour, Namkhana, Midnapore, Raidighi, Basirhat, Dhamakhali, Kakdwip etc. and other states like Andhra Pradesh, Orissa, Hyderabad, Karnataka, Tamil Nadu, Kerala, Gujarat etc., primarily offering stored fish with fewer live options. Whereas, Krishnapur fish market, in North 24 parganas, mainly

received fish from local ponds, Sealdah, Patipukur, Howrah, Raidighi, Digha, Diamond harbour, etc. and also from other states like Andhra Pradesh, Orissa., featuring both stored and live fish, while its retail market relied on wholesale supplies. Bantala fish market, in South 24 Parganas, on the other hand, exclusively sold live fish sourced from local fishermen and culture ponds. Bangladesh was also an important source of edible fish in Patipukur and Krishnapur fish markets. Before reaching the consumer, fishes must transit via a number of intermediaries, from the location of fish production (Kumar *et al.*, 2008) [23]. These included the distributors, wholesalers, retailers. In Patipukur fish market, imported fish remain in good condition in cool weather but suffered spoilage during extreme heat due to melting ice, leading to significant economic losses. Krishnapur fish market *also* experienced fish damage in hot temperatures, though it managed some losses by supplying live fish from local ponds. In contrast, Bantala fish market exclusively sold live fish from local farms, making it less vulnerable to temperature impacts.

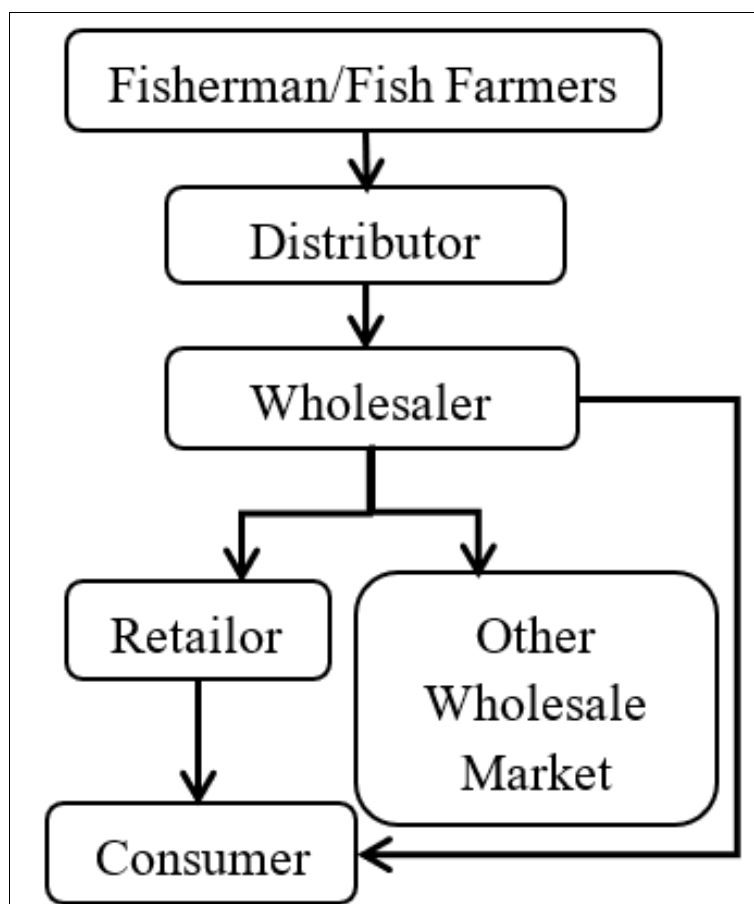


Fig 5: Marketing channel in Patipukur fish market, Kolkata

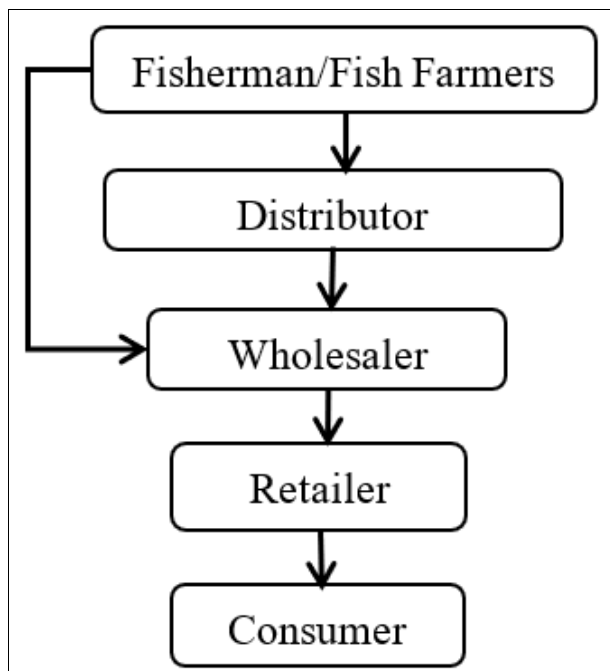


Fig 6: Marketing channel in Krishnapur fish market, North 24 parganas and Bantala fish market, South 24 parganas

3.4 Fish preservation methods in the studied markets

Fish deterioration is primarily caused by microbial activity, leading to changes in odour, flavour, texture, and colour. While various preservation methods are used in India, Dehradun primarily employs ice preservation, deep freezing, and drying (Abdurrahman *et al.*, 2017) [1]. According to the survey, In Patipukur fish market, leftover fish were preserved in ice within plastic boxes and stored in cold storage facilities. Krishnapur fish market also utilized ice preservation and had cold storage available. However, Bantala fish market lacked any storage facilities.

3.5 Age group of fish sellers in studied fish markets

During the survey of three markets, 15 fish sellers from each were interviewed. In Patipukur fish market, the age distributions were as follows: 6% were aged 20-30 years, 27% were 31-40 years, 40% were 41-50 years, 20% were 51-60 years, and 7% were 61-70 years. In Krishnapur fish market, 33% were aged 20-30 years, 27% were 31-40 years, 20% were 41-50 years, 13% were 51-60 years, and 7% were 61-70 years. In Bantala fish market, 26% were 31-40 years, 27% were 41-50 years, 27% were 51-60 years, and 20% were 61-70 years (Table 3).

Table 3: Age groups of the fish sellers interviewed in the different fish markets

Age Groups	Patipukur fish market	Krishnapur fish market	Bantala fish market
20-30 years	6%	33%	-
31-40 years	27%	27%	26%
41-50 years	40%	20%	27%
51-60 years	20%	13%	27%
61-70 years	7%	7%	20%

3.6 Socio-economic status of the fisher sellers in the markets

In Patipukur fish market, 67% of fish sellers were educated up to graduation, 27% had completed 5-10 years of education, and 6% were illiterate. In Krishnapur fish market, 44% were

graduates, 31% had 5-10 years of education, 13% were below class 5, and 12% were illiterate. Bantala had 36% of sellers with a graduation level, 57% educated from class 5-10, and 7% below class 5 (Table 4).

Table 4: Education of the fish sellers interviewed in the different fish markets

Literacy	Patipukur fish market	Krishnapur fish market	Bantala fish market
Illiterate	6%	12%	-
Below class 5	-	13%	7%
Class 5 - Class10	27%	31%	57%
Upto Graduation	67%	44%	36%

3.7 Hygiene status of the studied markets

Maintaining hygiene in fish markets was challenging yet essential. The survey revealed that Patipukur fish market was very unhygienic, lacking a drainage system for stagnant water. In contrast, Krishnapur retail fish market had a drainage system, helping it stay relatively clean despite congestion, while the wholesale market was also much cleaner. Bantala fish market, located beside a highway, benefitted from drains that helped keep it clean.

4. Conclusion

Through our study, we came to know many fish species which were found in those markets are now either found in low quantity and in high price or not available. There were some constraints observed while surveying such as, lack of storage facility in rural fish market, unhygienic condition and poor drainage facility of the urban fish market, lack of space of semi-urban fish market, poor handling of fishes, poor transportation, handling by intermediaries, inadequate ice supply during the summer season, causing fish spoilage and results in economic loss (Kumar *et al.*, 2008) [23]. It is highly needed to improve the situations so that the fish marketing system can be improved and can lower the economic losses. We may suggest holistic management plan need to be implemented by approving low interest credit from the banks to the fisher men and also help from the NGOs and Governmental sectors may efficiently boost this fishery sector.

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