

MARKET INFRASTRUCTURE AND SPECIES AVAILABILITY OF FOUR WHOLESALE FISH MARKETS IN DHAKA CITY, BANGLADESH

Jannatul Ferdhosi Shikha and Rumana Tasmin *

Department of Zoology, Faculty of life and Earth Science. Jagannath University, Dhaka-1100, Bangladesh

ABSTRACT: The study was conducted on species availability and infrastructure analysis of four different wholesale fish markets in Dhaka City. Two markets were selected from Dhaka South City Corporation, Showari Ghat and Jatrabari fish market, and two from Dhaka North City Corporation, Karwan Bazar and Abdullahpur fish market. The investigation was carried out from November 2018 to October 2019. Questionnaire based survey, FGDs (Focus Group Discussion) and KIIs (Key Informant Interviews) were conducted to get quantitative and qualitative data for present study. A total number of 62 fishes and 6 crustacean species were recorded during the study period. Among all species, 39 freshwater, 10 marine and 13 exotic fishes were recorded. Infrastructure facilities were very poor for all four markets in the matter of hygiene and quality control. Fish shades were not enough, improper sanitation and drainage system indicates the possibilities of disease transmission and deteriorate fish quality. Electricity and water supplies were good but no system was present to determine the distillation of those supplied water. Thus, infrastructural condition of the markets does not support a hygienic condition for fish marketing to provide quality fish and fish byproducts. The study highlighted the need for national initiatives, awareness building, and law implementation for improving the wholesale markets infrastructure to a minimum standard so that fish trade could provide good quality to the people of Dhaka City.

Keywords: Species availability, Infrastructure, Wholesale fish market, Hygiene.

INTRODUCTION

Bangladesh has a vast freshwater and marine ecosystem with rich species biodiversity. Fisheries commodities are accumulated from different sources of water bodies, such as river, beel, pond, gher, estuaries and sea, and these fishes are transferred to local markets via different intermediaries and channels (Ali et al. 2004). Though Bangladesh is a small country of South Asia but it has a great resource of fish and other aquatic animals. Inland aquatic habitats of

*Author for corresponding: tasminrumana79@gmail.com

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Bangladesh are rich in faunal diversity containing at least 265 species of finfish, 63 species of prawn, and several species of turtles, tortoises, freshwater mussels and other living aquatic organisms (Rahman 2005). Bangladesh is also rich in marine fishes having 475 marine finfish and 36 Marine shrimp species (DoF 2013). In 2017-18, fisheries sector contributed 3.57% to national GDP and 25.30% to the agricultural GDP and 1.5% to foreign exchange earnings by exporting fish and fish products (DoF 2018). Buriganga, Turag, Dhaleshwari and Shitalakshya are bounded the Dhaka city which is the capital of Bangladesh. According to Bangladesh Bureau of Statistics, it is one of the largest and most populated cities in the country with a population of 21 million (Islam et al. 2015). Fish is the primary protein source in Bangladeshi diet contributing about 60% of total animal protein (DoF 2018; Jessica et al. 2015); According to BBS report, per capita fish consumption in the country reaches 62.58 gm, which is higher than their daily protein demand (60 gm) (BBS 2017). In 2014-2015, total fishery production of Bangladesh was 3,684,245 metric tons, of which 1,023,991 metric tons was obtained from inland capture fisheries, 2,060,408 metric tons from inland aquaculture and 599,846 metric tons from marine water production (FRSS 2016). There are several fish markets found in Dhaka city where fish accepted from all over the country especially from the southern part of Bangladesh. Availability of fish to consumers at the right time and in the right place requires an effective marketing system (Bahadur 2004).

In most developing countries, main constraints of fish marketing were related to infrastructure, plant management and institutional management aspect (Alam et al. 2010). Infrastructure of the fish markets should be hygienic and suitable for the protection of any perishable condition in a fish market (Cuter et al. 2005). Infrastructure development of fish markets of Dhaka city is an imperative issue to get quality fish and prevent disease transmission from unhygienic condition.

Therefore, overall objectives of this study was to identify the present infrastructure condition and survey the available fish species on those wholesale markets in Dhaka city from the point of view on hygiene and environmental aspect.

MATERIAL AND METHODS

Study period: The study was carried out for a period of one year from November, 2018 to October, 2019 on four wholesale fish markets in Dhaka city.

Study area: There were many fish markets in and around the Dhaka city, among them total four wholesale fish markets were selected for this study. Two fish markets are Showari Ghat and Jatrabari from Dhaka South and others are

Abdullahpur fish market and Karwan Bazaar from Dhaka North City Corporation area (Figure 1).

Methods of data collection and analysis: A combination of eye observation and survey through questionnaire were adopted for this study to understand the overall infrastructural situation and available fish species in four fish markets. Structured interview schedules were used to collect information about supply condition of ice, water and electricity, sanitation facilities and major constrains from selected wholesale markets through FGD (focus group discussion) and KIIs (Key Informant Interviews) with operators and officials of the markets, members of trader’s associations and wholesalers. A total of 16 FGDs (6 in Jatrabari fish market, 4 in Showari Ghat fish market, 3 in Karwan bazaar and 3 in Abdullahpur fish market) were conducted where each group size of FGD was 4 to 9 person. Cross-check interviews were conducted with key informant’s interviews and each interview last on average 2 to 5 minutes. The data were analyzed using Microsoft Excel software. Research tools to collect detail data are presented in Table 1.

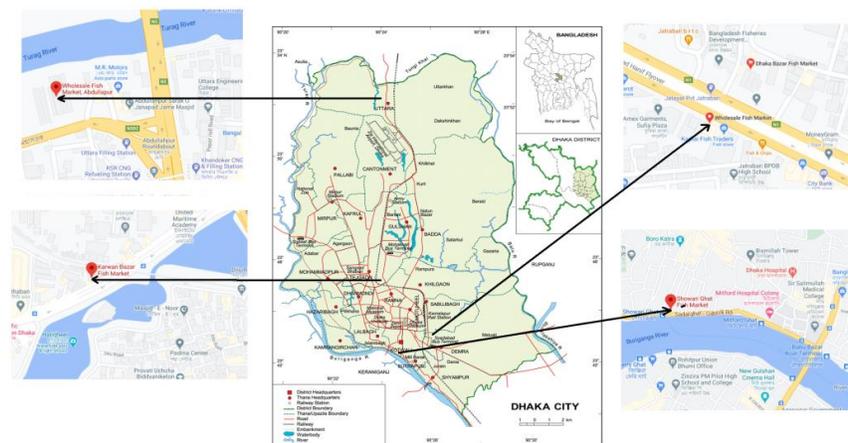


Fig. 1. Map of study area in Dhaka city.

Table 1. Methodological tools used for data collection

Data Collection Techniques	Study Areas	Collected Information
Questionnaire interview and direct eye observation	Showari Ghat, Jatrabari, Karwan bazaar and Abdullahpur fish market	About fish species, building information, environmental condition, drainage system, roof and floor condition
FGD and KIIs		Sanitation facility, ice, electricity, water supply and major constrains

Table2. The comparative scenario of present infrastructural condition in four fish markets

Physical facilities	Showari Ghat fish market	Jatrabarifish market	Karwan Bazaar	Abdullapur fish market
Quality of floor	Some floor are cemented some are mud cracked and rough	Some floors are cemented and smooth, some are mud and cracked in different places	Concreted, rough and somewhere cracked	Some floors are cemented and smooth, some are mud and cracked in different places
Storage facility	Present	Present	Absent	Absent
Ice factory	Two	Four	Absent	Two
Electricity supply	Present	Present	Present	Present
Water supply	Present	Present	Present	Present
Market owned toilet	One	Absent	present	Six
Fish dumping place	Mud built floor and basket	On the platform and basket	On the platform and basket	On the platform, mud built floor and basket
Drainage system	The floors don't have a clear slope to a drain	The floors have a clear sloop to a drain	The floors have a clear sloop to a drain	The floors do not have a clear slope to a drain
Protective enclosure to prevent entry of pests	Absent	Some parts, 'Yes' and some parts, 'No'	Absent	Absent
Roof condition	Some made with plastic and some with tin shade	Some place concreted and some with tin shade	Some made with plastic and some with tin shade	Some made with plastic and some with tin shade

RESULTS AND DISCUSSION

Infrastructural condition: Infrastructure facilities were very poor for all four markets. Fish shades were not enough, lack of hygienic management indicates the possibilities of disease transmission, deteriorates fish quality which could be great issues for public health especially in any pandemic situation. Electricity and water supplies were good but no system was present to determine the distillation of those supplied water. This infrastructural condition of the markets does not support a hygienic condition for fish marketing to provide quality fish and fish byproducts (Table 2).

Seasonal variation of available fish species in four markets: On the basis of total species availability all the year round, mostly abundant was in rainy season and it was 45 percent and others 33 and 22 percent in winter and summer season, respectively (Figure 2).

Freshwater species: Among 39 species of freshwater fishes, koi (*Anabas testudineus*), Taki (*Channa punctata*), Ilish (*Tenualosa ilisha*), Rui (*Labeo rohita*), Shing (*Heteropneustes fossilis*), Catla (*Catla catla*), Mrigel (*Cirrhinus*

cirrhosus), Pangas (*Pangasius pangasius*) found mostly in the all four fish markets (Table 3).

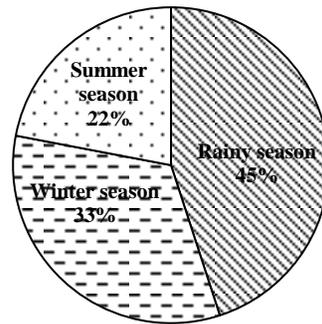


Fig. 2. Availability of fish species in different season from all markets.

Table 3. List of freshwater fish species available in different fish markets in Dhaka City

Family	Local Name	Common Name	Scientific Name	Seasonal Abundance	Market Name
Anabantidae	Koi	Climbing perch	<i>Anabas testudineus</i>	TY	All markets
Anguillidae	Bao Baim	Giant Mottled eel	<i>Anguilla bengalensis</i>	WS	Jatrabari, Abdullahpur, karwan Bazaar fish market
Ambassidae	Chanda	Elongate glass-perchlet	<i>Chanda nama</i>	WS	All markets
	Kata chanda	Himalayan glassy-perchlet	<i>Parambassis baculis</i>	SS	All markets
Bagridae	Tengra	Striped dwarf catfish	<i>Mystus vittatus</i>	TY	All markets
	Golsha Tengra	Gangeticmystus	<i>Mystus bleekeri</i>	TY	Jatrabari, Abdullapur, karwan Bazaar fish market
	Ayre	Long-whiskered catfish	<i>Sperata aor</i>	RS	All markets
	Rita	Rita	<i>Rita rita</i>	WS	Jatrabari, karwan Bazaar fish market
Belonidae	Kaikka	Needle fish	<i>Xenentodon cancila</i>	WS	All markets
Chnidae	Shol	Striped snakehead	<i>Channa striatus</i>	WS	All markets
	Gajar	Giant snakehead	<i>Channa marulius</i>	SS	Jatrabari, karwan Bazaar, Showari Ghat fish market
	Taki	Spotted snakehead	<i>Channa punctata</i>	TY	All markets
Clariidae	Magur	Air breathing catfish	<i>Clarias batrachus</i>	WS	All markets

Family	Local Name	Common Name	Scientific Name	Seasonal Abundance	Market Name
Clupeidae	Ilish	Hilsa	<i>Tenualosa ilisha</i>	TY	All markets
	Kachki	Ganga river	<i>Corica soboma</i>	WS	All markets
Cyprinidae	Chapila	Indian river shad	<i>Gudusia chapra</i>	WS	All markets
	Rui	Rohu	<i>Labeo rohita</i>	TY	All markets
	Catla	Catla	<i>Catla catla</i>	TY	All markets
	Mrigel	Mrigal	<i>Cirrhinus cirrhosus</i>	TY	All markets
	Kalibaas	Black rohu	<i>Labeo calbasu</i>	TY	All markets
	Bhangonbata	Bata labeo	<i>Labeo bata</i>	SS	All markets
	Sarpunti	Olive barb	<i>Puntius sarana</i>	TY	All markets
	Cholapunti	Swamp barb	<i>Puntius chola</i>	SS	All markets
Gobiidae	Mola	Molacarpel	<i>Amblypharyngo do mola</i>	SS	All markets
	Dhela	Cotio	<i>Rohtee cotio</i>	WS	All markets
	Bele	Tank goby	<i>Glossogobius giuris</i>	WS	Jatrabari fish market
Heteropneustidae	Shing	Stinging catfish	<i>Heteropneustes fossilis</i>	TY	All markets
Mastacembelidae	Baim	Tire-track spiny eel	<i>Mastacembelus armatus</i>	TY	Jatrabari, Showari Ghat fish market
	Tara baim	One stripe spiny eel	<i>Macroglyptus aculeatus</i>	TY	Jatrabari fish market
Nandidae	Bheda	Mud perch	<i>Nandus nandus</i>	SS	All markets
Notopteridae	Chital	Humped featherback	<i>Notopterus chitala</i>	RS	All markets
	Foli	Grey featherback	<i>Notopterus notopterus</i>	RS	Jatrabari, karwan Bazaar fish market
Osphronemidae	Khalisha/Khail sha	Giant gourami	<i>Colisa fasciatus</i>	WS	All markets
	LalKhalisha	Red gourami	<i>Colisa lalia</i>	WS	Jatrabari, Abdullapur fish market
Pangasidae	Pangas	Yellowtail catfish	<i>Pangasius pangasius</i>	TY	All markets
Siluridae	Boal	Freshwater shark	<i>Wallagaattu</i>	TY	All markets
	Pabda	Indian butter catfish	<i>Ompok pabda</i>	TY	All markets
	Madhupabda	Pabo catfish	<i>Ompok pabo</i>	TY	Jareabari, karwan bazaar, Showari Ghat fish market
Sisoridae	Baghair	Devil catfish	<i>Bagarius bagarius</i>	TY	Jatrabari fish market
Synbranchidae	Kuicha	Kuchia	<i>Monopterusuchia</i>	TY	Jatrabari fish market

NB: TY= throughout the year, WS= winter season, SS= summer season, RS = rainy season

Species availability in different fish market: A total number of 62 fish species and six crustacean species were recorded during the study period. From all species, there were 39 species from freshwater and 10 species from marine, and 13 were exotic fish.

Marine species: Loitta (*Harpadon nehereus*), Poa (*Pama pama*), Lalpoa (*Johnius argentatus*) found mostly in the four market throughout the year. Other

fish species also found with great market demand. Now- a-days marine fish species are becoming more popular for their nutritive value (Table 4).

Table 4. List of marine fish species available in different fish markets in Dhaka City

Family	Local Name	Common Name	Scientific Name	Seasonal Abundance	Market Name
Centropomidae	Bhetki	Bhetki	<i>Lates calcarifer</i>	TY	Jatraabari, karwan Bazaar fish market
Engraulidae	Phasa	Hairpin anchovy	<i>Setipinna taty</i>	SS	Jatrabari fish market
Harpadontidae	Loitta	Bombay duck	<i>Harpadon nehereus</i>	TY	All markets
Sciaenidae	Poa	Pama	<i>Pama pama</i>	TY	All markets
	Lalpoa	Silver jew	<i>Johnius argentatus</i>	TY	All markets
	Sadapoa	Silver jew	<i>Otolithes argentatus</i>	TY	All markets
Scombridae	Mackerel	Indian mackerel	<i>Rastrelliger kanagurta</i>	TY	Jatraabari, karwan Bazaar, abdullapur fish market
Stromatidae	Rup chanda	Chinese pomfret	<i>Pampus chinensis</i>	TY	All markets
	Folichanda	Silver pomfret	<i>Pampus argenteus</i>	WS	Jatraabari, karwan Bazaar fish market
Tunnidae	Tuna	Born maittya	<i>Euthynnus affinis</i>	WS	All markets

Crustacean species: Gura chingri (*Nematopalaemon tenuipes*), Golda chingri (*Macrobrachium rosenbergii*), Bagda chingri (*Penaeus monodon*) found mostly in the four market throughout the year (Table 5).

Exotic Species: Among 13 species of exotic species, Tilapia (*Oreochromis mossambicus*), African catfish (*Clarias gariepinus*), Carpu (*Cyprinus carpio*), Thai pungus (*Pangasius hypophthalmus*), Silver carp (*Hypophthalmichthys molitrix*), Thai sarputi (*Barbonymus gonionotus*) found mostly in the all four fish markets (Table 6). All species were found year round with high demand due to their availability and low cost in the market.

Table 5. List of crustacean's species available in different fish markets in Dhaka City

Family	Local Name	Common Name	Scientific Name	Seasonal Abundance	Market Name
Palaemonidae	Gurachingri	Spider prawn	<i>Nematopalaemon tenuipes</i>	TY	All markets
	Golda chingri	Fresh water prawn	<i>Macrobrachium rosenbergii</i>	TY	All markets
	Chatka chingri	Monsoon river prawn	<i>Macrobrachium alcolmsonii</i>	TY	All markets
Penaeidae	Horina chingri	Brown shrimp	<i>Metapenaeus monoceros</i>	TY	All markets
	Bagda chingri	Giant tiger shrimp	<i>Penaeus monodon</i>	TY	All markets
	Chaka chingri	Indian white shrimp	<i>Penaeus indicus</i>	TY	All markets

TY= throughout the year

Table 6. List of exotic species available in different fish markets in Dhaka City

Family	Local Name	Common Name	Scientific Name	Seasonal Abundance	Market Name
Cichlidae	Tilapia	Mozambique tilapia	<i>Oreochromis mossambicus</i>	TY	All markets
	Nilotica	Nile cichlid	<i>Oreochromis niloticus</i>	TY	All markets
	Lal Tilapia	Red tilapia	<i>Oreochromis niloticus</i>	TY	All markets
Clariidae	African catfish	North African catfish	<i>Clarias gariepinus</i>	TY	All markets
Cyprinidae	Mirror carp	Mirror carp	<i>Cyprinus carpio</i> var <i>speculararis</i>	TY	All markets
	Scale carp	Scale carp	<i>Cyprinus carpio</i> var <i>nudus</i>	TY	All markets
	Carp	Common carp	<i>Cyprinus carpio</i> var <i>communis</i>	TY	All markets
	Silver carp	Silver carp	<i>Hypophthalmic thys molitrix</i>	TY	All markets
	Bighead carp	Bighead carp	<i>Aristichthys nobilis</i>	TY	All markets
	Black carp	Black carp	<i>Mylopharyngodon piceus</i>	TY	All markets
	Thai sarputi	Silver barb	<i>Barbonymus gonionotus</i>	TY	All markets
Pangasiidae	Grass carp	Grass carp	<i>Ctenopharyngo don idella</i>	TY	All markets
	Thai pungus	Big-catfish	<i>Pangasius hypophthalmus</i>	TY	All markets

In previous study 71 freshwater species from 25 families from Dhaka (Bhuiyan 1964); 65 species from 29 families from Feni (Yeasmin et al. 2016) were recorded. Another study was conducted by Chowdhury and Iqbal (2007) and they recorded 98 inland and marine water fishes along with crustaceans. Rahman (2005) recorded 260 species in Mymensingh town which is much higher rate according to Dhaka city. According to Aktar et al. (2013), a total 71 to 43 species were recorded from different markets of Noakhali district in Bangladesh. Based on recorded data it was found that species number is getting lower than the previous study and notable popularity of cultured freshwater and exotic fishes were observed almost all the fish markets. Decreasing of indigenous species in the markets may be due to habitat loss, pollution in the environment and high cost to meet the consumers demand (Aziz et al. 2021).

The present infrastructural condition of the markets in Dhaka City is still poorly developed in term of landing, fish storage facility, preserving, transport, sanitation, water supply and retail facilities. Quality of floor of all fish markets were more or less same in nature, floors were cemented or mud and in some

parts cracked and rough. Storage facility present in Showari Ghat and Jartabari fish markets but those were not sufficient with the number of retailers of those fish markets. Karwan Bazar is an iconic wholesale market in the entire Dhaka City and situated in the middle of the city but this fish market didn't have any storage facility. Ice factory also absent in Karwan Bazar fish market but rest three markets have. Electricity and water supply was present to the all markets but sanitation facility was very poor in all markets. Showari Ghat and Abdullahpur fish markets had market owned toilets but was not much hygienic.

There was no permanent protective enclosure found in the study period in the four fish markets only Jatrabari fish markets had some shade in some parts as protective enclosure but rest of the three markets didn't have any measure to prevent the entry of unwanted animals or pests. Fish mainly dumped on the platform in all markets. Drainage system was very poor and roof condition was not well developed. Roof mainly found as cemented or plastic shade or tin shade which was not fully cover the protection from any environmental hazard such as heavy rain, storm and high temperature.

According to Rahman et al. (2009), marketing costs become high if marketing functions are not performed efficiently due to functional difficulties such as poor roads or transportation, inadequate storage facility leading to losses; poor handling or lack of knowledge may leads to decrease fish freshness, possibility to transmit many diseases etc. Fish is very sensitive and perishable food items which need a lot of care at the time of marketing. Any kind of miss handling of fishes may occur a great loss of the fisherman and make issues regarding public health. After observing the markets, it was revealed that there was no significant changes occurred in comparison with previous studies (Hussain et al. 1995; Rahman 1997; Hasan et al. 2014). However, considering the previous and present investigations it is clear that the infrastructural condition of wholesale fish markets are still inadequate over long time and unhygienic may cause serious threats to get quality fish and public health issues.

Recommendations: After completion of successful research on four major fish markets of Dhaka city, present study suggests few recommendations for further development of markets through establishment of modern facilities to ensure public health and in case of safety measures;

- Improvement of fish transportation system; such as freezing van for dead fish, follow scientific guidelines for transporting live fish with proper space, oxygenation, aeration in open truck/tank. (more details, Rajts and Shelley, 2020)
- Focus on safe handling hygienically from farm gate to consumer which will help to keep the fish with high price and safe to eat.

- Priority should be given on proper sanitation system, hygienic condition, drainage and ensure continuous water supply at each major market in Bangladesh.
- Establishment of more ice plants, cold-storage and preservation facilities and improvement of roof or shades.
- Government regular monitoring and strict law implementation must need to control any illegal movement related to human health hazard
- To get the quality and nutritive value of fish, must need to educate farmers, processor and consumer about handling method of aquatic products.

CONCLUSION

Fish marketing plays an important role in the economy of Bangladesh, contributing to increased fish production on the basis of consumer demand, diversification of the economy, increased employment opportunities. On the other hand, fish market must maintain a high standard of public health hygiene and it will need to comply with national public health regulations e.g., Food Safety Act, 2013 (BFSA 2019). Fish markets are one of the crucial places which facilitate trade of most perishable food item like fish, but infrastructural facilities are still not satisfactory from the point of view about food safety and environmental aspects. Therefore making collaboration among the scientists of research institutes and universities with fisheries sector in the matter of quality control, disease transmission, breeding and culture of threatened natural fish, introduce new species and provision of governmental, institutional and banking assistance including insurance facilities to make people interest who are directly involve with this profession to encourage and introducing new innovative techniques will boost up the popularity and production of fish. Thus, considering human health as a major concern communication among government, NGOs, stakeholders, policymakers, researcher need to work together to update and upgrade a healthy fish market which would be able to meet the consumer's satisfaction at both national and international level.

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