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AN INVESTIGATION ON SPECIES COMPOSITION, CONSUMER'S PREFERENCES AND MARKETING CHANNEL OF HILSA IN TWO COASTAL DISTRICTS OF SOUTHERN BANGLADESH

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ABSTRACT

Hilsa is recognized as the national fish species of Bangladesh which has enormous significant to the socio-economy development of ultra-poor and poor fishermen. The present study assessed the species availability, prices, marketing channel and consumer's preferences of hilsa in two coastal districts namely Bhola and Patuakhali. Pertinent data were collected from hilsa fishermen by personal interviewing with a semi-structured questionnaire, focus group discussion, and crosscheck interviews with key informants during January 2015 to December 2015. Considerable differences in price were noticed between fishermen and consumers and this was happened due to the involvement of a number of middlemen in the marketing channel of hilsa. In the study area, wholesalers make a profit in the tune of 10-12% commission whereas commission agents take 2-5% commission for sending the fish to the markets. Consumer acceptance of *Tenualosa ilisha*, *Hilsa toli* and *Hilsa keele* was 39.83%, 43.50%, 16.67% in Bhola and in Patuakhali it was 40.42%, 43.50%, 16.80% respectively. It was observed that consumer acceptance of *T. ilisha* was same in Bhola and Patuakhali district. Safety, price, freshness, size, sources and taste are the main factors behind consumers' purchasing behavior. A number of constraints such as lack of storage facilities, poor supply of ice, exploitation by middlemen, lack of money and lack of infrastructure were reported by the retailers. It is therefore necessary to establish ice factory, improvement of transport facilities, provision of GO and NGO; introduction of quality control measures of hilsa market operators for improved their marketing system.

KEY WORDS

Hilsa, availability, species composition, consumers' preferences, distribution, marketing.

Bangladesh is a south Asian country located in between latitude 20°34' and 26°39' north and longitude 88°01' and 92°41' east. The country is crisscrossed with hundreds of rivers and blessed by rich marine and fresh water resources. All of these water resources are offering boundless scope and potentiality for augmenting fish production and socio-economic security of the people living around the villages of these inland water bodies (Ali, 1991). Fish is an essential foremost food for the people of Bangladesh and plays an important role in the economy of the country. Due to the plentiful availability of inland water, fish production increased significantly. Bengali people have been known to be fond of rice and fish (Ali, 1997). Fisheries sector represents one of the most productive and dynamic sectors in Bangladesh. This sector contributes about 60% of animal protein to the daily diets of consumers, contributes about 3.69% to GDP, 22.60% to agriculture GDP and accounts for

about 11% of the total employment of Bangladesh. In 2014-2015 economic year, we exported about 83,524 MT of fish and fishery products and earned 4,660 crore BDT (DoF, 2015). The manifold small and big rivers are the key harbors of variety of fish species of the country. Hilsa, locally known as "Ilish" constitutes the largest single species fishery of Bangladesh (FAO, 2004). Hilsa serves as a health-food for the affluent world owing to the fish oils which are rich in polyunsaturated fatty acids (PUFAs), especially omega-3 PUFAs and at the same time, it is a health-food for the people in other extreme of the nutritional scale due to its proteins, oils, vitamins and minerals (Mohanty *et al.*, 2011). With the protection of hilsa spawners, fries and other initiatives, the production of hilsa has gone up from 52000 tonnes to 350000 tonnes. Hilsa contributes about 1% to GDP and 11% of the total fish production in Bangladesh. Total annual hilsa production is about 3.85 Lakh MT; which has the market price of more than 17000 crore BDT (DoF, 2015). A large-sized hilsa weighs about 2.5 kg. Female hilsa grow faster and are usually larger than male hilsa. The hilsa is known to be a fast swimmer and attains maturity in one to two years. Though the hilsa is generally regarded as an anadromous fish, there is evidence that it is in fact a diadromous fish, which means it can migrate both ways between ocean and river. Hilsa shad (*Tenulosa ilisha*) lives in the sea for most of its life, but migrates at least 1,200-1,300 km upstream from estuarine region for spawning purpose and it also found about 250 km distance from coastal region (Halder and Islam, 2008).

The largest portion of hilsa is harvested from the coastal areas of Bangladesh, but 75% of total Ilish is consumed outside of the coastal areas (Ahmed, 2007). However, hilsa is one of the most expensive fish in Bangladesh. Its price varies region to region due to geographical location and species availability. So price of hilsa is high in northern region due to distance and transportation cost. In our country, most of the people are poverty-stricken. Economic condition of most of them is not so good. They can't afford surplus budget for purchasing such an expensive fish for consumption. Sometimes it becomes impossible to purchase large size hilsa for the middle or lower-middle class consumers because of its high price. The economy affects purchasing power of the consumers. For example, if prices collapse, consumers have greater purchasing power of that product. If the value of the dollar increases relative to foreign currency, consumers have greater purchasing power. When inflation occurs, consumers have less purchasing power. In case of volume, value and employment, the fish market in Bangladesh is large. A large number of people, whom live below the poverty line, find employment in the coastal fish marketing chain as fishermen, processors, assemblers, traders, transporters, intermediaries and day laborers, including children and women. Considerable differences in price were noticed between fishermen and consumers and this happened due to the involvement of a number of middlemen in the marketing chain of hilsa. The study was conducted in Bhola and Patuakhali district, situated in the southern part of Bangladesh. The study areas were selected because hilsa is more plentiful in southern part than northern part, especially in Bhola and Patuakhali district. Though hilsa is our national fish and holds great nutritional, cultural and economic significance, a continuous indiscriminate harvest of jatka may adversely affect the annual total shad catch in the fishery (Amin *et al.*, 2000). If these jatka were not harvested and instead grew to maturity, they would boost total production by an additional 0.2 million MT per year, double the present annual catch of hilsa. In the year 2014, abundance of jatka was found higher (CPUE 3.04 kg/100m net/hour) than previous years and it was 223% higher than base year 2005. The degenerating trend of catch per unit effort (CPUE) of hilsa fishing is threatening the existence of hilsa fishermen. The resource must be protected from irreversible damage and managed on a sustainable basis. The foremost objective of the study was to understand species availability, consumer's preferences and marketing channel of hilsa in southern part of Bangladesh. This study will provide baseline information about hilsa fishery in Bangladesh, especially its marketing channel and consumers' preferences in the study area.

MATERIALS AND METHODS OF RESEARCH

Study area and Duration. The study was carried out in different market of Bhola and Patuakhali district, Bangladesh. The geographical location of Bhola and Patuakhali are 22°30'N 90°45'E and 22.3542°N 90.3181°E respectively (Fig. 1). Study duration was one year from January to December 2015.

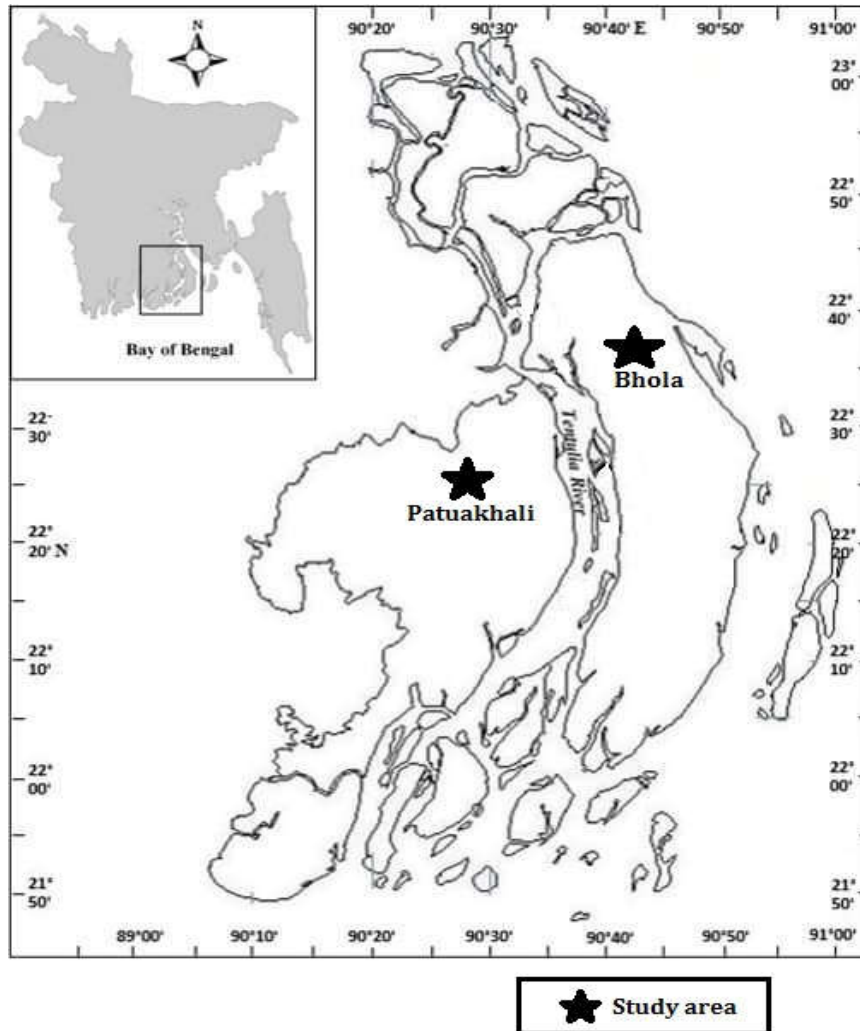


Figure 1 – Map showing the study area (indicating Bhola and Patuakhali district by star sign)

Data collection procedure. Data about species availability, market price, consumers' preferences and marketing channel of hilsa were collected by interviews and personal communication from the selected study areas. Interviews were conducted through face to face interview methods by using semi-structured open ended questions as well as Focus Group Discussions (FGD) with fishermen, market intermediaries and consumers. Cross-check Interviews (CI) were also conducted with key informants such as Upazila Fisheries Officer (UFO), District Fisheries Officers (DFO) and relevant GO and NGO officers and staffs.

Species identification. The species were identified with the help of standard taxonomic keys of Talwar and Jhingran, 1991; Rahman, 2005; Hossain *et al.*, 2007; Froese and Pauly, 2016.

Data processing and analysis. Data were processed and analyzed by using Microsoft Excel Software 2010 and SPSS 16.0.

RESULTS OF STUDY

Species availability of hilsa. There are 3 species were recorded from the study areas. Table 1 represent the available hilsa species in Bhola and Patuakhali district indentified during study period.

Table 1 – Availability of hilsa species in study areas

Sl. No.	EN ^a	SN ^b	Availability of hilsa species										
			Bhola				Patuakhali						
			MA ^c	A ^d	RA ^e	NA ^f	MA ^c	A ^d	RA ^e	NA ^f			
1.	Hilsa shad	<i>Tenualosa ilisha</i>	√					√					
2.	Toli shed	<i>Hilsa toli</i>	√					√					
3.	Keele shad	<i>Hilsa keele</i>			√					√			

a= English Name, b= Scientific Name, c= Mostly Available, d= Available, e= Rarely Available, f= Not Available.

Price of hilsa species at study period. The price of fish varied with availability, season, size and quality. Retailers also mentioned that price varied according to daily demand and supply of fish. Due to limited secondary data, it was difficult to do any proper price analysis but, nevertheless, a trend can be conducted for ranging the price of available hilsa fish species (Tables 2-3).

Table 2 – Price of different hilsa species in Bhola

Sp.	Wt. (Kg)	Price of hilsa species in different months (Tk/Kg)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
<i>T. ilisha</i>	< ½	400	375	400	375	375	350	400	375	500	400	450	400	400
	½ -1	550	550	600	575	600	575	550	550	800	600	575	575	592
	>1	750	725	750	825	800	825	850	850	1000	800	800	800	815
<i>H. toli</i>	< ½	350	325	325	300	300	225	175	200	250	200	300	350	275
	½ -1	350	375	400	425	400	300	275	275	400	300	400	400	358
	>1	575	600	550	575	525	500	550	600	700	550	600	650	581
<i>H. keele</i>	< ½	375	350	325	350	300	275	350	325	400	350	325	350	340
	½ -1	425	425	400	375	400	425	475	450	500	450	425	450	433
	>1	500	500	475	500	475	500	600	550	700	600	700	650	563

Table 3 – Price of different hilsa species in Patuakhali

Sp.	Wt. (Kg)	Price of hilsa species in different months (Tk/Kg)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
<i>T. ilisha</i>	< ½	550	550	525	550	500	525	500	500	600	550	600	550	542
	½ -1	775	750	750	725	750	725	700	700	1000	750	775	750	763
	>1	850	900	875	900	850	900	950	1000	1150	1000	1000	950	944
<i>H. toli</i>	< ½	275	300	300	275	300	275	250	300	400	350	325	350	308
	½ -1	450	475	450	450	425	450	400	400	550	500	500	450	458
	>1	675	650	650	625	650	650	700	700	800	700	725	750	690
<i>H. keele</i>	< ½	450	475	450	450	425	425	450	400	500	450	400	450	444
	½ -1	550	525	550	575	550	575	600	600	600	550	500	550	560
	>1	775	750	775	725	750	775	800	750	900	800	750	700	771

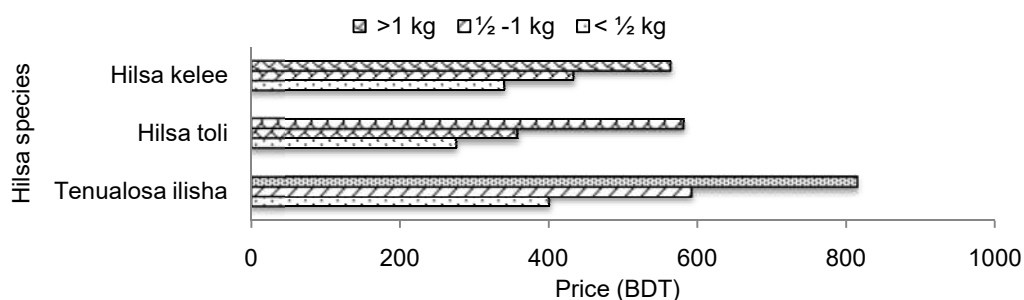


Figure 2 – Average Price (BDT) of different hilsa species in Bhola district

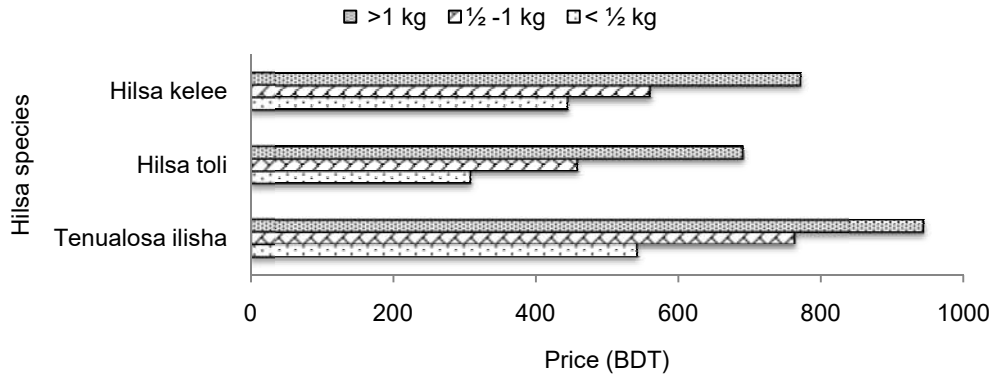


Figure 3 – Average Price (BDT) of different hilsa species in Patuakhali district

Socio-demographic characteristics of the sample. In this study, one hundred fifty respondents were interviewed with a structured questionnaire. Among them, half of the respondents were from Patuakhali district and rest half were from Bhola district. Several socio-demographic characteristics of the respondents is described below in Table 4.

Table 4 – Socio-demographic characteristics of the sample (% of respondents, n= 150)

Variable	%	Variable	%
Sex		Education level	
Male	53.7	Primary	27.5
Female	46.3	Secondary	37.8
Age		Tertiary	
21-30	22.5	Occupation	
31-40	45.6	Self employed	14.6
41-50	19.4	Private sector	32.9
>50	12.5	Government service	52.5
Marital status		Place of residence	
Single	23.8	Urban	36.8
Married	57.6	Semi-Urban	31.5
Separated / divorced	18.6	Rural	31.7

Consumers' preferences for different hilsa species. Purchasing capability of hilsa depends on the availability of species, price, taste of the species and income of the consumers. Preference also differs from area to area, person to person and species to species. Consumer's preferences for different hilsa species are shown below on a monthly basis (Fig. 4 & 5).

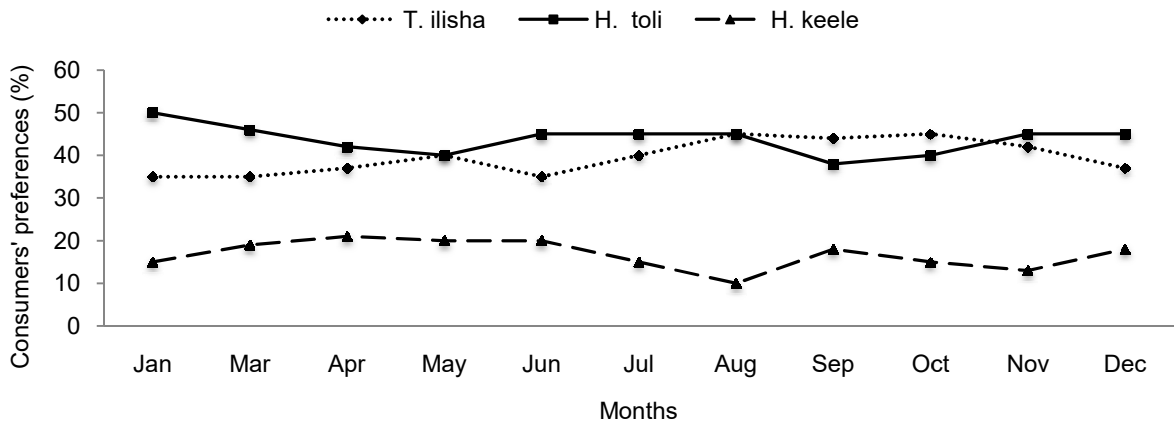


Figure 4 – Consumers' preferences for different hilsa species in Bhola district

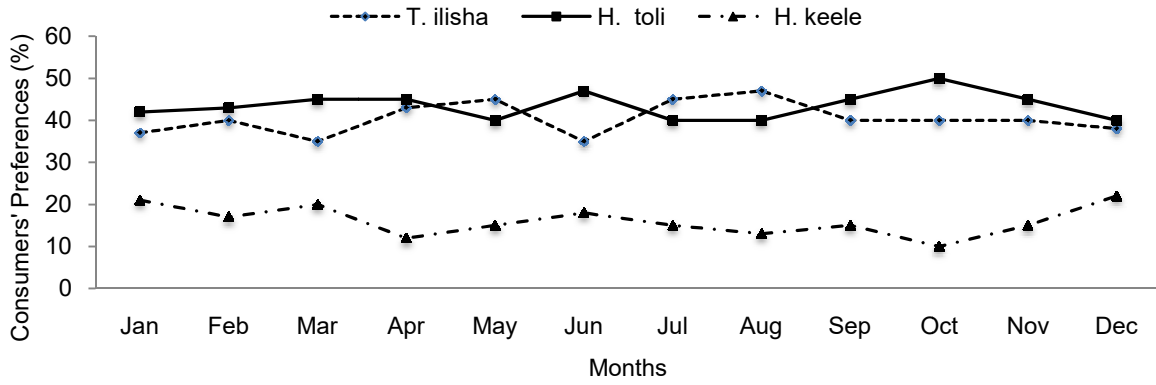


Figure 5 – Consumer’s preferences for different hilsa species in Patuakhali district

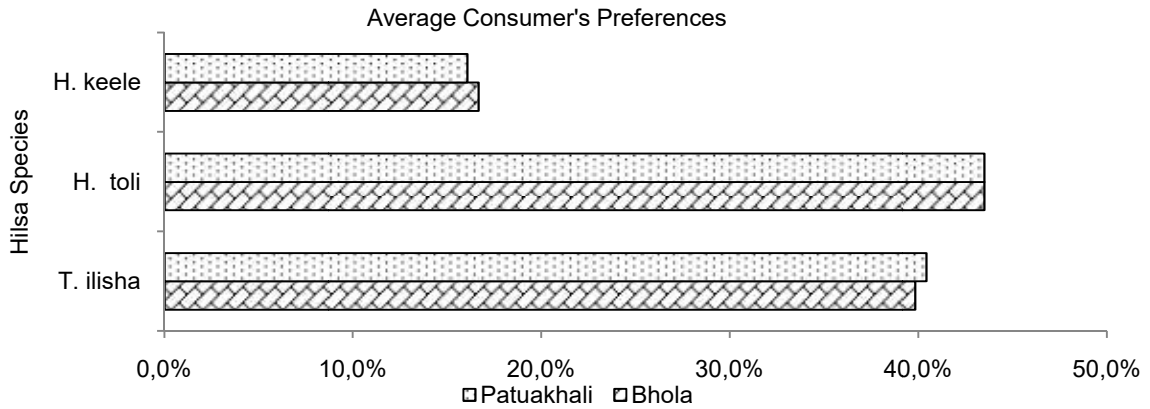


Figure 6 – Comparison of consumer’s preferences for different hilsa species of study area

Consumers’ hilsa consumption habits. Figure 7 presents consumers’ fish consumption habits described by where fish is consumed, how frequently fish is consumed and where fish is purchased.

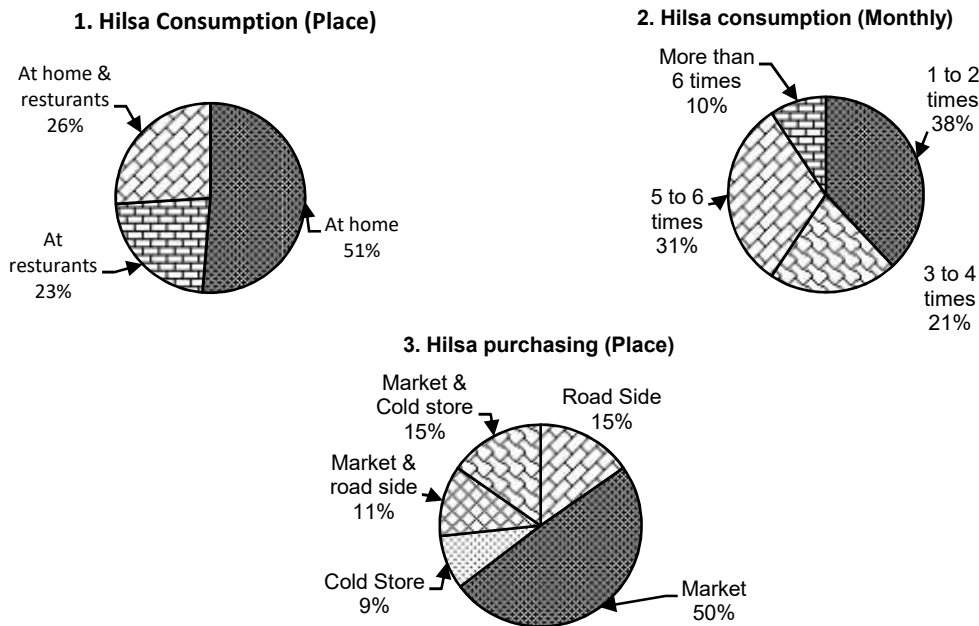


Figure 7 – Consumer’s habit for hilsa consumption and purchasing. (1) Hilsa consumption (Place); (2) Hilsa consumption (Frequency/month); (3) Hilsa purchasing (Place)

Consumers' hilsa purchasing behavior. The questionnaire also touched on the set of product attributes that were likely to have an influence on consumers' choice. To determine the most important factors that influence consumers' choice, consumers were asked to rate 6 product attributes – price, freshness, size, taste, source and safety. These product attributes were rated based on their level of importance prior to purchasing fish using a Likert scale ranging from 1 indicating strongly disagree to 5 indicating strongly agree. Product attributes were then ranked for their level of importance based on the number of consumers giving high scores (4-5) to each attribute.

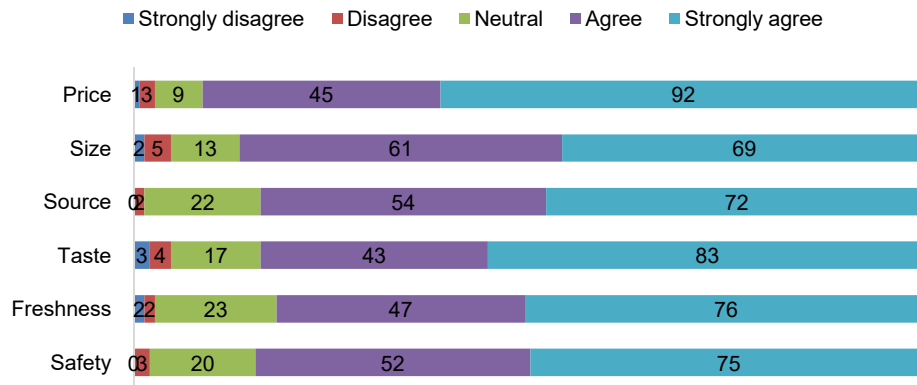


Figure 8 – Factors influencing consumers' hilsa purchasing behavior (%)

Distribution and marketing channel of hilsa. A number of middlemen are involved between hilsa fishermen and consumers in marketing system both in Bhola and Patuakhali district. The market chain from fishermen to consumers encircles mainly primary, secondary and retail markets, involving sales agents, wholesalers, suppliers and retailers (Fig. 7).

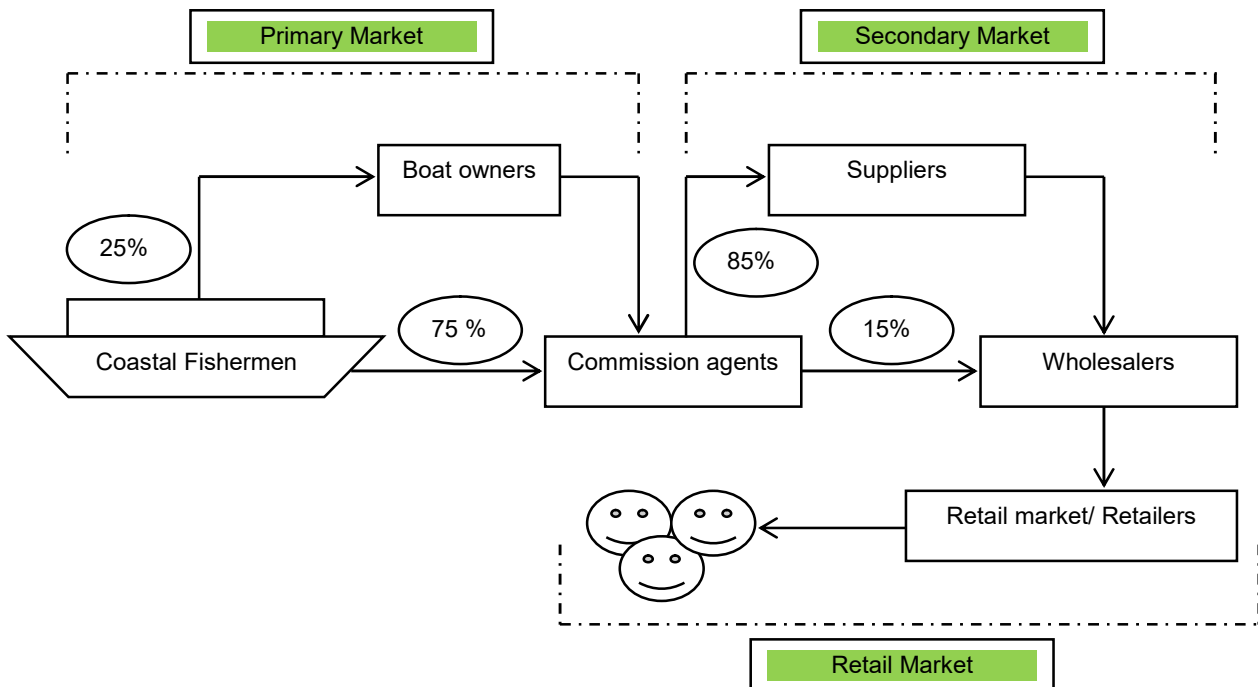


Figure 9 – Hilsa marketing channel from fishermen to consumers in Bhola and Patuakhali

Marketing constraints. In a word, facilities at fish markets are inconsiderable, with poor sanitation and hygiene. There are currently no norm practices for handling, washing, sorting, grading, cleaning and icing of fish. At the primary market level, the main constraints for

fishermen are a lack of market information and bargaining power. Political disturbances (i.e. strikes, road blocks, etc.) affect fish transportation as well as marketing. The marketing infrastructure, including ice, cold storage and transport facilities are fairly superfluous and unwholesome. Comparatively, wholesale markets have better facilities, but in general environment in primary and retail markets are far from favorable with regards to parking, stalls, spacing, sanitation, drainage and management.

DISCUSSION OF RESULTS

Species availability of hilsa. According to table.1, it was estimated that *Tenualosa ilisha* and *Hilsa toli* were mostly available hilsa species found in Bhola during study period. The other species *Hilsa keele* was rarely available and available in Bhola and Patuakhali district respectively. It is due to geographical location of Bhola. Among these three species availability was more or less same but exception was occurred in case of *H. keele*. It was found more in Patuakhali than Bhola.

Price of hilsa species. There was no previous information on literature about the price of hilsa and their purchasing capability in Bhola and Patuakhali district. So it is not possible to compare the present findings with previous one. However, price varied from species to species and district to district for any product especially for fish. Price of all hilsa species was found high in Patuakhali than Bhola (Tables 2 and 3). There are various reasons behind this problem. But the main reason behind this problem is the geographical location of Patuakhali district. There is no big river around Patuakhali district which is abundant with hilsa.

On the other hand, in Bhola there are two rivers named the Padma and Tatulia which is more abundant with hilsa than the small rivers around Patuakhali district. Sometimes considerable amount of hilsa were transported to Patuakhali from those district where hilsa was more available than Patuakhali. During transportation, it had to pass through a certain number of channel or intermediaries. As a result price of hilsa increased significantly in case of Patuakhali district. Fishermen of Bhola and Patuakhali also mentioned that hilsa fishing is profitable. Same finding was also observed in the river Meghna in Chandpur district (Sazzad, 1993). The present investigation revealed that price of different hilsa species differs from one another (Tables 2 & 3) significantly from month to month. Price variation depends on availability and consumer preference of the species. Among all available hilsa species *T. ilisha* and *H.toli* were the most available species of hilsa in both Bhola and Patuakhali district. But the price of *T.ilisha* was higher in all months in Bhola and Patuakhali than *H. toli* (Chandana ilish). It was because the taste of *T. ilisha* was more preferred by the consumers. Though the price was higher, it was found that consumer preferred *T. ilisha* much for its better taste than *H. toli*. The price of another species *H.keele* was found to be increased or decreased with the availability of them. Among all the species *T.ilisha* had the highest price and *H. toli* had the lowest price in all months.

According to Tables 2 & 3, it was estimated that the price of all hilsa species were more or less same in July and August. But the price of all species increased and decreased suddenly in September and October respectively. It was due to all types of fishing was prohibited in hilsa sanctuaries during 25 September to 5 October (DoF, 2015). At present Government banned Jatka fishing during November to January to increase the production of hilsa (DoF, 2013).

Consumer's preferences of hilsa. Hilsa is one of the most important tropical fishes of the Indo-Pacific region and has occupied a top position among the edible fishes owing to its taste, flavor and culinary properties (Nowsad *et al.*, 2012). Among the different species of hilsa consumer's preference depends on availability, size, flavor and more importantly on price. Purchasing capability is increased and decreased with the increased and decreased of income respectively. According to Figures 4 & 5, among those three available hilsa species *T. ilisha* and *H. toli* was more or less same accepted among the consumer of hilsa in both Bhola and Patuakhli district. For both Bhola and Patuakhali district *H. keele* was less accepted among the hilsa consumer.

Consumer acceptance of *T. ilisha*, *H. toli*, *H. keele* was 39.83%, 43.50%, 16.67% in Bhola and in Patuakhali it was 40.42%, 43.50%, 16.80% respectively (Fig. 6). It was estimated that consumer acceptance of *T. ilisha* was same in Bhola and Patuakhali district. In Bhola *T. ilisha* and *H. toli* in Patuakhali was more accepted hilsa species by the consumer. Though the price of *T. ilisha* was high but the consumer purchased it more due to its delicious taste. Consumer also purchased *H. toli* which is known as Chandana ilish for its availability and low price both in Bhola and Patuakhali district.

In September, the prices of all hilsa fish species were high compared to other months. It is due to all types of fishing was prohibited in Hilsa sanctuaries during last week of September and first week of October. Consumers purchasing capability also differed from September to October due to this reason. The price of all hilsa species remained more or less same in July and August. It was observed that the price of hilsa is higher than other fish species. Similar information was also found from the studied of fish availability and marketing system in shawrupkathi upazila, Pirojpur district, Bangladesh (Farzana, 2014).

Distribution and marketing channel of hilsa. Marketing channel includes the involvement of some intermediaries or middlemen through which transformation of hilsa take place from fishermen to consumer. Fishermen are the primary producers in the hilsa marketing systems. With a few exceptions, fishermen never directly communicate with the consumers. Presence of intermediaries has also been reported in Netrokona, Mymensingh and Gazipur district (Quddus, 1991; Mia, 1996; Rahman, 2003). In Bangladesh, fish marketing is almost exclusively preserved by the private sector where the livelihoods of a large number of people are associated with fish production and marketing systems (DFID, 1997). During the observation, it was found that the auctioneers get 3 to 5% commission by performing their activities. Aratdars also get 4 to 5% commission due to arrange auctioning activities and providing other facilities such as clean water supply, electricity, space, communication etc. which is called aratdary. Besides in some cases fishermen have to pay market tools that locally called khazna which vary from 5 to 10% depending on amount of sales (Fig. 9).

Hilsa market can be classified into 3 types; Primary market, Secondary market and retail market. In primary market, commission agents and boat owners get about 75% and 25% of hilsa respectively. But in secondary market commission agent sells their hilsa about 85% to the suppliers and only 15% to the wholesalers (Fig. 9). At last consumer gets hilsa from retail market or retailers. Similar result was found by (Neser, 2007).

Main problems of hilsa marketing were related to infrastructure, plant management and institutional management aspect. From the infrastructural problems lack of modern and hygienic landing centre; storage of adequate ice-plants with sufficient capacity, cold and freezer storage; lack of handling and preservation facilities; illiteracy, ignorance, lack of awareness of the fishermen etc. were the most severe. Similar fish marketing problems were found by (Mia, 1996; Parween *et al.*, 1996). Studies revealed very high level of post-harvest loss during pre-processing, processing, storage and transportation of fishery products (Nowsad, 2005).

RECOMMENDATIONS

Price of hilsa is very high due to various constrains such of transport cost, less availability compared to other fish species, long marketing chain, overfishing of immature hilsa locally named as "Jatka" in time of ban period, use of current jal etc.

GO and NGO should provide the necessary infrastructural, financial and technical assistance for the improvement of the livelihood of this fishing community.

Institutional credit system should be extended to the deserving fishermen on soft term basis.

By reducing the length of marketing channel, it will be possible to minimize the cost of transportation of hilsa from one district to another. Public awareness as well as fishermen awareness should be increased for catching of immature fish during ban period. It will maximize the production of hilsa and the price of hilsa will be low due to its availability.

The fishers do not have any alternate job opportunities during lean and ban fishing periods. Therefore, arrangement for alternate income generating activities should be made for the fishers during lean and ban fishing periods and also take step for sustainable fishing.

As well as public awareness is very much important in this case.

CONCLUSION

Fish is an important source of animal protein to the population of the South and South East Asian countries. Fish ranks second to rice as our staple diet and fisheries play the second important role next to agriculture in food production as well as in the country's economy. The contribution of fishery in the economy of Bangladesh and livelihood of her people is very important for creating job opportunities of unemployed people, earning foreign exchange, alleviating poverty and improving nutritional status of the people of Bangladesh. Instead of significance importance of fisheries sector, the fishermen had to lead subhuman life due to lack of awareness of sustainable fishing as well as poor income. Almost all fishermen mentioned lack of capital and lack of viable alternatives during banning period as their main problems. Government support to the affected fisher's community during ban period which quite insufficient and is not properly distributed. Urgent steps should be taken to provide alternate livelihood support to the hilsa fishers especially during ban and lean period.

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