

Extent and Causes of Quality Deterioration of Wet Fish in Fish Value Chain in Sylhet-Sunamgonj Area in Bangladesh

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Abstract: Sylhet-Sunamgonj region is one of the most important freshwater fish producing areas of Bangladesh. A huge amount of fish is produced in these regions to support local consumption and also export to other countries. The caught fish are not adequately taken care off during harvest and post-harvest handling. So, a serious loss in wet fish occurs. The present study has determined the extent of quality loss in fish value chain in Sylhet-Sunamgonj regions with a view to minimize such losses. Extent of loss in wet fish quality at the stakeholder level during transportation like fish farmer, arotder (commission agent), wholesaler and retailer was assessed. Two big landing centers, one big wholesale markets and one retail market of Sylhet-Sunamgonj region were studied. Data were collected through questionnaire interview along with traveling throughout the distribution channel. A sensory method was used to assess the quality of wet fish. Insufficient icing, mishandling of fish, non-insulated carrying container and lack of awareness were found to be the reasons for the quick quality loss of wet fish in these regions.

Key words: Quality deterioration, arotder, distribution channel loss assessment, retailer, Bangladesh

INTRODUCTION

Fish is a cheap preferred source of protein and an important export commodity in Bangladesh. Fish are the main, indeed the only source of animal protein and most of the fat soluble vitamins for the rural people who represent >80% of the total population. In the past, the rural poor used to catch small fish from ditches, canals and flood plains at little or no cost. Now the open water fishery is in decline, partly due to fishing pressure from the ever increasing population and partly due to loss of nature habitat. Sunamgong and Sylhet districts are the important inland fisheries area in Bangladesh. Fish are being harvested here in large quantity from the haor area (natural depression). But fish harvest has seriously declined for the past few years. The quantity of fish whatever landed for consumption suffers from serious post-harvest loss mostly due to ignorance and/or negligence of the people involved in the harvest, distribution, processing and trade (Nowsad, 2004). Proper handling and processing keeps the fish quality well. Low quality fish is a great concern for food security and public health. It also results in serious economic loss for the processors and fish traders. Furthermore, the poor in the post-harvest fisheries sector are the most likely to suffer the negative consequences of change primarily because the policies that influence how change affects

the poor are not always informed by an adequate knowledge of the strengths, capacities and needs of the poor.

Although, Sylhet-Sunamgonj area is playing a vital role in the fish distribution grid in the country, there is no hand on information on how much fish is deteriorated or lost its quality during transportation and marketing. Post-harvest study in Cox's Bazar, Southern district of Bangladesh suggests that about 20% marine fish was deteriorated 50-70% of its original quality before it reached local retail shop and about 30% fish lost 70% of its quality during distant transport (Nowsad, 2004). It was assumed that the situation would be worse in Sylhet-Sunamgonj region due to presence of lesser infrastructure facilities in this region compared to Cox's Bazar. Therefore, the present study was designed to determine the extent of quality loss and the causes of losses in wet fish value chain in Sylhet-Sunamgonj area.

MATERIALS AND METHODS

Study area and period: Study area was Sylhet region which comprises the districts of Sylhet and Sunamgonj. The Sylhet district includes the Sylhet Sadar and Biswanath Upazila and Sunamgonj district includes Dirai Upazila. Two major landing centres of the region were selected for the study. One from Sunamgonj Dirai of



Sylhet Division



Fig. 1: The study area

Sunamgonj and one from Sylhet Mahatabpur of Bishanath and Kazir bazar of Sylhet Sadar. One whole sale market (Arot) from Sylhet sadar named Kazir bazaar arot and one retail market from Sylhet Sadar named Lal bazar were selected for the study. The study was carried out in July and August in 2010 (Fig. 1).

Stakeholders of fish value chain: In the value chain of wet fish, the stakeholders addressed for loss assessment of fish were fish farmer/fishermen commission agent in primary market fish traders or commission agent in secondary market and retailers.

Distribution channel: Two distribution channels were studied to determine the post-harvest loss:

- From the landed fish at haor to the landing centre to arot to retailers in case of captured fresh fish that was directly caught from the haor

- From the farmers to landing centre to arot to retailers in case of cultured fish (mainly carps, tilapia and pangas)

For the distribution channel 1 data were collected from the spots (Lauranjani bridge, Dirai, Sunamgonj) where the fish were accumulated by the fishermen beside the haor. Usually small indigenous fishes were available in this distribution channel. Due to dry season, the fishermen had to pass usually 2-3 miles from the catching area to the selected place where they sold it to the local commission agents. The local agents took the fish to the main or secondary commission agents that usually took a journey of 2-3 h. Then, the retailers brought the fish to the retail markets. For distribution channel 2, data were collected from the fish farmers to commission agents to retailers at Lal bazar retail market at Sylhet town.

Quality loss assessment of fish: Quality loss of wet fish in different stages of distribution channel was assessed using the modified method of Nowsad (2010) based on Fish Loss Assessment and Control Tool originally developed by Torry Research Institute, UK (Sakaguchi, 1994). The sensory assessment tool was modified based on local conditions (Nowsad, 2010). The steps in distribution channel considered for direct assessment were farmer/fishermen on farm and landing center, commission agent, wholesaler and retailer. Variables are different carrying containers, different icing and handling conditions, different time lapsed to market fish, different distances from origin and different transportation systems. Qualities of major cultured and captured fishes were assessed. Table 1 and 2 were used to determine the post-harvest quality loss of fish.

Three research voyages were made. In each voyage, the data collectors moved along with the fish from the origin of harvest through the distribution channels up to retailers and assessed the quality deterioration of same fish or same lot of fish. In every step of distribution, at least five lots of same fish and 5 individual measurements for each lot were assessed based on Table 1. Sensory Defects Points (DP) of the fishes at different steps of the distribution channels were estimated using sensory attribute (Table 1) (Nowsad, 2010) and then quality grade of the fish were determined as shown in Table 2.

Identification of the causes of post-harvest loss: The causes of post-harvest loss were identified through PRA, SWOT analysis and checklist interview. To assess the post-harvest loss in wet fish (handling and icing), the components are:

Table 1: Defect Points (DP) for assessment of quality loss of fish¹

Characteristics	Defects	DP	Name of fish
Odor of broken neck	Natural fishy odor	1	
	Faint odor	3	
	Sour odor	5	
Odor of gills	Natural odor	1	
	Faint sour odor	2	
	Slight moderate sour odor	3	
	Moderate to strong sour odor	5	
Color of gills	Slight pinkish red	1	
	Pinkish red to brownish	2	
	Brown to grey	3	
	Bleached color	5	
Slime of gills	Thin colorless slime, filaments soft and separate	1	
	Sticky greenish slime, filaments separate	3	
	Yellowish slime, filaments attached	5	
Body slime	Clear, transparent, uniformly spread	1	
	Turbid, opaque	3	
	Thick, sticky, yellowish or Greenish	5	
Eye	Bulging with protruding lens, transparent eye cap	1	
	Slight cloudy lens, sunken	2	
	Dull, sunken, cloudy, blood line/reddish cornea	3	
	Sunken eyes covered with yellow slime	5	
Consistency of flesh	Firm, elastic	1	
	Moderately soft and some loss of elasticity	2	
	Some softening of muscle	3	
	Limp or floppy	5	
General appearance	Full bloom, bright, shimmering, iridescent	1	
	Slight dullness, loss of bloom	2	
	Definite dullness and loss of bloom	3	
	Reddish lateral line and caudal region, dull, no bloom	5	
Total DP			
Average DP			

¹Indicators modified based on Howgate *et al.* (1992) and Connell (1990)

Table 2: Quality grade of fish with Defect Points (DP)

Grade	DP	Grade characteristics
A	<2	Excellent, highly acceptable
B	2-3	Good, acceptable
C	>3 to <4	Deteriorating, not acceptable
D	4-5	Spoilt, rejected

Howgate *et al.* (1992)

- Inland culture fishery
- Inland capture fishery

RESULTS AND DISCUSSION

Table 3 shows that fish quality deteriorates, i.e., the DP changes with the travel of fish. Fish were caught from

haor in the morning and brought to the selected place besides haor (Laurangani Bridge area of Derai Upazila under Sunamgonj district) to sell. Laurangani bridge area of Derai Upazila under Sunamgonj district is about 76 km away from Kazirbazar arot of Sylhet. The retail market Lalbazer was about 3 km from Kazirbazar arot. No ice was used during transportation of fish. There was no facility for purchasing ice near the temporary auction centre. The fish which had extra respiratory organ like Baim, (*Mastacembelus armatus*) Taki (*Channa punctata*), Gochi (*Macrognathus aculeatus*), Gutum (*Lepidocephalichthys guntea*), Tengra (*Mystus bleekeri*) and Shing (*Heteropneustes fossilis*) were in quite fresh condition. Good DPs indicated that almost all fish species were in good and acceptable quality conditions as the time between catching and selling was little. Shing was in live condition from harvest to retail markets. But Meni (*Nandus nandus*), Taki (*Channa punctata*) and Punti (*Puntius punti*) were deteriorated in retailers of labazar. Ice boxes were not used also in any stage from harvest to retail markets. Bamboo splits baskets were mostly used to keep or carry fish.

Table 4 shows the quality of distributed fish from landing centre Mahtabpur, Bishanath, Sylhet site to Kazirbazar arot. The distance between landing centre Mahtabpur to Kazir bazer arot was 22 km. Defect points 3 is said to be the breaking points beyond which a fish is said to be deteriorated (Nowsad, 2010). In this study, DP of punti (*P. sophore*) badly crossed DP 3 in retailers. Mrigale (*Cirrhinus cirrhosus*) and Bata (*Labeo bata*) also had DP 3 in retailers. Indian major carps deteriorated gradually from arot to retail markets (Table 4). Defect points of mrigale, bata and punti were found 3.0, 3.0 and 3.5, respectively. Tilapia (*Oreochromis niloticus*) and Pangas (*Pangasius suchi*) were found to be in good condition in retail markets (defect points 1.85 and 2.00). Table 5 shows that all the fishes were washed, cleaned, sorted and graded in landing spot. But icing was not done. The haor area was about 25 km away from the landing centre and there was no ice factory in landing spots. As a result ice was not used. The local traders and transported the fish to the arot immediately after accumulation the fish in the landing spots. In arot, washing and cleaning and icing were not seen but sorting was done. Again in the retail market washing, cleaning, sorting, grading and poor icing were done. In the retail markets, the retailers sprinkled water over the fish frequently to show the fish fresh.

Table 6 shows that fish accumulated from distance places were washed, cleaned, sorted, graded and iced adequately in landing centre and in retail market. But only

Table 3: Sensory defect points (DP) of fish with the change of stakeholders

Sensory Defect Points (DP) of fish									
Stakeholders	Average temp and distance	Baim (<i>Mastace mbehus armatus</i>)	Tengra (<i>Mystus bleekeri</i>)	Meni (<i>Nandus nandus</i>)	Taki (<i>Channa punctata</i>)	Gochi (<i>Macrog nathus acu leatus</i>)	Gotum (<i>Lepidoce phalicht hys guntea</i>)	Punti (<i>Puntius sophore</i>)	Shing (<i>Heterop neustes fossilis</i>)
Lauranjani, Derai, Sunamgonj	0	2.02±0.01	1.68±0.01	1.67±0.00	1.04±0.07	1.05±0.01	1.0±0.00	2.16±0.01	Live
Kazir bazar Arot	32	2.56±0.07	2.37±0.00	2.22±0.01	2.04±0.07	2.11±0.00	2.00±0.00	2.97±0.01	1.14±0.00
Retailer Lal Bazer	33	2.67±0.07	2.61±0.00	3.00±0.00	3.0±0.01	3.0±0.01	2.97±0.00	3.50±0.01	1.57±0.01

Table 4: Quality deterioration of fish with the change of stakeholders

Sensory (DP)									
Stakeholders	Average temp and distance	Rui (<i>Labeo rohita</i>)	Catla (<i>Catla catla</i>)	Mrigale Punti (<i>Cirrhinus cirrh osus</i>)	Pangas (<i>Puntius sophore</i>)	Pangas (<i>Pangas ius suchi</i>)	Tilapia Bata (<i>Labeo bata</i>)	<i>(Oreochromis niloticus)</i>	
(Mahtabpur, bishanath, Sylhet)	32	1.68±0.00	1.68±0.01	1.68±0.01	2.3±0.01	1.00±0.00	2.10±0.00	1.0±0.00	
Kazir bazar Arot	34	2.48±0.01	2.29±0.02	2.54±0.01	2.96±0.01	1.46±0.07	2.80±0.07	1.60±0.04	
Retailer Lal bazer	34	2.80±0.03	2.90±0.01	3.00±0.01	3.50±0.02	2.00±0.07	3.00±0.01	1.850±0.01	

Table 5: Washing and cleaning of harvested fish at different stakeholder in case of fish accumulated from distance places. (Distribution channel-1)

Name of stake holders	Frequency (Practice %)				
	Washing	Cleaning	Sorting	Grading	Icing
Lauranjani, Derai, Sunamgonj (Landing centre)	100	100	100	100	Nil
Kazir bazar (Arot)	Nil	Nil	50	Nil	Nil
Lal bazar (Retail market)	100	100	50	100	50

Table 6: Washing and cleaning of harvested fish at different stakeholder in case of fish accumulated from distance places. (Distribution channel-2)

Name of stake holders	Frequency (Practice %)				
	Washing	Cleaning	Sorting	Grading	Icing
Mahtabpur, Bishanath, Sylhet (Landing centre)	50	50	100	100	75
Kazir bazar (Arot)	Nil	Nil	50	Nil	Nil
Lal bazar (Retail market)	100	100	50	100	50

sorting was performed in arot. Actually due to rapid and continuous bidding and selling process, aroters did not manage time to wash or handle the fish in arot. This scenario is almost similar throughout the country. Nowsad (2004) observed the quality losses due to unavailability of suitable ice-box and ignorance of fishers on adequate handling, icing and freezing of fish. Hossain *et al.* (2002) found very poor or no preservation facilities for freshwater fish species in Mymensingh area. On the other hand, as there is no preservation (Icing, chilling and freezing) or storage facilities of these species (Hossain and Afroze, 1991; Hossain *et al.*, 2002), the retail fish traders suffered huge economic loss due to low price offer for quality deterioration. Hossain *et al.* (2002, 2005) and Hoq and Kohinor (2005) identified the livelihood of such fish traders in Kewatkhali and Shutiakhali Union of Mymensingh area which were highly vulnerable.

CONCLUSION

Post-harvest loss reduction tools with policy supports could be the way to avoid the post-harvest loss of fish significantly. It is supposed to save fish and fish products worth about Tk.5-6 thousand crore in our country (Nowsad, 2010). About 5-6 million fishers and fish traders will be benefited either directly or indirectly. Reduction in quality loss will improve the image of the country's fisheries sector and re-establish the faith of foreign buyers on local products (Nowsad, 2008). Therefore, in depth long term steps for loss reduction is urgently needed.

This will not only pave the way for better protection of human life but also will help the people who make their living on fisheries with a more sustainable livelihood approach in near future.

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