



Well-being Status of Fishery Stakeholder Groups: A Comparative Study Between Improved and Poor Fish Handlers in *Haor* and Floodplain

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ABSTRACT

This study presents a comparative analysis of well-being status between improved fish handler (IHs) and poor fish handler (PHs) groups of Kishoreganj *haor* and Daudkandi floodplain. Two hundred seventy respondents were surveyed randomly through structured questionnaires, focus group discussion (FGD) and key informant interview (KII) from July, 2018 to October, 2019. Young people (11-30-year group) were dominant in both the two stakeholder groups in *haor* and floodplain. Most of the stakeholders belonged to medium size family (5-8 persons) in both the groups. Access to education, electricity, kitchen, housing and sanitation facilities were comparatively better in IHs than PHs in both *haor* and Daudkandi floodplain fisheries (DFPF). In Kishoreganj *haor*, higher number of IHs possessed above 12 decimal of homestead land. The quality of life was comparatively better in IHs than PHs. About 45% IHs and 48.89% PHs in *haor* areas received health service from the Government hospitals, while it was 38.57% and 52% in DFPF, respectively. Monthly income and yearly savings were higher in IHs than PHs in both study areas. Lack of proper knowledge on pre-harvest, harvest and post-harvest handling practices of fish from fishing to transport into retail markets were found to be the major constraints of poor quality and low price of fish. IHs had comparatively better well-being status than the PHs. It is, therefore, suggested that improved fish handling must be practiced by all the stakeholder groups to improve their well-being status.

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Introduction

Bangladesh has diversified water resources in the form of ponds, *haors* and *beels*, *baors*, flooded cultivated lands, canals, rivers and estuaries (DoF, 2018). *Haor* is, therefore, a highly productive natural source of livelihoods that support millions of poor people who engage themselves in fisheries related activities such as capture and trading. On the other hand, seasonal floodplains are the important sources of fish production in open waters where the poor fishers undertake fishing free of cost for their livelihoods. Recently, floodplain aquaculture with embankment / enclosure has been widely practiced by the land owners particularly in Daudkandi and Muradnagar areas of Cumilla district, and expanding in other areas of the country (DoF, 2007). Aquaculture could be one of the best options for the rural people that can generate income, employment and food security and can contribute significantly to alleviate rural poverty (Rahman *et al.*, 2005). The livelihood pattern of *haor* people is quite different and they are more disadvantaged than those of the mainland or non-

haor people due to unique geographical settings (Rahman and Salam, 2008). In case of both the *haor* and floodplain fisheries, coordination among the different stakeholders at policy planning, implementation and target beneficiary level, particularly among the agencies responsible for development and management of water resources and fisheries are lacking. Therefore, post-harvest loss in fisheries was found to be very high in both the areas, although situation seemed to be different based on different socio-economic and technical condition of the two regions.

Fish is a perishable commodity, and in Bangladesh average post-harvest quality loss in wet fish encountered is 12.4% (Nowsad, 2010). If the prevailing mishandling situation continues with such post-harvest fishery losses, it will bring about serious catastrophe in the protein supply and nutrition status of the half-starved and nutrition-deprived people as well as the health-conscious consumers of the country who find the quality fish as an important source of nutraceutical item for

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healthy living (Nowsad, 2005). Low quality fish and fish products are the great concern of food security and public health and these also bring serious economic loss that fishery stakeholders suffer year after year (Nowsad, 2010).

Livelihood of fishing communities, ethnic people and other neighboring stakeholders are entirely depend on fishing, fish trading and processing. Minimizing post-harvest loss of freshwater fish during distribution and marketing would be an important key element in increasing profit and ensuring food and nutritional security without intensifying the fishing or aquaculture effort. As understood, post-harvest fishery loss varies among the stakeholders based on their level of awareness, attitude, empowerment, fisheries management practice and other socio-economic conditions (Nowsad, 2010). In the *haor*, mostly unorganized, unempowered ethnic and marginally poor fishing communities are involved in fishing and other fishery related trades. Most of them do not follow the improved handling practice prescribed by FAO Codex or FIQC, hence huge post post-harvest loss occur which tend to increase economic loss also. As a result, the social well-being status of the fishery communities would be lower than those stakeholders who follow improved handling practice. On the other hand, the Daudkandi floodplain fisheries (DFPF) are operated by local landowners and inhabitants to culture fish under organized CBFM or community enterprise. So, their responses towards awareness and skill improvement on adopting improved handling practice and reduction of post-harvest loss would be different from that of the resource users of *haor* areas. The stakeholders in DFPF follow the improved handling practice that might reduce post-harvest loss and increase income by increasing the value of fish. For this reason, the well-being status of DFPF stakeholders could be higher than that of *haor* areas.

Considering this backdrops, this experiment was conducted to determine and compare the well-being status between improved and poor fish handling stakeholder groups (IHs and PHs, respectively) in two different floodplain fisheries, one in Kishoreganj *haor* and other in Daudkani floodplain.

Materials and Methods

Study areas and study period

The study was conducted in 10 fish landing centers at 5 *haor Upazila*, viz., Karimganj, Tarail, Nikli, Kotiadi and Itna of Kishoreganj district and 10 floodplain-based culture fisheries projects at Daudkandi *Upazila* of Cumilla district for a period of 16 months from July, 2018 to October, 2019.

Respondent's selection and questionnaires preparation

A total of 9 structured questionnaire survey forms were developed through rigorous process of drafting, editing, fine-tuning, expert-sharing, field testing and final field validation. Among them, 5 survey forms were prepared for *haor*-based interventions, viz., for i) fisherman, ii) *aratdar*, iii) *paiker*, iv) retailer and v) ice factory owner. In case of DFPFs on the other hand, four survey forms were prepared, for e.g., i) project directors (shareholder/lease owner) ii) fishers' family iii) fish handlers and iv) fish traders. Secondary data were collected from *Upazila* Fisheries Office, District Fisheries Office, books, journals, reports and NGOs.

Identification of IHs and PHs groups

A sensory based Fish Freshness Assessment Tool (Nowsad et al. 2015) was used, where the fishes at different stages of distribution under a distinct stakeholder if found with defect points > 3.2 was taken as PHs and the same when found <3.2 was taken as IHs. The system was originally developed Howgate et al. (1992) by the Torry Research Station, UK, and updated by several scientists (Connell, 1990; Sakaguchi, 1994). Sensory indicators have been calibrated according to the physical environments of local fish species (Nowsad, 2004). The IHs and PHs were selected by analyzing the qualities of fishes belong to the stakeholders from harvest to retail distribution. The loss evaluation study specified that fish moderately lose quality throughout handling by the fishermen, *aratdar*, project directors (shareholder/lease owner), fishers' family and fish handlers. On the other hand, the quality of fish was reduced more frequently in *paiker*, retailer and fish traders. Maximum quality losses were introduced at the *aratdar* (*haor*) and fish traders (floodplain).

Technique of data collection

A total of 270 respondents were surveyed, of which 150 were from Kishoreganj *haor* (60 IHs and 90 PHs) and 120 from DFPF (70 IHs and 50 PHs). The study was based on collection of primary and secondary data. Primary data were collected by questionnaire interview with stakeholders, FGD with intermediaries and cross-check interview with key informants (KII).

Data analysis

All the collected information was accumulated and analyzed by Microsoft Excel 2016 and then presented in textual, tabular and graphical forms. Paired samples t-test was done to know the significant differences ($p < 0.05$) between IHs and PHs by using Statistical Package for Social Sciences (SPSS/PC; Version 20.0; SPSS Inc., Chicago).

Results and Discussion

Demographic characteristics

The demographic characteristics of fishery stakeholders which include age structure, family size, level of education and occupation are presented in Table 1.

Most of the stakeholders were young aged (11-30 years) both in IHs and PHs groups from *haor* and floodplain areas, as also similar results were recorded by Trina *et al.* (2015). Medium sized family was dominant in all types of stakeholder groups where large size was recessive. This finding was more or less in agreement with BBS (2019) and Faroque (2006). The literacy rate was higher in PHs than IHs both in *haor* and floodplain. Some of the reasons for this condition in PHs were found to be lack of awareness about the importance of education, poverty, child labour, illiterate guardians etc. Stakeholders involved in fishing/fish trading were higher in Kishoreganj *haor* than DFPP for both IHs and PHs groups (Table 1). Bhaumik *et al.* (2005) found that the primary occupation of all the respondents were fishing in the fishermen of twin pronged floodplain wetlands in West Bengal which mostly agrees with the present study.

Physical assets of respondents

Sources of drinking water

The facility of safe drinking water is considered to be the most valued elements in the society. Drinking water facilities were maintaining better health condition. All of the stakeholders from Kishoreganj used tube well water where 96% of IHs in DFPP used tube well. About 4% used municipal supply water in DFPP where no one of such in

Kishoreganj *haor* (Fig. 1). Present result in agreement with the findings of Kabir *et al.* (2012). According to BBS (2019) about 98% people from seven geographic divisions of Bangladesh used to drink tube-well water which was very much supportive to this study.

Electricity facilities

Electricity is one of the factors that supports the development and growth of the country and describe the empowerment status of the stakeholders. In Kishoreganj *haor* areas, most of the stakeholders had the electricity facilities. About 11.1% PHs had solar electricity facilities in *haor* whereas none in DFPP (Fig. 2). Ali *et al.* (2010) found that about 95% of the farmers in some selected areas of Tarakanda *upazila* of Mymensingh district had electricity facilities which relatively support the present study.

Toilet facilities

There were three types of sanitation facilities available in *haor* basins and Daudkandi floodplain, *viz.*, open toilet, closed toilet and sanitary toilet. In *haor* areas, about 93.33% IHs used sanitary toilet, while it was 71.11% for PHs. Using of open toilet was higher in Kishoreganj *haor* than DFPP (Fig. 3). Poor handler groups in *haor* were more vulnerable to live without proper sanitary facilities because their awareness and educational level were comparatively lower than IHs. IHs toilet facilities were more improved than the fishermen of the Old Brahmaputra River studied by Kabir *et al.* (2012).

Table 1. Demographic characters of respondents

Variables	Categories	Haor		Floodplain	
		IHs	PHs	IHs	PHs
Age structure	Children (0-10)	16(26.67)	21(23.33)	10(14.29)	9(18)
	Young (11-30)	25(41.66)	35(38.89)	32(45.71)	23(46)
	Middle (31-50)	12(20)	20(22.22)	20(28.57)	11(22)
	Old (>50)	7(11.67)	14(15.56)	8(11.43)	7(14)
Family size	Small (2-4)	17(28.33)	26(28.89)	24(34.28)	21(42)
	Medium (5-8)	40(66.67)	60(66.67)	39(55.72)	27(54)
	Large (>8)	3(5)	4(4.44)	7(10)	2(4)
Educational status	Illiterate	9(15)	21(23.33)	14(20)	12(24)
	Primary	23(38.33)	42(46.67)	17(24.29)	14(28)
	SSC	24(40)	19(21.11)	29(41.43)	21(42)
	HSC	3(5)	6(6.67)	6(8.57)	2(4)
	Graduation	1(1.67)	2(2.22)	4(5.71)	1(2)
Occupational status	F/FT	27(45)	36(40)	13(18.57)	12(24)
	F/FT +A	11(18.33)	21(23.33)	25(35.71)	18(36)
	F/FT +SB	9(15)	14(15.56)	16(22.86)	6(12)
	F/FT +A+SB	6(10)	7(7.78)	9(12.86)	3(6)
	Others	7(11.67)	12(13.33)	7(10)	11(22)

IHs = Improved handlers; PHs= Poor handlers; SSC = Secondary School Certificate; HSC = Higher Secondary School Certificate; F/FT= Fishing/Fish trading; F/FT +A = Fishing/Fish trading and agriculture; F/FT +SB = Fishing/Fish trading and small business; F/FT +A+SB = Fishing/Fish trading, agriculture and small business.

Kitchen facilities

The kitchen facilities were classified into three groups such as open, only fence no roof, fence with roof. Only 4.44% PHs had no kitchen in *haor* where it was 30% in DFPF. Improved handlers had better kitchen facilities than PHs in both *haor* and floodplain (Fig. 3). Kitchen facilities were higher than the fisherman of Tulsiganga River in Joypurhat, stated by Paul *et al.* (2018).

Housing condition

The social status of the people is indicated by nature of house. During the study, attempts were made to find out the condition of living house of the stakeholders. Semi-*pakka* and *pakka* houses were found to be higher in Kishoreganj *haor* than in DFPF in both IHs and PHs (Fig. 4). Khatun *et al.* (2013) found that most of the houses of pond fish farmers (78%) in Charbata of Noakhali were made of corrugated iron sheet which supports present study.

Land holding

Total land area was classified into 4 groups such as no land, 1 - 5 decimal, 6 - 50 decimal and above to 50 decimal according to land having by stakeholder group's. In *haor* areas, 33.33% improved handlers had above 50 decimal land where it was 25.56% for PHs (Fig. 5). The IHs had higher amount of land than PHs in DFPF also. Islam *et al.* (2017) reported a higher number of fishermen in Padma River at Chapai Nawabganj district had more than 50 decimal land which is more or less similar to the present findings.

Holding of homestead land

Homestead area was classified into 5 groups such as no land, 1-3 decimal, 4-8 decimal, 9–12 decimal and above to 12 decimal according to land having by stakeholder

groups. Stakeholders in IHs in Kishoreganj *haor* had higher number of above 12 decimal lands than DFPF (Fig. 6). Mazumder (2014) found that about 84% of the fishermen in Singra *Upazila* of Natore had homestead land size more or less similar to the present study.

Response to social stimuli (%)

Quality of life

The quality of life was better in IHs groups than PHs. None of the stakeholders in DFPF were very poor where 5% in IHs and 2.2% in PHs were very poor in Kishoreganj *haor* (Fig. 7). The present findings were higher than the results of Pollnac *et al.* (2001), and Pollnac and Poggie (2008).

Place of treatment of illness

Stakeholders, either improved or poor handler, from Daudkandi floodplain fisheries went to government hospitals as well as private hospitals more than the stakeholders from Kishoreganj *haor* (Fig. 8). Ali *et al.* (2010) found that 45% fisherman in Tarakanda *Upazila* in Mymensingh took treatment from public hospital which were more or less similar to this study. According to Rishan and Fagun (2019) 61% of people received their treatment from Habiganj Sadar hospital which is slightly higher than the present study.

Financial condition of fishery stakeholders (%)

Bank account

Stakeholders from DFPF had higher number of bank account than Kishoreganj *haor* area. Higher number of IHs had bank account than PHs in these two regions (Fig. 9). Present findings were higher than the Rishan and Fagun (2019) outcomes about the bank account of fisherman at Habiganj Sadar *Upazila*.

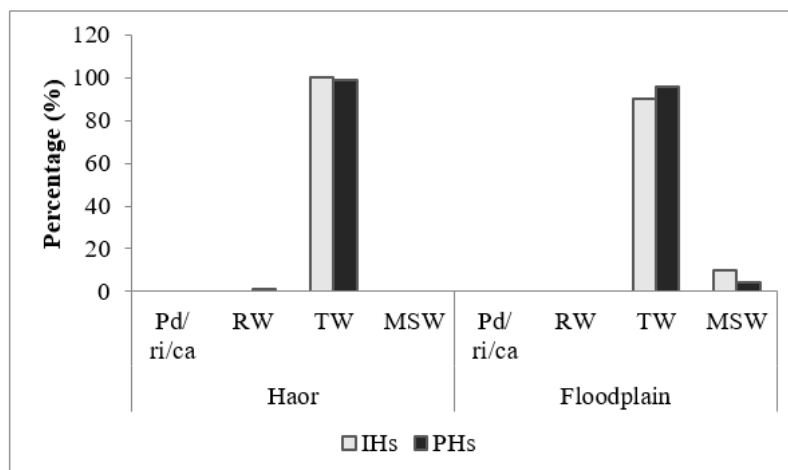


Figure 1. Comparison of sources of drinking water among different fishery stakeholder groups. IHs = Improved handlers; PHs= Poor handlers; Pd/ri/ca= Pond/river/canal; RW=Rain water; MSW = Municipal supply water; TW= Tube-well water

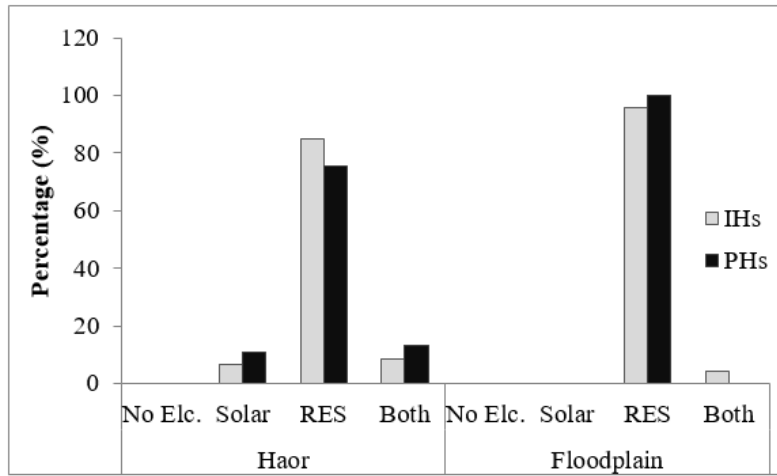


Figure 2. Comparison of electricity facilities among different fishery stakeholder groups. IHs = Improved handlers; PHs= Poor handlers; RES = Rural electricity supply; Elc = Electricity

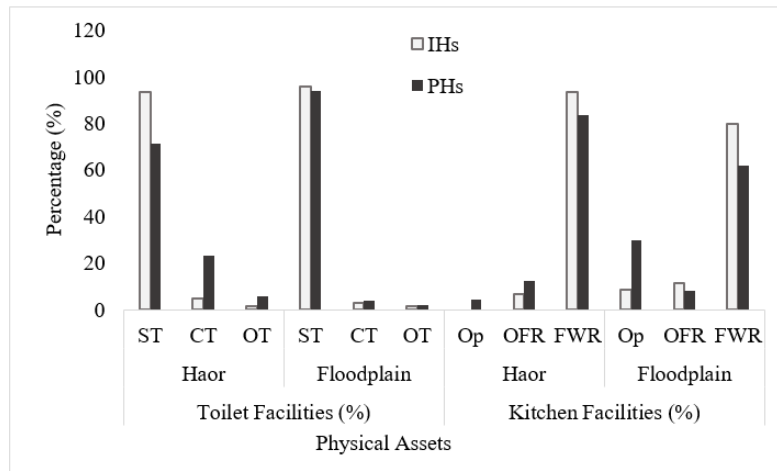


Figure 3. Comparison of toilet and kitchen facilities among different fishery stakeholder groups. IHs = Improved handlers; PHs= Poor handlers; ST= Sanitary toilet; CT= Closed toilet; OT= Open toilet; Op= Open; OFR= Only Fence no roof; FWR= Fence with roof

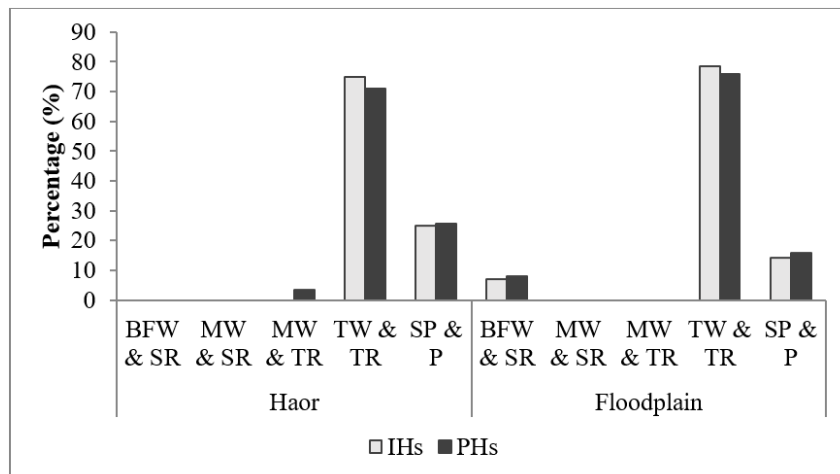


Figure 4. Comparison of housing materials among different fishery stakeholder groups. IHs = Improved handlers; PHs= Poor handlers; BFW = Bamboo fenced wall; SR = Straw roof; MW = Mud wall; TW= Tin Wall; TR = Tin roof; SP = Semi-pakka; P = Pakka

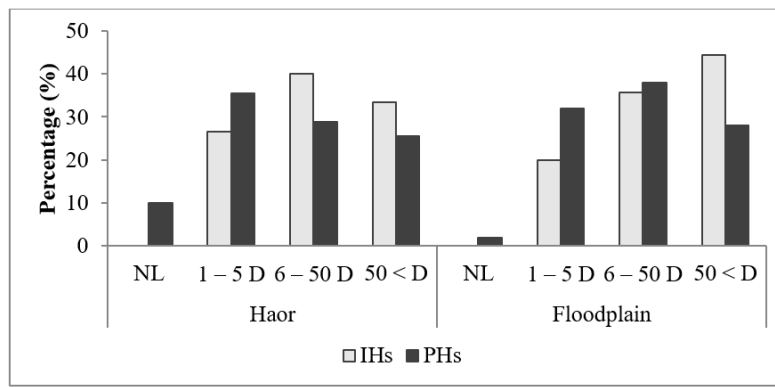


Figure 5. Comparison of land holding among different fishery stakeholder groups. IHS = Improved handlers; PHs= Poor handlers; NL = No land; D= Decimal

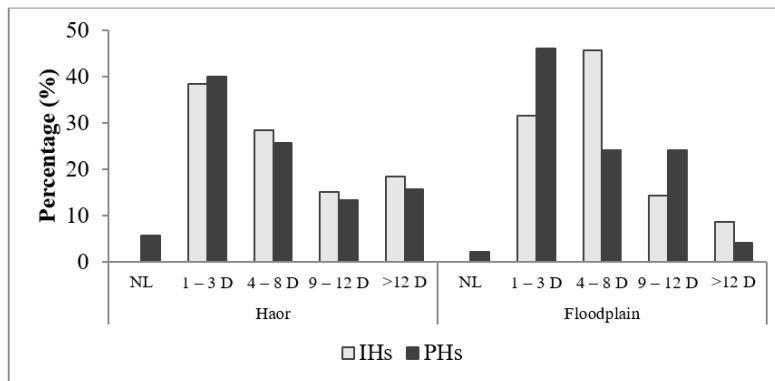


Figure 6. Comparison of holding of homestead land among different fishery stakeholder groups. IHS = Improved handlers; PHs= Poor handlers; NL = No land; D= Decimal

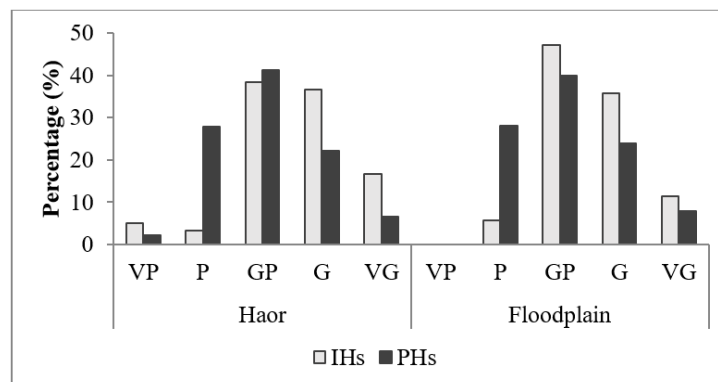


Figure 7. Comparison of quality of life among different fishery stakeholder groups. IHS = Improved handlers; PHs= Poor handlers; VP= Very poor; P= Poor; GP= Neither good nor poor; G=Good; VG= Very good

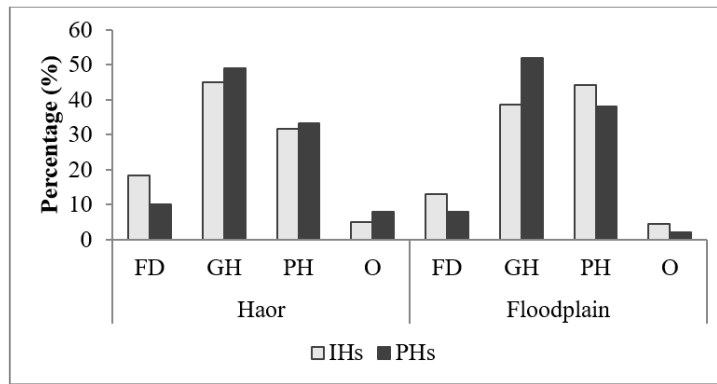


Figure 8. Comparison of place of treatment among different fishery stakeholder groups. IHS = Improved handlers; PHs= Poor handlers; FD= Family doctor; GH= Government hospital; PH= Private hospital; O= Others

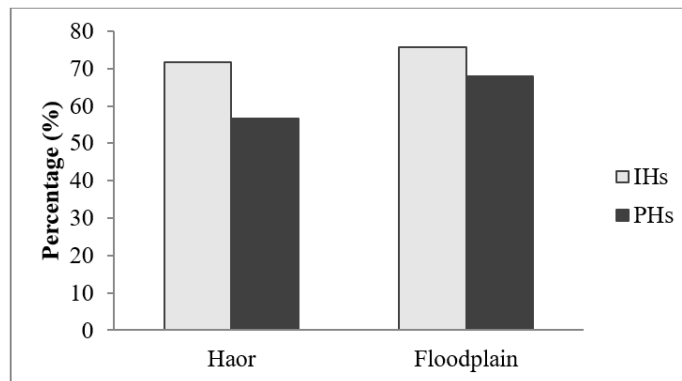


Figure 9. Comparison of having bank account among different fishery stakeholder groups. IHS = Improved handlers; PHs= Poor handlers

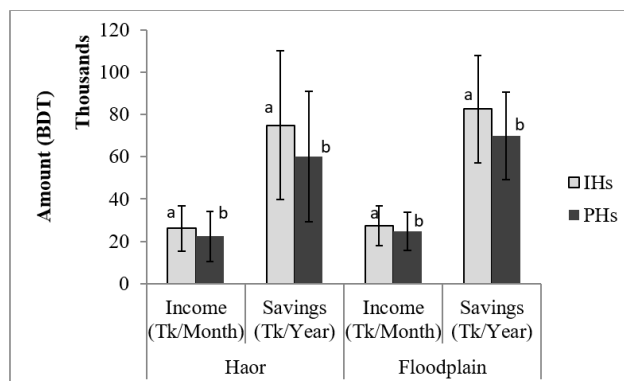


Figure 10. Comparison of income and savings among different fishery stakeholder groups. IHS = Improved handlers; PHs= Poor handlers; Tk= Bangladeshi Taka

Income and savings

The monthly income and yearly savings of stakeholders were higher in DFPF than Kishoreganj *haor*. Income and savings were also significantly ($p < 0.05$) higher in IHs than PHs (Fig. 10) in Kishoreganj *haor* and DFPF. The IHs were found to follow proper handling practice in pre-harvest, harvest and post-harvest period. For this reason, it was observed that the quality of fish didn't deteriorate and consumers paid high price for such high-quality fish. These improved practices increased the monthly income and as also yearly savings of improved handlers in both *haor* and DFPF compared to PHs groups. IHs income were higher from the Fishermen of Old Brahmaputra River studied by Kabir *et al.* (2012).

Conclusion

The analyses of good practices in fish handling by the stakeholders from the harvest to sale found that improved fish handler stakeholders had comparatively better well-being status than the poor fish handling stakeholders based on their physical assets, response to social stimuli and financial conditions. Lack of awareness, education, proper knowledge on fish handling from landing centers to retail markets were found to be the major limitations of quality and price degradation of fish. Therefore, improved fish handling must be practiced by all the stakeholder groups to improve the well-being status. The government/DoF may launch awareness and skill development and capacity building program on improved fish handling to improve the on-going handling situation, especially in *haor*-based open water fisheries of the country.

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Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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