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FISH DIVERSITY AND SOCIO-ECONOMIC CONDITION OF FISHERMEN AT THE HALTI BEEL IN NATORE DISTRICT, BANGLADESH

Gulshan Ara Latifa[1*], Mst. Mahmuda Parvin[2] and Md. Asaduzzaman Sardar[3]

Department of Zoology, University of Dhaka, Dhaka-1000, Bangladesh

Abstract: This study was conducted to investigate the fish diversity and livelihood condition of fishermen community at Dangapara village of Halti beel, Singra, Natore. The socio-economic data were collected from 50 randomly selected fishermen using questionnaire survey between July and October 2019. In this study, a total of 43 fish species were recorded under seven orders, 20 families and 32 genera. Majority of fishermen were illiterate (44%), about 28% fishermen could sign only, 24% and 4% fishermen were completed primary and secondary education, respectively. Among them 79% were Muslims and 21% were Hindus. The majority of fishermen had mud house with straw and tin roof while 56% household used tin roof, 34% household used tin shed with tin roof, only 10% household used straw. Fishermen annual income was between 30001 to 40000 BDT. About 66% household had kacha toilets, 30% household had semi paka toilets, only 4% household had no sanitary facilities. The most of the households (78%) were used electricity as their energy source. The majority of fishermen (64%) were received health service from village doctors. About 44% fishermen was directly engaged in fishing as their main occupation while 26% and 24% fishermen were engaged in labor and agriculture activities, only 8% fishermen was engaged in other professions.

Key words: *Fish diversity, fishers, livelihood, beel, wetlands*

INTRODUCTION

Bangladesh is blessed with diversified aquatic resources. There are 4,712,205 ha of inland waterbodies that includes ponds, rivers, beels, haors and baors, about 3724310 metric tons of fishes have harvested in the year 2018-2019 (DoF 2020). The fishermen communities have engaged in fishing of these waterbodies and supported in supplying the main protein to Bangladesh peoples. Typically, a beel fishery has substantial importance for freshwater fish habitat, fishermen community and fish source for local peoples. For example, Galib *et. al.* (2009) accounted a total of 81 fish species in the Chalan beel of

*****Author for correspondence: <*gulshan_al@yahoo.com*>, [2]*Department of Environmental Science, Stamford University of Bangladesh*
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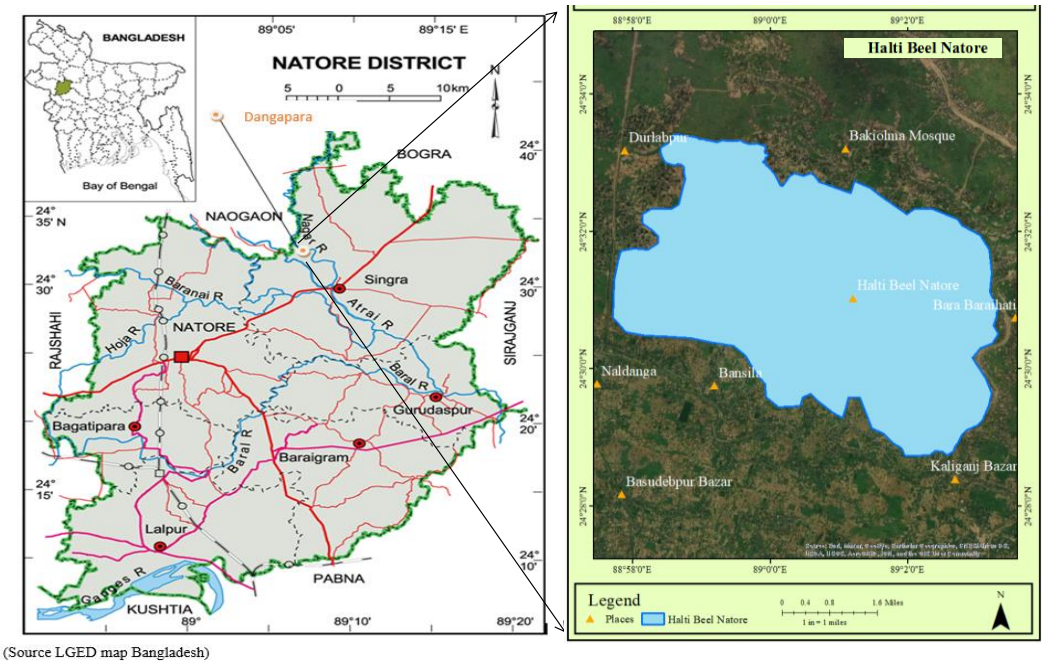
which 95.06% were used as protein food for local people consumption. which 95.06% were used as protein food for local people consumption. Generally, fishermen community is backward class people in Bangladesh, they are devastating with various problems including social, professional and economic. For example, Paul et al. (2013) reported that Turag River fishermen is vulnerable community, they are facing severe economic problem and took loan from different microcredit NGOs such as GRAMEEN, ADESH, ASA or Mahajan (boat owner or fish whole seller). The majority of fishermen are illiterate and their family size is moderate (4-7 family members) to large (above 7 family members). Although these fishermen (64-70%) were engaged in full-time fishing but many of them (26-34%) were engaged in agriculture and day labor activities for their subsistence. These authors suggest the fishermen community require government supports for their betterment. Furthermore, Rahman *et al.* (2015) stated the Majority of Talma River fishermen was landless, they are mostly received health service village doctors. These authors did find that about 86% household had no electricity supply. Fish species of the Halti Beel was studied by Imteazzaman et al. (2013) who recorded 55 indigenous and eight exotic species (total 63 fish species) belonging to eight orders, 20 families and 41 genera. Currently, the fish species diversity has declined rapidly in Bangladesh, it has gained more attention (IUCN 2015). While, some studies have assessed the fish biodiversity in Bangladesh but mostly done in more than a decades ago (Ahmad et al. 2000, Galib et al. 2009, Hossain et al. 2014, Zafar et al. 2004). Therefore, the study was undertaken to assess the fish diversity and livelihood condition at Halti beel of Dangapara at Singra upazila in Natore district.

MATERIAL AND METHODS

Study Area: The Halti beel is an important wetland in north-western Bangladesh that located in Natore Sadar Upazila of Natore district within the latitudes of 24º28.5´ to 24º 32´ North and the longitudes of 89º00´ to 89º03´ East (Fig. 1) with the total area of about 1012.5 ha (during monsoon) and 15.95 ha (during dry season). The water depth varies from 1.5 to 6 m depending on season (Imteazzaman and Galib 2013). A part of Halti beel has been declared as fishery sanctuary as this is the natural breeding place of fishes and water persists year round (The Daily Asian Age, 11th April, 2020). This wetland is a rich source of different fish species throughout the year and hundreds of fishers from nearby villages depend on the water-body for their livelihood (Imteazzaman and Galib, 2013). The beel lies between two rivers, the Atrai and the Barnai and it receives regular flood water during monsoon period from these two rivers.

Fish species collection and identification: The fish samples were collected from the Halti beel between August and October 2019. Fishes were collected

from several sites using different net and fishing trap. The collected fishes were counted on the spots and brought to the laboratory except those were easily identifiable and preserved in 10% formalin solution. The collected fishes were identified by Rahman (1989 and 2005), Talwar and Jhingran (1991). The status of fish species was determined according to IUCN (2015).



(Source LGED map Bangladesh)

Fig 1: Map of Natore Sadar Upazila showing the Halti beel

Socio-economic data Collection: Socio-economic status of the fishermen of the study area were collected through questionnaire survey comprised of the variables namely age, family size, education, income sources, religion, education of children, annual income, training exposure, family type, health facilities and other socio-economic issues. Primary data of the study was collected through questionnaire, key informant interviews (KII) and field work. The secondary data and information used in this study were collected from various sources such as journals, books, magazines, newspapers etc. The questionnaire method was chosen to collect primary socio-economic data because it provides insights into people's beliefs, attitudes, values, behavior etc. It can also decrease the possibility of the biasness of interviewer to the interviewee (Sommer and Sommer 1991). For the questionnaire survey, total 50 families of the fishers of the Dangapara village, Shingra, Natore were taken. Simple descriptive analysis

and graphical presentation of data were carried out using Microsoft Excel (version 2007).

RESULTS AND DISCUSSION

Fish diversity of Halti beel: A total of 43 fish species were recorded during the study period from Halti beel. Fishes belonging to seven orders of 20 families and

Table 1. Fish faunal diversity of Halti beel with status

Order	Family	Scientific Name	Common Name	Local Name	Status National	Status Global
Cypriniformes	Cyprinidae	*Amblypharyngodon mola* (Hamilton, 1822)	Mola carplet	Mola	LC	LC
		Esomus danricus (Hamilton 1822)	Flying barb	Darkina	LC	LC
		Gibelion catla (Hamilton, 1822)	Catla	Catla, Katol	LC	-
		Cirrhinus cirrhosus (Bloch, 1795)	Mrigal Carp	Mrigal	NT	VU
		Cirrhinus reba (Hamilton, 1822)	Reba	Tatkini,	NT	LC
		Labeo calbasu (Hamilton, 1822)	Black rohu	Kalibaos, baus	LC	LC
		Labeo rohita (Hamilton, 1822)	Rohu	Rui	LC	LC
		Pethia conchonius (Hamilton, 1822)	Red barb, Rosy barb	Kanchan punti	LC	LC
		Puntius ticto (Hamilton, 1822)	Puntio barb	Punti	DD	-
		Systomus sarana (Hamilton, 1822)	Olive barb	Sharputi	NT	LC
		Puntius sophore (Hamilton, 1822)	Spotfin swamp barb	Jat punti	LC	LC
		Puntius terio (Hamilton, 1822)	One spot barb	Teri punti	LC	LC
	Balitoridae	*Acanthocobitis botia* (Hamilton, 1822)	Sand Loach	Balichata	LC	LC
	Cobitidae	*Botia dario* (Hamilton, 1822)	Necktie Loach	Bou Mach	EN	LC
		Lepidocephalichthys guntea (Hamilton, 1822)	Guntea Loach	Gutum	LC	LC
Siluriformes	Bagridae	*Mystus cavasius* (Hamilton, 1822)	Gangetic Mystus	Golsha,	NT	LC
		Mystus tengara (Hamilton, 1822)	Tengara Mystus	Bujuri Tengra	LC	LC
		Mystus vittatus (Bloch, 1794)	Striped Dwarf Catfish	Tengra	LC	LC
		Sperata aor (Hamilton, 1822)	Long-whiskered Catfish	Ayre	VU	LC
	Siluridae	*Ompok pabda* (Hamilton, 1822)	Pabda catfish	Madhu pabda	EN	NT
		*Wallago attu (*Bloch & Schneider, 1801)	Freshwater shark	Boal	VU	NT
	Clariidae	*Clarias batrachus*	Walking Catfish	Magur	LC	LC

Order	Family	Scientific Name	Common Name	Local Name	Status National	Status Global
		(Linnaeus, 1758)				
	Heteropneustidae	*Heteropneustes fossilis* (Bloch, 1794)	Stinging Catfish	Jiol	LC	LC
	Chacidae	*Chaca chaca* (Hamilton, 1822)	Angler Catfish	Chaka	EN	LC
Perciformes	Gobiidae	*Glossogobius giuris* (Hamilton, 1822)	Fresh Water Goby	Bele	LC	LC
	Channidae	*Channa marulius (Hamilton, 1822)*	Giant Snakehead	Gajar	EN	LC
		Channa punctatus (Bloch, 1793)	Spotted Snakehead	Taki	LC	LC
		Channa striatus (Bloch, 1793)	Common Snakehead	Shol	LC	LC
	Badidae	*Badis badis* (Hamilton, 1822)	Badis	Naptey koi	NT	LC
	Ambassidae	*Chanda nama* (Hamilton, 1822)	Asian Glass Fish	Lomba Chanda	LC	LC
		Pseudambassis ranga (Hamilton, 1822)	Indian Glass Perch	Gol chanda	LC	LC
	Nandidae	*Nandus nandus* (Hamilton, 1822)	Mottled Nandus	Bheda	NT	LC
	Anabantidae	*Anabas testudineus* (Bloch, 1792)	The Climbing Perch	Koi	LC	DD
	Osphronemidae	*Trichogaster fasciata* (Bloch & Schneider, 1801)	Banded gourami	Khoila	LC	LC
		Trichogaster lalius (Hamilton, 1822)	Dwarf gourami	Lal Khailsha	LC	LC
	Belonidae	*Xenentodon cancila* (Hamilton, 1822)	Freshwater Garfish	Kankila	LC	Unknown
Clupeiformes	Clupeidae	*Corica soborna* (Hamilton, 1822)	Ganges River-sprat	Kachki	LC	LC
		Gudusia chapra (Hamilton, 1822)	Indian river shad	Chapila	VU	LC
Symbranchiformes	Mastacembelidae	*Macrognathus aculeatus* (Bloch, 1786)	One-stripe Spinyeel	Tara Baim	NT	NE
		Macrognathus pancalus (Hamilton, 1822)	Stripped Spinyeel	Guchi	LC	LC
		Mastacembelus armatus (Lacepède, 1800)	Tire-track Spinyeel	Baim, Sal Baim,	EN	NE
Syngnathiformes	Syngnathidae	*Microphis deocata* (Hamilton, 1822)	Deocata Pipefish	Kumirer Khil	VU	NT
Tetraodontiformes	Tetraodontidae	*Tetraodon cutcutia* (Hamilton, 1822)	Ocellated pufferfish	Tepa	LC	LC

(Source: IUCN 2015)
Note: Status EN- Endangered, VU- Vulnerable, CR- Critically Endangered, DD- Data Deficient, NT- Not Threatened and LC- Least Concern.

32 genera were recorded. A checklist of identified fishes including their local names, common names, and scientific names, national following IUCN 2015 and global status is given in Table 1. A total number of fish species was 43 belonging to seven orders and 20 families. Cypriniformes was recorded as the most diversified fish group.

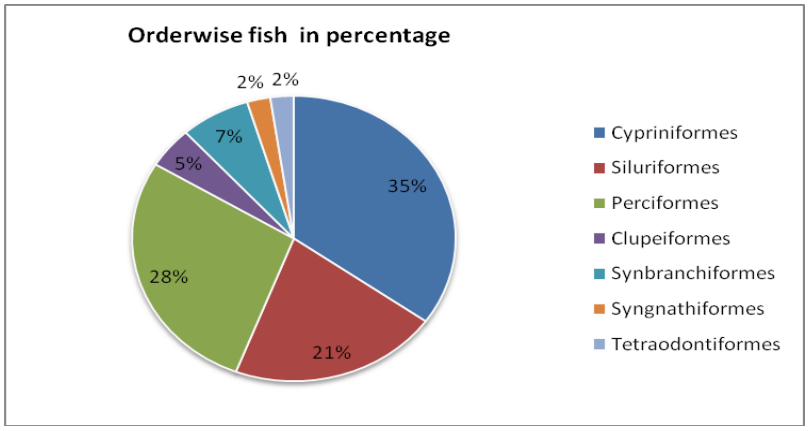


Fig. 2. Percentage composition of fish orders in Halti Beel

In this study, among 43 species, 27 were least concern, seven were near threatened, four endangered, four vulnerable and one species were identified as data deficient (Table 1). From the relative abundance of fishes of different orders shows that Cypriniformes and Perciformes were recorded as most abundant order whereas 15 species were under Cypriniformes and 12 species were under Perciformes. The percentage and total number of species under the different orders were Cypriniformes 35%, Siluriformes 21%, Perciformes 28%, Clupeiformes 5%, Synbranchiformes 7%, Syngnathiformes 2%, and Tetraodontiformes 2% (Fig. 2). In wet seasons, *Corica soborna, Channa punctatus, Puntius sophore, Puntius ticto, Chanda nama, Amblypharyngodon mola, Mystus vittatus* and *Mystus tengara* were the most common species recorded from the Halti beel.

Socio-economic condition of the fishermen of Dangapara fisheries village of Halti beel area: The study was conducted to determine the socio-economic status of the fishermen of the study area. Variables namely age, family size, income sources, education, religion, annual income, education of children, training exposure, family type, health facilities and other socio-economic issues were considered.

Age Structure: The age of the fishers ranged from 20 to 65 years with an average age of 40.4 years. The fishers were assorted into the following five groups based on their age such as young aged 20-30 years, young middle aged 31-40 years, middle aged 41-50 years, senior 50-60 years and oldest above 61 years. It was showed that as young aged, young middle aged, middle aged, senior and oldest (above 61 years) persons were composed of 40%, 16%, 26%, 12% and 6%, respectively (Fig. 3a) The highest and lowest age group of the fishermen in Dangapara were young aged and oldest.

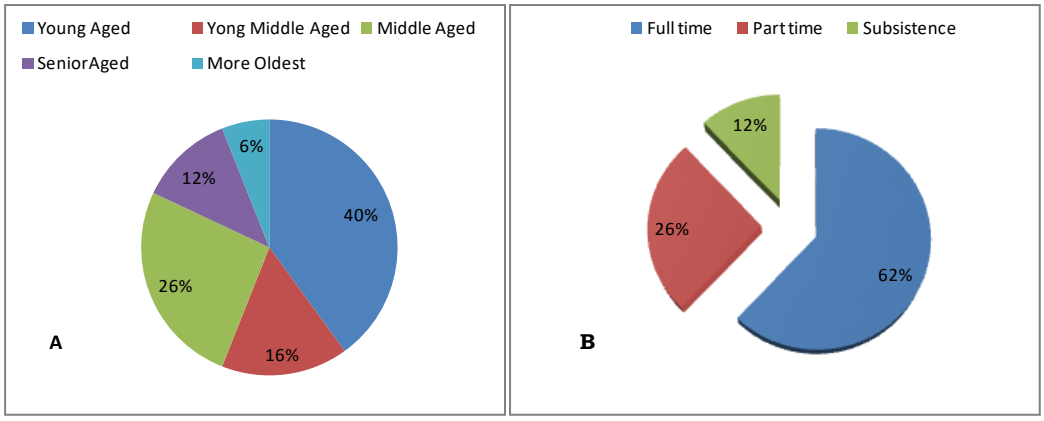


Fig. 3.a. Age group composition of fisher's b. Occupation type of the fishers

Types of Fishers: The main source of income of fishermen was fishing. About 62% fishermen were full-time fishers, 26% were part-time fishers and 12% were subsistence (Fig. 3b). Many of the part time fishermen were involved in agriculture and common labor performance while women were engaged in rearing livestock and tailoring etc.

Religious and Marital status of Fishers: In this study, Hindus were the most dominant group and composed of 83% of total fishermen, while 17% of fishermen was Muslim. Generally, Hindu community of lowest castle was involved in fishing activities. In Hindus, the hereditary fishermen are notably known as Jele, Majhi or Halder. In this study, the majority of fishermen was married (80%) while 20% fishermen was unmarried.

Educational status of the fishers: The status and life style of a society is determined based on education. The study was divided into four educational categorized such as illiterate, sign only, primary and secondary. About 44% fishermen was illiterate, 28% fishermen could sign only, 24% fishermen was completed the primary education, while only 4% fishermen was completed the secondary level (Table 2).

Table 2. Distribution of the fishers according to their educational status

Categories	No. of fishers (n=50)	% of total fishers
Illiterate	22	44
Sign only	14	28
Primary	12	24
Secondary	2	4

Family size: Family size was categorized as small family (2-4 members), medium family (4-5 members), large family (6-7 members) and largest family (8-9 members). The study was found that the majority of family (36%) had only 4-5 members (medium family), 28% family had 6-7 members (large family), 24% family and 12% family consist of 2-3 members and 8-9 members, respectively (Fig. 4a).

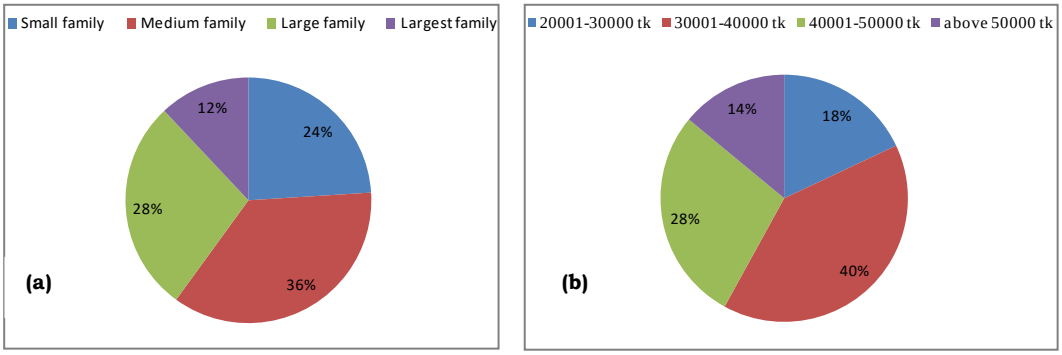


Fig. 4. Family size (a) and annual income (b) of fishers

Annual Income of Fishers: One of the important factors that reflects the socio-economic conditions of fisherman is their annual income. The fishermen were categorized into four groups based on their annual income such as Tk.20001-30000, Tk. 30001-40000, and Tk. 40001-50000 and above 50000. It was found that 40% of fishermen had annual income between 30001 to 40000 BDT (Bangladeshi Taka); 28% fishermen earn annually 40001 to 50000 BDT; 18% fishermen income was 20001 to 30000 BDT and only 14% fishermen yearly income was above 50000 BDT (Fig. 4b). The annual income level was more or less similar to the findings of Siddiqua et al. (2013), who recorded about 61,375 BDT annual incomes of professional fishermen of Dogger beel in Hajigonj upazila. Hossain et al. (2014) accounted at 72000 BDT annual incomes of fishermen at Jelepara of Pahartali upazila.

Major income sources of fishers: Fishing was the main occupation of most of the fishermen in the study area. However, some were also occupied in agriculture, day labor, rickshaw puller and others. Earning source is one of the important elements for understanding of socio-economic condition of fishers. About 44% fishermen were engaged in fishing activities for their livelihood, 26% fishermen were laborer, 24% were dependent on agriculture and rest 6% earned their income from other professions (Table 3).

Housing type: Different types of houses were found in the fishermen communities. Three main types were identified in this study: i) Muddy house;

straw and tin, only roof was tin, ii) Tin shed with tin, both roof and surroundings built by tin and iii) Straw, completely built by straw houses. Housing pattern of the fishers were muddy house with straw and tin, only roof was tin (56%), followed by tin shed with tin (34%) and straw (10%). There was no brick house known as 'Paka bari'. Most of them were lived in muddy house with straw and roof of tin house for their bad financial condition.

Table 3. Major income sources of the fishers in the study area

Categories	No. of fishers (n=50)	% of total fishers
Fishing	22	44
Laborer	13	26
Agriculture	12	24
Others	3	6

Use of electricity: This study was observed that 78% fishermen had electricity and 22% fishers did not use electricity in Dangapara fisheries village, Shingra, Natore. Electricity facility is a good indicator of social development. Presence of electricity in a village indicates that the village is developed or is in a developmental process. Ahmed *et al.* (2003) reported a higher value (67.5%) of electrification among the fish trader house. Samima's (2000) reported that 20% fishermen is used electricity at their house in Gollamari fishing community.

Drinking water availability: The availability of clean and pure drinking water is an essential element in the society. Actually, impure drinking water may cause several health hazards and finally hamper the development of a local economy (Paisak et al. 1995). Four types of drinking water availability were observed in the present study; (i) own tube-well (ii) shared tube-well (iii) neighbors' tube-well and (iv) Govt. tube-well. Hundred percent of households could have tube-well water facilities for drinking water. The study was found that 46% of the fishermen used own tube-well, 28% of them used shared tube-well, 22% used neighbors' tube-well and 4% of the respondent used Govt. tube-well in the Dangarapa fisheries village, Singra, Natore (Fig. 5).

Sanitary condition: The sanitary conditions of the fishers were not satisfactory. They used two types of toilets: i) kacha toilets which made of local materials; bamboo, wood, with little drainage facilities; ii) semi paka toilet which made of brick with tin with poor drainage disposal system. The present study showed that 66% of the toilets were kacha, 30% toilets were semi paka and 4% of the fishers had no sanitary facilities (Fig. 6a). The result indicates that the sanitary status of the respondent fishermen is in alarming situation. Halim et al. (2017) also reported that 70% fishers of Kafrikhal beel had seldom paka latrines.

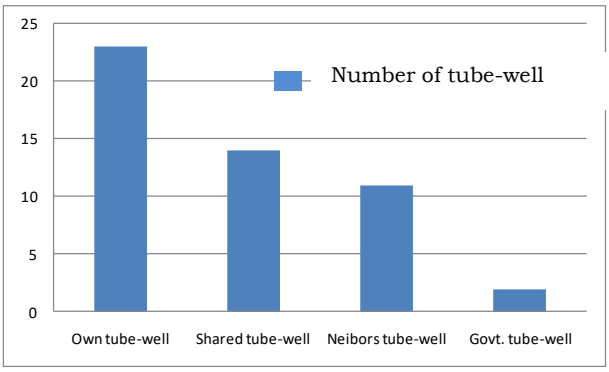


Fig. 5. Distribution of fishers according to drinking water sources.

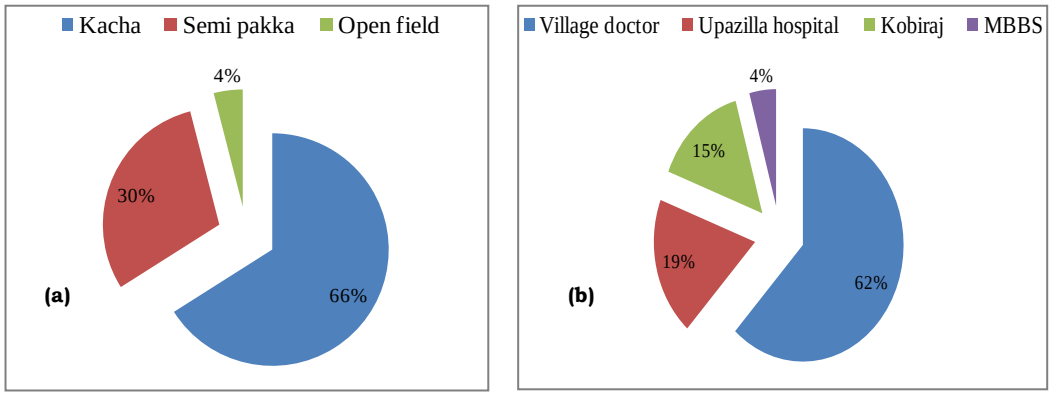


Fig. 6. Distribution of fishers according to their sanitary facilities (a) and health facilities (b)

Health facilities: A large number of people do not have knowledge about nutritional value of food and lived in unhygienic environment. These are led to diseases outbreak that is a common phenomenon and suffering various enteric diseases like diarrhea, cholera, typhoid, gastric and skin diseases. Moreover, the scientific knowledge about the fish disease is not sufficient in the country (Ali and Rahman 1986). The fishermen took the health service from four groups: kabiraj, village doctor, upazila hospital and private chamber of MBBS (Bachelor of Medicine and Bachelor of Surgery) doctor. Majority of Fishermen (58%) took the health service from village doctors (58%). About 14% fishermen was received health service from kabiraj, 18% fishermen went upazila hospital and only 4% fishermen received health service from private chamber of MBBS doctors (Fig. 6b).

Fishing equipment: The study observed that fishermen was used different nets for fishing i.e., Poa jal, Moiya jal, Push net, Current jal, Jhaki jal, Chandi bair, Ber jal, Dharma jal, Thella jal, Bair, Borshi at the Halti beel under Chalan beel region.

Fish Marketing Problems: The study found that a large number of fishermen were engaged in catching fish, transportation and marketing systems. This study was identified several problems that was included of involvement of broker, limited availability of market sites, and insufficient supply of ice and other fishing materials. The institutional support from local government authority is urgent necessary for solving these problems which could help the fishermens for getting proper price of their harvested fish.

Fishing problems of the Halti beel area: Different problems were recognized by putting questions to the fishermen. The identified problems were insufficient fishing gears, lack of boat, problem created by local personnel, a little credit facility, flooding of river, uses of banned and destructive fishing gears etc.

Socio-economic Constraints of the Fishers: Generally, fishermen are faced various problems during fishing activities and marketing. These problems were notably identified as extortion, inadequate credit facilities, presence of aquatic vegetation, lack of knowledge, marketing facilities, appropriate gears and over fishing and exploitation (Khan *et al.* 1986). However, these problems are jeopardized the fishermen community and led to increase poverty day by day. Later on, poverty affects their children's educations. For instance, fishermen children are engaged in catching fish instead of going school which make them illiterate generation after generation thus they are not able to do the betterment of their society.

CONCLUSIONS

In this study, a total of 43 fish species belonging to seven orders of 20 families and 32 genera were recorded at the Halti beel in Natore district. Currently, fish diversity is rapidly decreasing because of different reasons including overexploitation, illegal use of fishing gears and techniques. Many of these species are commonly found at the Halti beel thus it warranted proper management and conservation plan. For instance, this study area could be a wonderful place for natural conservation of threatened fish species of Bangladesh. This study indicates that majority of the fishermen was engaged in fishing for their-livelihood. The most of fishermen have no more option than fishing for their subsistence. Therefore, socio-economic status of the fishermen community of the study area and its adjacent areas should be received more attention from government and non-government organization. The authority should be conducted several awareness programs these are including proper education, health condition, sanitary hygiene, schooling of children etc. These such initiatives are likely created an opportunity for children education and other facilities so that they could be actively aware of their problems, prime rights and which may improve their livelihood status.

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