

Livelihood Dimensions of the Fishermen in Shibs River of Bangladesh

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Abstract: The Shibs River is a coastal river and livelihood of the fishing community is greatly influenced by tidal waves, surrounding environment and fish biodiversity in the river. A total of 150 fishermen were surveyed from February to December, 2019 at Paikgacha Upazila to study about their socio-economic condition. Among the respondents, most of them were 31 to 40 years old and Hindu (72%). Primary education was completed by 41% fishermen and 30.7% can sign only. In the sampled community, tin shaded house, half cemented house and full cemented house were observed and among them tin shade house (48.4%) was predominant. Only 4.4% was recognized as local leader on the community. Minimal consciousness regarding sanitation was observed among the fisher folk and only 8.6% household had cemented improved sanitary toilet. They suffer from various air and waterborne diseases like fever, diarrhea, jaundice and typhoid and 38% fishermen were treated by village doctors who have no scientific knowledge on medicine. Most of the fishermen utilized tube-well water (91%) and 69.3% had access to electricity. Fulltime fishermen (62.8%) outnumbered seasonal fisher folk (37.2%). Therefore, fishing was the main occupation of 71.5% respondents; though few were involved in various agricultural (21%), day laboring (5.5%) and other activities (2%) as their main occupation. Their annual income was not sufficient and majority (40.4%) earned 60,000-75,000 BDT annually. They cannot upgrade their mode of life and status in the society. So, they must be provided with economic supports as well as other incentives in a sustainable manner which eventually will eliminate rural poverty.

Key words: Socio-economy • Correlation • Problem tree • Constraints • Coastal River

INTRODUCTION

Bangladesh is a densely populated country with 1,103 people per km² [1]. Advancement in human development index was initiated by the government of Bangladesh from 1990's through a significant progress in poverty alleviation based on continuous economic growth [2]. It has an agro-based economy with 63.37% rural people [3] and 40.6% of the total population is engaged in agricultural activity [1]. In such economy,

fisheries sector plays an exigent role as a source of income and employment, holding a very significant place in the socio-economic prosperity of the country [4-12]. This sector contributes 3.57% to the national GDP [13-20] involving about 12 million people of the country directly or indirectly in fisheries and other ancillary activities [21-27]. Therefore, prioritizing in agricultural sectors like fisheries is important for reducing rural poverty as well as improving the food security of the poor [28]. So, clear concept about the rural livelihoods is a must for

understanding of rural poverty, human suffering, facilities and limitations. Livelihoods aspects are focal to the rural development and the means of gaining a living or a combination of the resources utilized and the activities undertaken in order to survive [29] and livelihood diversification includes both farm and non-farm activities undertaken to create income, main household activity, the production of agricultural and non-agricultural goods and services, sale of waged labor, business or self-employment in small firms and other ways or strategies to reduce jeopardy [30, 31]. Rural livelihood diversification is the process by which farm dependent households involve in non-farm activities relying on non-farm income transfers for improving their subsistent [32]. People try to change livelihood up to sustainability and when it can cope up with and recover from stress and shocks and maintain its capabilities and assets, not diminishing the natural resources [33].

The fisheries in Bangladesh includes inland and marine sector and both can be classified into capture and culture subsectors. Hundreds of rivers with tributaries flow through Bangladesh occupying a huge potential for fisheries and fishing activities are carried out regularly by the fishermen in the rivers. Such livelihood of fishery plays an integral role in alleviating rural poverty and supplying nutrition to the poor fishermen community. But in Bangladesh, fishing community is vulnerable to natural disasters, particularly floods, cyclone due to climate change, sea level rise, deforestation and tropical climate. Researchers stated fishermen as the poorest among the poor and fishing as the activity of the last resort [34-37]. Scientists also claim that, effects of climate change unfavorably create challenges to the livelihood and food security of fishing communities as they are natural resource dependent [38]. Tides influence rivers flows in the coastal zone of Bangladesh where the climate change causes natural calamities, which threaten food security as well as lives of the community and affect their fisheries, agricultural and livestock production. The livelihood and socio-economic status of this fishing community are not satisfactory as availability of fishes in the river are reducing continuously [39-40].

Fishing community adjacent to Shibsra River is greatly influenced with the river ecosystem, resources, climate and calamities. It is blessed with diversity of fish species. The livelihood and socioeconomics of the fishers of the Shibsra River has not been described statistically. The analysis of livelihoods of the vulnerable fisher's community depending on natural resource like Shibsra River is no so easy. The main objective of this study is to identify the present socio-economic status and livelihood

pattern of the fishermen of the Shibsra River. It will help the administrators, policymakers, donors, academicians and researchers who frame policies and finance different projects for the development of rural economy of Bangladesh. The study will also provide methodological assistance for the researchers in conducting studies related to livelihood of the rural poor fishing community.

MATERIALS AND METHODS

Study Area: The study was conducted at Paikgachha Upazila along the Shibsra River system where several unions were selected for the assessment (Fig. 1) locating in the South-Western region of Bangladesh. It is one of the most renowned rivers in Khulna region and inside the Sundarbans; it is connected with the Pasur River. Moreover, the study was carried out from February to December, 2019.

Data Collection: Data collection was implemented based on observation and survey method and the survey was carried out using personal interview supplemented by multiple methodological Participatory Rural Appraisal (PRA) tools such as- Focus Group Discussion (FGD) and Crosscheck Interviews (CI) with Key Informants (KI) [41]. Field surveys were used for the collection of primary data. For the confirmation of the secondary data, primary data was also used. A total 150 fishers of the Shibsra River were randomly selected and interviewed personally. Data on the social condition of the fishermen was collected using different survey indicators such as- age distribution, religion status, family status, educational status, housing, social status, sanitation, diseases, treatment, drinking water facilities, communication, electricity, refrigerator and recreational facilities. On the other hand, for the assessment of economic condition, data on job related indicators such as- fishing experience, purpose of fishing, fishing type, fishermen type, fish preservation, selling process, main occupation, annual income, savings credit source, purpose of taking loan and training facilities were used. Journals, newspaper and textbooks were used as secondary source of information. Government and non-government organization also provided information. In this study, FGD was used to get an overview of the livelihood status and major problems of the target fishermen community. Twelve FGD sessions were conducted in open place and tea stall where each group consisted of 6 to 8 persons. After collecting the data through questionnaire interviews and FGD, crosscheck interviews were conducted with Fisheries Field Assistant and relevant local NGO workers at their office.

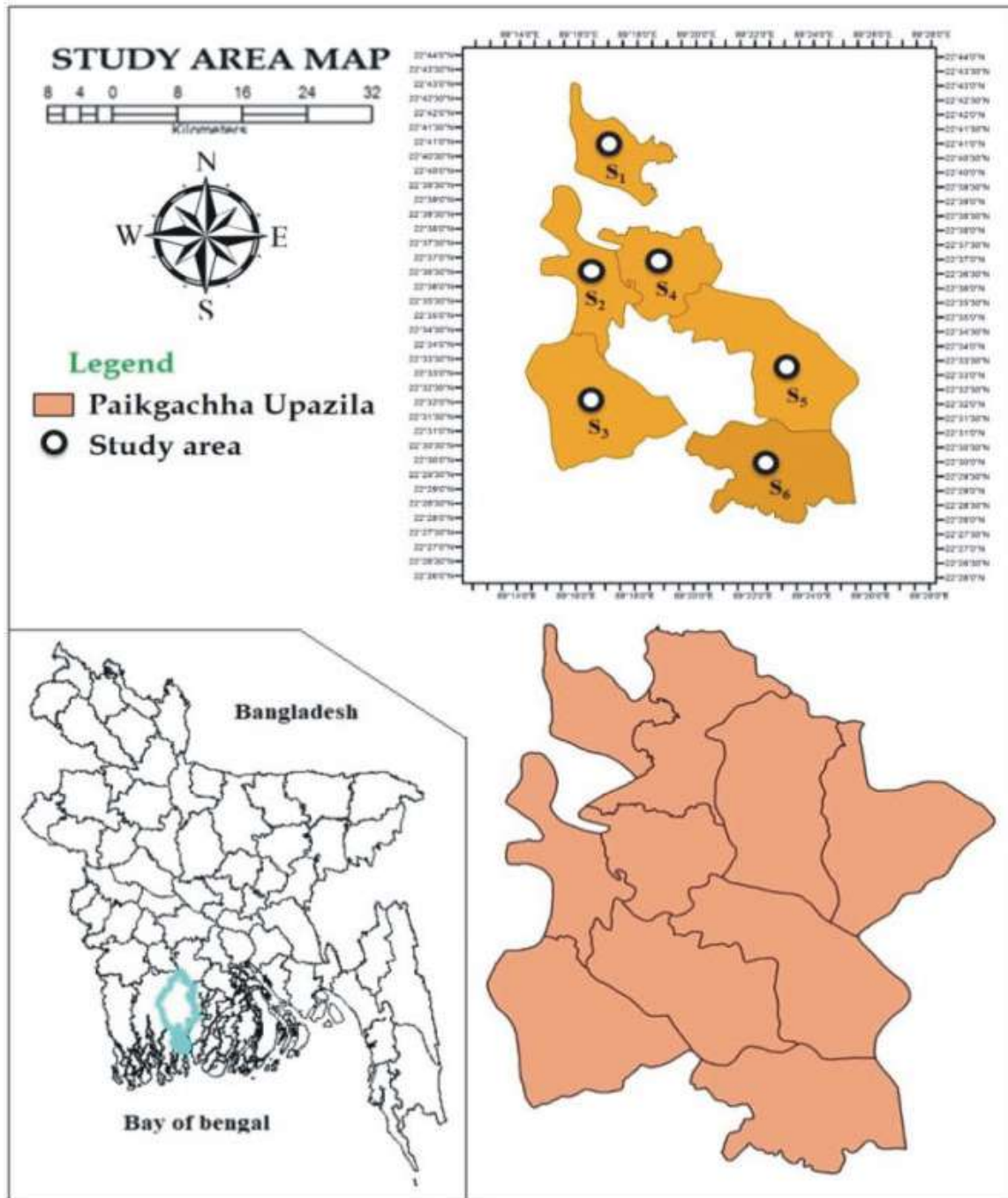


Fig. 1: Map of the study area in the Paikgacha Upazila

Data Processing and Analysis: Collected data from various sources were entered into the computer using Microsoft Excel version 2013. Finally, the qualitative and quantitative data were analyzed using MS-Excel and SPSS Software (version 16.00) then presented in textual, tabular, graphical and hierarchy forms. Map of the study area was modified by Arc GIS software (Version 10.00).

RESULTS AND DISCUSSION

Socio-Demographic Dimensions

Age Composition: Age composition is the proportionate numbers of person in consecutive age categories in a given population. For the assessment of the potentiality of human resources of the fishermen the study of age

Table 1: Socio-demographic dimensions of the fishermen of Shibs River

Variables	Categories with Percentage (%)	Total
Age	10-20 years (16.7%)	100%
	21-30 years (24.3%)	
	31-40 years (35%)	
	Above 40 years (24%)	
Religion	Muslim (28%)	100%
	Hindu (72%)	
Family type	Nuclear (37.4%)	100%
	Joint (62.6%)	
Family size	2 to 3 members (9%)	100%
	4 to 5 members (48%)	
	6 to 7 members (25%)	
	Above 7 members (18%)	
Housing pattern	Shack (29.5%)	100%
	Tin shade (48.4%)	
	Half cemented building (semi-permanent) (18.7%)	
	Full cemented building (permanent) (3.4%)	
Social status	Ordinary (81.6%)	100%
	Local leaders (4.4%)	
	Respective persons (14%)	
Sanitation	Open defecation (10.4%)	100%
	Kacha (unimproved toilet) (45%)	
	Semi paka (basic standard toilet) (36%)	
	Paka (improved toilet) (8.6%)	
Diseases	Fever of all types (41%)	100%
	Gastrointestinal diseases (21.3%)	
	Respiratory diseases (16%)	
	Pain/Aches (12.7%)	
	Others (9%)	
Treatment	Traditional (kabiraj/ hakimi) (34.7%)	100%
	Village doctor (unqualified allopaths) (38%)	
	Professional doctor (qualified allopaths) (27.3%)	
Drinking water	River and pond (9%)	100%
	Ground water (91%)	
Communication	Road (88%)	100%
	Water (12%)	
Electricity connection	Present (69.3%)	100%
	Absent (30.7%)	
Refrigerator	Present (5%)	100%
	Absent (95%)	
Recreation facility	No facilities (35%)	100%
	Tea stalls (40%)	
	Radio-television (25%)	

composition is needed. In the present study, four age groups such as 10-20, 21-30, 31-40 and above 40 years were classified (Table 1). The study showed, majority of the fishermen belonged to the 31-40 age group (35%) while the 12-20 aged had lowest involvement (16.7%). Findings of age groups are in agreement with the result of Baki, *et al.* [42] who found 48% respondent in 31-40 aged group in Dhaka near Turag-Buriganga River. But, Khatun, *et al.* [43] found 46% pond fish farmers of Charbata belonging to 36-50 aged group in Noakhali.

Religious Status: Religion-wise distribution of sample respondents indicated that most of the fishermen (72%) belonged to Hindu community while the rest 28% were Muslim (Table 1). Study of Das, *et al.* [44] was in

accordance with the present study where majority belonged to Hindu community in Batiaghata Upazila at Khulna. But the finding of Mondol, *et al.* [45] and Ali, *et al.* [46] were controversial to the present study where they found 76% Muslim fishermen near Sundarbans and 75% Muslim in Lohalia River fishing community, respectively.

Family Types: Majority (62.6%) of the studied fisher folk maintained joint family and other 37.4% preferred nuclear family (Table 1). The findings were in agreement with Ali, *et al.* [46] who found 65% fishermen had joint family and 35%-unit family and Mahmud, *et al.* [47] also found most of the fishermen (84%) of Paira River having joint family.

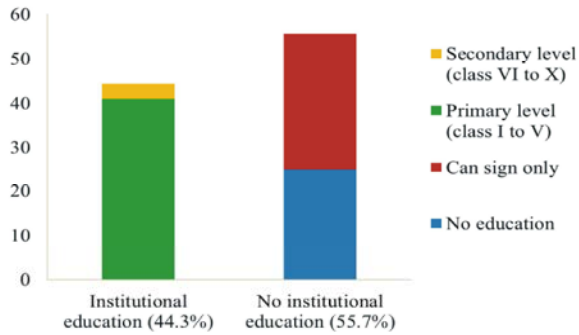


Fig. 2: Educational qualification of the fishermen of the Shibsra River

Family Size: In the present study, on the basis of number of family members the respondents were divided into four groups (Table 1). The highest participants (48%) were in the 4 to 5 member's family group and lowest (9%) was in the 2 to 3 membered family. Similar result was found in Barishal [48] and Mymensingh [49] district.

Educational Qualification: Geographical and social marginalization of the fishing communities often cause educational disadvantage [50]. To study about the educational status of the fishermen, they were grouped into four categories such as- primary, secondary, who can sign only and who have no education. It was found that, 25% respondents received no education even they cannot sign (Fig. 2). In the early age, most of them had to enter into the fishing profession due to lack of parents' awareness regarding education and poverty elevation. However, 30.7% can only sign having no academic knowledge. Among them, about 41 and 3.3% completed primary and secondary education, respectively. So, Fig. 2 indicates that about 44.3% had the institutional knowledge. Mahmud, *et al.* [47] found that maximum fishermen (46%) passed primary level and 14% passed secondary level in Patuakhali near Paira River which corroborated to the present study. Kabir, *et al.* [51] also reported that among the fishermen of Old Brahmaputra River, 88% were illiterate, 2% can sign only and remaining 10% passed primary level.

Housing Pattern: It was found that, 29.5% of the respondents reside in shack made of, palm leaves, bamboo, wood, jute sacks and sticks. Tin shade houses (48.4%) were made of corrugated iron sheets as roofs and wall and using mud as floor. Where, 18.7% houses were half cemented partially made of brick wall, cemented floors

and roofs of corrugated iron sheets and remaining 3.4% houses were fully cemented (Table 1). Shill *et al.* [52] found, most (58%) of the respondents had kacha, 18% half cemented building, 10% tin shade and only 2% had permanent structured building. Mahmud, *et al.* [47] also found that 14% houses made of straw and soil, 62% houses of tin shade, wood and soil, 20% made of brick and tin and other 4% cemented building.

Social Status: Social status of the fishermen can be indicated by their income patterns, quantum of savings, degree of indebtedness, housing condition, literacy and family background. From the present study it was found that, among the sampled fisher folk 4.4% were local leaders having political power, 14% respective fishermen those have profound fishing experience and honorable in the society and other 81.6% were ordinary fishermen (Table 1). The finding is in agreement with the result of Hossen, *et al.* [53] who found 85% ordinary, 13% respectable and 2% local leaders in the fishing community near Tetulia River.

Sanitation: Generally, health profile depends on sanitary condition which includes safe disposal of fecal matter. Most of the fishermen (45%) had Kacha toilet (unhygienic or unimproved latrine) in the study area. While 36% of the fishermen used hygienic Semi paka or half cemented latrine (basic standard toilet) which at minimum had a slab and only 8.6% have improved Paka or cemented sanitary latrine having profound flush and draining system. But 10.4% had no latrine that they use agricultural land, crop field, canals and bushy area for open defecation (Table 1). This investigation is different from the result of Kabir, *et al.* [51] who found 5% fishermen having semi-paka and 30% having no sanitary facilities near the Old Brahmaputra River and also different from the study of Hossen, *et al.* [48] conducted in Barishal.

Diseases and Treatment: From the survey it was found, as the main health problem 41% fishermen suffer from all type of fever, 21.3% gastrointestinal disease (like diarrhea, jaundice, ulcer and gastric), 16% respiratory disease (like asthma, pneumonia and tuberculosis), 12.7% pain or aches (like back pain and rheumatic) and remaining 9% suffered from other diseases (Table 1). But Bappa *et al.* [54] found 45% skin disease, 28% wounding and 27% headache problem among the fishermen in Jhenidah district.

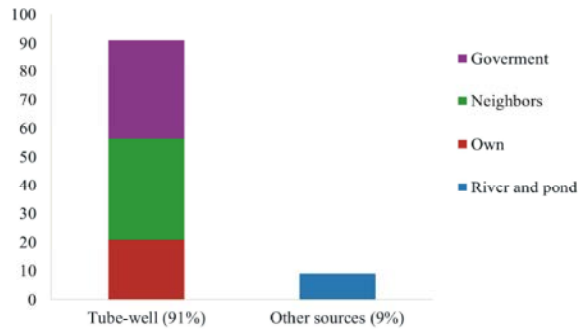


Fig. 3: Drinking water sources of the fishermen of the Shibsra River

In the study area, health facilities of the fishermen were poor and it was found that 34.7% of the fishermen households depend on traditional treatment method including kabiraji or hakimi or homeopathy. While 38% took treatment from village doctors or palli chikitsoks (unqualified allopaths) who practice allopathic medicine with little or no professional training. Only 27.3% respondents went to professional doctors like Upazila doctors or qualified allopaths who have professional medical training experience in public or private facilities (Table 1). This finding was close to the findings of Kabir, *et al.* [51] and Hossen, *et al.* [53].

Drinking Water Facility: Fishermen's health is directly influenced by the quality of drinking water. Among the surveyed respondents only 9% fishermen used pond and river water and most of the fishermen (91%) used tube well water (Table 1). Among them 20.8% fishermen had own tube-well, 35.5% fishermen used shared or neighbor tube-well and remaining 34.7% used Government tube-well in school or market premise (Fig. 3). The finding is close to the study on the fishermen of Batiaghata Upazila at Khulna [46].

Communication: A lack of community support is a barrier in aimed success [55]. Maximum (88%) fishermen use road-ways as their local transportation system was improved and other 12% use water-based vehicles (manual boat and engine-driven boat) for transporting their domestic goods (Table 1) and the result is in accordance with the findings of Mohiuddin, *et al.* [56] where they found that, 91% shrimp farmers used road-ways for transportation.

Electricity and Refrigerator Facility: For socio-economic development, rural electrification is one of the basic needs [35, 57]. From the present survey, it was found that 69.3%

fishermen were deprived of electricity facilities (Table 1) which is in accordance with the result of Ali, *et al.* [46], who found 35% fishermen got electricity facilities and 65% did not have the facility but different from the findings of Hossen, *et al.* [48] who reported 94% fish farmers having the facility. Moreover, in the present study, very few (5%) fishermen had their own refrigerator at home.

Recreational Facility: In the study period, about 25% of the fishermen had own radio or television for their recreation as well as getting news and 40% fishermen passed their time in the tea stall, market with friends and neighbor. But 35% had no such facilities or scope for recreation (Table 1). The findings of the present study are different from the record of Kostori [58] who found that 36% use radio or television and 64% having no way for recreation in the area surrounding Chalan Beel. Baki, *et al.* [42] also found 52% fishermen having own television near Turag-Buriganga River.

Job-Related Dimensions

Fishing Experience: Experience in fishing is effective for successful catch as the experienced fishermen have profound practical knowledge about the wave pattern, flow of water, tide and abundance of fishes in the river. On the basis of experience, fishermen were grouped into five groups such as 5-10, 11-20, 21-30, 31-40 and above 40 years. Majority (50%) of them belonged to the group of 11-20 years' experience group and minority (4.7%) had experience more than 40 years (Table 2) and the finding corroborated with the result of Hossen, *et al.* [53] who found 52% fishermen having fishing experience lower than 15 years.

Purpose of Fishing: Access to water bodies is an important driving factor for the involvement in fishing and it is a common option among agricultural livelihood strategies. From the survey it was observed that, 62% fishermen catch fishes for both commercial purpose and family consumption. While 33.2% and 4.8% fishermen do fish for commercial purpose and family consumption, respectively (Table 2). The finding is contradictory to the report of rural Laos where all the fishers harvest fish for both selling and family consumption [59].

Fishing Type: Income from the fisheries sector is day by day diminishing and most of them remain poor depriving of basic needs. So, 37.2% respondents shifted to other income sources and harvest fish seasonally and 62.8%

Table 2: Job-related dimensions of the fishermen of Shibs River

Variables	Categories with Percentage (%)	Total
Fishing experience	5-15 years (64%)	100%
	16-30 years (27.3%)	
	Above 30 years (8.7%)	
Purpose of fishing	Commercial purpose (33.2%)	100%
	Family consumption (4.8%)	
	Both commercial and family consumption (62%)	
Fishermen type	Fulltime (62.8%)	100%
	Seasonal (37.2%)	
Fishing type	Individual (40.2%)	100%
	Group (59.8%)	
Process of fish preservation	Do not preserve (75%)	100%
	Icing (25%)	
Fish selling	Store house or arot (35%)	100%
	Direct market (20%)	
	Middleman (45%)	
Main occupation	Fishing (71.5%)	100%
	Agriculture (21%)	
	Day labor (5.5%)	
	Others (2%)	
Annual income (BDT)	60, 000-75, 000 (40.4%)	100%
	76, 000-85, 000 (38%)	
	86, 000-95, 000 (15.3%)	
	Above 96, 000 (6.3%)	
Savings	Save (25.9%)	100%
	Cannot save (74.1%)	
Purpose of taking loans	Fishing equipment (42.5%)	100%
	Housing (20.5%)	
	Marriage (14%)	
	Business (11%)	
	Health (6.8%)	
	Education (5.2%)	
Training organization	Government organizations (20%)	100%
	Non-government organizations (NGO's) (24.7%)	
	No training (55.3%)	

fishermen keep fishing throughout the year (Table 2) which is different from the findings of Hossen, *et al.* [48] who found 47 and 33% fulltime and seasonal fishermen, respectively.

Fishermen Type: Both group and individual fishing was recorded in the surveyed area. Most of the fishermen go for fishing in the river 3-4 km away from their residence twice daily but, during new moon and full moon they go 3-4 times [44]. In the present study, 59.8% fishermen prefer fishing in group and 40.2% individually (Table 2) and the result similar to the report of Hossen, *et al.* [48]. Paul, *et al.* [59] reported that, in Birulia about 70% fishermen and in Boroibari about 64% Fishermen were full-time Fishermen near Turag River.

Fish Preservation System: Most of the fishermen used to catch fishes from nearby Shibs River and sold the fish to

the fish market or to the buyers. So, they did not need any kind of preservation process. Among the respondent's, most of the fishermen did not preserve fish (75%) but sometimes they use ice (25%) (Table 2).

Fish Selling Process: The fishermen of the study area were poor having no sufficient capital for fishing. They had to take high rated loan (locally called dadon) from moneylenders as they had no enough capital for fishing in the river and also take boat from Mahajan's. After harvest, all the fishes were taken by the Mahajan and he used to receive their loan back by selling them and distributed rest of the money. From the study it has been reported that 35% respondents used to sell harvested fish to the storehouse which is locally called arot whereas, 20% and 45% sell to direct market and middleman, respectively (Table 2). The finding is close to the report of Das, *et al.* [46].

Main Occupation: In the present study, the fishermen were engaged in various types of occupation and the main occupation of the fish farmers was considered from which most of the income was earned. Maximum fishers appeared to be active in the monsoon season when the water level rises and the number of fishers increases simultaneously. Around 71.5% fish farmer responded to fishing as their primary occupation. But their monthly earning was not sufficient for them and they had to involve in alternative livelihoods such as- agriculture (21%), day labor (5.5%) and other occupation (2%) such as- net mending, wood carpenter and van pulling (Table 2). Similar result was found from the study of Kabir, *et al.* [51] where 70% of fishermen of the Old Brahmaputra River were engaged in fishing as their main occupation, 20% involving in agriculture and remaining 10% worked as daily labor.

Annual Income from Fishing: In the present study it was found that 40.4% and 38% respondent annual income ranged from 60, 000 to 75, 000 BDT and 76, 000 to 85, 000 BDT, respectively. About 15.3% fishermen earned 86, 000 to 95, 000 BDT and only 6.3% had annual income above 96, 000 BDT (Table 2). The range is in accordance with the report of Shill *et al.* [52] and Baki *et al.* [42] reporting annual income range of 66, 000-1, 05, 000 BDT and 60, 000 to 85, 000 BDT, respectively. The present findings of annual income of fish farmers match well with the findings of Khatun, *et al.* [43].

Expenditure: Expenditure of the fishermen is divided into two broad categories: job related expenditure (including fishing and other occupation) and family expenditure shown in Fig. 4. In the present study, the respondent fisher folk spent almost 35% for fishery and other job operation and 60% for household purposes. The hiring charges of vessel and crafts repairing cost contributed about 15 and 8% of the total expenditure, respectively. Remaining 14% job expenditure includes license fee, transportation cost and other occupational cost except fishing. Similar study was conducted on Hilsa fishermen of Ganga River in India and they found that almost 40% of their expenditure was used for fishing and business [51]. The family expenditure was maximum for food (43%) followed by children’s education (10%), treatment (4%), clothing (3%) and recreation (3%). The finding is more or less similar to the finding of Roy, *et al.* [60].

Savings: The total income of fishers finishes for buying the necessary goods, food item, fuel, cloths, health care

and educational purpose [61]. So, they have to borrow money and in the present study, only 25.9% respondents can save money monthly but other 74.1% cannot save (Table 2) which is close to the findings of Hossen, *et al.* [62].

Source and Purpose of Lending Money: Among the respondents, 31.3% fishermen lend money from government and non-government organizations for purchasing fishing gears and vessels. After repayment, only 26.3% became self-sufficient who did not need financial help (Fig. 5). But 20.7% had to avail loan from relatives, 14.7% from neighbor and 7% from co-operatives which was similar to the findings of Kabir, *et al.* [51] in Mymensingh district. But Quddus, *et al.* [63] represented that, only 34% farmers got bank loan for fish culture while majority (53%) of farmers expend from their own sources.

The purchase of fishing equipment was the major purpose of loan taken by 42.5% of the respondent fisher folk followed by house construction (20.5%), marriage expenses of children (14%), business purpose (11%), health treatment (6.8%) and education of children (5.2%) (Table 2). The finding is more or less similar to the findings of Salim *et al.* [64] and they found that 39.4% Indian fishermen borrow money for fishing purpose.

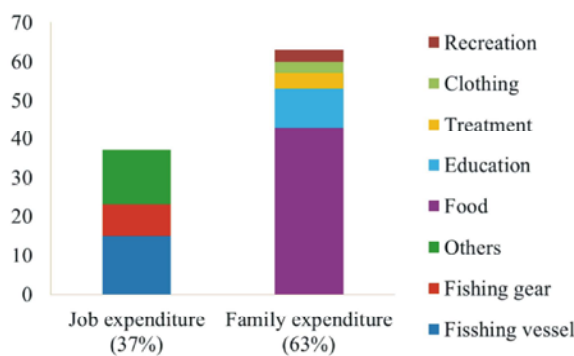


Fig. 4: Expenditure of the fishermen of Shibsra River

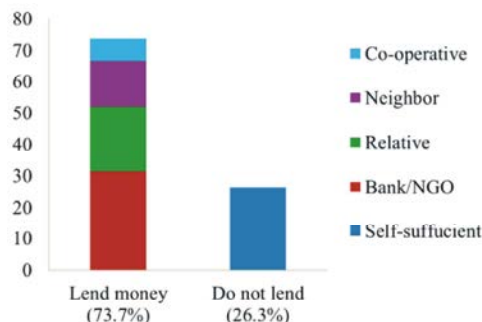


Fig. 5: Percentage of self-sufficient fishermen and money lending sources

Table 3: Correlation coefficient between different socio-economic variables of the fishermen

	Age	Education	Fishing experience	Main occupation	Annual income	Savings	Social status	Housing	Sanitation
Age	1								
Education	0.008	1							
Fishing experience	0.884**	0.008	1						
Main occupation	-0.284**	-0.022	-0.249**	1					
Annual income	0.189*	0.114	0.184*	0.005	1				
Savings	-0.191*	0.095	-0.156	0.043	-0.441**	1			
Social status	0.170*	0.028	0.134	-0.075	0.499**	-0.414**	1		
Housing	0.248**	0.004	0.310**	-0.034	0.418**	-0.374**	0.454**	1	
Sanitation	0.207*	0.102	0.200*	-0.127	0.376**	-0.244**	0.279**	0.671**	1
Treatments	0.138	0.133	0.122	0.100	0.137	-0.050	-0.025	0.336**	0.138

** indicates $p < 0.01$ & * indicates $p < 0.05$

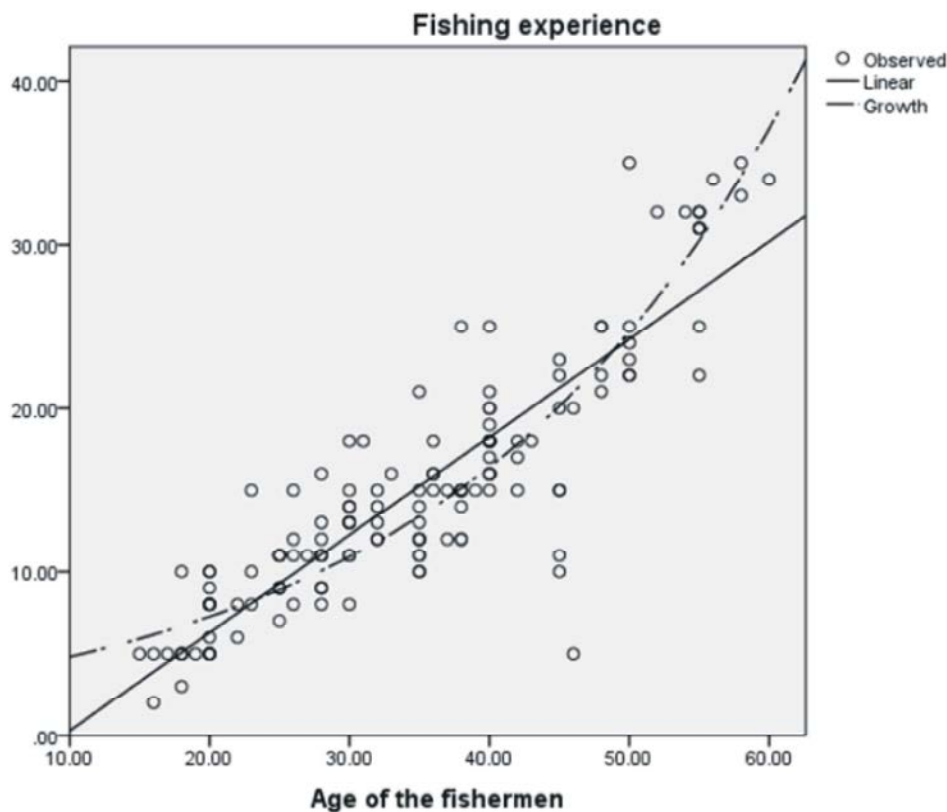


Fig. 6: Regression curve of age and fishing experience of the fishermen of Shibs River

Training Received: From the investigation, it was found that 20% fishers acquired technical skill from Government organizations like Department of Fisheries (DoF), Bangladesh Fisheries Research Institute (BFRI), from NGO's (24.7%) like WorldFish Bangladesh, Winrock International, CP Bangladesh and ACI. Remaining 55.3% fishermen got technical assistance or advice about fishing from relatives, friends and neighbors. The result is similar to the fish farmers of Bagmara Upazila at Rajshahi district where 8%, 10% and 60% received training from DoF, NGO's and neighbor or friends [65].

Partial Correlation among Different Variables: Partial correlations within different variables are presented in Table 3. There was strong positive correlation ($r = 0.884$; $p < 0.01$) between age and fishing experience of fishermen, which indicated that, the experience of fishermen steadily increased with the cumulative age (Fig. 6). The result is similar to the finding of Hossen, *et al.* [62] but, contradictory to the findings of Hossen, *et al.* [53] who found negative correlation between the two variables. Moreover, age and annual income of the fishermen (Fig. 7) were positively correlated ($r = 0.189$; $p < 0.05$)

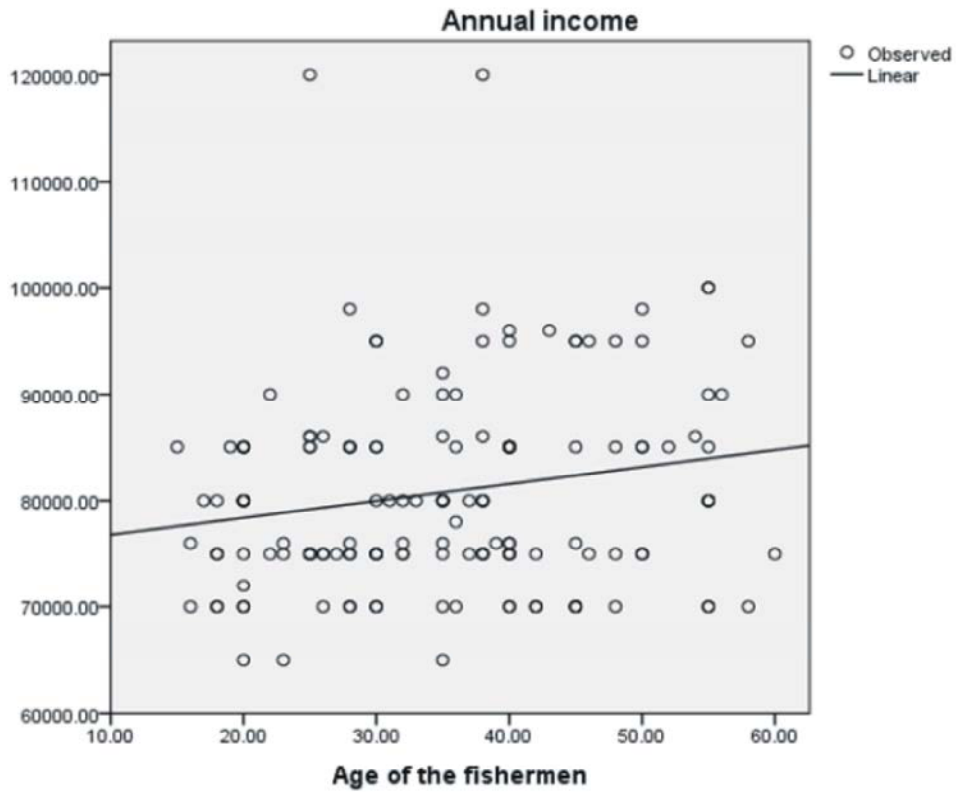


Fig. 7: Regression curve of age and annual income of the fishermen of Shibs River

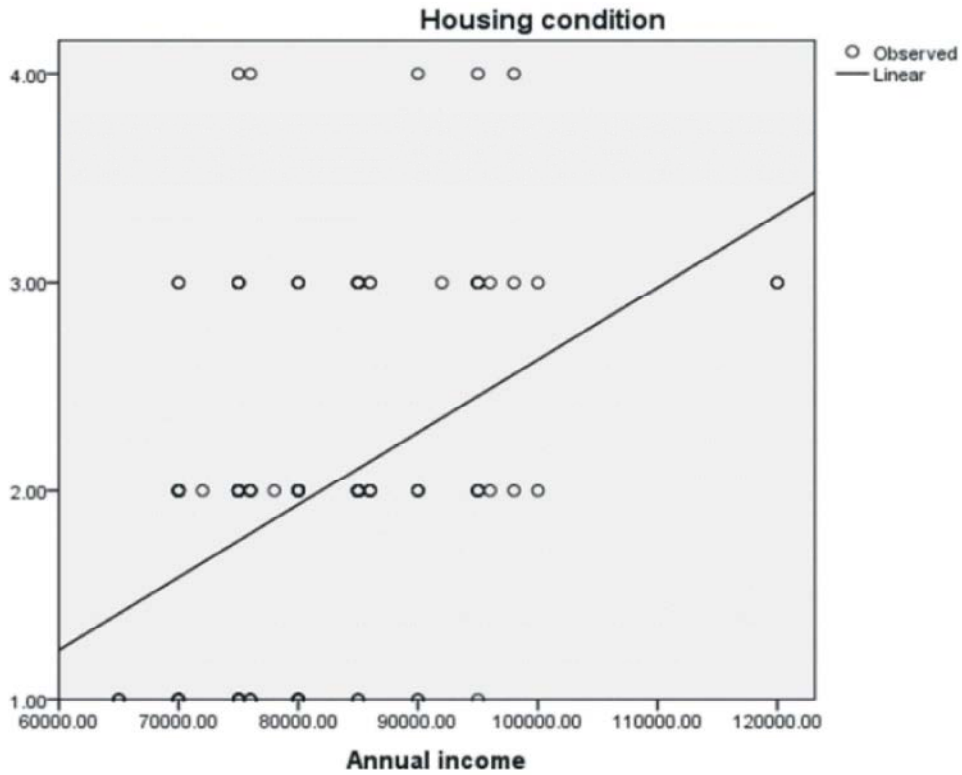


Fig. 8: Regression curve of age and housing condition of the fishermen of Shibs River

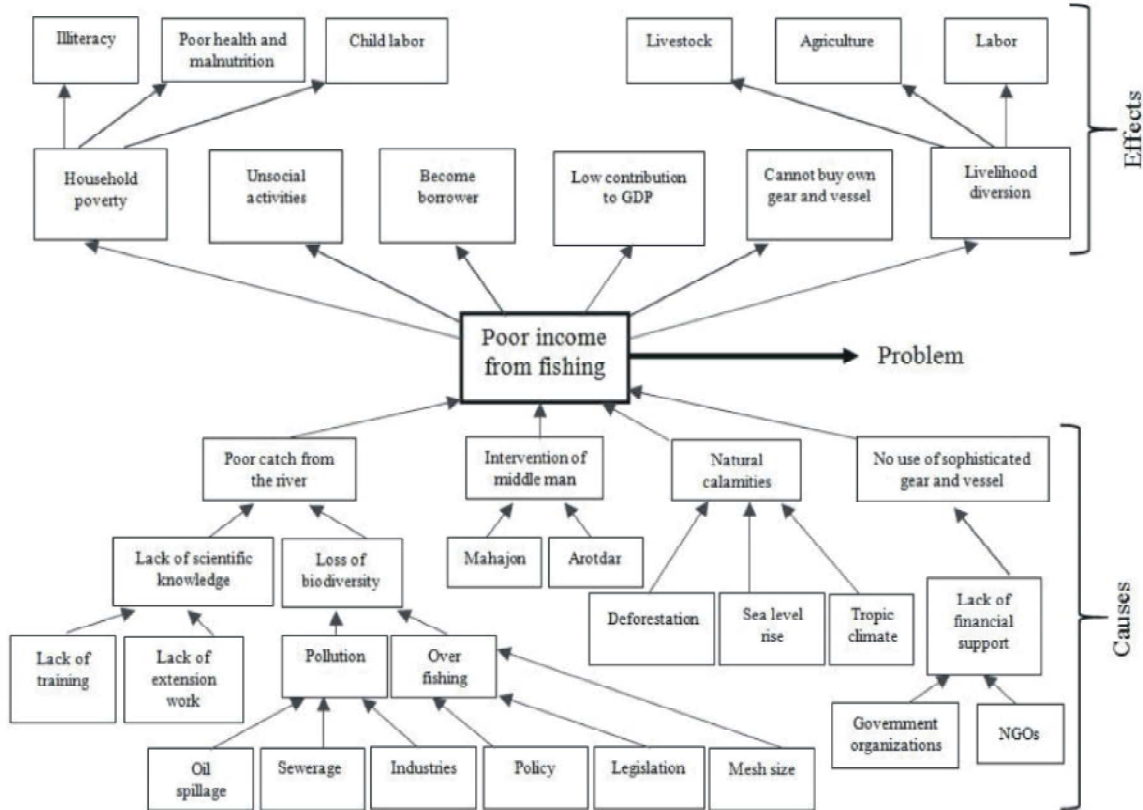


Fig. 9: Problem tree analysis

which is similar to the result ($r = 0.297$) of Roy, *et al.* [61]. Hossen *et al.* [62] also found weak correlation ($r = 0.071$) between these two variables. The age and housing condition of the respondents showed lower positive correlation ($r = 0.248$; $p < 0.01$) presented in Fig. 8. There was negative medium correlation ($r = -0.441$; $p < 0.01$) between annual income and saving capability but Hossen, *et al.* [53] found positive correlation ($r = 0.073$) between the variables. The correlation between education and main occupation was lower ($r = -0.284$; $p < 0.01$) which revealed that, educated people had tendency to diversify into other income sources. Annual income and social status exhibited moderate positive correlation ($r = 0.499$; $p < 0.01$). Annual income and housing status also exposed medium positive correlation ($r = 0.418$; $p < 0.01$) indicating that, their housing condition improve with increasing income. There was positive correlation ($r = 0.671$; $p < 0.01$) between housing condition and sanitation which meant that families at the same time improved their housing condition and toilet facilities and the value is in agreement with the result of Hossen, *et al.* [62]. Mondal, *et al.* [45] found strong correlation ($r = 0.870$) between housing and sanitation of the fishermen near Sundarbans estuaries.

In the present survey, savings and housing condition indicated lower negative correlation ($r = 0.374$; $p < 0.01$) which is dissimilar to the result of Hossen, *et al.* [53] who found positive correlation ($r = 0.472$) between the variables.

Problem Tree Analysis: A problem tree analysis is a bottom up approach which represents the problems, causes and effects in a model. In the present study, ‘poor income from fishing’ was marked as the core problem. The reasons behind the problem with their effects were pointed out through participants brainstorming. This tree analysis demonstrated that four major reasons were responsible for the low income from fishing, namely declined fish catch, activities of the middleman, natural calamities and lack of financial support resulting in low standard of living (Fig. 9). In the Shibs River, small meshed and non-selected fishing nets and traps such as synthetic nylon fibred gill net (locally calling current jal), pollution and detrition of some other environmental variables were responsible for destroying fishing habitats in this river that is very common to other coastal rivers also [66-73]. Eventually these problems result in

household poverty, unsocial activities, indebtedness and livelihood diversification. They also cannot buy own gear and vessel and their contribution to the national GDP decreases. The effects were similar to some problems faced by the Hilsa fishers near the Ganga River [75]. Roy, *et al.* and Ahmed, *et al.* [76, 77] also reported that, insufficient resources for livelihood and vulnerability to natural are major constraints of the fisher folk and consequently they remain poor.

CONCLUSION

Most of the surveyed fishermen did not have academic knowledge and so they were not interested to send their children to school. They were not aware of necessity of sanitation and proper disease treatment. Some fishers got little amount of financial support but finally they were failed to utilize that effectively and as a result, they remain poor and face social inferiority. The fisher folk of the Shibsra River had a treasure of intrinsic knowledge and supportive training in fishing will uplift their effectiveness. Moreover, for improving the socio-economic condition their problems should be eradicated from root level. To overcome the problems of the poor fishers, profound implementation of the fishing laws to conserve the river resources, effective extension service to create awareness regarding sustainable fishing, management of the Sundarbans forest, creating income generating activities, maintenance of market value chain, financial as well as training support from organizations and fishery cooperative are required. It is urgent to consider the perceptions of the fishing community during national policy making as their condition reflects the rural poverty.

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