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Pearson's Correlation and Likert Scale Based Investigation on Livelihood Status of the Fishermen Living Around the Sundarban Estuaries, Bangladesh

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Abstract: The Sundarbans form a perfect mangrove ecosystem, which supports a large group of fish, shrimp, edible crab and also supply food and cash to local coastal communities. The present study was conducted to evaluate the livelihood status of the fishermen Engaged in Fishing in the Estuaries of Sundarbans during the period from January to December, 2014. The investigation was conducted on the Hariabhanga, Haringhata, Pasur and Shibsa estuarine area of the Sundarbans using a structured questionnaire. It was found that most of the fishermen were belonged to the age groups of 21 to 40 years (66%), represented by 76% Muslim. The family size of fishing community is usually consisted of 5-7 members and medium family is the predominant (56%) among the fishermen but in a joint family (78%). Over 82% of the fishermen primary occupation was fishing. About 36% of the fishermen were only could write the name or illiterate while 42% and 16 and 6% of the fishermen were primary, secondary and higher secondary level of education, respectively. Highest income (44%) of the fishermen were 7,000 to 10,000 BDT and mostly use their own source (46%) for buying the fishing equipment's. About 38% of the fishermen received health service from Kabiraj, 26% of village doctors, 16% of union health complex and the remaining 20 % got health service from MBBS doctors in Upazila health complex. Maximum of their house were tin shed (42%), electricity facility was only 14% and their main recreational place was a tea stall (44%). About 38% of the fishermen used katcha sanitary while 46% used semi-pucca sanitary and 16% of the fishers use pucca sanitary facilities. Around 10% fishermen used their own tube-well, 34% used, shared tube-well and remaining 56% used Govt. tube well in the school area for drinking water purpose. Pearson's correlation coefficient represented strongly positive relation between age and experience ($r= 0.968$, $p= 0.01$). Likert scale technique was applied to identify extortion by the local extortionist as most critical constraint.

Key words: Livelihood Status · Fishermen · Constrains · Estuaries · Sundarbans · Bangladesh

INTRODUCTION

The Sundarbans is the largest single mass of tidal halophytic mangrove forest in the world [1-3]. The Sundarbans is a UNESCO World Heritage Site, the maximum of which situated in Bangladesh and the remaining in India [3,4]. The Sundarbans are situated in the estuary of the river Ganges, spanning an area of about one million hectares in South-west Bangladesh and Southeastern part of the State of West Bengal in India [5].

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Mangroves are among the naturally most productive ecosystems on earth and occupy approximately 75% of the world's tropical coastlines [6, 7]. Mangroves support more than 80 species of flora and 1300 species of fauna and act as nursery habitats for fish and crustacean of commercial value [8, 9]. The area consists of about 106 deltaic islands with a maze of innumerable rivers, rivulets and creeks. At present, more than one million people live in the Sundarbans and most of them are primarily marginal farmers and fishermen [10].

Mangrove waters are very rich in fishery resources and act as nurseries and spawning grounds for a great number of fishes, crabs, shrimps and various kinds of mollusks [11-13]. By this relationship, it can be seen that many mangrove dwellers catch marine animals around mangrove forests. Aquaculture is also widely practiced in mangrove areas, particularly in Southeast Asian countries. With over 3.5 million people from the surrounding areas depending directly or indirectly on the Sundarbans for their livelihood [14].

The Mangrove fisheries plays an enormously important role on the socio-economic development of Bangladesh. It is the main source of animal protein, employment opportunities, food security, foreign incomes and socio-economic improvement [15-21]. This sector contributes 3.65% to GDP and 23.81% to agricultural GDP. Fish supplements to about 60% of our daily animal protein intake [22-32]. About 10% of the population is dependent directly and indirectly on the fisheries for their living [33, 34]. It generates 1.4 million full time employment and part time employment of nearly 11 million people [35]. A large portion of rural family members are involved in part time fishing from the beels [36].

Fishermen are one of the most vulnerable communities in Bangladesh. They are poor by any standard and over the years economic condition of the fishermen had further deteriorated. Alam and Bashar [37] appraised the average per capital annual income of the fishermen families to be BDT 2,442 i.e. about 70% lower than the per capital income of the country as a whole. Being an isolated community fishermen are deprived of many amenities of life.

An estuary is a partly enclosed coastal body of water with one or more rivers or streams flowing into it and with a free connection to the open sea. There are many estuaries adjacent to the Sundarbans. Fishing activities is occurred regularly by the fishermen in the adjacent area. This area consisting of fishery plays a very important role in alleviation of rural poverty and supplying food to the poor fishing community. However, socioeconomic status of this fisherman is not satisfactory; availability of fishes in the estuaries are also declining day by day. Considering the above fact, the present study was carried out to assess the livelihood status and constraint faced by the fishermen in the estuarine area.

MATERIALS AND METHODS

Study Area: The investigation was imposed on the Hariabhanga, Haringhata, Pasur and Shibsa estuarine area of the Sundarbans (Fig. 1). Data were collected from 200 fishermen randomly covering these selected areas. In each estuary, data of 50 fishermen were collected by using structured questionnaire in the study area.

Collection of Data: The present study was conducted to assess the livelihood status and constraint faced by the fishermen of the estuaries adjacent to the Sundarbans. This study was conducted from January to December, 2014. The study was based on collection of primary and secondary data. Before collecting the primary data a draft questionnaire was developed which was pre-tested with few fishermen and the final questionnaire was improved, rearranged and modified. The final questionnaire included the questions on the age structure, family size and type, occupation status, educational status, housing condition, drinking water facilities, sanitary facilities, health facilities, credit facilities and monthly income, factors affecting the level of fish production etc. Primary data were collected through personal interview supplemented by multiple methodological Participatory Rural Appraisal tools such as Focus Group Discussion (FGD) and Crosscheck Interviews (CI) with key informants. Necessary relevant information on the socio- economic condition of fishermen was collected from regional offices.

Data Analysis: All the collected information were scrutinized and summarized carefully before the actual tabulation. SPSS (Version 16.00) and Microsoft Excel 2013 were used to compile and analyzed the data upon completion of data collection.

Likert scale with values of 4, 3, 2 and 1 was settled to determine constraints faced by fishers in the Estuaries of Sundarbans. In this way the fishermen were enquired to rate their constraint as "very critical" "critical" "to some extent critical" and not "critical". The variable mean score of 2.5 was used to discover whether the factor in question was critical or not. The variables with mean score of 2.5 and above were considered critical while variable with less than 2.5 were not.

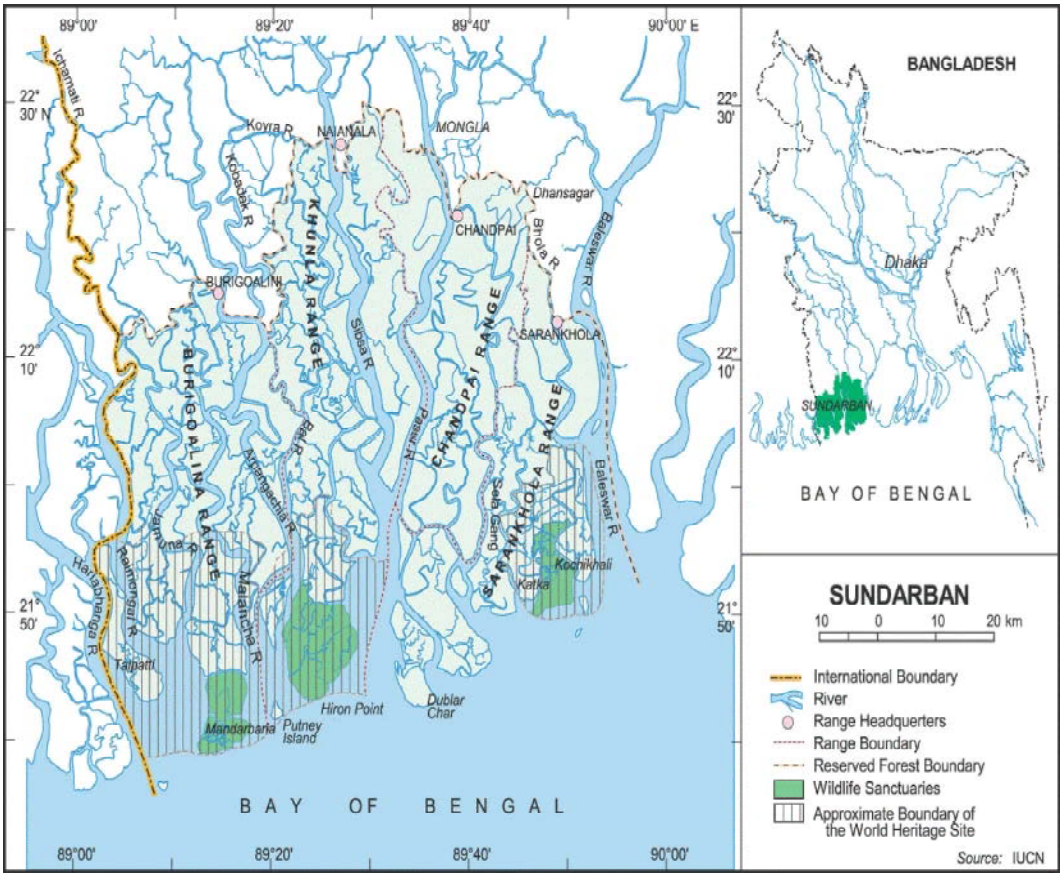

Fig. 1: Map of the study area.

RESULTS AND DISCUSSION

Age Group: The fishermen in the estuaries of the Sundarbans area**,** according to age structure ranged from 10 years to above 61 years. Among the different age group, the highest numbers in were 21-40 years (66%) and lowest (10%) were between 10-20 years age group (Table 1). Ahmed [38] in Tangail and Ahmed [39] in coastal region reported 66% and 70% under 40 years age respectively. Ali *et al*. [40] found that most of the fish farmers (50%) belong to age group of 31 to 40 years in Mymensingh district.

Religious Status: In the present survey, it was found that Muslims were featuring as the absolute majority (76%) of the fishermen and the minorities (24%) of them were Hindus (Table 1). In the study of Chantarasri [41]and Rabbani & Sarker [42] in Sundarbans Reserve Forest also stated that most fishermen were Muslim. Ahamed [39] studies in coastal area and showed that majority of fishermen were Muslim (68.33%). Hassan and Mahmud's [43] studies on the coastal fishing community in Kuakata showed that the majority of fishermen were Muslim (93.94%). Hindu fishermen were found at (32%) at Sundarban [39].

Educational Status: On the basis of education score of the fishermen, they were classified into five categories (Table 1). Most of the people were illiterate. However, ability of writing name was considered as literate (36%). There were minimum people who had passed primary (42%), 16% had passed secondary and 6% had passed higher secondary. Literacy rate was not satisfactory in the communities in the estuaries of Sundarbans area. Ahamed's [39] study in Sundarbans and Mahbubullah [44] in the polder and areas obtained literacy rates 25% and 23% respectively.

Marital Status: Investigations were made to see the marital status of people of the study area. It was found that (Table 1) the majority of them 172 (86%) were married while the unmarried responded only 28 (14%). Samima [45]

Table 1. Socio-economic profile of the Fishermen of Sundarbans Estuaries

Capital	Patterns	Number of respondents	Percentage (%)	Cumulative Percentage (%)
Age distribution	10 to 20	20	10	10
	21 to 40	132	66	76
	41 to 60	36	18	94
	61 to Above	12	6	100
Experience	Low (<15year)	112	56	56
	Medium (16-30 year)	70	35	91
	High (<31 to above)	18	9	100
Religious Status	Muslims	152	76	76
	Hindus	48	24	100
Educational status	Illiterate/ Can Write Name	72	36	36
	Primary	84	42	78
	Secondary	32	16	94
	Higher Secondary	12	6	100
Marital Status	Yes	172	86	86
	No	28	14	100
Family Type	Joint Family	156	78	78
	Unit Family	44	22	100
Family Size	2 to 4	32	16	16
	5 to 7	112	56	72
	8 to 10	48	24	96
	Above 10	8	4	100
Housing condition	Kacha	60	30	30
	Thinshed	84	42	72
	Half Building	44	22	94
	Building	12	6	100
Sanitary Condition	Kacha	76	38	38
	Semi Pacca	92	46	84
	Pacca	32	16	100
Health Facilities	Kobiraj	76	38	38
	Village Doctor	52	26	64
	Union Hospital	32	16	80
	Upazila Hospital	40	20	100
Source of drinking water	Own Tube well	20	10	10
	Shared tube well	68	34	44
	Government tube well in school	112	56	100
School / College Going Children	Yes	92	46	46
	No	108	54	100
Electricity facilities	Present	28	14	14
	Absent	172	86	100
Occupation Type	Main	164	82	82
	Secondary	36	18	100
Monthly income	3000-6000	60	30	30
	7000-10000	88	44	74
	11000-above	52	26	100
Recreational facilities	Radio	76	38	38
	Television	36	18	56
	Tea Stall	88	44	100
Credit access	Self Sufficient	92	46	46
	Borrow Money from their Neighbors	48	24	70
	Relatives	20	10	80
	NGO`s	28	14	94
	Co-operatives	12	6	100

Table 2: Partial correlations among different variables

Variable	r value	P value	Variable	r value	P value
Age and experience	0.968	0.01	Health and sanitation	0.687	0.01
Age and income	0.408	0.01	House and sanitation	0.870	0.01
Age and education	0.556	0.01	House and health	0.645	0.01
Age and health	0.240	0.01	Income and sanitation	0.809	0.01
Income and occupation	0.602	0.01	Income and house	0.817	0.01
Occupation and housing	0.500	0.01	Income and health	0.804	0.01
Income and education	0.427	0.01	Income and experience	0.444	0.01
Education and sanitation	0.418	0.01	Age and occupation	0.312	0.01

in Gallamari and obtained married fishermen respectively 94%, 92% and 70%. Hassan and Mahamud's [43] studies on the coastal fishing community of Kalapara village, Kuakata showed that 89.39% fishermen were married and rest 10.61% was single. So the present study is more or less related with those studies.

Family Type: From the study it was found that, 78% fishermen family were jointed and 22% family were nuclear (Figure 5). About 42.5% of the fish farmers lived in nuclear family and the rest (57.5%) in joint family in Mymensingh district [40].

Family Size: On the basis of family size the fishermen were classified into four categories: Small family (2-4), Medium family (5-7), large family (8-10) and very large family (above 10). The highest percentage was obtained in the 5-7 members' family (56%). The lowest percentage was obtained in the above 10 members family (4%). 16% people lived in 2-4 members family, 24% people lived in 8-10 members in family (Figure 6). Most of the fish farmer (45%) belonged in the 4 to 5 member's family in Mymensingh district [40].

School Going Children: It has been found that the maximum children were going to school because of getting various facilities. The findings of the survey showed that out of total school going children 46% (92) and 27% (108) were no school going children (Figure 7). The percentages of school going children were less in this area. The economic condition of the people was so poor that they cannot often offer to educational expense of their children.

Monthly Income: The monthly average income of the people community was observed from the collected data and information that most of the people earn monthly. The study revealed that 44% (60) earned 7,000 to 10,000 taka where lowest percentage (26%) earned above 11,000 taka per month (Table 1). Rabbani and Sarker [42] notated that income of the majority of the fishermen ranged from 2,000-3,500 taka per month. This result is more or less similar to the present study. Mahabubullah [44] reported that 71% earned 400 taka or above per month. DoF [46] stated that average income of majority of the fishermen were 15000 Taka/ year.

Credit Access: The national and local NGO like BRAC provide credit only to the organized poor members for purchase fishing gears and boats. After repayment only 46% became self-sufficient who did not need financial help but 24% borrow money from their neighbors, 10% from relatives, 14% from NGO's and 6% from co-operatives for their fishing business (Table 2) which was similar to the findings of Alam *et al*. [47] in Mymensingh district.

Occupational Status: Most of the fishermen around the estuaries of the Sundarbans area are involved in fishing as their main occupation. It was revealed that the main occupation of the people were fishing (82%), while 18% were secondary occupation (Figure 9) which was more or less similar to the findings of Alam *et al*. [47].

Housing Condition: The nature of house was indicated the social status of the people. During the survey attempts were made to find out the condition of living house of the people. It was found that majority fishers (42%) were live in Tin shed house where least percentage (6%) were live in building (Table 1). The construction materials are Goalpata, Tin, Mud and Brick. Samima [45] in Gallamary fishing community reported most of the fishermen's floor materials (94%) were Katcha.

Sanitary Condition: Most of the people in the estuaries of Sundarbans area, sanitation facilities were very low. The findings of the survey revealed that on the average 76 (38%) household used kacha latrines where 32 (16%) household used pucca latrines (Table 1). As awareness of proper sanitation is closely related to ability and education. CPP [48] in Tangail obtained 4% fishermen household had no latrines.

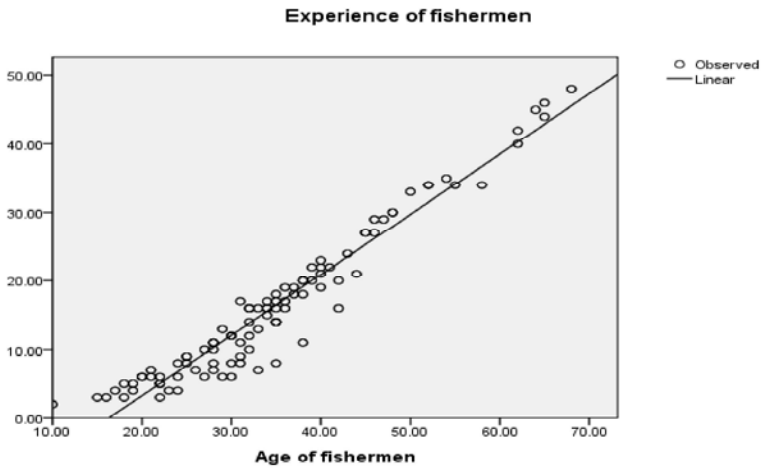

Fig. 2: Regression curve of the age and experience.

Table 3: Constraints faced by the fishermen of Sundarbans Estuaries

Constraints	Very critical	Critical	Extent Critical	Not critical	Scores	Points	Remarks
Lack of sufficient fishing craft	67	32	60	41	525	2.625	Critical
Lack of fishing gears	51	36	20	92	447	2.235	Not Critical
presence of aquatic vegetation	20	40	45	95	385	1.925	Not Critical
Climate changing problem	32	100	68	00	564	2.82	Critical
Insufficient credit facilities	16	64	36	84	412	2.06	Not Critical
lack of knowledge of fishing	00	68	64	68	400	2.00	Not Critical
Lack of education due to poverty	80	108	00	12	656	3.28	Critical
Poor housing condition	00	20	96	84	340	1.70	Not Critical
extortion by the local extortionist	158	22	20	00	738	3.69	Critical
lack of marketing facilities	24	28	44	104	372	1.86	Not Critical
Disturbances by dacoits and thieves	108	73	03	16	673	3.365	Critical

Health Facilities: The health facilities of the fishermen were moderately poor and it was found that 38% and 26% of the fishermen households were dependent on kobiraj and village doctors respectively who did not have any understanding and knowledge of medical science. Present findings was more or less similar to the findings of Ali *et al*. [40].

Sources of Drinking Water: In the study period, it was observed that 20 (10%) people used own tube well. 68 (34%) used shared tube well and 112 (56%) collected water from government tube well in school area (Table 1). Mahbubullah [44] noted that 41% fishermen used tube well water for drinking, cooking, bathing and washing.

Use of Electricity: In the survey it was found that majority percentage of households had no electricity connection (86%) and minority (14%) percentage of households had electricity connection (Table 1). DoF [46] reported from "Third Fisheries Project" that 2% fishermen household used electricity. Samima [45] reported that 20% used electricity in Gallamary fishing community, Khulna.

Recreational Facilities: In the study period, about 38% and 18% of the fishermen used own Radio and Television respectively for their recreational purpose and also for getting national news. But 44% fishermen passed their time in the tea stall for recreation (Figure 14). Kostori [49] found 36% use radio/ Television and 64% have no way for recreation in the Chalan Beel, Sirajganj district.

Partial Correlation among the Different Variables: Age and experience of fishermen were strongly positively correlated ($r = 0.968$, $p = 0.01$), which shows the experience of fishermen steadily increased with the passing of year. Partial correlations within different variables are presented in the Table 2. Figure 2 demonstrated the strong relationship between age and experience. Age and income exposed positive correlation ($r = 0.408$, $p = 0.01$) which predict that, income was increase with increasing age for a certain period (up to youth). Income and house presented the strongly positive correlations ($r = 0.817$, $p = 0.01$) because housing depended on income. Income and health type exposed strongly positive correlation ($r = 0.804$, $p = 0.01$).

Socio-economic Constraints of the Estuarine Fishermen: Most of the fishermen are facing various problems during fishing and marketing their goods in the local market. The main problem was documented as extortion by the local extortionist. Most of the fishermen were very poor and they have limited resources to buy nets and other fishing craft. The Likert scale technique was used to analyze Table 3. Table exposed lack of sufficient fishing craft, Climate changing problem, Lack of education due to poverty gears and disturbances by dacoits and thieves and sometimes by the local people themselves as critical problem where lack of fishing gears, presence of aquatic vegetation, Insufficient credit facilities, lack of knowledge of fishing, lack of marketing facilities and poor housing condition were identified as not critical.

They are ignored in all respect in the society. Most of them are illiterate and live from hand to mouth. Being very poor their children often go for fishing rather than going school. As a result, generation after generation they remain illiterate and not being able to contributes for the improvement of their community.

CONCLUSION

The livelihood condition of the Fishermen in the estuaries of the Sundarbans area was not satisfactory. The Fishermen transport were deprived of many amenities. The education level of the Fishermen was so poor. Due to the lack of awareness as well as the poor income of the Fishermen families, the study of the poor Fishermen student doesn't go so far. The educational status should be improved in the adjacent area. So why, some educational institutes should be built up in the adjacent area. The Government should take some important stage by providing some sorts of management policy as well as providing of some extra providence during the ban season of the fishing. That may be done within the providing of the VGF card. Some forms of NGO's activity must be ensured in the adjacent area for the improvement of the life leading status of the Fishermen. The NGO's must be helpful about the providence of the loan which may be used for the up gradation of the income procedure. As well as health facilities should be ensured by the government assistance. So there is a necessity of proper administrative involvement to make proper guideline for the proper use of resources by the communal people to safeguard their living pattern.

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