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INCOME AND EXPENDITURE DISTRIBUTION PATTERN OF SUNAMGONJ HAOR AREA: IMPLICATIONS FOR POVERTY ALLEVIATION

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ABSTRACT

Fishing income (52 per cent) was the main source of income and food expenditure (85 per cent) was the main sector of expenditure of the Sunamgonj haor fishermen. Absolute poor was about 48 per cent by Direct Calorie Intake (DCI) method and about 49 per cent and 60 per cent fishermen (for income measurement unit) and 37 per cent and 55 per cent (for expenditure measurement unit) below the lower and upper poverty lines by Cost of Basic Need (CBN) method respectively. The poverty level of the haor fishermen for expenditure measurement unit is lower than income measurement unit. Boat and defecation facilities were significant by odds ratio and odds ratio confidence interval. Education status of the household head and ownership of cultivated land were significant only by odds ratio. Govt. and other agencies (NGO) may consider the significant factors to increase the socio-economic conditions and particularly to reduce poverty level of the haor fishermen.

I. INTRODUCTION

The fisheries sector makes important contributions to income, employment, nutrition, and foreign exchange earnings. The sector (marine and inland fisheries) plays a vital role in the country's economy, contributing 6 per cent to export earnings and 63 per cent of animal protein to people's diets. The sector provides full time employment for 1.2 million people. A further 11 million people are engaged in part-time fishing, fish trading, food processing, making fishing equipment, fish and shrimp farming, hatchery and nursery operations, and working as fishery laborers. In addition approximately 70 per cent of the rural population fish for subsistence needs. There are three types of participant in fishing: subsistence, seasonal and professional (FAP, 1994: 17). Subsistence fishers are opportunistic, and catch mainly for consumption purposes, and with limited equipment and gears. They include laborers, small farmers, women and children, but do not class themselves as 'fishers' (*jele*). Seasonal fishers are a group that has recently expanded in response to crises and a shortage of agricultural land. They are primarily landless and marginal farmers, and fishing has become an important component of their livelihoods. Professional fishers define themselves as full-time fishers, and their occupation is primarily fishing. Since, the importance of fisheries in Bangladesh is clearly very large, and given its strategic importance for food security and national development, the fisheries sector has received considerable attention. It is highly essential to establish the rights of poor engage in gaining a livelihood from the water, with a view to improving their socio-economic conditions and reduce their poverty level.

Bangladesh is blessed with rich and diverse natural resources for fisheries. About 34 per cent of the country's area is under water almost six months each year. In Bangladesh's context fisheries can be classified into six groups: pond fisheries, beel-haor-baor (natural depressions, ox-bow lakes) fisheries, riverine fisheries, estuarine fisheries, bheri (embankment in rice fields) fisheries, and marine fisheries. There are about 10 thousand Jalmahals (large water-bodies) at present in Bangladesh. Jalmahals are such water-bodies, which are khas or government-owned property and are perennial in nature. The jalmahal management means the judicious harvesting of fish from the water-bodies, creation of fish sanctuary, banning catch of fish below 9 inches and conservation of aquatic resource and its use with the active cooperation of professional fishermen. The Ministry of Land (MOL) usually leases out these jalmahals for a period of 1-3 years to the public on open auction basis only with a view to realizing revenue. In reality, influential non-professional fisherman's groups take lease of the jalmahals through this auction practice. It is thus unfortunate that the professional fishermen's groups are being deprived of their legitimate right to fishing. Various government projects have been under implementation since 1980 to enhance fish production in inland water-bodies.

In addition to the normal programme and activities for protection, conservation and management of inland fisheries, Government development projects with donor support have been undertaken during the last two decades in order to increase production, and more recently for the development of fishers' livelihoods. In most cases these projects have been in collaboration with NGOs. In late 1995 to mid 1997 there was a switch to a greater focus on institutions and

local participation in the form of community-based fisheries management (CBFM) of inland fisheries through awareness raising and capacity-building of communities. Such communities have subsequently established fish sanctuaries stocked with fish fingerlings, established closed fishing seasons, rehabilitated wetland habitats, and taken up income generating activities with the help of training and credit to improve their incomes. The objective of these community based approaches is to generate improved inland fisheries management policies both for the Government and NGOs, eventually resulting in more sustainable, equitable and participatory management of resources for improved livelihoods of fishers in the selected deeply flooded areas.

The beels (deeper areas in the floodplain) are perennial and seasonal standing water-bodies that may be within larger natural depressions or low-lying areas, which in the north-east are called haors. During the rainy season a haor becomes a large sheet of water, like a small sea and offers good fishing. With the receding of floodwaters, fish accumulate in the deeper areas or beels for shelter and are harvested during the dry season. According to DOF (1985), an area of land totaling 114,161 ha is beel, which constitutes about 2.82 per cent of total inland open water area. Most of the beels and haors are located in the northeastern region of the country. According to MOL there are 3,528 government owned beels in the country, but there are private beels also. Beel/haor fishery is declining due to over-fishing, which includes harvesting by dewatering (draining and pumping out all water in the dry season). Other destructive fishing practices, loss and degradation of habitats, obstacles in the migration route of fish to and from floodplain, river etc also have a negative impact. The quantitative and qualitative decline of beel fishery has occurred during the last 3-4 decades. In order to improve this, the Government has in a few locations taken up programmes such as improvement of habitat through excavation of canals linking rivers with beels and floodplain; construction of fish pass and fish sanctuary; stocking of fish fry; improving fishers' access right to fishery, etc.

Poverty may be one of the significant reasons for the decline in the aquatic resources, especially fisheries production in the haor areas. Generally, poverty and harvests are interrelated. When the poverty level increases in the haor area, then the fish harvesting must be increased to meet the minimum food requirements, if fishing is the main source of income. It is become visible that most of the studies on poverty and income distribution in Bangladesh are concerned with measurement of poverty by estimating income and nutritional deprivations and far less than with its explanation and identification of vulnerable groups more exposed to poverty. With some limitations, attempt have been made to put together an empirical study on haor fisher community's poverty with owing emphasis on both measurement and explanation of poverty with its proposition for the beg to be excused in fisheries production.

The main purpose of this paper is to examine the income, expenditure and socio-economic conditions of the haor fishermen. In particular, it measures the incidences of poverty using the direct calorie intake and cost of basic needs method and income and expenditure inequality. It also determines the factors causing poverty, or at least the factors correlated to poverty. Finally, it suggests policy guidelines and recommendations for improving poverty level and socio-

economic conditions. With these objectives, the paper has been organized as follows: The next section reviews some literature. Section III describes the theoretical framework. Section IV discusses the methods of analysis. Section V examines socio-economic conditions of haor fishermen. Section VI shows the level and distribution pattern of income and expenditure. Section VII attempts to present the poverty level. Section VIII explicates some recommendation. The paper concludes in Section IX.

II. LITERATURE REVIEW

There is a large body of literature that relates income, expenditure and poverty, but there are few studies have been done on the haor fishermen in this regard. Only different evaluation committees and research organizations have conducted a few studies concerning the livelihood of fishermen and the utilization of haor areas. So in the literature review, we have to consider only income, expenditure and poverty level in rural areas in general, instead of how these factors specifically interact in the lives of fishermen, especially haor fishermen.

Income and expenditure distribution and poverty are intensively studied subjects in Bangladesh. Even so, existing estimates of poverty and inequality (income and expenditure) are often so highly controversial as to make a general understanding extremely difficult. For example, the World Bank estimates that there was substantial reduction in the incidence of rural poverty between 1991-92 and 1995-96 (World Bank, 1998), whereas careful estimates by others (e.g., Sen 1998) suggested that the reduction of poverty was insignificant over the same period of time. The Bangladesh Bureau of Statistics (BBS) estimates that the Gini coefficient of income distribution in Bangladesh for 1995-96 was one of the highest of the estimates available for Asian nations (BBS, 1998). This view is in conflict with the widely documented evidence. e.g., World Bank 1999, that inequality in Bangladesh is low by international standards.

Estimating the actual numbers of people in poverty is complex due to the various procedures for estimating poverty level. The proportion in poverty has reduced recently: in 1985-86 about 55.7 per cent people were poor and 27 per cent people were hardcore poor, but absolute numbers in poverty still remain high (Ali et al., 2003). Rural poverty incidence in a BIDS survey fell from 64.8 per cent in 1987-88 to 53.9 per cent in 1999-2000 (Draft National Strategy for Economic Growth and Poverty Reduction). In 1979, about 75 per cent people were below the national poverty line, i.e. their per capita energy intake less than 1900 K. cal.

Ravallion and Sen (1996) calculated the head count ratio, poverty gap and square poverty gap for the year 1983-84 through 1991-92. They found that after 1983-84 the poverty level in Bangladesh had increased up to the 1991-92 levels in the rural areas. Head count ratio, poverty gap and square poverty gap were 45.9, 10.9 and 3.6 respectively during the year 1985-86 and 52.9, 14.6 and 5.6 respectively during the year 1991-92. They calculated the poverty line income and found that the poverty line income was Tk. 268.92 per month in the year 1983-84 and Tk. 469.13 per month in the year 1991-92 respectively. They also calculated Gini

coefficients at the rural level and found that the Gini coefficient had increased over the years. Gini coefficient was 0.25 in the year 1983-84 and 0.26 in the year 1991-92 respectively.

BBS (2001) calculated the three poverty ratios and used the Cost of Basic Need (CBN) method for upper and lower poverty line expenditure. Head count ration, poverty gap and square poverty gap were 33.73, 7.29 and 2.28 respectively for the lower poverty line and 49.75, 12.90 and 4.50 for the upper poverty line. This head count ratio indicates that about 34 per cent people below the lower poverty line in the rural area. They found that about 50 per cent of population below the upper poverty line in the rural area.

CIRDAP (2001) worked on Monitoring Adjustment and Poverty in Bangladesh. For measuring the incidence of poverty, the poverty line had been estimated using the food energy-intake (FEI) method. The poverty incidence was found relatively stable for the year December 1995 through May 1999. Head count ratio was 46.8 in the year December 1995 and 44.9 in the year May 1999. Also depth and severity of poverty are more or less stable of that year. Poverty gap and square poverty gap were 11.6 and 4.2 respectively in December 1995 and 11.1 and 4.0 respectively in the year May 1999. Although the square poverty gap (3.9) was lower in the year April 1997.

CIRDAP (2001), measuring household income distribution by decile group suggested in May 1999 that the lowest decile, having a population share of 7.7 per cent, receives 1.3 per cent of total income in the rural areas. In contrast, the highest decile has an income share of 35.2 per cent with a population share of 13.7 per cent. The Gini coefficient is 0.36 (compared to 0.31 in April 1998). Average household and per capita income situation improved significantly across the poor and the non-poor in the rural areas. In the rural areas, the average household incomes in nominal terms for the poor has increased by 43 per cent over the December 1995 to May 1999 period, where as the increase is nearly 20 per cent for the non-poor. In case of average monthly household expenditure, the poor spend Tk. 2272 compared to Tk 5031 for the non-poor in the rural areas in May 1999. The distribution of household expenditure by decile groups from the survey suggested that the lowest decile, with 6 per cent of the population, has a share of 3 per cent of total expenditure. The highest decile, on the other hand, has population and expenditure shares of 14 per cent and 31 per cent respectively. The Gini coefficient of expenditure distribution is 0.28. Per capita rural expenditure in May 1999 was Tk. 755 monthly per capita, it was more than April 1998 expenditure of Tk.630 monthly per capita by 19.8 percent. In case of rural poor and non-poor households the per capita expenditures of Tk. 422 and Tk. 1026 were higher by 12.2 per cent and 19.0 per cent respectively. In the rural areas, the daily per capita calorie intake of the poor is 1932 k.cal in May 1999 compared to 2555 k.cal for the non-poor in May 1999.

Khan and Sen (2001) found that their income and expenditure figures significantly differ from the BBS income and expenditure figures due to different procedure. Khan and Sen found that per capita income and expenditure were Tk. 562.03 and Tk. 504.71 per month respectively. In the BBS study, they were Tk. 581 and Tk. 509 respectively during the year 1991-92. Khan and Sen also found

that during 1995-96, per capita income and expenditure were Tk. 631.88 and Tk. 652.65 per month respectively, and in the BBS study Tk. 697 and Tk. 662 respectively. Income and expenditure were varied due to the inclusion of capital receipt of Tk. 63.19, which was included in the BBS study, but excluded in the Khan and Sen study. They also calculated the income and expenditure Gini coefficient and found that the Gini coefficient for the distribution of expenditure was significantly lower than the Gini coefficients for the distribution of income. The income Gini coefficients were 0.276 and 0.310 for the year 1991-92 and the year 1995-96 respectively. The expenditure Gini coefficients were 0.249 and 0.277 for 1991-92 and 1995-96 respectively.

Sen and Mujeri (2002) found that head count ratio and poverty gap decreased but the square poverty gap increased over the time in the rural areas. Head count ratio, poverty gap and square poverty gap were 45.8, 11.5 and 3.9 respectively during the year 1995-96 and 43.6, 11.3 and 4.0 respectively during 2000. They also calculate the poverty line income and Gini coefficients in rural level and found that Gini coefficient increased over the year. Poverty line income was Tk. 541.77 per month in 1995-96 and Tk. 634.48 per month in the year 2000. Gini coefficient was 0.28 in the year 1995-96 and 0.30 in the year 2000.

III. THEORETICAL FRAMEWORK

According to The Concise Oxford Dictionary, the adjective 'poor' means "lacking adequate money or means to live comfortably". The noun 'poverty' is defined as the state of being poor and as "want of the necessities of life". Poverty has been described as a "matter of deprivation" (Sen, 1981). Deprivation is predicated on social norms and is very much a function of time and space. Poverty in developing countries can indicate absolute deprivation, infringing on basic subsistence of life; whereas poverty in developed countries can indicate relative deprivation, a lack of ability to afford a standard of living enjoyed by a reference group with higher incomes.

According to the World Bank (2003), "poverty is pronounced deprivation in well-being", where well-being can be measured by an individual's possession of income, health, nutrition, education, assets, housing, and certain rights in a society such as freedom of speech. Also poverty is a lack of opportunities, powerlessness, and vulnerability. Poverty is truly a multidimensional phenomenon in such a setting and requires multi-dimensional policy and program interventions in order to improve the well-being of individuals and, hence, make them free from poverty. There are certainly other concepts of well-being beyond poverty, both measured through monetary concepts and non-monetary dimensions, for example, inequality. Inequality focuses on the distribution of attributes, such as income or consumption, across the population

Poverty lines are widely perceived as occupying a central role in poverty analysis. The poverty line defines the minimum acceptable standard of living for society. It divides the population into two groups: poor and non-poor. When an individual is poor, he has a standard of living that is below the minimum

acceptable level (Quibria, 1991). There are two main types of poverty lines. The first, a relative poverty line, the poor are those with significantly less access to income and wealth than others in their society. The second, an absolute poverty, is when the poor are those who do not have the resources to meet the basic needs for healthy living. There are three standard approaches (appendix-1) for deriving absolute poverty line.

Direct calorie intake (DCI) is probably the easiest method to apply. Poor households, for instance, are defined as those households with per capita energy intake less than the standard per capita requirement of energy (e.g. Bangladesh uses a national threshold of 2,122 calories per capita per day energy intake in accordance with Food and Agriculture Organization standards for a healthy diet in South Asian countries).

An improvement over the DCI is the food-energy intake method (FEI) method, which measures consumption or income poverty (household's command over basic food and nonfood items) by finding a monetary value of the poverty line at which "basic needs" (in this case predetermined food energy requirement/calorie intake) are met. Once this consumption or income level is located, it automatically provides the allowance for both food and non-food consumption.

An often proposed ideal method of deriving a poverty line is the cost-of-basic needs (CBN) method by stipulating a bundle of goods and services that are required by everyone (or every household) to attain an acceptable standard of living in the society. The CBN method usually sets poverty line by computing the cost of a food basket enabling households to meet pre-determined minimum daily nutritional requirement and then adding to this cost an allowance for non-food consumption. There are three steps to implement this method: (a) defining a bundle of food items meeting a defined required daily nutrient (usually caloric) intake; (b) estimating the cost of the food bundle; and (c) computing an allowance for non-food items.

Three main methods have been used for estimating poverty in Bangladesh. DCI and CBN method have been used to measure the extent of poverty in HES 1995-96. In earlier household expenditure surveys up to HES 1991-92, BBS used both FEI and DCI methods for measuring the incidence of poverty in the country. The methods differ in terms of their indicator of welfare and their approach to the threshold or poverty line: DCI, FEI, and CBN, as summarized in Appendix-1. For 1999, separate urban and rural poverty lines (with differing per capita per day calorie requirement: 2112 k. cals for urban and 2122 k. cals for rural areas) for 21 regions were computed in Bangladesh.

The FGT (Foster, Greer and Thorbecke) measure has been quite widely used in recent years. FGT measure captures the head count index, poverty gap index and square poverty gap index. The most common standard indicator is the incidence of poverty (also called poverty index or headcount index). This describes the percentage of the population whose per capita incomes, or expenditures spending, are below the poverty line, that is, the population that cannot afford to buy a basic basket of goods. This measure fails to capture the extent to which individual income (or expenditure) falls below the poverty line. The poverty gap index is the

aggregate income shortfall of the poor as a proportion of the poverty line. Poverty gap index captures the acuteness of poverty since it measures the total short fall of the poor from the poverty line. This measure has the drawback that it does not consider the importance of the number of people who are below the poverty line. For this reason, it is important to use both measures of poverty jointly to evaluate the extent of poverty. There are certain policy changes that favor one group of poor and adversely affect another group. In such cases head count index may not register any change but poverty gap index may get around this problem to some extent. A third measure, the square of poverty gap index gives a weight to the poverty gap (more weight to very poor than to less poor). It is the average value of the square of depth of poverty for each individual. Poorest people contribute relatively more to the index.

Monetary poverty is not only the exclusive paradigm for poverty measurement and non-monetary dimensions of poverty are useful in assessing poverty components. Some of the characteristics of the poor by region, community, household and individual characteristics followed by quantitative and qualitative description of the major determinants of poverty. At the regional level, there are numerous characteristics that might be associated with poverty. The relationship of these characteristics with poverty is country specific. In general, poverty is high in areas characterized by geographical isolation, a low resource base, high or low rainfall, and other inhospitable climatic conditions. For example, many argue that economic development in Bangladesh is severely retarded due to its susceptibility to annual floods (World Bank, 2003). The household and individual level characteristics category would include the age structure of household members, education, gender of the household head, and the extent of participation in the labor force. At the community level, infrastructure is a major determinant of poverty. Other indicators of community level characteristics include human resource development, equal access to employment, social mobility and representation, and land distribution. Recent research has also stressed the importance of social networks and institutions, and social capital in the community.

IV. METHODOLOGY

The Remainder sampling technique was used to select fishermen for collecting data from Sunamgonj haor area. Since it is very difficult to measure each individual's expenditure (or income) separately in haor area, surveys typically estimate total household income and expenditure, which then is distributed evenly among household members. Then adult equivalent scales are generally used to take account of the relative needs of individuals of different age and sex within the household. The adult equivalent scale measures the relative income and expenditure required by households of different composition to maintain the same standard of living. Appendix-2 gives the information about the equivalence scale, which was used by World Bank in a study of consumer expenditure in the developing countries (specifically for India). In that table the male adult is the unit of measurement and other members of the family have been expressed in terms of adult-male equivalents.

Two methods, Direct Calorie Intake (DCI) and Cost of Basic Needs (CBN), were used for estimating poverty line. DCI method is based on caloric in-take: a household with per capita calorie in-take per day less than 1805 kcal, 2122 kcal and 1600 kcal are considered **"hard core poor"**, **"absolute poor "** and **"ultra poor"** respectively.

CBN entails a basket of food items based on nutritional requirements and consumption patterns, and a reasonable allowance for non-food consumption. Three steps are followed for estimating the poverty line.

1. The cost of a bundle of fixed food items *(nutritional basket considered minimal for the healthy survival of a typical family in rural Bangladesh)* is estimated. The food poverty line is computed as –

$$Z_f = \sum P_j F_j$$

Where F_j is the required per capita quantity of the food items j and P_j is the unit price of j-th food item.

2. The total per capita consumption is denoted by y and food per capita consumption by x, the "lower" and "upper" allowances for non-food consumption were estimated as-

$$ZL_n = E\left[y_i - x_i \middle| y_i = Z_f \right]$$

and

$$ZU_n = E\left[y_i - x_i \middle| x_i = Z_f \right]$$

Where, E is the expectation statistical symbol

3. Estimation of the total lower and upper poverty lines-

Lower poverty line-

$$Z_L = Z_f + ZL_n$$

Upper poverty line-

$$Z_U = Z_f + ZU_n$$

FGT poverty measure for a given *a* is defined over a continuous variable *y* *(individual income below the poverty line)* which has support in the non-negative real numbers, as

An estimate of this in discrete terms is

$$P_\alpha = \int_0^q \left(\frac{Z - y}{Z} \right)^\alpha dy , \quad \alpha \geq 0$$

$$P_\alpha = \frac{1}{N} \sum_{i=1}^q \left(\frac{Z - y_i}{Z} \right)^\alpha , \quad \alpha \geq 0$$

The three variants of FGT measures are headcount ratio ($\alpha=0$), poverty gap ($\alpha=1$) and severity index ($\alpha=2$).

The relative degree of income and expenditure inequality can be obtained by calculating Gini concentration ratio, or more simply as the Gini coefficient. Gini coefficients are aggregate inequality measures and can vary anywhere from 0 (perfect equality) to 1 (perfect inequality).

The direct method formula used to calculate Gini coefficient (World Bank, 2003) is

$$GINI = 1 - \sum_{i}^{N} \left(\sigma x_i - \sigma x_{i-1} \right) \left(\sigma y_i + \sigma y_{i-1} \right)$$

Where,

      GINI is the Gini index
      X and Y represent population and income or expenditure
      σX and σY are cumulative percentages of Xs and Ys (in fractions) and N is the number of elements (observations)

For measuring non-monetary dimensions of poverty, logistic regression techniques have been used usually. Logistic regression techniques can be used to determine the socio-economic factors causing poverty, or at least the factors correlated to poverty. An interesting method that does not require any distributional assumptions concerning explanatory variables is Cox's linear logistic regression model (1970). This logistic regression model can be used not only to identify risk factors but also to predict the probability of success. The general logistic model expresses a qualitative dependent variable as a function of several independent variables, both qualitative and quantitative (Fox, 1984).

If *p* is the probability of fishermen having income above the lower poverty level income, the

$$p = \frac{1}{1 + e^{\beta x}}$$

Where ß is a vector of the unknown coefficient and X is a vector of covariates that affect the fishermen income. The general logistic regression model can thus be expressed as:

$$\ln \frac{p_i}{1 - p_i} = \beta X = \sum_{j=0}^{K} \beta_j X_{ji}$$

which express the log odds of current users as a linear function of the independent variables. The odds ratio represents the chance of a fisherman to be above the lower poverty level income compared to the fishermen below the lower poverty level income. The confidence interval for the odds ratio was calculated by using the following formula.

$$e^{\left\{ \beta_1 \pm z_{\alpha/2} s.e \left(\beta_1 \right) \right\}}$$

V. SOCIO-ECONOMIC CONDITIONS

Socio-economic background of any community plays an important role in the adoption and implementation of a development programme. Specifically in order to get a complete picture of haor fish culture or to assess the effectiveness of policies towards alleviating poverty, it is essential to know the socio-economic characteristics of fishermen. However, the socio-economic condition of full-time fishers has always been deplorable (Ali *et al.*, 2003). They are usually poor, illiterate, unorganized and neglected. The majority of fishermen live below the poverty line. They are exploited by the middleman/moneylenders and their access to resources is frequently limited. Many of them do not have fishing equipment (gear and boat) of their own. Most are landless, and many of them do not even have homestead land, but build their houses on riverbanks (Government khas land) subject to flooding. They rarely have access to bank/formal credit because of a lack of collateral. Consequently they have to depend on private moneylenders who usually charge a very high rate of interest. Most of them undertake fishing on a share basis with the boat-gear owner or moneylender, or as daily laborer or on a monthly salary basis.

Most fishers are poor, landless and disorganized, with low social status and are thus exploited by the rich and powerful individuals (Ali et al., 2003). Fishermen's access to fishing sites is limited because of their poverty, as well as lack of organization and capacity. Government policies have provisions for fishers' access to resources and credit, but in reality they do not get these benefits due to the lack of an organization forum for their interests and their low socio-economic status. In recent years they have been getting financial and social support from NGOs. What follows is a brief sketch of some selected characteristics of the poor fishermen by region, community, household, and also individual characteristics. This is followed by quantitative and qualitative descriptions of the major determinants of poverty.

Professional fishers were traditionally Hindus. This group has declined due to competition and out-migration, and Muslim agriculturalists have increasingly entered this part of the fishery. For example, Karim Rezaul (1994) reported that in riverine areas the fishers were 54 per cent Hindus and 46 per cent Muslims. Additionally, Thompson (1999) found that there were 64 per cent Muslim fishers and 36 per cent Hindu fishers in a sample of different water-bodies. Average household size was 6.37 and it was 5.19 at the national rural area (BBS, 2001).
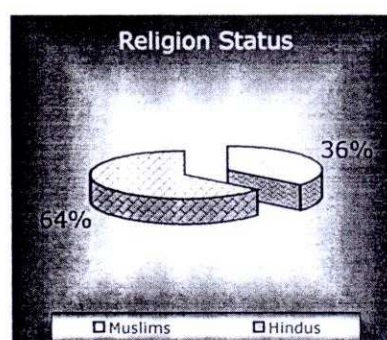

Figure-1: Distribution of the Selected Haor Fishermen by Religion

Fishing is the prime occupation in the study area, as is evident from the fact that only 26 per cent of the households owned any cultivated land. More than 74 per cent households had boats, which is the essential item for fishing and livelihood

provision of the haor adjacent households. In terms of the environment the fishermen and their families live in, the indicators are poor. Although, the use of sanitary latrine is gradually increasing in the rural areas, the bulk of the rural population still use open space, which can lead to the transmission of diseases. According to BBS household survey (2001), 14.2 per cent households have access to sanitary toilet, 66 per cent have access to other type of (pacca and kancha) toilet, and 19.26 per cent households use open space; against 12.46 per cent households using sanitary toilet, 53.4 per cent other type and 34.20 per cent open space in 1991.

Looking at the study area, the haor fisherman's defecation facilities were miserable because only 7 per cent fishermen had water slab defecation or sanitation facilities. This already difficult situation in the haor becomes worse during the flood seasons.

Table-1: Socio-economic Characteristics of Fishermen (Percentage)

Characteristics	Percentage
Household size (No.)	6.37
Adult size of family member (No.)	5.17
Own cultivated land	26
Boat	74
Sanitary/water slab toilet	7
Education status of the household head (illiterate)	49
Radio	14
Tape recorder	8

Source: Field Survey, 2003

The fisherman's level of educational attainment influences technology adoption capabilities, their management of resources, and their ability to make rational economic decisions. It greatly influences efficient management of haor fish farming. The education level is wretched in the study area because more than 49 per cent of fishermen are not able to write their name.

There are two types of rural credit providers. The first type is formal, financial provider such as government savings banks, commercial banks, and fishermens' associations or non-governmental organizations. Another type is informal financial institutions like production credit groups, other formal groups and moneylenders. About 70 per cent of rural households are dependent on some sort of credit, either institutional or private (BBS 1998). The poor and those who have no resources for collateral are heavily dependent on private sources of credit such as moneylenders, who are locally called dadondar or mohajans, who charge a high rate of interest. It is particularly fisherman who being poor and virtually landless, who have to depend on private loans from dadondars, mohajans and aratdars. This can sometimes be on the condition of selling the expected catch to the aratdar or mohajan at a low or fixed price at the time of taking loan (Ali *et al.*, 2003).

Getting credit formal credit is also not easy for the fisherman. Some institutional credit providers like (NGOs) have a specific boundary of operation in which lending conditions require borrowers to be registered as clients or members of

those financial institutions. In the case of moneylenders, borrowers might submit their loan application at once. About 37 per cent of the selected fishermen depend on the ERA[1] loan.

The ERA only gives loans to the group members of the community based fishermen project (CBFM). The objectives of ERA loan are mainly to providing financial assistance to the fishermen under CBFM project.

Table-2: Sources of Loan of the Selected Fishermen

Sources		Percentage
Institutional Loan	Bank	15
	ERA	37
Non-institutional Loan	Mohajan	60
	Mortgaged out	1
	Others	5

Source: Field survey, 2003

More than 60 per cent of the selected fishermen depended on mohajans for non-institutional loan. The maximum of the loans were used for consumption purposes in the haor area.

VI. INCOME AND EXPENDITURE

The level and distribution of income and expenditure among the household members and among the various socio-economic groups are treated as a significant factor for the household level study. Income influences the purchasing power of the households to meet their basic needs. Income is a very important area to consider when characterizing the poor. "When measuring the resources available to an individual it is preferable to quantify expenditure rather than income. Expenditure generates the flow of services from which material well-being is derived. Income, in contrast, provides the capacity to purchase things ... generally income is valued not for its own sake but for the ability it provides to buy goods and services. It is thus more satisfactory to measure directly the level of goods and services bought" (Travers and Richardson, 1993). There are a number of problems with using income as a proxy of household welfare. First, income data are very unreliable, since there are problems in identifying and assessing production for home consumption and for sale in the local market. Second, income may understate the level of living. Third, the level of living may exceed income if there is sharing. For a variety reasons, expenditures are usually measured more accurately than the incomes in surveys and household expenditures is a better indicator of welfare than the income (Quibria, 1991).

Sources of Income and Sectors of Expenditure

In the study the income is divided into three broad categories: agricultural, fishing and others among the various sources of income. All agricultural income comes from only paddy production in the Sunamgonj haor area because the area is flood-prone. Fishing is the main source of income of the adjacent haor

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[1] ERA (Effort for Rural Advancement) is a local NGO in Sunamgonj district

households. Fishermen can not fish properly in the haor due to economic, social and technical constraints. Thus, the socio-economic conditions of the haor fishermen are poor. They cannot earn a sufficient amount of money to meet basic needs. The source of fishing income covers fishing, fishing as wage labor, fish and fishing related trading, drying, processing, salting, renting of fishing equipment and gear making. Other income is agricultural laboring, non-agricultural laboring, homestead garden, sale of agricultural byproducts, dairy, poultry, hiring out draft power, hiring irrigation equipment, land sold, boatman, rickshaw, van, handicrafts, tailoring, carpentery, masonry, petty trade, business, service, remittances and pension.

Fishing income in the study area was Tk. 420. per month per adult. More than 50 per cent of income comes from fishing. The result can be compared to others studies. In FAP 16 study (ISPAN, 1992) average fishing income of full-time fishers in riverine fisheries was Tk. 70 day/fisher. In catch-sharing system fishers or wage laborers earned Tk. 40 per day per laborer.

Table-3: Sources of Adult Income of the Selected Fishermen

Source	Income (Tk.)	Percentage
Agriculture	140	18
Fishing	420	52
Others	240	30
Total	800	100

Source: Field Survey, 2003

The ISPAN (1995) study reported that while the average income of a fisher per day was Tk. 135 during peak period (mid April to mid July and mid September to mid October); but their average income per day was Tk. 45 during the lean period. On the other hand, wage-labor fishers earn Tk. 800 to 1200 per month during the lean season. CNRS (2000) reported that a full-time fisher earns on an average Tk. 50 to 60 per person per day during peak season and Tk. 30 to 50 per day during lean season in CPP area, Tangail.

Fishing is the focal income source of fishermen. About 88 per cent of fishing income comes directly from fishing. The second largest source of fishing income is fish and fish related trading.

Table-4: Sources of Adult Fishing Income of the Selected Fishermen

Source	Income (Tk.)	Percentage
Fishing	369.02	87.86
Fishing as wage labor	9.56	2.28
Fish and fishing related trading	30.74	7.32
Drying, processing and salting fish	9.56	2.28
Renting of fishing equipment	0.56	0.13
Gear making	0.28	0.07
Others	0.28	0.07
Total	420	100

Source: Field Survey, 2003

Less than one per cent of fishing income comes from renting of fishing equipment and gear making.

The expenditure of the study subjects is divided into three broad categories: basic needs, fishing related, and others. Basic needs expenditure is food, clothing, housing, health and education. The sector of fishing related expenditure is considered to encompass rent, repairing and buying new gear and boat. Other expenditure is considered to be fuel, traveling, loan repayment, land buying and taking mortgage, livestock buying, furniture buying, festivals, ceremonies, marriage, smoking, tea, soft drinks, bread, biscuits and betel nut consumption.

Basic needs expenditure is Tk. 572 per month per adult, which is about 76 per cent of their total expenditure. Fishing related expenditure was so small that it was only 6 per cent, even though fishing is the main source of income of the selected households.

Table-5: Sectors of Adult Expenditure of the Selected Fishermen

Sector	Expenditure (Tk.)	Percentage
Basic needs	572	76
Fishing related	44	6
Others	132	18
Total	748	100

Food expenditure is the fisherman's largest component in the basic needs expenditure. In the study, more than 85 per cent of their basic needs expenditure is on food in the study area.

This result is comparable with other studies. According to CIRDAP (2001), in rural areas the proportion of total expenditure spent on food is 78 per cent for the poor compared to 69 per cent for the non-poor.

Table-6: Sectors of Adult Basic Needs Adult Expenditure of the Selected Fishermen

Basic Need	Expenditure (Tk.)	Percentage
Food	487	85.14
Clothing	33	5.77
Housing	21	3.67
Education	7	1.22
Health	24	4.20
Total	572	100

Source: Field Survey, 2003

The poor spend 37 per cent of their total food expenditure on cereals whereas similar share for the non-poor is 22 per cent. The lowest component of expenditure in the basic needs category is education, comprising only 1 per cent.

Gear and boat are the most important fish related expenditure of the haor fishermen. Boats especially necessary during flood seasons. About 55 per cent and 41 per cent of fishing related expenditure are on gear and boat respectively of the selected fishermen in the haor area.

Table-7: Sectors of Fishing Related Adult Expenditure of the Selected Fishermen

| Sector	Expenditure (Tk.)	Percentage
Gear	24.33	55.29
Boat	18.12	41.17
Others	1.56	3.54
Total	44	100

Source: Field Survey, 2003

Income and Expenditure Distribution

The selected haor fishermen are grouped into six categories according to the level of their monthly adult income and expenditure. Table and figure show the adult income and expenditure distribution pattern. The first category includes the fishermen having monthly adult income up of to Tk. 500 and the last category includes the fishermen having monthly adult income of more than Tk. 1300.

Table-8: Adult Income and Expenditure Distribution of the Selected Fishermen (Percentage)

Group	Income	Expenditure
UP to 500	15	7
501-700	44	43
701-900	12	31
901-1100	9	12
1101-1300	12	3
Above 1300	8	3

Source: Field Survey, 2003

Figure-2: Income and Expenditure Distribution
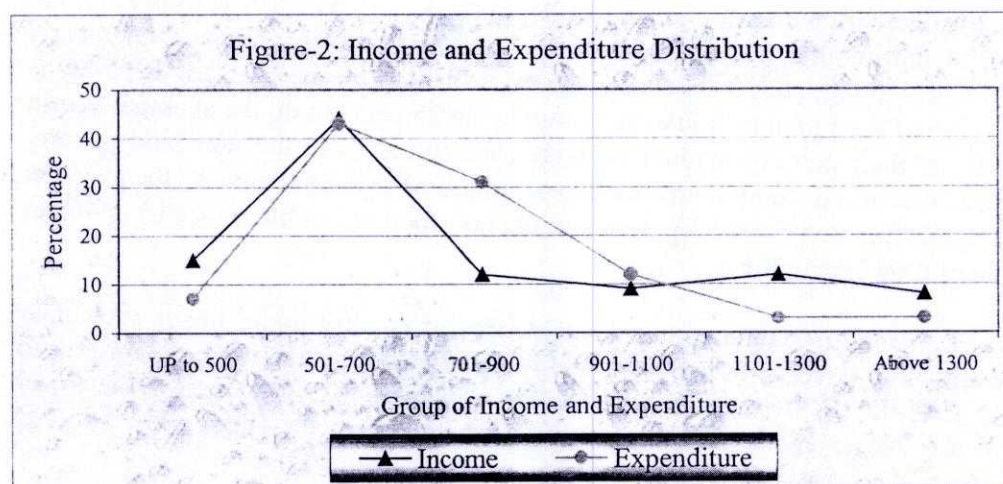
The highest proportion of the selected fishermen is grouped in the income and expenditure group of Tk. 501 to Tk. 700. The second highest proportions of fishermen are in the income group of up to Tk. 500. per month per adult and in the expenditure group of 701 Tk. to 900 Tk. per month per adult. This means that the fishermen's expenditure level is more or less higher than the income level.

VII. POVERTY LEVEL

The poor and vulnerable fisherman may not be able to benefit from growth, because they lack health, skills, or access to basic infrastructure. Poverty incidence is quite different when measured by BBS using the DCI poverty line. In the early 1990s, when poverty incidence declined according to the CBN method, poverty incidence measured by BBS using the DCI poverty line decreased only in rural areas, while in urban areas the rate of poverty increased. Moreover, the poverty rates in rural and urban are at almost the same level, although there is a danger that urban poverty incidence would seem much higher compared to the estimates using other poverty measures.

In fact the DCI poverty incidence in 1995 was 47.1 per cent in rural areas and 49.7 per cent in urban areas (World Bank, 2003). Absolute and hard-core poor were 47.67 per cent and 15.12 per cent respectively. These were 42.3 per cent and 18.7 per cent at the rural area (BBS, 2003). This implies that absolute poor in the fishermen was higher. The ultra poor was 10.47 per cent.

Table-9: The Selected Fishermen Below the Poverty Line

Poverty Level	Percentage
Absolute poor	47.67
Hard core poor	15.12
Ultra poor	10.47

Source: Field Survey, 2003

The food poverty line has been estimated as Tk. 524 per capita per month for the study area by using the price of the selected food bundle (appendix-3). The monthly per capita "lower" and "upper" allowances have been estimated as Tk. 121 and Tk. 187 respectively. That is 23.09 per cent for "lower" and 35.70 per cent for "upper" allowances of the food poverty line for the non-food essentials. The corresponding per capita "lower" and "upper" poverty lines have been estimated as Tk. 645 and Tk. 711 respectively. The non-food expenditure was found consistent with other studies in Bangladesh. Rahman (1994) found that the cost of non-food items, which includes clothing, footwear, housing, medicare, fuel and lighting, education etc., has been estimated by the BBS for 1985-86 as the ratio of food to non-food expenditure being 35 per cent on the average. World Bank, in their poverty manual exercise used to calculate the non-food poverty line as the ratio of food to non-food expenditure being 30 per cent on the average. Ravallion and Sen (1996) reported that the non-food expenditure was 15 to 40 per cent of food expenditure.

In the income measurement unit, incidences of poverty under lower and upper poverty line were 48.84 per cent and 60.47 per cent respectively. According to the 1995-96 HES (BBS, 1998) 45.4 per cent of fishers were below the lower poverty line as against the rural average of 39.8 per cent. These were 34.1 per cent and 47.4 per cent at the national rural area (BBS, 2003).

Table-10: Poverty Level of the Selected Fishermen by CBN Method

Poverty Measure	Lower Poverty Line		Upper Poverty Line	
	Income	Expenditure	Income	Expenditure
Head Count Ratio (Incidence of Poverty)	48.84	37.21	60.47	54.65
Poverty Gap (Depth of Poverty)	8.23	5.18	12.76	8.79
Square Poverty Gap (Severity of Poverty)	2.24	1.23	3.70	2.24

Source: Field Survey, 2003

The depth of poverty and severity of poverty were 8.23 per cent and 2.24 per cent by lower poverty line respectively. These were 8.2 per cent and 2.6 per cent at the national level (BBS, 2001). The depth of poverty and severity of poverty were 12.76 per cent and 3.70 per cent by upper poverty line respectively. These were 13.8 per cent and 4.8 per cent at the national level (BBS, 2001). In the expenditure measurement unit, incidences of poverty under lower and upper poverty line were 37.21 per cent and 54.65 per cent respectively. The depth of poverty and severity of poverty were 5.18 per cent and 1.23 per cent by lower

poverty line respectively. The depth of poverty and severity of poverty were 8.79 per cent and 2.24 per cent by upper poverty line respectively. It implies that the poverty level of the haor fishermen is low if we use expenditure and is high if we use the income.

The BBS estimates of the Gini coefficients of income distribution are based on a ranking of individuals by income per household rather than per capita income. Khan and Sen (2001) used per capita income and expenditure as the criteria of ranking for the estimation of the Gini coefficients for income and expenditure distribution. Hossain, Keus and Apu (2002) used the Gini coefficient in the 'Patuakhali Barguna Aquaculture Extension Project' to measure the inequality. The study used adult income and expenditure to estimate the Gini coefficients. The Gini coefficient for any sets of data with highly unequal distributions typically lies between 0.50 and 0.70, while for any sets of data with relatively equitable distributions, it is on the order of 0.20 to 0.35 (Todaro, 1998).

The income Gini coefficient was within the relatively equitable distributions range (0.20 to 0.35) and the expenditure Gini coefficient was below the relatively equitable distributions range in the study area.

Table-11: Gini Coefficient of the Selected Fishermen (Percentage)

Factor	Gini Coefficient
Income	0.24
Expenditure	0.16

Source: Field Survey, 2003

For measuring non-monetary dimensions of poverty, the dependent variable (status) is a dichotomous response variable that was assigned the value of 1 if the fishermen above the lower poverty level income and 0 for the fishermen below the lower poverty level income. The Independent variable, having the education facilities of household head was assigned value 2 and for illiterate 1, having cultivated land was assigned 1 and for not 0, for defecation facilities as hanging/bamboo/none was assigned 1 and for sanitary/water slab 2 and for having boat was assigned 1 and for not 0. The results are presented (Table-12) in the form of logit regression coefficients, standard error, Wald statistic, Significance Level (*p* value), Exp(B) (odds ratios), and Confidence Interval. If the odds ratio is greater than unity, the probability of being a fisherman rich is higher than that a fisherman being poor. The *p* value (Significance level) is used to identify the significance or the relative importance of the selected variables in the logistic regression model.

The logit model had been fitted and the change in deviance on fitting the covariates was 10.906 relative to a null model without any terms, a chi-square with 4 degrees of freedom, a highly significant (*p*=0.028) contribution to the model. Fishermen's education was found to be a significant indicator (*p*=0.065) in explaining the probabilities (p_i). The fishermen having education (literate) were about 2.52 times likely to be a fisherman above the lower poverty level income compared to those who had no education. As expected, education increases accessibility to "new technologies", including awareness and use of modern technology for fishing.

Fishermen having cultivated land were found to be a significant indicator (*p*=0.085) in explaining the probabilities (p_i). The fishermen having cultivated

land were about 2.826 times likely to be a fisherman above the lower poverty level income compared to those who had no cultivated land. As expected, fishermen having cultivated land spawn extra income besides fishing income.

Table-12: Logistic Regression of the Fishermen Upper the Lower Poverty Line on Some Selected Socio-economic Factors Among Fishermen

	B	S.E.	Wald	Sig.	Exp (B)	95.0% C.I.for EXP (B)	
						Lower	Upper
Education Status							
No Education					1.00		
Literate	.926	.502	3.395	.065	2.524	.943	6.755
Ownership of Cultivated Land							
No Cultivated land					1.00		
Cultivated land	1.039	.604	2.962	.085	2.826	.866	9.227
Defecation Facilities							
Hanging or bamboo or None					1.00		
Sanitary or Water Slab	1.995	.986	4.089	.043	7.349	1.063	50.797
Having Boat							
No					1.00		
Yes	1.345	.604	4.964	.026	3.837	1.176	12.527
Constant	-1.830	.614	8.892	.003	.160		
Model chi-square					10.906		
Degrees of freedom					4		
Probability					.028		

Source: Field Survey, 2003

The effect of the fishermen defecation facilities on income was found to be significant indicator (p=0.043). The fishermen having sanitary or water slab facilities were about 7.35 times more likely to be a fishermen above the lower poverty level of income compared to those who had bamboo made or hanging type or no defecation facilities available. Generally, it was observed that fishermen with higher level of income have better sanitation facilities available. Thus, the fishermen above the lower poverty level income increase accessibility Sanitary or Water Slab facilities for defecation.

Fishermen having a boat were found to be a significant indicator (p=0.026) in explaining the probabilities (p_i). The fishermen having boat were about 3.837 times likely to be a fisherman above the lower poverty level of income compared to those who had no boat facilities. Since the boat facilities of the hoar fishermen is an essential or necessities items, as expected those household who had no boat facilities were mostly poor.

Since the estimated 95 per cent confidence interval for the odds ratio of the education status of the household head and the ownership of cultivated land were included the unity, the explanation by odds ratio of that variables were not accepted by the odds ratio confidence interval. Where as the defecation facilities and having boat were excluded the unity, the explanation by odds ratio of that variable was accepted by the odds ratio confidence interval.

VIII. RECOMMENDATION

Policy is a collection of decisions that sets out the general aims, and objectives of the governing body with respect to inland fisheries. The fisheries sector could increase their contribution in terms of income, employment, human nutrition and foreign exchange earning to the national economy. These policy recommendations constitute important guidelines for developing the fisheries sector in the haor area. Several recommendations emerged from this study, which are highlighted below, that are aimed to improving the socioeconomic conditions and to reduce the poverty level of the haor fishermen and thereby improve their welfare.

Provision of Institutional Credit

Boats and nets are the most important objects for fishing. Boat is a significant factor by odds ratio and odds ratio confidence interval. Therefore the provision of institutional credit through both the government and other agencies such as NGOs is essential for buying the boats and nets as and when needed in the near future. If we can increase the fishing related expenditure of the fishermen then the fishing income as well as the per capita income will be increased and will reduce the poverty level. In addition to fishing, fishermen need credit for diverse purposes such as for small business, raising ducks, rickshaw, sheep, swing-machine, tailoring, handicraft production and group credit. Fishermen also desire credit for buying irrigation equipment. At the same time, financial assistance should be provided to them in a way that includes the women of the community. They can also use group credit for purposes such as the provision of safe drinking water for their families by purchasing and installing tube wells.
Government and other agencies (NGO) may take some steps to improve their defecation facilities because defecation facilities were a significant by odds ratio and odds ratio confidence interval.

Community Based Fisheries Management (CBFM)

Community based fisheries management study suggested that the members of CBFM project (fishermen) are gradually improving their livelihoods and are enjoying the right to common properties through the CBFM project. The CBFM system should strengthen their activities by ensuring the participation of more fishermen, which can ultimately change the fate of underprivileged fishermen of the country.

Training and Adult Education

The Government and other agencies (e.g. NGO) should fulfill their responsibility by disseminating information to fishermen and arranging indispensable training in new technologies and scientific methods of fishing in the haor area. Such training will assist fishermen to identify and solve the problems related to community-based activities.

Income Generating Activities (IGA)

Haor fishermen have no work in the off-season and at the same time they no sufficient amount of cultivated land. Due to lack of cultivated land (only 26% fishermen was found), income-generating activities in off-season can be a good indicator to increase fishermen income.

Infrastructure Development

The infrastructure of study area is not so good. For this reasons, in the harvesting seasons the price is low in the local market (based on personal contract of researcher). To overcome this problem, the transportation, storage and communication system should be improved to enable the fishermen to supply fish from the haor area to the cities or towns where the price is quite high. In the harvesting seasons the price is low in the local market (based on personal contract of researcher).

IX. CONCLUSION

The fisheries sector can make important contributions for improving socio-economic conditions and reduce poverty level, as Bangladesh is uniquely endowed with vast open water resource. The professional fishermen's groups are being deprived of their legitimate right to fishing because the water-bodies are taken lease of by the influential non-professional fishermen's groups. It is highly essential to establish the rights of poor people in the exploitation of these vast water-bodies with a view to improving their socio-economic conditions and reduce poverty level. All the haors of the country need to be leased out to the fishermen community for their usage. Then only can the rights of the fishermen community be established and poverty alleviation to a considerable extent be possible.

Due to economic constraints fishermen were not capable to buy their main instruments (e.g. boat, net, etc.). Government and other agencies (NGO) may take some necessary steps for buying main instruments for fishing, arranging training programs for applying haor fish culture, improving sanitation facilities, for organizing CBFM activities and starting income generating activities to increase off-seasons income. The results of the study hope to provide policy makers and decision makers with realistic information about poverty as well as income and expenditure distribution pattern and to become a resource for experts and researchers who are interested in studying poverty, as well as the social and economic issues of fishermen in the haor area.

REFERENCES

❖ Ali, Md. Liaquat, S. S. Alam, S. A. Ahmed, P-J. Dixon, A.S. Halls, P. M. Thompson and P. Sultana (2003): *Understanding Livelihoods Dependent on Inland Fisheries in Bangladesh and Southeast Asia,* Bangladesh Country Status Report, (DFID/FMSP Project R8118), World Fish Center

❖ Apu, N.A., M.M. Rahman and J.D. Balarin, (1997): *Fishers' participation in leadership selection: A case study of oxbow lakes project,* Proceedings of the ICLARM/Danida national workshop on policy for sustainable inland fisheries management, Dhaka, Bangladesh

❖ BBS (1998): *Report of the Household Expenditure Survey 1995-96,* Statistical Division, Minstry of Planning, Government of Bangladesh, Dhaka

❖ BBS (2001): *Report of the Household Expenditure Survey 2000,* Statistical Division, Minstry of Planning, Government of Bangladesh, Dhaka

❖ BBS (2003): *Statistical Year Book,* Planning Commission, Ministry of Planning, Dhaka, Bangladesh

❖ BIDS (1994): *Backstopping Service to Third Fisheries Project,* Fifth Interim Report, BIDS, Dhaka

❖ CIRDAP (2001): *Monitoring Adjustment and Poverty in Bangladesh-Phase III,* Project Completion Report, Research Division, CIRDAP, March 2001

❖ CNRS (2000): *RRA Report on Hail Haor Site,* MACH Project, Bangladesh

❖ CNRS (2000): *RRA Report on Turag Bangsi Site,* MACH Project, Bangladesh

❖ Cox, D.R. (1970): *Analysis of Binary Data,* London, Chapman and Hall

❖ DOF (1985): *Water area Statistics of Bangladesh,* Department of Fisheries, Ministry of Fisheries and Livestock, Government of Bangladesh

❖ FAP 17 (1994): *Main Volume FAP 17 Fisheries studies and pilot project,* final report, Government of Bangladesh Flood Action Plan Ministry of Irrigation, Water Development and Flood Control, Government of Bangladesh, Dhaka

❖ Fox, J. (1984): *Linear Statistical Models and Related Methods,* John Willy & Sons, New York

❖ Gujarati, D. N., (1998): *Basic Econometrics,* Third Edition, McGRAW-HILL International Edition, Singapore, Economic Series

❖ Hossain Z. Keus, H. J., N. A. Apu, (2002): *Integrated Baseline Study,* Patuakhali Barguna Aquaculture Extension Project

❖ ISPAN (1992): *Environmental Impact Assessment (Case Study),* Compartmentalization Pilot Project (CPP), FAP-16, Report prepared for USAID and Ministry of Irrigation, Water Development and Flood Control, Government of Bangladesh, Dhaka

❖ ISPAN (1995): *Charland Socio-Economic Survey Report,* FAP-16, ISPAN (Irrigation Support Project for Asia and the NearEast), report prepared for USAID and Ministry of Irrigation, Water Development and Flood Control, Government of Bangladesh, Dhaka

❖ ISPAN (1995): *Padma Charland Socio-economic,* RRA, FAP-16, ISPAN (Irrigation Support Project for Asia and the NearEast), report prepared for USAID and Ministry of Irrigation, Water Development and Flood Control, Government of Bangladesh, Dhaka

❖ Karim Rezaul et al (1994): *Fishers and fish in Bangladesh,* Some Socio economic and Environmental Issues, Dhaka, Bangladesh

❖ Khan, A. R. and B. Sen, (2001): *Inequality and its Sources in Bangladesh,* 1991/92 to 1995/96: An Analysis Based on household Expenditure Surveys, Bangladesh Development Studies, 25(1): 1-47

❖ Quibria, M. G., (1991): *Understanding Poverty: An Introduction to Conceptual and Measurement Issues,* Asian Development Review, 9(2): 90-112

❖ Rahman, P. M. M. (1994): '*Poverty Issueses in Rural Bangladesh'*, PP. 3-70

❖ Ravallion, M. and B. Sen (1996): *When Method Matters: Monitoring Poverty in Bangladesh,* Economic Development and Cultural Change, 44: 761-792

❖ Sen, A. K., (1981): *Poverty and Famines,* Oxford: Clarendon Press, PP. 22

❖ Sen, B. and M. Mujeri (2002): *Poverty in Bangladesh: Trends, Profiles and Determinants*, Background Paper Prepared for the National Strategy for Economic Growth and Poverty Reduction (Draft)

❖ Sen, Binayak (1998): *Politics of Poverty Alleviation,* in Rehman Sobhan (Ed.), Crisis in Governance. A Review of Bangladesh's Development 1997, Centre for Policy Dialogue and University Press Ltd, Dhaka, pp. 159-182

❖ Thompson, P. M. (1999): *Economic and Social Impacts of the Community Based Fisheries Management Project*, World Fish Center, Dhaka, Bangladesh

❖ Todaro, M.P., (1998): *Economic Development,* Sixth Edition, Addison-Wesley, Delhi, India, PP: 137-176

❖ Travers, P. and S. Richardson (1993): *Living Decently. Material Well-Being in Australia*, Oxford University Press, Melbourne

❖ Wodon. Q. (1995): *A profile of poverty in Bangladesh: 1983-92,* Poverty and Human Resources Division. October 23. World Bank, Washington, D.C.

❖ World Bank, (1998): *Bangladesh: From Counting the Poor to Making the Poor Count,* Washington, D.C. and Dhaka

❖ World Bank, (2003): *Poverty Manual,* Washington, D.C

APPENDIX

Appendix-1: Strengths and Weaknesses of Alternative Methods for Poverty Measurement

Items	Direct Calorie Intake	Food Energy Intake	Cost of Basic Needs
Indicator	Calorie Intake	Expenditure (Or Income)	Expenditure (Or Income)
Threshold	2122 Kilocalorie/person-day	Expenditure level at which household members are expected to reach calorie intake threshold	Expenditure level at which household members are expected to meet basic needs (food and non-food)
Measure	Headcount or Others	Headcount or Others	Headcount or Others
Strengths and Weaknesses	Indicator not representative; threshold consistent (for monitoring caloric intake)	Indicator representative; threshold not consistent (for real expenditures)	Indicator representative; threshold consistent (for real expenditures)

Source: Wodon, 1995

Appendix–2: Equivalence Scale for Developing Countries (Used for India)

Age	Male	Female
0	0.43	0.43
1-3	0.54	0.54
4-6	0.72	0.72
7-9	0.87	0.87
10-12	1.03	0.93
13-15	0.97	0.80
16-19	1.02	0.75
20-39	1.00	0.71
40-49	0.95	0.68
50-59	0.90	0.64
60-69	0.80	0.51
70+	0.70	0.50

Source: Poverty manual, World Bank, 2002

Appendix-3: Calorie Conversion of Food Items Consumed by Household

Food Item	Weight (Gm)	Calorie	Calorie/Kg	Price/Kg
Rice	397	1386	3491	16
Wheat	40	139	3475	16
Pulses	40	153	3825	30
Fish	48	51	1063	40
Meat	12	14	1167	90
Potato	27	26	963	10
Other Vegetables	150	26	173	15
Oil	20	180	9000	55
Milk	58	39	673	22
Sugar	20	82	4100	32
Fruits	20	6	300	25
Sum	832	2112	-	-

Source: Poverty Manual, World Bank, 2003