Poverty Thresholds Analysis: Reassessing and Revalidating Quantitative Indicators

Zulfiqar Ali









Poverty Thresholds Analysis: Reassessing and Revalidating Quantitative Indicators

Zulfiqar Ali

1. Introduction

The aim of this paper is to explore poverty thresholds from an economic perspective. In so doing, the paper will make three important contributions. First, it will contribute to our understanding of the notion of 'extreme poverty' as a distinct category. Second, it will help 'locate' in socio-economic terms the target population of SHIREE beneficiaries. Finally, it will help identify and assess useful graduation indicators¹. Poverty thresholds refer to minimum levels below which a person is considered to lack adequate subsistence and to be living in poverty. The poverty threshold is useful as an economic tool to define and measure the socio-economic position of the poor and to design relevant programmes to reduce poverty.

In Bangladesh, nearly one-third of the population of around 160 million lives below the national poverty line. It is also the most densely populated country in the world barring a few small city states like Singapore. With such a high incidence of poverty, the government as well as nongovernment organizations are active in implementing anti-poverty programs.

SHIREE plays an important role to help the poorest in the country with a mission of lifting 1 million people out of extreme poverty by 2015. From the outset therefore SHIREE targeted a beneficiary population which was amongst the poorest of the poor. The present study, hence, provides us an opportunity to examine, *inter alia* the socio-economic status of the SHIREE beneficiaries and to assess whether or not they are among the very poorest of the country.

Defining extreme poverty

The extreme poor experience poverty in its multiple deprivations manifested in having little or no income or stable employment, little or no education, poor housing, ill health, malnutrition, social marginalization, and lack of voice and power. These poor groups subsist at the bottom of the social pyramid and elsewhere have been defined and characterized using a range of terminologies including the 'extreme poor', 'hard-core poor', 'ultra- poor', 'severe poor', 'chronically poor', 'poorest of the poor', 'chronically severe poor', 'marginalized chronically poor' and the 'destitute'. While these labels may point to similar socio-economic characteristics, they also reveal important differences. For example, the Bangladesh Bureau of Statistics (BBS) characterizes the '*extreme poor*' as those who live below 'the lower poverty line consumption' using the cost of basic needs (CBN) method, and the

¹ The study has been commissioned by SHIREE and implemented by Unnayan Shamannay. SHIREE is a partnership involving UKAid and the Government of Bangladesh designed to lift 1 million people out of extreme poverty by 2015. SHIREE is one of UKAid's portfolio of projects designed to reduce extreme poverty in Bangladesh.

SHIREE provides grants to a number of national and international NGOs working in Bangladesh through two main funds: the Scale Fund and the Innovation Fund. The former provides NGOs substantial grants to scale up proven approaches to improving the livelihoods of the extreme poor, while the latter provides smaller grants to test and evaluate innovative approaches to improve the livelihoods of the extreme poor, with successes ready for scaling up.

'hard-core poor' as those who cannot meet the lowest minimum requirements of 1,805 kilocalories per person per day using the direct calorie intake (DCI) method. These two definitions also provide different estimates for the rates of extreme and hard-core poverty in the country. Based on the same 2005 dataset, the extreme poverty rate was calculated at 25.1 percent while the hard-core poverty rate was 19.5 percent (BBS 2007). According to the 2010 HIES, the former now stands at 17.6 percent².

BRAC uses the term 'ultra poor' in its flagship programme ³and targets its beneficiaries through a number of 'exclusion' and 'inclusion' criteria based on landlessness, assetlessness, income earners, and credit behaviour (see Annex Table-1 for details). The Program for Research on Chronic Poverty in Bangladesh (PRCPB) of the Bangladesh Institute of Development Studies (BIDS) instead emphasizes duration as well as severity as the main criteria in defining and identifying the 'chronically poor'. Furthermore, the PRCPB identifies a third category of extreme poor known as the 'marginalized chronically poor'. This category includes three broad populations: those who live in remote rural and unfavourable agro-ecological areas; socially marginalized groups of people such as beggars, abandoned older women, disabled adolescent girls; and those who are alienated, excluded, and/or adversely incorporated based on their marginal social identity such as low-income religious and ethnic minorities, street children, and *hijra*. The work carried out in Bangladesh under the Chronic Poverty Research Centre emphasises instead the extended duration of living in a condition of absolute poverty – a characteristic which helps distinguish the chronic poor from the transitory poor.

Sen and Begum (1998) and Khan and Seeley (2005) offer important reviews of the literature on defining and identifying extreme poor households in the country. Both studies agree that the notion of the extreme poor covers quite diverse, heterogeneous, and socially and geographically scattered groups of people. This heterogeneity or diversity make the task of defining and identifying the extreme poor, complex.

Although Bangladesh has made good progress in reducing poverty, the extreme poor groups have benefited less from economic growth and development. The country has made impressive gains in human development indicating that a six-year old from an average poor family in 2011 is many more times likely to attend school, attain a much higher level of nutrition, and live a longer and healthier life in comparison to a similar child in 1971 or even in 1995. The child also stands a much higher chance of moving out of the ranks of the poor. Despite such positive changes, extreme poor households remain largely excluded from the economic and social gains enjoyed by the majority.

 $^{^{2}}$ The 2010 HIES however does not provide estimates of 'hard-core poverty' based on the direct calorie intake method.

³ The programme is called 'Challenging the Frontiers of Poverty Reduction, Targeting the Ultra Poor' (CFPR-TUP)

2. Poverty and Human and Social Development in Bangladesh

Incidence of and Trends in Extreme Poverty in Bangladesh

The incidence of poverty (including moderate and extreme/hardcore poverty) has declined in Bangladesh over the past few years (Table-1). Recent estimates show that income poverty (based on cost of basic needs method (CBN) method) has declined from 48.9 percent in 2000, to 40.0 percent in 2005 and down further to 31.5 percent in 2010. Similarly, extreme or lower poverty line based poverty (based on CBN) has also declined substantially during the same period, from 34.3 percent in 2000, to 25.1 in 2005 and down further to 17.6 percent in 2010 (BBS 2010). The calorie based measures of absolute and hard-core poverty have also declined, but not as steeply, with absolute poverty falling from 44.3 to 40.4 and in hardcore poverty falling only from 20.0 to 19.5%.

However, it is important to note here that although the poverty head-count has declined, the absolute number of poor has actually increased. This reflects the high population growth in the country.

Year	Based on CBN method		Based on DCI method		
	Upper poverty line	Lower poverty line	Absolute poverty (2,122 K. cal)	Hardcore poverty (1,805 K. cal)	
2010	31.5	17.6			
2005	40.0	25.1	40.4	19.5	
2000	48.9	34.3	44.3	20.0	
1995-95	50.1	35.1	47.5	25.1	
1991-92	56.6	41.0	47.5	28.0	

Table-1: Incidence of Absolute and Hardcore Poverty

Source: BBS 2007 and BBS 2011

The perception based poverty assessment ⁴as shown in Table-2 also confirms the decline in both moderate (as reflected in occasional deficit) and extreme (as reflected in Col 2 below, Always in deficit) poverty during the same period. These figures indicate that the issues of extreme poverty have not been fully overlooked in anti-poverty policies and programs as the incidence of extreme poverty has also declined during the past decades.

Table-2: Incidence of Self-Assessed Poverty in Bangladesh (Percent of rural households)

Year	Always in deficit	Occasional deficit	Break-even	Surplus
2010	8.4	24.1	32.9	34.6
2004	11.6	31.9	33.4	23.1
2001	9.9	26.3	40.8	23.0
1995	18.0	32.2	30.7	19.1
1989	24.0	50.0	17.5	8.5

Source: GoB 2005; Ali et al 2010

⁴ Where people are asked to categorize themselves into various poverty categories based on food availability throughout the year.

As indicated earlier, some caution is required in reading the poverty headline figures. For example if we take table 1, the rate of poverty reduction using the DCI method over the 2000 to 2005 period, is greater for absolute poverty than it is for hard core poverty (3.9 percentage points reduction as opposed to 0.5 percentage points reduction). In the case of perception based self-assessed poverty, we actually see an increase in extreme poverty during 2001-2004. Subsequently there were some improvements but by 2010, the rate of those who considered themselves always in deficit had dropped by a mere 1.5% (Table-2). In other words, there is some evidence of greater stagnation among the very poorest. Several other recent estimates also conclude that the rate of extreme poverty lies at around the 20 percent mark (Sen and Hulme 2006, Ali *et al* 2006). Moreover, when compared over time we see that there has been little fluctuation in the overall levels of extreme poverty (GOB 2005). This suggests that while the extreme poor have not been fully bypassed, extreme poverty concerns have not been adequately focused in the country's fight against poverty.

Human and Social Development in Bangladesh

The current status and changes over time (1990 to 2007/10) of selected social indicators in Bangladesh are presented in Table-3. The figures on child nutritional status reveal that a high proportion of children in the country are currently suffering from malnutrition. It is true for both the measures of underweight (41 percent) and stunting (43 percent). In both these measures, rural children are lagging far behind their urban counterparts. Trends however show improvement for both underweight and stunting over the same period. The percentage of children underweight has declined from 68% in 1990 to 41% in 2010. Likewise, the percentage of children stunted has declined from 64% to 43% over the same period.

Improvements can also be observed in the mortality indicators over the last one and a half decade though they remain fairly high today. Under-five mortality has declined from 151% in 1990 to 73% in 2010. Infant mortality has also declined from 94% to 41% during the same period. Access to safe drinking water is satisfactory at its current state (97.8%). However, arsenic contamination now poses a very serious threat in terms of safe water access, and therefore the definition of 'safe water' needs to be reviewed and re-estimated accordingly⁵. Access to sanitary toilets is still very poor: only 54.1% of the total population has access to latrines. The situation in this regard has however improved during the period 1990-2010.

Though the literacy rate has increased from 32.4% in 1990 to 57.91% in 2010, it remains fairly low especially when compared to other developing countries. Male literacy is higher than that of female. It is however important to note here that the rate of progress of female literacy is much higher than that of males indicating greater convergence between the two. Net primary enrolment has also improved significantly over the last decade. While the net primary enrolment was 60% in 1990, it has increased to 85% in 2010. There is little difference between boys and girls in terms of primary enrolment (indeed girl's enrolment is slightly higher than that of boys).

⁵ Reliable and complete information on arsenic contamination throughout the country is still not available.

Table-3: Selected Social Develo	oment Indicators in	Bangladesh, 1990-2010)
			· .

Indiactora				Year		
indicators		1990	1995	2000	2003/05	2007/10
	Rural	-	-	53.9	48.8	43.0
% Underweight	Urban	-	-	43.1	42.2	33.4
	National	68	56.3	50.8	47.5	41.0
	Rural	-	-	51.1	44.3	45.0
% Stunted	Urban	-	-	40.4	37.6	36.4
	National	64	54.6	48.0	43	43.2
Human Poverty Inde	ex (HPI)	-	47.4	40.3	36.4	-
Total Fertility Rate		4.3	3.5	3.0	2.56	2.3
Under 5 Mortality Ra 1000)	ate (per	151	125	92	88	73
Infant Mortality Rate (per 1000)		94	71	57	53.3	41
Maternal Mortality R 100,000)	ate (per	478	447	400	391	-
Access to safe Drink	king Water	89	97	97.5	97.4	97.8
Access to Sanitary T	oilet	21	38	43.4	53.2	54.1
	Male	38.9	-	49.5	52.8	61.12
Literacy Rate (7+)	Female	25.5	-	40.1	44.5	54.80
	Both	32.4	-	44.9	48.8	57.91
	Boys	60	82	81	81.1	82.61
Net Primary enrollment rate	Girls	59	82	83	84.4	86.99
	Both	60	82	82	82.8	84.75
Contraceptive Prevalence Rate		40	49	52	53.4	55.8
Rate of Immunization (DPT 3): 12-23 Months		62	69	74.4	81.0	90.0
Net Secondary Enrolment		31.47	43.24	45.39	47.75	-
Boys-Girls Ratio in F	Primary	-	1.103	1.036	1.1098	_
Boys-Girls Ratio in S	Secondary	1.23	1.096	0.866	-	-

Source: NIPORT 2009; UNDP 2009; BBS and UNICEF 2009.

3. Methodology and Data

In order to define the poverty threshold for identifying extreme poverty in Bangladesh, the paper attempts to address the following two research questions:

- (1) What are the most appropriate indicators to be employed, from an economic perspective, to identify the extreme poor and subsequently judge their graduation from this status?
- (2) How useful are economic indicators to identify and judge graduation from extreme poverty in comparison to other non-income indicators?

In what follows, I identify key poverty indicators from the literature and then test them using standard econometric models in order to identify a limited number of robust indicators for extreme poverty in Bangladesh. The selected indicators with some specified threshold levels are then compared with other income and non-income dimensions of poverty.

Sources of Data

The major dataset used in the paper is the 2005 Household Income and Expenditure Survey (HIES) published by the Bangladesh Bureau of Statistics (BBS)⁶. BBS is responsible for carrying out the national household survey periodically and for providing estimates of poverty head-count in the country. Whilst the HIES was carried out in both the rural and the urban areas of the country, the present paper uses the rural dataset only. The results obtained from the analyses are therefore applicable only for the rural households.

In addition to the HIES dataset, two other datasets have also been used for comparative purposes.: the SHIREE baseline data⁷ and PRCPB dataset. SHIREE targeted the bottom 10% of households as its targeted beneficiaries. In this chapter the SHIREE dataset allows us to do two things. First, through a comparison of the HIES and SHIREE datasets we will be able to locate in socio-economic terms the beneficiaries of SHIREE. Second, from this comparison we will be able to assess how successful SHIREE was in targeting the poorest of the poor.

The PRCPB dataset was produced by the Bangladesh Institute of Development Studies (BIDS) under the Chronic Poverty Study in 2010. It is a county-wide rural household survey carried out in 64 villages from 64 districts of the country. The dataset is used here to enable comparisons of selected poverty indicators.

⁶ The analysis presented here was carried out before the publication of the 2010 HIES.

⁷ See <u>www.SHIREE.org</u> for details of SHIREE's Change Monitoring System which includes the baseline survey.

4. Various Approaches to Define Poverty

A rich plethora of definitions of poverty can be identified in the literature varying according to whether they focus on economic or non-economic indicators; single or multi dimensions. Below we look at four broad definitional approaches .

First, poverty can be defined according to food intake or nutritional status, and the relevant measurements include minimum calorific requirements, child or adult malnutrition. While this definition captures the food poverty situation fairly well, it doesn't take into account the non-food basic necessities of individuals. There are two prominent methods associated with this approach: Direct Calorie Intake (DCI) and Food Energy Intake (FEI). Under the DCI method, a household is poor if its per capita calorie intake is less than the standard per capita nutritional requirement (which is 2,122 kcal per day in the context of Bangladesh). This is best used to measure under-nourishment as it doesn't include non-food items. With the FEI method, a food poverty line is estimated which equates to the monetary value of the food expenditure that allows households to meet stipulated calorie requirements. The FEI is normally derived through regression of the relationship between calorie intake and expenditure. The Bangladesh Bureau of Statistics (BBS) used this method to define and measure poverty in Bangladesh during the seventies and eighties.

Second, poverty can be defined based on income or expenditure of households. Some threshold levels of per capita income or expenditure are used to define and measure poverty. These measures take into account both food and non-food basic necessities of individuals, and are used often as the official measure of poverty in many countries. This widespread use of these measures make them very useful for cross-country comparisons. Normally poverty line incomes, be it country based or international such as the US \$1 or \$2 a day measure, are used as the poverty threshold.

The Cost of Basic Needs (CBN) method is popularly used to define and measure poverty under an income or expenditure based measurement. With the CBN method, a basic food basket is identified from the data, consistent with consumption patterns, and the quantities in the basket are scaled accordingly to correspond to nutritional requirements. The cost of acquiring the basket is then calculated and this becomes the food poverty line. A non-food poverty line can also be calculated by estimating the cost of consuming a basic set of non-food goods for (i) extreme poor households whose total expenditures equals the food poverty line, and (ii) moderate poor households whose food expenditure equals food poverty line. A combination of these food and non-food poverty lines gives the poverty lines through which poverty rates are estimated.

The Bangladesh Bureau of Statistics uses this method to measure poverty and extreme poverty in the country. Estimates of poverty using this method are also commonly used by various government, non-government organizations, academics and practitioners. Additionally the World Bank uses this approach (e.g., \$1 or \$1.25 a day) for global comparison

While the CBN is a widely used measure of poverty and takes account of both food and non-food basic necessities, it has been criticised on a number of grounds. Arguably the strongest criticism lies in the fact that neither income nor expenditure necessarily reflect the actual poverty situation of individuals and households. An individual for example may be considered poor based on income or expenditure in the short term, but in reality they are non-poor. The opposite may also occur where those considered non-poor based on income or expenditure but are in fact poor. For example, during certain periods a beggar may be able to earn a level of income which would indicate a non-poor status or a non-poor may not be actively earning an income and might therefore be classified as poor.

Third, following the criticisms of income or expenditure based measurement, some argue in favour of asset based measurements rather than mere income or expenditure. Assets may be of various types such as land, livestock, other productive assets, houses, etc. The main argument for this measure is that the asset position of individuals or households indicates a relatively stable situation based on which poverty situation can be assessed more accurately.

Based on a survey carried out in rural Bangladesh, Davis and Baulch (2009) argue for example that assets are more important than income or expenditure in identifying the poor and the poorest. They further pointed out that tangible assets such as those linked to small businesses, land, livestock, and

agricultural machinery are particularly important because they can make such a difference to people's livelihoods. They also highlighted the importance of intangible assets in the form of family-based social capital (inheritance, remittances, helping in crisis, etc.), and human assets in the form of skills.

Fourth, poverty may also be conceptualized as an absence of human rights such as access to health, education and employment or as a lack of capabilities. The multidimensionality of poverty is more strongly recognized in this kind of approach, and both economic and social indicators as well as political and cultural indicators in some cases, are included. While understanding poverty from the multi-dimensional perspective is important, it is in fact difficult to administer. Furthermore, there are a number of approaches which adopt a multidimensional approach and there is no consistency in the indicators selected.

The Multi-dimensional Poverty Indices (MPI) developed at Oxford is a good example of multidimensional approaches. It includes ten sub-indicators under three broad indicators of health, education and standard of living. The index is constructed giving equal weights to each of the three broad indicators in the first place (weighted equally at 1/3), and then again equal weights to each of the sub-indicators under the broad indicators (i.e., 1/2 for each of education and health, and 1/6 for standard of living). The indicators are as follows:

- Health:
 - Child Mortality: If any child has died in the family.
 - Nutrition: If any adult or child in the family is malnourished.
- Education:
 - Years of Schooling: If no household member has completed 5 years of schooling.
 - Child School Attendance: If any school-aged child is out of school in years 1 to 8.
- Standard of Living:
 - Electricity: If household does not have electricity.
 - Drinking water: If household does not meet MDG definitions, or is more than 30 minutes' walk.
 - Sanitation: If household does not meet MDG definitions, or the toilet is shared.
 - Flooring: If the floor is dirt, sand, or dung.
 - Cooking fuel: If they cook with wood, charcoal, or dung.
 - Assets: If household do *not* own *more than one* of: radio, TV, telephone, bike, motorbike or refrigerator and do not own a car or truck.

While the multidimensional approaches allow for a richer and more comprehensive understanding of poverty, they are not, as mentioned above, always easy to measure and weigh. For this reason, here we focus on indicators which are first of all present in the datasets we are using and which in our view, are more easily defined and measured.

5. Constructing Poverty Thresholds for Rural Bangladesh

Extreme Poverty Indicators

In order to define and measure extreme poverty in the context of rural Bangladesh, the paper uses three poverty proxy methods: the poverty probability (probit) model, ordinary least square (OLS) regression, and principal component analysis (PCA). Although these are quite common methods in poverty analyses, they have hardly been used in the context of Bangladesh.

In the first stage, a set of household level poverty indicators⁸ were selected based on other poverty studies carried out in Bangladesh. The selected indicators fall broadly into the following categories:

- Demographic characteristics of the household (for example household size and household headedness);
- Asset holding of the household (for example land holding and ownership of productive and durable assets);
- Housing and sanitation (for example quality of house and access to sanitary toilet);
- Educational indicators (for example educational status of household head and spouse);
- Employment (for example employment status of household head);
- Access to infrastructure (for example access to electricity).

Table 4 uses HIES 2005 data and presents the mean values of and household distribution of selected poverty indicators across four statuses: the bottom 10%, those falling below that lower poverty line, those falling below the upper poverty line and the non-poor

Indicators	Bottom 10%	Extreme poor (Ipl)	Moderate poor (upl)	Non-poor
Household size	5.21	5.19	5.10	4.75
Female headed household	.11	.09	.08	.13
Total cultivable land (acre)	.22	.29	.44	1.11
Homestead land (acre)	.06	.08	.10	.14
Total operated land (acre)	.39	.52	.70	1.16
Livestock	.31	.35	.42	.43
Poultry	.61	.62	.65	.67
Bamboo	.22	.24	.28	.33
Timber	.30	.30	.35	.40
Total non-land asset value	8,805	11,509	17,853	31,119
Access to electricity	.08	.11	.19	.41
Poor roof material (% of hhs)	22.2	19.7	15.6	7.4
Access to sanitary toilet (% of hhs)	24.2	24.2	32.3	52.4
HH head illiterate (% of hhs)	79.5	78.3	69.4	52.2
HH head primary complete and above	8.3	9.4	17.3	31.0
(%)	00.0	70.0	74.0	50.0
Spouse initerate (% of fins)	82.0	/8.0	74.9	59.6
Spouse primary complete and above	5.7	7.8	10.7	23.0
(%)				
HH head wage labourer (% of hhs)	56.9	53.5	39.6	20.4

Table-4: Mean Values of and Household Distribution by Candidate Poverty Indicators (HIES 2005)

⁸ The present study didn't use village or community level indicators as the main purpose of the study is to construct poverty threshold for predicting extreme poverty at the household level using economic indicators.

Comparison between HIES, SHIREE and PRCPB Datasets

As mentioned earlier, two other datasets are used for comparative analysis: the SHIREE-CMS 1 dataset and the BIDS-PRCPB dataset⁹. The latter was carried out amongst rural populations while the former includes rural and urban respondents. Consequently the analysis which follows focuses only on the rural sub set of the SHIREE-CMS dataset. which follows, given the former includes Here we have taken three different groups in order to compare the SHIREE households: the bottom 5% of the HIES, the bottom 10% of the HIES and the bottom 5% of the PRCPB. In selecting these three goups, we are able to robustly locate the SHIREE beneficiaries in socio-economic terms. A comparison of key poverty indicators between the three datasets is presented in Table-5.

Indicators	SHIREE (CMS1)	HIES (Bottom 5%)	HIES (Bottom 10%)	PRCPB (Bottom 10%)
Household size	3.23	5.11	5.21	5.6
Female headed household	.33	.13	.11	.20
Total cultivable land (acre)	.04	.13	.22	.59
Homestead land (acre)	-	-	.06	.09
Total operated land (acre)	-	-	.39	1.22
Livestock	.08	-	.31	-
Poultry	.01	-	.61	-
Bamboo	-	-	.22	-
Timber	-	-	.30	-
Total non-land asset value	344	6,614	8,805	2,457
Access to electricity	4.9	-	8.0	5.0
Poor roof material (% of hhs)	27.1	-	22.2	19.3
Access to sanitary toilet (% of hhs)	4.1	17.5	24.2	38.9
HH head illiterate (% of hhs)	78.9	81.1	79.5	62.3
HH head primary complete and above	9.7	-	8.3	9.8
(%)	70.4		00.0	01.1
Spouse illiterate (% of nns)	70.4	-	82.0	61.1
Spouse primary complete and above (%)	15.0	-	5.7	9.5
HH head wage labourer (% of hhs)	64.3	63.5	56.9	44.1

Table-5: Mean Values of and Household Distribution by selected Poverty Indicators (SHIREE/HIES/PRCPB)

A number of important findings emerge from the table. First of all, the household size is much smaller among SHIREE households compared to that of the bottom 10% of HIES and the PRCPB households. The difference in household size is actually quite significant and the most obvious explanation is that among SHIREE beneficiaries there are many cases of household abandonment or fragmentation. Smaller sized households reflect situations of impoverishment and destitution. This analysis seems to be borne out if we look at the prevalence of female headed households across the datasets. Again among SHIREE beneficiaries there is a significantly higher proportion of female headed households than in the other datasets. At one level this reflects the fact that SHIREE and its partners identified female headed households are particularly vulnerable and are more likely to face poverty. Both the household size and the prevalence of female headed households strongly suggest that SHIREE's beneficiaries are extreme poor.

If we look then at the other indicators presented in Table-5, a clear picture emerges. In almost all cases, the situation of SHIREE households falls well below that of the bottom 10% of HIES or PRCPB

⁹ For more details of CMS1, see <u>http://www.shiree.org/extreme-poverty-monitor/cms-1-the-household-profile/</u>

households. SHIREE households therefore have less cultivable land,, livestock and poultry; have less access to electricity and sanitation; and have poorer quality housing. The comparison of total nonland asset values is striking. While SHIREE households have an average non land asset value of 334 Taka, the bottom 10% of the HIES has an average of 8,805 Taka. Indeed the bottom 5% of the HIES has 6,614 Taka and the bottom 5% of the PRCPB has 2,457 Taka.

It is therefore obvious from the results that the SHIREE households fall well below the bottom 10% of HIES households and also below the bottom 5% of HIES. This allows us to conclude that the overwhelming majority of SHIREE households are from the bottom 2-3% of rural households. This would allow us to also argue that SHIREE's overall targeting strategy has been very successful in reaching the poorest of the poor.

Exploring Significant Indicators: Poverty Probability Method

The probit model helps explore the significant indicators that best predict extreme poverty. In the model, the dependent variable was whether or not the household is extremely poor (i.e using the bottom 10% criterion), and the list of selected poverty indicators (except homestead and operational land as these are correlated with total cultivable land) mentioned earlier as the explanatory variables.

The results of the probit model are presented in Table 6. It shows that larger household size¹⁰, female headed household, poor housing, and wage labourer are all associated with higher probability of extreme poverty. On the contrary, households with better asset holding (both land and non-land), and having access to electricity and sanitary toilet have a lower probability of being extreme poor. Education of the head of the household or spouse has, however, not come out as a significant explanatory variable in this respect.

Indicators	Coefficients	Significance Level
Household size	.13	.00
Female headed household	.24	.01
Total cultivable land (acre)	12	.00
Livestock	.04	.47
Poultry	.03	.54
Bamboo	.08	.21
Timber	.17	.00
Total non-land asset value	001	.00
Access to electricity	56	.00
Poor roof material	.20	.00
Access to sanitary toilet	15	.00
HH head illiterate	.05	.50
HH head primary complete and above	12	.24
Spouse illiterate	.02	.80
Spouse primary complete and above	09	.41
HH head wage labourer	.28	.00

Table-6: Probit Model for the Extreme Poverty (Bottom 10%) Indicators

¹⁰ In its 2010 baseline survey, the mean family size of Shiree respondents was 3.32. This is significantly lower than the national average and contradicts the argument about an association between large household size and extreme poverty. This underlines the fact that there exists a non-linear relationship between the household size and poverty status. For the very poorest and most vulnerable households such as those found in Shiree, household size is relatively smaller. As we move to moderate poor households, we observe that household size increases relatively. The percentage of female headed households in Shiree (40.9% of households) is exceptionally high, and most of these consisted of widowed (60.5%) or divorced/abandoned (21.0%) women. Female headed households were smaller by, on average, just under 1.4 family members (2.50 versus 3.88, female versus male, respectively) (Shiree 2010)

Exploring the Significant Indicators: The OLS Regression

In this method, an OLS regression is run using the candidate poverty indicators mentioned earlier. The dependent variable in this case is the rural Bangladesh 2005 per capita household expenditure.¹¹ The results are presented in Table-7.

The OLS regression is considered to be a strong predictor of household income (expenditure in this case), and the variables that came out as significant explanatory variables in relation to household income include land holding, non-land asset holding, access to electricity, access to sanitary toilet, and education of the head of the household. In contrast, the variables that have negative influence on household income include larger household size, female headed household, poor housing, illiteracy, and employment as wage labourer.

Indicators	Coefficients	Significance Level
Household size	-81.96	.00
Female headed household	-217.69	.00
Total cultivable land (acre)	87.15	.00
Livestock	-44.38	.05
Poultry	-22.21	.32
Bamboo	13.34	.58
Timber	-35.51	.12
Total non-land asset value	.004	.00
Access to electricity	271.18	.00
Poor roof material	-88.82	.00
Access to sanitary toilet	213.04	.00
HH head illiterate	-104.51	.00
HH head primary complete and above	101.00	.00
Spouse illiterate	49.86	.09
Spouse primary complete and above	32.48	.38
HH head wage labourer	-150.04	.00

Table-7: OLS Regression for Per Capita Expenditure

Exploring Significant Indicators: Principal Component Analysis

Principal component analysis is a technique which helps reduce the information contained in larger sets of variables to a smaller number. The first principal component is the linear index of underlying variables that captures most variation.

To help compare results obtained from the different models, we have used the same set of variables in the principal component analysis as in the previous two models. The results, presented in Table 8, show the factor scores associated with these variables. Generally, a variable with a positive factor score is associated with higher socio-economic status. Based on this principle, the variables that came out as significant predictors for better socio-economic status include household size, land holding, non-land asset holding, access to electricity and sanitary toilet, education of the head of the household and spouse, and employment of the head of the household.

¹¹ Expenditure data is usually used as a proxy for income in most poverty analysis since it is considered relatively more reliable than income to predict household consumption behaviour.

Indicators	
Household size	.13
Female headed household	03
Total cultivable land (acre)	.29
Livestock	.12
Poultry	.11
Bamboo	.19
Timber	.20
Total non-land asset value	.33
Access to electricity	.24
Poor roof material	16
Access to sanitary toilet	.27
HH head illiterate	37
HH head primary complete and above	.38
Spouse illiterate	27
Spouse primary complete and above	.31
HH head wage labourer	.29

Table-8: Factor Scores in Principal Component Analysis (Component 1)

The Significance of Extreme Poverty Indicators: Comparing the Models

A comparison of results obtained from the three models discussed above is presented in Table 9. 'Y' denotes the significance of variables under each of the models estimated. The final column of the table indicates the variables that emerged as significant explanatory variables in all three models. As observed, 'household size', 'cultivable land', 'non-land asset ownership', 'access to electricity', 'access to sanitary toilet', and 'wage employment' are the indicators that came out as the most significant indicators of poverty.

Of the six indicators, three (i.e household size, access to electricity and access to sanitary toilet) can be considered as mainly 'public policy variables', while the remaining three (i.e. land holding, non-land asset ownership and employment as wage labourer) are household-level economic related indicators. Since the main focus of the study is to explore the economic related indicators which predict extreme poverty, we now focus on the three household level indicators. However, descriptive statistics are provided on all six variables using all three datasets.

Indicators	Probit	OLS	PCA	Significant in All
Household size	Y	Y	Y	YYY
Female headed household	Y	Y	-	
Total cultivable land (acre)	Y	Y	Y	YYY
Livestock	-	Y	Y	
Poultry	-	-	Y	
Bamboo	-	-	Y	
Timber	Y	-	Y	
Total non-land asset value	Y	Y	Y	YYY
Access to electricity	Y	Y	Y	YYY
Poor roof material (% of hhs)	Y	Ý	-	
Access to sanitary toilet (% of hhs)	Ý	Ý	Ý	YYY

Table 9: Comparison of Significance of Poverty Indicators by Different Models

HH head illiterate (% of hhs)	-	Y	-	
HH head primary complete and above (%)	-	Y	Y	
Spouse illiterate (% of hhs)	-	-	-	
Spouse primary complete and above (%)	-	-	Y	
HH head wage labourer (% of hhs)	Y	Y	Y	YYY

Tables 10 to 15 present the descriptive statistics across four extreme poverty categories: HIES lower poverty line, bottom 10% of HIES households, , bottom 10% of the PRCPB households, and SHIREE-CMS households.

Table 10 shows that over one-third of SHIREE households have only 1 or 2 members in their households. The figure for the other dataset households is much lower lying between 3 and 5 percent. If we look at land ownership (table 11), the proportion of households with absolutely no land is significantly higher in SHIREE. If we then combine absolute and functionally landless (owning up to 0.50 acre of land), the proportion becomes over 84% for both HIES and SHIREE households.

In respect of non-land asset holding (table 12), almost 100% of SHIREE households have total nonland asset value of less that 8,806 Taka. The corresponding proportion for HIES bottom 10% is 68% and HIES extreme poverty is 59%. However, if we consider non-land asset value of up to 20,000 Taka (which is equivalent to the mean asset value plus 1 standard deviation for bottom 10% of HIES households), then 100% of SHIREE households and 87% of HIES bottom 10% and 82% of HIES extreme poor households fall within this category.

Regarding access to electricity (table 13), an overwhelming majority of SHIREE and HIES extreme poor households¹² (over 95% of SHIREE and 88% of HIES extreme poor households) do not have access to electricity. Over 95% of SHIREE households and 75% of HIES extreme poor households do not have any access to sanitary toilet (table 14). Finally, 64% of SHIREE households, 57% of HIES bottom 10% households and 54% of HIES below the lower poverty line households are wage labourers (Table 15).

Household Size	SHIREE	HIES Bottom 10%	HIES Ex-poor (lower poverty line)	PRCPB (Bottom 10%)
1-2 members	34.8	3.6	4.6	4.1
3-4 members	45.1	33.1	33.9	28.8
5 or more members	20.0	63.3	61.5	67.1
Total	100.0	100.0	100.0	100.0

Table 10: Distribution of Households b	v Household Size and Poverty	v Statue	(% of households)
Table TV. Distribution of nouseholds b	y nousellolu size allu Poveli	y Sialus	(% OI HOUSEHOIUS)

Table 11: Distribution of Households b	y Cultivable Land and Poverty	Status (% of households)
--	-------------------------------	--------------------------

Land Ownership	SHIREE	HIES Bottom 10%	HIES Ex-poor (lower poverty line)	PRCPB (Bottom 10%)
Absolutely landless (no land at all)	84.4	68.5	64.4	-
Functionally landless (up to .50 acre)	0.2	19.4	20.0	62.3
Marginal farmer (.51-1.00 acre)	15.4	6.0	8.1	24.6
Small/medium/large farmer (over 1.00)	-	6.1	7.5	13.1
Total	100.0	100.0	100.0	100.0

¹² Remembering that only the **rural** cohort of shiree households is analysed

Table 12: Distribution of Households by Non-land Asset and Poverty Status (% of households)

Non-land Asset Holding (value in Taka)	SHIREE	Bottom 10%	HIES Ex-poor (lower poverty line)	PRCPB (Bottom 10%)
No or very little asset holding (<8,806)	99.7	67.5	58.6	40.1
Poor asset holding (8,806-20,000)	0.3	19.4	23.0	28.8
Moderate asset holding (20,001-32,000)	-	8.1	10.8	16.1
High asset holding (over 32,000)	-	5.0	7.6	15.0
Total	100.0	100.0	100.0	100.0

Table 13: Distribution of Households by Access to Electricity and Poverty Status (% of households)

Households' Access to Electricity	SHIREE	Bottom 10%	HIES Ex-poor (lower poverty line)	PRCPB (Bottom 10%)
No	95.1	91.7	88.6	82.8
Yes	4.9	8.3	11.4	17.2
Total	100.0	100.0	100.0	100.0

Table 14: Distribution of Households by Access to Sanitary Toilet and Poverty Status (% of households)

Households' Access to Sanitary Toilet	SHIREE	Bottom 10%	HIES Ex-poor (lpl)	PRCPB (Bottom 10%)
No	96.3	75.8	75.8	61.1
Yes	3.7	24.2	24.2	38.9
Total	100.0	100.0	100.0	100.0

Table 15: Distribution of Households by Employment Status of the HH Head and Poverty Status (% of households)

Employment Status of the HH Head	SHIREE	Bottom 10%	HIES Ex-poor (Ipl)	PRCPB (Bottom 10%)
Wage labourer	64.3	57.0	53.5	44.1
Others	35.7	43.0	46.5	55.9
Total	100.0	100.0	100.0	100.0

Constructing the Threshold Values of Selected Indicators

In constructing the poverty threshold for extreme poverty, three points have been considered. First, the focus of the study, which is to identify household level economic indicators to predict extreme poverty. Second, the results obtained from the three models. Third, the descriptive statistics on selected poverty indicators.

Based on the above, the indicators that have been considered for predicting extreme poverty in the context of rural Bangladesh are: cultivable land ownership, total non-land asset ownership, and the employment status of the household head. The threshold values for each of the indicators can be considered as follows:

- Cultivable land ownership:

Ownership of total non-land asset value:

- Employment status:

Not more than 0.50 acre¹³, Not more than Taka 20,000, At best wage labourer.

The next question is how to use these indicators and thresholds to define and measure extreme poverty in Bangladesh. Should we for example consider indicators separately or put them all together or combine them? Table 16 attempts to respond to this question by looking at the distribution of households that satisfy the above three criteria separately or in combination. We have explored this question using three datasets: SHIREE, HIES bottom 10% and HIES below the lower poverty line.

Table 16: Distribution of Households across the three criteria

Criteria	Bottom 10% (HIES 2005)	Extreme poor (lower poverty line) (HIES 2005)	SHIREE (CMS1)
Satisfy all three	52.3	47.4	52.3
Satisfy at least two	84.8	79.8	94.4
Satisfy at least one	94.6	92.2	95.6

As the table shows, 52.3% of both SHIREE and the HIES bottom 10% households and 47.4% of HIES below the lower poverty line households satisfy all three criteria (i.e. they satisfy all the three criteria at the same time). The table also shows that 94.4% of SHIREE households, 79.8% of HIES below the lower poverty line households, and 84.8% of HIES bottom 10% households satisfy at least two of the three criteria. Based on these observations, the study concludes that the **households that satisfy any two of the above three criteria may be considered extreme poor** in the context of rural Bangladesh.¹⁴

In an attempt to translate this definition into monetary terms, the average monthly per capita expenditure of these newly defined extreme poor households has been calculated from HIES data. The results, presented in Table 17, show that the average monthly per capita expenditure of those who satisfy any two of the three criteria is 995 Taka which is equivalent to 33 Taka per person per day. In 2010 prices, this comes to Taka 47¹⁵.

Table	17: Distribu	ition of Hou	seholds Tha	t Satisfy the	Above Criteria

Criteria	% of Total Households (HIES 2005)	Average monthly per capita expenditure	Expenditure Taka/person/day
Satisfy all three	26.1	774	25.38
Satisfy at least two	57.1	995	32.62
Satisfy at least one	78.5	1277	41.87

¹³ The 0.50 acre threshold is used because in Bangladesh owning less than 0.50 acres is considered 'functionally landless'. The threshold has proven to be robust. According to government records, the 0.50 acre threshold covers about 85 percent of extreme poor households and 90 percent of the bottom 10% of rural households. Given that this chapter seeks to come up with a threshold value of selected and combined indicators relevant for the extreme poor, the 0.50 acre has been included. However, for specific programmes focusing on extreme poverty, one may choose a lower value.

¹⁴ Nb shiree households fall well below this threshold

¹⁵ Note - from CMS3 analysis average per capita spend of shire rural households was 22.9BDT in 2010

6. Conclusion

Although Bangladesh has made remarkable progress in reducing income poverty over the past several decades, about one-third of its population (which accounts for over 50 million people) is still living below the income poverty line. The majority of these people are also extremely poor and live in destitute and vulnerable conditions. Poverty reduction in the future in Bangladesh depends largely on effectively targeting extremely poor households. In order to target effectively, it is important to define and accurately identify the extreme poor households.. To date, the definition of extreme poverty that has been most widely used is that of the lower poverty line calculated by the Bangladesh Bureau of Statistics (BBS) using the Household Income and Expenditure Survey (HIES) data¹⁶. This definition mainly takes into account the income or expenditure of the households at any particular point in time, and thus, fails to capture other important economic dimensions that may be equally strong in predicting extreme poverty. The present study attempted to explore different economic related indicators capable of defining and measuring extreme poverty.

Based on the analyses presented above, the paper offers the following conclusions:

- (1) Land, non-land asset, and employment are three important economic related indicators that significantly predict extreme poverty at the household level;
- (2) The threshold values of the above indicators are less than 0.50 acre of land, no more than a total of 20,000 Taka in non-land asset value¹⁷, and the household head is either unemployed or at best, a wage labourer;
- (3) Those who satisfy any two of the above three criteria may be considered 'extreme poor';
- (4) The above definition predicts extreme poverty well and a large proportion of income based extreme poor are also picked up by this definition.

In addition, based on the analysis of SHIREE data, the study has also found the following:

- (5) SHIREE households are the bottom 2-3% of all rural extreme poor households;
- (6) SHIREE has been successful in targeting the poorest of the poor in its programmatic interventions.

However, it is important to note here that although the paper has come up with robust findings, it has limited its analysis to economic related dimensions of extreme poverty. It is important to remember that extreme poverty, like poverty more generally, has very important non-economic characteristics and dynamics. Our understanding of extreme poverty will depend crucially on exploring and making sense of its multidimensionality.

¹⁶ It should be noted however that many NGOs use their own definitions of extreme poverty for programmatic purposes. ¹⁷ The figure of 20,000 Taka is arrived at by taking the mean + 1SD. The 'mean' refers to the average

non-land asset value of the extreme poor using the HIES data.

Annex Table-1 Alternative definitions characterizing extreme poverty

Source	Terminology	Definitions/characteristics
BBS ¹	Extreme poor	People living below the lower poverty line income using the CBN method
	Hardcore poor	People living below 1805 K. cal/person/day using theDCI method
BRAC ²	Ultra poor	 Exclusion criteria (all binding): The household is borrowing from a micro credit providing NGO The household is a recipient of current cycle VGD card or other government development programme; There are no adult women in the household who are physically able Inclusion criteria (need to satisfy at least 3): total land owned including homestead not more than 10 decimals No adult male income earner in the household Adult women in the household are selling labour outside the household Households where school-aged children are forced to labour Households with no productive assets
PRCPB ⁴	Chronically poor	 Chronic poverty as long duration poverty: The core definition of poverty is long duration poverty, i.e., those who remain in poverty over an extended period of time. This, of course, raises the operational question as to how long a person should be in poverty to be deemed chronically poor. The tightest possible definition is intergenerationally transmitted poverty, in which case an 'operational' definition could be a period corresponding to at least a generation (about 13-15 years) Chronic poverty as long duration-cum-severe poverty: The study, however, proposes to distinguish the concept of 'long-duration' poverty from 'long-duration-cum-severe' poverty and argues that it is the latter which condition of poverty which is of most concern. The inclusion of severity helps capture and address the notion of 'poverty stress'. The study therefore views the concept of chronic poverty in a multiplicative (duration x severity) sense.
	Marginalized chronically poor	 Three broad categories of marginalized chronically poor: The first group consists of people located in remote rural areas, such as distant <i>char lands, haor</i> areas, and borderlands, especially in the North. This group also includes people affected by unfavourable agro-ecological environments such as riverbank erosion. The second group consists of a socially heterogeneous category of the income poorest, including abandoned older women, disabled adolescent girls, rural beggars, and people whose livelihood is dependent primarily on agricultural wage labour, especially migrant labour. The third group includes people who are not necessarily among the poorest of the poor from an income point of view, but who are alienated, excluded, and/or adversely incorporated because of their marginal social identity. This category relates to low-income ethnic and religious minorities, the stateless residence of the <i>chitmahals</i>, as well as other marginalized communities such as the <i>hijra</i>. It includes people engaged in occupations that are declining because of market changes, and work that is of low-

		productivity, manual labour-intensive, and involving long hours – jobs that are unsustainable in the long-run, physically and otherwise. Children living and working on the street because of difficult childhoods are also included here.
Sen and Begum⁵	The poorest/ extreme poor	 The authors define and identify the poorest of the poor in rural Bangladesh using the following criteria: Land holding: no more than .5 acre Housing: resides in <i>jhupri</i> or single structure thatch Occupation: agricultural labourers
Khan and Seeley ⁶	Extreme poor	 A household may be defined as extreme poor if the members fulfil at least two of the following criteria: Households having no more than .5 acre of land and a person with disability Households having no more than .5 acre of land and a female member as the head of the household Households fully dependent on a child who is responsible for managing the household Old people living alone with no children to support them, and having difficulty in maintaining their livelihood Households with chronically ill household heads or primary income-earners Poor households with many daughters or only daughters who are seen as a burden on the family Households from ethnic groups who are a minority in a village and find themselves excluded from employment and development activities

Sources: BBS (2007); Rahman and Ali (2006); Khan (2005); Sen and Hulme (2006); Sen and Begum (1998); and Seeley and Khan (2005).

References

- Ali, Z. et. al. (2010): 'An Assessment of the Contribution of BRDB in Poverty Reduction and Rural Development in Bangladesh', a report prepared for the Rural Development and Cooperatives Division of the Ministry of LGRD & Cooperatives, Dhaka: Bangladesh Institute of Development Studies (BIDS).
- Ali, Z. et. al. (2006): 'Rural Poverty Dynamics 2005/2006: Evidence from 64-Village Census Plus', Dhaka: Programme for Research on Chronic Poverty in Bangladesh, Bangladesh Institute of Development Studies (BIDS).
- BBS (2007): Report of the Household Income and Expenditure Survey 2005, Dhaka: Bangladesh Bureau of Statistics, Ministry of Planning, Government of the People's Republic of Bangladesh.
- BBS (2011): Preliminary Report on the Household Income and Expenditure Survey 2010, Dhaka: Bangladesh Bureau of Statistics, Ministry of Planning, Government of the People's Republic of Bangladesh.
- BBS and UNICEF (2010): Progotir Pathay 2009, Dhaka: Bangladesh Bureau of Statistics and UNICEF.
- Davis, P. and Baulch, B. (2009): Parallel Realities: Exploring Poverty Dynamics using Mixed Methods in Rural Bangladesh, CPRC Working Paper No. 155, Chronic Poverty Research Centre (CPRC), University of Manchester, UK.
- GoB (2005): Unlocking the Potential: National Strategy for Accelerated Poverty Reduction, Dhaka: General Economics Division, Planning Commission, Government of the People's Republic of Bangladesh.
- Khan (2005): 'The Experience of Poverty: What Does It Mean', in Khan and Seeley (eds), *Making a Living: The Livelihoods of the Rural Poor in Bangladesh*, Dhaka: University Press Limited.
- Khan and Seeley (2005): 'The livelihoods of the Poor: Why the Labels Don't Fit', in Khan and Seeley (eds), *Making a Living: The Livelihoods of the Rural Poor in Bangladesh*, Dhaka: University Press Limited.
- NIPORT (2009): Bangladesh Demographic and Health Survey 2007, Dhaka: NIPORT, Mitra and Associates, and Macro International.
- Rahman and Ali (2006): 'Stories of Targeting: Process Documentation of Selecting the Ultra Poor for CFPR/TUP Programme', CFPR Working Paper, Series No. 1, Dhaka: RED, BRAC.
- Sen, B. and Begum, S. (1998): 'Methodology for Identifying the Poorest at Local Level', Dhaka: Bangladesh Institute of Development Studies.
- Sen, B. and Hulme, D. (2006): Chronic Poverty in Bangladesh: Tales of Ascent, Descent, Marginality and Persistence, Dhaka: Bangladesh Institute of Development Studies and Chronic Poverty Research Centre.

Shiree (2010): Final Report Socio-Economic & Nutrition Baseline Survey carried out in March/April 2010. Available at http://www.shiree.org/wp-content/uploads/2012/02/2-SE-Survey-Report-March-April-2010.pdf

UNDP (2009): Human Development Report 2009, UNDP.

Vu, L. And Baulch, B. (2010): 'Assessing Alternative Poverty Methods in Rural Vietnam', Oxford Development Studies (forthcoming).

*r*hiree

House 5, Road 10, Baridhara Dhaka 1212, Bangladesh Phone: 88 02 8822758, 88 02 9892425 E-mail: info@shiree.org

www.shiree.org