

Use of Household Income and Consumption Data as a Measure of Poverty in Rural Bangladesh

Scientific Report No. 99
April 2007



icddr,b

KNOWLEDGE FOR
GLOBAL LIFESAVING SOLUTIONS

Use of Household Income and Consumption Data as a Measure of Poverty in Rural Bangladesh

Tania Wahed¹
Abbas Bhuiya¹
A. Mushtaque R. Chowdhury²
Syed Masud Ahmed²

Correspondence to

Abbas Bhuiya
Social and Behavioural Sciences Unit, ICDDR,B
Mohakhali, Dhaka 1000, Bangladesh
Email: abbas@icddrb.org
GPO Box 128

¹ ICDDR,B, GPO Box 128, Dhaka 1000, Bangladesh

² BRAC, 75 Mohakhali, Dhaka 1212, Bangladesh

This report is not copyrighted and may be freely quoted as long as the source is properly indicated.

ISBN-978-984-551-285-5

Scientific Report No. 99

April 2007

Published by

ICDDR,B

GPO Box 128, Dhaka 1000

Mohakhali, Dhaka 1212, Bangladesh

Telephone: 8860523-32 (10 lines); Fax: (880-2)-8826050

Email: msik@icddr.org

URL: <http://www.icddr.org>

Printed by

Parallel Printers, Dhaka

Acknowledgements

This study was done under the auspices of the Poverty and Health Programme of ICDDR,B. The Poverty and Health programme has been supported by the Department for International Development (DFID), UK (Grant #00230). The study used the longitudinal panel data from the BRAC-ICDDR,B Joint Research Project in Matlab conducted during 1992-2004 which was supported by the Aga Khan Foundation, Ford Foundation, Rockefeller Foundation, and the United States Agency for International Development. The authors acknowledge the support extended by the Department for International Development (DFID), UK, through the 'Future Health Systems: Innovations for equity'- a research program consortium (Grant # H050474) and by the Government of Bangladesh through the "Improved health for the poor: Health, nutrition and population research' project (Grant # 00410). ICDDR,B acknowledges with gratitude the commitment of the above development partners to the Centre's research efforts.

The authors are grateful to David Peters, Director, Future Health Systems, Johns Hopkins University Bloomberg School of Public Health (JHSPH) for his valuable comments.

Introduction

Reduction of poverty has been the single most important goal in all development efforts in the recent past. Although there is a general understanding of what poverty is, its measurement has always been a challenge. Difficulty arises in determining which approach one should adopt and what indicators to use in measuring poverty. The type of poverty measures and indicators to be used depends on the purpose of measurement. Policy-makers quite often look for the number of people below the poverty line to assess the success or failure of policies. Programme managers at the grassroots level look for easily measurable proxy indicators, which are useful to identify the poor and bring them under the coverage of different programmes and also to measure changes. In addition, the challenges faced vary by the nature of the economy in the society where the measurement is to be carried out. Poverty lines, such as the population living with less than US\$1 a day, are generally used for cross-national comparisons. In the recent past, attempts have been made to use household assets to classify households into various groups of socioeconomic status in a relative sense. Whether direct or indirect measures and indicators are used, it is important to know how well they are consistent in identifying the poor. However, the selection of indicators would finally be judged by taking into consideration the marginal gain in precision weighing against easiness of collection of data and analysis and finally practicable applicability. It is against this background that this paper examined the correspondence of results between various methods and indicators used for assessing poverty in a rural setting in Bangladesh.

Poverty and its measurement

Poverty has many definitions, all of which share the same meaning. Poverty is conceptualized as the inability to attain a minimal standard of living. Poverty is the lack of resources relative to need (1). The measurement of poverty is extremely important as a gauge of the well-being and living conditions prevailing in a country and is a reflection of the access of different groups of people to basic needs. The most common standard indicator is the incidence of poverty, also known as the poverty rate or headcount rate (2). Incidence of poverty typically measures the absolute number or proportion of individuals whose income or consumption expenditure falls below a pre-determined minimum threshold. This minimum level is usually called the poverty line. Poverty lines are generally defined as the per-capita monetary requirements an individual requires to meet the basic needs. Poverty lines are monetary cut-off points separating the poor from the non-poor (2). For our purpose, we have used the international poverty line proposed by the World Bank as an estimate of

global poverty, set at US\$1 a day (more precisely US\$1.02 per day) in 1985 and re-calculated in the 1993 purchasing power parity (PPP) terms at about \$1.08 per day. This threshold stands as an internationally accepted minimum level of consumption or income and will be referred to as the \$1 per day poverty line or extreme poverty henceforth. Alternatives to the World Bank estimates of poverty exist, and the issue of best poverty estimate - a topic of debate in the research community - has been considered to be beyond the scope of this paper.

Income and consumption measures are commonly used for establishing poverty lines representing, respectively, the availability of cash resources and the standard of living approaches to measuring the extent and composition of poverty (3). The adequacy of income or consumption assessments to generate reliable estimates of absolute poverty is an issue of keen debate. The pros and cons to using income or consumption as a welfare indicator and a measure of poverty are quite ample. The choice of income or consumption as an indicator of household welfare is often determined by the availability of data. Where choice is available, researchers have normally preferred consumption to income on the ground that the former is a better indicator of permanent income and standard of living of people due to consumption smoothing through savings, transfers, borrowings, etc (3). Income fluctuates from year to year and, in addition, typically rises and then falls in the course of one's lifetime, whereas consumption remains relatively stable. The smoothing of the short-term and long-term fluctuations in income are hallmarks of the permanent income and life-cycle hypotheses respectively. As borrowings and transfers are not part of the usual UN-recommended definition of income; "information about income may not reflect the real living standard of households" (4). Consequently, it is argued that expenditure leads to more stable poverty statistics, whereas income tends to measure transitory or less-stable poverty (5). However, although households may be more willing to recall what they have spent rather than what they have earned, the use of consumption expenditure can have its own practical problems. First, consumption data are difficult to collect as estimates for consumption are based on a mixed recall period as distinct from a uniform recall period. The length of the recall period typically depends on the category of consumption, with long reference periods used for costly and/or infrequently consumed items, and short reference periods for frequently consumed and minor items that would be easily forgotten (6). A one-week recall for food consumption is common in surveys, and for some items a longer period. A longer recall period usually results in a lower estimate of consumption and, hence, a higher rate of poverty. Conversely, the differences in survey methods, such as questionnaire design, can create non-negligible differences in the estimates (7). For example, for a more detailed questionnaire, respondents are more likely to remember more details and report higher spending leading to an under-estimation of the poverty

rate (7). In addition, the issue of handling consumption of own-produced goods, gifts, and relief, which is substantial among rural households, involves evaluating the monetary value of non-marketed production and consumption and may lead to inaccuracy in the estimate. Furthermore, consumption can be systematically understated because a household may under-declare what they have spent on illicit (alcohol, drugs, tobacco) or luxurious items.

On the other hand, obtaining information on income from surveys can be less difficult as sources of income are few, and fewer questions may need to be responded to, to capture household income. Albeit, respondents may under-report their estimated income for various reasons - one of the main reasons is for taxation purposes. However, the hard-to-get and inaccurate reputation of income is mainly from the upper-income brackets (8). Moreover, the income of the salaried and the lower-income households can be obtained as accurately if not more so than expenditure (8). Nevertheless, in large agricultural economies (involving changes in the value of assets) or self-employed populations, income maybe seriously under-stated. In view of the above discussion, the issue of whether to use income or consumption as a measure of poverty remains unresolved.

Materials and methods

The study is based on existing longitudinal household panel data from the BRAC-ICDDR,B joint research project in Matlab for 1995 and 1999. The surveys provide data on income and/or consumption-expenditure levels of a sample of households and also include information on the demographic characteristics, such as family size and composition, ownership of assets, production and consumption, nature of employment, landholdings, and savings and loans. A common sampling frame and a four-cell study design that was followed in the baseline survey initiated in 1992 were used in designing the surveys (9). These cells were: villages with (a) BRAC intervention, (b) ICDDR,B intervention, (c) with both BRAC and ICDDR,B interventions, and (d) usual Government interventions. In the baseline survey of 1992, 12,000 households of 60 villages of the Matlab Health and Demographic Surveillance System (HDSS) area were included. The 1995 survey covered all households of 14 of the 60 villages and included 3,666 households in the first round of the survey. In 1999, all 60 villages sampled in 1992 were included, and 11,364 of the 12,424 identified households were successfully interviewed (9). All the households were categorized as BRAC 'eligible' or 'non eligible' depending on ownership of land and involvement of household members in manual labour. Households with less than 50 decimals of land and involved in selling manual labour for more than 100 days a year were classified as BRAC eligible (9). The others were considered non-eligible for BRAC-targeted programmes. To keep the survey manageable

and cost-effective, only 25% of the non-eligible households identified in 1992 were selected randomly in 1999 compared to 50% in 1992 and 1995 (9). Conversely, all identified eligible households were included in the survey. To compensate for the selection bias due to over-sampling of the BRAC eligible households, 50% and 25% of the eligible households sampled in 1995 and 1999 respectively were randomly re-selected for the purpose of analysis reported in this paper. As a result, the number of households analyzed in this report was 2,644 for 1995 and 1,096 for 1999.

The questionnaires include questions typically posed to the head of each surveyed household, but the spouse of the household head (in a male-headed household) was the main respondent for the expenditure survey and, if required, assisted by other members of the household (10). In female-headed households, the household head provided the answers. The expenditure survey included both food and non-food items using different reference periods for various items (11, for more information). The reference periods were determined after four rounds of pre-testing to ascertain the frequency of purchase of different items. For example, for the 1995 survey, the amount of rice, vegetables, flour, small fish, and milk was determined using one week of recall and meat items a month period of recall. In 1999, all food items were determined using one week of recall. In both the surveys for non-food items, one week of recall was used for kerosene, one month for fuel-wood, 6 months for health expenditure, and a year of recall was used for household durables, education, clothing, and household capital expenditure. The survey included questions on the amount and value of goods purchased, goods consumed from own-production (value was calculated using current market prices in Matlab), and products received as gifts or relief. In cases where the respondent was unable to provide the value of the good, the prevailing market price in the village was used. When the quantity of the good consumed was unknown but the value was known, the quantity of the good consumed was computed by dividing the value by the prevailing market price. The aggregate monthly income from different sources and consumption expenditure for the household was computed. A recurring problem in the use of either income or consumption expenditure to set the poverty line is the issue of family size and composition. More elaborate methods of weighting schemes or equivalence scales (12-14) can be used. In this paper, however, we have only adjusted for household size to determine per-capita monthly income and expenditure on consumption for each household. Once distribution of monthly income and expenditure of households surveyed were estimated, poverty lines in local currency were defined in order to rank the households by consumption or income per person and to compute the proportion of the population below the poverty line. As mentioned, the original threshold set at \$1 a day in 1985 (more precisely 1.02 per day) was chosen “as being representative of the poverty lines found in low income countries” (15) and was re-calculated in the 1993

PPP terms to about \$1.08 per day¹. Subsequently, the international poverty lines set at \$1.08 and \$2.15 (the higher threshold) a day at the 1993 international prices was converted to local currency using 1993 PPP. The \$1 a day is converted into local currency for the country concerned using PPP rather than the exchange rate. An estimate of the international poverty line, based on the use of PPP rather than exchange rates, ensures that the prices of non-traded goods are taken into account (4). The PPP between two countries is the rate at which the currency of one country needs to be converted into that of a second country to ensure that a given amount of the first country's currency will purchase the same volume of goods and services in the second country as it does in the first (16). In other words, the PPP conversion factor is the number of units of a country's currency required to buy the same amount of goods and services in the domestic market as US\$1 would buy in the United States (17). The obtained per-capita threshold a day in local currency was then adjusted to calculate the monthly estimate of the poverty line in local currency. Subsequently, the general consumer price indices of Bangladesh (Bangladesh Bank estimates) were used to adjust the monthly estimates of the international poverty line in local currency to prices prevailing around the time (1995 and 1999) of the survey. The poverty line in local currency was then used to determine the proportion of the households in Matlab living on less than \$1.08 and \$2.15 a day. In an attempt to evaluate whether consumption or income is a better indicator of poverty, the obtained estimates of incidence of poverty using both income and consumption-expenditure measures were then compared with the estimates published from different international and national sources. The validity of the estimates from both income and consumption measures are also examined by evaluating the associations between the estimates obtained with traditional indicators of socioeconomic status.

Ownership of land and occupation were combined to define socioeconomic status (SES). Households depending on menial labour, irrespective of ownership of land, were categorized as the poorest, while the households not involved in menial labour were categorized into middle- and high-socioeconomic groups depending on their landholdings. Households not involved in menial labour with landholdings of less than 50 decimals and more than 50 decimals were, respectively, categorized into middle- and higher-socioeconomic groups. Wealth quintiles were used as the other indicator of SES. SES was defined in terms of assets or wealth. Each household asset for which information was collected was assigned a weight

¹ As the original 1985 PPPs based on Penn World tables were not comparable with the World Bank's PPPs at base 1993, both in terms of primary data and methods used, a simple adjustment for inflation in the USA between 1985 and 1993 was not possible to update the poverty line (7). To be consistent with the original aim of using a poverty line that can be considered representative of the lines actually found in poor countries, the \$ value of the original set of poverty lines using the 1993 PPP was re-calculated and compared with the mean consumption also by the new PPP terms (7). The resulting poverty line used as reference lines by the World Bank was set at \$1.08 per day in the 1993 PPP prices.

or a factor score generated through a principal components analysis. The resulting asset scores were standardized in relation to a standard normal distribution with a mean of zero and a standard deviation of one. The standardized scores were then summed by household, and individuals were then ranked according to the total score of the household. The second step was to stratify the sample in five about equally large wealth groups. The poverty estimates (\$1 a day and \$2 a day) for each SES group defined by the above-mentioned indicators were determined to see whether the estimates obtained correlate with the traditional indicators. The statistical significance of the association of the poverty estimates with the traditional indicators has also been evaluated. Standard epidemiological measures of sensitivity and specificity have also been evaluated to determine the appropriateness of the measures. In addition, we have also attempted to ascertain the appropriateness of the poverty thresholds as cut-off points by evaluating the proportion of income and consumption spent on food.

Quality control: Several steps were taken to ensure the quality of data. The questionnaires were scrutinized at the end of the day by the interviewer and the team supervisor. The completed questionnaires were sent to the head office where the validity of the responses was checked, and if inconsistent answers were provided, the respondent was re-interviewed. A separate quality control team re-surveyed 5% of the households, and the main survey data were cross-checked for validity.

Findings

Table 1 provides poverty estimates for thresholds set at \$1.08 at the 1993 PPP prices and twice the \$1 a day poverty line (around \$2.15 per day in the 1993 PPP prices) for 1995 and 1999. The percentages of the survey population with consumption or income above these thresholds are also described. Available data showed that 35% of the population of Matlab was consumption poor (threshold \$1 per day) compared to 51.6% who were income poor in 1995. The two measures of poverty provide different estimates of extreme poverty for 1995. However, higher inequality in an income distribution than a consumption distribution is expected. Using the 1997 Family Income and Expenditure Survey (FIES) data, Balisacan reported a 25% poverty incidence for the Philippines using expenditure compared to the 37% official estimate based on income (18). Estimates of the proportion of the survey population living within a dollar and two dollars a day poverty line were higher when measured by consumption compared to income for 1995. For 1999, an estimated 37.1% of the survey population was living below a dollar a day using consumption-expenditure data, a 2.1% increase in the headcount rate. In addition, our estimates indicate that the proportion of people living between a dollar and two dollars a day had increased in 1999. The proportion of people below the higher threshold of two dollars a

day was 75.5% and 74.8% using consumption and income measures respectively for 1995. In 1999, an estimated 84.7% was below the two-dollar threshold. In an attempt to investigate the evidence of reliability of the two measures, the estimates from Matlab were compared with the estimates published from different international and national sources (Table 2). The range of variations of the published values was quite large varying from 25% to around 54% for 1995. The dollar-a-day estimates were closer to the published estimates when consumption measures were used.

In an attempt to investigate the appropriateness of the measures, the associations of the estimates with the traditional SES indicators were examined. Tables 3, 4, and 5 provide details of the association between SES (defined by asset quintiles, ownership of land and occupation) and poverty status. The estimates of the fraction of the population below the poverty line defined as \$1 a day was highest for the lowest asset quintile and lowest for the highest quintile. The estimates for the fraction of the population below the dollar-a-day poverty line declined along the wealth gradient and the estimates for the higher thresholds (\$1-2 a day and more than \$2 a day) increased with each successive wealth quintile. This was also true for the other alternative SES indicators defined by ownership of land and type of occupation. The tables show that the incidence of poverty was (statistically significant) negatively related with the household SES as defined by asset quintiles and ownership of land and occupation for both income and consumption measures in 1995 and 1999. On the basis of the associations of the estimates and the SES indicators provided in Table 3-5, the issue of whether to use income or consumption as a welfare indicator remains unresolved. The mean per-capita daily available consumption and income in the 1993 PPP dollars also increases for improvements in SES as defined by wealth quintiles, and ownership of land and occupation. This also is an indication of the reliability of the measures.

Table 6 shows that, with rising income, the share of expenditure for food declines, which reconfirms Engel's Law (19). The proportion of income spent on food was found to decline with each successive poverty threshold. As suggested by Engel, low-income households devote a larger share of income to food than the higher-income groups. Expenditure for food products increased in absolute value for each higher threshold but, as expected, in percentage terms, it was less than the increase in income. In addition, a quite realistic assumption according to empirical evidence is that poor households spend 80% or more of income on food (20). It was observed that more than 80% of income was spent on food by both lower thresholds (\$1 a day, \$1-2 a day). In Table 6a, expenditure on food was observed to consume the entire income of all thresholds, which probably implies that the thresholds used are too low, and to determine or measure the extent of poverty with consumption data, a higher threshold may be required.

Experts have suggested that the dollar a day is too low a standard and, as such, underestimates the true extent of poverty in the world. The absolute poverty line of two dollars a day may provide a relevant alternative threshold more typical of developing countries. In Figure 1, the median per-capita daily income, overall consumption and food expenditure in the 1993 PPP terms has been plotted against the proportion of income spent on food. It is observed from the figure that the median per-capita daily income or consumption of people who spend 80% or more of their income on food are above the one dollar a day but within the two dollars a day threshold. Hence, it can be suggested that the two dollars-a-day poverty line can be assumed to be a more relevant threshold of poverty for Bangladesh.

However, as the poverty rates estimated on the basis of income were different than the rates obtained by consumption measures, an analysis of the data was undertaken on the basis of the following epidemiologic measures. Table 7 shows the results of sensitivity, specificity, positive predictability, and negative predictability using both consumption and income measures for 1995. The sensitivity of the measure refers to the ability of the poverty indicator to accurately identify the population who are actually poor as defined by the SES indicator. A sensitive indicator is one that rarely loses a case or person in poverty. The specificity of the measure refers to the proportion of the non-poor by the SES indicator who are accurately identified as non-poor by the poverty measure. The positive/negative predictive values refer to the proportion of the identified poor/non-poor by the measure who are actually poor/non-poor by the SES indicator. The relation between specificity and sensitivity is characteristic, if one of them increases the other decreases. The sensitivity of a measure is important initially as the measure should include a higher proportion of the poor in its estimates. However, when the results are in hand, the predictive value becomes important. To consider the predictive value of a measure, one should have definite information in hand about those who are actually poor and then calculate the predictive values. Income was found to be a more sensitive measure (Table 7), as it is able to identify the population who are actually poor as defined by all the traditional SES indicators. The results imply that consumption cannot be assumed to be a better measure than income on the basis that when sensitivity is considered income is a better measure, which implies that, the measure does not miss counting the poor. However, for specificity, consumption was found to be a better measure. Conversely, since we have the poverty estimates using income and consumption measures, we have also attempted to analyze the performance of the alternative SES indicators as measures of poverty. As observed from Table 7a, the alternative SES indicator defined by ownership of land and occupation is obviously a sensitive measure. However, when the poor were defined as those involved in menial labour with landholdings of less than 50 decimals, the measure was more sensitive as an indicator. The sensitivity of

asset quintiles as an indicator of poverty was evidently quite adequate. However, the sensitivity of the measure was highest when the poor were defined as those in the bottom four quintiles. Eligibility for BRAC membership is often used as an SES indicator as they represent vulnerable households. The performance of the measure was found to be satisfactory, however, the other indicators were found to be more sensitive.

When the analysis was done with income and consumption, it was observed that consumption explained 50% of the income poor, while income explained 74% of the consumption poor. The results imply that consumption cannot be assumed to be a better measure than income based on the fact that when sensitivity (and negative predictability) is considered, income is better as a measure, which implies that the measure misses few when counting the poor, and for specificity and positive predictability, consumption is a better measure.

Figure 2 is a repetition of the same findings described in Table 1, but with a different focus and provides the estimates for consumption-based poverty levels over the time span of 1995 and 1999. As observed, the estimate for the poverty rate for \$1 a day threshold has increased slightly (from 35% in 1995 to 37.1%) in 1999. There was a considerable increase in the proportion of the population in the \$1-2-a-day category. There was a significant decline in the proportion with consumption levels above \$2 a day. As such, the observed poverty rates for Matlab suggest that the poverty situation has declined since 1995. The marked bunching up of people just above the \$1 line suggests that a great many people remain vulnerable to the ups and downs of the economy.

Figure 3 provides interesting data of poverty status by BRAC eligibility. Households that are eligible for BRAC membership are usually relatively disadvantaged by various socioeconomic, occupational, health, nutrition and education indicators compared to better off 'non eligible' households (9). It is interesting to note that the incidence of poverty has increased for the eligible households over the period measured by the percentage below \$1 a day and \$2 a day. The increase in the rate was more for the eligible non-member group than in the eligible member group. This probably is an indication of the positive impact of BRAC programmes, as, initially in earlier studies, eligible non-members were found to be wealthier than eligible members (10). Normally as a consequence of their initial SES and a reflection of the situation where the world's poorest suffer more, it would have been expected that non-members would have been better off. The effects of BRAC programmes may have had some positive effects (by an imperceptible amount compared to the non-member groups), although it was not enough to prevent the rise in the proportion of poverty. For the BRAC non-eligible households, the percentage below \$1 a day has declined more for the non-

member group than for the member group. For the non-eligible households below the \$2 a day line, the proportion of households has increased, more so for the non-member group than for the member group. The marked bunching up of people just above the \$1 line can be clearly observed. For the group above the \$2 a day demarcation, the proportion of people has declined for all groups (only exception is the non-eligible member group for which the rate has remained similar but with an imperceptible increase) more so for the non-member group than the member group. To further analyze the situation, the poverty status of the extreme poor was examined by evaluating the estimates for the thresholds of 75 cents, 75-80 cents, 81-90 cents, 91 cents-\$1 (Fig. 5). It was observed that, for the less than 75-cent threshold, there has been an improvement over time for the eligible member group. For the other thresholds below the \$1.08 demarcation, the poverty situation has declined for the member group, i.e. the proportion of the population belonging to this group has increased below the \$1.08 threshold. The decline in status was more obvious for the eligible member group than for the eligible non-member group for the 80 cent-\$1.08 a day thresholds (with the only exception of the 90-cent threshold). Whether this is due to the impact of the BRAC programmes on the rural poor or an effect of the initial poverty status should be examined.

Discussion

In the above analysis, the adequacy of the comparison of consumption and income as an indicator of poverty would have been more appropriate if data needed to estimate incidence of income-based poverty were available for 1999. As discussed before, the point in favour of expenditure is that it is broader, and allows for consumption smoothing through borrowings, use of savings, and other transfers which makes the poverty indicator more meaningful (8). However, the fewer questions needed to capture household income would definitely mean lower non-response rates to questions and also make the process of collecting data easier. At the household level, information on consumption is difficult to collect, as it requires a great deal of survey time. Thus, income has a significant advantage over consumption in the data-collection phase on the basis of convenience and survey time required for the questionnaires. Moreover, the hard-to-get and inaccurate reputation of income is a problem of the upper-income brackets and not considered to be a problem for the rural poor.

Using income and consumption data, we get very different estimates of poverty for our survey population. In addition, the share of income devoted to food was found to be more than 80% for both the \$1 a day and \$1-2 a day thresholds for the income-poor and for all thresholds of the consumption-poor. The inequality in the distribution of consumption is much less than the distribution of income in Matlab. However, one expects higher

inequality in an income distribution than a consumption distribution (7). Consumption greatly exceeds reported income in commonly used household surveys for those at the bottom of the distribution of resources (21,22). One of the major factors that contribute to less inequality in expenditure distribution is the greater dependence, particularly of the poor households, on subsistence production and access to common property resources (23). For a poor country like Bangladesh, one can think of sensible arguments in defense of income as the desirable indicator of poverty. For the poor households, current consumption is often achieved by resorting to survival mechanisms, e.g. sale of assets and incurring of debt, which cannot be sustained in the long run (24). Furthermore, the level of assets and access to credit markets may be so limited that the arguments favouring consumption may be less important for the rural poor in Bangladesh. Thus, income can be considered a relevant and convenient yardstick for the measurement of poverty for countries like Bangladesh.

Different people are consumption-poor than are income-poor. A different poverty threshold for consumption than for income is suggested (and supported by the evidence provided in Table 6a), since consumption is a different yardstick. Income can be interpreted as a measure of welfare opportunity, whereas consumption can be interpreted as a measure of welfare achievement (25). Not all income is consumed and, nor is all consumption financed out of income. A daily income of US\$1 may permit less consumption than a daily consumption expenditure of the same amount (7). On the basis of the above discussion, the fact that we have two different estimates for poverty should be an acceptable and expected finding. As our findings suggest that both income and consumption are strongly correlated with the other independent measures of well being, it should be considered a favourable indication for both the measures. However, the sensitivity analysis suggests that income can be regarded as a better indicator of welfare as it misses fewer cases or people below the poverty threshold. On the other hand, the specificity measure favours consumption as an indicator. Nonetheless, the sensitivity of a measure is important initially as the intent should be to include as many of the poor as possible in the estimates.

From the discussion above, it follows that both consumption and income are reliable estimates of poverty, whereas, income has a few advantages, such as convenience, a broader coverage of the poor, and appropriateness. The appropriateness of the measure can be supported by the judgment that a person who needs to resort to distress sale of assets or incur debt for survival should be considered poor if the income of the person falls below the poverty threshold.

However, the inherent limitations of the measures used should not be under-estimated. The definition of poverty used in this study does not reflect deprivation relating to access to healthcare, education, employment, or social and political participation. Also, it cannot be categorically asserted that two persons in two different economies, consuming at US\$1 (US \$2) per day, face the same degree of deprivation or have the same degree of need (4). Apart from the problems in economics of making inter-personal comparisons of welfare, other problems, such as rural-urban price differentials, should also be taken into account (4). Concerns about including the PPP exchange rates also exist. The use of PPP rates rather than exchange rates ensures that the prices of non-traded goods are taken into account (4). The PPP factors take into account the price levels of all goods and services in proportion to their share in international consumption expenditure and were designed to compare aggregates from national account. As such, PPPs may not reflect the comparative cost of goods typically consumed by the very poor. In PPP calculations, the prices of basic necessities play a minor role, whereas they play a huge role in the consumption of the poor (7). There is a possibility that the official poverty thresholds may have been increased (albeit unintentionally) in real terms over time due to flaws in the inflation index used for adjusting the thresholds. Moreover, the rate of the CPI is lower for the poor than the higher income groups because the price of rice, the principal food staple that has a higher portion in the budget of the poor, usually increases at a slower rate than the general prices (24).

References

1. Jesuit D, Smeeding T. Poverty and income distribution. Syracuse, NY: Luxembourg Income Study (LIS), 2002 (Luxembourg income study working paper no. 293). p 13
2. Asian Development Bank. Poverty statistics: glossary: Manila, Asian Development Bank, 2005. (www.adb.org/statistics/poverty, accessed on 22 July, 2005).
3. Saunders P, Bradshaw J, Hirst M. Using household expenditure to develop an income poverty line. *Social Policy Admin* 2002 Jun;36(3):217-34.
4. International Labour Organization. Key indicators of the labour market. Geneva: International Labour Organization, 2005. (www.ilo.org/public/english/region/eurpro/london/download/kilmorder.pdf, accessed on 19 July, 2005).
5. Economic and Social Commission for Asia and the Pacific. Poverty statistics: issues and recommendations for improving poverty statistics. Proceedings from the Working Group of Statistical Experts: 12th Session, November 2001. (www.unescap.org/stat/cos12/wgse12/wgse12-03.asp, accessed on 22 July, 2005).
6. International Labour Organization. Household income and expenditure surveys. In: Year book of labour statistics, sources and methods, v.6. Geneva: International Labour Office, 1994: p. 353
7. Chen S, Ravallion M. How have the world's poorest fared since the early 1980s. Washington, DC: World Bank, 2004, (World Bank policy research working paper no. 3341). p 42.
8. On comparability of poverty statistics from different sources and disaggregation levels. 2002 (www.unstats.un.org/unsd/method/poverty, accessed on 19 July, 2005).
9. Ahmed SM, Masud Rana AKM, Chowdhury M, Bhuiya A. Revisiting Matlab: repeat survey 1999. Dhaka: BRAC-ICDDR,B Joint Research Project, 2001. (Working paper no. 31). p 50
10. Zaman H. Poverty and BRAC's micro credit programme: exploring some linkages. Dhaka: BRAC-ICDDR,B Joint Research Project, 1997. (Working paper no. 18). p 45
11. Scott C, Amenuvegbe B. Effect of recall duration on reporting of household expenditures: an experimental study in Ghana: social dimensions of adjustment in sub-Saharan Africa. Washington, DC: World Bank, 1990. (Working paper no. 6). p 32
12. Deaton A, Muellbauer J. Economics and consumer behaviour. Cambridge University Press, 1980. p 464
13. Lipton M, Ravallion M. Poverty and policy. In: Behrman J, Srinivasan TN, editors. Handbook of development economics. v.3. Amsterdam: North Holland; Elsevier Science, 1995: p 768
14. Coutler AE, Cowell ACC, Jenkins SP. Equivalence scale relativities and the extent of inequality and poverty. *Econ J* 1992;102:1067-82.

15. Ravallion M, Guarav D, and van de Dominique W. Quantifying absolute poverty in the developing world. *Rev Income Wealth* 1991;37:345-61.
16. The United Nations Statistics Division: the International Comparison Program: uses of purchasing power parity (PPPs): (<http://www.worldbank.org/data/ICP>, accessed on 22 July, 2005).
17. World Bank. World development indicators, Washington, DC: World Bank, 2004. p 386
18. Balisacan A 2001. Is what we know about the poor robust? Presented at the ADB and Asia and Pacific forum on Poverty, Manila, 5-9 February, 2000.
19. Engel, E. Die Lebenskosten belgischer Arbeiterfamilien frueher und jetzt. Ermittelt aus Familienhaushaltsrechnungen und vergleichend zusammengestellt. *Bull Int Inst of Stat*, 1895;9: 57ff.
20. Food and Agriculture Organization, Theoretical concepts for the analysis of economic policies -The Salter Swan Model - implications of economic policy for food security: training manual. (<http://www.fao.org/DOCREP/004/X3936E/X3936E10.htm>, accessed on 29 July,2005).
21. Rogers JM, Gray MB: CE data: quintiles of income versus quintiles of outlays, *Monthly Labor Rev*, 1994 Dec; 117(12):32-7.
22. Meyer BD, James X, Sullivan JX. Measuring the well-being of the poor using income and consumption. *J Hum Resourc*, 2003; 38 Suppl): p1180-220.
23. Mustafa KM, Khandker BH. The basic MIMAP poverty profile (BMPP): Bangladesh. 2000 Presented at the MIMAP annual meeting, September 2000. Phillipines. Dhaka: Bangladesh. Bureau of Statistics, 2000.
24. Khan A, Sen B. The structure and distribution of personal income and poverty reduction in Bangladesh during the 1990s. Political Economy and Research Institute conference papers. Presented at the Egalitarian Development in the Era of Globalization Conference honoring Professor Keith Griffin, 22-24 April, 2004. Gordon Hall, University of Massachusetts Amherst. (<http://www.umass.edu/peri/Calendar/griffinpapers.htm>, accessed on 22 July,2005).
25. Atkinson AB. Poverty and social security, Prentice Hall: Harvester Wheatsheaf, Hemel Hempstead, 1989. p 432

Table 1. Proportion of households below the poverty line using income or expenditure, Matlab (1995, 1999).							
Poverty threshold	Consumption/expenditure				Income		
	1995		1999		1995		1999
	No.	%	No.	%	No.	%	
Less than a dollar a day	924	35.0	407	37.1	1,354	51.6	NA
Within 1-2\$ a day	1,070	40.5	522	47.6	609	23.2	NA
More than 2\$ a day	649	24.6	167	15.2	661	25.2	NA
NA = Not available							

Table 2. Poverty estimates for Bangladesh from various international and national sources.

Source	Reference year	Poverty rate (%)	Poverty rate: rural (%)	Poverty rate: urban (%)	Less than \$1 a day (%)	\$1-2 a day (%)
World development report 2000/2001 ¹	1995-1996	35.6	39.8	14.3	29.1	48.7
World Development Indicators 2005 ²	1995-1996	51	55.2	29.4		
	2000	49.8	53	36.6	36	46.8
Globalis indicator ³	1995-1996				28.61	
	2000				36.03	
Asian Development Bank ⁴	2000	49.8	53	36.6		
UNSD millennium database ⁵	1995				29	
	2000				36	
UNESCAP ⁶	1995	51	55.2	29.4	29	
	2000	49.8	53	36.6	36	
EDSD poverty database ⁷	1995-1996	47.5	47.1	49.7		
FAOSTAT ⁸	1996	51	55.2	29.4		
	2000	49.8	53	36.6		
Sen B, Mujeri M ⁹	1995-1996	41.2	45.8	22.4		
	2000	39.8	43.6	26.4		
Sen B and Rahman A ¹⁰	1995-1996	53.08	56.65	35.04		
Sen B and Hulme D ¹¹	2000	39.8	43.6	26.4		
National estimates ¹²						
BBS poverty line I	1995	47.9	47.1	49.7		
BBS poverty line II	1995	25.1	24.6	27.3		
MIMAP/BBS ¹³	1996	47	47.9	44.4		
MIMAP/BBS	1999	44.7	44.9	43.3		

Sources:

- ¹ World development report 2000/2001. Attacking poverty. (<http://siteresources.worldbank.org/INTPOVERTY/Resources/WDR/English-Full-Text-Report/tab4.pdf>).
- ² World Bank. World development indicators. Washington, DC: World Bank, 2005. (http://devdata.worldbank.org/wdipdfs/table2_5.pdf, accessed on 1 November, 2005).
- ³ Globalis-Bangladesh. (http://globalis.gvu.unu.edu/indicator_detail.cfm?IndicatorID=50&Country=BD, accessed on 1 November, 2005).
- ⁴ Asian Development Bank. Key indicators 2004. Manila: Asian Development Bank, 2004. (http://www.adb.org/Documents/Books/Key_Indicators/2004/xls/rt01.xls, accessed on 1 November, 2005).
- ⁵ UNSD millennium database. (http://unstats.un.org/unsd/mi/mi_series_results.asp?rowId=580, accessed on 3 November, 2005).
- ⁶ United Nations ESCAP Statistics Division (<http://unescap.org/stat/data/datatable.aspx>, accessed on 2 November, 2005).
- ⁷ EDSD poverty database-SDBS. (<http://adb.org/Documents/EDRC/STATISTICS/Poverty/SPI.pdf>, accessed on 1 November, 2005).
- ⁸ Food and Agriculture Organization. (<http://www.fao.org/es/ess/faostat/foodsecurity/Files/Poverty.xls>, accessed on 1 November, 2005).
- ⁹ Sen B, Mujeri M. Poverty in Bangladesh: trends, profiles and determinants. Background Paper for PRSP, Economics Relations Division, Ministry of Finance, Govt. of Bangladesh.
- ¹⁰ Sen B, Rahman A. Poverty impact of integrated area development projects, South Asia Poverty Monitor, BIDS / UNDP, Dhaka, 1998 (mimeo). (http://www.adb.org/documents/epps/ban/addressing_poverty/addressing_poverty.pdf, accessed on 1 November, 2005)
- ¹¹ Sen B, Hulme D. Chronic poverty in Bangladesh: tales of ascent, descent, marginality and persistence: the state of the poorest 2004/2005. Dhaka/Manchester: Bangladesh Institute of Development Studies, IDPM/Chronic Poverty Research Centre.(Working Paper No.43). p12.
- ¹² Bangladesh Bureau of Statistics.
- ¹³ BBS/MIMAP- Bangladesh, poverty monitoring survey,1999. Dhaka: Bangladesh Bureau of Statistics,1999.

Table 3. Poverty estimates for Matlab on the basis of 1995 consumption data.						
Socioeconomic status indicators	No. of HH	% less than \$1 a day	% within \$1-2/day	% more than \$2	Mean consumption in PPP \$	P value
Asset quintiles						
1	708	55.8	32.6	11.6	1.56	<0.001
2	338	39.9	41.4	18.6	1.79	
3	537	36.1	44.5	19.4	1.83	
4	525	24.2	45.5	30.3	2.06	
5	534	13.5	41.4	45.1	2.32	
Total	2,642	34.9	40.5	24.6	1.90	
Land/occupation						
Menial labour	1,708	40.5	39.5	20	1.83	<0.001
Non-menial and land <50 decimals	251	36.3	38.6	25.1	2.25	
Non-menial and land >50 decimals	683	20.5	43.8	35.7	2.65	
Total	2,642	34.9	40.5	24.6	2.08	
PPP= Purchasing Power Parity; HH= Household						

Table 4. Poverty estimates for Matlab on the basis of 1995 income data.						
Socioeconomic status indicators	No. of HH	% less than \$1 a day	% within \$1-2/day	% more than \$2	Mean income in PPP dollar	P value
Asset quintiles						
1	698	67.2	19.8	13.0	1.46	<0.001
2	335	60.0	21.2	18.8	1.59	
3	534	53.0	25.1	21.9	1.69	
4	523	45.9	23.7	30.4	1.85	
5	533	30.0	26.6	43.3	2.13	
Total	2,623	51.6	23.2	25.2	1.74	
Land/occupation						
Menial labour	1,694	58.5	23.8	17.7	2.89	<0.001
Non-menial and land <50 decimals	249	49	18.5	32.5	10.93	
Non-menial and land >50 decimals	680	35.3	23.5	41.2	7.69	
Total	2,623	51.6	23.2	25.2	4.89	
PPP= Purchasing Power Parity; HH= Household						

Table 5. Poverty estimates for Matlab on the basis of 1999 consumption data.

Socioeconomic status indicators	No. of HH	% less than \$1 a day	% within \$1-2/ day	% more than \$2	Mean consumption in PPP \$	P value
Asset quintiles						
1	240	61.7	33.3	5.0	1.43	<0.001
2	209	49.8	40.2	10.0	1.60	
3	194	38.1	51.5	10.3	1.72	
4	234	24.4	58.5	17.1	1.93	
5	219	11.0	55.3	33.8	2.23	
Total	1,096	37.1	47.6	15.2	1.78	
Land/occupation						
Menial labour	334	58.1	38.9	3	1.09	<0.001
Non-menial and land <50 decimals	371	38.8	47.4	13.7	1.47	
Non-menial and land >50 decimals	391	17.6	55.2	27.1	1.98	
Total	1,096	37.1	47.6	15.2	1.54	
PPP = Purchasing Power Parity; HH= Household						

Table 6. Percentage of income and consumption spent on food by socio-economic status using income as an indicator for Matlab (1995).

Socioeconomic status	Mean/ Median	Income spent on food (%)	Consumption spent on food (%)	Per-capita daily food consumption in 1993 PPP dollars
Poor: defined by the lower threshold (per capita income less than a dollar a day)	Mean	100	90.2	1.18
	Median	100	84.1	0.88
Medium SES: defined by the threshold – per- capita income within 1-2 dollar a day	Mean	96.56	82.1	1.44
	Median	75.26	80.03	1.10
Non-poor: defined by per- capita income more than 2 dollars a day	Mean	44.95	75.05	2.32
	Median	27.07	77.56	1.39
PPP= Purchasing Power Parity				

Table 6a. The percentage of income and consumption spent on food by socioeconomic status using consumption as an indicator for Matlab (1995).

Socioeconomic status	Mean/ Median	Income spent on food (%)	Consumption spent on food (%)	Per-capita daily food consumption in 1993 PPP dollars
Poor: defined by the lower threshold (per capita consumption less than a dollar a day)	Mean	100	97.04	0.74
	Median	100	84.55	0.68
Medium SES: defined by the threshold – per- capita consumption within 1-2 dollar a day	Mean	100	83.01	1.23
	Median	96.59	79.88	1.12
Non-poor: defined by per- capita consumption more than 2 dollars a day	Mean	100	68.99	3.13
	Median	100	74.96	2.19
PPP= Purchasing Power Parity				

Table 7. Sensitivity, specificity, positive predictability and negative predictability using 1995 data using the traditional SES indicators as the standard.					
Indicator	The measure used as the standard	Sensitivity	Specificity	Positive predictability	Negative predictability
Income	Eligibility criterion	66.32	58.23	51.4	72.13
	Land and occupation-Poor: involved in menial labour	58.5	60.96	73.19	44.64
	Poor involved in menial labour & with less than 50 decimals of land	57.28	64.71	82.26	34.65
Consumption	Eligibility criterion	50	75.17	57.58	69.05
	Land and occupation-Poor: involved in menial labour	40.51	75.18	74.89	40.89
	Poor involved in menial labour & with less than 50 decimals of land	39.97	79.50	84.83	31.59
	Asset quintile	Sensitivity	Specificity	Positive predictability	Negative predictability
Income	Poor (1), including the lowest quintile	67.19	54.08	34.66	81.97
	Poor (1+2), including the lowest 2 quintiles	64.86	57.04	49.52	71.42
	Poor (1+2+3), including the lower 3 quintiles	60.82	62.12	70.44	51.65
	Poor (1+2+3+4), including the lower 4 quintiles	57.08	69.98	88.17	29.37
Consumption	Poor (1), including the lowest quintile	55.79	72.70	42.79	81.79
	Poor (1+2), including the lowest 2 quintiles	50.67	75.38	57.42	69.98
	Poor (1+2+3), including the lower 3 quintiles	45.74	81.21	78.44	50.03
	Poor (1+2+3+4), including the lower 4 quintiles	40.37	86.51	92.20	26.88
Income	Consumption	74.45	60.66	50.37	81.57
Consumption	Income	50.37	81.57	74.45	60.66
SES = Socioeconomic status					

Table 7a. Sensitivity, specificity, positive predictability and negative predictability using 1995 data using income and consumption as the standard.					
Indicator	The measure used as the standard	Sensitivity	Specificity	Positive predictability	Negative predictability
Income	Eligibility criterion	51.4	72.13	66.32	58.23
	Land and occupation- Poor: involved in menial labour	73.19	44.64	58.5	60.96
	Poor involved in menial labour & with less than 50 decimals of land	82.26	34.65	57.28	64.71
Consumption	Eligibility criterion	57.58	69.05	50	75.17
	Land and occupation - Poor: involved in menial labour	74.89	40.89	40.51	75.18
	Poor involved in menial labour & with less than 50 decimals of land	84.83	31.59	39.97	79.50
	Asset quintile	Sensitivity	Specifici	Positive predictability	Negative predictability
Income	Poor (1), including the lowest quintile	34.66	81.97	67.19	54.08
	Poor (1+2), including the lowest 2 quintiles	49.52	71.42	64.86	57.04
	Poor (1+2+3), including the lower 3 quintiles	70.44	51.65	60.82	62.12
	Poor (1+2+3+4), including the lower 4 quintiles	88.17	29.37	57.08	69.98
Consumption	Poor (1), including the lowest quintile	42.79	81.79	55.79	72.70
	Poor (1+2), including the lowest 2 quintiles	57.42	69.98	50.67	75.38
	Poor (1+2+3), including the lower 3 quintiles	78.44	50.03	45.74	81.21
	Poor (1+2+3+4), including the lower 4 quintiles	92.20	26.88	40.37	86.51

Fig. 1. The median income, consumption, and food expenditure of people categorized by the percentage of income spent on food.

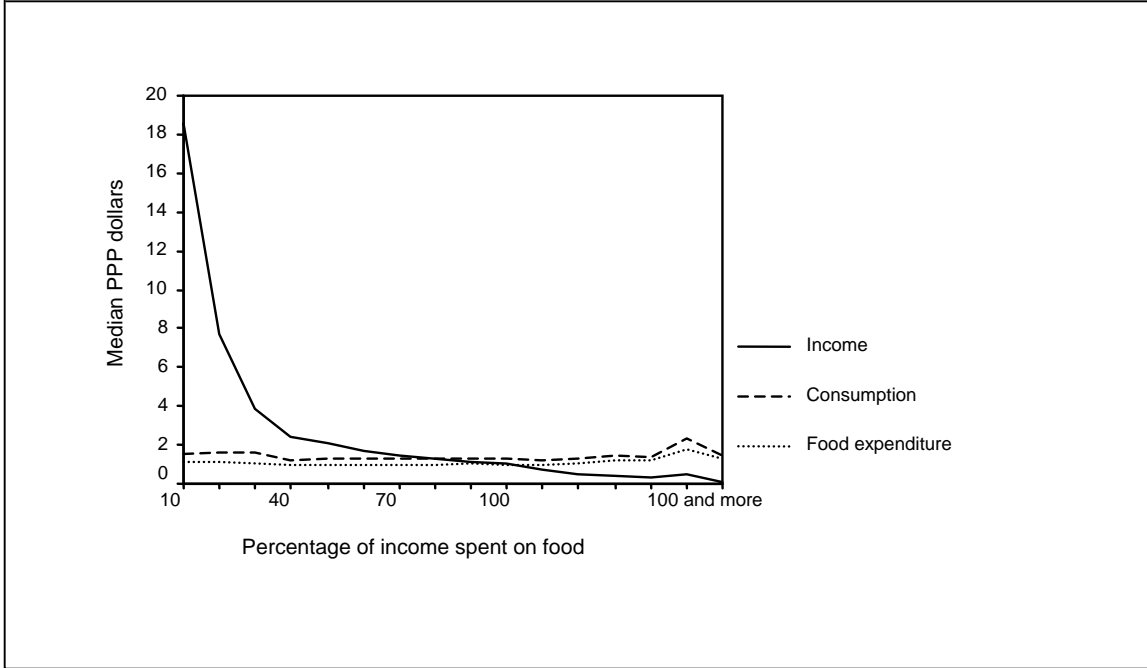


Fig. 2. Consumption-based poverty level in Matlab, 1995 and 1999.

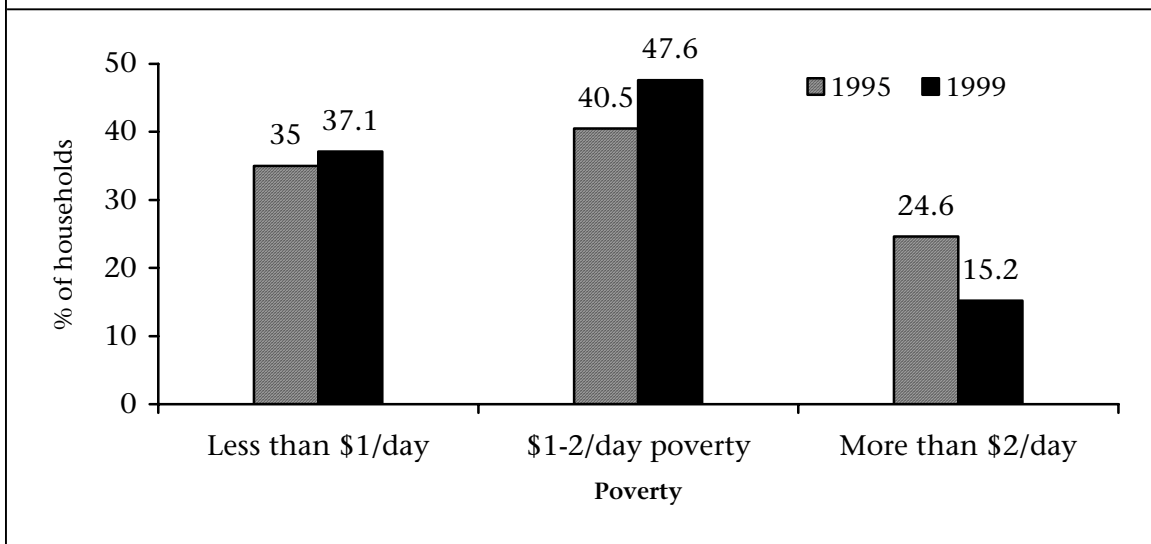


Fig. 3. Membership in BRAC programme and consumption -based poverty level in Matlab, 1995 and 1999.

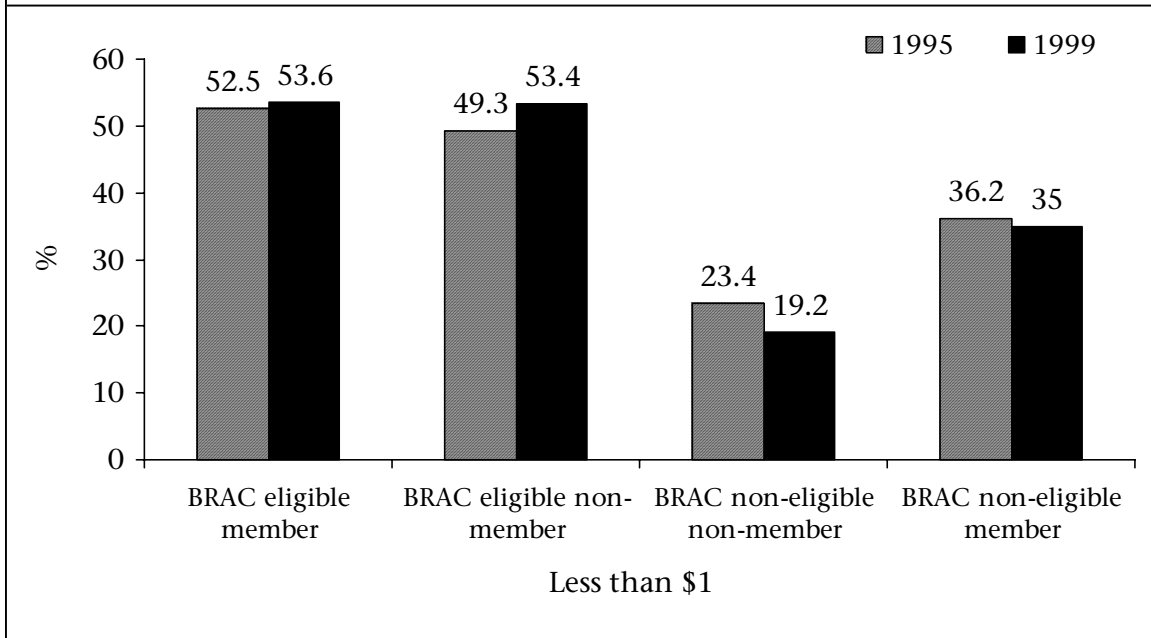


Fig. 4. Membership in BRAC programme and consumption-based poverty level in Matlab, 1995 and 1999.

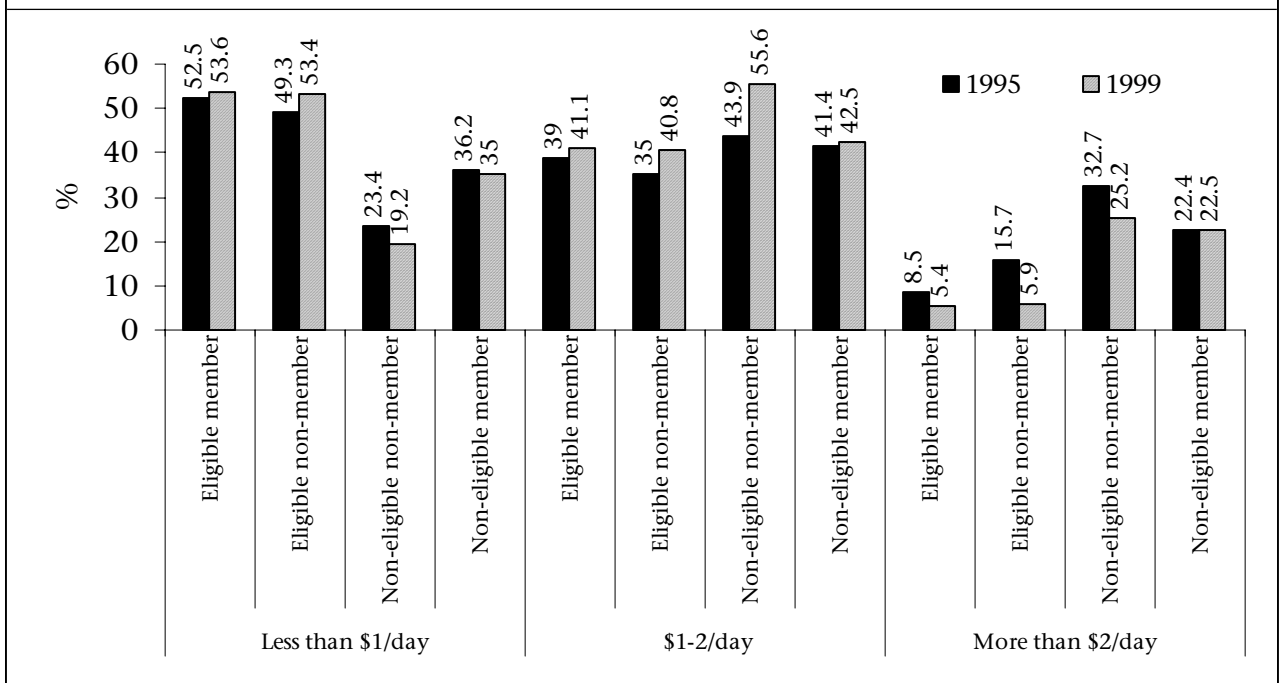


Fig.5. Membership in BRAC programme and consumption-based poverty level in Matlab, 1995 and 1999.

