Identifying the poor:
A critical review of alternative approaches

Jane Falkingham [1] and Ceema Namazie [2]
London School of Economics

December 2001

[1] Reader in Social Policy, Department of Social Policy.
Address for correspondence: London School of Economics, Houghton Street,
London WC2A 2AE. j.c.falkingham@lse.ac.uk.
[2] Researcher, STICERD, LSE.

Contents

Identifying the poor: a critical review of alternative approaches

Jane Falkingham and Ceema Namazie
London School of Economics

December 2001

1. Introduction

Poverty reduction is now the overarching objective of the international donor community.   In 1996 the Development Assistance Committee of the OECD announced a set of International Development Targets (IDTs), which were subsequently agreed by the entire UN membership (see Box 1) (OECD, 1996). First amongst these is a commitment to halve the proportion of people in developing countries living in extreme poverty by 2015. The central focus on poverty reduction was subsequently reaffirmed by the International Financial Institutions (IFI) in 1999 with the launch of the Poverty Reduction Strategy Paper (PRSP) as the new framework for debt relief and concessional multilateral lending.

Box 1: The International Development Targets

- A reduction by one half in the proportion of people living in extreme poverty by 2015.
- Universal primary education in all countries by 2015.
- Demonstrated progress towards gender equality and the empowerment of women by eliminating gender disparity in primary and secondary education by 2005.
- A reduction by two-thirds in the mortality rates for infants and children under age 5 and a reduction by three-fourths in maternal mortality by 2015.
- Access through primary health care system to reproductive health services for all individuals of appropriate ages as soon as possible, and no later than the year 2015.
- The implementation of national strategies for sustainable development in all countries by 2005 so as to ensure that current trends in the loss of environmental resources are effectively reversed at both global and national levels by 2015.

There is now a growing recognition that the health and education related IDTs need to be modified to incorporate an explicit poverty dimension. Work by Gwatkin and others has highlighted that without such a distributional component it would be possible in principle for the IDTs to be achieved without addressing the needs of the poor at all (Gwatkin, 2000).   For example, it would be theoretically possible in some countries to reduce overall infant mortality rates by two-thirds with all the improvements being concentrated in the richest sections of the population and without any improvement in the health of the poor. The recent DFID Strategy Paper for achieving the health related IDTs reflects this concern,

outlining a clear commitment to achieving better health for poor people (DFID, 2000). Given this, there is pressing need for national governments and the global development community to monitor both changes in i) the level and nature of poverty over time *and* ii) progress in health and educational outcomes amongst the poor (and the rich). In order to do this reliable methods to distinguish the poor are needed.

Before one can identify the poor it is first necessary to clarify what is meant by poverty. Section Two therefore briefly reviews alternative conceptualisations of poverty. Section Three then discusses issues in the measurement of material or economic dimensions of poverty. In particular, problems in the collections and measurement of information on household income and expenditure in the context of low income countries are discussed. However, given their prominence in the literature, the strengths and limitations of alternative poverty lines are also examined. Section Four then turns to an examination of alternative measures of, or proxies for, household welfare. The first part of this section focuses exclusively on recent research on asset indices as a measure of household socio-economic status using data from the Demographic and Health Surveys. Following this, lessons for the derivation of proxy indicators are drawn from work in other spheres, including poverty focused programmatic field interventions, proxy mean-testing and poverty mapping. Finally, in Section Five, recommendations are made for the next steps involved in the continuing development of improved and appropriate methods of identifying the poor using existing survey tools at the country level.

2. What is poverty?

Poverty is a multidimensional phenomena and accordingly there are a wide variety of approaches to its definition and measurement. Traditionally economists and policy analysts have focussed on money-metric measures of poverty, based on the assumption that a person's ***material standard of living*** largely determines their well-being. The poor are then defined or identified as those with a material standard of living as measured by income or expenditure below a certain level - the so-called poverty line (see Atkinson, 1987, 1989 and Ravallion, 1992). Practical problems, largely associated with the difficulty of accurately quantifying income or expenditure, have recently led to the exploration of alternative, non-monetary, proxies for household welfare. Prominent amongst these is the use of household asset indexes i.e. an aggregate measure of the access to, and ownership of, a specified list of household attributes (Filmer and Pritchett, 1998; Montgomery et al, 1999; Sahn and Stifel, 2000).
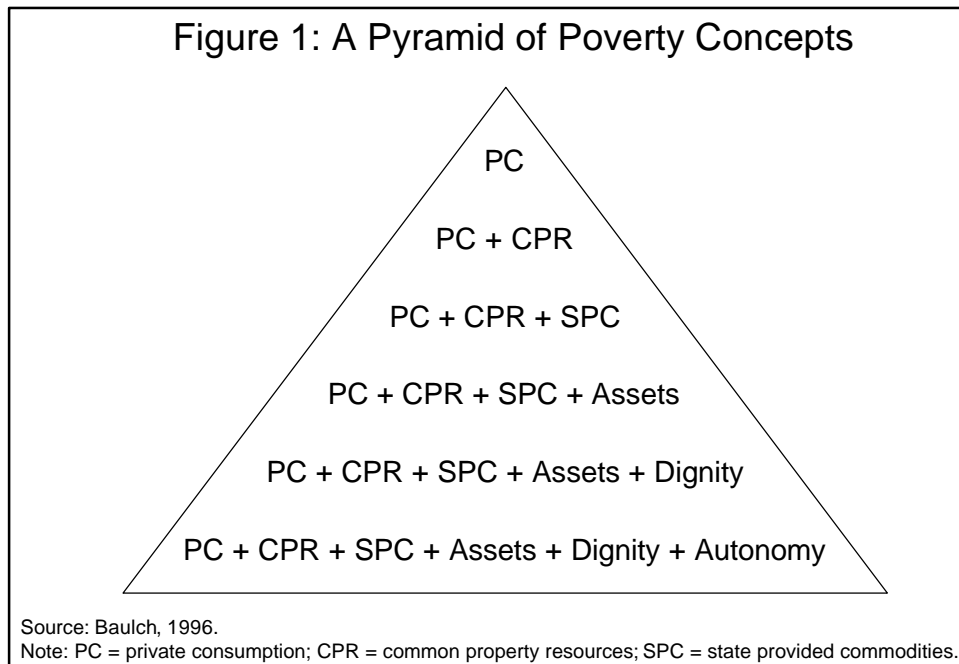
It is increasingly recognised that poverty measures based on household income or expenditure reflect a *static* concept, offering only a limited picture of household well-being. In the face of what might be considered transitory shocks to income,

households may reduce the consumption of food or household expenditure on clothing or other items in order to preserve their asset holdings, such as land or housing or durables. If however shocks permanently affect welfare, households may run-down their holdings of assets such as durables, jewellery, livestock or land. Agarwal (1991) examining the welfare impact of famine in Bangladesh, concludes that focusing exclusively on either asset ownership, or food expenditure/nutritional levels/household expenditure may give a misleading picture of well-being. **Vulnerability** and **livelihood strategy** approaches to poverty assessment are now seen as offering a more *dynamic* conception of poverty. They focus on the households' ability to cope with shocks to living standards, by incorporating measures of investments in human capital (health and education), physical investments (housing, equipment and land), social capital and claims on other assets (such as friendships and kinship networks) stores (food, money or valuables such as jewellery), as well as labour (Moser 1998; Bond and Mukherjee, 2001). Such approaches are particularly valuable for exploring the linkages between poverty and health e.g. the role of private household expenditure in the impoverishment of households, or financial costs as a barrier to access to health services amongst the poor.

Theoretical considerations and the recognition that monetary measures fail to capture other important aspects of individual well-being, such as community resources, social relations, culture, personal security and the natural environment ,have resulted in the development of a set of complementary indicators which aim to capture **human capabilities** (Sen, 1985, 1987; McKinley 1997; Micklewright and Stewart, 1999). Capability poverty focuses on an individual's capacity to live a healthy life, free of avoidable morbidity, having adequate nourishment, being informed and knowledgeable, being capable of reproduction, enjoying personal security, and being able to freely and actively participate in society. Material resources at some level are generally necessary for some of these activities, but they are not sufficient. Measures which focus on capability poverty thus incorporate access to public services, assets and employment, as well as money metric measures which reflect the ability to 'purchase' food, clothing and shelter. Capability poverty can be measured directly in terms of capabilities themselves: e.g. the percentage of children who are underweight; or indirectly in terms of access to opportunities, or the means of capabilities, such as access to a trained health professional at birth, and access to education and other public services.

Baulch has usefully described the progressive broadening of what is thought to constitute poverty in terms of a 'pyramid of poverty concepts' (Baulch, 1996). Each concept represents a dimension of well being, and each conceptualisation constitutes a different combination of dimensions, with the combinations getting broader and more complex (see Figure 1). The traditional 'economic' conception of poverty ideally focuses on line 3 of Baulch's pyramid, i.e. private consumption combined with common property resources and the consumption of state-provided commodities. However, as discussed further below, difficulties of

measuring consumption of state-provided commodities and access to common property resources often results in a focus on private consumption alone. At the other end of the spectrum, Sen (1999) sees freedom, autonomy and dignity as central and other concepts are relegated to a secondary level of importance.

Figure 1: A Pyramid of Poverty Concepts

PC

PC + CPR

PC + CPR + SPC

PC + CPR + SPC + Assets

PC + CPR + SPC + Assets + Dignity

PC + CPR + SPC + Assets + Dignity + Autonomy

Source: Baulch, 1996.
Note: PC = private consumption; CPR = common property resources; SPC = state provided commodities.

Accompanying the alternative conceptualisations of poverty is a burgeoning array of methodological approaches towards its assessment (McGee and Brock, 2001). These range from ethnographic investigations using classical anthropological methods (Scott, 1985; McGee, 1998), participatory poverty assessments (Norton et al, 2001), longitudinal village studies (Jayaraman and Lanjouw, 1998), and conventional household surveys (Grosh and Munoz, 1996; Grosh and Glewwe, 2000). The relative merits of alternative conceptions and methodological approaches largely depend upon the purpose of the poverty analysis.

This paper has as its focus the identification of the poor for the purposes of monitoring the IDTs. As such it primarily concentrates on the more narrow conceptions of *material* (or economic) poverty or well-being. The bulk of the discussion is therefore concerned with issues involved in determining a scalar indicator of households' material welfare and the strengths and limitations of alternative choices. However, as is discussed below, the search for alternative indicators of material household welfare has resulted in some measures implicitly reflecting a broader conception of poverty.

4

3. Measuring 'material' poverty and identifying the poor

The level of material poverty, and the profile of the poor, found at any one time in any one country are critically dependent upon two criteria: a) how people are ranked in terms of welfare and b) the definition of the poverty line. Where the poverty line is set determines how *many* people are poor and how many are non-poor and may also determine who is entitled to state transfers and other publicly provided benefits. As such its determination is almost always a matter for debate and controversy, and the derivation of the poverty line commonly receives the bulk of attention and intellectual effort in studies of poverty (Olson Lanjouw, 1997). However, how the population is 'lined up' against the poverty line is equally, if not more, important in determining *who* is poor. A change in the definition of the welfare indicator that results in a change in the ranking of the population will result in a different set of people being defined as poor, even if the poverty line remains the same. Yet this aspect often receives less attention from the analyst – despite the fact that the purpose of most poverty analyses is to identify the characteristics of the poor. Theoretical considerations in the choice of poverty line are discussed below, followed by an assessment of alternative approaches to measuring and ranking households' economic welfare.

3.1 Absolute or relative poverty?

There are two main approaches to constructing a poverty line. An absolute definition of poverty assumes it is possible to define a minimum standard of living based on a person's physiological needs for water, clothing and shelter - i.e. their basic needs. In contrast, the relative approach defines poverty in relation to a generally accepted standard of living in a specific society at a specific time and goes beyond basic physiological needs. The two concepts of absolute and relative poverty capture different, but equally important, dimensions of the poverty problem. On the one hand it is essential to identify how many people, and which people, are living in households that are unable to purchase or consume a fixed minimum amount of goods and services, i.e. who are living in absolute poverty. On the other hand, it is also crucial to identify those with resources that are so limited as to exclude them from enjoying a life-style that at least approaches that of the rest of society. A commonly used relative poverty line is households living below half average income.

Relative poverty lines make most sense in countries where absolute deprivation is *not* the social norm. In many low income countries, an income corresponding to the half the median will not necessarily meet even the basic needs of a household. However, even in countries where the majority of the population are living in absolute poverty, relative poverty rates can still provide useful information concerning the characteristics of the poorest of the poor. It is also

clear that the relative concept is pertinent to the assessment of social cohesion, something of importance in low and high income countries alike[1].

3.1.1 Absolute poverty lines

Most development agencies are concerned with the reduction of absolute poverty. The definition of poverty inherent within the IDT of eradicating world poverty is an absolute one, i.e. one is considered poor if surviving on less than one US dollar per person a day. This international standard was developed by the World Bank in the 1980s and was based on the average of the poverty lines of ten low income countries, all of which were located wholly, or in part, within the tropics.

The most common approach to defining an absolute poverty line is to estimate the cost of a basket of goods; a basket which contains quantities of commodities sufficient to ensure that basic consumption needs are met. The main problem is in choosing the food energy requirements for 'basic needs'. In addition to setting the calorific requirements, the mixture of food goods used to 'supply' these calories must be appropriate to the country in question. For example, the basket should not contain meat as the main source of protein in a country where the majority of the population are vegetarians (or vice versa as has been the case in some World Bank sponsored poverty lines in Central Asia, see Popkin, 1994). The composition of the food basket should ideally be based on country-specific consumption patterns of low income households rather than simply identifying the lowest cost food bundle, which achieves the required energy intake. The second problem is in making allowance for non-food consumption. Often this is done by finding the minimum costs of a food basket and then dividing this by the share of food in total expenditure of low income households. This gives a reasonable approximation of total subsistence costs.

The appeal of an absolute definition of poverty is its apparent clarity and its moral force. However, there are some problems with an absolute definition. The main difficulty in defining an adequate minimum is that standards of living themselves change over time and space. The costs of purchasing the minimum basket may vary across regions within a country (and between countries) and over time, as indeed will energy intake and patterns of food consumption. Beveridge recognised that '*determination of what is required for reasonable human subsistence is to some extent a matter of judgement; estimates on this point change with time and generally in a progressive community, change upwards*' (Beveridge, 1942). How we clothe and feed ourselves has changed drastically over the years. So has the state of knowledge about nutritional requirements. Furthermore climatic conditions in different countries generate different needs, and even within countries individuals vary in their physical requirements.

---

[1] For more discussion of relative versus absolute poverty line see Atkinson (1989), Atkinson and Micklewright (1992), Ravallion (1994) and Glewwe and Gaag (1988).

Given these issues, it is questionable whether it is possible (or appropriate) to have a universal international absolute poverty line - such as the IDT line of $1 a day - that is applicable across both time and space. In its 2000 report on poverty in Central and Eastern Europe and the CIS, the World Bank argues that a higher poverty line is needed in that region, given that its cooler climate necessitates additional expenditures on heat, winter clothing and food. A line of US$2 a day was therefore taken as a low threshold. A higher threshold of US$4 was also used, recognising that what may be considered as 'subsistence needs' inevitably varies with the level of a country's development; even the poorest households in the region incur expenses on some basic services such as postal services, childcare and health care and need to cover the running costs of a minimum of some basic consumer durables, such as a (black and white) television or a refrigerator (World Bank, 2000).

There are also methodological problems in applying an international poverty line. In converting the US dollar poverty lines into national currencies, account is taken of differences in the costs of goods, recognising that US$4 exchanged into rupees at the market exchange rate in Delhi will buy more loaves of bread than US$4 exchanged into roubles in Moscow, or the same money spent directly in New York. Estimates of these differences in purchasing power use costings based on retail price surveys, and the international poverty lines therefore reflect 'purchasing power parity' (PPP) dollars rather than actual dollars. However it is difficult to estimate comparable prices when markets are only partially developed, as remains the case in many de-monetised and rural economies. Absolute poverty rates based on the PPP dollar lines should therefore be viewed as providing 'broad-brush' estimates only; estimates which are useful for monitoring progress at the national or supra national level but which should not be used for targeting purposes.

Although international poverty lines defined in US dollars allow easy comparison of poverty across countries (perhaps too easy in view of the imprecision of the PPP estimates), they tell us very little about the level of resources considered as representing subsistence needs in any particular country. Thus the $1 poverty line should be seen as a supplement to rather than replacement for a national poverty line based on a minimum consumption basket that has been calculated and priced specifically for individual country's' own circumstances. National poverty lines are a vital part of the fight against poverty, helping to maintain poverty as a focus of public attention. An official poverty line provides a public benchmark for the level of living standards that are considered adequate in a country, and thus constitutes a key device for monitoring the progress of poverty reduction policies, whether by government or other parts of civil society. If the number of people that are poor in a country according to an official national poverty line rises from one year to the next, then whatever else may be happening in that country, one key aspect of national well-being has deteriorated.

3.1.2 Relative poverty lines

Relative poverty is where poverty is defined in relation to a generally accepted standard of living in a specific society at a specific time and goes beyond basic physiological needs. The view of poverty has a long heritage. In the eighteenth century Adam Smith, commented that '*by necessities I understand not only commodities which are indispensably necessary for the support of life, but whatever the custom of the country renders it indecent for creditable people , even of the lowest order, to be without*' (Smith, xxx). More recently Peter Townsend argued that '*Individuals … can be said to be in poverty when they lack the resources to obtain the types of diet, participate in the activities and have the living conditions and amenities which are customary, or at least widely encouraged or approved in the societies to which they belong*' (Townsend, xxx).

However, again there are problems in defining a poverty line within this approach. How do we establish what the norms of our society are? What do we put in the basket of goods? At least with the absolute approach there are reasonably objective norms but with the relative approach the decisions concerning what is an acceptable minimum become much more subjective.

A commonly adopted solution is to use a 'proportional' measure. The definition of poverty used by the European Commission to compare the incidence of poverty across member states is half the mean (average) country-specific household expenditure. Thus households are defined as poor if they have a level of total expenditure below half the national average. This has the advantage of allowing comparisons across countries, whilst using a country-specific measure. The idea of using 50% of the current year average as a 'poverty line' was proposed in the 1960s by US economist Fuchs because it was a line that would automatically rise as living standards rose.

Another approach that is widely used is simply to define the poverty line as a percentage cut-off point in the welfare distribution below which people are poor. Commonly used definitions are the bottom 20% or 40% of the population. This approach to setting the poverty line is attractive in that it is both simple and transparent, and is quite functional in terms of identifying a population sub-group upon which to focus attention.

There are however dangers in an entirely relative approach. A definition of poverty that is entirely relative would deny the existence of poverty in a country where everyone was starving. It would also not reflect a dramatic fall in living standards if everyone's living standards fell drastically but evenly as under a relative approach the number of poor would not change (Sen, 1987). A relative poverty line is not very useful if one wants to monitor poverty over time or space. There will always be a bottom 20% of the population, even if living standards for the whole population have risen over time. Furthermore, as Jean Olsen Lanjouw (1997) points out, the relative poverty line is essentially arbitrary. It is not clear

why poverty should be defined in terms of one percentage point instead of another – and the percentage point settled upon can influence the characteristics of the subgroup designated as poor.

However, as discussed above, the advantage of relative poverty lines is that in countries with high absolute poverty, they serve to focus attention on the poorest of the poor. They can also provide a useful way of summarising distributional outcomes. Finally relative poverty lines can be applied to scalar indicators of welfare that are not money metric and for which it is not possible to construct an absolute poverty line. This is particularly pertinent to the discussion of asset-based welfare indicators in section 4 below.

In deciding which approach to take in determining the poverty line, it is important to bear in mind the context within which the poverty line is to be used. Ultimately it is a policy tool and can only be useful as such.

3.2 Money-metric measures of household welfare – income or expenditure?

Quantifying the welfare of individuals or households is notoriously difficult. In theory, the best indicator of welfare is the actual consumption of the individuals and ideally this consumption would include both consumption of food and other goods, as well as consumption of services such as education and health. In practice, income and expenditure data are commonly used to proxy for the level of consumption enjoyed. They are normally easier to measure directly and have the advantage of providing a monetary definition of poverty. Such a definition is readily understood by the wider public.

A money metric measure of welfare can be built up in a variety of ways. However, before discussing the strengths and weaknesses of alternative approaches, it is important to recognise the general limitations of such an indicator. Using a monetary definition does not take into account the terms on which that money is 'received' and, in particular, of the time spent working (Piachaud, 1987). This is a point that has particular relevance for women who often work in low status jobs. On a purely monetary definition, 'earning' (either in cash or in-kind) $5 a week in a 50 hour week in an unpleasant job is treated the same way as earning $5 in a 20 hour week in a pleasant job even though the quality of life which results from these two cases is likely to be very different. Furthermore a money metric definition tells us nothing about the environment in which people live and work, including time spent travelling to work, to buy (or sell) produce or collect water. In theory it might be possible to put a monetary value on some of these aspects of quality of life, although it is hard to imagine that this could be done without a great deal of controversy.

9

3.2.1 Income or expenditure?

Views differ as to whether low income or consumption provides the better indicator of poverty although, as Atkinson (1989) points out, the fundamental distinction as to whether poverty is concerned with low income or low spending is rarely made explicit. However very different results are obtained depending on which measure is used.

There are two main reasons why an analysis based on income may lead to different conclusions from one based on expenditure. Firstly, a household may have an income (Y) below a given amount (Z) (the poverty line) but may be able to attain a level of expenditure above Z by running down savings or by borrowing. In such cases $Y < Z < E$. Thus if income is used as the indicator, the household would be defined as poor but if expenditure was used the same household would be defined as not poor. Conversely receipt of an income above Z does not imply that a minimum target level of consumption is necessarily realised and it is possible that $Y > Z > E$.

Secondly, income and expenditure may also give different answers because of the constraints faced and choices made by families. In addition to consumption possibilities, the actual level of expenditure will also reflect tastes. To chose not to eat meat is one thing, but to have no opportunity so to do is something entirely different. Thus a vegetarian who by choice only spends money on rice and beans and an elderly person who would prefer to eat meat but who can only afford rice and beans may both be defined as poor using expenditure, but in fact the vegetarian may be defined as non-poor when using income.

So which should be used? The choice depends partially upon the conception of poverty being employed. Atkinson (1989) distinguishes between a 'standard of living approach' and a 'minimum rights' approach to poverty. Interpreting poverty as a low standard of living leads naturally to a focus on consumption. The right to a minimum level of resources in order to participate within society leads, on the other hand, to income.

Economists generally prefer expenditure to income as incomes tend to fluctuate a lot over the course of a year, particularly so in developing countries when income is dependent on the agricultural seasons. The permanent-income hypothesis by Friedman (1957) supports the view that consumption expenditure is a better proxy for permanent income, since people tend to smooth out their fluctuations in income, and this is reflected in their expenditure. For example, if a person receives a bonus, they do not necessarily spend it, but save part of it. Similarly, if income falls in a particular year, a person may use savings to make up for the temporary short fall. However, the permanent income hypothesis assumes perfect capital markets, i.e. that one can borrow and save, which is often not the case in developing countries, and hence can be an argument for using income. In practice, the choice of welfare indicator is often dictated by

more prosaic, but nonetheless important, considerations – most notably ease of data collection and the degree of measurement error.

3.3. Practical issues in measuring income and expenditure

There are a number of practical and measurement issues in using income and expenditure as a measure of household welfare. These are summarised here and are usefully discussed in greater detail in Hentschel and Lanjouw (1996), Deaton (1997) and Deaton and Zaidi (1999).

3.3.1 Measurement error – underreporting and recall bias

The problems of collecting high quality income and expenditure data are legendary. It is widely acknowledged that income data in particular are often subject to problems of under-reporting, especially income derived from the private and informal sectors. This problem is exacerbated if respondents to the survey think that the information they give may be used for purposes other than the survey itself. For example, if people (wrongly) think that the information may be passed to the tax office then this may cause them to under-estimate their income or refuse to answer the questions altogether.

Expenditure data is subject to a different set of problems. Income, for the majority of people is a regular flow of money[2]. Pensions and wages are paid weekly or monthly. Expenditure however may be irregular. Some people may go shopping for food every day, whilst others go once a week or even less frequently. Non-food items may be subject to even greater fluctuations. Expenditure data in most developing countries is usually collected on the basis of recall (rather than a diary) and the recall period is commonly the last week, two weeks or month. Recall data are prone to large measurement errors some of which, but not all, are random. Scott and Amenuvegbe (1990) found that the longer the recall period, the lower the consumption reported. A different, but related problem is identified by Pradhan (2000) who found that the more commodities listed on the recall sheet, the higher the measure of aggregated consumption that results. Changes in the number of items included in the survey instrument may thus bias inter-temporal or cross national comparisons. Moreover omission of certain categories of expenditures may bias the profile of poverty if the effect of the omitted category is non random.

3.3.2 Valuing home production of foodstuffs.

In societies where the majority of people earn a wage or monetary payment have little resources beyond wages or social security benefits, it may be adequate to define expenditure (or income) in relation to *cash,* i.e. monies actually spent on goods (or monies earned or otherwise received). However in agricultural/rural

---

[2] In many countries of the FSU, wages are often paid in arrears and in practice the 'flow' is very lumpy.

economies home production may account for a significant proportion of the household's consumption. The valuation of such consumption is a major issue for the calculation of expenditure or income of households who are both producers and consumers. If the survey collects information on the quantity of food stuffs consumed, it is necessary to impute a cash value. This then entails a decision over which prices to use – market (what it would have cost to buy it) or farm-gate (the opportunity cost of not selling it), local or regional, state-subsidised or private. Ideally the prices used should reflect differences in labour, transport and production costs (for a fuller discussion of these issues see Deaton and Zaidi, 1999). They should also ideally reflect differences in quality. For example, using market prices to impute the income foregone by consumption of home production may overestimate its value due to differences in the quality of goods consumed versus those 'selected' to be sold in the marketplace.

A similar problem arises in imputing the value of wage or transfer income when people are paid in-kind. This is a particular problem in the countries of the FSU where partial de-monetisation of the economy, the growing informalisation of the labour market, increasing reliance on non-market forms of production and inter-household transfers have resulted in household incomes comprising a complex mix of in-cash, in-kind, official, unofficial and informal payments (Falkingham, 1999). There are real issues in how one attribute a value to child benefit that is paid in-kind in vodka as has been recorded in some regions of Russia.

3.3.3 Deriving the 'use value' of other goods and services

Similar problems arise in deriving the 'use values' of other goods and services. Data requirements for such goods often make them difficult to estimate. For example, the valuation of semi-durable or durable goods requires information on depreciation rates as well as prices. There are particular problems in valuing the imputed benefit of owner-occupied housing in regions where the rental equivalent is almost impossible to determine. This is especially the case in rural areas or in the transition economies of the former Soviet Union where there is virtually no rental market for housing.

Pricing basic services can also become complex. For example, how do you price expenditure on water, when water maybe supplied through public provision in one area, while in another area households may have to purchase water from a private seller, for a higher price. (These issues are tackled in Hentschel and Lanjouw, 1996)

Finally there are issues surrounding the implications for poverty profiles of imputing a value to benefits in kind from services such as publicly provided education and health services. On the one hand it is desirable to include them as their omission may bias cross-national comparisons (see for example, work by Gardiner at al, 1995). But on the other hand imputing a value to receipt of health care services may move a person within the welfare distribution within the

country. For example, other things being equal a household containing a person who received health care in last year will have a higher ranking than a household where everyone has been healthy all year. Similarly high private spending on health may result in a household being defined as non-poor. Therefore it may be desirable to impute a value health services for cross-national comparisons of welfare but not for within-country comparisons of welfare.

3.4 Equivalence scales and the profile of poverty

Finally, even if we are able to construct a consumption aggregate that adequately includes the consumption of home produced foodstuffs, other goods and benefits in kind received from public services in order to compare the living standards of different households i.e. to *rank* them, it is then necessary to adjust their total expenditures for differences between them in their sizes. Larger households have greater needs – for example there are more mouths to feed. Adjustment may also be made for differences in the composition of the household, recognising that the need for expenditure differs between children, working age adults and the elderly. The choice of "equivalence scale", the term given to the adjustment factor, may have major implications both for the overall level of measured poverty and for which groups in the population are shown to suffer most.

The simplest (and commonest) approach is to ignore differences in composition and to divide total expenditure by the number of persons in the household. This *per capita* adjustment assumes that there are no "economies of scale" associated with household size. Thus a household of four persons is assumed to have twice the needs of a household of two.

Economies of scale may arise for various reasons, for example housing costs such as rent and heating are unlikely to double when household size doubles. A widely accepted way of taking these economies into account is to adjust total expenditure as follows:

Adjusted expenditure = Total expenditure / [Household size ^{A}]

where A is a number between 0 and 1. For example, with A equal to 0.5 (strong economies of scale), a household of four persons is assumed to have needs that are twice those of a one-person household, whereas with the per capita adjustment (A = 1.0, no economies of scale) their needs would be four times as high. Where there are moderate economies of scale, and A is equal to 0.75, it is assumed that a four person household has needs that are 2.8 times those of the one-person household.

The derivation of equivalence scales involves several factors including how needs vary with age and activity level and the share of food in total household expenditure. Many equivalence scales take the food share of low income families as a reference (Ravallion, 1998). In many low income countries, where housing

costs currently constitute a relatively small share of total expenditures there are likely to be relatively low economies of scale, implying that the per capita adjustment may be a reasonable one.

The choice of equivalence scale can significantly alter the profile of poverty (Lanjouw and Ravallion, 1995). In particular, work by Lanjouw, Milanovic and Paternostro (1998) found that using a per capita welfare indicator can lead to a conclusion that larger households are poorer, whilst alternative equivalence scales will reverse this conclusion. The somewhat surprising finding in the World Bank report on the profile of poverty in Russia that pensioners are less likely to be poor than other groups is due in part to the equivalence scale implicit in the poverty line used.

4. Alternative approaches to measuring material poverty

Given the problems in measuring income and expenditure and the difficulties in determining how, if at all, to adjust for differences in household size and composition, analysts are increasingly concerned to identify alternative measures of household welfare that are robust but are less data intensive and subject to smaller measurement error.

Alternative indicators of household welfare are also required in situations not only where income and expenditure data are of poor quality, but also where they are completely absent. This is particularly relevant for analysts interested in monitoring the distributional dimension of progress towards the non-economic related IDTs. In many cases the surveys that contain detailed information on, for example health related outcomes such as infant and child mortality or access to reproductive health services, do not collect information on household incomes or expenditures. The Demographic and Health Surveys are a notable example and as such attempts to derive proxy indicators of consumption using DHS data warrant particular attention.

Finally, the search for alternative approaches has for some analysts been motivated by theoretical rather than practical considerations, in particular the growing belief that money metric expenditures define the poor in too narrow a manner (Sahn and Stifel, 2001).

4.1 Asset indicators in the DHS

Demographic and Health Surveys (DHS) have now been administered in approximately 50 countries across Africa, Asia, the Arab world, Latin America and the former Soviet Union. The primary focus of the surveys is to collect information regarding demographic and health related behaviours. The survey instruments do not include any questions on income and expenditure. However they do include a range of questions on the *ownership of assets* such as a car, refrigerator, or television as well as *dwelling characteristics* such as type of roof and flooring materials and type of toilet, and *access to basic services* including clean water and electricity. As the interest in poverty amongst the international donor community has increased, so too have the number of studies that use these questions to construct indicators of households' socio-economic status – despite the fact that this was not the primary purpose for their inclusion in the survey.

Montgomery et al (1999) provide a useful survey of studies that have used alternative measures of household socio-economic status to examine demographic behaviour and outcomes. Since their survey, important methodological contributions have been made, amongst others, by Filmer and Pritchett (1998, 1999) and Sahn and Stifel (2000, 2001). An inventory of selected studies that have used asset based indicators is presented in Appendix I.

15

4.1.1 Components of the asset index

Most studies have employed a range of indicators detailed in Box 2.

```
┌─────────────────────────────────────────────────────────────────────────┐
│        Box 2: Housing characteristics and household durables in the DHS   │
│  •        Has electricity                                                 │
│  •        Source of drinking water                                        │
│                   Piped water                                             │
│                   Well water                                              │
│                   Surface water                                           │
│                   Rainwater                                               │
│                   Tanker truck                                            │
│                   Bottled water                                           │
│                   Other                                                   │
│  •        Time to water source                                            │
│  •        Type of toilet facility                                         │
│                   Flush toilet                                            │
│                   Pit toilet latrine                                      │
│                   No facility                                             │
│                   Other                                                   │
│  •        Main floor material                                             │
│                   Natural                                                 │
│                   Rudimentary                                             │
│                   Finished                                                │
│                   Other                                                   │
│  •        Persons per sleeping room                                       │
│  •        Household possessions                                           │
│                   Radio                                                   │
│                   Television                                              │
│                   Telephone                                               │
│                   Refrigerator                                            │
│                   Bicycle                                                 │
│                   Motorcycle                                              │
│                   Private car                                             │
└─────────────────────────────────────────────────────────────────────────┘
```

It should be noted that asset ownership based on information from the DHS does not reflect the *quantity* nor *quality* of durable goods owned by the household and it could be argued those better off may have better quality or technological advanced equipment than those less well off. For example, they may have a colour television rather than black & white or be able to receive satellite and digital transmissions rather than terrestrial. In most countries using simple information on ownership of durables, taken in conjunction with information on basic services and dwelling information, is unlikely to affect the final picture of welfare. However in some circumstances, such as the transition countries of Central Asia where most households own durables such as televisions and refrigerators, it would be useful to distinguish whether these durables were obtained during or post the Soviet administration. Furthermore, the DHS, unlike the Core Welfare indicator Questionnaire (CWIQ) does not distinguish whether the durables are in working condition. Similarly, there is no information on the

reliability of the supply services such as electricity or water. Households in many low income countries suffer from frequent power cuts and interruptions to other services.

There are also methodological issues in including in as *household* based indicator assets and services that are shared or publicly owned, such as well water or pit latrine or connection to electricity supply (see Deaton, 1997).

Finally, there are problems in generalising indicators across rural and urban areas. The index treats ownership of assets and housing characteristics as equivalent in both rural and urban areas, even though they may have very different meanings. For example, urban slum dwellers often live in brick and concrete houses but in far worse conditions than rural families in thatched or tin houses (for a detailed discussion of this issue see Kausar, Griffiths and Matthews, 1999).

4.1.2 A question of weighting

In order to create an index from the information on asset ownership it is necessary to aggregate the individual responses. A number of different techniques have been used in the literature.

The simplest approach is to assign equal weights to the ownership of each asset or presence of each household dwelling characteristic. However as Filmer and Pritchett (1998) note, the only appeal of this approach is 'not seeming to be as completely arbitrary as it really is'. Such an approach assumes that the welfare value of the ownership of a radio is the same as having access to a flush toilet which in turn is the same as having electricity. Clearly this is not the case. Unfortunately, despite this obvious methodological weakness, most of the studies surveyed by Montgomery et al (1999) impose equal weights to aggregate the separate indicators into a scalar index.

In an attempt to move away from purely arbitrary weights, in the construction of the Index of Fulfilment of Basic Needs – the Bolivian national poverty bench mark comprising of 10 indicators capturing housing quality, access to public services, education and access to informal and formal health services - the indicators were combined using weights determined by a form of consultative process among national poverty experts and policy analysts (Navajas et al. 2000). Although this approach is an improvement on the first solution, it still involves subjective decisions regarding the welfare value of each component.

A third, and more objective, approach is to impose a set of weights using the prices of various assets. However this is only possible if the prices of various assets are available and involves similar problems in the estimation of the value of basic services and dwelling attributes to those discussed in section 3.3.3 above.

A fourth approach is not to construct an index but to enter all the components of the asset indicator in a multivariate regression equation. This is the approach recommended in Montgomery *et al* (1999). This approach deals with the problem of 'controlling' for wealth in estimating the impact of non-wealth variables. It does not, however, identify the wealth effect as many assets can have both a direct and indirect effect on outcomes. For example a household's access to piped water may both indicate greater wealth but may also impact upon health independently. One cannot infer the impact of an increase in wealth on the health outcomes from the unconstrained coefficients on the asset variables in the regression model. Thus, while the regression coefficients produce a liner 'index' of the asset variable that best predict the dependent variable (e.g. health), this 'index' cannot be interpreted as the effect of an increase in wealth on health.

An alternative approach is to use the statistical procedure of principal components to determine the weights of the asset index. This approach is the one used by Hammer (1998) and Filmer and Pritchett (1998) to determine the weights, whilst Sahn and Stifel (2000) favoured the use of factor analysis (see Appendix II for a description of these statistical techniques). Interestingly there is little difference in the two alternative approaches; the Spearman rank coefficient for indices created using the two methods was found by Shan and Stifel (2000) to be about 0.98. Most recent studies have therefore used the simpler principal components method (e.g. Zeller, 2001; Georgian OOP study).

4.1.3 How well do the asset indices used act as proxies for welfare?

One criticism levied against the use of asset indices is that the components of the index are often taken from a generic list, despite the fact that qualitative studies emphasise the need to tailor measures to reflect living conditions of the country, region or area under analysis (Moser and Holland 1997; Moser 1998; Bond and Mukherjee 2001). Usually, the choice of asset indicators is limited to those available in the survey and as such there remain many unanswered questions as to their appropriateness.

Few studies have attempted to verify the extent to which the asset indicator being used is a good proxy for household consumption; the main reason being that such verification requires a data set that contains both the components of the asset index and the money metric measure of household consumption they are meant to represent.

Montgomery *et al*. (1999) evaluated the performance of proxy measures commonly used in demographic studies employing data from the DHS in relation to consumption expenditure per adult, the latter being their preferred measure of living standards. To do this they used data from LSMS surveys from five countries[3] and a consumption survey from rural Guatemala. The LSMS data

---

[3] Ghana (1987-89), Jamaica (1989), Pakistan (1991), Peru (1994) and Tanzania (1993-4).

include questions on asset ownership and dwelling characteristics, allowing them to directly replicate the proxy indicators and to then correlate the resultant index with a measure of consumption. They found that the proxy variables were weak predicators of consumption per adult, with extremely low partial R^2 values. However in subsequent analyses of fertility, child schooling and mortality, the proxy based coefficient estimates compared favourably to those obtained using consumption, providing a generally reliable guide to the sign and magnitude of the preferred estimates. Sahn and Stifel (2001), using data from 12 separate LSMS[4] also found the correlation of their asset index with household expenditure to be weak. They defend this by arguing that the asset index was not intended to be a proxy for consumption but rather an alternative indicator of households' wealth.

In contrast, Filmer and Pritchett (1998) who validated their asset index using data from the Indonesian, Pakistani and Nepalese LSMS, concluded that the asset index had 'reasonable coherence' with current consumption expenditures and worked 'as well or better, than traditional expenditure based measures in predicting [educational] enrolment status'. They also note that their asset index is better thought of as acting as a proxy for long run household wealth rather than current per capita consumption.

4.1.4 Summary

It appears that there is mileage in using asset indices to produce welfare rankings of the population. However, it is important to recognise that such indices are generally poor proxies for current consumption/income and may be better thought of as being proxies for longer term or 'permanent' income. Furthermore, their use is strictly limited to providing *relative* analyses of welfare, e.g. the characteristics of those households in the bottom 20% of the distribution versus those in the top 20% of the distribution. Asset indices can say nothing about levels of absolute poverty. Nor can they be reliably used to monitor changes in poverty over time as there may be significant changes in household ownership of, or access to, some of the index components, which may not necessarily translate into a reduction in material poverty.

4.2 Other experiences with proxy indicators of welfare

4.2.1 Lessons from the field

Most programmatic interventions in the development field are now committed to deepening their poverty focus, i.e. increasing poverty outreach and their impact on poor people. In order to evaluate this dimension of their performance,

---

[4] Cote d'Ivoire (1988), Ghana (1988, 1992), Jamaica (1998), Madagascar (1993), Nepal (1996), Pakistan (1991), Papua New Guinea (1996), Peru (1994), South Africa (1994) and Vietnam (1993, 1998).

programmes need information on the levels of poverty amongst their clients relative to people within the same community. Two approaches have been commonly used by microfinance institutions (MFI): Participatory Wealth Ranking (PWR) and the CASHPOR House Index (CHI) (Simanowitz, Nkuna and Kasim 2000) [5].

The CASHPOR House Index

The CASHPOR[6] House Index (CHI) was first used to target services to poor clients by the Grameen Bank in Bangladesh. It uses external housing conditions as a proxy for proxy. The advantage is that the index is easy to calculate and is based on simple, observable and verifiable information similar to that collected in the DHS.

Table 1: Components of the CASHPOR House Index and adaptations to South India and China

CASHPOR House Index	Adaptation to South India	Adaptation to China
Size of House: Category Point Small 0 Medium 2 Large 6	**Size of House:** Category Point Small <20sq. meters 0 Medium 20-29 sq meters 2 Large >29 sq meters 6	**Size of House:** Category Point Small 0 Medium 2 Large 6
Structural condition: Category Point Dilapidated 0 Average 2 Good 6		**Structural condition:** Category Point Dilapidated 0 Average 2 Good 6
Quality of walls: Category Point Poor 0 Average 2 Good 6	**Height and materials of walls:** Category Point < 4 feet mud 0 4 feet mud 2 > 5 feet 6	**Quality of walls:** Category Point Poor 0 Average 2 Good 6
Quality of roof: Category Point Thatch /Leaves 0 Tin/Iron sheets 2 Permanent roof 6	**Quality of roof:** Category Point Thatch /Leaves 0 Tin/Iron sheets 2 Tiles & other good materials 6	**Quality of roof:** Category Point Non/Mud 0 Partial stone 2 Cement/Concrete 6

Source: Simanowitz, Nkuna and Kasim (2000)

The general guide to determining the poverty status of households is:
Score 3 or less   Very poor
Score 4-6   Poor
Score 7 or more   Not poor

---

[5] See www.cgap.org for a number of discussion papers on assessing the relative poverty of microfinance clients.
[6] CASHPOR is a network of 23 Grameen Bank replications in nine countries of Asia.

Where households score 4 or more they are excluded from being eligible for the program. As such there is an appeals process whereby households can ask for their eligibility to be reassessed through interview. It is argued that this approach to identifying the poor, and hence eligible clients for a poverty reduction program, can be highly effective[7] and low cost. However this is only the case where household characteristics have a strong relationship to poverty. For example, where the poor have benefited from public housing programs, as in some Scheduled Caste villages in southern India, the housing index is not an appropriate tool to distinguish between the poor and not poor.

There has been little systematic evaluation of the targeting efficiency of CHI. Two studies have compared the poverty rankings obtained as a result of using CHI and a PWR exercise and found a poor correlation (Simanowitz, 2000). There were many cases where people were judged to be living in poverty even though they had reasonable housing condition. For example, there were people living in houses constructed prior to the death of the main breadwinner. Given this, and the arbitrary nature of the weighting used, we would urge caution before extending its use beyond the area of MFI.

Participatory Wealth Ranking

Participatory Wealth Ranking offers a method for communities themselves to define who the poor are, providing a more holistic and people centred determination of poverty and its ranking (Bilsborrow, 1994). An important function of the methodology is the empowerment of the community, asserting the primacy of local knowledge over externally determined measurement criteria. The ranking is based on the subjective views of the people in a community, who generate their own criteria with which to rank poverty or wealth.

The ranking takes place in 3 steps: mapping, reference groups and analysis (Grandin, 1998).
Mapping: A community meeting is set up involving representatives from all areas of the village. A village map is then drawn and a list of households generated from the map. Each household is then given a card.
Reference Groups: Three reference groups are set up for each section of the village that has been mapped, with 3-5 members of the community in each group. Each group then meets separately and sorts the household cards into piles according to wealth on a continuum from high to low.
Analysis: The results of the ranking of the different reference groups are brought together and the piles are scored. The final score of each household is the average of the ranks it was given by the three reference groups.

The attraction of PWR is that it is conceptually simple, the results are transparent and given the involvement of the community in their derivation, the rankings are

---

[7] It is estimated by David Gibbons (founder of CASHPOR) that the CHI is about 80 percent accurate in areas where there is no effective government housing program.

widely accepted. However it requires skilled facilitators and deliberate distortion of results by participants can make the results unusable – although this is relatively rare. The main drawback from the perspective of monitoring progress towards the IDTS is that while this approach has been found to work well in identifying the poor at the village or neighbourhood level, it cannot be used to rank larger populations or determine the poorest in a large geographic region. It also tells us nothing about levels of absolute poverty. Nevertheless it offers a promising way forward for monitoring the poverty focus of interventions at the local level.

4.2.2 Lessons from proxy means testing

Valuable insights into alternative appropriate components for inclusion in asset indicators are offered by research carried out by economists and social policy analysts interested in identifying welfare proxies for the purposes of targeting welfare benefits (Grosh and Baker, 1995; Alexandrova and Braithwaite, 1997; Grosh and Glinskaya, 1998; Ahmed and Bouis, 2001). The steps involved in designing a proxy means test are detailed in Appendix III. A notable characteristic of all these studies is that they start by constructing a consumption aggregate (usually from a LSMS) and then identify a set of variables that correlate with this measure of household welfare. Interestingly, most proxy means-tests include direct summary questions on total household income and expenditure or sources of income.

Grosh and Glinskaya (1998) identify six classes of independent variables that are predicted to correlate with poverty:
• location,
• household composition,
• social categories (such as student or pensioner status),
• housing quality,
• ownership of assets and consumer durables and
• employment and verfiable income related variables.

In their work on developing a proxy means-test for Armenia, Grosh and Glinskaya (1998) found that overall the regression equations were relatively poor predictors of the variation in per capita expenditure (their preferred consumption aggregate), with the best equation producing an R squared of just 0.31. However, they also note that this may be a function of the particular circumstances of transition countries. In a full market setting, the assets which constitute the core of the proxies equation (human capital, housing, land, livestock etc.) are correlated with consumption both because past earnings were necessary to acquire the assets and because the assets can generate a return in the present. However, since markets are not fully developed in Armenia, the authors argue that it is not surprising that the correlation between assets and current expenditure is low. This reaffirms the point made earlier that greater

detail on both the asset and the timing of acquiring that asset may be required in transition countries than in other low income countries.

Ahmed and Bouis (2001) in their work on developing a proxy means test for targeting food subsidies in Egypt, found that the predictive performance of their model was relatively high. The regression model itself had an adjusted R squared of 0.43. However, when households were ranked by actual per capita expenditures and by predicted expenditures from the estimated model, it was found that nearly three-quarters of those defined as poor using actual expenditure were correctly predicted as poor, giving an error of exclusion of 28%. On the other hand, 16% of the actual non-poor were predicted as poor, representing the error of inclusion. Such targeting errors are within the bounds of tolerance of most programs.

4.2.3 Lessons from poverty mapping: combining survey and census data

Recent research on poverty mapping can also provide useful guidance on the development of proxy indicators. Poverty maps provide information on the spatial distribution of living standards and can provide an important policy tool for prioritising the distribution of government expenditures [8]. A major impediment to the development of detailed poverty maps is that data on economic welfare, such as income or expenditure, are usually only available in sample surveys whose limited sample size usually precludes disaggregation below the regional level. In contrast, census data, which have the required spatial coverage, generally lack the necessary detailed data. Thus most poverty maps rely on welfare indices that aggregate information from the census, such as access to public services and level of education. These indices are commonly labelled '*basic needs indicators'*.

In common with the experience with DHS based indices, most BNI have been constructed in a fairly ad hoc manner. In many cases the BNI are restricted to a subset of information from the census and focus almost exclusively on access to services and dwelling characteristics, making little use of other demographic and socio-economic information. Once again, there has been little attempt to validate the extent to which they provide reasonable proxies for household welfare due to data constraints. A notable exception is the work by Hentschel et al (2000) for Ecuador, detailed in box 3 below.

---

[8] For example see World Bank (1996) for Ecuador, Government of El Salvador (1995) for El Salvador and FONCODES (1995) for Peru.

Box 3: Case study: Evaluating the Basic Needs Indicator in Ecuador

In 1994 the National Statistical Institute of Ecuador developed a basic needs indicator at the household level. It consists of a weighted composite of five variables capturing access to water, access to sanitation services, access to waste disposal, education (of household head) and a crowding index (the number of people per bedroom).   Each service was allocated a certain number of points according to its availability and type or level. For each household the indicator was the sum of points across the services.

Level	Water	Sanitation	Waste	Education	Crowding
1	100	100	100	100	100
2	50	50	50	50	75
3	25	25	25	25	50
4	0	0	0	0	25
5	na	na	na	na	0

Water: Level 1 = public network; 2 = water truck; 3 = well; 4 = other.
Sanitation: Level 1 = in house, flush; 2 = in house, no flush; 3 =shared; 4 = other.
Waste: Level 1 =collection by trucks; 2 =burned or buried; 3 = discarded; 4 = other.
Education: Level 1 = household head has tertiary education; 2 = secondary; 3 =primary or literate; 4 = none or unknown.
Crowding: Level 1 = one person or fewer to a bedroom; 2 = between one and two; 3 = between two and three; 4 = between three and four; 5 = more than four.

Data from the LSMS for Ecuador can be used to examine how effectively the basic needs indicator performs vis a vis poverty measured by consumption expenditure.   Only 41% of those households identified by the basic needs criterion as constituting the poorest quintile are in fact among the bottom fifth according to consumption expenditure. Furthermore almost one in ten households ranked in the bottom quintile by the BNI were ranked in the top two consumption based quintiles. Thus, leakage from an allocation based on the basic needs criterion would be very high.

Source: Hentschel *et al* (2000)

In an attempt to improve the quality of the poverty map in Ecuador, Hentschel *et al* (2000) estimated a model of consumption using data from the LSMS including as explanatory variables those that are also available in the census. These included:

- demographic variables, such as the household's size and its age and sex composition;
- the education and occupation of each family member;
- the quality of housing (materials, size);
- access to public services, such as electricity and water;
- principal language spoken in the household;
- location of the household.

This represented a significant expansion on the restricted number of variables in the basic needs indicator detailed in Box 3 above.

Separate models were estimated for each region, distinguishing between urban and rural areas. The R squared values ranged from 0.46 for rural Sierra to 0.74 for rural Oriente. The parameter estimates from the models were then applied to

census data to predict the probability of a given household being poor and develop a new poverty map for Ecuador.

The study usefully demonstrates how sample survey data can be combined with census data to yield reasonably reliable estimates of poverty, even at fairly disaggregated levels. However, as the authors note, beyond a certain level of spatial disaggregation, the standard errors rise rapidly and caution needs to be applied. One practical application of this methodology would be to use the poverty maps in combination with other data on regional patterns. For example, the poverty map could be overlaid with a map documenting the location of primary health care facilities. This kind of exercise could help policymakers decide where to prioritise efforts to expand access to primary health care.

The study also serves to highlight the role that demographic and labour market characteristics can play in improving the predictive power of proxy indicators.

Rather than evaluating a census based BNI *after* the fact, pioneering work by the Tanzanian National Bureau of Statistics in collaboration with Oxford Policy Management (OPM, 2001) has recently used data from the 2000/01 Household Budget Survey for Tanzania to identify the most important variables for predicting expenditure and poverty status. It is envisaged that information from these predicators will be incorporated in the Population Census in 2002, and so maximize the Census' usefulness for poverty mapping.

Of the 19 variables included in the first estimation, only 8 were significant, with an R squared of 0.35:
- Household size
- Household dependency ratio
- Number of rooms in dwelling occupied by household
- Distance to drinking water
- Educational status of household head (above standard 4 or not)
- Type of Settlement (capital city/other urban/rural)
- Type of roof material
- Distance to nearest health clinic

The model was then expanded to include information on a wide range of assets such as ownership of hand milling machine, hoes, wheelbarrow video, books (not school books), iron, watch and music system. The addition of supplementary information on a total of 19 assets appreciably increased the amount of variance explained by the model, increasing the R squared to 0.45.

Prima facie, the modelling demonstrated a good case for collecting further information on asset ownership in the new census. However, as the authors highlight, the costs of collecting additional data also need be taken into account. Given it was not practical in the Tanzanian context to include questions on so many assets in the census, it was necessary to prioritise them by selecting a

subset that were thought to reflect key aspects of poverty with the specific context of Tanzania *and* increased the variance explained by the model. The final set of additional questions recommended to the Census team included ownership of a telephone, a radio, a bicycle, a hoe, a wheelbarrow and an iron (electric or charcoal).

As a next step it would be interesting to take the final set of indicators identified by the OPM work to be included in the 2002 Census and convert these into a welfare indicator using principal components method to estimate the weights, and then compare the relative welfare rankings
a) based on actual expenditure ;
b) based on predicted expenditure and ;
c) based on the scores on the asset indicator .

This would allow a direct evaluation of the two main approaches to using proxy indicators.

4.2.4 Lessons from the CGAP Poverty Assessment Tool

A promising new methodology for a simple low-cost tool for identifying the poor is offered by the CGAP Poverty Assessment Tool, which has recently been developed by The Consultative Group to Assist the Poorest (CPAG) of the World Bank in collaboration with the International Food Policy Research Institute (IFPRI). It's development is detailed in Zeller et al (2001).

The first step in the development of the CGAP tool was to identify a large number of indicators that 'powerfully reflect poverty and for which credible information can be quickly and inexpensively obtained' (Zeller et al, 2001, p.11). The initial compilation of indicators was based on a detailed review of results of large, in-depth surveys on household economics as well as of indicators and methods used by MFIs, famine early warning systems and national monitoring systems for food security, nutrition and vulnerability (see, for example Wratten, 1995). This yielded a total of over 300 indicators.

The indicators were then divided into two groups. The first group reflects the *means* to achieve welfare i.e. the income potential of the household and include indicators of the household's human capital (family size, education, occupation), physical capital (type and value of assets owned) and social capital. The second group includes indicators related to achievements in consumption in order to fulfil present and future basic needs (access to health services, food, electricity, energy, water, shelter and clothing, human security and environmental quality). From this it is clear that the CGAP tool is capturing a wider concept of poverty than simple material or economic poverty and is more akin to a measure of capability poverty.

The final selection of the variables to be field tested in a questionnaire was then based on a number of criteria, including the ease and accuracy with which the information could be collected.

Table 2: Indicators in the final CPAG questionnaire

Human resources	Dwelling	Food security & vulnerability	Assets
• Age & sex of adult household members • Level of education of adult household members • Occupation of adult household members • Number of children below 15 years of age in household • Annual clothing/ footwear expenditure for all household members	• Number of rooms • Type of roofing • Type of exterior walls • Observed structural condition of dwelling • Type of electrical connection • Type of cooking fuel used • Source of drinking water • Type of latrine	• Number of meals served in last two days • Serving frequency (weekly) of 3 luxury foods • Serving frequency (weekly) of 1 inferior food • Hunger episodes in last month • Hunger episodes in last 12 months • Frequency of purchase of staple goods • Size of stock of local staple in dwelling	• Area & value of land owned • Number & value of selected livestock resources • Value of transportation related assets • Value of electric appliances *Plus* Rural / urban indicator

The following indicators were rejected:

- Indicators using child-specific information. Not all households have children; hence using child-related information precluded some households from comparative analysis.
- Indicators of social capital. This is an evolving area of investigation, and measurable and comparable indicators were not easily found.
- Subjective responses. Responses on self-assessment of poverty were considered unreliable to be used in comparisons
- Health related information. Eliciting health-related information requires longer recall periods and more intensive and specialized training of interviewers. In the absence of training provided by health specialists (which is expensive), responses can be highly subjective and misleading.

The questions were field tested in four sites, one each in Central America, East Africa, Southern Africa and South Asia and the final questionnaire is presented in Appendix IV. The tool is still at the development stage are requires additional testing and validation but appears to offer an exciting additional to the poverty monitoring toolkit. In particular the food security and vulnerability indicators turned out to be particularly important in explaining differences in relative poverty in all four case studies.

4.2.5 Lessons from the development of the Core Welfare Monitoring Survey

Another survey tool that has recently attracted significant interest is the World Bank's Core Welfare Monitoring Survey (CWIQ). The CWIQ is a household survey that measures changes in key social indicators for different population groups, in particular indicators of access, utilization and satisfaction with core social and economic services. The survey was designed for improving project and sector program design and the targeting of services towards the poor and most disadvantaged communities.

The combining of the CWIQ with a household budget survey is a new experiment. It is intended that the CWIQ will serve as a source of rapid information on key social indicators and on service delivery indicators, whilst the larger follow-up survey will provide the money-metric measures needed to signal whether the numbers in poverty are increasing or decreasing. Because the two surveys are carried out on the same sample of households, it will be possible at the end to combine the results of the two surveys so as to cross-tabulate the CWIQ indicators by expenditure quintile. The questionnaire differs from the standard household surveys in that it has been designed to assist national statistical offices produce reliable results more quickly, for monitoring national programmes. These features include; large sample households, a simple questionnaire with multiple choice questions the use of optical scanners to speed data entry, pre-programmed validation procedures to ensure high built-in data quality levels, and "push-button" standardized outputs.

To fully analyse the CWIQ data, it is necessary to be able to distinguish between poor and non-poor households, and hence information from a household survey is incorporated for ranking household across expenditure quintiles. Information from both quantitative and qualitative, if the latter is available, is used to identify the set of explanatory variables that closely correlated to household aggregated total expenditure.

In an application to Ghana, the initial set of variables included household level variables and member level variables such as literacy and enrolment, aggregated at the household level. The "asset score" appeared to be highly correlated with aggregated household total expenditure. The score was constructed by assigning equal weight to each of the ten assets variables listed in the question and was found to suggest in qualitative studies, to be a strong determinant of poverty.

5. The Way Forward

The motivation for this paper is to inform discussions between DFID and other donors on possible ways forward to improve the poverty focus of monitoring progress towards the health related IDTS and other global initiatives, including the Global Health Fund (GHF). The key difficulty in measuring the effectiveness of health interventions in improving the health of the poor is that it requires high quality information on both poverty and health status in the same dataset. One obvious option is to adapt existing tools such as the DHS and LSMS. This would involve improving the health module of the LSMS or the socio-economic status module in the DHS (or both).

5.1 Improving information on health outcomes in the LSMS

The LSMS collect a wide variety of information on a range of socio-economic variables. As one of their primary aims is the measurement of living standards, there are detailed modules on consumption expenditures and income. In depth information is also collected on economic activity. They usually include only a few additional questions on health, although a number of LSMS do include a special module administered to women of reproductive age, which includes questions on children ever born and children surviving (from which infant mortality can be calculated), contraceptive knowledge, attitudes and practice (KAP), and utilisation of reproductive health services (Falkingham, forthcoming).

Diamond et al (2001) have discussed the types of information necessary for the reliable measurement of health outcomes at length. Given the already complex nature of the LSMS instrument, it may not be practical to include all the health related questions necessary for comprehensive monitoring of progress towards the health related IDTs and the GHF. However, this should not preclude the inclusion of some key variables that would allow valuable insights into the health of the poor. It is suggested that future LSMS should at a minimum include questions on self-reported health status (chronic, acute and mental health), utilisation of health services (both primary and tertiary) and, for women of reproductive age, birth history, KAP and use of health services during last pregnancy. Given the importance of private health expenditures in the impoverishment of households, it is suggested that information on both formal and other out-of-pocket payments related to health care should also be collected. There is already work underway within the World Bank to improve the identification and measurement of informal payments for health care. To date this has primarily focussed on the transition countries of Central and Eastern Europe and the FSU (see Lewis, 2000). However, given the growing importance of issues such as affordability and sustainability within the health sector, it is vital that this work is extended to other contexts.

5.2 Improving asset indicators in the DHS

Diamond et al (2001) argue persuasively that 'DHS information should be seen as the starting point for measuring the health of the poor'. Over the last five years there has been significant progress on the identification and use of proxy indicators of household welfare within the DHS, especially the pioneering work by Lant Pritchett and Leon Filmer. However, this review suggests that continuing to focus on the current, fairly narrow, range of asset questions currently included in the DHS is not sufficient and highlights the need for further work on the identification of a small set of suitable asset indicators.

Hentschel et al (2000) found that demographic characteristics of household members, their level of education and simple information on economic activity status were highly significant correlates of per capita household expenditure. Their focus on the demographic and socio-economic characteristics of *all* members of the household rather than the household head alone, as is common in other studies, is useful, overcoming the problem of missing data for household heads encountered in contexts where polygamy is widely practiced. The inclusion of such variables greatly improved the explanatory power of their model.

Similarly, the work by OPM demonstrated that proxy indicators can be significantly improved by the addition of a few, well selected, supplementary variables. The exciting work by IFPRI and CGAP (Zeller et al, 2001) highlights the importance of food security and vulnerability. Questions that capture these dimensions are relatively simple to ask, and have found to be powerful correlates of poverty (Falkingham, 2000).

The DHS currently collects information on the demographic characteristics of all household members. It also collects limited information on education and employment status. However these data have not been used in the construction of aggregate indices of household welfare. Further work is therefore necessary on two fronts: i) to explore whether it is possible to improve proxy indicators using existing DHS data and ii) to carry out further work on the identification of a small number of easily administered questions that could be included in future DHS. Questions to be explored should include alternative asset questions as well as indicators of food security and summary money metric measures. There is an urgent need to evaluate the potential possibilities offered by the CGAP and CWIQ instruments.

5.3 Better tools

A common criticism levied at the quantitative measurement of poverty based on household survey data is that household surveys by their very nature miss out an important group of poor people – the homeless and those in institutions. It is also argued that household surveys will tend to under-represent other poor population

groups such as slum dwellers. Work is in progress to improve this and the 1998/99 INFHS explicitly targeted slum pockets in their design by including three major cities with known slum populations. Again, more work on ways to improve the DHS's (and that of other surveys) coverage of the poor is needed.

Appendix I

(not included)

Appendix II Principal components and factor analysis

Principle Components Method

The Principle Components statistical procedure has been employed to determine the weights attributed to the variables within an asset index. As Filmer and Pritchett (1998) state, the procedure locates and removes the few orthogonal linear combinations of the variables from a large number which best portray the common information. The first principal component constitutes the linear index of variables with the most information which is common to all the variables.

The approach produces an asset index (Aj) for each household based upon the following formula:

$$A_j = f_1 (a_{j1} - a_1) / (s_1) + \ldots + f_n (a_{jn} - a_n) / (s_n)$$

Where for each household A_j
f_1 = the scoring factor for the first asset as calculated by the procedure
a_{j1} = the jth household's value for the first asset
a_1 = mean of the first asset variable over all households
s_1 = standard deviation of the first asset variable over all households
n = total number of assets included in the procedure
j = 1, …, j households
n = 1, …, n household assets

The scoring factor is the weight assigned to each variable in the linear combination of the variables which constitute the first principal component. Each variable is normalised by its mean and standard deviation. The assumption being, as stated by Filmer and Pritchett (1998), that household long-run wealth determines the most common variation in asset variables. The mean value of the index is zero. In short, the weights are the standardised first principal component of the variance-co-variance matrix of the observed household assets.

Factor Analysis

Factor analysis is generally used to reduce or group a large number of variables into a smaller number of factors – i.e. data reduction for instrument development or subsequent analysis (Munro, 1997). The method is based upon matrix algebra.

Factor analysis has been employed to obtain a set of weights for each asset in order to construct an index of household assets (Sahn and Stifel, 2000). This method produces an asset index (Ai) for each household based on the following formula:

$$A_i = w_1 \, a_{i1} + \ldots + w_k \, a_{ik}$$

Where for each household
a_{i1} = the ith household's value for the first asset recorded in the survey
k = total number of assets included in the procedure
w = weights to be estimated

Unlike the principle component procedure, factor analysis calculates the covariance of the assets in terms of a significantly smaller number of hypothetical common factors (Sahn and Stifel, 2000). Furthermore, it allows for asset-specific influences to explain the variances – i.e. all of the common factors are not forced to explain the entire covariance matrix. However, the two approaches do rank households similarly.

Using factor analysis, an explicit structure is imposed from the outset. The structural model here includes one factor because the assumption is that only one common factor explains the variance in the ownership of the set of assets. Sahn and Stifel (2000) assume that this common factor is a measure of economic status, i.e. welfare. The ownership of the observed assets is a linear function of the unobserved common factor for each household and the unobserved noise component.

Structural model:
$$a_{ik} = b_k \, c_i + u_{ik}$$

where
b_k = observed asset for each household
c_i = unobserved common factor for each household
u_{ik} = unobserved noise component (or unique element)
i = 1, …, N households
k = 1, …, K household assets

Appendix III Steps in designing a proxy means test

1. Measuring household welfare

The first step in designing a proxy means test is to define the measure of household welfare. This requires a full income and expenditure survey such as the LSMS.

2. Identifying correlates of household welfare

The next step in formulating a proxy means test is to identify a set of variables that correlate well with household welfare (per capita expenditure). In selecting the variables in is important to take 3 factors into account. First, they must be closely correlated with consumption to maximise accuracy in prediction and hence in targeting. Secondly, from a programmatic point of view they must be easily measurable. And thirdly, they need to be easily verifiable. Good predictors of consumption that cannot be measured or verified will undermine the administrative feasibility of the programme.

Most studies then use stepwise ordinary least squares (OLS) regression to predict expenditure (see Grosh and Baker, 1995 for a discussion on this).

In effect this is equivalent to estimating a consumption function where
$y_i = a + bx_i + e_i$.

There are a number of problems in using OLS to predict consumption. First OLS assumes that the covariance of x_i and e_i is zero which may in fact not be true. Secondly, many of the independent variables on the right hand side are endogenous. That is, the decisions the household makes concerning them are not independent of the decisions that determine the dependent variable, i.e. household welfare. Finally, as Grosh and Baker (1995) point out OLS does not minimise poverty per se but rather minimises the squared errors between the observed and predicted levels of welfare.

However it can be argued that the disadvantages of OLS are outweighed by its advantages. Given that the primary concern is to identify who is poor rather than explaining why they are poor, problems of endogeneity may not be so important. Furthermore, OLS copes well with the large numbers of variables and continuous variables that are needed for developing a proxy based means-test. Most importantly however from a practical point of view, is the fact that policymakers and the general public can easily understand the results. Whilst Ravallion and Chao's (1989) algorithm directly minimises poverty, and so theoretically may be a preferable tool for designing a transfer scheme, it is cumbersome to use when a large number of predictive variables are available and, more importantly, is unfamiliar to policymakers (Grosh and Baker, 1995).

3. Establishing eligibility

Once the equation has been specified, it is relatively straightforward to use the predicted household welfare level from the regression equation to assign households to the eligible or ineligible groups. Separate equations can be estimated for different regions and for rural and urban areas.

The decision as to where to set the cut off for eligibility (or the 'poverty line') is essentially arbitrary, determined by policy and factors such as available budgetary resources.

Grosh and Glinskaya (1998) identify six classes of independent variables that are predicted to correlate with poverty:
- location,
- household composition,
- social categories (such as student or pensioner status),
- housing quality,
- ownership of assets and consumer durables and
- employment and verifiable income related variables.

Variables:
- Household composition and characteristics
Age of head of household (possibly age-squared)
Sex of head of household
Number of children under 1.5 in household
Number of children 1.5 to 4 years old in household
Number of children aged 5-16 in household
Number of people aged 65 and over.
Pensioner living alone
Dummy for Ethnicity
Dummy for Educational level of head

- Social categories
No. of student aged over age 16
No. of Pensioner
No. of Disabled (1 if in receipt of disability pension, else 0)
No. of Orphans (1 if in receipt of 'pension in case of loss of breadwinner, else 0)

- Housing quality

Household lives in room or bed in dormitory (1, yes, 0 otherwise)
Draws water from spring, river etc, rainwater or other
No centralized supply of hot water
No bathing facilities in dwelling
No electricity
No centralised gas

Heats home from coal or wood stove

- Ownership of assets
Household has land (1, else 0)
Total Amount of land in hectares
Household involved in raising livestock, poultry, bees etc. (1, else 0)
Household has 1 cow
Household has 2 cows
HH has 3+ cows
Household has pigs
Household has sheep
Households has 1 horse
Household has 2 horses
Household has 3+ horses
Household has poultry
Automatic washing machine
Radio
Camera
Car
Sewing machine
Bike

- Employment and income related variables.
Employment status dummies
Verifiable income – wages from formal sector, cash benefits
Whether or not household has received remittances

Appendix IV CGAP Recommended Questionnaire

Assessing Living Standards of Households

International Food Policy Research Institute

A study sponsored by the Consultative Group to Assist the Poorest (CGAP)

Section A Household Identification

A1. Date (mm/dd/yyyy): __/__/____

A2. Division code: ☐☐

A3. MFI unit code: ☐☐

A4. Group code: ☐☐

A5.Group name: ☐

A6. Household code: ☐☐

A7. Household chosen as (1) client of MFI, or (2) nonclient of MFI? ☐

A8. Is household from replacement list? (0) No (1) Yes ☐

A9. If yes, the original household was (1) not found or (2) unwilling to answer, or (3) client status was wrongly classified: ☐

A10. Name of respondent:

Name of the household head ☐

Address of the household: ☐

A11. Interviewer code: ☐☐   A12. Date checked by supervisor (mm/dd/yyyy): ___/___/____

A13. Supervisor signature: _____

Section B. Family Structure

ID code	Name	Status of the head of the HH[a]	Relation to head of HH[b]	Sex[c]	Age	Max. level of school-ing[d]	Can write[e]	Main occupa-tion, current year[f]	Current mem-ber of MFI[e]	Amount of loan borrowed	Clothes/Footwear expenses for the last 12 months in local currency[g]
1	(HH head)										
2											
3											
4											
5											
6											
7											
8											

[a](1) single; (2) married, with the spouse permanently present in the household; (3) married with the spouse migrant; (4) widow or widower; (5) divorced or separated; (6) living mostly away from home but contributing regularly to household.

[b](1) head of the household; (2) spouse; (3) son or daughter; (4) father or mother; (5) grandchild; (6) grandparents; (7) other relative; (8) other nonrelative.

[c](1) male; (2) female.

[d](1) less than primary 6; (2) some primary; (3) completed primary 6; (4) attended technical school; (5) attended secondary; (6) completed secondary; (7) attended college or university.

[e](0) no; (1) yes.

[f](1) self-employed in agriculture; (2) self-employed in nonfarm enterprise; (3) student; (4) casual worker; (5) salaried worker; (6) domestic worker; (7) unemployed, looking for a job; (8) unwilling to work or retired; (9) not able to work (handicapped).

[g]In order to get an accurate recall the clothes and footwear expenses for each adult are preferably asked in the presence of the spouse of the head of the household. If the clothes were sewn at home, provide costs of all materials (thread, fabric, buttons, needles).

B2. Children members of household (from 0 to 14 years)

ID code	Name		Clothes/ Footwear expenses for past 12 months, in local currency[a]

Clothes and footwear expenses are asked for once those for adults have been recorded, an the presence of the spouse of the head of the household. In case of ready-to-wear clothing footwear items, include full price. In other cases, include cost of fabric, cloth as well as tailo and stitching charges

Section C. Food-Related Indicators

(Both the head of the household and his or her spouse should be present when answering for this section.)

C1. Did any special event occur in the last two days (for example, family event, guests invited)? (0) No (1) Yes ☐

C2. If no, how many meals were served to the household members *during the last 2 days*? ☐

C3. If yes, how many meals were served to the household members *during the 2 days preceding the special event*? ☐

C4. Were there any special events in the last *seven days* (for example, family event, guests invited)? (0) No (1) Yes ☐

(If "Yes," the "last seven days" in C5 and C6 should refer to the week preceding the special event.)

C5. During the *last seven days*, for how many *days* were the following foods served in a main meal eaten by the household?

Luxury food	Number of days served
Luxury food 1	
Luxury food 2	
Luxury food 3	

C6. During the *last seven days*, for how many *days* did a main meal consist of an inferior food only? ☐

C7. During the *last 30 days*, for how many days did your household not have enough to eat everyday?

(0) No (1) Yes ☐

C 8. During the *last 12 months*, for how many months did your household have at least one day without enough to eat? (0) No (1) Yes ☐

C9. How often do you purchase the following?

Staple	Frequency served
Staple 1	
Staple 2	
Staple 3	

(1) Daily (2) Twice a week (3) Weekly (4) Fortnightly (5) Monthly (6) Less frequently than a month ☐

C10. For how many weeks do you have a stock of *local staples* in your house? ☐

C11. If your household earnings increased by (US$10–$20), how much of that would you spend on purchasing additional food? (Estimate amount as 5% of GDP per capita.) ☐ ☐ ☐

(*Note:* Does not include alcohol and tobacco.)

Section D. Dwelling-Related Indicators

(Information should be collected about the dwelling in which the family currently resides.) ☐

D1. What is the ownership status of dwelling? (1) Owned (2) Given by relative or other to use (3) Provided by government (4) Rented ☐

D2. How many rooms does the dwelling have? (Include detached rooms in same compound if same household.)

D3. What type of roofing material is used in main house? (1) Tarpaulin, plastic sheets, or branches and twigs (2) Grass (3) Stone or slate (4) Iron sheets (5) Brick tiles (6) concrete ☐

D4. What type of exterior walls does the dwelling have? (1) Tarpaulin, plastic sheets, or branches and twigs (2) Mud walls (3) Iron sheets (4) Timber (5) Brick or stone with mud (6) Brick or stone with cement plaster ☐

D5. What type of flooring does the dwelling have? (1) Dirt (2) Wood (3) Cement (4) Cement with additional covering ☐

D6. Is the dwelling built on squatter land? (0) No (1) Yes ☐

D7. What is the observed structural condition of main dwelling? (1) Seriously dilapidated (2) Need for major repairs (3) Sound structure ☐

D8. What is the electricity supply? (1) No connection (2) Shared connection (3) Own connection ☐

D9. What type of cooking fuel source primarily is used? (1) Dung (2) Collected wood (3) Purchased wood or sawdust (4) Charcoal (5) Kerosene (6) Gas (7) Electricity ☐

D10. What is the source of drinking water? (1) Rainwater (2) Dam (3) Pond or lake (4) River or stream (5) Spring (6) Public well—open (7) Public well—sealed with pump (9) Well in residence yard (9) Piped public water (10) Bore hole in residence ☐☐

D11. What type of toilet facility is available? (1) Bush, field, or no facility (2) Shared pit toilet (3) Own pit toilet (4) Shared, ventilated, improved pit latrine (5) Own improved latrine (6) Flush toilet ☐

E. Other Asset-Based Indicators

E1.　Area of land owned: Agricultural _____ Nonagricultural _____

　　　Value of land owned: Agricultural _____ Nonagricultural _____

E2. Number and value of selected assets owned by household. (Ask household to identify any assets purchased with MFI loan and eliminate these from the table below.)

Asset type and code	Number owned	Resale value at current market price
tock		
1. Cattle and buffalo		
2. Adult sheep, goats, and pigs		
3.Adult poultry and rabbits		
4. Horses and donkeys		
Transportation		
5. Cars		
6. Motorcycles		
7. Bicycles		
8. Other vehicles		
9. Carts		
Appliances and electronics		
10. Televisions		
11. Video cassette recorders		
12. Refrigerators		
13. Electric or gas cookers		
14. Washing machines		
15. Radios 16. Fans		