

# 6

## *Measurement of Living Standards*

The common theme throughout this book is the examination of disparities in a particular health variable (be it health status, health service utilization, or payments for health care) across people with different standards of living. For example, the concern might be to see whether gaps in health outcomes between the poor and the better off have grown or whether they are larger in one country than another. This raises the question of how best to measure living standards. One approach is to use “direct” measures, such as income, expenditure, or consumption. Another is to use a “proxy” measure, making the best use of available data. One popular approach in this vein is to use principal components analysis to construct an index of “wealth” from information on household ownership of durable goods and housing characteristics.

In approaching the issue of living standards measurement, it is important to be aware of the limitations and potential problems of alternative measures. This requires an understanding not only of the conceptual differences between different approaches, but also of the problems that can arise in the construction of living standards variables. With this in mind, this chapter has four purposes: (i) to outline different approaches to living standards measurement, (ii) to discuss the relationship between and merits of different living standards measures, (iii) to discuss briefly how different measures can be constructed from survey data, and (iv) to provide guidance on where further information on living standards measurement can be obtained.

### **An overview of living standards measures**

#### *Direct measures of material living standards*

The most direct (and popular) measures of living standards are income and consumption. In general terms, income refers to the earnings from productive activities and current transfers. It can be seen as comprising claims on goods and services by individuals or households.

In contrast, consumption refers to resources actually consumed. Although many components of consumption are measured by looking at household expenditures, there are important differences between the two concepts. First, expenditure excludes consumption that is not based on market transactions. Given the importance of home production in many developing countries, this can be an important distinction. Second, expenditure refers to the purchase of a particular good or service. However, the good or service may not be immediately consumed, or at least

**Box 6.1** *Brief Definitions of Direct Measures of Living Standards*

*Income.* The amount of money received during a period of time in exchange for labor or services, from the sale of goods or property, or as a profit from financial investments.

*Expenditure.* Money payments or the incurrence of a liability to obtain goods or services.

*Consumption.* Final use of goods and services, excluding the intermediate use of some goods and services in the production of others.

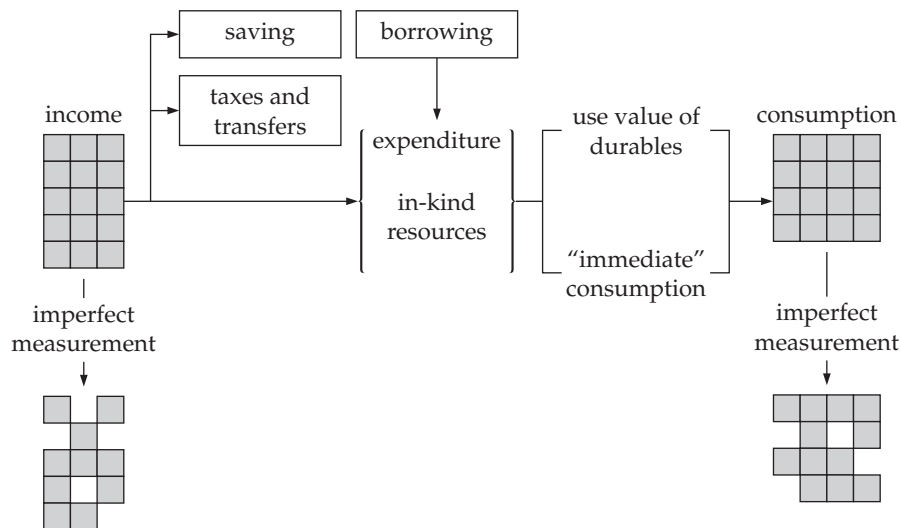
Source: Authors.

there may be lasting benefits. This is the case, for example, with consumer durables. Ideally, in this case, consumption should capture the benefits that come from the use of the good, rather than the value of the purchase itself (see box 6.1).

Measured income often diverges substantially from measured consumption (see figure 6.1). In part, this is due to conceptual differences in the respective terms—it is possible to save from income and to finance consumption from borrowing. Moreover, although this is not inherent in the definition of income, income surveys often exclude household production. There is a long-standing and vigorous debate about which is the better measure of standards of living. For developing countries, a strong case can be made for preferring consumption, based on both conceptual and practical considerations (Deaton and Grosh 2000).

1. Income is received only intermittently, whereas consumption can be “smoothed” over time. As a consequence, it is reasonable to expect that consumption will be more directly related to current living standards than will current income, at least for short reference periods. In other words, although the flow of consump-

**Figure 6.1** *The Relationship between Income and Consumption*



Source: Authors.

tion over a period of, say, a week or a month, may provide a good indication of the level of consumption during a full year, measured income over the same period is most likely an inaccurate measure of income for a full year.

2. Income and expenditure data are both difficult to collect. In developed countries, in which a large proportion of the population works in the formal sector and in which consumption patterns are very complex, the balance often tips in favor of measuring income rather than consumption. Even so, these surveys often have considerable problems dealing with self-employment, informal economic activities, and widespread reluctance to disclose information on income to survey enumerators. In developing countries, formal employment is less common, many households have multiple and continually changing sources of income, and home production is more widespread. In these contexts, it is generally far easier to measure consumption than income.

### *Proxy measures of living standards*

Both income and consumption data are expensive and difficult to collect, and many otherwise useful data sources lack direct measures of living standards (e.g., the demographic and health surveys [DHS]). On the face of it, this precludes the analysis of socioeconomic inequalities of health, as well as testing of hypotheses relating to the impact of living standards on health and health service outcomes. Moreover, the exclusion of living standards measures in multivariate analysis raises the possibility that other coefficient estimates are rendered biased. These concerns have prompted researchers to use data on household assets and other characteristics to construct alternative measures of welfare or living standards (Bollen et al. 2001; Filmer and Pritchett 2001; Montgomery et al. 2000; Sahn and Stifel 2000). This approach has the considerable merit of requiring only data that can be easily and quickly collected in a single household interview and, although lacking somewhat in theoretical foundations, can provide a convenient way to summarize the living standards of a household. There are three primary approaches to constructing welfare indices, which differ in how different household assets and characteristics are weighted in the overall index.<sup>1</sup>

- **“Arbitrary” approach:** Some studies have used what may be referred to as “naïve” indices to proxy or control for living standards, often constructed as the sum of indicator or dummy variables for whether a household possesses certain assets (Case et al. 2004; Montgomery et al. 2000; Morris et al. 2000). For example, a simple “asset score,” constructed by assigning equal weight to each of 10 assets, has been proposed as a “convenient proxy” in the context of the new core welfare indicator questionnaire (CWIQ) surveys.<sup>2</sup>
- **Principal components and factor analysis:** As an alternative to a simple sum of asset variables that are available in the data, it is possible to use statistical techniques to determine the weights in the index. The two most common

<sup>1</sup>In regression analysis, it is also possible to include assets and other living standards proxies separately in the analysis. Although that may provide adequate control for living standards, it does not permit a ranking of households or individuals.

<sup>2</sup>See <http://www4.worldbank.org/af/stats/cwiq.cfm>. The CWIQ methodology also suggests that assets can be selected and weighted on the basis of a consumption regression in cases in which the requisite data are available.

approaches for doing that are principal components analysis and factor analysis.<sup>3</sup> These are essentially tools for summarizing variability among a set of variables. Specifically, principal components analysis seeks to describe the variation of a set of variables as a set of linear combinations of the original variables, in which each consecutive linear combination is derived so as to explain as much as possible of the variation in the original data, while being uncorrelated with other linear combinations. Typically, the asset index is assumed to be the first principal component—that is, the first linear combination.<sup>4</sup> Principal components analysis suffers from an underlying lack of theory to motivate either the choice of variables or the appropriateness of the weights.

- **Predicting consumption:** In cases in which complementary consumption data are available—from a past or parallel survey—it may be possible to derive weights for a living standards index through a “consumption regression.” In other words, consumption data are regressed on a set of household assets and characteristics that are common to the two surveys, and coefficient estimates are used as weights. This approach draws on the techniques from the targeting literature, which seek to identify a set of variables that predict consumption and use this information to channel services or benefits (e.g., cash transfers) to the poorer segments of the population (Coady et al. 2004; Grosh and Baker 1995). Consumption regressions have also been implemented in other contexts, for example, to link survey and census data for the purposes of poverty mapping. In many cases, the estimated models have considerable predictive power. However, in both of these cases, the set of household and asset characteristics has been broader than has typically been the case for assets constructed through principal components or factor analysis, including for example, educational status, language, location, and ethnic affiliation. In other words, many of the attempts to predict consumption have included not only indicators but also determinants of income and consumption.

## Some practical issues in constructing living standards variables

### *Measuring income*

Broadly speaking, income is composed of earnings from productive activities and transfers. It is customary to distinguish four main components in the measurement of income: (i) wage income from labor services; (ii) rental income from the supply of land, capital, or other assets; (iii) self-employment income; and (iv) current transfers from government or nongovernment agencies or other households. There is, however, some disagreement about what exactly should be considered “productive

---

<sup>3</sup>For a detailed discussion of the statistical techniques, see Bartholomew et al. (2002).

<sup>4</sup>In contrast to the principal components approach proposed by Filmer and Pritchett (1999), Sahn and Stifel (2000) construct a welfare index on the basis of factor analysis. They argue that factor analysis is preferable to the principal component method because it does not force all of the components to accurately and completely explain the correlation structure between the assets. Despite the perceived advantages, they note that the Spearman rank correlation between the principal components and factor analysis asset indices is about 0.98 for each of the samples considered.

activities,” and hence, what should be included in income measures (McKay 2000). In particular, many attempts to measure income have not considered home production, although this can be conceived as a form of income. In cases in which home production is considered, practical considerations often limit the scope. For example, some income measures seek to include subsistence agricultural production in the calculation of household income. In contrast, “service activities” such as child minding performed in the household are generally excluded. For home-produced goods that are either exchanged by barter or consumed directly in the household, and for any income received in-kind, values have to be imputed.<sup>5</sup>

Although some surveys in developing countries—for example, in Latin America—have collected detailed income data, attention is often restricted to employment income. That is the case, for example, in most Living Standards Measurement Study (LSMS) surveys. Moreover, the quality of the data has often been poor. As a consequence, income data from these surveys have rarely been used as a proxy for living standards. If reasonably complete income data are available, a measure of total income may be a useful proxy for living standards, in particular if consumption data are not available. In cases in which consumption data are available, it is always advisable to try to assess the validity of the relative measures. That entails comparing household income with consumption aggregates, but it also requires a detailed analysis of the questionnaire and the data collection process.

### *Measuring consumption and constructing consumption aggregates*

As noted, consumption is seen by many as the preferred measure of living standards. Surveys have differed a great deal in the level of detail of their consumption modules. Some surveys have included comprehensive and detailed lists of consumption items. For example, the Brazilian budget survey uses a list of 1,300 items. Most surveys, however, are less detailed. The LSMS surveys, which have been designed and implemented with the explicit objective of measuring living standards, have included somewhere in the region of 20 to 40 food items and a similar number of nonfood items.<sup>6</sup> Because of this heterogeneity, it is not possible to provide general guidelines on how to construct consumption aggregates or to fully account for the methodological challenges and pitfalls in this process.<sup>7</sup> Here, we restrict ourselves to a general overview of the steps of the process.

Most surveys collect data on four main classes of consumption: (i) food items, (ii) nonfood, nondurable items, (iii) consumer durables, and (iv) housing.<sup>8</sup> Consumption is measured with a particular reference period in mind. Although the reference

---

<sup>5</sup>The imputation of values for home production is discussed in more detail below.

<sup>6</sup>Morris et al. (2000) have suggested that in many contexts, aggregate consumption can be proxied by a reduced list of consumption items. They report results in which a proxy constructed from 10 items was correlated with total household consumption at the  $r = 0.74$  level.

<sup>7</sup>There are, however, good sources of information on these issues. For example, Deaton and Zaidi (2002) provide a detailed review and offer many examples of Stata code.

<sup>8</sup>Because of the difficulty in defining meaningful shadow prices, most consumption measures exclude publicly supplied goods and services, even though these services can have a big impact on material living standards. Similarly, conceptual problems in establishing the value of leisure, in particular in contexts in which un- or underemployment is widespread, often make it impractical to include leisure as a component of consumption.

period varies, many surveys aim to accurately measure the total consumption of the household in the past year. In this way, temporary drops in consumption are ignored, and it is still possible to capture changes in living standards of a single individual or household over time. In some contexts—for example, where there are important seasonal variations in living standards—it may be appropriate to focus on time periods shorter than a year. The reference period should be distinguished from the recall period, which refers to the time period for which respondents are asked to report consumption in the survey. Recall periods tend to differ for different types of goods, such that reporting on goods that tend to be purchased infrequently is based on a longer time period. The balance has to be struck between capturing a sufficiently long period so that the consumption during the period is representative of the reference period (year) as a whole and making it sufficiently short such that households can remember expenditures and consumption with reasonable accuracy. Surveys have taken different approaches to striking that balance.

In general, there are three steps in the construction of a consumption-based living standards measure: (i) construct an aggregate of different components of consumption, (ii) make adjustments for cost of living differences, and (iii) make adjustments for household size and composition. These steps are discussed in turn.

**AGGREGATING DIFFERENT COMPONENTS OF CONSUMPTION** The first step in constructing a consumption aggregate is to simply add up the values of different types of consumption. However, before this can be done, a common reference period has to be established for all items, and values have to be imputed in cases in which they are not available.

**Food consumption:** A food consumption subaggregate is constructed through the aggregation of (i) food purchased in the marketplace, (ii) food that is home-produced, (iii) food items received as gifts or remittances from other households, and (iv) food received as in-kind payment from employers.

1. All data on food expenditures or consumption must be converted to a uniform reference period—for example, a year. Some care is required in this because the recall periods can sometimes vary for different types of food items. For example, some nonperishable food items are consumed infrequently. In these cases, “food consumed” during a recall period may be different from “food purchased.” Ideally, that should be reflected in the questionnaire design by extending the recall period for these items.
2. In some surveys, data may be available for more than one reference period. For example, some LSMS surveys collect data both on food expenditures in the “past two weeks” and on food expenditures in a “usual month.” In these cases, a choice has to be made, taking into account the benefits and problems of alternative designs.
3. Many households, in addition to consuming goods and services procured in the market, also produce goods for the market or home consumption. Home production presents both theoretical and practical challenges that relate to determining the appropriate value of home-produced goods and services.<sup>9</sup>

---

<sup>9</sup>In situations in which a large proportion of consumption comes from home production, there is a real risk that the measures of living standards reflect assumptions about the value of different goods and services, rather than some theoretically appealing measure of welfare.



In most surveys, attention is restricted to home-produced food, which typically is captured in a separate questionnaire module. The survey may collect data only on the value of different home-produced food items, or on both value and quantity. If data on the value of these items are not available, it is possible to impute the value by using quantities and estimates of “farm-gate” prices.

4. Information on food received as in-kind payment may not be collected in all surveys, or it may be collected in a different part of the questionnaire from other food-related questions. If the data are available, the values should be added to other food consumption for a subaggregate.

**Nonfood consumption:** Most surveys collect data only on purchased nonfood items and do not consider home-production. Data generally are collected on a wide range of items. However, because values rather than quantities typically are reported, the aggregation is straightforward.

1. Similarly to food consumption, the recall period may vary for different nonfood consumption items. It may be a month for daily-use items, but considerably longer for items that are purchased less frequently. It is therefore important to ensure that the data are converted to a common reference period.
2. It may also be advisable to exclude some nonfood expenditures—for example, tax payments, gifts, and transfers to other households as well as lumpy expenditures (marriages, funerals, etc.). However, there are no general rules in this regard, and it will require a judgment based on considerations of the particular context and on how the data will be used.

**Consumer durables:** We have noted that in the case of durable goods, it is not appropriate to measure consumption by expenditure on the item. Rather, consumption refers to the “rental equivalent” or “user cost” of the good. This can be thought of as comprising two components: (i) the opportunity cost of funds tied up in the durable good and (ii) the depreciation of the good. Generally, these values must be imputed. For this reason, most surveys collect data on the stock and characteristics of durables, rather than on expenditures on these items.

1. Generally, the most important “durable good” is housing. In this case, rental data are sometimes available. For households that do not report rent, a value can be imputed by using the relationship between rent and housing characteristics in the subset of households that report rent (a “hedonic regression”).<sup>10</sup> However, this approach can be tenuous in contexts in which this subset is a small proportion of all households or in which these households are “unrepresentative” in respect to the relationship between paid rent and housing characteristics.
2. For other household durables, the imputation of values is normally done on the basis of data on date of purchase and cost of acquisition, combined with assumptions about the lifetime of the good. Alternatively, depreciation rates can be calculated using reported “current values.” Procedures are described in detail by Deaton and Zaidi (2002).

---

<sup>10</sup>A “hedonic regression” simply refers to the regression of rental value on a number of housing characteristics (e.g., number of rooms, type of floor, type of roof, access to water, type of toilet, etc.). The estimated relationship can be used to predict values for households in cases in which rent is not observed (but housing characteristics are).

**ADJUSTING FOR COST-OF-LIVING DIFFERENCES** Monetary estimates of total consumption must be adjusted to reflect differences in prices. This concerns mainly regional differences in prices. For example, prices tend to be lower in rural than in urban areas, at least for some goods and services. However, if the fieldwork was carried out during an extensive period, it may also be necessary to take into account temporal variation in prices, even in a simple cross-section survey.

Price adjustments raise both practical and conceptual issues (Deaton and Grosh 2000; Deaton and Zaidi 2002). At a practical level, a decision has to be made about the source of price data. In general, there are three options: (i) household-level data on the volume and value of purchases, (ii) a dedicated price questionnaire, or (iii) price data from separate price surveys. Although household-level price data have some problems—in particular in relation to the definition of units of consumption and heterogeneity in quality—generally, they are seen as the preferred source. It may, however, be advisable to average prices over households in clusters. Price data from market or community questionnaires have also been used in many surveys. Although these data can be difficult to collect and have limitations, they are a useful substitute. Data from statistical offices or ministries of finance are often based on irregular price surveys, and the spatial disaggregation of the data may be limited. These types of data should hence be used only as a last resort.

In general terms, a price index is constructed as a weighted sum of price ratios of different commodities,

$$PI = \sum_k w_k \left( \frac{p_k^h}{p_k^0} \right),$$

where  $k$  is the set of commodities,  $w$  is the weight,  $p^h$  is the price faced by the household, and  $p^0$  is a reference price (often the median price for the respective commodity). There are different approaches to constructing a price index. The fundamental difference concerns the weights that are used. For a Paasche price index, the weights are simply the share of each household's budget devoted to the particular good. As a consequence, the weights vary across households. In contrast, the Laspeyres price index uses the same weights for all households, based on budget shares of households on or near the poverty line. The results from the different approaches correspond to different theoretical approaches to the measurement of welfare and can sometimes lead to different findings. Although the Laspeyres price index may be more convenient to calculate because the weights are constant, Deaton and Zaidi (2000) suggest that the Paasche index is preferable because it tends to indicate welfare more correctly.

**ADJUSTING FOR HOUSEHOLD SIZE AND COMPOSITION** As noted, most surveys use the household as a unit of observation in the measurement of consumption. The reason is that it would be both costly and time-consuming to collect consumption data on an individual basis. It also facilitates the treatment of joint household goods such as housing, where it is not possible to assign consumption to specific individuals. Although this is convenient, we are often interested in *individual* consumption or welfare.<sup>11</sup> To obtain individual-level estimates, it is necessary to adjust household

<sup>11</sup>Treating the household as the unit of observation also ignores the possibility that the intra-household distribution of resources can be very uneven.



estimates of aggregate consumption to reflect household size and composition. This is done by using a deflator, or equivalence scale. In the simplest case, we can simply use the number of household members to convert household consumption into individual consumption. However, although per capita household consumption is a convenient measure of living standards, it ignores household economies of scale that arise because some goods and services that are consumed by the household have public good characteristics—that is, they generate benefits for other household members besides the primary consumer. There may also be age- or gender-specific differences in consumption needs (in particular to reflect the consumption needs of children relative to adults).

Reflecting these concerns, equivalence scales can be constructed as some function of the household size and demographic composition provided estimates are available for household economies of scale and the cost of children. A common approach is to define the number of adult equivalents (AE) in the household as

$$AE = (A + \alpha K)^\theta,$$

where  $A$  is the number of adults in the household,  $K$  is the number of children,  $\alpha$  is the “cost of children,” and  $\theta$  reflects the degree of economies of scale (Cirto and Michael 1995). The challenge is to determine the appropriate values for  $\alpha$  and  $\theta$ . Identifying equivalence scales is notoriously difficult (Deaton 1997). Behavioral (Deaton and Muellbauer 1986; Deaton and Paxson 1998) and subjective (van Praag and Warnaar 1997) approaches have been taken. While recognizing the difficulty of identifying equivalence scales for developing countries, Deaton and Zaidi (2002) propose values in the region of 0.3 to 0.5 for  $\alpha$  (higher in developed countries) and 0.75 to 1.0 for  $\theta$ , given that food accounts for a large proportion of total consumption, and economies of scale are relatively limited.<sup>12</sup>

### *Constructing an asset index*

PRINCIPAL COMPONENTS AND FACTOR ANALYSIS Because asset indices constructed from principal components and factor analysis generally are highly correlated, the choice of technique is mainly a matter of convenience.<sup>13</sup> In the case of principal component analysis, the asset index,  $A_i$ , for individual  $i$  is defined as follows:

$$A_i = \sum_k \left[ f_k \frac{(a_{ik} - \bar{a}_k)}{s_k} \right],$$

<sup>12</sup>The selection of values of  $\alpha$  and  $\theta$  is not a strictly technical exercise, but also reflects value judgments. For example, there are no clear technical grounds on which to determine how the value of household public goods declines as it is shared across more household members. Similarly, although the nutritional requirements of children relative to adults can be determined on technical grounds, other child “needs” are more difficult to establish. Given inherent uncertainty about the parameter values and given that the choice of parameter reflects value judgments, it is advisable to construct several individual consumption aggregates and to test the robustness of findings to different assumptions concerning economies of scale and consumption needs. Insofar as findings (e.g., comparisons of inequality over time and across countries) vary on the choice of parameters, analysts need to assess not only the soundness of chosen parameters on technical grounds, but also whether the choice is consistent with the views and values of policy makers and society.

<sup>13</sup>For a detailed discussion of how to construct asset indices, see Vyas and Kumaranayake (2006).

where  $a_{ik}$  is the value of asset  $k$  for household  $i$ ,  $\bar{a}_k$  is the sample mean,  $s_k$  is the sample standard deviation, and  $f_k$  are the weights associated with the first principal component.

Such an index can be computed fairly easily in many statistical packages. In Stata, principal components or factors are computed by the following:

```
#delimit ;
global assets "elctrcty radio fridge tv bike motor_bike car
tele water_piped water_pumpwell water_pubwell water_open
water_other wc latrine floor_dirt floor_cement floor_brick floor_
adobe floor_parq floor_other persroom";
#delimit cr
factor $assets [aw=weight], pcf
```

where the list of household assets and characteristics are specified in the global macro `assets`.<sup>14</sup> Because the option `pcf` is specified, this command extracts the principal components.<sup>15</sup> The default is to perform ordinary factor analysis. An option `factors()` can be added to control the number of factors that are extracted. For example, if one is interested only in the first principal component, `factors(1)` could be added. The command displays a table of components, and it is possible to read off the proportion of variance in the variables that is accounted for by each component.

In the construction of living standards indices on the basis of principal components analysis, it is generally assumed that the first component is an adequate measure of welfare. The index is computed with the following:

```
predict asset_index
```

This is essentially the sum of the asset variables, weighted by the elements of the first eigenvector. If consumption data are available, the correlation with the asset index can be examined. In fact, living standard indices based on principal components analysis often have a weak relationship with consumption, with correlation coefficients often in the region of 0.2 to 0.4. In part, this may be due to a poor selection of asset variables, but there may also be deeper reasons that consumption is only weakly related to asset ownership.<sup>16</sup>

Health variables are often compared across quantiles of some measure of living standards—income, consumption, or an assets index. In Stata, a categorical variable identifying quantiles can be computed by the following:

```
xtile quintile=asset_index [aw = weight], nq(5)
```

Here, we construct quintiles (`nq(5)`). Note that weights must be applied if the sample is not self-weighted.

---

<sup>14</sup>The command `#delimit ;` changes the way Stata reads code in a do-file. Rather than executing line by line, the program now treats semicolons as the end of the commands. This means that commands can be spread over several lines to improve readability. The command `#delimit cr` returns to the default setting of line-by-line processing. An alternative way of spreading a command over multiple lines is to end a command line with `///`.

<sup>15</sup>Alternatively, principal components can be computed in Stata using the command `pca`.

<sup>16</sup>Moser (1998) has argued that the choice of asset indicators needs to be tailored to the circumstances of a particular context.

**USING FACTOR WEIGHTS FROM ANOTHER SURVEY** Nationally representative samples do not provide the detailed data required to answer all questions of interest. For example, one might be interested in utilization of a specific health service that is not separately identified in a national survey. Or, one might be interested in the use of a specific provider or in health or health service utilization in a particular locality. In such cases, a detailed but small-scale and nonrepresentative survey may be undertaken to extract the required data on the health variable of interest. For example, an exit survey could be used to collect data directly from the users of a particular service. Given the detailed consideration of health variables in such a study and the limited time available for enumeration, it will not usually be possible to have detailed measurement of income or consumption. Recording assets and housing conditions is easier and offers a more feasible way of assessing living standards. Factor or principal components analysis could be applied to the assets data from the specific survey. But one may worry that the weights derived from such a specialized survey may not be consistent with those that would be obtained from a nationally representative survey and further, one may be interested in where sample observations lie in the national distribution of living standards. If there exists a national survey that collects data on the same assets as those in the specific survey, then the former can be used to compute factor weights and these can be applied to the specific survey assets data to derive assets index scores that can be assessed against the national distribution of the index.

This is the approach adopted by, for example, Thiede et al. (2005) in their study of the use of HIV/AIDS voluntary counseling and testing (VCT) services in South Africa. They collected data on assets from users of public clinics in townships only and computed a wealth score using the principal component factor loadings from an analysis of all urban households in the national demographic and health survey (DHS). From the DHS data, the cutoff points for wealth quintiles in South Africa's whole urban population could be calculated and the fraction of township residents located in each urban wealth quintile identified. Township residents were concentrated in the middle part of the urban wealth distribution—only 14 percent of the township population was located in the poorest urban wealth quintile, and only 8 percent was in the richest quintile (see table 6.1). The fraction of township clinic users could then be compared with the respective population shares in each wealth quintile for the entire urban population. For example, although the poorest urban quintile accounted for 8 percent of the township population, it accounted for 36 percent of township VCT users (table 6.1). The richest urban quintile, although

**Table 6.1** *Percentage of Township Population and Users of HIV/AIDS Voluntary Counseling and Testing Services by Urban Wealth Quintile, South Africa*

<i>Urban quintile</i>	<i>Percent of township population</i>	<i>Percent of users of HIV/AIDS VCT services</i>
Poorest 20%	14.0	35.6
2nd	23.7	38.9
3rd	28.8	17.3
4th	25.4	7.2
Richest 20%	8.1	1.0

*Source:* Thiede et al. 2005.

accounting for 8 percent of the township population, accounted for just 1 percent of township VCT users.

### **Does the choice of the measure of living standards matter?**

So far, we have focused on the construction of different measures of living standards. We have noted that there are both conceptual and practical differences between different measures. But one could reasonably ask which is the “best” measure. Unfortunately, there is not a simple answer to this question. Arguably, income is an inferior measure, not only because of measurement challenges, but also because for most households the fluctuation in income over time does not imply commensurate changes in living standards. In other words, if a household suffers a temporary negative income shock due to illness, but is able to maintain consumption through savings or insurance, it may be misleading to rank the household based on income or to express out-of-pocket payments as a share of income.

On normative grounds, most analysts prefer to assess living standards with reference to some notion of long-term command over resources. This latent variable can be proxied by consumption or an asset index. As mentioned above, most economists prefer consumption because it is rooted in economic theory. Consumption data, however, are expensive to collect and may also be more susceptible to measurement error.<sup>17</sup> In contrast, asset and housing data are easier to collect and potentially less susceptible to measurement error.

In practice, the correlation between consumption and asset indices is often low. But does the choice between these two measures matter for the analysis of health equity? Montgomery et al. (2000) show that although asset indices are often poor predictors of consumption, they may still be useful in testing the hypothesis of whether consumption is a significant determinant of health outcomes, in particular in cases in which sample sizes are large and there is a great deal of variation in consumption.<sup>18</sup> They also find little evidence that the use of asset indices to proxy for consumption results in biased coefficient estimates on other variables of interest. Focusing specifically on health equity, Wagstaff and Watanabe (2003) compare measured inequality in wasting and stunting for 19 countries (based on LSMS data) and find that for most countries the choice between consumption and the asset index as the welfare measure makes little difference to the measured degree of socioeconomic inequality in malnutrition. This finding offers a degree of confidence to analysts who are concerned about the robustness of their results.

But robustness is not a consistent finding. Results have also been shown to be sensitive to the choice of assets and household characteristics that are included in the index (Houweling et al. 2003). Moreover, in some contexts, the choice of welfare indicator can drive conclusions in important ways. This is the case, for example, in Mozambique, where the choice of welfare indicator has a large and significant impact on socioeconomic inequalities in service use and on the incidence of public

---

<sup>17</sup>Although measurement error in consumption has been used as an argument for asset indices (Filmer and Pritchett 2001; Sahn and Stifel 2003), measurement error can also be an important problem in the collection of data on household assets and characteristics. As a result, reliability of asset-based measures of SES may also be low (Onwujekwe et al. 2006).

<sup>18</sup>See also Bollen et al. (2001), Sahn and Stifel (2003), and McKenzie (2005).

spending (Lindelow 2006). For most health services, this study found less inequality in utilization when consumption rather than the assets index was used as the living standards measure. For example, although the poorest quintile ranked by the assets index received only 9.6 percent of all child immunizations, the poorest quintile ranked by consumption received 21.4 percent. For health center visits, inequality moved in the opposite direction—there was inequality favoring the poor using the assets index as the living standards measure but inequality favoring the rich using consumption.<sup>19</sup> Clearly such results suggest that the sensitivity of results to the living standards measure should be checked when it is possible to do so.

## References

- Bartholomew, D., F. Steele, I. Moustkaki, and J. Galbraith. 2002. *The Analysis and Interpretation of Multivariate Data for Social Scientists*. London, England: Chapman and Hall.
- Bollen, K. A., J. L. Glanville, and G. Stecklov. 2001. "Socioeconomic Status and Class in Studies of Fertility and Health in Developing Countries." *Annual Review of Sociology* 27: 153–85.
- Case, A., C. Paxson, and J. Ableidinger. 2004. "Orphans in Africa: Parental Death, Poverty, and School Enrollment." *Demography* 41(3): 483–508.
- Cirto, C., and R. Michael. 1995. *Measuring Poverty: A New Approach*. Washington, DC: National Academy Press.
- Coady, D., M. Grosh, and J. Hoddinott. 2004. *Targeting of Transfers in Developing Countries: Review of Lessons and Experience: Regional and Sectoral Studies*. Washington, DC: World Bank.
- Deaton, A. 1997. *The Analysis of Household Surveys: A Microeconomic Approach to Development Policy*. Baltimore, MD: Published for the World Bank [by] Johns Hopkins University Press.
- Deaton, A., and M. Grosh. 2000. "Consumption." In *Designing Household Survey Questionnaires for Developing Countries: Lessons from 15 Years of the Living Standards Measurement Study*, ed. M. Grosh and P. Glewwe. Washington, DC: World Bank.
- Deaton, A., and J. Muellbauer. 1986. "On Measuring Child Costs: With Applications to Poor Countries." *Journal of Political Economy* 4: 720–44.
- Deaton, A., and C. H. Paxson. 1998. "Economies of Scale, Household Size, and the Demand For Food." *Journal of Political Economy* 106: 897–930.
- Deaton, A., and S. Zaidi. 2002. "Guidelines for Constructing Consumption Aggregates." LSMS Working Paper No. 135. World Bank, Washington, DC.
- Filmer, D., and L. Pritchett. 1999. "The Effect of Household Wealth on Educational Attainment: Evidence from 35 Countries." *Population and Development Review* 25(1): 85–120.
- Filmer, D., and L. Pritchett. 2001. "Estimating Wealth Effects without Expenditure Data—or Tears: An Application to Educational Enrollments in States of India." *Demography* 38(1): 115–133.
- Grosh, M., and J. Baker. 1995. "Proxy Means Tests for Targeting Social Programs: Simulations and Speculation." LSMS Working Paper No. 118. World Bank, Washington DC.
- Houweling, T. A., A. E. Kunst, and J. P. Mackenbach. 2003. "Measuring Health Inequality among Children in Developing Countries: Does the Choice of the Indicator of Economic Status Matter?" *Int J Equity Health* 2(1): 8.

---

<sup>19</sup>See chapter 8 for further discussion of this study.

- Lindelow, M. 2006. "Sometimes More Equal Than Others: How Health Inequalities Depend on the Choice of Welfare Indicator." *Health Economics* 15: 263–79.
- McKay, A. 2000. "Should the Survey Measure Total Household Income?" In *Designing Household Survey Questionnaires for Developing Countries: Lessons from 15 Years of the Living Standards Measurement Study*, ed. M. Grosh and P. Glewwe. Washington, DC: The World Bank.
- McKenzie, D. J. 2005. "Measuring Inequality with Asset Indicators." *Journal of Population Economics* 18(2): 229–60.
- Montgomery, M. R., M. Gragnoloti, K. Burke, and E. Paredes. 2000. "Measuring Living Standards with Proxy Variables." *Demography* 37(2): 155–74.
- Morris, S. S., C. Calogero, J. Hoddinot, and L. J. M. Christiaensen. 2000. "Validity of Rapid Estimates of Household Wealth and Income for Health Surveys in Rural Africa." *Journal of Epidemiology and Community Health* 54: 381–87.
- Moser, C. 1998. "The Asset Vulnerability Framework: Reassessing Urban Poverty Reduction Strategies." *World Development* 26(1): 1–19.
- Onwujekwe, O., K. Hanson, and J. Fox-Rushby. 2006. "Some Indicators of Socio-economic Status May Not Be Reliable and Use of Indices with These Data Could Worsen Equity." *Health Economics* 15(6): 639–44.
- Sahn, D. E., and D. C. Stifel. 2000. "Poverty Comparisons Over Time and Across Countries in Africa." *World Development* 28(12): 2123–55.
- Sahn, D. E., and D. C. Stifel. 2003. "Exploring Alternative Measures of Welfare in the Absence of Expenditure Data." *Review of Income and Wealth* 49(4): 463–89.
- Thiede, M., N. Palmer, and S. Mbatsha. 2005. "South Africa: Who Goes to the Public Sector for Voluntary HIV/AIDS Counselling and Testing?" In *Reaching the Poor with Health, Nutrition and Population Services: What Works, What Doesn't, and Why*, ed. D. R. Gwatkin, A. Wagstaff, and A. S. Yazbeck. Washington, DC: World Bank.
- van Praag, B. M. S., and M. F. Warnaar. 1997. "The Cost of Children and the Use of Demographic Variables in Consumer Demand." In *Handbook of Population and Family Economics*, ed. M. Rosenzweig and O. Stark, 241–73. Amsterdam, Netherlands: North-Holland.
- Vyas, S., and L. Kumaranayake. 2006. "Constructing Socio-Economic Status Indices: How to Use Principal Components Analysis." *Health Policy Plan* 21(6): 459–68.
- Wagstaff, A., and N. Watanabe. 2003. "What Difference Does the Choice of SES Make in Health Inequality Measurement?" *Health Economics* 12(10): 885–90.