

MEASURING POVERTY

Poverty Monitoring and Analysis Project
Ministry of Planning

Poverty is a multidimensional concept: The concept of poverty is applied to situations at both individual (or household) and country levels. From both these perspectives, poverty is a multidimensional concept. At the country level poverty is linked to the capacity of the economy to provide a central administration with sufficient resources to develop infrastructures, organize public services and implement development programs. Key economic factors that determine this capacity include: the level of economic activity, the state of the international market, and the currently exchange rate. While the first of these three factors can be directly affected by policy at national level, the latter two are closely related to the global economic context. In addition, social factors are also key determinants of the capacity of the economy to provide adequate resources to the central administration.

Links between poverty at household level and poverty at country level are complex: positive economic growth rate (measured, for example as an increase in per capita GDP) may be accompanied by impoverishment of particular sub-population. Such vulnerable groups often include workers migrating from rural areas in search of economic opportunities in the cities, where they often make a precarious living at the margin of urban development. Industrial activity requiring large amounts of cheap labor may generate appreciable taxes and income from export while workers receive low wage with limited job security and little negotiating power.

Despite the complexity of the concept of poverty, it is essential for policy makers and social actors in general to have access to a quantitative assessment of the poverty situation. Quantitative knowledge is required both to follow changes over time (in order to monitor the impact of policy implementation) and to compare with the situation in other countries. In Cambodia, substantial efforts have been made over the last decade, both by the central administration and by the international community, to collect information countrywide about a range of demographic and socio-economic variables. Measuring poverty, as with all measurement of social issues, necessarily requires simplification. Many of the dimensions of poverty described above are difficult – or impossible – to quantify. Even for those features that seem possible to measure, summarizing various dimensions in a single index is highly challenging. In order to provide a measure of

poverty it is necessary to make choices, leading to a simplification of the concept of poverty.

However, measurement of poverty is necessary in order to provide essential information for all programs that aim to reduce poverty. For example, the World Bank discussion paper, *A Poverty Profile of Cambodia*, states: *“Better and up -to-date information about the poor is essential to assist the government in designing effective policies for attacking poverty. Who are the poor? How many poor are there? Where do they live? What are their sources of income? Policies intended to help the poor cannot succeed unless the Government knows who the poor are and how they are likely to respond to public interventions”, (Prescott and Pradham, 1997).*

Therefore, we must simplify. Two aspects of poverty are more easily quantified than others and can be used as a basis for poverty assessment – individual income and consumption values⁶. In Cambodia, consumption values have been selected as the basis for attempts to quantify poverty. The main reason for selecting consumption rather than income, as a basis for a poverty index is that discrepancies are often observed between declared an income and declared consumption, with the declared income being significantly lower than declared consumption. Another reason is that there is more information available on consumption than income as the socio-economic surveys of 1993/94 and 1997 focus on consumption assessment. Consumption data are usually more reliable than those of income. The first countrywide survey to provide information on income was the 1999 SES.

Poverty lines

The consumption level that separates the poor from the rest of the population is called the poverty line. The first step in calculating a consumption-based index to assess a level of consumption below which an individual will be defined as poor: the so-called poverty line. It is well known that if consumption is divided into two categories, food consumption and non-food consumption, the poorer people are, the higher the proportion of their overall consumption that is accounted for by food consumption. In determining consumption levels that can be used to separate the poor from the non-poor, food consumption is the most significant measure. **Thus a food poverty line (a minimum level of food consumption) is first calculated. A non-food minimum allowance is then calculated and added to the food poverty line to provide the total poverty line.**

Once a poverty line has been set, a number of summary statistics describing the incidence, depth and severity of poverty may be calculated. These include the headcount index (which measures the incidence of poverty), the poverty gap (which measures the depth of poverty) and the squared poverty gap (which measures the severity of poverty). Foster, Greer and Thorbecke (1984) show that these three poverty measures may all be calculated using the following formula:

$$P_{\alpha} = \frac{1}{N} \sum_{i=1}^M \left(\frac{z - y_i}{z} \right)^{\alpha}, \text{ where } \alpha \geq 0$$

Where:

- y_i is the average real spending of the household member i (here per capita expenditure for person i)
- z is the poverty line (FPL or OPL)
- N is the number of people in the sample population (all household members in adult equivalents)
- M is the number of poor people (all household members in adult equivalents below the poverty line) and
- α can be interpreted as a measure of inequality aversion or coefficient reflecting different degrees of importance, which a government might accord to the depth or severity of poverty.

Poverty indices

When individual consumption is compared with the corresponding poverty line value, classified as poor are those whose level of consumption is below the poverty line. A series of indexes may be derived for the purpose of describing and comparing situations. The indicator most often used is the headcount index, which give the percentage of the population classified as poor. It is this index, which is used in the body of the report. It belongs to the family of indices derived from the Foster, Greer and Thorbecke equation above. The sum runs over all poor (from 1 to M), and α is a parameter that runs from 0 to whatever wanted (one seldom goes after 2).

i) Incidence of poverty

When $\alpha = 0$, the above equation reduces to $P_0 = M/N$, the number of poor people in the population divided by the number of people in the sample population. This very

⁶ Consumption data is collected at household level. Individual consumption values are calculated by dividing the household value by the size of the household (Knowles, 1998).

commonly used measure of the incidence of poverty is called the headcount ratio or, when turned into a percentage, the headcount index (proportion of person whose expenditure level is under the poverty line). Although it is easy to interpret, the headcount index is not sensitive to how far below the poverty line poor people are.

ii) Intensity of poverty

When $a = 1$, $P_1 = \frac{1}{N} * \sum_{i=1}^M \frac{z - y_i}{z} = \frac{M}{N} * \frac{z - y_i}{z}$, the poverty gap index: mean of the gaps

between poor peoples' standard of living and the poverty line, which shows the shortfall of the poor's expenditure from the poverty line expressed as an average of all people in the population. The poverty gap, which is simply the sum of all the poverty gaps in the population, can be used as an indicator of the minimum cost of eliminating poverty using perfectly targeted transfers. The targeting of transfers, however, usually involve leakages and administration costs so that it is not unusual for the actual cost of eliminating poverty to be a multiple of the poverty gap. Otherwise, intensity (also referred to as depth) indicates the difference between the average level of expenditures of poor people and the poverty.

iii) Inequality of poverty

When $a = 2$, $P_2 = \frac{1}{N} * \sum_{i=1}^M \left(\frac{z - y_i}{z} \right)^2 = \frac{M}{N} * \left(\frac{z - y_i}{z} \right)^2$, this is the poverty severity index which

is sensitive to the distribution of living standards among the poor. Even if its absolute value has no intuitive interpretation, this index is thought to provide relevant ranking among countries, as it takes into account the variations in distribution of welfare amongst the poor, or the squared poverty gap index – which measures the severity (or intensity) of poverty and gives more weight to the poorest of the poor – is produced. This is another relevant poverty indicator that is inequality in the distribution of expenditures among poor people (also referred to as severity).

Unlike some other poverty measures, these three poverty measures have the useful property of being additively decomposable (i.e., the national poverty headcount will be equal to the weighted average of headcounts in rural and urban areas or different regions).

- *Food poverty line*

In Cambodia, the food poverty line has been calculated using data from the SES 1993-94 and updated with data from the subsequent SES surveys. Data were collected by asking respondents to report the quantity consumed in the past week of a given list of food items and the value of this consumption. Where values are given in-kind rather than in cash terms, value is assessed using the market price. The steps for calculating the food poverty line from this data are as follows:

a) Nutrition is itself a complex subject. Diet must fulfill a wide range of nutritional needs, such as protein, energy and many micronutrients. Again, measurement requires simplification. The choice made here is to simplify by focusing only on energy intake, measured in terms of calories. **The benchmark adopted is a 2 100 calories minimum energy requirement per person per day.** This is a low value, for example, the World Health Organization (1985) states that the daily calorie requirement for subsistence farmer (a large part of Cambodian population) is 2 780 which the rural population in Cambodia represents at about 85% (census, 1998).

b) There are many possible ways to provide 2 100 calories per day. However, typical consumption patterns can be identified for broad categories of population in a given country at a given date. SES 1993-94 provides detailed data on quantities of food consumption, from which consumption patterns may be drawn. **The population group chosen to derive the model composition of food consumption is the third quintile for total consumption distribution.** A reference food basket is constructed by taking average values of the reported quantities consumed of each food item by this population group. It is important to notice that in this basket more than two-third (69%) of the calories obtained are from cereals, especially rice. The reference food basket derived in this way actually corresponds to a calorie content of 2 298. Thus, all quantities are scaled down by the same factor in order to achieve a reference food basket with a calorie content of 2 100.

c) Cost of this reference basket has now to be determined. This is done using market prices. SES makes use of pre-stratification of areas. SES 1993-94 defined three strata: Phnom Penh, other urban areas, and rural areas. Separate price estimates were obtained for each of the three strata, leading to three different food poverty lines.

- *Non food poverty line*

To incorporate non-food expenditure into the construction of poverty line, a minimum allowance for non-food goods was computed, based on the typical non-food spending of those who can just afford the reference food basket and are therefore just on the food poverty line. If people who are just on the food poverty line allocates expenditure to non-food items, it can be assumed that the welfare derived from this amount of non-food is higher than welfare derived from the food expenditure that this requires them to forgo. It can thus be considered a minimum allowance for non-food spending.

It is not easy to calculate the cost of this minimum non-food allowance, and consequently the overall poverty line, because no unit value for non-food items were recorded in any of the SES surveys. SES 1997 used a different method for calculating the cost of this allowance to that employed in SES 1993-94 and 1999 was to estimate a regression equation. Given the individual total expenditure and the poverty line value, one can estimate an equation for the individual food share to be a function of these two values. The value of this estimated food share for those just reaching the poverty line (total expenditure equal to poverty line) enables the non-food allowance to be calculated, and then the overall poverty line.

The method used in SES 1997 is closer to the steps used to estimate the food poverty line and is an update of the non-food allowance calculation from the 1993-94 data. The non-food consumption of individuals whose total consumption was within 10% above or below the value of the food poverty line was used to form a set of weights (share in total consumption) for ten groups of non-food items. To overcome the fact that data on unit price were not collected, the Phnom Penh Consumer Price Index was used to obtain an estimate of the change in the cost of the non-food allowance between July-September 1994 and June 1997. The main drawback of this method is that it assumes that price movement in the Phnom Penh strata is a good approximation for the rural and other urban areas strata. This is unlikely, as it is not the case for food prices.

The regression approach follows the following steps:

- 1) In order to compute the non-food allowance for those just capable of reaching the food poverty line, one build a food demand function for each strata j (Phnom Penh, Other Urban Areas, Rural Areas), which compute the food share for each household (food share for household i in strata $j = s_i^j$) as a linear function of the

log of the value of total spending (total spending for household $i = x_i$) relative to the food poverty line (food poverty line for strata $j = z_j^f$)

$$s_i^j = a_j + b \log \frac{x_i}{z_j^f} \quad (1)$$

In this equation, we know the food share, the total expenditure and the food poverty line. We use (1) to compute the constant a_j and the slope b by best adjustment on the data.

- 2) Using such determined coefficients a_j and b , we compute a non-food allowance (we compute a food share, so we deduce a non-food allowance) for each strata for those just reaching the poverty line. For these households indeed, $x_i = z_j^f$, so the ratio equal 1, and consequently the log equal 0: Thus the food share for those just reaching the poverty line is given by a_j .
- 3) We compute an overall poverty line by adding the non-food allowance to the food poverty line for each stratum. As a_j is the food share for those just reaching the poverty line, their non-food share is given by $(1 - a_j)$, and thus the non-food allowance is $(1 - a_j) * z_j^f$. Then the overall poverty line is:

$$z_j = z_j^f + (1 - a_j) * z_j^f$$

$$z_j = z_j^f (2 - a_j)$$