

Poverty Lines

Summary

The poor are those whose expenditure (or income) falls below a poverty line. This chapter explains how poverty lines are constructed and discusses the strengths and weaknesses of defining poverty lines based on three methods: the cost of basic needs, food energy intake, and subjective evaluations. The construction of a poverty line is the most difficult step in the practical measurement of poverty.

The *cost of basic needs approach* is most commonly used. It first estimates the cost of acquiring enough food for adequate nutrition—usually 2,100 Calories per person per day—and then adds the cost of other essentials such as clothing and shelter. When price information is unavailable, the *food energy intake method* can be used. This method plots expenditure (or income) per capita against food consumption (in calories per person per day) to determine the expenditure (or income) level at which a household acquires enough food. *Subjective poverty lines* are based on asking people what minimum income level is needed just to make ends meet.

An absolute poverty line remains fixed over time, adjusted only for inflation, as in the United States. It allows the evolution of poverty over time to be tracked, and is also useful when evaluating the effects of policies and programs on the incidence of poverty. However, in most countries, poverty lines are revised from time to time, reflecting the evolution of social consensus about what constitutes poverty. Poverty lines that are revised in this way allow relative poverty to be measured, but not absolute poverty.

The choice of poverty line depends on the use to which it will be put: thus, for international comparisons, the \$1/day standard is helpful, while for targeting

programs or policies to the poor a relative poverty line suffices. The appropriate choice of poverty line is a matter of judgment, and will therefore vary from country to country.

Learning Objectives

After completing the chapter on *Poverty Lines*, you should be able to

1. Explain what a poverty line is, why it is needed, and how countries adjust their poverty lines over time.
2. Distinguish between absolute and relative poverty lines, and identify the conditions under which one might be preferred to the other.
3. Identify the steps required to construct a poverty line using the cost of basic needs method, and justify the choices made at each step.
4. Show how to construct a poverty line using the food energy intake method, and explain the serious weaknesses of this method.
5. Explain how subjective poverty lines are constructed and critically appraise their usefulness.
6. Construct a poverty line using real survey data, using
 - the cost of basic needs method
 - the food energy intake method.

Introduction: Defining a Poverty Line

Assume we have chosen a measure of household well-being, say, consumption expenditure. The next step is to choose a poverty line. Households whose consumption expenditure falls below this line are considered poor.

The choice of poverty line depends in large measure on the intended use of the poverty rates. If the goal is to identify “the poor” for a targeted system of food subsidies, a line that generates a poverty rate of 60 percent, or of 2 percent, is unlikely to be helpful. In this sense, the poverty rate is indeed a social and policy construct, and appropriately so.

However, it is common practice to define the poor as those who lack command over basic consumption needs, including food and nonfood components. In this case the poverty line is obtained by specifying a consumption bundle considered adequate for basic consumption needs, then estimating the cost of these basic needs. The

poverty line may be thought of as the minimum expenditure required by an individual to fulfill his or her basic food and nonfood needs.

Once we have computed a household's consumption, we need to determine whether that amount places the household in poverty, or defines the household as poor. The threshold used for this is the poverty line. The poverty line defines the level of consumption (or income) needed for a household to escape poverty.

It is sometimes argued that the notion of a poverty line implies a distinct turning point in the welfare function. That is, by rising from just below to just above the poverty line, households (and individuals therein) move from considerable misery to an adequate minimum amount of well-being. However, given that well-being follows a continuum, and given how arbitrary the choice of poverty line is, the notion of such a turning point is not compelling.

A corollary is that it usually makes sense to define more than one poverty line. For example, one common approach is to define one poverty line that marks households that are poor, and another lower level that marks those that are extremely poor. Another approach is to construct a food poverty line, which is based on some notion of the minimum amount of money a household needs to purchase some basic-needs food bundle and nothing more. If the cost of basic nonfood needs is estimated, the food poverty line added to the nonfood needs will equal the overall poverty line.

Review Questions

1. A poverty line is

- A. The minimum expenditure required to fulfill basic needs.
- B. The threshold consumption needed for a household to escape poverty.
- C. Somewhat arbitrary because the line between poor and nonpoor can be hard to define.
- D. All of the above.

More formally, following Ravallion (1998), the poverty line for a household, z_i , may be defined as the minimum spending or consumption (or income, or other measure) needed to achieve at least the minimum utility level u_z , given the level of prices (p) and the demographic characteristics of the household (x), so

$$z_i = e(p, x, u_z). \quad (3.1)$$

In practice, we cannot measure u_z , or even $e(\cdot)$, so a more pragmatic solution is needed.

There are two approaches. One is to compute a poverty line for each household, adjusting it from household to household to take into account differences in the prices they face and their demographic composition. For example, a small household in a rural area may face low housing costs and relatively modest food prices. Thus, their z_i may be low compared with a large household in a city where housing is more expensive and food prices are perhaps higher. This gives a different poverty line for each household.

A second and more widely used approach is to construct one per capita poverty line for all individuals, but to adjust per capita expenditure (or income) y_i for differences in prices and household composition. The adjusted per capita y_i is then compared with the poverty line to determine if the individual is living below the poverty line. With this approach, it is easier to talk of “the poverty line” and present it as a single number.

The approach taken for Cambodia in 1999 is somewhere between these two extremes. Separate poverty lines were constructed for each of three major regions, based on the prices prevailing in those areas; whether a household in any given region is poor is then determined by comparing its expenditure per capita with the appropriate regional poverty line. These poverty lines are shown in table 3.1, based on Gibson’s (1999) poverty profile of Cambodia using the Cambodia Socio-Economic Survey (CSES) 1999 data, and Prescott and Pradhan’s (1997) profile using the Socio-Economic Survey of Cambodia (SESC) 1993–94 data. We discuss the construction of these poverty lines in more detail later in the chapter.

As shown in table 3.1, the money value of poverty lines for Phnom Penh, the capital of Cambodia, are higher than for other areas. This is consistent with experience in other countries. For example, in Vietnam, Duong and Trinh (1999) noted that the World Bank concluded that households would need to spend at least 1,071,000 Vietnamese dong (about \$81) per person per year in 1998 to be out of poverty. However, for urban areas, the amount was estimated to be 1,342,000 dong (\$101); in rural areas it was just 1,054,000 dong (\$79). This reflects the fact that costs are higher in cities.

Over time, we expect nominal poverty lines to change for a population. This is due to two factors. First, poverty lines reflect the costs of purchasing food and non-food items. As prices rise—inflation is typical—nominal poverty lines increase. This is what underlies the rising nominal poverty lines in Cambodia, shown in table 3.1. It is also reflected in the poverty line for Thailand, shown in table 3.2.

Table 3.1 Summary of Poverty Lines for Cambodia

Area	(riels per person per day)			
	1993/94 SESC		1999 CSES	
	Food poverty line	Poverty line	Food poverty line	Poverty line
Phnom Penh	1,185	1,578	1,737	2,470
Other urban	995	1,264	1,583	2,093
Rural	881	1,117	1,379	1,777

Sources: Prescott and Pradhan 1997; Gibson 1999.

Note: Average exchange rate was 2,617 riels/US\$ in 1993–94 and 3,808 riels/US\$ in 1999. SESC = Socio-Economic Survey of Cambodia; CSES = Cambodia Socio-Economic Survey.

Table 3.2 Average Poverty Line of Thailand

Year	Poverty line (baht/person/month)
1988	473
1990	522
1992	600
1994	636
1996	737
1998	878
1999	886

Source: Kakwani 2000.

Note: The mid-year exchange rate was 37 baht/\$ in 1999, 42.4 baht/\$ in 1998, and 25 baht/\$ in all previous years.

Second, the poverty line could change if the real poverty threshold were revised over time. This raises the question of whether we should look at relative, or absolute, poverty lines. We now consider each in turn.

Review Question

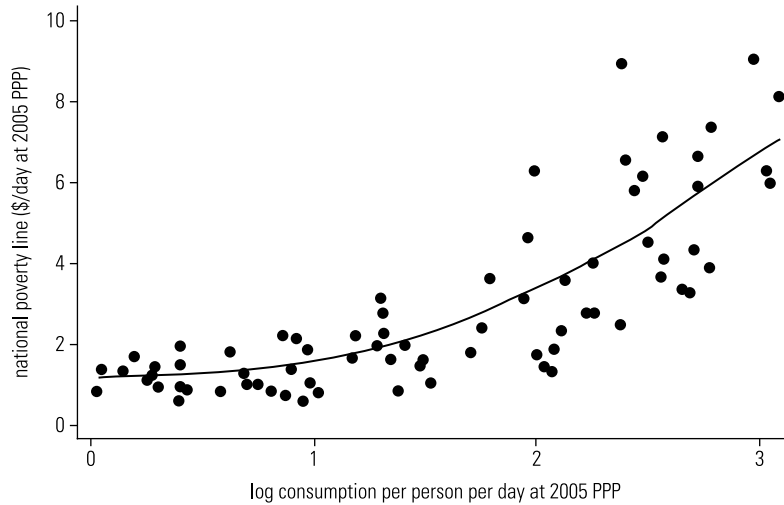
2. In measuring poverty in Cambodia, researchers used

- A. One poverty line for the country, and adjusted household spending for price differences.
- B. Separate poverty lines for each individual.
- C. Separate poverty lines for each household.
- D. Separate poverty lines for each major region.

Relative Poverty

Sometimes we are interested in focusing on the poorest segment (for example, poorest one-fifth or two-fifths) of the population; these are the relatively poor. When defined in this way, it is a truism that “the poor are always with us.” It is often helpful to have a measure such as this to target programs geared to helping the poor.

In practice, rich countries have higher poverty lines than do poor countries, as shown clearly in figure 3.1, which is from Chen and Ravallion (2008). This explains why, for instance, the official poverty rate in the early 1990s was close to 15 percent in the United States and also close to 15 percent in much poorer Indonesia. Many of those counted as poor in the United States would be considered comfortably well-off by Indonesian standards.

Figure 3.1 Poverty Lines across Countries

Source: Chen and Ravallion 2008.

As countries become better off, they have a tendency to revise the poverty line upward—with the notable exception of the United States, where the line has (in principle) remained unchanged for four decades. For instance, the European Union typically defines the poor as those whose per capita income falls below 50 percent of the median. As the median income rises, so does the poverty line, so this is more properly viewed as a crude measure of inequality rather than of absolute poverty.

Based on a sample of 36 countries, Ravallion, Datt, and van de Walle (1991) estimated the following relationship:

$$\ln Z_i = 6.704 - 1.773 \ln(C/cap) + 0.228 [\ln(C/cap)]^2 + v_i \quad (3.2)$$

$t = 5.1 \quad t = -3.6 \quad t = 5.1$

where $R^2 = 0.89$; all three coefficients are statistically significant at the 1 percent level or better. They found that at the mean value of per capita consumption (which they measured in purchasing power parity terms), the elasticity of the official poverty line (z_i) with respect to consumption per capita (C/cap) was 0.71. This means that if per capita consumption were to rise 10 percent, the official poverty line would rise 7.1 percent on average. But the nonlinear relationship implies that the elasticity of the poverty line with respect to consumption per capita was close to 0 in low-income countries, and was almost 1 in high-income countries. Using more recent data, Chen and Ravallion (2008) find very similar results.

To the extent that one's goal is to identify and target today's poor, then a relative poverty line is appropriate, and needs to be tailored to the overall level of development of the country. For instance, a \$1/day poverty line might be useful in Vietnam, where 27 percent of the population would be considered poor by this standard in 1998 (Haughton 2000), but would be of little relevance in the United States, where almost nobody would fall below that poverty line.

Review Question

3. According to Ravallion, Datt, and van de Walle (1991), as countries become richer, they adjust their real poverty lines upward

- A. A little, if they are poor, and a lot if they are rich.
- B. A little, if they are rich, and a lot if they are poor.
- C. To maintain poverty at 27 percent.
- D. To adjust for inflation.

Absolute Poverty. An absolute poverty line is “fixed in terms of the standards indicator being used, and fixed over the entire domain of the poverty comparison” (Ravallion 1992, 25). In other words, the poverty line is set so that it represents the same purchasing power year after year, but this fixed line may differ from country to country or region to region (the “domain” of the relevant comparison). For example, the U.S. poverty line does not change over time (except to adjust for inflation), so that the poverty rate today may be compared with the poverty rate of a decade ago, knowing that the definition of what constitutes poverty has not changed.

An absolute poverty line is essential if one is trying to judge the effect of antipoverty policies over time, or to estimate the impact of a project (for example, microcredit) on poverty. Legitimate comparisons of poverty rates between one country and another can only be made if the same absolute poverty line is used in both countries. Thus, the World Bank needs absolute poverty lines to be able to compare poverty rates across countries. Such comparisons are useful in determining where to channel resources, and in assessing progress in the war on poverty.

The World Bank has recently revised its measurement of world poverty; Chen and Ravallion (2008) use a poverty rate of US\$1.25 a day (in 2005 U.S. dollars), and by this standard there were 1.38 billion poor in 2005 (see box 3.1). If the poverty line is set at US\$2.00 a day, this number rises to 2.09 billion. These are absolute poverty lines. There is a vigorous controversy about whether world poverty is indeed falling; this issue is addressed more completely in chapter 10. In this context, the focus is on absolute poverty.

Box 3.1 The “\$1/Day” Standard

Cross-country comparisons of poverty rates are notoriously difficult (see chapter 10), but Shao-hua Chen and Martin Ravallion (2008) of the World Bank have tried to get around this problem by computing the proportion of the population in different countries living on less than US\$1.25 per person per day (in 2005 U.S. dollars). This line refers to the poverty line used by the 15 poorest countries in their sample, converted to U.S. dollars using the most recent measures of purchasing power parity. The numbers shown in the table below suggest that the poverty rate in Vietnam compares favorably with that of India and is falling rapidly, but lags behind (more affluent) China.

Country	Percentage of population living on less than \$1.25/day	Year	Country	Percentage of population living on less than \$1/day	Year
China, rural	26	2005	Indonesia, rural	24	2005
China, urban	2	2005	Indonesia, urban	19	2005
India, rural	44	2004/05	Philippines	23	2006
India, urban	36	2004/05	Vietnam	50	1998
Nigeria	64	2003	Vietnam	22	2006

Source: PovCalNet (accessed November 11, 2008).

Review Question

4. An absolute poverty line is needed for all of the following *except*

- A. To make international comparisons of poverty rates.
- B. To evaluate the effects of projects, such as irrigation investments, on poverty.
- C. To target antipoverty measures to the poorest quintile of the population.
- D. To measure the success of government policies in combating poverty.

Issues in Choosing an Absolute Poverty Line

In choosing an absolute poverty line, one first has to determine how to measure the standard of living, and then pick an appropriate level to serve as a poverty line.

Decide the Standard of Living

An important conceptual problem arises when working with absolute poverty lines—the issue of what is meant by “the standard of living” (Ravallion [1998], on which much of this discussion is based).

In practice, almost all absolute poverty lines are set by measuring the cost of buying a basket of goods (the “commodity-based poverty line,” which we denote by z). If we assume that

$$u = f(y), \quad (3.3)$$

which says that utility or “standard of living” (u) depends on income or expenditure (y), then

$$y = f^{-1}(u). \quad (3.4)$$

Equation (3.4) says that for any given level of utility, there is some income (or expenditure) level that is needed to achieve it. If u_z is the utility that just suffices to avoid being poor, then

$$z = f^{-1}(u_z). \quad (3.5)$$

In other words, given a poverty line that is absolute in the space of welfare (that is, gives u_z) there is a corresponding absolute commodity-based poverty line.

But suppose we make a different but equally plausible assumption, which is that utilities are interdependent. My well-being may depend not just on what I consume, but also on how my consumption stacks up against that of the rest of society. Thus, a household of four with an income of \$12,000 per year would not be considered poor in Indonesia, but when this household compares its position with average incomes in the United States, it may feel very poor. We may capture this idea by assuming

$$u = g\left(y, \frac{y}{\bar{y}}\right), \quad (3.6)$$

where \bar{y} is the mean income in the society. In this case

$$u_z = g\left(z, \frac{z}{\bar{y}}\right) \quad (3.7)$$

and making the standard assumption of invertibility,

$$z = g^{-1}(\bar{y}, u_z). \quad (3.8)$$

Equation (3.8) means that for a poverty line to be absolute in the space of welfare (that is, to yield u_z), the commodity-based poverty line (z) may have to rise as \bar{y} rises. The commodity-based poverty line would then look more like a relative poverty line. The key idea here is that the poverty line should be set at a level that enables individuals to achieve certain capabilities, including healthy and active lives and full participation in society. In practice, this almost certainly

would imply that the commodity-based poverty line would rise as a country becomes more affluent, because the minimum resources needed to participate fully in society probably rise over time. In Sen's prose, "an absolute approach in the space of capabilities translates into a relative approach in the space of commodities" (Sen 1983, 168). However, in what follows, we simplify the analysis by assuming that utilities are not interdependent, so the commodity-based poverty line is given in absolute terms.

Review Question

5. Is the following statement true or false? If my well-being depends on where I stand relative to others, then the dollar absolute poverty line needs to change as a country becomes richer.

- True
- False

Decide u_z and $g(\cdot)$

Even if we assume that the commodity-based poverty line remains constant, we are still left with two problems.

- *The referencing problem.* What is the appropriate value of u_z —that is, what is the value of the utility of the poverty line? The choice is arbitrary, of course, but "a degree of consensus about the choice of the reference utility level in a specific society may well be crucial to mobilizing resources for fighting poverty" (Ravallion 1998, 6).
- *The identification problem.* Given u_z , what is the correct value of z —that is, what is the correct commodity value of the poverty line? This problem arises for two reasons: the size and demographic composition of households vary—an issue raised in the discussion of equivalence scales in chapter 2—and "the view that we can measure welfare by looking solely at demand behavior is untenable" (Ravallion 1998, 7).

The implication is that external information and judgments will be required to answer the referencing and identification problems, and hence, to determine the absolute poverty line. But how is this to be done in practice?

Table 3.3 presents absolute and relative poverty headcount rates for different regions in the world. How regions compare with each other depends on which poverty measure is used. For example, by the absolute measure of less than \$1/day, Sub-Saharan Africa has the highest portion of the population living in poverty. However, countries in Latin America and the Caribbean have the highest portion of their population living below one-third of the average national consumption; in effect, these Latin American and the Caribbean countries are the most unequal societies, an issue that is addressed directly in chapter 6.

Table 3.3 Absolute and Relative Poverty Rates

Region	Percentage of population living on less than \$1/day (in 1998)	Percentage of population living on less than one-third of average national consumption for 1993 (in 1998)
East Asia and Pacific	15.3	19.6
East Asia and Pacific excluding China	11.3	24.6
Europe and Central Asia	5.1	25.6
Latin America and the Caribbean	15.6	51.4
Middle East and North Africa	1.9	10.8
South Asia	40.0	40.2
Sub-Saharan Africa	46.3	50.5
Total	24.0	32.1
Total excluding China	26.2	37.0

Source: World Bank 2000.

Review Question

6. The poverty line will vary depending on the domain of comparison because
- A. Of the referencing problem.
 - B. Of the identification problem.
 - C. Of the purpose of the comparison.
 - D. The \$1/day standard is too low.

Solution A: Objective Poverty Lines

How then are we to determine poverty lines? One possibility is to pick an “objective” poverty line. A common and fairly satisfactory method of approaching capabilities is to begin with nutritional requirements. The most common way of making this operational is the cost of basic needs approach, while the food energy intake method has been suggested as an alternative when the data are more limited.

The Cost of Basic Needs Method

The most satisfactory approach to building up a poverty line, while remaining in the spirit of trying to ensure that the line covers basic needs, proceeds as follows:

- Stipulate a consumption bundle that is deemed to be adequate, with both food and nonfood components.
- Estimate the cost of the bundle for each subgroup (urban or rural, each region, and so forth).

This is essentially the approach taken by Seebohm Rowntree in his seminal studies of poverty in York, undertaken in 1901 and 1936 (Rowntree 1941). Note that although we begin with a consumption bundle—so much food, so much housing space, so much electricity, and so forth—the poverty line is measured in money. We are therefore not insisting that each basic need be met by each person (a nonwelfarist position), only that it *could* be met (a welfarist position). Operationally, the steps to follow are these:

- Pick a nutritional requirement for good health, such as 2,100 Calories per person per day. This standard is widely used, and has been proposed by the Food and Agricultural Organization of the United Nations. It is also an approximation, given that food needs vary across individuals, by climate, by the level of an individual's activity, and seasonally.
- Estimate the cost of meeting this food energy requirement, using a diet that reflects the habits of households near the poverty line (for example, those in the lowest, or second-lowest, quintile of the income distribution; or those consuming between 2,000 and 2,200 calories). This may not be easy if diets vary widely across the country. Call this food component z^F .
- Add a nonfood component (z^{NF}). There is a lot of disagreement about how to do this; we offer some more thoughts on this issue below; for U.S. practice, see box 3.2, below.
- Then the basic needs poverty line is given by

$$z^{BN} = z^F + z^{NF}. \quad (3.9)$$

Review Question

7. Is the following statement true, false, or uncertain? The cost of basic needs approach requires that households meet their basic needs of food and essential nonfood spending.

- True
- False
- Uncertain

Box 3.2 The U.S. Poverty Line

In 1963 and 1964, Mollie Orshansky of the U.S. Social Security Administration computed the cost of an “adequate” amount of food intake, to get z^F . She then multiplied this number by 3 to get z^{BN} . Why? Because at the time, consumers in the United States devoted a third of their spending to food. This line is still used, updated regularly for price changes.

Source: Dalaker and Naifeh 1998.

To illustrate how this might work, suppose, following common practice, that we use a food energy threshold of 2,100 Calories per day. Suppose that there are only three foodstuffs: rice, corn, and eggs. For this hypothetical example, imagine that table 3.4 shows the expenditure on each item, and the amount consumed per person by a household in the second (from bottom) quintile; because such a household consumes, we suppose, just 2,000 Calories per day, the figures here have to be grossed up to give the cost of purchasing 2,100 Calories. In this example the cost comes to 105 pesos per day.

The choice of which diet to use when estimating the cost of obtaining 2,100 Calories is not a trivial one, a point emphasized in the context of Indonesia by Pradhan et al. (2000).¹ To illustrate, consider the information in table 3.5, drawn from the Vietnam Living Standards Survey of 1992–93 (World Bank 1994). Households in the

Table 3.4 Illustration of Construction of Cost-of-Food Component of Poverty Line

	Expenditure per day (pesos)	Calories	Calories, adjusted to give 2,100 Calories	Expenditure, adjusted to cover 2,100 Calories
Rice	60	1,400	1,470	63
Corn	20	400	420	21
Eggs	20	200	210	21
Total	100	2,000	2,100	105

Source: Authors.

Table 3.5 Food Consumption by Expenditure Quintile, Vietnam, 1992–93

Quintile	Expenditure per capita, thousand dong/year	Percentage of expenditure devoted to food	Calories per capita per day	Dong per Calorie
Lowest	562	70	1,591	0.68
Low-mid	821	65	1,855	0.79
Middle	1,075	60	2,020	0.87
Mid-upper	1,467	54	2,160	1.00
Upper	2,939	47	2,751	1.38

Source: World Bank 1994.

Review Question

8. In constructing a cost of basic needs poverty line in Vietnam, the poverty line will be

- A. Lower if the food price of the lowest quintile is used.
- B. Higher if one uses the calorie per capita level of the lowest quintile.
- C. Lower if one uses the percentage of spending on nonfood from the top expenditure quintile.
- D. Higher if one uses a threshold of 2,020 Calories per capita per day.

poorest quintile paid 0.68 dong per Calorie; those in the richest expenditure quintile paid almost twice as much (1.38 dong/Calorie). Depending on which cost per calorie one uses, the poverty line could vary widely.

An application. In practice, researchers in this case used the price of food for households in the middle quintile, on the grounds that those households were close to the poverty line because they were consuming almost 2,100 Calories per day. The annual food expenditure of the middle quintile, grossed up to pay for 2,100 Calories per day, came to 750,228 dong per capita in 1993; the nonfood expenditure of this same group of households was taken to be adequate for those at the poverty line (after a similar grossing up). This gave an overall poverty line of 1,160,842 dong. Individual households lived in regions with different prices, so their expenditure per capita was first deflated, then compared with this poverty line. The result was an estimated headcount poverty rate in Vietnam of 58 percent (World Bank 1999).

To compare poverty over time, this poverty line was updated to 1998. The cost of each item in the poverty-line diet of 1993 was recomputed using 1998 prices (as taken from the price questionnaire component of the Vietnam Living Standards Survey, mainly); nonfood expenditure was inflated using data from the Vietnam General Statistical Office's price index. This yielded a poverty line of 1,793,903 dong, and an associated poverty rate of 37 percent. The details are summarized in table 3.6.

There is no wholly satisfactory way to measure the nonfood component of the poverty line, and the procedures followed tend to be case specific. We saw above that for Vietnam, researchers essentially used the (slightly adjusted) level of nonfood spending by households that were in the middle expenditure quintile in 1993. The poverty lines developed for the Republic of Korea measure the cost of food plus the cost of housing that meets the official minimum apartment size plus the cost of non-food items as measured by average spending by households in the poorest two-fifths of the income distribution.

Table 3.6 Poverty Lines and Headcount Measures of Poverty, Vietnam

	Poverty line (thousand dong/capita/year)	Headcount poverty rate (percent)
Poverty overall		
1993	1,160 (\$109)	58
1998	1,790 (\$135)	37
Food poverty		
1993	750 (\$70)	25
1998	1,287 (\$97)	15

Sources: Vietnam General Statistical Office 2000; World Bank 1994.

Note: The food poverty rate excludes any provision for nonfood items; it sets the poverty line at z^F .

Is there a better way to proceed? Probably not. Even the theory calls for compromise. Consider the food expenditure function shown in figure 3.2. Generally, $b = f(y)$, where b is food purchases and y is total expenditure. Following Ravallion (1998), let b^F be the cost of buying 2,100 Calories. Then an upper poverty line might be given by

$$f^{-1}(b^F) = z^f, \quad (3.10)$$

which measures the income level at which the household would buy 2,100 Calories of food; this is essentially the poverty line used in Vietnam. The nonfood component is given by A (in figure 3.2).

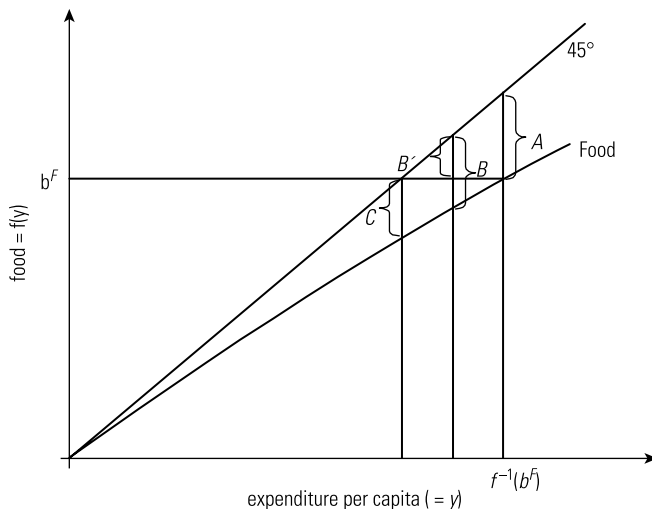
A lower poverty line might be given by

$$z_L^F = b^F, \quad (3.11)$$

which measures the per capita expenditure level at which the household could just buy enough food, but would not have any money left over to buy anything else; in Vietnam this is referred to as the food poverty line. But even in this case, households will typically buy nonfood items, as shown by C in figure 3.2. Ravallion suggests that one might want to compromise, and measure nonfood at the midpoint between these two extremes, giving B . In each case, the poverty line would be given by

$$z = b^F + 0 \text{ (or } A \text{ or } B'). \quad (3.12)$$

Figure 3.2 Food Expenditure Function



Review Question

9. The nonfood component of the poverty line, under the cost of basic needs approach, may be obtained as

- A. The cost of basic housing and services.
- B. Nonfood consumption of a household with just enough income to buy 2,100 Calories of food per capita per day along with other necessary goods and services.
- C. Nonfood consumption of a household with just enough income to buy 2,100 Calories of food per capita per day.
- D. All of the above.

As one might expect, when there is potential disagreement about the best approach to take, practice varies widely from one analyst to the next. Table 3.7 summarizes the approaches used to measure poverty in Africa, based on World Bank poverty assessments undertaken up to 1998. Based on a list of 40 cases of poverty measurement compiled by Hanmer, Pyatt, and White (1999), 23 measured relative poverty; most of these set the poverty line as a share of mean income or expenditure (11 cases) or identified the poor using some percentage (for example, 20 percent, 25 percent) of the income or expenditure distribution. The remaining 17 cases used an absolute measure of poverty, with most of them beginning with a calorie requirement (12 cases), sometimes adding a nonfood component (5 cases). In a further five cases, the analysts specified a basket of goods (including food) that was intended to measure the cost of basic needs but did not begin by identifying a calorie requirement. The heterogeneity of these measures makes it difficult to compare poverty across countries, although if one's interest is in assessing poverty within a country, these differences are of secondary importance.

Food Energy Intake Method

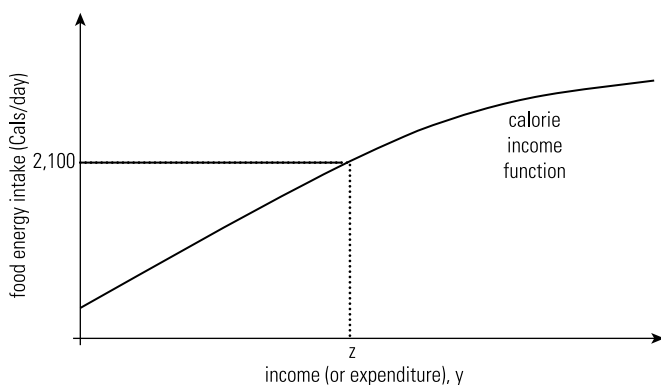
The basic needs approach outlined above requires information on the prices of the goods that the poor consume, especially when making comparisons across regions or over time. When price data are not available, a number of researchers have used an alternative method to construct the poverty line—the *food energy intake method*. As before, the goal here is to find the level of consumption expenditure (or income) that allows the household to obtain enough food to meet its energy requirements. Note that consumption will include nonfood as well as food items; even underfed households typically consume some clothing and shelter, which means that at the margin these “basic needs” must be as valuable as additional food.

The basic idea is captured in figure 3.3, which shows a *calorie income function*; as income (or expenditure) rises, food energy intake also rises, although typically

Table 3.7 Typology of Poverty Lines in World Bank Poverty Assessments for Africa

Absolute (17 cases)	
Calorie requirement (12)	Calories only Calorie cost/food share (1) Calories + basket of goods (5)
Basket of goods (including food) (5)	
Relative (23 cases)	
Relative to income base	Multiple of wage Share of mean income or expenditure (11)
Specified percentage of income distribution (11)	

Source: Hanman, Pyatt, and White 1999.

Figure 3.3 Calorie Income Function

Source: Authors.

more slowly. Given some level of just-adequate food energy intake k , one may use this curve to determine the poverty-line level of expenditure, z . Formally, the function shows

$$k = f(y) \quad (3.13)$$

So, given monotonicity,

$$y = f^{-1}(k), \quad (3.14)$$

or, given a minimum adequate level of calorie k_{\min} , we have

$$z = f^{-1}(k_{\min}), \quad (3.15)$$

where z is the poverty line. This approach is parsimonious in that it does not require any information about the prices of goods consumed.

First one needs to determine the amount of food that is adequate. Vietnam pegs this level at 2,100 calories per person per day, in line with UN Food and Agriculture

Organization recommendations, but it is recognized that individuals may need more or less food than this. Clearly, the needs of young children, growing teenagers, manual workers, pregnant women, or sedentary office workers may differ quite markedly; physical stature also plays a role. Not all countries have set the same cut-off point, as table 3.8 shows.

A variant of this approach was used to measure poverty in Vietnam, using data from the Vietnam Living Standards Survey of 1993 (World Bank 2004). Separate food expenditure lines were estimated for urban and rural areas in each of seven provinces; the cost of obtaining 2,100 Calories of food per person per day was then computed, as were the associated poverty lines—one for each rural and urban area in each province. This gave a headcount index of 55 percent (Dollar and Litvack 1998).

Table 3.8 Per Capita Daily Calorie Intake Used in Poverty Line Construction

	Years	Urban	Rural
Bangladesh	1996–99	2,112	2,122
India	1993–95	2,100	2,400
Indonesia	1990, 1999	2,100	2,100
Laos	1995	2,100	2,100
Pakistan	1992–93, 1996–97	2,295	2,550
Thailand	1990, 1998	2,100	2,100
Vietnam	1993, 1998	2,100	2,100

Source: www.idrc.ca/uploads/user-S/10282146370mimap60.doc [accessed July 16, 2008].

Note: Thailand now uses Calorie levels that are differentiated by age and gender; for instance, for adults ages 31–50, 2,100 Calories for men and 1,750 Calories for women.

Review Question

10. Is the following statement true, false, or uncertain? The food energy intake approach sets the poverty line at the level of expenditure at which the household buys just enough calories (for example, 2,100 Calories per capita per day).

- True
- False
- Uncertain

Unfortunately, the food energy intake method is seriously flawed, and should not be used for comparisons across time, or across regions, or between urban and rural areas, unless the alternatives are infeasible. Ravallion and Bidani (1994) computed headcount poverty measures for Indonesia using the SUSENAS (Indonesia's National Socioeconomic Survey) data for 1990, using both the cost of basic needs and the food energy intake methods. Their results are shown in table 3.9. The most striking finding is that while the overall poverty rates are designed to be relatively

Table 3.9 Headcount Measures of Poverty in Indonesia, 1990

	Percentage of individuals who are poor		
	Cost of basic needs method		Food energy intake method
	Food	Food + nonfood	
Indonesia overall	7.9	19.6	15.1
Urban	2.8	10.7	16.8
Rural	10.2	23.6	14.3

Source: Ravallion and Bidani 1994.

similar, the disaggregated results are very different: the cost of basic needs method shows rural poverty to be more than twice as great as urban poverty, while the food energy intake method indicates (implausibly) that poverty is higher in urban than in rural areas. Ravallion and Bidani also computed poverty rates using these two measures for each of the main regions of Indonesia, and found almost no correlation between the two measures.

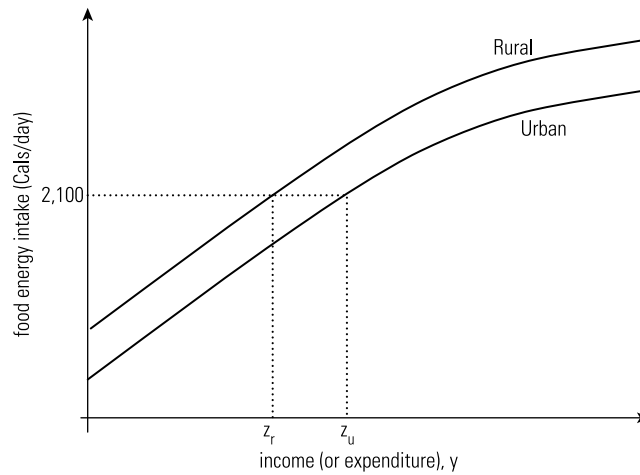
Why is the food energy intake method potentially unreliable? The weaknesses of the method were pointed out in an important article by Ravallion and Bidani (1994); in the next few paragraphs we summarize their approach and findings. The method also failed in a recent analysis of data from Vietnam, for slightly different reasons, also summarized below.

The Urban-Rural Problem. The problem begins when one recognizes that food energy, typically shown on the calorie income function, depends on other factors as well as income. The other influences include the tastes of the household (for example, urban tastes in food may differ from rural tastes); the level of activity of household members; the relative prices of different foods, and of food to nonfood items; and the presence of publicly provided goods.

Figure 3.4 shows hypothetical (but plausible) calorie income functions for urban and rural households. Rural households can obtain food more cheaply, both because food is typically less expensive in rural areas and also because they are more willing to consume foodstuffs that are cheaper per calorie (such as cassava rather than rice); urban consumers are more likely to buy higher quality foodstuffs, which raises the cost per calorie. It follows that the calorie income function for rural households will typically be higher than that for urban households. The implication is that for a given level of food energy intake, the poverty line in the rural area will be lower than in the urban area, as figure 3.4 makes clear. To the extent that this reflects differences in the cost of living, it is not a problem to have two poverty lines of this kind.

The key finding of Ravallion and Bidani (1994), based on 1990 data from the SUSENAS household survey in Indonesia, was that the urban poverty line (Indonesian rupiah [Rp] 20,614/person/month) was much higher than the rural

Figure 3.4 Calorie Income Functions for Urban and Rural Indonesia



Source: Authors.

one (Rp 13,295/person/month) and, most important, this gap far exceeded the difference in the cost of living between urban and rural areas. Using these poverty lines, Ravallion and Bidani (1994) found that poverty in Indonesia appeared to be higher in the urban than in the rural areas (table 3.10), a completely implausible result. The point is also illustrated in figure 3.5, which shows the cumulative distribution of consumption per capita for rural and urban areas and marks the poverty lines and headcount poverty rates.

Review Question

11. Ravallion and Bidani found, using the food energy intake method, that the urban poverty line in Indonesia exceeded the rural poverty line by more than a simple comparison of living costs would lead one to expect, because

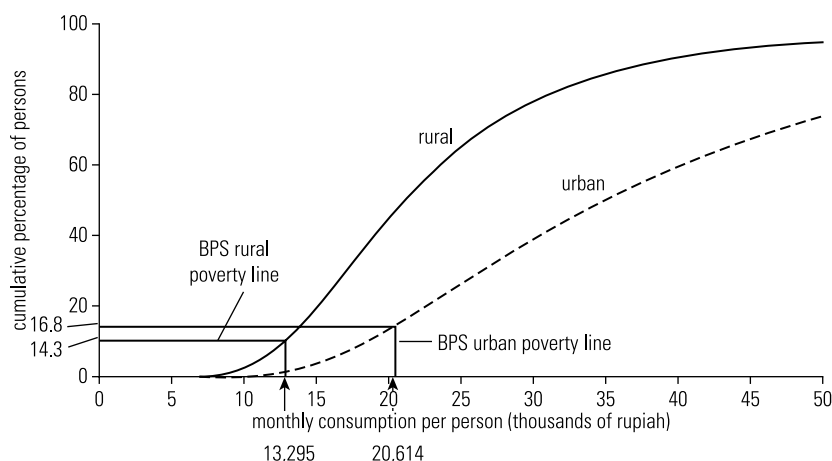
- A. Urban households eat more.
- B. Urban households eat better-quality food.
- C. Urban food prices are much higher than rural food prices.
- D. Urban housing costs more than rural housing.

The Relative Price Problem. When researchers tried to apply the food energy intake approach to data from the Vietnam Living Standards Survey of 1998, the method failed. As with the 1993 data, the idea was to compute food expenditure functions, find the cost of 2,100 Calories of food, and calculate the related level of expenditure per capita, which would then serve as a poverty line. After undertaking this exercise, researchers found a higher level of poverty in 1998 than in 1993, an

Table 3.10 Poverty Lines in Indonesia Using Food Energy Intake Method, 1990

Poverty measure	Indonesia overall	Urban areas	Rural areas
P ₀ (%)	15.1	16.8	14.3
P ₁ (%)	2.42	3.23	1.06
P ₂ (x 100)	0.66	0.94	0.53

Source: Ravallion and Bidani 1994.

Figure 3.5 Cumulative Distribution Functions for Consumption, Indonesia, 1990

Source: Ravallion and Bidani 1994.

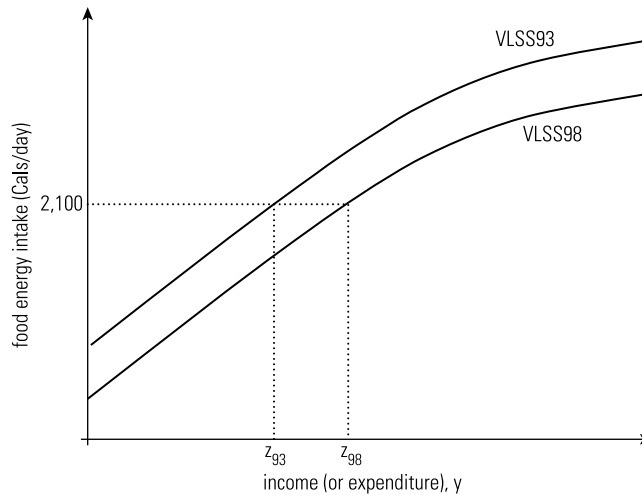
Note: BPS = Biro Pusat Statistik (the Indonesian Central Bureau of Statistics).

implausible result in an economy whose real GDP grew by 9 percent annually between 1993 and 1998, and where there was a general sense that the benefits of this growth had spread widely.

What went wrong? Figure 3.6 shows the situation. The food expenditure function shifted down between 1993 and 1998; for a given (real) income, households in 1998 would buy less food than in 1993. The main reason was that the price of food rose 70 percent between 1993 and 1998, while the price of nonfood items rose by just 25 percent; thus, food became *relatively* much more expensive. As a result, consumers shifted away from food to nonfood consumption. This meant that the poverty line rose from z_{93} to z_{98} (see figure 3.6), a jump that turned out to be implausibly large. As noted above, the cost of basic needs method proved much more satisfactory in this case, because it tracked the cost of the components of spending (rice, other food, and nonfood items) between 1993 and 1998, and thus was able to inflate the poverty line so that it tracked the evolution of the cost of living (for the poor) correctly over time.

This is a serious indictment of the food energy intake method. But it should also be clear that every measure of poverty can be faulted because each rests in part on arbitrary assumptions. In measuring poverty, there is no single truth.

Figure 3.6 The Determination of Poverty Lines for Vietnam, 1993 and 1998



Source: Authors.

Review Question

12. Is the following statement true or false? The food energy intake method showed that the real poverty line in Vietnam rose rapidly between 1993 and 1998, because of inflation.

- True
- False

Solution B: Subjective Poverty Lines

We could measure poverty by asking people to define a poverty line, and using this to measure the extent of poverty. For instance, in a survey one might ask

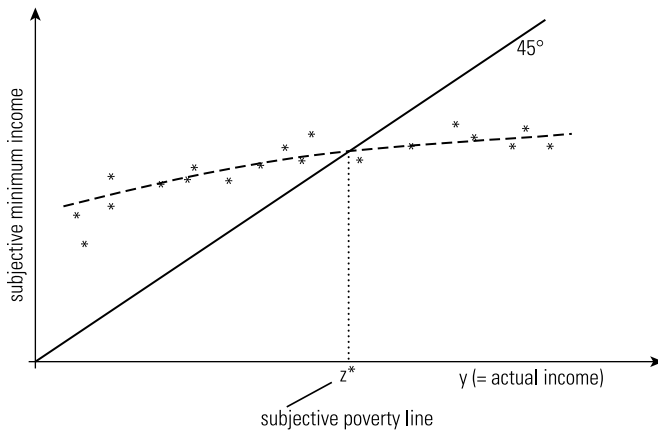
What income level do you personally consider to be absolutely minimal? That is to say, with less you could not make ends meet.

The answers will vary from person to person (and by size of household), but they could be plotted, and a line fitted through them, to get a subjective poverty line such as z^* in figure 3.7. It may also be possible to get adequate results by asking “do you consider your current consumption to be adequate to make ends meet?”

Mahar Mangahas has amassed extensive information on subjective poverty in the Philippines as part of the social weather stations project. Collected biannually

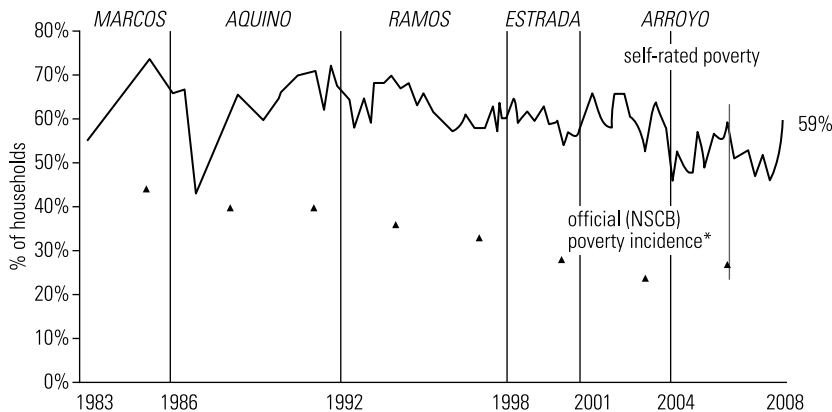
since 1985, and quarterly since 1992, the surveys poll about 1,200 households. Each household is shown a card with a line running across it; below the line is marked “poor” (*mahirap*) and above the line “nonpoor,” and each household is asked to mark on the card where it fits. Separately, households are also asked to define a poverty line. Figure 3.8 reproduces a graph that tracks the evolution of this poverty rate from 1983 to 2008. Here are the comments of Mahar Mangahas that accompany the graph:

Figure 3.7 Estimating a Subjective Poverty Line



Source: Authors.

Figure 3.8 Self-Rated Poverty: Households That Are “Mahirap,” April 1983 to Second Quarter 2008



Source: Mangahas 2008 (<http://www.sws.org.ph/>), reprinted with permission.
 Note: NSCB = National Statistical Coordination Board of the Philippines.

Fifty-nine percent of Filipino families, or about 10.6 million, rate themselves as *Mahirap* or Poor, 24% put themselves on the Borderline, and 17% rate themselves as *Hindi Mahirap* or Not Poor, according to the Second Quarter 2008 Social Weather Survey, fielded over June 27-30, 2008.

The new Self-Rated Poverty rate is 9 points higher than the 50% (estimated 9.0 million) in the First Quarter, and 13 points above the previous low of 46% (est. 8.1 million) in December 2007, thus wiping out the decline in Self-Rated Poverty “to its 20-year low in 2007” mentioned in President Gloria Macapagal-Arroyo’s State of the Nation Address last July 28th. (Mangahas 2008)²

Gaurav Datt of the World Bank has analyzed the Filipino data in some detail. Here are some of his more interesting findings (Datt 2002):

- *Self-rated poverty lines are high.* In 1997, the median poverty line was about 10,000 pesos per month for a “typical” household; this compares with the government’s “basic needs” poverty line, which at that time stood at 4,495 pesos/month. The implication is that self-rated poverty rates are high—60 percent of all households in 1997, compared with 25 percent using the basic needs line.
- *The self-rated poverty line has risen rapidly over time,* by about 60–70 percent between 1985 and 1997. One consequence is that there is no trend in self-rated poverty over time. Another implication is that even when there is an economic slowdown, as occurred in 1997–98, the self-rated poverty rate hardly changes: it rose from 59 percent in 1996–97 to 61 percent in 1998.
- Perhaps a surprise, the *self-rated poverty line given by poor households is only slightly lower* than that for nonpoor households, and in fact, the difference is not statistically significant. One might have expected poor households to have a less generous measure of the poverty line.
- There is a *clear urban/rural difference in perceptions* of the poverty line, with urban households setting a (money) poverty line at about twice the level of rural households, giving

$$z_{self-rated}^u \approx 2z_{self-rated}^r \quad (3.16)$$

The cost of living is certainly higher in urban areas, but by a factor of 1.2 to 1.5 rather than by a factor of 2. Thus, the urban self-rated poverty line is, in real terms, higher than its rural counterpart. Why?

- One possibility is that there is more inequality in the urban areas, and that this raises expectations.
- Another plausible explanation is that households in urban areas may have more exposure to the media, and may have been affected more thoroughly by consumerism.

- A third explanation is that urban households may be more attuned to political processes, and their estimates of the poverty line may include an element of strategic behavior—trying to influence policy makers.

Self-rated measures of poverty are rarely collected. If the Filipino experience is at all representative, it is clear that self-rated measures may complement, but cannot fully supplant, the more traditional “objective” measures of poverty.

The question of the reliability of self-rated measures of satisfaction continues to be debated. Angus Deaton (2008) finds a measure of “life satisfaction,” as collected in 123 countries in 2006 by the Gallup organization, is highly correlated with real per capita income. More specifically, life satisfaction is measured on a scale of 0 (dissatisfied) through 10 (satisfied), in response to a question that asks, “All things considered, how satisfied are you with your life as a whole these days?” This, notes Deaton, is not synonymous with “happiness,” which is a more short-term phenomenon. Using a measure of GDP per capita in 2000 international dollars, Deaton (2008) estimated the following regression:

$$\text{Average life satisfaction} = 0.845 \ln(\text{GDP/capita}) - 3.25 \text{ GDP growth rate, 2003–05} + \alpha$$

$$\text{SE} = 0.050 \qquad \qquad \qquad \text{SE} = 1.46$$

Here, α refers to the intercept. This equation has an R^2 of 0.71. The strong link between real income and life satisfaction is clear; more surprising, perhaps, is that after controlling for the level of per capita GDP, faster GDP growth is associated with *lower* life satisfaction, perhaps because of the psychological and other adjustment costs associated with rapid economic growth.

Deaton concludes that, “reports of life satisfaction, at least on average, may provide a useful summary of the different components of people’s capabilities” (2008, 12), but he considers that more objective measures of poverty are still needed, because people may simply have adapted to misery and hardship. The dilemma is this: if a poor slave says he is happy, should we take that assertion at face value? But if not, then a subjective measure of life satisfaction is an incomplete measure of well-being.

Review Question

13. Based on experience in the Philippines, which of the following statements is *not* true?

- A. Subjective poverty lines are not absolute over time.
- B. Self-rated poverty lines show high poverty rates.
- C. The rich report markedly higher poverty lines than the poor.
- D. Urban households set poverty lines higher than rural households, by more than the price differential between urban and rural areas would imply.

Notes

1. Pradhan et al. (2000) favor an interactive procedure: pick a reference population that is relatively poor and compute their cost of calories; now recompute the poverty line; take as the new reference population those households close to this poverty line and recalculate the cost of calories; compute the poverty line again; and so on, until the poverty line stabilizes.
2. The exchange rate in mid-September 2003 was P54.75 per U.S. dollar.

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