XI INCOME LEVELS, DISTRIBUTION AND POVERTY

XI. 1 The assessment of poverty

A major reason for requiring statistics on the income of agricultural households is to explore whether there is a problem that requires government intervention. Particular attention is paid within policy planning circles to the problems associated with low-incomes. In less developed countries this may manifest itself in a lack of ability to meet basic needs (food, shelter etc.). In more developed economies these needs may be met but there may still be disparities between groups that raise concern on the grounds of equity. While basic needs may be met, low-income households could still be regarded as suffering deprivation.

What is meant by the term "deprivation" depends on the context (Bradley *et al*., 1986) but it is, nevertheless, a potent concept in justifying policy action. Within the agricultural sector of industrialized countries it is commonly found that various forms of deprivation are connected - an inadequate income will tend to be associated with isolation on a small farm, where the family is locked into a restricted set of social contacts and has only a narrow range of access to the facilities provided for society in general. The problem is therefore multifaceted. Nevertheless, these additional forms of deprivation (social, cultural, etc.) are separate from (but may be linked to) what can be described as economic deprivation or income poverty. Economic deprivation may be described as situations where people have an insufficient command over the resources needed for living and are excluded from the socio-economic system.

In order to turn this inexact notion of insufficiency into a measure which can be used to guide practical policy, some standards have to be set for what is deemed sufficient. One way of doing this is to establish a *poverty line.* This has two distinct roles (Ravallion, 1998). One is to determine what the minimum level of living is before a person is no longer deemed to be "poor." The other is to make comparisons between families in order to inform observers of what expenditures are needed in each set of circumstances to ensure that the minimum level of living needed to escape poverty is reached. It is possible to establish a poverty level in terms of a combination of characteristics. An example would be income plus leisure where two people of identical income might be classified differently if one has more leisure time than the other. In this situation the term poverty boundary is more appropriate than poverty line. However, it is more usual to simplify the relevant variables to one - that of income. When tackling low-incomes in agriculture, a monetary poverty line can be a very useful yardstick against which the circumstances of agricultural households, families or individuals can be compared.

XI.1.1 Social exclusion

While social exclusion is a concern for society in general, it is of special interest in an agricultural society. For individuals in particular groups, social exclusion is a form of marginalization leading to economic deprivation in terms of limitations of functionings of living standards (the term "functionings" in the literature, following Sen, means what a person succeeds in doing and being) and various forms of social and cultural disadvantage. Social exclusion in a rural environment, where self-employed work is "unpaid," may be disguised in that it may not manifest itself in unemployment *per se* but in low-income and low wealth farm households.

Social exclusion is related to both inequallity and poverty and may be expressed in terms of both the number and quality of functionings from which the person is excluded. Its multifaceted nature can be captured by reporting the proportions of households having financial difficulties, not having access to basic

necessities, living in bad housing conditions, having infrequent social contacts, dissatisfied with the work or living conditions, etc.

In order to capture the multidimensionality of inequallity and poverty a comprehensive measure of poverty which pools indicators such as the headcount, the income gap, the difference in income between social groups, and the within-group Gini (see below) into a single poverty ratio is required (Dagum and Costa, 2003). Dagum and Costa also propose a methodology to develop a multivariate analysis of poverty, which also includes elements of social exclusion and limitations in the space of functionings and capabilities.

XI.2 Ways of measuring the incidence of poverty among households

Of course, poverty is associated with one end of the income distribution. The distribution of incomes is important because an otherwise satisfactory level of average or median income can nevertheless contain cases where incomes are sufficiently low as to constitute a policy problem. Thus when considering poverty among households it is necessary to put this in the more general context of the spread of incomes. The Canberra Group report (2001), which is a major foundation of the methodology outlined in this Handbook, is quite reticent in its treatment of how income distributions should be described, lacking a specific section dealing with them as a tool in economic and social analysis. However, before dealing with the distribution of incomes it is first necessary to set out the basis on which poverty lines might be established. Later some of the practical issues in the application of poverty lines will be described.

Poverty lines are by their nature impossible to set without involving value judgements. These may be explicit or hidden in the assumptions behind what may appear to be objective methodologies. A variety of approaches to defining a poverty line have been used or proposed. Two polar positions can be taken. The first position assumes that the poverty line can be set in absolute terms, in which case it would be possible to totally eliminate poverty if every one could be lifted above the poverty line. The second position assumes that poverty is a relative phenomenon, in which case poverty will never be removed (Hagenaars and Van Praag, 1985; Hagenaars *et al*, 1994; Ravallion, 1998).

At its most extreme, an absolutist view of poverty would be a situation of deprivation of certain basic goods and services necessary for maintaining physical subsistence. This makes no reference to the well-being of the rest of society. In these circumstances, a poverty line would correspond to the income required to allow the acquisition of these basic means. This was basically the approach of the seminal work on UK poverty by Rowntree (1901) and Booth (1902). It is particularly suited to the circumstances of less developed countries. Of course, if income (rather than consumption) is used as the criterion on which the line is drawn, then it becomes important to ensure that income is adequately measured, especially income taken in kind from own production of food and other domestic requirements.

A less rigid attitude might set a poverty line somewhat above this subsistence-consumption level. This higher level will reflect society's view of what constitutes a minimum acceptable income for its members. Both are absolute figures, though in the latter case the level takes into account more than physical necessities. As Atkinson (1975) points out: "It is misleading to suggest that poverty may be seen in terms of an absolute standard which may be applied to all countries and at all times, independent of the social structure and level of development. A poverty line is necessarily defined in relation to social conventions and the contemporary living standards of a particular society." Though a subsistence poverty line may have the appearance of objectivity, the *choice* of defining poverty in this way is as subjective as any other based on less clear physical requirements (see also Atkinson, 1980).

The other extreme in poverty line definitions is represented by those which set the line at some percentage of the society's average personal income or at some point in the distribution of incomes, for example, at some percentage of the median income or the lowest decile. Expressed in such a way, poverty will never be eliminated. But this too imposes the judgement of the observer on the measure of poverty. In an attempt to strive for greater objectivity, exercises have been conducted to extract from a representative cross-section of people, using surveys, society's assessment of where the poverty line lies (Hagenaars and Van Praag, 1985).

While different respondents perceive poverty differently according to their circumstances, suitable weighting can be employed to achieve poverty levels that reflect the mix of views in society. This has been termed a "subjective" view of poverty (Forster, 1994), and constitutes a third approach for establishing poverty lines. However, adopting a poverty line derived in this way presupposes that society in general is the best assessor of poverty; this is not self-evident. Table XI.1 summarizes the three approaches to establishing poverty lines.

Table XI.1
Three different approaches to defining low-income (poverty lines implied)

	Absolute approach	**Relative approach**	**Subjective approach**
Method	- Define an absolute subsistence minimum in terms of basic needs. The aggregate cost constitutes the low-income line	- Define low-income as a fraction of average or median income (*e.g.* 50% of median)	- Incorporate a minimum income question in household surveys
Examples	- U.S. Social Security Administration Poverty Index	- International comparative studies often use this method	- Very few regular surveys adopt this approach
Advantages	- Permit analysts to quantify easily the effects of social programmes	- Allow cross-country comparisons because of its independence of a specific country's definition of basic needs	- Can avoid the problem of the arbitrary choice of basic needs
Difficulties	- Arbitrary nature of the choice as to what constitute basic needs - Difficulty in cross-country comparisons	- Relationship between low-income and poverty is less clear	- Cross-country comparison is extremely difficult

Source: FÖRSTER (1994), pp.7-10 cited in OECD (2001).

In its work on low-incomes in agriculture the OECD (2001) has outlined ways of measuring poverty among agricultural households in its Member Countries. The OECD's methodology is based on international practice and uses evidence from the Luxembourg Income Study (LIS) database for the mid-1990s to compare the degree of "low-income" in agricultural households to other households in the different countries. Twenty-one countries provided data, including thirteen of the EU-15; Portugal and Greece were unfortunate omissions. This is regrettable as, arguably, low-incomes among agricultural households are particularly problematic in these two countries. Both the "broad" and "narrow" definitions of an agricultural household were applied.[1] The sources of data for the LIS database are principally household (family) budget

[1] In the broad definition, a farm household is "a household whose farm self-employment income is not zero." In the narrow definition a farm household is "a household whose farm self-employment income is more than 50% of total household income." For the purpose of income measurement at the household level, disposable income was used, adjusted for household size (equivalence elasticity = 0.55) (see Förster, 1994). The low-income threshold was 50% of the median (disposable) income of all households.

surveys or panel surveys. Unfortunately, such general surveys have well-known deficiencies; they usually have few agricultural cases and the quality of income data is sometimes suspect, particularly where gaps in coverage of the components of income prevent full comparability between agricultural and other households. For these reasons Eurostat has so far declined to use them to generate microeconomic statistics on agricultural households. The desire to improve this data situation is, of course, one reason for assembling this Handbook. Having said this, the OECD's descriptions of statistical presentations of low-incomes are entirely valid and can form a template for application in situations where suitable data exist.

XI.2.1 Low-income rate (Cumulative proportions below percentiles of the median)

The first method of presenting low-income often adopted in international comparisons is to ask what proportion of the population is below specified percentages of the median income. This proportion is often called the *low-income rate*. Though the results must be treated with caution (because of the quality of the basic data), some of the main features of the OECD/LIS analysis are worth noting. If the standard of low-income was taken as 50% of the median income of all households, and if the "broad" definition of an agricultural household was adopted, the incidence of low-incomes was much higher in agricultural households than in other households in nine countries (Australia, Denmark, France, Hungary, Ireland, Italy, Netherlands, Poland, Spain). The highest incidences of low-income were recorded in Hungary (33.8%), Australia (25.4%) and Ireland (24.6%). The largest differences in the percentage of low-income agricultural households and low-income non-agricultural households were recorded in Hungary, Poland, Ireland and Australia. The smallest differences were recorded in the Czech republic, Canada and Finland. However, if the "narrow" definition of an agricultural household was taken, the results were different. With the exception of Hungary, the Netherlands and the UK, the low-income rate among agricultural households was higher. Moreover (again when using the "narrow" definition), the number of countries where the incidence of low-income was higher among agricultural households than among non-agricultural households increased from nine to thirteen. These examples illustrate the importance of the choice of definition of an agricultural household to the outcome of the analysis.

XI.2.2 The low-income gap

The cumulative proportions below given percentiles of the median (i.e. the low-income rate described above), provides useful information on the incidence of low-income. However, it does not capture the intensity of low-income. That is, it does not show how far the low-income households fall below a given cut-off line. The average low-income gap (ALG) is commonly used as an indicator of this intensity, and it is defined as the difference between the average income of the low-income households and the low-income line, as a percentage of that low-income line:

$$\text{ALG} = \frac{z - \bar{y}_q}{z}$$

where

z = low-income threshold

$\bar{y}_q$ = average income of the low-income population

Using this methodology, the OECD analysis found that the low-income gap was bigger in agricultural households than in non-agricultural households in all the countries where data were available. This means the intensity of poverty was higher among agricultural households. Comparisons between the

income gaps calculated using the two definitions of an agricultural household found that the "narrow" definition produced a bigger low-income gap in all countries, although the extent of the widening of this gap varied amongst countries.

XI.2.3 Relative income level by percentile

Low-income rates indicate the share of the population below specified percentages of the median. An alternative way to examine a distribution of income is to compare the income of households at selected percentiles with the median income.

For example, in Australia in 1994-1995 the median income (adjusted by household size) per household for all households was AU$16,708. Agricultural households in the lower quartile, i.e. 25% up from the bottom, had a medium income of AU$8,282 and expressed as a percentage of the median, was 49.6%.[2] The corresponding figure for non-agricultural households was 59.3%. These results can be interpreted as follows; the agricultural household income at its lower quartile was about half of the median income of all households and about 10% below that of non-agricultural households at the same quartile.

In the OECD/LIS analysis, if the lower quartile of both agricultural households and non-agricultural households were compared, seven of the countries had agricultural household income below that of non-agricultural households. If the "narrow" definition was taken, the number of countries which had inferior agricultural household incomes at the lower quartile increased to eleven.

XI.2.4 Cumulative decile shares - Lorenz curve

Relative income level per percentile reveals relative income levels of households at certain percentiles compared to the median income. In order to understand the concentration of incomes, it is useful to know cumulative shares of total income.[3] The Lorenz curve is a familiar construction to illustrate graphically the concentration of incomes. It plots cumulative proportions of the population, from the poorest upwards, against the cumulative shares of income that they receive. If all incomes were identical, this would trace a diagonal 45 degree line ("line of perfect equallity"). In the other extreme case - if the richest unit received all the income - the Lorenz curve would lie along the horizontal axis, and then along the vertical axis at the 100% income share ("line of perfect inequallity").

The Lorenz curve allows for an unambiguous comparison of the relative distribution in cases where the curves do not intersect. One distribution is unambiguously more equal than the other if every point on its Lorenz curve lies inside (upper-left) the other (the first has Lorenz superiority to the second). If two Lorenz curve cross, it is not possible to say which curve represents a more equal distribution of income.

In the OECD/LIS analysis, unambiguous comparisons between agricultural households and non-agricultural households were not always possible because the curves crossed. However, where this problem was not encountered, there were some interesting and mixed results. With both the "broad" and "narrow" definitions, non-agricultural households had Lorenz superiority over agricultural households in most countries, but with exceptions. When comparisons were made between the two ways of defining the

[2] This figure represents the upper bound value of the lower quartile.

[3] When drawing Lorenz curves, "bottom coding" may be necessary in order to avoid bias. If the adjusted disposable income of a household is negative, its income is adjusted to zero, and if the income is lower than 10 per cent of the upper bound value of the first decile, it is adjusted to that value (10 per cent of the upper bound value of the first decile). For example, if the upper bound value of the first decile in a country (adjusted disposable income basis) were $2,000, all the adjusted disposable incomes lower than $200 (10% of $2,000) would be adjusted to $200 (Atkinson *et al.*, 1995). The same adjustment is done for the Gini coefficients in the next section.

agricultural household, in most countries the "broad" definition produced a Lorenz superior result, though in Finland and Norway the "narrow" approach was superior.

XI.2.5 Gini coefficient

A derived summary statistic used to characterize the distribution of incomes is the Gini coefficient. The Gini coefficient is defined as the area between the Lorenz curve and the 45 degree line as a ratio to the area of whole triangle. The Gini coefficient is 0 when all incomes are distributed equally and 1 (or 100 if expressed in a form more comparable with other indices) when there is perfect inequallity. The Gini coefficient may by calculated from the formula:

$$G = \frac{2}{n^2 \bar{y}} \sum_{i=1}^{n} i\left(y_i - \bar{y}\right)$$

where

n = total population

$\bar{y}$ = average income

y_i = income of the i^{th} household

In the OECD/LIS analysis a mixed pattern emerged, both between countries and when using the "broad" and "narrow" definitions of an agricultural household. In some countries the Gini coefficient was lower in agricultural households than in non-agricultural households, i.e. incomes were distributed more equally in agricultural households. For others, the reverse was true. If the results from the "broad" and the "narrow" definitions were compared, the Gini coefficient was higher when using the narrow definition in most countries, suggesting that the distribution is more equal when all households having some income from agriculture are included (see Appendix D of Ashok *et al.* (2002) for making adjustments to Gini coefficient calculations to allow for negative incomes).

XI.2.6 Sen index

Finally, as an alternative summary measure, the Sen index can be considered. This was developed by Sen to combine the three indicators described above into a single indicator of poverty for a given poverty line. To recap, the three indicators of low-income are:

- Low-income rate - Cumulative proportions below percentiles of median: a proportion of the population is below specified percentages of the median;
- The average low-income gap: the difference between the average income of the low-income households and the low-income line (specified percentages of the median), as a percentage of that low-income line;
- Gini coefficient: area between the Lorenz curve and the 45 degree line as a ratio of the whole triangle that represents a degree of inequallity in the distribution of income.

The Sen index consists of the head-count ratio multiplied by the income-gap ratio augmented by the Gini coefficient of the poor weighted by the ratio of the mean income of the poor to the poverty-line income level, and multiplied by 100 to be in a form comparable with other indicators. The Sen index is thus defined in the following way (Förster, 1994; p.21):

$$S = LIR\left[ALG + \frac{\overline{y_q}}{z} G_p \right]$$

$$= LIR\left[ALG + (1 - ALG) G_p \right]$$

where

LIR = low-income rate (head-count ratio)

ALG = average low-income gap

$\overline{y_q}$ = average income of the low-income population

z = poverty line

G_p = Gini coefficient of income inequallity among the low-income population

In short, the Sen index can be interpreted as a weighted sum of poverty gaps of the poor. The values for the Sen index lie in the closed interval, with S = 0 if everyone has an income above the poverty line, and S = 1 (or 100) if everyone has zero income. The Sen index is useful for cross-country comparisons of poverty, because it combines the incidence, the intensity and the distribution of low-incomes in a single indicator.[4]

According to the OECD/LIS analysis, if the Sen indices of agricultural households (using the "broad" definition of agricultural household) and non-agricultural households that had less than 50% of the median income were compared, the Sen index was generally higher for agricultural households, i.e. the degree of poverty was greater. If the "narrow" definition of agricultural household was taken, the Sen index was also higher in agricultural households in all the countries where the data were available. However, for most of the countries, the Sen index was lower using the "broad" definition than it was when the "narrow" definition was used. That is, the degree of poverty among agricultural households was higher when using the "narrow" definition of an agricultural household.

XI.2.7 Warning in the interpretation of coefficients

Though the Canberra Group (2001) report does not offer much detailed advice on the use of the different ways of measuring poverty or inequallity, it makes some valuable comments on the care with which changes in coefficients over time (such as the Gini coefficient) have to be treated. The problems that may arise when attempting to identify trends include:

[4] Unfortunately because of a problem of sample size, a Sen index could not be calculated for several countries.

- ***Two point trends***. Comparable household income microdata may only be available for two periods. Having two periods permits the user to estimate the change between them, but it may convey a misleading impression of the underlying trend. There is considerable danger in taking a very small number of years to extrapolate long-run trends.
- ***Business cycle effects***. Because of cyclical variations in inequallity, trends based on an arbitrary time period (e.g., 1980 to 1995) might produce misleading comparisons if its "fit" with the business cycle differs between nations. If trends in inequallity are pro-cyclical - as is the case in the United States - peak (year) to trough (year) trend estimates are biased downwards while trough to peak trends are biased upwards. The opposite holds if inequallity trends are counter-cyclical. Comparing peak-to-peak or trough-to-trough provides the least biased estimates and this requires a lengthy time series of estimates.
- ***Mixing datasets and definitions***. The only 'time series' available may have been constructed using several income definitions and/or several datasets over time. In general, mixing cursorily different datasets to form a single trend is not recommended as the trend will reflect *both* the "real" inequallity change *and* differences across datasets.

XI.3 Poverty lines and inequallity measures in practice in agriculture

All poverty lines are arbitrary. The choice of method of their determination depends essentially on the problem at hand and the dominant social values. The absolutist approach is now less in favour because of rising general levels of consumption and changed public perceptions of poverty. Bare physical subsistence criteria have been replaced by criteria relating to the ability to participate acceptably in the social system (Van Slooten and Coverdale, 1977). Another set of value judgements is involved when equivalence scales are used to apply poverty lines to families of different sizes and compositions. If the marginal needs of additional household members are given a low rating, then poverty among (often elderly) single-person households is emphasised more and family poverty is emphasised less. On the other hand, a high rating will make poverty appear more "rural" and, in the European context, more "southern." Ultimately the setting of a poverty line is not an economic decision but a political one (Madden, 1975).

For practical purposes many countries utilize a poverty line in their general welfare policies, though it may not be labelled bluntly as such. Its practical implementation may involve measuring the cost of some single parameter, such as the necessary family expenditure on food, and extrapolating from this to the total income required to cover all purposes at the poverty level. The United States has used a poverty line developed from the USDA's Low Cost Food Plan, the poverty line income being three times this on the grounds that average food expenditure comprised about one third of the typical family's budget (the Orshansky index) (Orshansky, 1963). This was clearly inappropriate for farm families which produced more of their own food than the typical United States family, so the poverty line for farm families was set initially at 60% of the standard line (Bryant *et al*., 1981). Criticism that, while food costs of farmers were lower, this did not necessarily apply to the other components in family budgets, resulted in the gradual narrowing of the farm/non-farm poverty lines to 85% in 1969 and its total elimination in 1981 (see Fisher, 1997a, 1997b and 1992). In Australia, the 1973 Henderson Poverty Enquiry used a farmer poverty line 20% below that for all families (Vincent, 1976). In Canada, the similar "low-income cut-off" is defined differently for rural and non-rural households (OECD, 1995).

There are problems associated with using an income base that is too narrow when assessing the extent of poverty, especially rural poverty. This is illustrated by the impact on the numbers of United States rural families classed as poor when the concept of income was widened to include unrealized capital gains and the value of non-market services provided by owner-occupied housing, home-grown food and

do-it-yourself activities in addition to annual money income (which is used in official United States statistics). All of these additional forms of income are probably more important for agricultural households than for non-agricultural ones and especially for poor ones (Gardner, 1975). This "full income" approach attempted to estimate the purchasing power available for consumption and saving in a normal year. In the absence of reliable data by which piecemeal corrections could be made to income data, Gardner used an intricate method based on rates of return on the factors (land, capital and human) used on farms. Because of this, substantial errors were probably involved, but the methodology gives a first approximation of the importance of taking a wider income view. In 1969, 20% of rural farm families were below the poverty line when using conventional income measurement. Taking a full income approach reduced this to the range 5% to 14%, depending on certain assumptions. Seven to eight percentage points of this reduction was attributable to a more equal distribution of farm incomes and a further five percentage points was due to a higher average income.

Poverty lines are easier to use where incomes are stable. The random variation in agricultural incomes from year to year, principally weather-related, means that in some years a farm family could fall below the line and in other years be above it. Classification on a single year's income, as is common in income distribution statistics, would be foolish. Evidence from Australia, Denmark and Germany (see Chapter IX.5) suggests that a distinction should be drawn between the core of farm households that are in a persistent low-income situation and those who suffer temporary low-incomes. While the former are likely to constitute a welfare problem requiring intervention with public funds, the latter are not. How far low-incomes have to fall, and for how long, before government action is justified is, of course, a matter of political judgement.

Despite methodological difficulties, one might have supposed that the importance of low-incomes to agricultural policy would have engendered a substantial effort by official statisticians to assess the number of farm families who fall below poverty lines. This is not the case. Only in the United States have figures for farmers who are in poverty been published regularly (though this has now ceased), and even these do not seem to have been of major importance in shaping agricultural policy. Other countries have occasional studies or pieces of research, though these are not numerous. The use of a poverty line for farm families in Australia, referred to above, was part of a special investigation that has not been repeated. The OECD study of low-incomes in agriculture (OECD, 2001) mentions only Belgium, Canada, Czech Republic, Ireland, New Zealand and Turkey as having national studies that have considered the distribution of incomes (household or individual). Even here, poverty lines do not often form part of the methodology. In most of the EU Member States the information by which such an exercise could be carried out is either not coordinated or simply not collected. One of the exceptions is Ireland where there are not only periodic studies of income distributions for farmers based on the household budget survey (which links with the National Farms Survey to improve data quality) but also special welfare payments for landholders whose incomes fall below specified thresholds (the Farm Assist Scheme, which is a means-tested social insurance scheme). Some 20% to 25% of landholders seemed to qualify in the 1980s.

In the absence of basic data, the matter of how best to calculate and use the poverty line and measures of inequallity that may be of policy interest shrink to irrelevance. So too do the more modest ways outlined by the Canberra Group report (using graphical presentations, medians, quartiles and Gini coefficients). Nevertheless, it is to be hoped that further developments in this direction will be possible once data sources are in a more satisfactory state.

This Handbook recognizes the usefulness of calculating the basic statistical characteristics of the distribution of incomes of agricultural households, including medians and quartiles, and measures of inequallity and of poverty based on them.

The use of Lorenz curves, low-income rates etc. is encouraged, with comparisons drawn over time, geographically and between agricultural households (variously defined) and other socio-professional group, suitable attention being given to hazards in these comparisons. When setting income poverty lines no particular methodology is preferred, though accounts of the methods used should accompany results.

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