

# 4 Poverty Measurement and Alternative Indicators of Development

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## 1 INTRODUCTION

This contribution stems from work developed within the Regional Project to Overcome Poverty (UNDP-Latin America). Its main contention is that measuring poverty involves the same general approach as measuring social progress or development. The chapter owes a lot to many people. In particular, section 4.4 is a somewhat personal interpretation and simplification of the work developed by Meghnad Desai for the above-mentioned project (Desai, 1990). This chapter argues that the most appropriate procedure for poverty measurement involves a particular use of his quality of life measure.

Section 2 critically appraises the two methods currently prevailing in Latin America: the poverty line procedure (PL) and the Unsatisfied Basic Needs (UBN) approach. Section 3 develops the proposal for an Integrated Poverty Measure (IPM), which is based on combining these two methods. Section 4 develops the proposal for a Social Progress Index (SPI). Finally, section 5 looks at the IPM and the quality of life component of the SPI together, attempting to solve some of their common problems, and arguing that the first is a special case of the second.

## 2 CURRENT METHODOLOGIES FOR MEASURING POVERTY IN LATIN AMERICA: A DESCRIPTION AND CRITICAL EVALUATION

The multidimensional character of poverty has resulted in different approaches to measurement. In Latin America, the PL and UBN methods have prevailed.

The PL or indirect method in principle, consists of:

- (a) definition of basic needs and their satisfiers;
- (b) definition of a standard basket of essential satisfiers (SBES) for each household;
- (c) cost estimation of the SBES, which makes up the poverty line;
- (d) comparison of the poverty line with household income (or consumption);
- (e) classification of households whose income (or consumption) is below the poverty line, as poor.

Every member of a poor household is considered poor.

Up to 1950, PL poverty measuring methods based on complete SBES were prevalent throughout the world.<sup>1</sup> A variant of this method, which can be called the Standard Food Basket (SFB) procedure, widely used in Latin America, consists of the following steps: (a) A Standard Food Basket (SFB) is defined and an estimate of its cost is considered the extreme poverty line; (b) this line is multiplied by the quotient of a group of households' total consumption expenditure and food expenditure (the reciprocal of Engel Coefficient) to obtain the poverty line. The group selected for this calculation may be either the first stratum of households that meets its nutritional requirements or all households, or their the poorest stratum.<sup>2</sup>

While the SFB method in Latin American countries has used factors ranging from 1.75 to 2.5 to transform the extreme poverty line into the poverty line, the implicit factor in the SBES method turned out, *ex post-facto*, in the case of Mexico, to be much larger: 3.5. Obviously, very different incidences of poverty result from the two procedures. The difference between them is not only statistical, but conceptual as well. While the SFB procedure is normative only as regards on food, identifying the standard for other needs as an observed amount of consumption expenditure, the SBES takes a normative stand as regards all needs.

The UBN or direct method consists of the following steps:

- (a) definition of basic needs and their satisfiers;
- (b) selection of variables and indicators that, for each need and satisfier, express their degree of satisfaction;
- (c) definition of a minimum level for each indicator, below which the need is considered unsatisfied;
- (d) classification of households as poor when one or more basic needs are unsatisfied.

Every person that belongs to a poor household is regarded as poor.

Poverty estimates based on the UBN method in Latin American countries

have been formulated on the basis of the following household indicators:

- (a) overcrowding;
- (b) improvised or inadequate housing, as judged by their building materials;
- (c) inadequate water supply;
- (d) lack of (or inadequate) sewage disposal system;
- (e) non-attendance of children at primary school;
- (f) an indirect indicator of households' economic capacity, which associates the educational level of the head of household with the economic dependency rate.<sup>3</sup>

The concept of poverty implicit in the UBN method is an absolute one measured in terms of the characteristics of goods and services (type of water supply, building materials, etc.). Although this absolute concept of poverty does not in principle prevent its being dynamic and historical in character, the Latin American practice has been to maintain fixed minimum indicators over time, bringing about serious distortions in the perception of the evolution of UBN poverty.<sup>4</sup>

The SFB version of the PL method, as applied in Latin American countries, entails an absolute concept of poverty as regards food characteristics (calories, proteins), etc. and a relative concept as regards goods (food), as the SFB is based on the currently observed diets of food-non-poor families, and as the Engel Coefficient utilised to obtain the poverty line should change as consumption budgets are transformed. Thus the poverty line, in contrast with UBN standards, has changed over time in Latin American countries.

While the UBN method involves a factual concept of poverty, identified by observed non-satisfaction of basic needs, the PL method involves a potentiality concept as it looks for the incapacity to satisfy basic needs due to insufficient income (or consumption).

Both the UBN and the PL methods of poverty measuring have one fundamental drawback: the assumption that satisfaction of basic needs depends only on certain sources of household welfare. In fact, at least six welfare sources determine such satisfaction:

- (a) current income;
- (b) rights of access to governmental goods or services;
- (c) ownership (or rights of use) of assets which provide basic consumption services (i.e. a basic accumulated patrimony);
- (d) educational levels, skills and capabilities;

- (e) time available for education, recreation and housework;
- (f) non-basic assets.

The PL method only takes into account current household income (and non-basic assets when current private consumption is the observed variable),<sup>5</sup> while UBN (as applied in Latin America) only considers household patrimony and rights of access to some governmental services. Thus both methods provide a partial view of poverty, which results in its underestimation.

There are some possibilities of substitution among some welfare sources. With a higher income, some needs like health care and education can be met through the private sector. Some basic assets may also be substituted, for example, renting a dwelling when one does not own one. However, these substitution possibilities are not unlimited. Neither the lack of free time for education and recreation nor low educational levels and capabilities, can be replaced with extra monetary income. In Latin American countries, the possibilities for renting popular housing (and domestic equipment) or obtaining loans to build or buy a house are almost non-existent, so for the vast majority of the population the only practical solution is to slowly build their own dwellings. Public services such as piped water, sewerage and electricity do not admit individual solutions (except in rural areas at very high costs).

The specific limitations of the SFB variant are: first, that the procedure not only assumes that in satisfying nutritional standards the selected group (on which sometimes both diets and the Engel Coefficient are based) should also satisfy other basic needs, but hence assumes what should be the result of the measurement exercise: that this population group is not poor. Besides, this assumption is refuted by the empirical evidence: a significant percentage of households above the minimum food threshold are deprived according to the UBN measure.<sup>6</sup> Second, the conceptual definition of extreme poverty frequently used in this variant – households that would be unable to satisfy their food requirements even if they allocated 100 per cent of their income to raw food – is unacceptable, as this is an impossible situation. The proportion of total expenditure devoted to food in poor urban Latin American groups is around 50 per cent. When the SFB cost is multiplied by the reciprocal of the Engel Coefficient, the result comes closer to a conceptually coherent extreme or food poverty line than to a poverty one, that is, a line that identifies households which are not able to purchase the SFB with the actual percentage of their income dedicated to food. Thus, the segment of population identified in these studies as poor should be interpreted as extremely poor or food-poor.<sup>7</sup>

An additional drawback of the UBN procedure is that the incidence of poverty is not independent of the number of items included. Each time one adds an additional item, the incidence of poverty rises.<sup>8</sup> On the other hand, the UBN method needs additional poverty indices besides the head-count ratio, which is a very limited poverty measure. There is a challenge to develop poverty measures which take into account how poor the poor are (poverty intensity) as well as measures sensitive to distribution among the poor (see section 5).

A common limitation of both methods derives from the assumption of total equity within the household, implicit in the procedure of classifying as poor all individuals living in a poor household. It has been proved repeatedly that inequality exists within the household. Although this assumption has more severe consequences for the PL method, it is also relevant to the UBN.

While PL centres on current private consumption requirements, UBN focuses on public expenditure and private investment requirements. PL measurements identify target populations with insufficient income which therefore require support through employment, wage and income generation policies.<sup>9</sup> Conversely, the target populations identified by UBN require housing loans, water supply, sewage disposal systems, education and other such policies. While the first approach leads mainly to the definition of *economic policies*, the second leads mostly to the definition of *social policies*.

### 3 THE INTEGRATED POVERTY MEASURE (IPM)

An adequate poverty measure should take into account the six welfare sources mentioned in the preceding section and their interrelations. Two hypothetical examples will suffice to illustrate the consequences of not doing so. First, two households of identical size, age and sex structure, and with the same current income, would be considered by PL to be in an identical situation. But as soon as one considers other sources of welfare a difference emerges. If, for example, only one of them has access to free medical care or education, or one has a larger patrimony of basic consumer assets, one would no longer consider them as having the same standard of living. Second, as a consequence of women's entry into the wage labour market, many households experience a steep rise in their monetary income. National economic accounts will register an increase both in GDP and in household income. PL will register a downward shift in the incidence of poverty. None the less, part of this economic growth and decrease in

Table 4.1 Basic definitions for the integrated poverty measurement method

Needs which can be verified by UBN (1)	Needs which can make up the PL (2)	Needs verified with a mixed approach (3)	Definitions of PL by household (4)	Income or consumption comparable with PL (5)
1. Water	1. Food	The cost of private health care and insurance must be added to PL when households members are not entitled to free services. If they are, the needs are considered satisfied.	1. Standards in (2) are determined for each person according to sex and age group, except items 2 and 8, which are at household level.	Income or expenditure which is compared with PL is available income, once expenses incurred on column (1) items have been deducted. PL results from columns (2), (3) and (4).
2. Sewerage	2. Fuel			
3. Electricity	3. Personal and home care			
4. Housing (building materials and overcrowding)	4. Clothing and footwear			
5. Adults' educational level	5. Public transport			
6. Children's school attendance	6. Basic communications			
7. Available time	7. Leisure and Culture			
8. Furniture and household appliances	8. Payments for housing services (rent and mortgage are excluded)			
	9. Expenses related to school attendance and health care			
		3.	If members have no available time for domestic work, the private cost of child-care and/or paid domestic services are added to PL.	

poverty will be spurious. In terms of our welfare sources, current monetary income and consumption will increase, but the time available to women for education, recreation and domestic work will be reduced. It may be necessary to hire a person for domestic work and/or to pay for child-care. Other additional expenditure requirements will arise, like transport costs and costs of meals outside the home. Thus, both monetary income and required monetary expenditures will be higher. The final balance may be positive, neutral or negative in terms of the household's standard of living.

PL and UBN measurement methods are thus complementary. When applied simultaneously, the poor population results from the union of both sets of poor and not from their intersection. Their simultaneous use constitutes a new methodology: PL-UBN or Integrated Poverty Measure (IPM).

The integration of PL and UBN calls for the elimination of redundancies and for a general review of both methods in order to achieve full complementarity.

From this perspective, it is obvious that the indirect indicator of economic capacity becomes redundant. Moreover, to achieve maximum complementarity, it is necessary to specify which method will detect the satisfaction of which needs. A convenient division is to use UBN to tackle all needs that are preponderantly met through public spending, through households' accumulated investment, or as a result of personal time and effort. Those which are predominantly met through current private consumption expenditures can be dealt with by using PL. There is a good deal of leeway to move specific needs from PL to UBN, even if their satisfaction depends on current income (the satisfaction of food requirements, for example, can be detected directly), but not as much to move in the opposite direction (the satisfaction of the need education, for example, can never be analysed through income). Consequently, the satisfaction of at least the needs enumerated in column (1) of Table 4.1 must be identified through UBN. Of the needs listed there, water supply and sewerage, children's school attendance and housing characteristics are usually included in Latin American UBN studies. Adults' educational levels and electricity could be added, as data on these may be found in censuses and household surveys. If adults' educational level is included, we should count as poor only the person under the minimum educational level and not the whole household, thus relaxing, at least to this extent, the assumption of equity within the household. On the other hand, the adding of possession of furniture and household appliances, as well as available time (another need in relation to which the equity assumption can be relaxed), would require

the modification of questionnaires.

Health care and security (risk insurance), inasmuch as the need can be satisfied through either private or free services, require a combined treatment. If an individual household has no free access to these services, their poverty line should include their private costs (Table 4.1). Primary school attendance is handled through UBN because school attendance is a yes-no variable with data available in censuses and household surveys. If school-age children are attending school, the need is considered satisfied, regardless of whether the school is private or public. If the school is private, expenditures incurred have to be deducted from income (consumption expenditure) before comparing it with the poverty line (Table 4.1, column (5)).

The needs whose satisfaction can be defined exclusively through PL are listed in column (3) of Table 4.1. In order to define the poverty line, once the inconsistencies of the SFB variant have been analysed, the best option would be to build a comprehensive standard basket for the needs included in PL and calculate the costs of satisfying them. Family income requirements are a function of family size, age and sex structure, access to free goods and services, available time for housework, and ownership of basic consumer assets (above all, housing). The poverty line has to be specifically calculated for each household on the basis of these variables.

The appropriate household income (or consumption expenditure) to be compared with the poverty line is available income for the needs that it has to satisfy. It is therefore necessary to deduct from each household's income (or expenditure) amounts spent on all needs tackled by UBN (Table 4.1).

IPM defines three broad groups of poor: (a) those who are poor under both PL and UBN; (b) those who are poor only under UBN; and (c) those who are poor only under PL. Rubén Kaztman has labelled the first group as chronic poor, the second as inertially deprived and the third as newly poor.

#### 4 TOWARDS A NEW WAY TO EVALUATE DEVELOPMENT: THE SOCIAL PROGRESS INDEX (SPI)

##### 4.1 The prevalence of per capita GDP as the development indicator

Growth of per capita GDP has, in practice, become the universal evaluation criterion and the exclusive objective of development. This exclusiveness produces serious distortions in development, such as its concentrating and

excluding character.

This predominance is explained by the following: (1) In economic systems based on the production of exchange values, needs (related to use values) are disregarded or their basic or non-basic nature ignored. (2) GDP weighs individuals according to their incomes, and goods and services according to their prices, in accordance with the direct and apparently objective way in which the real world values them. The theoretical scale of GDP and the practical real life scale are the same. (3) GDP is not an alien way to measure development for politicians or the average citizen. (4) In addition, GDP is a synthetic expression which forms part of the coherent conceptual scheme of national accounting.

The failure of alternative development indicators may be explained by the absence of those attributes which make for GDP's success. These alternative indicators emphasise qualitative aspects and basic needs, but usually have the following drawbacks. First, when they arrive at a single figure, it is usually expressed in artificial units (indices). Second, with regard to its conceptual framework: (a) it is not always explicitly formulated; (b) it does not have the internal consistency of national accounting, and (c) it does not generate the same degree of consensus.

##### 4.2 Some desirable characteristics for the SPI

Alternative development indicators may be of two types: those oriented to stand side-by-side with GDP, and those which seek to complement it in an integrated 'societal' development indicator. Indicators of the first type – which include the majority proposed up to now – perpetuate the separation of the economic and social domains and their respective policies. Their adoption at a national or international level would reinforce this separation. The struggle to develop indicators of the second type seeks to overcome the dichotomy between economic and social policies.

In what follows the definition of a social progress index (SPI) with the following features is pursued: (1) It should be a development indicator of the second type. (2) It should provide an account both of the *opportunity set* (built at the macro-social level) and of the *achievement set* (built mainly at the micro level) for social welfare. (3) It should be expressed in measurement units handled by the population in everyday life, thus easing its general adoption.

##### 4.3 The SPI as a measure of the opportunity set<sup>10</sup>

The opportunity set is composed of the man-nature dimension, expressing

Table 4.2 Components of the social progress index as a measure of the development process (opportunity set)

Dimensions of the development process	Component	Basic indicator		Observations	Composite indicator
		Description	Notation		
MAN-NATURE	Available means	Corrected GDP per equivalent adult	$GDP^e$	Corrections for: - price biases, etc. - inclusion of non-mercantile means	
	Free time or Required labour time	Index of average free time in relation to standard Index of required labour time in relation to standard	$I_{ft}$ $I_w$	$I_{ft}$ and $I_w$ are alternative indicators	$GDP^e I_{ft}$ $\frac{GDP^e}{I_w}$
MAN-MAN	Equity with respect to means and free time	Equality index	$I - G$		$\frac{I - G_y}{I - G_{ft}}$
GLOBAL VISION (MAN-NATURE and MAN-MAN)	Opportunity set for social progress	Egalitarian equivalent of available means and (a) free-time egalitarian equivalent (b) adjustment with free-time index (c) adjustment with labour-time index			(a) $[GDP^e_e(I - G_y)] [I_{ft}(I - G_{ft})]$ (b) $\frac{GDP^e_e(I - G_y) I_{ft}}{GDP^e_e(I - G_y) I_w}$ (c) $\frac{GDP^e_e(I - G_y) I_{ft}}{GDP^e_e(I - G_y) I_w}$

Table 4.3 The social progress index as a measure of the objective of development quality of life (achievement set)

Component	Basic indicators		Explanation and composite index	Definition of additional notation
	Description	Notation		
LONGEVITY: PROPORTION OF LIFE POTENTIAL REALISED	Future life expectancy as a proportion of future life potential	$R_j = \frac{FLE_j}{FLP_j}$	$FLE_j = E_a - a$ , $FLP_j = T - a$	$a$ , Individual's current age $E_a$ , Age conditional life expectancy $T$ , Standard longevity
CAPABILITY	Probability of being (totally or partially) capable	$S_j$	$0 \leq S_j \leq 1$	
CAPABLE LONGEVITY	Proportion of life potential realised in capable conditions	$RS_j$	$R_j = \frac{E_a - a}{T - a} (S_j)$	

Table 4.4 The social progress index as a measure of the objective of development quality of life and individual satisfaction of needs (partial achievement set)

Component	Standard	Description	Basic Indicator	Notation	Notes
1. PL needs	Poverty line, calculated by household, is expressed in per capita terms ( $C_j^*$ )	Current private consumption of households, in per capita terms ( $C_j$ ) is compared with per capita poverty line ( $C_j^*$ ).		$S_{pl} = (C_j - C_j^*)$ $C_j = C_j^*$ , meets needs $C_j < C_j^*$ , poor $C_j > C_j^*$ , non-poor	$S_{pl}$ 's satisfaction of PL needs. Similarity with PL method. In this case, however, $C_j^*$ and $C_j$ are determined for all (poor and non-poor).
2.1 UBN needs. Need by need analysis	For each need or satisfier, a specific standard is set $d_{ij}^* = 0$	Scores ( $d_{ij}$ ) are determined for each household or individual ( $i$ ) and for each need ( $j$ ). Standard score is 0, and its range is from -1 to 1. Individuals receive household's scores.		$d_{ij}$ score obtained by individual $j$ in need $i$ $d_{ij} = 0$ , at standard $d_{ij} > 0$ , below standard $d_{ij} < 0$ , above standard Standard is defined as $d_{ij}^* = 0$	Similarity with UBN method. In this case, however, binary scores are broadened. All households (and individuals) are scored.

Table 4.4 continued

Component	Standard	Description	Basic Indicator	Notation	Notes
2.2 UBN needs aggregation	At standard in every need, or zero overall score: $D_j^* = 0$ $(1 - D_j^*) = 1$	Synthetic indicator of deprivation ( $D_j$ ) is a weighted average of scores in specific needs ( $d_{ij}$ ). Thus, achievement indicator is $(1 - D_j)$ .		$D_j = \sum h_i d_{ij}; \sum h_i = 1$ $D_j^* = 0$ , standard $-1 \leq D_j < 0$ , above standard $0 < D_j \leq 1$ , below standard $Subn = (1 - D_j)$	$h_i$ , weight for need $i$ . For weighing criteria, see text. $Subn$ , satisfaction of basic needs.
3. PL and UBN needs (global satisfaction)	$(1 - D_j^*)$ Thus, $C_j^*(1 - D_j^*) = C_j^*$	Observed private consumption level ( $C_j$ ) is modified by multiplying it by achievement indicator $(1 - D_j)$ .		Combined standard = $C_j^*$ (see column (2)) Global consumption: $C_j = C_j^*(1 - D_j)$ Global satisfaction indicator: $S_g = C_j^* - C_j^*$	$S_g$ , global satisfaction of needs (UBN and PL). $S_g$ cannot be aggregated directly. First it has to be transformed into welfare.

people's ability to obtain what they need or want from nature, and the man-man dimension, which indicates how the proceeds from nature are distributed among participants in the production process.

GDP per capita is an approximation to the average amount of welfare means available in a given year. Any development indicator should reveal what GDP – despite its limitations – reveals: how far a society has departed from the realm of scarcity into the realm of abundance.

But GDP per capita has the following limitations:

- (a) It only records those welfare means which can be transacted in the market, leaving aside, among others, all goods and services produced by domestic work.
- (b) Conversely, it records commodities such as weapons or cigarettes which can hardly be considered means of welfare.
- (c) The prices of goods and services reflect all the biases of the markets, including externalities.
- (d) In referring only to one period, it does not take into account interdependencies over time nor does it reflect socially accumulated welfare means (assets);
- (e) It does not take into account the social distribution of available means;<sup>11</sup>
- (f) It does not account for educational levels and skills, nor for free time for education and recreation which, as stated above, are welfare means.

When GDP per capita ( $GDP_c$ ) is corrected to overcome the first three limitations, we obtain  $GDP^*_c$ . As human needs vary with age, sex, type of activity and other personal characteristics, we need to move additionally to GDP per adult equivalent ( $GDP^*_e$ ), approaching an expression of the flow of available welfare means per 'unit of needs' (Table 4.2).<sup>12</sup> Limitation (e) is considered in the man-man dimension.

Additionally, every society and household has to choose between producing more goods and services or having more time for education and recreation. Thus – approaching limitation (f) – available time for education and recreation should constitute an additional indicator of the opportunity set in the man-nature dimension. Alternatively,  $GDP^*_e$  could be corrected by the labour time required for its generation (Table 4.2).

In the man-man dimension, the opportunity set should be measured according to equity, which may be expressed by an indicator of equity in the distribution of  $GDP^*_e$  and of available time among the population. This could be  $1 - G$ , where  $G$  is the commonly used Gini coefficient

(Table 4.2).

Both dimensions are combined in a multiplicative format as shown in Table 4.2, rendering what can be interpreted as the total equity equivalent of the flow of all welfare means (including time) per unit of needs.<sup>13</sup>

#### 4.4 The SPI as a measure of the achievement set (welfare)<sup>14</sup>

Opportunities are not automatically transformed into welfare. The allocation of welfare means is not neutral in terms of human welfare. Those societies which dedicate a higher percentage of their welfare means to basic goods and services (food, education, health care, housing, basic sanitation, etc.) will have, *ceteris paribus*, higher levels of welfare, as a result of their greater efficiency in transforming means into welfare.

Tables 4.3, 4.4 and 4.5 show how the measurement of the achievement set for social welfare has been approached. The first step has been to define two dimensions of welfare: quantity of capable life and quality of life.

The SPI measures individuals' quantity of life through the proportion of life potential realised in capable conditions,  $R_s$ , which is the ratio of future life expectancy,  $FLE$ , the years a person still has left to live, given their age, corrected by the probabilities of being in capable conditions ( $S_j$ ), and future life potential,  $FLP$ , the years that ideally they should have left to live in capable conditions (Table 4.3).

Quality of life is approached in a very similar way to the measurement of poverty: through a combination of the UBN and PL methods. As with poverty, we start off reaffirming that household welfare depends on six sources (see section 2). To take all of them into account we proceed in the following manner: (1) We consider current household consumption as an initial variable instead of current income, implicitly considering the existence of other assets which allow the household to dissave (or to increase debts) in order to meet needs. Thus far, similarity is with PL. (2) Rights of access to public services, ownership (or rights of use) of basic consumption assets and acquired educational levels will be dealt with through UBN. (3) Available time for education and recreation may also be dealt with directly, verifying the satisfaction of educational and recreational needs, or by quantifying available time, expressing it as an index in relation to a standard, and multiplying the result by current consumption. The first option has been adopted here (Table 4.4).

Items (2) and (3) are quantified binarily in UBN poverty studies, scoring 0 for those households or individuals who comply with or exceed the standard, and 1 for those who do not (basic need is unsatisfied). In the present case, we need to widen the scale, including those above



Table 4.5 The social progress index as a measure of the objective of development quality (individual and social welfare) and quantity of life (achievement set)

Component	Standard	Description	Indicator	Notation	Notes
4. Individual welfare (quality of life)	Welfare is 0 when $S_g = 0$ $w_j = 0$   $C'_j = C^*_j$	Welfare is a step function of global satisfaction, $S_g$ . Below standards, it is positive but increases less than proportionally—by steps—with growing $S_g$ .		$w_j = f(C'_j - C^*_j) = f(S_g)$ $w_j = S_g$   $C'_j \leq C^*_j$ $w_j = 2S_g^{1/2}$   $C'_j < C^*_j \leq 2C^*_j$ $w_j = 3S_g^{1/3}$   $2C^*_j < C'_j \leq 3C^*_j$ $w_j = nS_g^{1/n}$   $(n-1)C^*_j < C'_j \leq nC^*_j$	Each individual's welfare is calculated applying the corresponding welfare function to each range of his $C'_j$ , thus obtaining all $w_j$ .
5. Social welfare (quality of life)	$W \geq 0$	Social aggregated welfare, $W$ , is the algebraic sum of (positive and negative) individuals' welfare. Per capita welfare is obtained by dividing $W$ by population.	$W = \sum_j w_j$  $W_c = W/n$		$n$ , population

Table 4.5 continued

Component	Standard	Description	Indicator	Notation	Notes
6. Quality and quantity of life: lifetime welfare (individual and social)	$RS_j = 1$   Individual standards $C'_j = C^*_j$  $LTD = 0$   Social standards $LTD > 0$ $QQL > 0$	By integrating quantity of life indicator, $RS_j$ , with quality of life, $w_j$ , in a multiplicative format, one obtains lifetime welfare or lifetime deprivation. Social $LTD$ and $LTW$ are the sum of individual indicators.	$ltd_j = RS_j(C'_j - C^*_j)$   $C'_j \leq C^*_j$  $LTD = \sum ltd_j$ $LTD_c = LTD/q$ $ltw_j = RS_j w_j$   $C'_j > C^*_j$  $LTW = \sum ltw_j$  $QOL = LTW + LTD$ $QQL_c = QQL/n$	$LTD$ can be interpreted as lifetime poverty debt. $LTD$ , divided by $q$ , number of poor, gives lifetime poverty debt per poor. Algebraic sum of $LTW$ and $LTD$ gives the final indicator $QQL$ , expressed in monetary terms.	

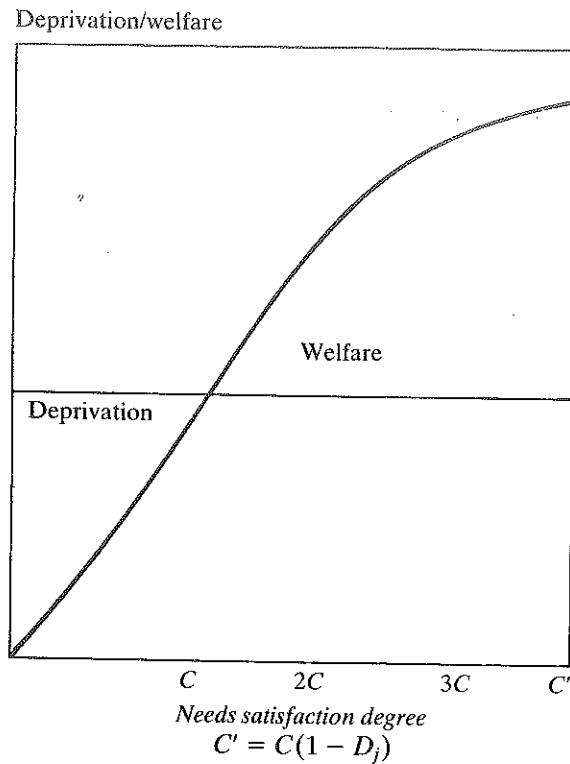


Figure 4.1 Welfare evolution as a function of needs satisfaction degree

the standard with negative values up to  $-1$ . Likewise, we may include intermediate values such as  $0.5$  and  $-0.5$ . Individual scores for specific needs are termed  $d_{ij}$  (Table 4.4).

The next step is to build a synthetic indicator of UBN deprivation for every household,  $D_j$ , as the weighted mean of scores obtained for each need ( $d_{ij}$ ). The poorer households will be deprived in relation to several needs and their average,  $D_j$ , will be positive and close to 1. A household with  $D_j$  equal to 0 may be one that exactly complies with the standard in every need, or one that has some unmet needs, compensated by some needs where the standard is exceeded. Non-poor households, which may include households with some unmet needs outweighed by others where the standards is exceeded, will have a negative  $D_j$  (which reflects welfare) (Table 4.4). Note should be taken that this already constitutes a difference from the UBN method, where deprivation as regards any need is regarded

as poverty. This stems from the fact that in the current UBN methodology no weighted mean of scores is obtained and the minimum  $d_{ij}$  score is 0.

To combine within a household the scores for various needs we may choose among four weighting criteria:

- (a) the proportion of the non-deprived population, which expresses the relative importance society attaches to each need and also the subjective feeling of relative deprivation;<sup>15</sup>
- (b) the relative costs of achieving satisfaction of each need;
- (c) one that reflects social goals, even if they have not actually been achieved;
- (d) one that reflects public opinion on how necessary the goods and services in question are.<sup>16</sup>

Going back to PL, current private consumption should not only include those goods and services that are purchased but also those produced and consumed within the household (cooking of food, child care, self-consumed foodstuffs, etc.) and transfers in kind in areas which are not considered in the UBN scale (like food). The individual position with respect to private consumption is expressed by the comparison of observed consumption,  $C_j$ , with the standard consumption or poverty line,  $C_j^*$ .

To combine the PL and the UBN dimensions, we multiply current consumption,  $C_j$ , by  $1 - D_j$ , before comparing it to  $C_j^*$ . When  $D_j$  is positive,  $C_j(1 - D_j) < C_j$ ; when  $D_j$  is zero,  $C_j(1 - D_j) = C_j$ ; and when  $D_j$  is negative,  $C_j(1 - D_j) > C_j$ . The value of  $C_j(1 - D_j)$  shall be called global consumption and denoted as  $C'_j$ . We should note that  $C_j^*$ , from now on, is a standard comprising both the poverty line and the specific standards for each item of basic needs, as  $D_j^* = 0$ . Thus, the global satisfaction indicator is  $(C'_j - C_j^*)$ , denoted  $S_g$ .

Welfare ( $w_j$ ) derived from global consumption takes on negative values (deprivation) for the poor ( $C'_j < C_j^*$ ) and positive ones for the non-poor ( $C'_j > C_j^*$ ). Above the minimum standards, each extra unit of consumption has decreasing welfare value (the mathematical expression may be found in Table 4.5). Between 0 and  $C_j^*$ , welfare is negative and changes proportionally with global consumption; from this point on, welfare is positive, but marginal welfare (the slope of the curve) decreases as consumption becomes greater (Figure 4.1).

We now have our quantity of life indicator,  $RS_j$ , and our quality of life indicator,  $w_j$ , which results from the comparison of global access to resources by a household (individual),  $C'_j$ , with the standard minimum resources,  $C_j^*$ , and from a specific welfare function applied to each range

of welfare means. We can now combine both dimensions to obtain our quantity and quality of life index (QQL). The simplest and most obvious way is to multiply  $w_j$  by  $RS_j$ , obtaining  $ltw_j = RS_j w_j$ . In this expression, lifetime welfare ( $ltw_j$ ) is a modified expression of welfare observed over a given period, according to the proportional achievement in the quantity of life. Since welfare is negative for the poor, it can be denoted as  $D$ , deprivation, and the product as  $ltd_j$ , lifetime deprivation:  $ltd_j = RS_j D_j$ . Aggregated lifetime deprivation and welfare ( $LTD$  and  $LTW$ ) are obtained by aggregating over all poor and non-poor households, respectively. Thus, at the social level,  $QQL$  may be expressed as the algebraic sum of lifetime welfare of all the non-poor and lifetime deprivation of all the poor ( $QQL = LTW + LTD$ ). It should be noted that  $QQL$  is expressed in monetary terms. This complies with the requirement, announced at the beginning of this section, that the index should be expressed in everyday units, handled by the population at large.

LTD can be interpreted as the 'poverty debt' (PD), and may be expressed as a proportion of the macroeconomic aggregates. Particularly interesting is its size in relation to GDP and foreign debt.

### The Opportunity Set and the Achievement Set Seen Together

Progress has been made in defining the opportunity and achievement sets, which are the two components of the SPI. A detailed analysis of both components should determine the links between the set of opportunities for social welfare and the actual achievement of welfare in the quantity and quality of life index. The task is both a theoretical and an empirical one. The quantification of both dimensions should permit an initial typology of countries.<sup>17</sup>

## 5 IPM AS A SPECIAL CASE OF THE OPPORTUNITY SET OF IPS

### 5.1 Poverty indices for UBN and IPM

Identifying the poor is only the first step in the measurement of poverty. As Amartya Sen has pointed out, the head-count ratio 'pays no attention whatever to the extent of income shortfall of those who lie below the poverty line. Furthermore, a transfer of income from a poor person to one who is richer can never increase the poverty measure  $H$  – surely

a perverse feature' (1981, p. 33). These limitations make it necessary to use other complementary measures. The poverty gap or poverty intensity ( $I$ ) is widely used. While there is some consensus on how to measure this gap for PL, no agreement exists on how to do it for UBN. Boltvinik (1992a) has proposed a procedure for IPM.  $I$  can be applied to a poor individual or household to determine how poor they are, or used at an aggregate level to determine the aggregate income shortfall of all the poor. When applied at the aggregate level it has some severe limitations: it is completely insensitive to transfers of income among the poor so long as nobody crosses the poverty line as a result of such transfers, and it pays no attention whatever to the number or proportion of poor people (Sen, 1981). This last limitation is readily eliminated by combining it with  $H$ .

In the quality of life component of the IPS, we have in fact presented a UBN poverty intensity measure for a household (individual). In Table 4.4 this is called a synthetic indicator of deprivation ( $D_j$ ). The PL and UBN dimensions were then combined in a multiplicative format arriving at the following expression, which is called satisfaction of basic needs (Table 4.4):

$$S_g = C^*_j - C'_j, \quad (1)$$

where

$$C'_j = C_j (1 - D_j), \text{ and } C^*_j = C^*_j (1 - D^*_j) \text{ as } D^*_j = 0$$

where  $C_j$  is private current consumption in the broad sense used. Expression (1) is readily transformed into an intensity measure of poverty in the IPM, simply by dividing it by the combined standard:

$$I(IPM)^1_j = (C^*_j - C'_j) / C^*_j \quad (2)$$

which is a similar format to that of the standard income poverty gap.

But this solution implies variable weights for PL and UBN, and has problems handling the extreme values (for example, when  $D_j$  is 1,  $C'_j$  becomes 0 and  $I(IPM)$  becomes 1, regardless of the values of  $C_j$ ). I have proposed (Boltvinik, 1992a) a somewhat more complicated procedure which tries to solve these problems. It separates UBN indicators into two groups: (a) those which have a monetary dimension, and (b) those whose main dimension is time. For the first group, a combined household indicator ( $D^m_j$ ) is obtained using as a weight for each item its cost as a proportion

of total costs, at the standard levels. The second group is combined with current private consumption using the following procedure:

$$l'i = (l_i + e_i) / le^* \quad (3)$$

where  $l$  stands for time devoted to work (both paid and unpaid),  $e$  for required annual time of study (in order to overcome educational deprivation), both by individual  $i$ , and  $le^*$  is a standard of maximum work and study time for the same individual. Thus  $l'i = 1$  can be interpreted as non-deprivation in the time-educational dimension,  $l'i > 1$  as deprivation, and  $l'i < 1$  as above standards. The indicator for the household,  $L'_j$ , can be obtained as a simple average of the  $l'_i$  of its members. The poverty intensity measure for PL and time-education, at household level, can then be simply:

$$I(PLT)_j = (C_j^* - C_j / L'_j) / C_j^* \quad \left| \begin{array}{l} L'_j > 1, \text{ when } C_j < C_j^* \\ 0 < L'_j < 1, \text{ when } C_j > C_j^* \end{array} \right. \quad (4)$$

The restriction on the values of  $L'_j$ , when the household is below the poverty line, derives from the assumption that in those cases underwork is not chosen but forced.

$I(PLT)_j$  is then combined with  $(D^m_j)$ , using proportions in total costs at the standards ( $a$  and  $b$ ) as weights, to obtain  $I(IPM)_j$ :

$$I(IPM)_j = a[I(PLT)_j] + b[D^m_j] \quad (5)$$

From the point of view of poverty measurement, it is imperative that a criterion for the identification of the poor should be defined as the combination of the three dimensions opens the possibility of deprivation in one dimension being outweighed by satisfaction above the standard in some other, rendering a negative  $I(IPM)$ . In this case, the question arises whether these households should be considered poor or non-poor. Following Boltvinik (1992) it can be stated that: 'A household or an individual unable to satisfy all basic needs, despite an efficient allocation of all welfare sources, should be considered poor.' In order to apply it correctly one should analyse in depth the dubious cases to find out, among other things, if the decisions that led to such an ambiguous situation were forced (in which case they should be considered poor) or freely chosen (they should then be considered non-poor).

When this is not possible, three possibilities are left: (a) to take all positive values of  $I(IPM)_j$  as a criterion for poverty; (b) to move the threshold to, say,  $+0.1$ , if one wants to avoid the error of identifying non-poor households as poor or to  $-0.1$  if one wants to avoid the opposite error; (c) to create a transitional category, say for those with  $I(IPM)$  between  $-0.1$  and  $0.1$ , which could be called in risk of poverty.

The remaining problems are how to aggregate for all households and how to design a measure sensitive to distribution among the poor. The aggregated  $I$  is only the average over all individuals'  $I$ , or the weighted average of all households'  $I$ , using as weights their number of members. As to the second issue, the Sen Poverty Index for the  $IPM$  can be obtained by combining  $H$  and  $I$ , and using the rank of the individual in the poverty ordering,  $r_j$ , as a weight – from the least poor to the poorest – which yields:

$$P_{IPM} = 1/n [\sum r_j I(IPM)_j] \quad (6)$$

## 5.2 SPI's quality of life as a generalised IPM

By now it is sufficiently clear that both these measures share a methodological core: the integration of the PL and UBN approaches. Nevertheless some obvious differences remain. First, their purpose is different. In measuring quality of life the SPI aims to measure social welfare, which implies looking at the standard of life of all the population, while the IPM is designed to measure poverty, which – once poor people have been identified – leaves the non-poor out of its calculations. Second, there are some differences in the procedures devised to handle the integration of PL and UBN, which have been analysed in subsection 5.1.

If poverty measurement is to be integrated in full with the measurement of social progress, it seems desirable to advance further in making SPI the general and IPM the particular case of a single methodology. Although this is beyond the scope of this paper, the general steps that should be followed are (a) to incorporate quantity of life into IPM, allowing it to arrive at a similar concept to that of lifetime deprivation; (b) to relate poverty measurement to a modified version of the opportunity set, which could take the form of the proportion of the flow of means of welfare pertaining to the poor; and (c) to eliminate all methodological differences not derived from the nature of the exercise.

## Notes

1. This is the procedure followed in Rowtree's works (1902, 1937, 1941 and, with Lavers, 1951) in the baskets used to define minimum wages – particularly in Latin America (see Franklin, 1967) – and in the work by Boltvinik (1984) in Mexico.
2. This method can be traced back to a proposal by Peter Townsend (1954) and to the official US poverty line method as developed by Molly Orshansky (1965). For a discussion of the options for the selection of the population group, see Barreiros, 1987 and 1992.
3. For the empirical results of both methods in Latin America, see Regional Project to Overcome Poverty, 1990, 1992a and 1992b, as well as the sources quoted therein.
4. For instance, UBN poverty, thus measured, shows a downward and steady decline in Chile and Colombia. On Chile, see ECLAC, 1991 and Ortega and Tironi, 1988. On Colombia, see Fresneda *et al.*, 1991, especially Chs. 4 and 5.
5. As these assets can be used to close the gap between income and consumption (dissaving), without hampering the satisfaction of other basic needs.
6. For empirical evidence on IPM poverty in Latin America as a whole and in eight specific countries, see Regional Project to Overcome Poverty, 1992a, Ch. 3 or 1992b, as well as Beccaria *et al.*, 1992. For Latin America as a whole, PL poverty incidence was 43.5 per cent, while IPM poverty was 61.5 per cent, thus showing that around 18 per cent of the population was above the poverty line but still poor by UBN standards. Additional empirical evidence on IPM, and thus on the incidence of poverty according to UBN, can be found for Buenos Aires in Minujin and Vinocur, 1992, for Montevideo in Kaztman, 1989, and for Ecuador in Larrea, 1991.
7. Additional criticism of the SFB procedure can be found in Boltvinik, 1989, 1991 and 1992b. Especially in 1992b, empirical results for Latin America are interpreted in the above-mentioned sense.
8. Empirical evidence on this drawback can be found in Larrea, 1990.
9. Cash transfers, which are a very important instrument of anti-poverty policies in developed countries, seldom exist in Latin American countries. Chile is one of the exceptions. For a critical and balanced account of the Chilean experience of the fight against poverty during Pinochet's regime, see Vergara, 1989 and 1992.
10. This subsection, as well as the preceding two, have been abridged, with some changes, from Boltvinik, 1990b.
11. These six limitations have been analysed in Sen, 1988.
12. Limitation (d) can be taken into account by calculating a *net product* in a broad sense, which would deduct not only capital depreciation, but also the depletion of non-renewable natural resources and ecological damage, thus arriving at a concept of sustainable flow of resources.

Taking into account social accumulated assets would require us to distinguish actual flows of welfare means and potential flows at full capacity utilisation, or to incorporate capital accounts fully. These corrections are not dealt with here. How educational levels should be considered in these calculations is also a pending issue.

13. Preliminary calculations of the opportunity set are presented, for a large number of countries, in Boltvinik, 1990.
14. This subsection is based on Desai, 1990. Nevertheless, I have introduced some simplifying changes, with which he will not necessarily agree.
15. This weighting proposal was made by Desai and Shah (1988) and afterwards slightly modified by Desai (1990).
16. This weighting method can be derived from Mack and Lansley's (1985) procedure for capturing social perception of basic needs.
17. The achievement set has not been empirically calculated. Nevertheless, Meghnad Desai (1990), with the support of ECLAC's Statistical Division, has performed some preliminary calculations of the poverty debt.

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