

## Poverty Assessment: Pakistan's Case

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This study is an attempt to determine the poverty-line and the incidence of poverty in Pakistan by using data of the latest Household Integrated Economic Survey: 1990-91. The study uses a different approach and methodology in respect of earlier studies of the subject. The approach is that of the "Basic Needs", which defines the poverty-line in terms of minimum expenditure on all needs, food as well as non-food. The methodology used in estimating the minimum expenditure on various needs is based on the "Extended Linear Expenditure System (ELES)". For the year under review, the total poverty-line was estimated at Rs 374 per capita per month, with the food poverty-line at Rs 191. A comparison with the income levels reported in the Survey revealed that roughly 47 percent population had an income less than this threshold level expenditure on all needs, the shortfall or gap being almost 25 percent. The proportion of population with an income less than the threshold expenditure on food alone was found to be 10 percent. In certain respects, the results were quite different, quantitatively as well as qualitatively, from those of the earlier studies.

### I. INTRODUCTION

There is no dearth of studies on poverty in Pakistan. A large number of studies done by national as well as foreign experts define the poverty-line and quantify poverty incidence for a number of years for which household income-expenditure survey reports are available. A glossary of such studies undertaken since 1973 may be seen in Malik (1994).

The present paper seeks justification on the ground that, as the reader will discover, it is distinguished from the earlier works on both accounts on which a study of poverty is usually based, namely, the approach to poverty and the methodology of quantifying the poverty-line.

The plan of the paper is as follows: Section II surveys the approaches used in the earlier poverty analyses in Pakistan. Sections III-V outline the methodology to be used in the present paper, with specification of the Extended Linear Expenditure System (ELES) and its estimation technique. Data and regression results are reported in Section VI, while the incidence of poverty is quantified in Section VII. Quantitative and qualitative features of the results obtained through ELES and compared with those of the earlier studies are discussed in Section VIII. The last section summarises the conclusions and touches on suggestions for further research.

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*Author's Note:* The views expressed in the paper, however, are personal. I am grateful to the (anonymous) referee whose comments have been helpful in improving the paper.

## II. APPROACH TO POVERTY

From the approach point of view, the earlier studies in general fall into two categories: first, those wherein the poverty-line is *arbitrarily fixed* (which, in fact, is no approach), and second, those which centre around the *Calorie-based Approach*. In the latter case, the majority of the studies were restricted to defining poverty in terms of the Food Poverty Line (FPL)—expenditure needed to meet the minimum calorie intake (mostly 2550 calories per day per adult). The critical calorie intake was converted into FPL either by costing the required quantities of various food items using food weights of some reference group, mostly the poorest one, or by Calorie-Food Expenditure Function—regressing calorie intake on food expenditure and identifying the expenditure consistent with the critical level of calorie intake. The latter method avoids the problem of using food weights. While there is no dispute about the calorific requirements being the most important, they are not the only human need. Lack of warmth and shelter is as bad as undernourishment. Basic non-food needs, therefore, must be reflected in poverty assessment.

However, even under the calorie-based approach, there have been studies which went one step ahead to define poverty in terms of the Total Poverty Line (TPL)—expenditure needed to meet the minimum food and basic non-food requirements. In these studies, TPL was defined as some multiple of FPL, the latter worked out on the calorie intake basis, as in Malik (1988), and more recently in Lanjouw (1994). The method is easily understandable and straightforward in interpretation. What it shows is that because of difficulty in identifying the minimum expenditure on non-food items, the calorie-based minimum food expenditure is scaled up to derive TPL by using some judgement about the correlation between the two.

Yet another kind of TPL studies under the calorie-based approach are available. They use Calorie-Total Expenditure Function—regressing calorie intake on *total expenditure*—and identify the expenditure consistent with the critical level of calorie intake, as in Ercelawn (1991) and Malik (1994). While it is easy to understand the technical nature of the function, there is a problem of interpretation of the estimated poverty-line. If total expenditure compatible with 2550 calories, derived through regression, is interpreted as FPL,<sup>1</sup> the latter is overestimated, because logically it should be the food expenditure compatible with 2550 calories which should define FPL, as also adopted by Mahmood *et al.* (1991). On the contrary, if it is to be interpreted as TPL, it implies constraining total expenditure (particularly of non-food components) to 2550 calories and, as such, it underestimates the TPL. We shall

<sup>1</sup>Malik's (1994) own interpretation reads as follows:

"The estimates show that for Pakistan, on aggregate, a monthly expenditure of 185 per adult equivalent was required in 1984-85—Rs 241.11 in 1987-88 and Rs 320.42 in 1990-91—to meet the minimum calorie requirement of 2550 calories per adult equivalent per month" (pp. 15-17).

revert to this issue in the latter part of the paper.

The present paper will make use of an alternative approach, called the *Basic Needs Approach*, in which the poverty-line will be defined in terms of the cost of obtaining a minimum bundle of all needs, food as well as non-food. The emphasis will be not on the "essentiality" of needs but on the "minimum or basic levels" of all needs. This approach is more general in nature and facilitates quantification of both the Food and the Total Poverty Lines simultaneously.

The Basic Needs Approach is not altogether a new one at least in the context of industrial countries. It had provided the foundation for much analytical work on poverty in the UK by Rowntree as far back as 1901. But, it has been much less used in the poverty-related empirical research in developing countries. One famous piece of research of this type is by Altimir (1982), who estimated Total Poverty incidence for 10 Latin American countries. Incidentally, a similar study has lately been carried out by Ahmad (1993) for Pakistan. The present paper based on the Basic Needs Approach will, however, be completely different from Ahmad's (1993) insofar as the methodology of quantifying the minimum level expenditure on various needs is concerned (see the methodology section below).

### III. METHODOLOGY

Theoretically, the task of quantifying the basic needs poverty-line involves three steps:

- (a) Identifying the needs;
- (b) fixing the norms for the minimum quantities of these needs; and
- (c) translating these quantities into monetary equivalence by using prices.

For (a), there is usually a consensus of opinion. In general, all possible componential needs are included specifically:

Food;  
 clothing and footwear;  
 housing (rent, fuel, lighting, furniture and fixtures);  
 transport and communication;  
 cleaning and laundry;  
 education and health; and  
 miscellaneous (recreation, gifts, marriages, etc).

It is under (b) and (c) where poverty estimates become subject to arbitrariness, depending on the methodology adopted.

The process used by Ahmad (1993) for identifying the quantum and value of each component of the minimum bundle of basic needs has been spelled out as follows:

“Discussions were held with professional economists in Federal Government, Provincial Government, Research Institutes, and Universities. A checklist thus prepared was re-checked with heads of different families. A team of economists was constituted to arrive at the quantum and value of each componential item of various basic needs separately in the rural and urban areas. These were re-checked with the consumers in different areas” (p. 28).

It is evident that a poverty-line derived through discussions with a limited number of persons will lack generality, and may also contain an element of arbitrariness emanating from the reported values (which assume certain prices) of goods consumed by these limited persons.

In the present paper, the Total Poverty Line has been estimated on a more scientific basis by using the *Extended Linear Expenditure System* (ELES) of consumer behaviour.

#### IV. THE EXTENDED LINEAR EXPENDITURE SYSTEM (ELES)

The ELES is an extended version à la Lluch (1973) of the Linear Expenditure System (LES) originally developed by Stone (1954). The LES system is based on the standard utility maximisation behaviour of the consumer. The utility function implicit in the system is the one directly additive with the demand function for individual good or group of goods being logarithmic of the kind:

$$U(X) = \sum f_i(x_i) = \sum a_i \cdot \log(x_i - r_i) \dots \dots \dots (1)$$

where  $x_i$  represents the quantity consumed of good  $i$  ( $i = 1, 2, \dots, n$ ), and  $r_i$  may be interpreted as representing basic needs, committed consumption or subsistence quantities, provided these are positive.

The budget constraint is defined in terms of total expenditure on all goods exogenously given ( $V$ ), i.e.,

$$\sum p_i x_i = \sum v_i = V \dots \dots \dots (2)$$

where  $p_i$  is the price of  $i$ th good. Maximising utility function as given in (1), subject

to the constraint in Equation (2), yields the demand function:

$$v_i = p_i r_i + b_i (V - \sum_j p_j r_j) \dots \dots \dots \dots \dots \dots \dots \quad (3)$$

The expression in Equation (3), which exactly corresponds to Stone's LES, forms a system of  $n$  expenditure equations which are linear in total expenditure and prices. The system allows a consumer to allocate a part of the total expenditure to ensuring minimum necessary quantities of each good and then allocating the remaining part  $(V - \sum_j p_j r_j)$ , technically known a supernumerary expenditure, among goods in proportion to  $b_i$ s. The  $b_i$ s, explicitly derived as  $b_i = (a_i / \sum_j a_j)$ , are share parameters defining marginal expenditure  $(dv/dV)$  and add up to 1. With the given level of total expenditure and prices, the term  $(\sum_j p_j r_j)$  determines the minimum level of consumption expenditure which, on average, the society regards as necessary. This basic level could obviously be used to define Total Poverty Line.

It may be clarified here that the utility function in Equation (1) holds only for  $x_i > r_i$ . This means that an individual's actual expenditure cannot be below his own minimum level of expenditure. But in all probability it would be below the minimum level of relatively better-off individuals. Thus,  $\sum_j p_j r_j$  can be interpreted as the average of all individuals' minimum expenditures.

The extension suggested by Lluch (1973) involved endogenisation of total expenditure ( $V$ ) so that the effect of relative prices on saving could be studied. This was done by replacing  $V$  by total income ( $Y$ ).

$$v_i = p_i r_i + b_i^* (Y - \sum_j p_j r_j) \dots \dots \dots \dots \dots \dots \dots \quad (4)$$

Here,  $b_i^*$ s represent the marginal propensity to consume (MPC) out of income so that they add up to aggregate MPC ( $u$ ). The term  $(Y - \sum_j p_j r_j)$  may now be thought of as supernumerary income.

Our preference to use ELES rather than LES to estimate  $\sum_j p_j r_j$  arises not because we are interested in the study of saving behaviour but because ELES provides for a better estimate of  $\sum_j p_j r_j$ . As noted by Lluch *et al.* (1977) themselves, first, "the  $r$  estimates are more stable and exhibit more regularities across countries under ELES specification" (p. 9); and secondly, ELES "enables the identification of  $\sum_j p_j r_j$  in the absence of price data if  $u \neq 1$ " (pp. 15-16).<sup>2</sup> The latter property is of particular importance for the present study as it would be based on purely cross-sectional data.

<sup>2</sup>This can be seen from adding all the expenditure equations of the ELES Equation (4) to obtain:

$$V = (1 - u) \sum_j p_j r_j + uY.$$

## V. ESTIMATION TECHNIQUE FOR ELES WITH CROSS-SECTION DATA

Since  $r_i$  occurs in all Equations (4), the demand system needs to be estimated as a whole by a method which imposes cross-equation constraints. In the case of time series, the procedure involves direct maximisation of the likelihood function associated with the system. For cross-section, the term  $p_i r_i$  becomes independent of the unit of observation, since each household faces the same commodity prices, and as such may be replaced by  $r_i^*$  which indicates subsistence expenditure in prices prevailing at the time of the household survey. With stochastic specification, the system may now be written as:

$$v_{ih} = d_i + b_i^* Y_h + e_{ih}, \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (5)$$

with  $h = 1, 2, \dots, H$  income groups of households; and  $d_i = r_i^* - b_i^* \sum_j r_j$ .

The system in Equation (5) is one of the identical regressors and hence estimation of each of its equations separately would be equivalent to the system's maximum likelihood estimation. However, since our measure of the minimum expenditure ( $\sum_j p_j r_j$ ), being an average of all individuals, is sensitive to the patterns of income distribution, it is proper to estimate Equation (5) through the Weighted Least Squares (WLS) rather than Ordinary Least Squares (OLS).

Once the parameters of Equation (5) for all commodities are estimated, we can obtain the requisite estimates of  $r^*$ 's and  $\sum r^*$ 's by using the following relationships:

$$r_i^* = d_i + b_i^* \sum_j r_j^* \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (6)$$

$$\sum_j r_j^* = \sum_i d_i / (1 - u) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (7)$$

$$u = \sum_i b_i^* \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (8)$$

## VI. DATA, RESULTS, AND POVERTY LINES

The regression results for 10 commodity groups, which fully exhaust households' total consumption expenditure alongwith  $r^*$ 's computed therefrom, are reported in Table 1. The results are based on the published data of Household Integrated Expenditure Survey (HIES): 1990-91 [Government of Pakistan (1993)]. Both the expenditure and the income used in the regression are in per capita terms and duly weighted by the relative frequency of each income group in total households.

Column  $r_i^*$  (extreme right) in Table 1 reports the ELES estimated subsistence expenditure (in 1990-91 prices) for various commodity groups. The Basic Needs

Total Poverty Line in 1990-91 prices works out to be Rs 374 per month per capita.<sup>3</sup> Fifty-one percent of this minimum is accounted for by food, another 21 percent by housing, 13 percent by clothing and cleaning, and the remaining 15 percent by health, education, transport, and miscellaneous.

Table 1

$$v_{ih} = d_i + b_i^* Y_h + e_{ih}$$

Commodity Group	$d_i$	$b_i^*$	$r_i^*$
Food, Beverages and Tobacco	138.91	.1400	191.23
Clothing and Footwear	20.51	.02573	30.13
Transport/Communication	-6.41	.05171	12.91
Cleaning and Laundry	11.54	.01451	16.96
Education	-2.48	.01865	4.50
Medical Care	7.19	.0099	10.90
Rent and Housing	12.19	.09226	46.67
Fuel and Lighting	19.15	.01102	23.27
Household Furniture/Fixture	1.85	.01772	8.50
Miscellaneous	-2.39	.08321	28.71
Total	200.06	.4647 <sup>4</sup>	373.7 <sup>5</sup>

Note: All coefficients are significant at 95 percent confidence level. The Adjusted  $R^2$  for all equations ranges between 0.85 and 0.99, except for Medical Care, with  $R^2$  at 0.77.

## VII. INCIDENCE OF POVERTY

Having estimated TPL, we may define a person as "poor" if his actual income—the genuine purchasing capacity—is below TPL. An alternative criterion

<sup>3</sup>In case the expenditure on tobacco and certain items of the "Miscellaneous" group, like entertainment and recreation, is treated as rather inessential and excluded from the analysis, the total poverty-line reduces to Rs 345.

<sup>4</sup>Although our primary concern in the results is about  $r^*$ s, the aggregate consumption function needs some comment. The aggregate MPC of 0.47 is quite low by all past standards. This was 0.77 for 1987-88 and 0.75 for 1984-85, based on those years' HIES. If comparison with previous Surveys means anything (see footnote 7), there appears to be a strong shift in the consumption function. The constant term of the function has shifted up tremendously, from Rs 70 per capita per month in 1987-88 to Rs 200 in 1990-91, while the slope (MPC) has reduced from 0.74 to 0.47 during the same period.

<sup>5</sup>It is noteworthy that the estimation of  $r^*$ s for various commodity groups is not indispensable for obtaining  $\sum_j p_j f_j$ , as the latter can equally be estimated through an aggregate-equation described in footnote 2. However, this facilitates illustration of the components and their respective shares in the estimated survival package.

may be to look at actual expenditure. It is likely that the incidence may be the same under both criteria, but the extent of the shortfall or gap from the threshold expenditure would definitely be different, as actual expenditure in the case of low-income groups often exceeds their income level and is financed through sources like net sales of property/assets, or net borrowing.

Comparing the TPL with the household income as reported in the Survey Report reveals that roughly 47 percent population is unable to fully meet the minimum level of expenditure on all needs.<sup>6</sup> The shortfall or the gap amounts to 25 percent of the total minimum expenditure. If TPL is compared with actual expenditure, the gap reduces to almost half, although the incidence remains the same.

If one looks at only food poverty, the results show the Food Poverty Line, or the equivalently-termed Destitution Line, at Rs 191 per capita per month, almost 9 percent less than the national average food expenditure. Estimating the incidence of food poverty is equally tricky. In real life, it is not the convention of the households to first fulfil their minimum food requirements and then think of spending their income on other basic needs. They go for procuring for non-food needs even before satisfying the minimum food needs. Thus, comparing simply the actual food expenditure with the FPL would not be an appropriate gauge for food poverty incidence. Logically, a person can be declared poor in the food poverty context if his genuine purchasing power, i.e., his income, falls below the threshold expenditure on food. With our estimate of FPL at Rs 191, the proportion of such population amounts to only 10 percent.

### VIII. RESULTS COMPARED WITH THOSE OF EARLIER STUDIES

First of all, it has been found that the incidence of *food poverty* or the level of destitution in Pakistan is quite small. Only 10 percent population is such whose income falls below the minimum required food expenditure. This sharply contrasts with the earlier studies, in which food poverty incidence has been shown to be around 20 percent.

Secondly, it has been found that if poverty is to be defined—and it should be done in terms of the minimum expenditure on *all needs*—the poverty incidence is quite significant. Whether we look at actual income or actual expenditure of the households, almost 47 percent population fails to meet the minimum standard of basic needs, the latter perceived against the backdrop of the existing national average living standard. The shortfall from the minimum standard works out to be 25 percent if viewed against actual income, and 13 percent against expenditure.

<sup>6</sup>If the poverty-line is taken at Rs 345 as per footnote 3, the incidence of poverty reduces to 43 percent.



Moreover, the shortfall is more pronounced in non-food items. No such findings are available from earlier studies.

Thirdly, in the light of the ELES results on TPL and FPL, one can appreciate the interpretation problems implicit in the calorie-total expenditure approach referred to earlier. Malik's (1994) poverty-line of Rs 256.3 per capita per month (p. 16) underestimates the poverty incidence if interpreted as TPL and overestimates it if interpreted as FPL.

Fourthly, how do these results compare with those of Ahmad (1993) who used a similar Basic Needs Approach with totally different methodology? The comparison is shown in Table 2. It transpires that Ahmad's estimates of poverty-lines are much lower than those of the present study. The major reason for this is the unrealistically low minimum food expenditure (food poverty-line at Rs 169). If one computes the incidence of food poverty implicit in these estimates, hardly any population turns out to be below the food poverty-line, which, of course, is hard to believe.

Table 2

*Poverty Line Estimates: 1990-91*  
(On National Basis)

	(Rs per Month per Capita)	
	Present Study	Ahmad (1993)
Total	374	337@
Food	191	169@

@ Ahmad's poverty-line estimates are basically for the rural and urban areas and in the 1991-92 prices. For comparison, these were converted first into the 1990-91 prices by using relevant inflation rates; and then into the national basis by using the rural-urban weights from the 90-91 Household Survey.

Fifthly, the present study's poverty estimates have several qualitative features which distinguish them from those of the other studies. Five such features are worth noting:

- (i) These estimates pertain to Total Poverty rather than only Food Poverty, which most of the earlier works have estimated. After all, poverty is an issue which must be addressed in the light of the prevailing norms of the overall living standards rather than simply the food requirements.
- (ii) These estimates are based on the Basic Needs Approach rather than the Calorie-based Approach, which has been commonly used in almost all previous studies and thus carried all possible errors emanating from the

- choice of food composition (weights) and/or the scaling factor.
- (iii) These estimates are free from that element of arbitrariness which usually enters the poverty estimates through the use of inappropriate prices. This is so because the ELES has facilitated estimating the poverty-line without using prices.
  - (iv) These estimates may be considered more robust and closer to reality as they are based not on discussions with a few persons, as in Ahmad (1993), but rather on the perception of 6400 households whose expenditure patterns have been reported in the Household Survey in 1990-91 and as such reflect their view about the minimum level of expenditure on all needs. Moreover, the said perception has been scientifically translated into the poverty-line through the application of the consumer behaviour analysis technique, i.e., the ELES, a feature completely lacking in Ahmad (1993) and other studies.
  - (v) These estimates provide for a better inter-temporal comparison as the ELES is a dynamic approach. The Calorie-based Approach is basically a static one as it always rests on the same reference point of 2550 calories per adult per day. On the contrary, the ELES provides for a dynamic approach, wherein the reference point is not constant but variable, shaped by the perception of the households about the minimum expenditure on all needs for the year under review. Unfortunately, a precise inter-temporal comparison in our case is difficult as the HIES 1990-91 is not perfectly compatible with earlier surveys.<sup>7</sup> Yet, just to have a rough idea of whether and how much the perception of poverty has changed in recent years, an attempt has been made to apply the ELES model to 1987-88 household data [Government of Pakistan (1990)] and work out the poverty-line for that year. The results are reported in Table 3. The estimates both for the Total and Food Poverty Lines have been found to have increased by 39 percent and 41 percent respectively between 1987-88 and 1990-91, whereas the general consumer price index rose by only 32 percent and food prices by 35 percent during the same period. Thus, the poverty-lines for 1990-91 as yielded by the ELES are not simply a

<sup>7</sup> It is partly because of the much smaller sample size and partly because of the revised questionnaire. The sample size for HIES 1990-91 consisted of 6516 households as against 18144 households in the case of (previous) HIES 1987-88. The household Gini coefficient of 0.41 implicit in the HIES for 1990-91, as against of 0.35 for 1987-88, is also an empirical indication of the incompatibility of the two surveys. The comparative figures reported in Table 3 of the text, therefore, should not be used to draw an inference about the incidence of poverty. The objective of the analysis simply is to show that even the norms of threshold expenditure get changed (apart from the inflation-driven change) as and when the overall living standard of the society is improved, and that the ELES is an approach which can facilitate capturing this change into the poverty-line.

blown-up (price-inflated) version of the poverty-lines for 1987-88 but also contain an element of change that has occurred in the norm of minimum levels of expenditure, owing to the overtime improvement in the national living standard.

Table 3

*Trends in Poverty Lines: 87-88 and 90-91*

	(Rs per Month per Capita in Current Prices)			
	87-88	90-91	Increase (%)	Price Changes
Total	270	374	39	32
Food	135	191	41	35

**IX. CONCLUSIONS**

This paper has been an attempt to determine the poverty-line and the incidence of poverty in Pakistan by adopting the Basic Needs Approach and using the ELES technique for the estimation of poverty-line. For 1990-91, based on that year's household survey data, the total poverty-line was estimated at Rs 374 per capita per month while the food poverty or the destitution-line was at Rs 191. Comparison with the income levels as reported in the survey revealed that roughly 47 percent population had an income less the estimated total poverty-line, while the population below the food poverty-line was only 10 percent.

Keeping in view the limitations of the paper, and of the data in particular, the following suggestions for further research would be in order:

- ELES-based inter-temporal comparison for Pakistan, once HIES on the revised format (compatible basis), becomes available for a more recent year.
- An inter-country comparison is conducted with comparable countries of South Asia and Southeast Asia.
- Relevant price indices are constructed and poverty analysis is made through ELES by using time series data.

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