An improvement to the existing measurement of poverty in Sri Lanka

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Abstract

Poverty is largely associated with demographic, socio-economic, cultural, environmental, health and psychological factors. The identification of the poor in the context of multidimensional nature of poverty is challenging and also a crucial aspect in any poverty alleviation program. Therefore the aim of this study is to develop an indicator, capable of capturing multidimensionality of poverty.

1. Introduction

Analyses on poverty in Sri Lanka have been mainly carried out by Department of Census and Statistics (DCS) since mid eighties with the aim of combating poverty in the country. When the DCS announced the Official Poverty Line in 2004, the incidence of poverty computed using different criteria has produced different values in poverty, confusing the planners, policy makers and other data users [1]. These poverty lines were mainly based on income levels of individuals living in households.

Poverty is multidisciplinary in nature. The early measures of poverty have not considered this feature. Therefore the existing measurement of poverty needs further strengthening. The specific objectives of the study are:

- To investigate the existing measurement of poverty in Sri Lanka
- To identify determinants of poverty
- To improve the existing measurement of poverty in Sri Lanka

2. Methodology

The major steps

Step 1 – Identification of Poverty Potential Variables

The household (hh) level variables such as hh dependents, education of hh head, school attending children, chronically ill individuals, hh equipments, toilet type, source of light, roof, wall and type of floor are considered as poverty potential variables for this analysis. The variable named poverty status of a household is considered as a definite potential poverty variable, constructed according to the existing measurement of poverty (The poverty status of a household is determined by poor or non-poor of head of the household). These variables are extracted from processing of data of HIES 2006/07.

Step 2 - Identification of Significant Poverty Potential Variables

The potential poverty variables noted in the above step 1 are subjected to Chi-square test to identify significant poverty potential variables. The associations between each of the potential poverty variables with poverty status of a household are tested. The significant variables of these tests with the variable poverty status are labeled as significant poverty potential variables.

Step 3 – Identification of Poverty Determinants

The poverty determinants are identified by fitting a linear logistic regression model. For this logistic model the variable poverty status is considered as the dependent variable. The significant poverty potential variables are considered as covariates to the logistic regression model. The significant variables from the linear logistic regression model and with the dependent variable poverty status are identified as poverty determinants.

Step 4 - Preparation of variables for Principal Component Analysis

The poverty determinants are incorporated into the Principal Component Analysis (PCA). The variable named poverty status is transformed to a proportion as number of poor persons in a district. Similarly other poverty determinants are also transformed into proportions (For an example Percentage of dependents in a district. The variable is named as p-dependents). Note that high district proportions corresponding to each poverty determinant might give a fair impression that an increase of poverty of the relevant districts. These district proportions will be considered as variables of PCA.

Step 5 – Ranking the Districts

The PCA is performed using the variables labeled as poverty determinants in the form of district proportions. In order to rank districts according to their poverty status the Principal Component (PC) Score relevant to each district is calculated (using district proportions). The PC Score of each district is considered as the Poverty Score of that district (in fact using first PC). Since the PC score of a district is a combination of districts proportions (poverty determinants), higher the PC score severe the poverty of that district compares to other districts.

3. Results

The variables in the three variable main effect model are obtained by adding poverty determinants sequentially starting from null model.

Table 1: Significant variables to the final main effect three variable model

Variable	Model_level	Reduction_Deviance	Difference_DF	Result
Source of light	null model	887.06	1	S*
Household	one	820.99	1	S*
Source of	two	518.87	1	S*

S* denotes highly significant variables in the appropriate model.

To derive principal component scores the following variables were used in PCA (using household level information per district).

- Percentage of dependents in a district (p-dependents)
- Percentage of households using kerosene as principal source of lighting (p-lightsource)
- Percentage of households using firewood as principal source of cooking (p-cookfuel)
- Percentage of poor households (p-poor)

Table 2: Eigen_value analysis of Covariance Matrix

Component	Eigen_value	Proportion	Cumulative
1	273	0.7998	0.7998
2	39	0.1154	0.9152
3	24	0.0690	0.9842
4	5	0.0158	1.0000

The first principal component is amounting to variance of 273 and explains about 80% of the total variation. This fact also clearly indicates that the first_PC alone can represent all four variables. Therefore first_PC is used to calculate PC_scores.

Table 3: Ranking of Districts by Poverty Status

District	PC_Score	Rank	District	PC_Score	Rank
Colombo	41.0	19	Ampara	72.8	14
Gampaha	57.6	18	Kurunegala	94.3	5
Kalutara	70.5	17	Puttalama	85.4	10
Kandy	79.0	12	Anuradhapura	91.4	8
Matale	96.6	3	Polonnaruwa	93.4	6
N-Eliya	89.7	9	Badulla	92.3	7
Galle	72.6	15	Monaragala	112.5	1
Matara	74.3	13	Ratnapura	99.0	2
Hambantota	84.6	11	Kegalle	96.4	4
Batticaloa	72.0	16			

Monaragala is the poorest and the Colombo is the richest.

4. Discussion

The method of existing measurement of poverty is the most significant approach in the series of monetary based methods. It provides comparisons among the districts in the same survey period as well as with previous survey periods. However, the method is unable to capture multidimensionality of poverty. This is the major disadvantage of this methodology in the context of multidimensionality nature of poverty.

The proposed method is multidimensional. It combines monetary terms as well as with non monetary terms. This is the key feature of this poverty measurement. It provides comparison among districts in the same survey period. Further a fair assessment is possible using the relative positions (ranks) of a district in two survey periods. This would not be unreasonable in selecting districts according to their poverty status when there is a need for implementing poverty alleviation (or poverty reduction) programs subject to available limited resources.

5. References

[1] Nanayakkara, A. G. W. (2006). *Poverty in Sri Lanka-Issues and Options*, Department of Census and Statistics