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Methodological issues of Poverty Measurement

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Abstract

Issues relating to defining poverty as lack of resources like income and wealth to a household or individual to meet the basic needs to maintain a reasonable standard of living in a given society have been addressed along with various approaches to measure poverty. Limitations of Multidimensional Poverty Index (MPI) including aggregation of the chosen indicators have been discussed. The paper suggests multiplicative aggregation of ratios of chosen indicators at current period and the base period to find an index of overall poverty status of a country at the C-th time period over the based period (OPI_{c0}). The index OPI_{c0} involves no selection of weights, satisfies desirable properties with significantly reduced substitutability among the indicators and producing no bias for advantaged groups. Replacing the base period data by the national targets to remove all forms of poverty, the modified index will indicate how far the country is at the C-th time period from the goals set at national level. The plot of growth/decline of multidimensional poverty in terms of changes in OPI_{ct} for a country reflects effectiveness of policy measures adopted and can be used in projection of poverty for the country. The index OPI_{c0} facilitates to form two sub-indices: (i) New Multidimensional poverty index (I_{NMPI}) based on suitable indicators, in line with MPI without any cut-off marks leading to rejection of households/ individuals and (ii) Transient poverty index for a period I_{TPt} based on chosen indicators like poverty spell, chronic and transient poverty and associated factors. Using longitudinal data, probability of movement into poverty and out of poverty can be estimated over time $p_{NP\rightarrow P}$ and $p_{P\rightarrow NP}$ and temporal poverty of a country during the period (t,tp) can be better understand by $P\text{-}Escape_{(t,tp)}$ and $P\text{-}Stic._{(t,tp)}$. Estimation of such probabilities along with economic trajectory of a country will help the planners to achieve the national goals.

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Introduction

Poverty is usually taken as lack of resources like income and wealth to a household or individual to meet the basic needs to maintain a reasonable standard of living in a given society (Townsend, 1979). In addition to failure to meet basic needs, the concept of poverty also deals with notions of inequality, disadvantage, deprivation, capability, inadequacy, etc. Political philosophy focusing on "ideal world' with no poverty also talks of prevalence of injustices in reality (Sen, 2009; Hamlin and Stemplowska, 2012). However, concepts of income and wealth are different. While wealth is a stock concept where inequality involves values of tangible assets, income is a flow concept where income inequality considers incomes from wages, rent and profit.

The 'currency of justice' approach emphasizing equality of resources and welfare by Sen (1980) and Dworkin (1981a, 1981b) has not been favoured since equality is basically relations among people and not distribution of goods (Anderson, 1999; Scheffler, 2003). Researches debated between resource-based and welfare based justice and even suggested hybrid of resources and welfare called "advantage" (Cohen, 1989). Capability deprivation approach by Sen (1999); Nussbaum (2000) suggests on what people are able to 'do or be' which is more important than what they possess. Measurement of poverty by capability approach shifting from income or resources to what one can do is extremely difficult. Wolf *et al*. (2014) suggested retention of traditional concept of poverty, for practical reasons.

Definition of Poverty

Definition of poverty as non-availability of financial resources to meet a set of basic needs is in fact, a nominal definition i.e. to define "Poverty", equivalent clauses or features are assigned. It is not an operational definition and gives rise to questions like:

- What is the set of basic needs?
- Is it static or changes with time?
- Is it same across all regions and culture?

Regarding (i), a person needs food, water, air and shelter to survive. However, the set of basic human needs may also cover physical, emotional, mental, relational, self and spiritual needs. Income is perceived as a means to improve human welfare, and lack of income is taken as the major contributor of poverty (Keeley, 2015). But income is not the sole measure of poverty. Illustrative variables which can influence individual capability are lack of: personal resources like health, talents, skills; external resources like income and wealth; and social structures including legal, cultural and environmental factors. Thus, poverty in terms of lack of income and wealth is just one of the many factors that determine poverty of an individual or a household. Thus, poverty is multidimensional.

(ii) The set of basic needs is perceived vaguely and is never exhaustive. In addition, the set varies with time. For example, poverty goes beyond deprivations of food, shelter to lack of access to education, medical facilities, social exclusions, etc. and schemes to mitigate such deprivations may require access to internet, bank account, etc. Education and health not only influence the freedom to live better but are important for effective participation in economic and political activities (Sen, 1999). Thus, the set of basic needs is not static and changes with time.

(iii) Poverty is an economic and a social problem too. Poor people often become socially isolated and feel helpless and marginalized. Their focus is primarily on the present, with little consideration for the future. In short, culture of poverty is both an adaptation and a response to the marginalization of the poor. Among the people who are in long state/ condition of poverty, Haq (2019) found that some cultural traits promote vulnerability and poverty and such traits are passed on from one generation to the next. Regional differences in multidimensional poverty are statistically challenged.

Literature Survey

In the backdrop of divergent issues relating to poverty and its measurement, two important questions are:

- Who are poor?
- How to find an index of poverty to reflect how poor the poor are?

Identification of the poor involves setting a poverty line reflecting minimum income required to meet the basic needs and finding the number of people below the poverty line (BPL) who are considered under poor or under absolute poverty. The other concept is relative poverty which is evaluated in comparison

to others in the country, say a relative poor person earns <60% of median income of the country. Thus, there will always be a substantial number of individuals who are relatively poor in each country. Accordingly, measurements of poverty emphasize absolute poverty and not relative poverty.

The poverty line first decides the minimum level of requirement of food, shelter, clothing, fuel, light, footwear, educational and medical needs, etc. which are multiplied by the corresponding prices. Thus, identification of the poor involves a survey to find sample proportion of poor (BPLs) and estimating population proportion by inductive logic. Quality of estimates clearly depends on measurable definition of poor, quality of sample and estimation procedure. For example, different estimates of poverty in India by India Human Development Survey (IHDS) data and Household Consumption Expenditure Survey by National Sample Survey Office (NSS) data could be due to differences in the number of items and design characteristics (Desai *et al*. 2024). However, the poverty line in terms of income may vary across countries and time. The international poverty line suggested by the World Bank (2021) as income of $1.90 per day, was revised to $2.15 per person per day by the World Bank (2022). The sustainable development goal (SDG-1) aiming at elimination of all forms of poverty considers daily income ≤ $1.25 at 2017 PPP (Purchasing Power Parity) as poverty line(UN DESA 2023). In India, inflation-adjusted poverty lines separately for urban and rural areas are used.

Poverty line based on consumption serves two purposes, normative and monitoring. While normative standards reflect a social contract about the basic standard of living that should be made available to all individuals while monitoring standards track lifestyle changes over time (Srinivasan, 2007). Following this monitoring approach, one can focus on understanding the poverty dynamics at the household level, using panel data.

Index of Poverty

Index of poverty based on multidimensional approach addresses both the identification of poor and intensity of poverty. Avoiding single income based poverty line, Multidimensional poverty first decides values of each of the chosen k-dimension of poverty like poor health, poor quality of work, lack of clean water or electricity, schooling, etc. by a vector PL= $(Z_{01},Z_{03},Z_{03},\ldots\ldots Z_{0k})^T$ and consider a person as poor if he/she experiences functioning failure in each dimension (Intersection method) or in at least one dimension (Union method) (Bossert *et al*. 2012). Clearly, the number of poor as per Union approach is much higher than the same by the intersection approach. It is possible to have intermediate identifications between these two extremes where a person may experience failure in more than one dimension but less than k-number of chosen dimensions (Alkire *et al*., 2011).

Multidimensional poverty requires appropriate aggregation of the chosen indicators to capture the proportion of the poor and measures of incidence of poverty among the identified poor involving deprivation scores on non-monetary indicators under selected dimensions. Index based on such multi-dimensional deprivations is called multidimensional poverty index (MPI). Clearly, MPI aiming at areas beyond the monetary metrics is popular at international level (Suppa, 2023). Country wise MPI data is published by the United Nations Development Programme jointly with the Oxford Poverty and Human Development Initiative (UNDP-OPHI 2021). However, the factors influencing differences in non-monetary and monetary poverty differ since different countries have different set of policies to support welfare, like social assistance, social insurance. labour market interventions, etc. (Yusuf *et al*. 2024). Accordingly, several countries developed their own multidimensional poverty measures at the national level primarily because national poverty statistics being used to guide national policies cannot be meaningfully compared across countries. For example, India launched National MPI considering the indicators of the global MPI plus additional indicators like maternal health and bank account under the dimensions of health and standard of living, respectively.

The global MPI is based on the proportion of people in a population who are multidimensionally poor, denoted by H (head count ratio) and also average number of deprivations of the poor, denoted by A and MPI of a country at a given year is computed as MPI = H *A. MPI counts the number of weighted items that households lack and take sum with equal weights to the dimensions and different weights to the indicators within a dimension. Deprivation

score of a household is taken as "1" if deprived and "0" if not. The proportion of multidimensional poor (weighted by household size) gives value of H. Non-monetary dimensions, indicators and weights of MPI are shown in Table 1.

Table 1: Non-monetary Dimensions, indicators and weights of MPI

Dimension (each given weight of 1/3)	Indicators and weights
Health	Any undernourished person <70 years of age [1/6]
	Death of a child <18 years during the previous five-year period [1/6]
Education	Non completion of six years of schooling [1/6]
	A school-aged child is not attending school [1/6]
Access to basic infrastructure	Lacks access to limited-standard drinking water [1/18]
	Lacks access to limited-standard sanitation [1/18]
	Use of solid fuel like dung, agricultural crop, shrubs, wood, charcoal, or coal for cooking [1/18]
	Lacks access to electricity [1/18]
	Inadequate housing materials either in floor/roof/walls [1⁄18]
	At most one possession of assets: radio, TV, telephone, computer, refrigerator, animal cart, bicycle, motorbike, and not owning a car or truck [1/18]

Methodology of MPI

MPI considers three equally weighted (1⁄3) dimensions, namely, Health with two indicators each with weight (1⁄6), Education (two indicators, each with weight 1⁄6), and Access to basic infrastructure with six indicators, each with weight1⁄18. The Deprivation score of an individual or a household identified as poor is the count of items that the household lacks where score of "1" is given if deprived and "0" if not. Sum of such scores is computed with equal weights to the dimensions and different weights to the indicators within a dimension. If the deprivation score of a household is more than 33%, then the household is considered as multidimensionally poor. The proportion of multidimensional poor (weighted by household size) gives the head count ratio or the proportion of poor in the country. Thus, MPI follows neither Intersection approach nor the Union approach.

Major limitations of MPI

Major limitations of MPI are:

No reasons to support that all the three dimensions contribute equally to poverty across countries, and people within a country (Ravallion, 2011). Equal weights of the three dimensions of MPI is not statistically justified (Pasha, 2017)

- Does not cover food insecurity, a direct consequence of poverty.
- Health related indicators like death rate; maternal mortality, access to hospitals, health insurance, etc. are absent.
- A household with no children gets zero deprivation scores in Education dimension and in one indicator of Health dimension.
- Intra-household inequality or inequality among the poor is ignored
- The assumption of no correlation among the items or dimensions of MPI is not realistic (Nicole 2011). For example, safe drinking water may be positively related to indicators of health and education.
- MPI does not reflect distribution of deprivations among the poor. Hence, policies based on MPI may fail to give attention required to the neediest of the needy.
- MPI based on cross-sectional data does not reflect the poverty dynamics i.e. movement into and out of poverty (intertemporal poverty) and the factors influencing such transitions. For developing countries like India, such intertemporal poverty are common despite persistence of poverty across time (Sahasranaman, 2021).

- The cut-off mark of deprivation score ≥33% is arbitrary. Any change in the cut-off mark will affect the results on poverty rates, country rankings, etc. Households lacking say 8 out of 10 indicators are not distinguished from households lacking 4 out 10. Moreover, a household lacking only in 5-indicators of "Access to basic infrastructure" is not considered as poor since 5×1⁄18= 0.277< 33%. Data dominated by the poor who are closest to the cut-off score, poverty can be reduced fast. Mishra (2024) observed information loss in computation of MPI due to cut-offs between and within dimensions and also converting data to binary form and suggested need of re-thinking of social welfare measures linked to poverty line for a broad-based approach Mishra (2024 b).
- Change in MPI due to 1% decrease in H≠ change in MPI due to 1 % decrease in A. For example, consider for a country at given year H= 14.96%, A= 44.39% and MPI=H*A = 0.066. Here, 1% decrease in H and unchanged value of A means improved MPI = 0.06196. Similarly, 1% decrease in A, with unchanged value of H implies new value of MPI = 0.06491. In this example, elasticity of MPI with respect to H and A are different and change in MPI is more dependent on change in H.
- Methodology of MPI as a composite index (CI) may be criticized for compensatory approach i.e. high deprivation in one indicator can be compensated by low deprivations in other indicators. Aggregation of indicators by geometric mean minimizes the substitution effect. The Human Development Index (HDI) now uses geometric mean for aggregation (UNDP 2010), Human Poverty Index for developing countries (HPI-1) uses cube root of average of figures in percentage (UNDP, 2007).
- The weighting system in MPI has been questioned. Different approaches were made to select weights and each choice has implications on the CI. Ravallion (2011) suggested for public debate about selection of weights. For OPHI's MPI, Deyshappriya and Feeny (2021) found dimension weights using Discrete Choice Experiment and arranged the dimensions based on their importance as Health (0.38), Education(0.33) and Living standards(weight 0.29). But findings based on order effects are at variance. Kumara (2013) used weights resulting from Principal Component Analysis (PCA) where each of the first six eigenvalues exceeded unity implying six independent dimensions of poverty, which is a shift from the MPI. Data driven PCA weights vary over time and space. Multiple Correspondence Analysis was undertaken by Pasha, (2017) to find weights of the indicators which were different for different countries since pattern of deprivations vary across regions.

Copula based weights considering dependence between the dimensions were used by Tkach & Gigliarano (2020) where such copula based weights were multiplied with the normalized scale values of deprivation scores to find the weighted sum. Association between dimensions of poverty using copula based multivariate generalizations of Spearman's rho is not unanimous. Effectiveness of copulas may be compromised by challenges related to scalability and handling mixed-type data in practical applications. Ranks of countries were sensitive to weighting schemes of MPI (Pasha, 2017). Alkire & Santos (2014) and Santos & Villatoro (2018) examined sensitivity of weights of MPI rankings.

Different weighting methods have their own advantages and disadvantages. The most suitable method to assign weights in multidimensional poverty analysis is difficult to identify (Kumara, 2013). Any weighting system can be criticized (Greco, *et al*.2019). Need is felt to develop MPI avoiding weights to the indicators/dimensions.

The paper suggests multiplicative aggregation of chosen indicators to find an index of overall poverty status of a country at a given time (OPI_{c0}), avoiding scaling and selection of weights, facilitating better comparisons, assessing changes across time, plotting of growth/decline of poverty curve, computation of the index for each dimension, finding relative importance of the dimensions and undertaking statistical tests.

Poverty Dynamics

Duration of poverty (poverty spell) and movements to and from poverty are the major areas of poverty dynamics (Addison *et al*., 2009). Poverty transition matrix (PTM) by Madan (2022); Guo *et al*. (2022) and stickiness probability of multidimensional poverty by

Apablaza and Yalonetzky, 2012; Alkire *et al*., 2017) ignore cumulative effect of poverty spell on poverty dynamics.

PTM showing probabilities of transitions from poverty or non-poverty (*P→NP*) and vice versa (*NP→P*) or remaining to poverty (*P→P*) or non-poverty (*NP→NP*) during time period t to (*t + 1*) may be presented by 2×2 matrix as follows:

$$\boldsymbol{PTM}_{\boldsymbol{t,(t+1)}} = \begin{pmatrix} p_{P\to P} & p_{P\to NP} \\ p_{NP\to P} & p_{NP\to NP} \end{pmatrix}$$

$p_{NP\to P}$ and $p_{P\to NP}$ are probability of transition into and out of poverty in a year and help to understand the evolution of poverty transitions.

Wang *et al*. (2023) obtained estimates of elements of PTM by Kaplan–Meier method followed by discrete-time proportional hazards model, to investigate dynamics of multidimensional poverty and its factors. While survival function S(t) gives the probability of survival of an individual exceeding a specified time t, hazard function λ(t) gives the probability that an individual at t-th time has an event at that time. Thus, λ(t) is related to the incidents/event rate, and S(t) reflects the cumulative occurrence or non-occurrence. Kaplan-Meier survival curve (a step function) is popular to analyze 'time-to-event' data but has several limitations and cannot assess the relationship of survival with the explanatory variables. Chakrabartty (2021) proposed Geometric Mean approach for survival analysis for better assessment of disease intensity in terms of the chosen measurable factors/variables, identification of bad prognosis factors and quantification of progress/deterioration of a patient over time (analogous to hazard function of an individual).

Denoting Poverty line by PL and Below poverty line by BPL, quick estimates of $p_{P\to NP}$ and $p_{NP\to P}$ given by Sahasranaman, (2021) are:

$$p_{P\to NP} = \frac{No.\,of\ individual\ transitions\ from\ BPL\ at (t-1) to\ the\ PL\ or\ hgher\ at\ t}{Total\ no.\,of\ individuals\ BPL\ at\ (t-1)}$$

and

$$p_{NP\to P} = \frac{No.of\ individual\ transitions\ from\ or\ above\ the\ PL\ at\ (t-1) to\ BPL\ at\ t}{Total\ no.of\ individuals\ at\ or\ above\ PL\ at\ (t-1)}$$

The author also derived (i) probability of escaping poverty (P-Escape$_{(t,tp)}$) by an individual who has been poor for $>t_p$ periods and is non-poor at t and (ii) stickiness probability (P-Stic.$_{(t,tp)}$) for an individual who has been poor for $>t_p$ periods and still is in poverty at t-th period. Impact of economic trajectory of a country over a period (t_p , t) can be better understood by *P-Escape*$_{(t,tp)}$ and *P-Stic*.$_{(t,tp)}$.

Vulnerable group may be defined as those whose monthly per-capita consumption is > PL but < 2PL (Desai *et al*. 2024). However, choice of 2PL is arbitrary. Better is to consider escaping poverty and stickiness probability. However, estimates of such probabilities are sensitive to short term fluctuations in economic conditions and migration opportunities.

Materials and Methods

Indicators

Let X_{1c} denote the proportion of poor below the poverty line defined by the country at the current period and X_{10} be the corresponding figure for the country for the base period. Let $X_2, X_3, \ldots\ldots X_k$ are the (*k*-1) indicators chosen to assess poverty under various non-monetary dimensions with count data, and X_{k+1}, $X_{k+2}, \ldots\ldots, X_{n-k}$ represent other indicators relating to economic, social, environmental and psychological dimensions like uncensored poverty spell, indicators/variables influencing chronic and transient poverty like household size, years of schooling, achievement in education, accumulation of wealth/assets, living standards, social relations, conditions of employment, status of health and well-being, increases in the child dependents, inactive adults, etc. (Acar *et al*., 2014) including number of individuals moved out or moved into the poverty at the given period. For each such indicator ensures that its ratio of current value and base period value are positively related to poverty.

Aggregation

Avoiding selection of weights, scaling/normalization, distributions and inter-correlations of the chosen indicators, the index of overall poverty status of a country at a given time (OPI_{c0}) is proposed to be defined as geometric mean of the ratios

$$\frac{X_{ic}}{X_{i0}} \text{ for } X_{i0} > 0;\ X_{ic} >$$

0 where the vector $X_c = (X_{1c}, X_{2c}, \ldots\ldots, X_{nc})^T$ are scores of n-indicators in the current period and scores of the corresponding base period vector is

$X_0 = (X_{10}, X_{20}, \ldots\ldots, X_{n0})^T$

i.e. $OPI_{c0} = \sqrt[n]{\frac{X_{1c}.X_{2c}.....X_{nc}}{X_{10}.X_{20}.....X_{n0}}}$ ...(1)

or avoiding the n-th root, $OPI_{c0} = \frac{X_{1c}.X_{2c}.....X_{nc}}{X_{10}.X_{20}.....X_{n0}}$ ...(2)

OPI_{c0} is a poverty metric based on monetary and non-monetary indicators such that lower value of OPI_{c0} indicates improvement based on all the chosen indicators.

Properties of OPI_{c0}:

$OPI_{c0} < 1 \Longrightarrow$ Overall improvsement of poverty of the country from the base year. Similarly, *i*-th indicator,

$\frac{X_{ic}}{X_{i0}} < 1$

imply improvement in the current period over the base period.

Progress or improvement in period t over (*t*-1)-th period by the of the i-th country may be evaluated by

$OPI_{i(t-1)} - OPI_{it}$ or by $\frac{OPI_{i(t-1)}}{OPI_{it}}$

The proposed index as per equation (2) is monotonic, 1% gain in X_{ic}/X_{i0} implies 1% gain in OPI_{c0}. A percentage change from the base period is reflected by $100*OPI_{c0}$

OPI_{c0} by (2) is simple to calculate, invariant under change of scale, can consider all indicators including those given in percentages or in ordinal scale or skewed. OPI_{c0} reduces greatly substitutability among the indicators and is not affected much by outliers, shows no bias either for developed or under-developed countries and enables repetitions of experiment under similar conditions (Herrero, *et al*. 2010). The index can be computed separately for each dimension considering the indicators chosen under the dimension. The index can be computed separately for the regions and also for properly defined sub-groups say rural or urban groups, socio-economically backward groups, educated or uneducated groups, etc.

Results

The Index Facilitates

- Identification of critical indicator for which and $\frac{X_{it}}{X_{i(t-1)}} > 1$ and merits attention for initiation of necessary corrective policy action.
- Similarly, critical dimension(s) can be identified
- Finding relative importance of j-th indicator by $\frac{\nabla(OPI_t)}{\nabla(\frac{X_{jc}}{X_{j0}})}$
- Satisfies time-reversal test since $OPI_{c0}*OPI_{c0}=1$
- Enables formation of chain indices since $OPI_{20}=OPI_{21}\times OPI_{10}$ and to
- Enables drawing of OPI_t graph of a country to reflect path of improvement or decline along with focused investigations on the points of fluctuations. Such path may also help interregional comparisons over time with respect to OPI_t.
- Replacing base period data by data for the previous year, the index can be computed on Year-to-Year basis ($OPI_{t,(t+1)}$)
- Replacing the base period data by the national targets to remove all forms of poverty, OPI_{c0} will indicate distance of a country from the national goals at the C-th time period.
- Mean and variance of OPI_{c0} for a group of regions can be computed in terms of logarithm of the components, since log (GM) approaches lognormal distribution (Alf *et al*., 1979).

Limitations of the Proposed Method

- If a new indicator is introduced at a later period, estimation of its values are required in the base year and subsequent years.
- Missing data are not considered. Treating missing data is beyond the scope of the present paper.
- Different base period figures (reference points) of countries do not help in meaningful comparison of countries in terms of OPI_{c0}.
- The method fails if a particular indicator or target attains zero or negative value.

Discussion

The paper proposes multiplicative aggregation of ratios of the chosen indicators to find an index of overall poverty of a country at a given time (OPI_t) avoiding the problems of scaling and weights,

facilitating better comparisons, assessing changes across time, plotting of growth/decline of poverty curve, computation of the index for each dimension, finding relative importance of the dimensions and undertaking statistical tests. The index is preferred as it satisfies many desirable properties including reduction of substitutability among the indicators, linearity between gain in ratio of an indicator and gain in OPI_t, time-reversal test, formation of chain indices, etc.

Replacing the base period data by the national targets to remove all forms of poverty, the index OPI_{c0} will indicate how far the country is at the C-th time period from the goals set at national level. Identification of critical indicator (s) may help the policy makers to initiate necessary corrective policy action. The plotting of growth/decline of multidimensional poverty in terms of changes in OPI_{ct} for a country reflects effectiveness of policy measures adopted and can be used in projection of poverty for the country.

The index OPI_{cO} can be broken down to sub-indices like:

- New Multidimensional poverty index (I_{NMPI}) considering the first k-indicators. This is in line with MPI with the additional benefit of no selection of weights and no cut-off marks leading to rejection of households or individuals.

- Index of transient poverty or time-dimension of poverty at t-th period (I_{TPt}) considering the indicators $X_{k+1}, X_{k+2}, \ldots, X_{n-k}$ relating to the factors influencing poverty spell, chronic and transient poverty, which could be in ordinal or interval scales. Using longitudinal data, assessment and monitoring of the extent of chronic or persistent poverty within society can be made in terms of probability of transitions to and from poverty ($p_{NP \rightarrow P}$) and $p_{P \rightarrow NP}$) and economic trajectory of a country over a period by P-Escape$_{(t,tp)}$ and P-Stic.$_{(t,tp)}$.

Empirical relationship may be found between I_{NMPIt} and I_{TPt} and also of OPI_{t0} on I_{NMPIt} and I_{TPt} by regression analysis for a particular country across time.

Conclusion

The proposed index OPI_{c0} satisfying desirable properties facilitates computation of New Multidimensional poverty index (I_{NMPIt}) which is in line with MPI with the additional benefits and Index of transient poverty (I_{TPt}) covering the factors influencing poverty spell, chronic and transient poverty, which could be in ordinal or interval scales. Estimation of probability of persistent poverty within society and probability of transitions to and from poverty along with economic trajectory of a country will help the planners to achieve the national goals. However, gender perspective and old age perspective need to be integrated with measures of poverty. Future studies may be undertaken to investigate robustness of the proposed index along with its relationships with the New Multidimensional poverty index (I_{NMPI}) and the Index of transient poverty (I_{TPt}).

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This statement does not apply to this article.

Ethics Statement

This research did not involve human participants, animal subjects, or any material that requires ethical approval.

Informed Consent Statement

This study did not involve human participants, and therefore, informed consent was not required.

Author Contributions

The sole author was responsible for the conceptualization, methodology, data collection, analysis, writing, and final approval of the manuscript.

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