

Relationship between monetary poverty and multidimensional social assistance eligibility criteria in Sri Lanka¹

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Abstract

Many countries use multidimensional approaches to determine eligibility for social assistance programmes. However, monetary-based metrics remain a key tool used for measure poverty. It is crucial to understand the linkages between the two, to understand how best to monitor and evaluate the effectiveness of the social assistance programmes. This paper looks to explore the relationship between the 22-indicator deprivation score used in Sri Lanka to determine eligibility for its key social assistance programme, Aswesuma, and the national poverty line, measured using per capita consumption expenditure, drawing on a nationally representative survey. It concludes that the deprivation score has a positive, but weak to moderate, relationship with expenditure-based poverty, and discusses implications for policymakers.

1. Background and literature

Orshansky (1969) stated, it is true that "poverty, like beauty, lies in the eyes of the beholder". The concept of poverty has long been a subject of intense debate, with numerous scholars grappling to define poverty, seeking to capture its multifaceted nature and implications. In their seminal work, Laderchi et al (2003) presents four conceptualizations of poverty in the form of the monetary approach, capabilities approach, social exclusion approach and the participatory approach.

The monetary approach, defines poverty as a person's inability to get a specific amount of income in order to achieve economic well-being (Ravallion 1998). This method is founded on utility theory, which states that a person will be satisfied by the consumption of goods and services (Asselin & Dauphin 2001). Those who use this monetary approach and identify the poor using the poverty line, give a positive but implicit answer (Boltvinik, 1999). Sri Lanka, for example, defines poverty in the context of expenditure per capita. This method has long been a favored mechanism to conceptualize and measure poverty – some attribute this popularity to it being easy to understand, despite being anchored on more complex concepts such as the cost of basic needs methods. Wisor (2012) highlights that monetary based indicators are responsive to shocks, which can be valuable in reflecting short- and

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long-term changes. Further, Wisor (2012) points out that the ease of access to household expenditure surveys, which are frequently undertaken in many countries, is a bonus.

However, it has also drawn criticism for several reasons. Some criticisms are based on a conceptual basis. Soria (2007) opined that the monetary approach has been favored given its compatibility with neoclassical microeconomic theory, and states that monetary measures alone are too narrow to fit reality. Many argue that poverty measures should go beyond mere income levels (Bader et al., 2016; Ravallion, 2016), stating that no single indicator, such as income or expenditure, can fully capture the multiple dimensions that contribute to poverty (Alkire et al., 2014; Alkire et al., 2018). This ties to Amartya Sen's famed capabilities approach, wherein poverty is defined as a deprivation of basic human capabilities (Sen, 1992). Nolan and Whelan (2010) argue that in practice, income may be unreliable as an indication of poverty, failing to identify persons experiencing deprivation and exclusion.

However, some other pushback has been on practical basis. Laderchi et al (2003) opined that defining poverty using a monetary lens is justified due to the availability of data. While this may be true in developed country contexts, this is not the case for many developing countries where informal sector workers have little to no records of how much money they earn (OECD, 2002) – this complexity is further compounded for those whose income --- and thereby, in many cases, expenditure --- varies on a seasonal basis. If so, this argument will not hold in developing country contexts.

This has given way to the rising popularity of alternate versions of poverty conceptualization and measurement, as seen in measures over the years such as the Human Poverty Index (HPI) and Human Development Index (HDI). Alkire and Foster's Multidimensional Poverty Index (Alkire and Foster, 2010), also draws from Sen's capabilities approach to poverty, has gained traction in recent years.

Notably, the move away from monetary based measures has also been reflected in recent poverty alleviation programmes in developing nations. Sri Lanka's Aswesuma programme, which the government is implementing amid its large-scale economic reform programme in the wake of its recent economic crisis, is no exception. It uses 22 indicators to calculate a deprivation score, which in turn, identifies those in need of assistance (Welfare Benefit Payment Regulations, 2022). (Table 1; more details in Annex 1)

Table 1: Indicators used to calculate the deprivation score for Aswesuma

Dimension	Indicator
Demographic	Single parent family
	High dependency ratio
Health	Persons with disability in family
	Persons with chronic disease in family
Education	Poor education in family (measured in years of schooling)
	Lack of school attendance of 5-16 year olds
Asset ownership	Lack of land ownership (resident house)
	Lack of land ownership (additional houses/buildings)

	Lack of land ownership (paddy land)
	Lack of land ownership (highland)
	Lack of livestock ownership
	Lack of agricultural/fishery machinery ownership
	Lack of vehicle ownership
Living standards	Poor nature of housing
	Poor building materials for housing (walls, roof, floor)
	Small floor area of housing
	Poor toilet facilities
	Unsafe drinking water source
	Lack of electricity access to household
Consumption	Low electricity consumption
	Low per capita expenditure (below expenditure poverty line)
	Low per capita income (below income poverty line)

Understanding the relationship between different ways in which poverty is conceptualized and measured is important, especially in the context of deciding how best to evaluate outcomes of social assistance programmes. Bader et al. (2016) highlighted a correlation between monetary poverty and nutrition in Laos. Many studies exist that look at the relationship between monetary poverty and multidimensional poverty (Alkire et al., 2015; Alkire & Foster, 2011; Alkire & Santos, 2014; Bader et al., 2016). These studies, which examine this relationship from the context of Laos, Germany, and Vietnam indicate that low to moderate correlation between monetary and multidimensional poverty.

While there are a multitude of papers analyzing the linkages between monetary poverty and the MPI, there is a dearth of literature examining the relationship between monetary poverty and other multidimensional measures. This includes other multidimensional indices such as the HDI and HPI, as well as multidimensional eligibility criteria used for social assistance programmes. The specific indicators used within these programmes differ from the MPI. Table 2, for example, shows that while there are some similarities in the indicators used in the MPI and the Aswesuma, there are also many differences.

Table 2: Indicators used in MPI and Aswesuma deprivation score

Dimension	Indicator type	MPI	Aswesuma
Demographic	Single parent family		✓
	High dependency ratio		✓
Health	Nutrition	✓	
	Child mortality	✓	
	Persons with disability in family		✓
	Persons with chronic disease in family		✓
Education	Poor education in family (measured in years of schooling)	✓	✓
	Lack of school attendance of 5-16 year olds	✓	✓
Asset ownership	Lack of land ownership		✓
	Lack of vehicle ownership		✓
	Lack of Agricultural machinery ownership		✓

	Consumer durables ownership	✓	
Living standards	Cooking fuel	✓	
	Poor housing characteristics	✓	✓
	Poor toilet facilities	✓	✓
	Unsafe drinking water source	✓	✓
	Lack of electricity access to household	✓	✓
Consumption	Low electricity consumption		✓
	Low per capita expenditure (below expenditure poverty line)		✓
	Low per capita income (below income poverty line)		✓

Therefore, it is important to assess the relationship between monetary poverty and these other indicators used in other multidimensional criteria. This paper fills this gap in the literature. As such, this paper explores the linkages between the multidimensional deprivation score used to determine eligibility for the Aswesuma programme, and expenditure based monetary poverty in Sri Lanka.

2. Data & methodology

2.1 Survey methodology

This paper will draw on data from LIRNEasia's 10,000 sample nationally representative survey conducted between August 2022 and March 2023, which allows for national level estimates to be made within a 95% confidence interval with +/-1.4% margin of error. The target populations for the survey were all households in Sri Lanka. National representation at the desired levels of precision was achieved by using a comprehensive national sample frame at the most granular level possible (most granular administrative division level data) and ensuring random selection at every level of sample selection (Table 3).

Table 3: Coverage and sample frame related information of the survey.

Coverage	Sample frame used	Level of representation	Fieldwork period
400 GNDs covering all 25 districts and provinces	GND-level data from the National Census of Population and Housing 2012	National, urban-rural level, Province into urban rural level and district level	Aug-2022 to March-2023

The sampling methodology in steps for the survey is as follows:

The national sample frame was separated into urban, rural and estate primary sample locations (PSUs).

- Sampling the required number of PSUs from each stratum² (urban, rural and estate) using probability proportionate to size (PPS).

² There were 24 strata used in this study. All nine provinces are divided into urban, rural and estate PSUs depending on the availability of those relevant types of GNDs.

- Mapping (This was done with the assistance of key informants (e.g., ward/ village leader, etc.)), listing, and marking all households in the selected PSU or a randomly selected segment of the PSU.
 - A random starting point (a GPS coordinate) was provided to the field team to list all households, or at least around 250 households, depending on the number of households available in the GN division.
- The lists served as the sample frame for simple random selection of households.
- Systematic random sampling selection of the required number of households (20-25 with about 5 extra households as buffer sample) from each selected PSU.
- Conducting the interview with the household head or a suitable alternative.

The lowest administrative level sampling frames available to the public were Grama Niladhari Divisions (GND) in Sri Lanka. GNDs were divided into smaller areas for listing and enumeration. These administrative units typically have a larger number of households than 250. For instance, some GNDs can have as many as 6,000 households, making the listing of all households impossible if selected into the sample. Therefore, such large administrative units were segmented while in the field, according to predefined methodology, and one or more smaller segments then randomly selected for listing and enumeration. It is important to note that the core principle of random selection was incorporated at every stage of sample selection to ensure national representation. There was no purposive, convenience or quota selection of any kind.

2.2 Measuring poverty

2.2.1 Measuring expenditure based poverty

The paper uses the national poverty line, which is determined using an expenditure-based method, as a measure of monetary poverty. The Department of Census and Statistics calculates this line based using a cost of basic needs approach, based on a basket of goods defined in 2012/2013. This includes the per-capita expenditure at which a person was able to meet the nutritional anchor of 2030 kilocalories, while also consuming a set basket of non-food items (DCS, 2019). The poverty line is set at the district level, accounting for varying living costs in different regions, from which a national aggregate is derived. In 2019, the national poverty line stood at Sri Lankan Rupees (LKR) 6,966 per person. However, the country saw rapid inflation since, with headline inflation (measured by the National Consumer Price Index) peaking at 73.7% in September 2022 – therefore, the poverty lines too have been inflation adjusted. Thereby, in December 2022, the national poverty line stands at LKR 13,777 per person.

2.2.2 Measuring Aswesuma deprivation score

As mentioned in Section 1, 22 indicators were used to calculate a deprivation score, to determine eligibility for the Aswesuma scheme. The deprivation score was calculated in line with the Welfare Benefit Payment (Selection of Persons Eligible to Receive Payments) Regulations No. 1 of 2022. The calculation of deprivation score includes a three-step procedure.

2.2.2.1. Calculation of indicator deprivation:

The level of deprivation is calculated for each of the 22 indicators. Here, $x_j(i)$ is the individual value on indicator j . Then

$\mu_j(i) = 1$; if individual deprived in indicator j
 $\mu_j(i) = 0$; if individual does not deprived in indicator j

See Annex 2 for the proportion of households classified as deprived, for each of the 22 indicators used to select families into the Aswesuma programme.

2.2.2.2. Calculation of weight for indicators

Thereafter, weights are assigned to these indicators, determined by their significance relative to districts. These weights, derived from the Household Income and Expenditure Survey, remain constant for a set duration and are adjusted after subsequent surveys. These weights translate to the importance of each indicator—lower weights indicating lesser importance and higher weights denoting greater significance due to a higher prevalence of deprivation.

$$\omega(j) = \frac{\frac{\ln 1}{f_j}}{\sum_{j=1}^k \frac{\ln 1}{f_j}} \times 100; j = 1, 2, \dots, k$$

Where, f_j denotes the proportion of people who are deprived on j^{th} indicator in the i^{th} district in the HIES sample and k is the number of indicators ($i = 1, 2, \dots, 25$ districts).

2.2.2.3. Calculation of weighted deprivation score for individual

Lastly, the individual's deprivation score is computed by considering these weighted factors.

$$\mu_{wi} = \sum_{j=1}^k \omega_j \times \mu_{Ai}(j)$$

Where; μ_{wi} is the weighted deprivation score for i^{th} individual. Weighted deprivation score is getting values between 0 and 1 in which towards zero (0) is less deprived and towards one (1) is highly deprived.

2.3 Types of analysis

Several statistical methods/tests are used to determine the relationship between the expenditure-based poverty line and deprivation score indicators.

Chi-square test: The chi-square test of independence is used to determine *whether there is* a relationship between the expenditure-based poverty line and the 22 deprivation score indicators. The Chi-square statistic's statistical significance was measured at .05 level.

Logistic regression: Logistic regression modeling was employed to achieve two primary objectives: (1) to understand how each of the 22 indicators of deprivation scores is associated with the expenditure-based poverty line (2) to explore how the expenditure-based poverty line relates to either the complete set of 22 indicators or various

combinations of these indicators. The variables were coded for the logistic regression models, as outlined in Table 4.

Table 4. Variable coding for logistic regression models

Variable	Value	Interpretation
Expenditure based poverty line (Outcome variable)	1	Below the poverty line
	0	Above the poverty line
22 deprivation score indicators (Predictor variables)	1	Deprived as per the indicator
	0	Not deprived as per the indicator

Logistic regression models were utilized as a binary regression technique suited for scenarios in which the variable of interest (the expenditure-based poverty line, as specified in Table 4) is binary.

The logistic models established connections between determining and mediating factors and the outcome variable in Table 4. These models contributed to the estimation of the probability of the outcome variable being above or below a particular threshold, thus leading to the observed outcome.

The probability of the outcome variable (Y_i) was calculated using the logistic function:

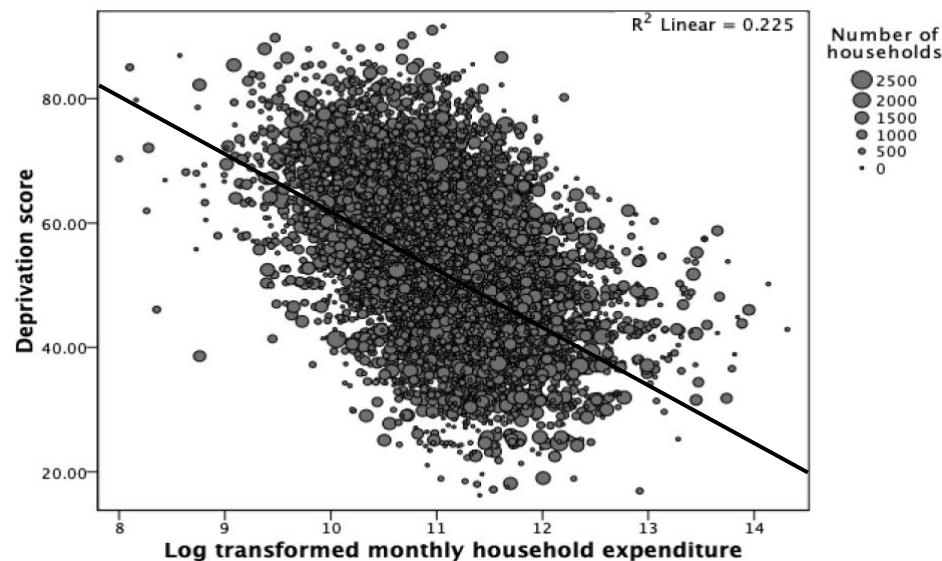
$$Probability (Y_i) = \frac{1}{1 + \exp(-\alpha - \sum_{t=1}^n \beta_t X_t)}$$

In this equation, Y_i represented the dichotomous outcome of interest, as defined in Table 4, while X_i referred to the influential factors (also known as determining and mediating factors) that influenced this outcome. The values of β_i indicated the sensitivities of each influential factor X_i . These influential factors corresponded to the 22 deprivation score indicators. The use of the exponential function in modeling the dependent variable ensured that its predicted value fell within the range of 0 and 1.

4. Analysis

We first examine the correlation between the deprivation score, derived from the 22 indicators, and the logarithmic value of total monthly expenditure. Figure 1 illustrates this relationship and demonstrates a negative association between the two. The Pearson correlation coefficient, which quantifies the strength of the relationship between the log-transformed total expenditure and the deprivation score, was -0.474. This suggests that as the deprivation score increases, the logarithmic value of total monthly expenditure decreases. This implies that households with higher levels of deprivation tend to have lower total monthly expenditure. However, the strength of this relationship is moderate.

Figure 1. Scatter plot for log transformed total household expenditure vs deprivation score.



Two million households in Sri Lanka were deemed poor as per the national poverty line. At the time of writing this paper, the government had not released a cutoff for the deprivation score, which could have served as a basis for determining eligibility for the programme. However,

Extraordinary Gazette No. 2328/13 released on 21 April 2023, identified that two million households would be selected for the programme based on their deprivation scores. Therefore we select the 2 million households with the lowest deprivation scores for this analysis, and compare how many of the 2 million households defined as poor as per the national poverty line were classified as in eligible for assistance through the Aswesuma deprivation score. This analysis finds that 53% of the 2 million households (~1.06 million households) defined as poor as per the expenditure based national poverty line were classified as eligible for assistance through the deprivation score. Meanwhile, 19% of the households above the expenditure-based poverty line (~940,000 households) were deemed eligible through the score.

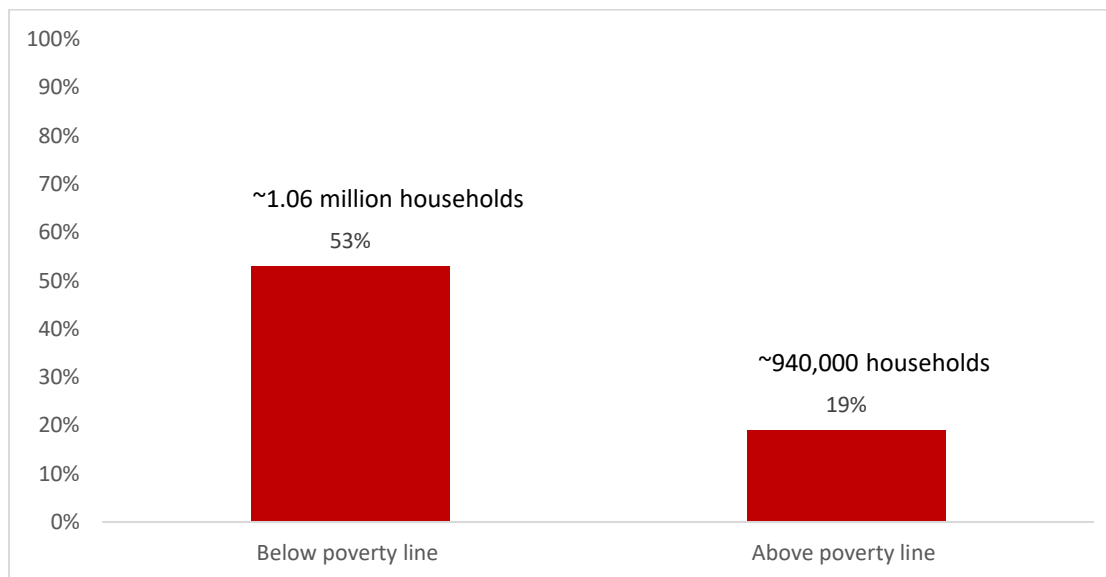


Figure 2: Aswesuma deprivation score - coverage of families above and below national poverty line (% of families above and below poverty line)

Thereafter, we break down the different indicators of the deprivation score. In doing this, we classify all households into 2 categories – deprived and non-deprived – for each of the 22 indicators used to calculate the deprivation score (Table 5).

Table 55: Chi-square test of Aswesuma criteria with poverty line

Indicator	Level of deprivation as per the indicator	Expenditure based poverty line		Chi-Square Significance
		Above poverty line	Below poverty line	
		Table %		
Poor education in family (measured in years of schooling)	Deprived	11%	23%	0.000
	Not Deprived	16%	50%	
Lack of school attendance of 5–16-year-olds	Deprived	2%	4%	0.000
	Not Deprived	25%	69%	
Persons with chronic disease in family	Deprived	19%	52%	0.333
	Not Deprived	8%	21%	
Persons with disability in family	Deprived	8%	21%	0.490
	Not Deprived	19%	52%	
Lack of land ownership (resident house)	Deprived	13%	32%	0.002
	Not Deprived	14%	40%	
Lack of land ownership (additional houses/buildings)	Deprived	27%	72%	0.007
	Not Deprived	0%	1%	
Lack of land ownership (highland)	Deprived	23%	58%	0.000
	Not Deprived	5%	15%	
Lack of land ownership (paddy land)	Deprived	26%	70%	0.342
	Not Deprived	1%	3%	
Lack of vehicle ownership	Deprived	17%	29%	0.000
	Not Deprived	11%	43%	
Lack of agricultural/fishery machinery ownership	Deprived	25%	66%	0.663
	Not Deprived	2%	6%	
Lack of livestock ownership	Deprived	27%	72%	0.647
	Not Deprived	0%	1%	
Poor nature of housing	Deprived	2%	2%	0.000
	Not Deprived	26%	71%	
Poor building materials for housing (walls, roof, floor)	Deprived	0%	0%	0.000

	Not Deprived	27%	72%	
Small floor area of housing	Deprived	13%	25%	0.000
	Not Deprived	15%	47%	
Unsafe drinking water source	Deprived	3%	4%	0.000
	Not Deprived	25%	69%	
Poor toilet facilities	Deprived	3%	4%	0.000
	Not Deprived	25%	68%	
Lack of electricity access to household	Deprived	0%	1%	0.176
	Not Deprived	27%	72%	
Low electricity consumption	Deprived	19%	35%	0.000
	Not Deprived	9%	38%	
High dependency ratio	Deprived	13%	29%	0.000
	Not Deprived	15%	44%	
Single parent family	Deprived	1%	2%	0.000
	Not Deprived	26%	70%	
Low per capita income (below income poverty line)	Deprived	21%	33%	0.000
	Not Deprived	6%	40%	

We then use Chi Square tests to identify the relationship between the expenditure based monetary poverty and the 22 indicators. Chi square values for 16 indicators are below 5%, signaling that there is a relationship between the expenditure-based poverty definition and these individual indicators. There are some exceptions, however. The high Chi-square significance values for lack of electricity access to household, lack of livestock ownership, agriculture and fishing machinery, and lack of land ownership (paddy land) seem to be impacted, in part, by very small groups being included/excluded on this basis. However, this argument has not held in the case of building materials used for housing (walls, roof, floor) and lack of land ownership (additional houses/buildings). Meanwhile, the incidence of persons with chronic disease in family and persons with disability in family are not related to monetary poverty.

To gain a deeper comprehension of the relationship between the expenditure-based poverty line and the 22 indicators (excluding the expenditure indicator), we formulated distinct binary logistic regression models (Table 6). These models are used to evaluate whether these indicators could function as more effective predictors of household expenditure.

Normally, a positive correlation would be anticipated, implying that as deprivation intensifies (as signified by the indicators), household expenditure would diminish, consequently falling below the poverty line. However, the lack of livestock ownership variable revealed a contrary association with the expenditure-based poverty line. This suggests that when households experience deprivation according to these indicators, their expenditure tends to escalate. As anticipated, the variable "low per capita income (below the income poverty line)" displays the most robust positive correlation with the expenditure-based poverty line. Indicators such as poor building materials for housing (walls, roof, floor), nature of housing, low electricity consumption, lack of vehicle ownership, lack of land ownership (additional houses/buildings), and poor toilet facilities exhibit a substantial relationship with the expenditure-based poverty line when each indicator is analyzed separately.

It is important to note that the model fit for these separate binary logistic regression models was low. This limited predictor set may not fully capture the complex relationship between deprivation indicators and household expenditure.

Table 66: Binary logistic regression for 22 indicators with total expenditure

Dependent variable	Expenditure based poverty line				
	Predictor	Sign	Exp(B)	Significance	Constant (Exp(B))
Poor education in family (measured in years of schooling)	(+)	1.549	0.000	0.321	0.013
Lack of school attendance of 5–16 year-old household members	(+)	1.489	0.000	0.367	0.003
Persons with chronic disease in family	(-)	0.954	0.336	0.390	0.000
Persons with disability in family	(+)	1.034	0.490	0.373	0.000
Lack of land ownership (resident house)	(+)	1.150	0.002	0.353	0.001
Lack of land ownership (additional houses/buildings)	(+)	1.927	0.008	0.197	0.001
Lack of land ownership (highland)	(+)	1.250	0.000	0.314	0.002
Lack of land ownership (paddy land)	(+)	1.127	0.329	0.336	0.000
Lack of vehicle ownership	(+)	2.296	0.000	0.247	0.048
Lack of agricultural/fishery machinery ownership	(+)	1.038	0.644	0.364	0.000
Lack of livestock ownership	(-)	0.889	0.644	0.423	0.000
Poor nature of housing	(+)	2.435	0.000	0.362	0.010
Poor building materials for housing (walls, roof, floor)	(+)	3.101	0.000	0.373	0.003

Small floor area of housing	(+)	1.558	0.000	0.315	0.014
Unsafe drinking water source	(+)	1.747	0.000	0.362	0.006
Poor toilet facilities	(+)	1.792	0.000	0.360	0.007
Lack of electricity access to household	(+)	1.282	0.170	0.375	0.000
Low electricity consumption	(+)	2.302	0.000	0.231	0.046
High dependency ratio	(+)	1.344	0.000	0.332	0.006
Single parent family	(+)	1.659	0.000	0.369	0.003
Low per capita income (below income poverty line)	(+)	4.205	0.000	0.154	0.123

Thereby, we then looked to investigate the simultaneous association between the multiple indicators used in the calculation of the expenditure-based deprivation score, and the expenditure-based poverty line (Table 7). By considering multiple indicators together, we sought to understand how the combination of these variables can effectively predict the likelihood of being below the poverty line. Three models were created. Model 1 included all the Aswesuma deprivation score indicators as dependent variables, except for per capita expenditure, which was the dependent variable. This included income as an indicator. Model 2 includes all the variables in model one, except income. Income has been excluded in this case, due to the argument that it produces imperfect estimates in developing countries due to the lack of verifiable data (OECD, 2002), and field observations on difficulties to ascertain income given seasonal changes. Model 3 further narrows the variables used in the model, limiting it to variables which had a high odds ratio from the individual logistic regression models.

Table 77: Logistic regression models

Model Number	1			2			3		
Number of explanatory variables	21			20			11		
Negelkerke R square	0.185			0.099			0.093		
% of Correctly classified cases	74%			73%			73%		
Dependent variable	Expenditure based poverty line								
Predictor	Sign	Significance	Exp(b)	Sign	Significance	Exp(b)	Sign	Significance	Exp(b)
Poor education in family (measured in years of schooling)	+	0.367	1.048	+	0.120	1.081	+	0.058	1.099
Lack of school attendance of 5–16 year old household members	+	0.000	1.431	+	0.000	1.574	+	0.000	1.673
Persons with chronic disease in family	(-)	0.051	0.900	(-)	0.197	0.935			
Persons with disability in family	(-)	0.063	0.904	(-)	0.663	0.977			
Lack of land ownership (resident house)	+	0.012	1.134	+	0.021	1.118			
Lack of land ownership (additional houses/buildings)	+	0.001	2.347	+	0.003	2.168	+	0.004	2.062
Lack of land ownership (highland)	+	0.008	1.192	+	0.016	1.165			
Lack of land ownership (paddy land)	+	0.855	1.026	+	0.594	1.075			
Lack of vehicle ownership	+	0.000	1.770	+	0.000	1.844	+	0.000	1.839
Lack of agricultural/fishery machinery ownership	(-)	0.013	0.796	(-)	0.016	0.807			
Lack of livestock ownership	(-)	0.144	0.671	(-)	0.269	0.748			
Poor nature of housing	+	0.009	1.364	+	0.001	1.448	+	0.000	1.508
Poor building materials for housing (walls, roof, floor)	+	0.151	1.475	+	0.214	1.380	+	0.547	1.165
Small floor area of housing	+	0.055	1.103	+	0.000	1.219	+	0.000	1.203
Unsafe drinking water source	+	0.086	1.167	+	0.002	1.307	+	0.001	1.328
Poor toilet facilities	+	0.014	1.246	+	0.006	1.268	+	0.037	1.195
Lack of electricity access to household	(-)	0.010	0.591	(-)	0.002	0.545			
Low electricity consumption	+	0.000	1.784	+	0.000	1.934	+	0.000	1.912
High dependency ratio	+	0.121	1.080	+	0.000	1.202			
Single parent family	+	0.008	1.379	+	0.002	1.432	+	0.001	1.450
Low per capita income (below income poverty line)	+	0.000	3.672						
Constant	(-)	0.000	0.053	(-)	0.000	0.088	(-)	0.000	0.075

Overall, the model fit was found to be unsatisfactory for all three models, all of which were below 20%. Even model 1, which included including income (which is thought to be strongly correlated with expenditure) as a predictor yielded a model fit of 18.5%. However, the fit of model 1 was double that of models 2 and 3, which stood at 9.9% and 9.3% respectively. Noteworthy, however, is that the fits of models 2 and 3, which included 21 and 11 explanatory variables respectively, were not vastly different.

In models 1 and 2, five predictors (persons with chronic disease in family, persons with disability in family, lack of agricultural/fishery machinery ownership, lack of livestock ownership, lack of electricity access to household) were negatively correlated with expenditure-based poverty measures – we posit this is for the same reasons identified for the low Chi squared values in table 4 (higher expenditure for selected groups, and small sample sizes).

Across the three models, three variables – the lack of land ownership with additional houses/buildings, lack of vehicle ownership, and low electricity consumption – had the strongest relationship with expenditure-based poverty.

5. Discussion, conclusion, and next steps

This paper adds to the existing body of literature that examines the relationship between monetary and multidimensional poverty. However, it differs from much of the existing literature in two ways. First, it uses expenditure (not income, as seen in Alkire et al., 2015; Alkire & Foster, 2011; Alkire & Santos, 2014; Bader et al., 2016) as a measure of monetary poverty, in line with what is used to define the national poverty line. Second, it anchors on a specific set of multidimensional criteria used to determine eligibility for an existing social assistance programme, instead of the multidimensional poverty index – therefore, this examines the linkages between monetary poverty and a largely unresearched set of multidimensional criteria. This will be relevant to many developing countries outside Sri Lanka who too have expenditure based national poverty lines but determine eligibility for social assistance programmes based on a range of multidimensional criteria unique to their country contexts.

This paper highlights that Aswesuma programme's deprivation score has a positive, but weak to moderate relationship with expenditure-based poverty. This echoes the weak relationship highlighted in studies that examined the relationship between income-based poverty and the MPI despite differences in indicators.

Adding income as an explanatory variable increased the model fit (measured by Negelkerke R square) twofold vis-à-vis models that excluded it. However, it is noteworthy that even with income being included as an explanatory variable, the model fit remained at 18.5%. This may add to the argument on practical considerations that income and expenditure are difficult to measure in developing countries, given the dearth of means to verify the data. While errors would have reduced to a large extent given the detailed measures taken to ascertain these numbers with internal logic checks, reporting errors may still be a cause of concern.

On the other hand, the relatively weak relationships and low model fit may be an indication that the two measures (expenditure and the Aswesuma criteria) may be measuring two different types of poverty that are not wholly comparable. While this requires further research and analysis, one could posit that several indicators in the deprivation score such as the lack of land ownership and access to water and sanitation are a sign of long-term poverty, which impacts people's capabilities to develop. Therefore, it should be used to provide some type of support through a variety of policy options, based on the specific gap. The use of a variety of policy measures may be examined, ranging from cash transfers, better financing, or direct provision of facilities, to support the development of those marginalized.

However, the relationship between the indicators may also be impacted by the research being conducted during times of a severe economic crisis. Some of the indicators (such as those mentioned above) may be less sensitive than income and expenditure during crisis. If this is found to be true through further research, policymakers should utilize select indicators that are sensitive to such changes in wellbeing during times of crisis to facilitate entry and exit from programmes. LIRNEasia is conducting further research to determine this relationship for one such indicator that has been discussed greatly in policy circles in Sri Lanka – electricity consumption.

This paper does not conclude that one type of poverty classification and measurement is superior to another, as much of the other literature does. It highlights that different types of indicators may serve different purposes. Therefore, the nature of these indicators should be considered when using it as a means for entry and exit from programmes, and an indicator to monitor and evaluate programmes.

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Annex 1: Details on Aswesuma deprivation score criteria

Dimension	Indicators	Description
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1	Education	Poor education in family (measured in years of schooling)	As the highest education level, having passed GCE Ordinary Level or higher is considered as 'not deprived' and the highest education level of having passed 10th Grade or lower levels, special education, never attended school is considered as deprived.
		Lack of school attendance of 5-16 year olds	If all the family members in the age of schooling (5-16 years) are attending school, it is considered as not deprived and if any of the family members in the age of schooling (5-16 years) are not attending school, considered as deprived.
2	Health	Persons with chronic disease in family	If no one in the family is suffering from long-term (chronic) diseases such as heart stroke, diabetes, cancer, high blood pressure, Kidney failures, mental illness, or other long-term disease that family is considered as not deprived and if any of the members is suffering from above diseases then that family is considered as deprived.
		Persons with disability in family	If family members are not disabled, they are considered as not deprived and if any of the family members has a disability they are considered as deprived.
3	Economic Level	Low per capita expenditure (below expenditure poverty line)	Cut-off is decided based on official poverty line published by the Department of Census and Statistics. If the monthly Per-capita expenditure is equal or above the poverty line then it is not considered as deprived and monthly Per-capita expenditure of below as per the poverty line indicates as deprived.
		Low per capita income (below income poverty line)	Cut-off is decided based on official poverty line published by the Department of Census and Statistics. If the monthly Per-capital income is equal or above the poverty line, then it is not considered as deprived and monthly Per-capital income of below poverty line indicates as deprived.
		Low electricity consumption	If average electricity consumption is 60 kWh or above, it is not considered as deprived and average electricity consumption is below 60 kWh indicates as deprived.
4	Assets	Lack of land ownership (resident house)	If the land with resident house is owned by family member/members they are considered as not deprived and if not owned, considered as deprived.
		Lack of land ownership (additional houses/buildings)	If there are other houses/buildings in the possession of family member/members, it is considered as not deprived and if they do not have any other house/building in their possession, considered as deprived.
		Lack of land ownership (highland)	If all the high lands in the possession of the family exceed 1/2 acre or equivalent, then they are not deprived. If they do not have any high lands or all the high land area is less than 1/2 acre then it is considered as deprived.
		Lack of land ownership (paddy land)	If all the paddy lands in the possession of the family exceed 1 acre or equivalent, then they are not deprived. If all the paddy land area is less than 1 acre, then it is considered as deprived.
		Lack of vehicle ownership	Ownership of at least one vehicle such as, Motor bike CC ≥ 125 , Three-wheeler, Car, Van/Jeep, Bus Lorry/Tipper, two-wheel tractor, tractor (4 wheel) considered as not deprived, else deprived.

		Lack of agricultural/fishery machinery ownership	Ownership of at least one of the machines such as, mechanical/non-mechanical fishing boats, combine Harvester, Paddy harvester/Prune considered as not deprived, else deprived.
		Lack of livestock ownership	Ownership of at least one livestock such, as 5 cattle for milk, 20 goats, 50 chickens, 50 ducks, 10 swine or micro livestock more in number considered as not deprived, else deprived.
5	Housing Condition	Nature of the house	Poor nature of housing unit is single homes (single story), single homes (2 stories), single house (more than 2 stories), adjoining homes/annex, luxury house, twin homes it is considered as not deprived. If the nature of the house is line homes/line rooms, shanties/slums, or other type, they are considered as deprived.
		Poor building materials for housing (walls, roof, floor)	<p>The raw materials of walls, floor and roof are made with permanent raw materials, then it is considered as not deprived and if semi-permanent raw material is used for any of the above, then it is considered as deprived.</p> <ul style="list-style-type: none"> • Walls - Bricks, laterite, cement block/rocks, clay block used for walls are permanent raw materials. Clay, boards/takaran, coconut/Palmyra branches and other similar materials are identified as semi-permanent raw materials. • Floor - Cement, terrazzo/porcelain tiles, concrete used for the floor are permanent raw materials. Clay, wood, sand and other similar materials are identified as semi-permanent raw materials. • Roof - Roof tiles, asbestos, concrete, aluminium mixed plates used for roof are permanent raw materials. Takaran, coconut/Palmyra branches/ hay or other similar materials are semi-permanent.
		Small floor area of housing	If floor area is 500 sq.ft. or higher than 500 sq.ft., it is considered as not deprived. If floor area is less than 500 sq.ft., it is considered as deprived.
		Unsafe drinking water source	The main source of drinking water is safe, if it is a protected well, tap Water by National Water supply and drainage board/community-based water supply/Local government institutions/Private water projects, tube well, RO filtered water, bottled water and then this family is considered as non-deprived on this indicator. The Main source of drinking water is unsafe if it is unprotected well, bowsers with non-RO filtered water, tanks/ rivers/streams/springs, rainwater, or another similar source, then it considered as deprived on this indicator.
		Poor toilet facilities	When the toilet facility is improved (water seal) and available only for personal use of the family, then that family is considered as not deprived in this indicator. Toilet facility is not improved (not water sealed) or it is shared with another family or other household, usage of public toilet, and using no toilet then that family is considered as deprived in this indicator.

		Lack of electricity access to household	If the main source of lighting is by electricity, solar power, generator/battery, biogas it is considered as not deprived. If the main source of lighting is kerosene, or other similar source they are considered as deprived.
6	Family Demography	High dependency ratio	If dependency ration of the family if greater than 0.65. percentage is considered as deprived based on 2019 hies and otherwise as not deprived. (Dependency Ratio = Number of people aged of 0-14 and those of aged 6 and over/Number of people aged of 15 - 64)
		Single Parent family	Single parent family considered as deprived. Here, a family unit consisting of only mother or father, the head of the household is widowed, or his /her spouse is divorced or permanently separated or not permanently separated but living separately and has no relation with this family unit or where only mother or father is living with their children is considered as a single parent family.

Annex 2: Classification of households as deprived vs non-deprived, based on individual indicators

In Table 8, we highlight the proportion of households classified as deprived, for each of the indicators used to select families into the Aswesuma programme, based on the first step of the three step process detailed in Section 2.2.2.1.

Table 8: Households classified as deprived.

Indicator	Percentage of households classified as deprived
Lack of livestock ownership	>99%
Lack of land ownership (additional houses/buildings)	99%
Lack of land ownership (paddy land)	96%
Lack of agricultural/fishery machinery ownership	91%
Lack of land ownership (highland)	81%
Persons with chronic disease in family	72%
Low per capita income (below income poverty line)	54%
Low electricity consumption	54%
Lack of vehicle ownership	46%
Lack of land ownership (resident house)	45%
High dependency ratio	41%
Small floor area of housing	38%
Poor education in family (measured in years of schooling)	34%
Persons with disability in family	29%
Low per capita expenditure (below expenditure poverty line)	27%
Poor toilet facilities	7%
Unsafe drinking water source	7%

Lack of school attendance of 5-16 year old	6%
Poor nature of housing	4%
Single parent family	4%
Lack of electricity access to household	1%
Poor building materials for housing (walls, roof, floor)	<1%

Table 3 hints that the 22 indicators have different functions. 99% of households do not own houses or buildings aside from what they live in. If a household does own such land, there is a case to not receive benefits – thereby, this can possibly serve as an exclusion criterion. Meanwhile, only 1% of households lack access to electricity, so there is a case for households to receive benefits on this basis – therefore, this can possibly serve as an inclusion criterion. Meanwhile, it’s also worth noting the deprivation score is computed at a district level – the percentage of households defined as deprived within the districts will differ.