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Identifying Poor Children: Understanding the Differences Between Poverty Approaches

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Abstract

Poverty measurement is crucial to be able to identify the most vulnerable children. This study aims at explaining to what extent and what are the conditions under which monetary, subjective and child multidimensional poverty approaches identify the same children as poor. When measuring poverty, children are often not distinguished from the other household members. However, children's experiences of poverty may be significantly different from adults. Using national representative individual micro-data from the 2015 Living Conditions Monitoring Survey (LCMS) for Zambia, we show that many characteristics of the child and the household significantly affect the probability of a joint identification of the child as poor according to the different poverty measures. The analysis reveals that 19.6 percent of children are identified as poor irrespective of the poverty measure adopted. The extent of this overlap varies significantly at the sub-national level.

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Keywords: Multidimensional Poverty, Monetary Poverty, Subjective poverty, Children, Zambia.

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1 Introduction

The worldwide trend of optimizing social spending has continued to promote poverty measurement as a crucial instrument for identifying the most vulnerable children to single them out as a policy priority. This study aims at explaining to what extent and under what conditions monetary, subjective and child multidimensional poverty approaches identify the same children as poor.

Efforts for refining poverty measurement have led to the creation of various monetary and non-monetary measures. Poverty estimates based on money metrics and non-monetary multidimensional measures were found to associate too loosely with each other for identifying the same individuals as poor (Bradshaw and Finch, 2003; Tran, Alkire and Klasen, 2015). Conclusions for child populations were not different (see Roelen, 2018; Roelen and Notten, 2013; among others). The introduction of subjective experiences of poverty adds further complexity to the picture.

Except for the effects of equivalence scales (if used), children are usually not distinguished from the other household's members. The poverty status of a household is equally attributed to each of its members. Children, however, may experience poverty significantly differently from adults. Empirical differences in the identification of poor children, be it in monetary terms (living in a monetary poor household), deprivation terms (multidimensional poverty) or subjective terms (whether or not someone feels poor in the household), are not frequently made because data are lacking.

The interpretation of monetary, multidimensional and subjective poverty outcomes is not straightforward as all of them refer to a “lack of well-being”, while each of them is grounded in distinct theories. Careless use of fundamentally different poverty measures, to legitimize inferences on children's well-being, risk overlooking that: (i) children experience poverty in a different way than adults (Marshall, 2004; UNDP, 2004); (ii) monetary and non-monetary measures provide diverging pictures of poverty (Bradshaw and Finch, 2003; Tran, Alkire and Klasen, 2015); and (iii) household-level poverty estimates mask intra-household inequalities (Hulme and McKay, 2008). This paper makes the differences visible by using a dataset that allows measuring monetary, multidimensional and subjective poverty to compare the outcomes in terms of identifying the “poor” children.

This paper uses data from the 2015 Living Conditions Monitoring Survey (LCMS) for Zambia which covers a national representative sample of 12,251 households and 31,472 children younger than 18 years. This survey comprises enough aspects of child well-being to

measure child multidimensional deprivation poverty in addition to households' monetary and subjective poverty. Child multidimensional deprivation is estimated following the UNICEF National Multidimensional Overlapping Deprivation Analysis methodology, adopting a child-centered and rights-based approach. Children cumulating simultaneous deprivations in 3 or more dimensions of child well-being such as education, health, nutrition, among others, are considered multidimensionally poor. Monetary poverty is estimated for each household, using Zambia's national extreme poverty line for 2015 of 152 Kwacha (approximately US\$12) per month per adult equivalent, and children of poor households are considered monetary poor. Similarly, children's subjective poverty is inferred from the response of a selected member of the household to the "Self-Assessed Poverty" question. Using a multinomial logit model, this study estimates the effects of child and household's characteristics on the probability of being simultaneously identified as poor according to the different child poverty measures.

Recent papers identified a conceptual and theoretical division between different poverty measures that might explain the empirical associations or lack of associations observed in different countries (see, for instance, Roelen, Gassmann and De Neubourg, 2012; White, Leavy and Masters, 2003).¹ Another strand of the literature, including Roelen (2017), Roelen and Notten (2013), Notten and Mpoue (2008), and Roelen, Gassmann and De Neubourg (2012), among others, specifically explored the less studied mismatch between child multidimensional and monetary poverty, reaching the same conclusions. Towards an explanation of the difference observed, White, Leavy and Masters (2003) attributed the mismatch of monetary and non-monetary approaches to child poverty to the status of dependence assumed by children within the household. Children are unable to sustain themselves and lack the agency to influence resource allocation towards securing their needs. However, none of these studies has considered the relationship between child-level multidimensional poverty and her household monetary and self-assessed poverty status.

Monetary resources aggregated at the household level and attributed to each member mask the dynamics of effective resource allocation within the household (Hulme and McKay, 2008). Brown, Ravallion and Van de Walle (2017), in their investigation of the implicit assumptions behind household-level measures of individual-level suffered poverty, pointed out

¹Studies that investigate the use of different measures of poverty for low and middle income countries include Tran, Alkire and Klasen (2015); Santos (2019); Kingdon and Knight (2006); Roelen (2017); Nilsson (2010); Ruggeri Laderchi, Saith and Stewart (2003); Singh and Sarkar (2015), Sahn and Stifel (2003a); Ballon et al. (2018); Klasen (2000), while for high-income country settings Wagle (2009); Wang et al. (2016); Bradshaw and Finch (2003); Perry (2002); Whelan, Layte and Maître (2004).

that this type of aggregation severely hinders the potential of reaching vulnerable women and children. These findings corroborate the empirical evidence suggesting the failure of assuming a single utility function for the household and equitable resource allocation within the household (see, for example, [Baland and Ziparo, 2017](#); [De Vreyer and Lambert, 2018](#); and [Sahn and Younger, 2009](#)).

This paper contributes to this literature by further investigating associations between monetary and non-monetary poverty measures, and child-level and household-level determined poverty in identifying poor children. The analysis shows that 19.6 percent of children are identified as poor irrespective of the poverty measure adopted. The extent of this overlap significantly varies at the sub-national level. The effect of child and household's characteristics on the probability of overlapping poverty measures are investigated. Age, gender, household composition, and level of education of the household's head significantly affect the probability of a joint identification by the different poverty measures considered.

Findings of the study reveal that multidimensionally poor children do not always belong to households that are monetary poor or wherein members perceive themselves as poor. A possible explanation is that child well-being is not always guaranteed by income, assets or adult assessment of poverty. For example, a wealthy household that does not invest in the education of its child is not monetary poor and might not feel poor but has a deprived child. The fulfillment of children's basic needs goes beyond the affordability of market-provided goods and services. Some of these essential goods and services (health and education, for example) are public in nature and rarely provided sufficiently by the markets.² Furthermore, as pointed out in [White, Leavy and Masters \(2003\)](#), children are unable to sustain themselves and lack the agency to influence resource allocation towards securing their needs.

The paper is organized as follows. Section 2 describes the dataset characteristics, the definitions of poverty used in the analysis, and how we identify the poor based on the different measures of poverty and the survey data for Zambia. Section 3 introduces descriptive statistics for the children and provides a first overview of the linkages between the different measures of poverty. Section 4 presents the empirical results on the extent to which monetary and subjective poverty measures correctly identify multidimensionally deprived children. Moreover, this section explores the set of conditions under which monetary and subjective poverty status better explain child multidimensional poverty. Section 5 concludes.

²See, for instance, [Notten and De Neubourg \(2011\)](#); [Thorbecke \(2008\)](#); [Minujin et al. \(2006\)](#); [Waddington \(2004\)](#); [Gordon and Townsend \(2003b\)](#); [Gordon and Townsend \(2003a\)](#); [Bourguignon and Chakravarty \(2003\)](#); [White, Leavy and Masters \(2003\)](#); [Tsui \(2002\)](#).

2 Data and Poverty Measurement Approaches

In this section, we describe the dataset used for the analysis and its main characteristics. This dataset presents interesting possibilities in terms of the approaches to poverty it can inform making it unique in the context of limited data available on developing countries. A summary of the different poverty measures explored in this study (monetary, multidimensional and subjective) follows, including a brief description of the methodology and specificities for Zambia.

2.1 Database

The data source used for the analysis is the *2015 Living Conditions Monitoring Survey* (LCMS 2015) of the Republic of Zambia. This survey can support the joint measurement of multidimensional, monetary and subjective poverty, and it is used for official monitoring of the poverty situation in the country. As such, it is one of the few datasets available that enables the simultaneous identification of poor children by the three different approaches considered. Moreover, the LCMS 2015 survey is the most recent household and individual dataset available in Zambia, with a nationally representative sample. It combines a rich set of child relevant variables that enrich the analysis performed.

Another distinctive feature of the survey is that it includes alternative variables for measuring subjective poverty. The survey asks for the self-assessed poverty status and, at the same time, inquires about the monthly amount of money that a household perceives as necessary to secure an adequate or minimum standard of living. The last allows comparing the self-assessed monetary poverty with the objective monetary poverty status of a child determined by the actual household income.

The Zambia LCMS 2015 dataset covers a sample of about 12,251 non-institutionalized private households and 31,472 children younger than 18 years, residing in both rural and urban areas of the country (see Appendix A). The survey design produces reliable estimates at national, provincial and rural/urban levels. To analyze the relationship between the alternative poverty measures for identifying the poverty status of a child, we restrict the sample to the total population of children aged 0 to 17 years.

2.2 Poverty Measurement

Different approaches can be used to measure child poverty. For this study, we assess the multidimensional child poverty by applying the *Multiple Overlapping Deprivation Analysis*

(MODA) approach tailored to country specific definitions. Monetary poverty and subjective poverty will be respectively measured by applying the national poverty line and employing the answers to specific questions about poverty self-assessment.

MODA Approach

The *Multiple Overlapping Deprivation Analysis* (MODA) is a methodology developed by the *United Nations International Children's Emergency Fund* (UNICEF) for measuring child poverty. Being a child-centered multidimensional approach, it complements traditional income-based and subjective measures of poverty by generating quality evidence on child poverty, simultaneous deprivations, and intra-household disparities among children. It measures the individual access to the basic goods and services considered as crucial for a child's survival and development.

MODA recognizes that a child's experience of deprivations is multi-faceted and inter-related. Also, it acknowledges that such multiple and overlapping deprivations are more likely to occur and with greater adverse effects in socio-economically disadvantaged groups. This methodology builds on existing approaches of multidimensional poverty measurement, including UNICEF's *Global Study on Child Poverty and Disparities* and the *Oxford Poverty and Human Development Initiative's* (OPHI) *Multidimensional Poverty Index* (MPI). However, some specific features distinguish MODA methodology in the measurement of child deprivation compared to other approaches. First, the child is the unit of analysis, rather than the household. Second, it allows the identification of intra-household differences in child poverty that surge from characteristics of the child such as gender, age, disability, etc.. Last, it adopts a life-cycle approach capturing children's age-specific needs corresponding to different stages in life (early childhood, primary childhood, and adolescence).

The methodology to measure multidimensional child poverty in this study has been previously adopted and validated by the Government of Zambia for a country-specific application, the National-MODA (N-MODA). This approach reflects the accomplishment with children's rights enshrined in the *Convention on the Right of the Child* (CRC) (UN, 1989), the *World Summit for Social Development* (UN, 1995), the *Millennium Development Goals* (MDGs) (UN, 2000; UNDP, 2003), and the *Sustainable Development Goals* (SDGs) (UN, 2015). These internationally agreed standards have guided the choice of crucial dimensions for a child's development.³ This guarantees that the multidimensional poverty analysis using

³The selection of a subset of dimensions of child deprivations was limited to the availability of the variables, trying to cover as much as possible enough aspects of the child well-being. See the Official National report

this methodology, including the selected customized choices of age groups, indicators, dimensions, and thresholds of deprivation to measure multidimensional poverty, better captures the multidimensional poverty status of children in Zambia reflecting the national context as well as the country’s international commitments. Figure 1 summarizes the key parameters used for measuring multidimensional poverty in Zambia.

Figure 1: AGE-GROUPS, DIMENSIONS AND INDICATORS FOR MULTIDIMENSIONAL POVERTY MEASUREMENT

AGE GROUP: 0-4 YEARS	AGE GROUP: 5-13 YEARS	AGE GROUP: 14-17 YEARS
NUTRITION	CHILD PROTECTION	CHILD PROTECTION
<ul style="list-style-type: none"> • Infant and Young Child Feeding • Weight for height (Wasting) 	<ul style="list-style-type: none"> • Child marriage/ cohabitation • Child labor 	<ul style="list-style-type: none"> • Child marriage/ cohabitation • Child labor
HEALTH	EDUCATION	EDUCATION
<ul style="list-style-type: none"> • Full Immunization 	<ul style="list-style-type: none"> • Compulsory School Attendance • Grade-for-age 	<ul style="list-style-type: none"> • Grade-for-age • Primary School Attainment
INFORMATION	INFORMATION	INFORMATION
<ul style="list-style-type: none"> • Availability of information devices 	<ul style="list-style-type: none"> • Availability of information devices 	<ul style="list-style-type: none"> • Availability of information devices
HOUSING	HOUSING	HOUSING
<ul style="list-style-type: none"> • Overcrowding • Housing materials (Floor & Roof) 	<ul style="list-style-type: none"> • Overcrowding • Housing materials (Floor & Roof) 	<ul style="list-style-type: none"> • Overcrowding • Housing materials (Floor & Roof)
SANITATION	SANITATION	SANITATION
<ul style="list-style-type: none"> • Access to improved sanitation • Garbage disposal 	<ul style="list-style-type: none"> • Access to improved sanitation • Garbage disposal 	<ul style="list-style-type: none"> • Access to improved sanitation • Garbage disposal
WATER	WATER	WATER
<ul style="list-style-type: none"> • Drinking Water Source • Water treatment 	<ul style="list-style-type: none"> • Drinking Water Source • Water treatment 	<ul style="list-style-type: none"> • Drinking Water Source • Water treatment

Source: Ministry of National Development Planning (2018)

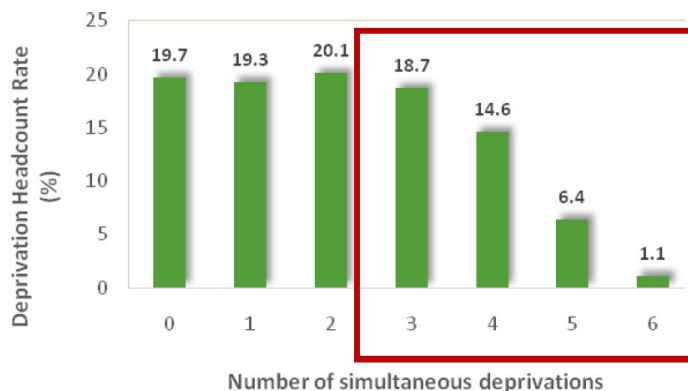
The multidimensional child poverty is estimated based on deprivation in different dimensions of child well-being: nutrition, health, protection, education, information, housing, sanitation, and water. Some of the dimensions and indicators are common across the different age groups, such as the household level indicators and dimensions (information, housing, sanitation, and water). However, dimensions that are common across age groups do not always include the same indicators (for example, the education dimension is informed by the indicators Compulsory School Attendance and Grade-for-Age for children aged 5 to 13 years, and Grade-for-Age and Primary School Attainment for children 14 to 17 years old) and an Ministry of National Development Planning (2018) for a detailed description.

indicator may adopt different thresholds within an age group depending on the age of the child as is the case of nutritional and health indicators. These differences reflect age-specific needs (like in the case of Infant and Young Child Feeding indicator).⁴

Following the union approach, a child is identified as deprived in a dimension if he or she is deprived in at least one of the indicators included in the dimension. This methodological choice is coherent with the idea that different indicators capture different aspects of the deprivation in a particular dimension.⁵ This approach also dictates that all the indicators included under a dimension are equally weighted as they complement each other in the explanation of the child’s deprivation in the respective dimension (De Neubourg et al., 2012).

Using the N-MODA approach, in this study a child is considered as multidimensionally poor (or deprived) if he or she cumulate simultaneous deprivations in three or more dimensions (i.e. the deprivation threshold is $K=3$). The choice of this threshold of deprivations is justified by the break observed in the distribution of simultaneous deprivations suffered by the children in Zambia (see Figure 2). Moreover, the selected deprivation threshold was validated by Zambia’s Ministry of National Development and Planning as it was considered to better reflect the prevailing situation of deprivation in the country.

Figure 2: DISTRIBUTION OF THE NUMBER OF DEPRIVATIONS FOR ALL CHILDREN AGED 0-17 YEARS



Source: Ministry of National Development Planning (2018)

This measure of multidimensional poverty leads to a total child poverty rate of comparable magnitude to the ones observed by adopting extreme monetary and subjective poverty

⁴Details about the definition of each of the dimensions listed as well as the thresholds of deprivation used are in Appendix A.

⁵Internal consistency in the choice of the indicators has been evaluated by performing a correlation test between indicators in the same dimension and between dimensions.

thresholds as detailed below.

Monetary Poverty

The monetary poverty approach identifies a child as poor when he or she lives in a household with an income or expenditure below a given poverty line. Monetary poverty measures a household's lack of financial means on the implicit assumption that this lack translates into the inability to secure the basic goods and services necessary for survival and development. This is coherent with the early definition of poverty by Rowntree (1991), referring to poverty as the lack of monetary resources to support individuals at the subsistence level of food, shelter, clothing, and other necessities.

The Zambian Central Statistical Office (CSO) has adopted a material well-being perception to monetary poverty. Accordingly, the poor are defined as those members of society who are unable to secure a minimum set of human basic needs, comprising of food and non-food items, given their total income. Hence, the poor are identified by comparing their measure of income, given by the household's consumption expenditure, to the national poverty line.⁶ In this study, child monetary poverty is measured at the level of the child's household using Zambia's national extreme poverty line for 2015 of K214.26 per month per adult equivalent (that is approximately USD17 per month).⁷ Considering the national poverty line instead of international standards of poverty better reflects specific country-level dimensions of poverty.

Subjective Poverty

Child subjective poverty is measured at the level of the child's household and reflects multiple dimensions of poverty as assessed by the household itself. The household's subjective poverty status is inferred from the response of a selected household member to the *Self-Assessed Poverty* module of Zambia's survey LCMS 2015. From the question "Do you consider your household to be non-poor, moderately poor or very poor?", we classify a child as subjectively poor if the household is considered very poor.

An alternative measure is provided by the survey to measure subjective poverty. A selected household member was asked: "How much money do you think is needed by your

⁶The CSO uses the Cost of Basic Needs approach when determining the national poverty line.

⁷When applying the extreme poverty line, 45.4 percent of children are identified as monetary poor as compared to 52.4 percent of children when using a moderate poverty line. The extreme poverty line is retained as the baseline measure of monetary poverty for our analysis. However, moderate poverty will be considered as robustness to explore differences in overlap with other poverty measures around the base monetary poverty threshold.

household in a month to have an adequate/minimum standard of living?”. This option was not retained due to the opportunity for bias introduced by the need for respondents to mentally cost their definition of an adequate standard of living before reporting it. This information will, however, be used for further analyses.

These approaches measure various aspects of poverty, not always identifying the same children as poor. The next sections will explore the relationship between the three measures empirically twofold. First, by analyzing the correlations between the measures of poverty we will show that although the measures are related, they do not perfectly overlap. Second, we will explore what are the specific characteristics of the children or their households that might lead to wrongly identified poor children using household-level poverty measures.

3 Descriptive Statistics

In this section, we describe some main characteristics of children in Zambia and their households. Moreover, we present evidence about the overlap registered between the three measures of poverty studied (monetary, multidimensional, and subjective) for this population.

To understand the characteristics of the children in Zambia and their families, Table 1 reports the main summary statistics of an ample set of variables at the child and household levels. Among children aged 0 to 17 years, only 1 percent of them are disabled and 2 percent orphan. Eighty-one percent of these children live in households with a male head, with a household size of 7 members on average. Among these households, they are on average composed of 4 children younger than 18 years old, with a standard deviation of 2 children. Most of the household heads have a complete primary education level (43 percent) followed by 39 percent of children living in a household with a head that has completed secondary school. Regarding the area of residence, 62 percent of children live in rural areas. The higher percentages of children are observed in Lusaka (16 percent), Copperbelt (14 percent), and Eastern and North-Western (with 12 percent each).

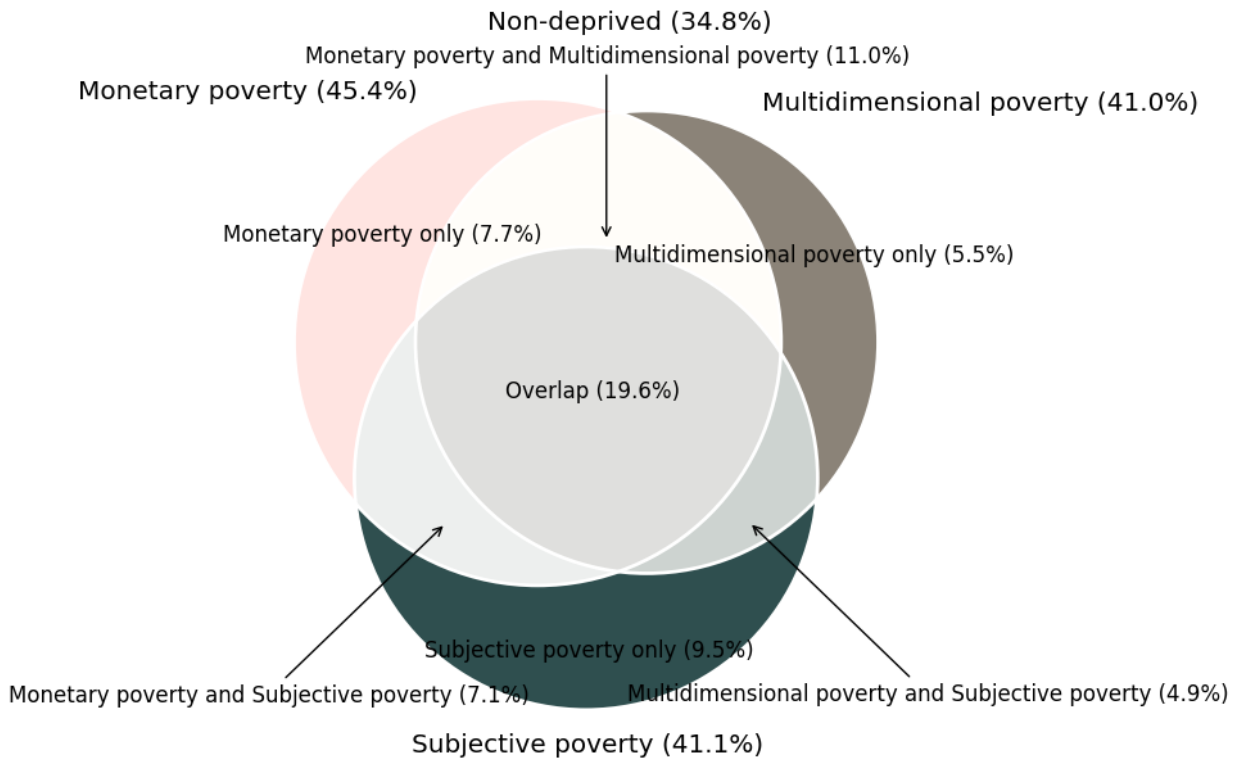
Table 1: DESCRIPTIVE STATISTICS OF ZAMBIAN CHILDREN

VARIABLE	N	Mean	S.D.	Min	Max
Age	31281	8.59	4.90	0	17
Male	31281	0.49	0.50	0	1
Disabled	31281	0.01	0.08	0	1
Orphan	31161	0.02	0.15	0	1
Male Household Head	31281	0.81	0.39	0	1
<i>Household Head Education:</i>					
No education or pre-school	30138	0.08	0.28	0	1
Primary School	30138	0.43	0.50	0	1
Secondary School	30138	0.39	0.49	0	1
Higher Education	30138	0.09	0.29	0	1
Household Size	31281	6.72	2.54	1	29
No. of children	31281	4.03	1.92	1	23
Rural	31281	0.62	0.48	0	1
<i>Province:</i>					
Central	31281	0.10	0.30	0	1
Copperbelt	31281	0.14	0.35	0	1
Eastern	31281	0.12	0.33	0	1
Luapula	31281	0.08	0.27	0	1
Lusaka	31281	0.16	0.37	0	1
Muchinga	31281	0.06	0.24	0	1
Northern	31281	0.09	0.29	0	1
North-Western	31281	0.12	0.33	0	1
Western	31281	0.07	0.25	0	1

Note: Statistics are calculated considering the individual sampling weights; Male, head of household sex, disabled, province and orphan are indicator variables. Rural is a dummy variable that indicates if the child lives in a rural area. Educational level dummies are the maximum level of education achieved by the household head. Household Size measures the number of household's members. No. of Children measures the number of children younger than 18 years in the household. Source: Own calculations based on LCMS 2015 data.

Child poverty in Zambia is high and largely depends on the approach adopted to identify poor children. Monetary poverty affects the highest percentage of children (45.4 percent) whereas 41.1 percent and 41.0 percent of children are poor according to the subjective and multidimensional poverty approaches, respectively. Despite the three measures giving similar percentages of poor children in Zambia, the differences in the children identified as poor by the three measures are evident. Figure 4 illustrates the extent of overlap in children identified as poor by monetary, multidimensional and subjective approaches.

Figure 3: OVERLAP IN MONETARY, MULTIDIMENSIONAL AND SUBJECTIVE POVERTY MEASURED FOR CHILDREN AGED 0 TO 17 YEARS



Note: Extreme Monetary Poverty is measured in absolute terms; Multidimensional Poverty is computed using a deprivation threshold of 3 dimensions; Subjective poverty considers a child as poor if the household is self-assessed as very poor. Source: Authors' calculations using Zambia LCMS (2015)

Despite the differences between the three measures in determining the poverty status of a child, 19.6 percent of children are jointly identified as poor.⁸ Moreover, a large portion of multidimensionally poor children also belongs to monetary and/or subjective poor households. As such, adopting a household-level subjective poverty approach would leave 40.2 percent of multidimensionally poor children unidentified as poor whereas the adoption of a monetary approach would leave 25.4 percent of multidimensional poor children unidentified. Moreover, the proportion of children that is identified as poor by only one of the measures

⁸Considering moderate measures of child poverty (absolute monetary poverty and moderate subjective poverty, and a threshold of multidimensional poverty set in $k = 2$ dimensions of deprivation, the overlap between the three measures increases largely (to 46.3 percent). However, using these poverty lines reduces the variability for the identification of the measures considering that only 8.7 percent of the children would not be poor in any case. See Appendix B.

is relatively low (7.7 percent monetary poor only, 5.5 percent multidimensionally poor only, and 9.6 percent subjectively poor only). These findings highlight that the three measures tend to overlap in identifying a core number of poor children. However, the overlap is not perfect. This is confirmed by positive yet moderate correlation coefficients linking children identified as poor by each measure (Table 2).

Table 2: CORRELATION BETWEEN MONETARY, MULTIDIMENSIONAL AND SUBJECTIVE POVERTY MEASURED FOR CHILDREN AGED 0 TO 17 YEARS, BY AREA OF RESIDENCE

		National			Rural			Urban		
		MP	MCP	SP	MP	MCP	SP	MP	MCP	SP
National	MP	1.000								
	MCP	0.4979*	1.000							
	SP	0.3701*	0.3359*	1.000						
Rural	MP				1.000					
	MCP				0.3433*	1.000				
	SP				0.2511*	0.2397*	1.000			
Urban	MP							1.000		
	MCP							0.4161*	1.000	
	SP							0.3596*	0.2518*	1.000

Note: MP: Extreme Monetary Poverty; MCP: Multidimensional Child Poverty ($k=3$); SP: Severe Subjective Poverty. Significance level: * $p < 0.01$. Source: Authors' calculations using Zambia LCMS (2015)

Poverty levels by area of residence often widely differ in magnitude (See Sahn and Stifel, 2003b).⁹ By disaggregating levels of association by the area of residence of children, the relationships between poverty measures is further explored. When comparing rural and urban areas, we observe only a slightly different pairwise correlation between subjective and monetary poverty measures. The difference in regions is larger between monetary and child multidimensional poverty. For all pairs observed, urban area scores larger correlation. However, the coefficients at both rural and urban levels are positive but lower than at the national level. The differing results suggest the need to go past national estimates for the analysis.

⁹In Zambia, multidimensional poverty affects 60 percent of children from the rural areas and 10 percent from urban areas. A similar division is observed when adopting a monetary approach to poverty, 81 percent and 25 percent of children from rural and urban areas are monetary poor, respectively Ministry of National Development Planning (2018).

4 Empirical Estimation

In this section, we empirically estimate the extent of the contribution of child characteristics to the probability of overlap between the different measures of child poverty. For this purpose, we explore how different characteristics of the children (age, gender, being disabled, being orphan, and the area of residence) and of their household (number of members in the household and the number of members that are younger than 18 years, and the gender and level of education achieved by the head of the household) affect the probability of observing children identified as poor according to the three poverty measures adopted. The extent and nature of poverty overlap experienced by children are considered. The estimated marginal effects results of the Multinomial Logit model are in Table 3. The reference category of comparison is non-being poor in either of the measures.

The probability of a perfect match between the three poverty measures decreases with the age of the child. While this pattern is maintained for the probability of a child being multidimensionally deprived and any of the other two measures, the probability of a child being identified as poor by subjective and monetary poverty measures (but not multidimensionally) increases with the age of the child. The gender of the child is not very significant to explain the overlaps between different child poverty measures. However, we observe that the gender significantly determines the probability of being subjectively and monetary poor, and subjectively and multidimensionally poor. In the first, being a boy is associated with a lower probability of being simultaneously monetary and subjectively poor (but not multidimensionally poor). In the second, the probability of being multidimensionally and subjectively poor is higher for boys than girls. Orphans are undoubtedly identified as poor by any of the three measures with higher probability than children with at least one parent alive. In fact, they face a lower probability of being non-poor. The disability status of the child is not significantly related to child poverty.

In terms of the household's characteristics, the relationship between the household's composition, in terms of size and number of children, and the probability of finding an overlap between the different poverty measures varies depending on the measures considered. The larger the household size, the lower the probability of a child being simultaneously identified as poor by the three measures. However, each additional child younger than 18 years old in the household increases the aforementioned probability. Therefore, the household composition is shown to be relevant to measure poverty independently of the approach. In the case of the monetary poverty measure, this is linked to income or expenditure being measured

Table 3: Multinomial Logit Estimates of the Effects of Child and Household's Characteristics on the Overlaps Between Child Poverty Measures for Children Aged 0 to 17 Years, Zambia

VARIABLES	(1) MP & MCP & SP	(2) MP & MCP	(3) MP & SP	(4) MCP & SP	(5) MP Only	(6) MCP Only	(7) SP Only	(8) Non-poor
Age	-0.0052*** (0.002)	-0.0071*** (0.002)	0.0090*** (0.002)	-0.0080*** (0.001)	0.0118*** (0.002)	-0.0128*** (0.001)	0.0073*** (0.002)	0.0049** (0.002)
Age-	0.0003*** (0.000)	0.0004*** (0.000)	-0.0006*** (0.000)	0.0004*** (0.000)	-0.0007*** (0.000)	0.0007*** (0.000)	-0.0004*** (0.000)	-0.0001 (0.000)
Squared	0.0075 (0.005)	0.0063 (0.004)	-0.0099** (0.004)	0.0075** (0.003)	-0.0049 (0.004)	-0.0014 (0.003)	0.0039 (0.005)	-0.009 (0.006)
Male	0.0543*** (0.018)	0.0086 (0.016)	0.0002 (0.012)	0.01 (0.010)	-0.0115 (0.016)	-0.0064 (0.014)	0.0318** (0.016)	-0.0870*** (0.023)
Orphan	0.0037 (0.027)	-0.022 (0.024)	0.002 (0.025)	-0.0187 (0.015)	0.011 (0.027)	-0.0283* (0.016)	-0.028 (0.032)	0.0802 (0.050)
Disabled	-0.0163*** (0.002)	0.0014 (0.002)	0.0092*** (0.002)	-0.0092*** (0.002)	0.0093*** (0.001)	-0.0051*** (0.002)	0.0006 (0.002)	0.0102*** (0.002)
No. of HH members	0.0271*** (0.003)	0.0058** (0.002)	-0.0047** (0.002)	-0.0026 (0.003)	0.0007 (0.002)	0.0003 (0.002)	-0.0096*** (0.003)	-0.0169*** (0.003)
No. Children <18 years in HH	-0.0521*** (0.007)	0.0226*** (0.006)	-0.0118** (0.005)	-0.0039 (0.004)	0.0292*** (0.006)	0.005 (0.005)	-0.0169*** (0.006)	0.0279*** (0.008)
Male HH head	-0.0890*** (0.011)	-0.0065 (0.008)	0.0174** (0.008)	0.0217*** (0.006)	0.0059 (0.008)	0.0025 (0.006)	0.0203** (0.010)	0.0277** (0.013)
HH head:	-0.1786*** (0.012)	-0.0303*** (0.009)	-0.0061 (0.008)	-0.0098* (0.006)	-0.0008 (0.009)	0.0152** (0.007)	0.0298*** (0.010)	0.1806*** (0.014)
Prim. Educ.	-0.3158*** (0.011)	-0.1206*** (0.009)	-0.0596*** (0.008)	-0.0451*** (0.005)	-0.0682*** (0.009)	-0.0188** (0.008)	-0.0358*** (0.011)	0.6639*** (0.016)
HH head:	0.1328*** (0.008)	0.0896*** (0.007)	-0.0063 (0.004)	0.0164*** (0.004)	0.0028 (0.004)	0.0142*** (0.004)	-0.0414*** (0.004)	-0.2081*** (0.005)
Higher Educ.								
Rural								
Observations	30,114	30,114	30,114	30,114	30,114	30,114	30,114	30,114

Note: The table reports marginal effects estimates from Multinomial Logit regression model calculated considering sampling weights. MP: Extreme Monetary Poverty; MCP: Multidimensional Child Poverty (k=3); SP: Severe Subjective Poverty. All regressions include province fixed effects. Robust Standard Errors are in parentheses. Significance level: *** p<0.01, ** p<0.05, * p<0.1.

at the household level and shared between members (more or less equally, depending on the equivalence scales used) to construct a per capita measure which is compared to the poverty line. For the multidimensional poverty measure, we expect that the distribution of the resources intra-household is linked to the household size and number of children. In the case of subjective poverty, the perception of poverty, when not linked to income availability or access to goods and services, may be directly associated with cultural aspects. In line with this idea, we observe that when the number of children in the household increases, the probability of being identified only as subjectively poor falls.

Moreover, the household's head education is a highly significant variable. The general trend is for a lower probability of a three-way overlap for household's heads with higher education compared to non-education or incomplete primary school. This is partially explained by the fact that the overall probability of being poor significantly decreases with the increased levels reached in this variable. A higher school educational level of the household head significantly reduces the probability of being poor in all the cases. A possible explanation is that higher educational levels usually lead to higher marginal returns to school and, thus, higher incomes, better knowledge of practices towards increasing child well-being, and better opinion and self-assessment of one's standard of living. However, for intermediate levels of education (primary or secondary) the probability of the joint identification of poor children through different poverty measures varies in its sign, depending on the overlap of measures evaluated. While for the perfect 3-measures overlap the sign is negative, we find differing and varied relationships in the other overlaps.

Last, living in a rural area increases the probability for children of being jointly identified as poor by the three measures of poverty compared to children living in urban areas. Moreover, the same pattern is observed for the other two-ways overlaps of multidimensional poverty and child poverty captured only by this measure. On the contrary, being subjectively poor only seems to be more of an urban phenomenon.

The differences observed in the overlaps and the characteristics of the children and their households give us the intuition that each of these overlaps are identifying different groups of children (with different characteristics). On the one hand, this may be associated to the limitations of monetary and subjective poverty measures to disentangle intra-household deprivations given their measurement at the household level. Moreover, the three measures might be capturing different aspects of child well-being.

5 Conclusions

Although differences exist between the three measures in determining the poverty status of a child, 19.6 percent of children are jointly identified as poor and there is a significant correlation between the measures.

Many individual and household characteristics such as age, gender, household composition, and level of education of the household's head significantly affect the probability of a perfect match between measures. However, the relationship of these variables differs depending on the nature of the overlap evaluated. These results support the literature that found that the different poverty measures capture different aspects of child well-being. Better understanding the differences between these measures is essential to correctly capture child poverty and move towards the realization of the development goals.

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Appendix

A *Data and Relevant Definitions*

Table A1: SAMPLE DESCRIPTION

	All children	0-4 years	5-13 years	14-17 years
<i>National</i>	31,472	6,384	18,223	6,865
<i>In Households</i>	10,198	4,853	8,286	5,041
<i>Urban</i>	13,130	2,515	7,403	3,212
<i>Rural</i>	18,342	3,869	10,820	3,653
<i>Province</i>				
<i>Central</i>	3,159	632	1,828	699
<i>Copperbelt</i>	3,308	665	1,903	740
<i>Eastern</i>	3,470	846	1,906	718
<i>Luapula</i>	3,261	717	1,822	722
<i>Lusaka</i>	3,082	495	1,881	706
<i>Muchinga</i>	2,731	474	1,697	560
<i>Northern</i>	3,135	628	1,823	684
<i>North-Western</i>	2,928	515	1,751	662
<i>Southern</i>	3,542	802	1,966	774
<i>Western</i>	2,856	610	1,646	600

Source: Authors' calculations using Zambia LCMS (2015)

Table A2: DIMENSIONS, INDICATORS AND THRESHOLDS OF DEPRIVATION FOR EACH INDICATOR

DIMENSIONS	INDICATORS	DEPRIVATION THRESHOLD
NUTRITION	<i>Infant and Young Child Feeding: Exclusive breast-feeding</i>	0-5 months: Child not exclusively breastfed.
	<i>Infant and Young Child Feeding: Meal Frequency</i>	6-59 months: Currently breastfeeding children: Child 6-8 months has not received a minimum of 2 complementary feedings a day; 9-23 months has not received at least 3 complementary feedings. Currently non-breastfeeding children: Child between 6-23 months has not received at least 4 feedings a day. 24-59 months: Child not having a minimum of four meals a day.
	<i>Weight for Height (Wasting)</i>	0-59 months: Child's weight-for-height/length Z-score is below minus two standard deviations (-2 SD) from the median of the WHO reference population, considered thin (wasted) and acutely malnourished.
HEALTH	<i>Full Immunization (BCG, 3 Polio, 3 DPT, Measles)</i>	0-59 months: Child has not received all basic vaccinations by the recommended date (Tuberculosis (BCG) by age of 12 months; child 12-59: has not received a vaccination against TB (BCG), and three doses of each of the following: Diphtheria; Pertussis; Tetanus / Hepatitis B / Haemophilus Influenzae type b (DPT-HepB-Hib). Additionally, they must be vaccinated against Polio (3) and a Measles, within the first twelve months from birth.

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Table A2 – *Continued from previous page*

DIMENSIONS	INDICATORS	DEPRIVATION THRESHOLD
CHILD PROTECTION	<i>Child Marriage/Cohabitation</i>	12-17 years: Child got married or is cohabiting with the partner, or ever married.
	<i>Child Labour</i>	5-15 years: Child younger than 15 years of age is engaged in any income generating activity or farming.
INFORMATION	<i>Availability of Information Devices</i>	0-17 years: Household does not report having at least one of the following information devices: TV, Radio, PC, phone, mobile phone.
EDUCATION	<i>Compulsory School Attendance</i>	7-13 years: Child of compulsory school age is not currently attending school.
	<i>Grade-for-Age</i>	7-17 years: Child is not attending at school age or attending school but 2 or more years behind the corresponding grade for the age.
	<i>Primary School Attainment</i>	14-17 years: Child beyond primary school age with no or incomplete primary education.
HOUSING	<i>Overcrowding</i>	0-17 years: Household has on average more than four people per occupied room (excluding bathrooms and toilets)
	<i>Housing Material (Floor and roof)</i>	0-17 years: Both roof and floor are made of natural materials, which are not considered permanent. Floor: mud, soil, sand, no floor; Roof: no roof, thatch/palm leaf/grass, mud, plastics.

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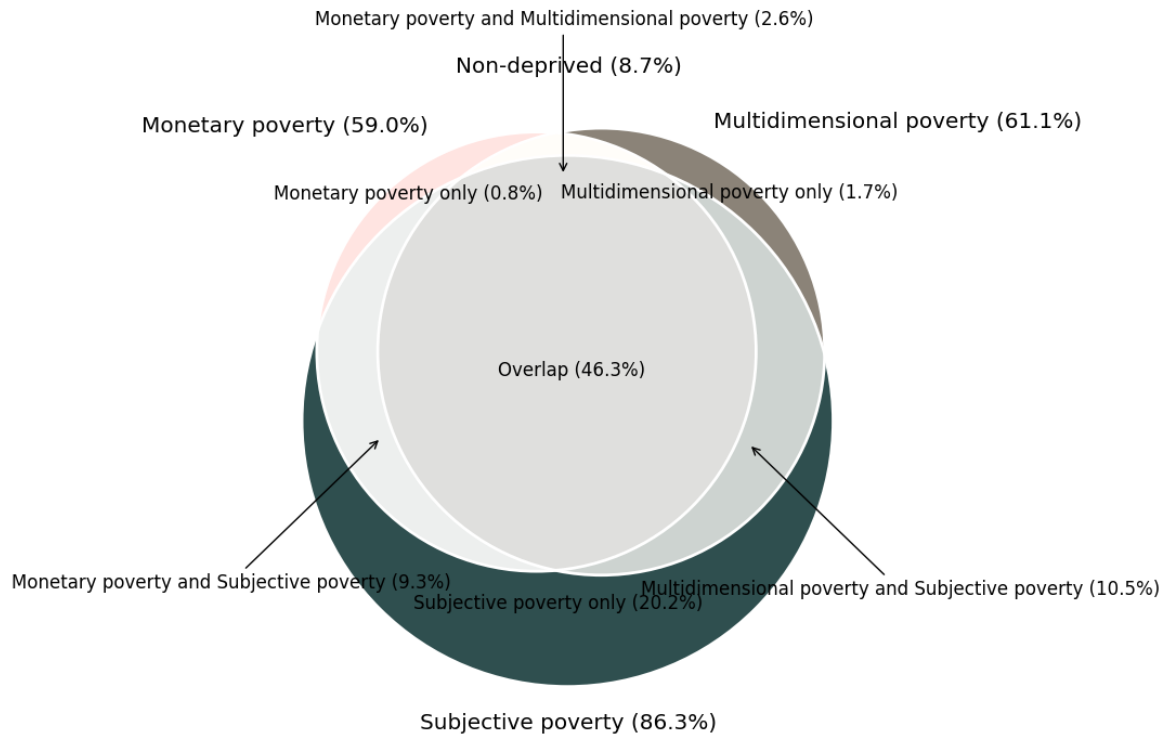
Table A2 – *Continued from previous page*

DIMENSIONS	INDICATORS	DEPRIVATION THRESHOLD
SANITATION	<i>Access to Improved Sanitation</i>	0-17 years: Household usually uses unimproved toilet facility: pit latrine without slab or open pit (Own, communal or from neighbour's/another household's), no facility, bush or field, bucket toilet/toilet/another container, other. Improved toilet facility: Flush toilet inside/outside the household (if flushed to piped sewer system, to pip latrine, to septic tank, or don't know), Pip latrine with slab (Own, Communal or from neighbour/another household), composting toilet, Aqua privy.
	<i>Garbage Disposal</i>	0-17 years: Household's garbage disposal is not refuse collected, or pit, or dumped in designated places.
WATER	<i>Drinking Water Source</i>	0-17 years: Household main source of drinking water is unimproved. Unimproved water sources: unprotected well, unprotected spring, surface water (river, dam lake ponds, stream, stream, canal, irrigation channel), tanker truck, cart with small tank, other. Also, deprived if main source is bottled water and the source of main non-drinking water is unimproved.
	<i>Water Treatment</i>	0-17 years: Unimproved water source is not treated or is not appropriately treated. Appropriate treatment method: boiling, adding bleach or chlorine, using a water filter, using solar disinfection.

Note: Shares computed using data corresponding to year 1998. Informality is defined using the legalistic definition. Source: Republic of Zambia (2018)

B *Estimates Robustness Checks*

Figure 4: OVERLAP IN MONETARY, MULTIDIMENSIONAL AND SUBJECTIVE POVERTY MEASURED FOR CHILDREN AGED 0 TO 17 YEARS



Note: Monetary Poverty is measured in absolute terms; Multidimensional Poverty is computed using a deprivation threshold of 2 dimensions; Subjective poverty considers a child as poor if the household is self-assessed as moderately poor or very poor. Source: Authors' calculations using Zambia LCMS (2015).

Table A3: Multinomial logit Estimates of the Effects of Child and Household's Characteristics on the Overlaps Between Child Poverty Measures for Children Aged 0 to 17 Years, Zambia

VARIABLES	(1) MP & MCP & SP	(2) MP & MCP	(3) MP & SP	(4) MCP & SP	(5) MP Only	(6) MCP Only	(7) SP Only	(8) Non-poor
Age	-0.0197*** (0.002)	-0.0020*** (0.001)	0.0281*** (0.003)	-0.0103*** (0.001)	0.0023*** (0.001)	-0.0014*** (0.000)	0.0045* (0.002)	-0.0015 (0.002)
Age- Squared	0.0011*** (0.000)	0.0001*** (0.000)	-0.0017*** (0.000)	0.0005*** (0.000)	-0.0001** (0.000)	0.0001*** (0.000)	-0.0002 (0.000)	0.0002 (0.000)
Male	0.0175*** (0.006)	0.0015 (0.002)	-0.0165** (0.006)	0.0003 (0.003)	0.0001 (0.002)	0.0007 (0.001)	-0.003 (0.006)	-0.0009 (0.004)
Orphan	0.0598** (0.022)	-0.0115 (0.008)	-0.0246 (0.021)	0.0196* (0.010)	0.0085 (0.005)	-0.0046 (0.004)	-0.0272 (0.022)	-0.0199 (0.015)
Disabled	-0.0296 (0.031)	-0.0094 (0.008)	0.0119 (0.039)	-0.0261* (0.014)	0.0186* (0.011)	-0.0056 (0.005)	-0.0725 (0.044)	0.1127*** (0.038)
No. of HH members	-0.0179*** (0.003)	-0.0001 (0.001)	0.0293*** (0.002)	-0.0104*** (0.002)	0.0020*** (0.001)	-0.0007* (0.000)	-0.0091*** (0.002)	0.0069*** (0.002)
No. Children <18 years in HH	0.0279*** (0.003)	0.0020 (0.001)	-0.0151*** (0.003)	0.0006 (0.002)	-0.0003 (0.001)	0.0000 (0.000)	-0.0079** (0.003)	-0.0073*** (0.002)
Male HH head	-0.0373*** (0.008)	0.0149*** (0.003)	0.0017 (0.008)	-0.006 (0.004)	0.0094** (0.004)	0.001 (0.001)	0.0015 (0.009)	0.0146** (0.006)
HH head:	-0.0728*** (0.012)	-0.0089** (0.004)	0.0436*** (0.012)	0.0127** (0.005)	-0.0159** (0.006)	-0.0051** (0.002)	0.0627*** (0.013)	-0.0163* (0.010)
Prim. Educ.	-0.2069*** (0.012)	-0.0118** (0.004)	0.0227* (0.013)	0.0142** (0.006)	-0.0131** (0.006)	-0.001 (0.003)	0.1574*** (0.013)	0.0385*** (0.010)
HH head:	-0.4605*** (0.012)	-0.0153 (0.005)	-0.1144*** (0.014)	-0.0248*** (0.006)	-0.0256*** (0.006)	0.0000 (0.004)	0.3513*** (0.018)	0.2893*** (0.016)
Higher Educ.	0.2341*** (0.007)	0.0133*** (0.003)	-0.0219*** (0.006)	0.0072** (0.003)	-0.0058*** (0.002)	-0.0005 (0.001)	-0.1555*** (0.005)	-0.0710*** (0.005)
Observations	30,159	30,159	30,159	30,159	30,159	30,159	30,159	30,159

Note: The table reports marginal effects estimates from Multinomial Logit regression model calculated considering sampling weights. MP: Moderate Monetary Poverty; MCP: Multidimensional Child Poverty (k=3); SP: Moderate Subjective Poverty. All regressions include province fixed effects. Robust Standard Errors are in parentheses. Significance level: *** p<0.01, ** p<0.05, * p<0.1.