WPS8426

Policy Research Working Paper 8426

Do Demographics Matter for African Child Poverty?

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WORLD BANK GROUP
Poverty and Equity Global Practice
May 2018

Policy Research Working Paper 8426

Abstract

The effect of demographics on poverty measurement based on per capita consumption is well known. The size and composition of the household can affect the well-being of everyone in the household, with respect to total consumption within that household. Failure to address this issue may often lead to an underestimation or overestimation of poverty, especially for children. Many studies have tried to address the issue, using the generic approach of equivalence scales. However, the choice of scale is controversial and may lead to comparability problems between countries because of the different demographic structures and choice of the pivot household for establishing the per capita poverty line. Based on the World Bank's African poverty database, this study estimates poverty rates for African children using the new international poverty line of $1.90 a day defined in terms of 2011 purchasing power parity. The equivalence scales approach (Food and Agriculture Organization/World Health Organization) is used with the adjustment suggested by Deaton after the identification of the pivot household, which is defined as the household whose per capita consumption is around the international poverty line. This study shows that taking account of demographics results in downward adjustments of child poverty, adult poverty, and child-adult poverty gaps. Moreover, breakdowns by country show that poverty may vary significantly depending on demographics, which may cause some reranking when comparing poverty between African countries. Finally, sensitivity analyses reveal that child poverty is not sensitive to the child discount factor, unlike adult poverty, but, overall, taking account of demographics is helpful for better identifying poor children.

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Do Demographics Matter for African Child Poverty?[*]

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Keywords: Africa, poverty measurement, equivalence scale, pivot household, demographics, child.

Jel Classification: C10, C13, D31, I30, I32, O55

[*] The authors would like to thank Abdelkrim Araar and Aly Sanoh for their review of earlier draft. This work was supported by the Belgium Poverty Reduction Partnership Program (BPRP) III, the Partnership for Economic Policy (PEP), which receives funding from the Department for International Development (DFID) of the United Kingdom (or UK Aid), and the Government of Canada through the International Development Research Centre (IDRC).

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1 Introduction

The effect of demographics on poverty measurement based on per capita consumption is well known through the literature (Coulter et al, 1992; Lanjouw and Ravallion, 1995). In fact, the size and the composition of the household can affect the well-being of everyone in the household, with respect to total consumption within that household. Failure to address this issue may often lead to an overestimation of global and regional poverty, especially for children. Many studies have tried to address the issue using the generic approach of equivalence scales (Klasen, 2000; Ray, 2000; Meenakshi and Ray, 2002; White and Masset, 2003; Streak et al, 2009). There has recently been a resurgence in the issue of demographics in global and regional poverty estimation. However, if the use of equivalence approaches is suggested to provide a more accurate measure of poverty, the global monitoring of poverty still mainly uses per capita consumption as the core measure of welfare.

In fact, adjustments by equivalence scales face an additional issue in terms of the actual significance of the international poverty line. This international line is determined by Chen and Ravallion (2010) as the mean of the national poverty lines for the 15 poorest countries in terms of consumption per capita. Most national poverty lines are established based on a reference household with a given size and composition. Even if the poverty line is for a single adult, it is not calibrated to single adults living alone (Ravallion, 2015). Once the basic caloric requirement of a single adult is determined, the food consumption structure that is used to derive the required food expenditure usually comes from an average food basket at the national level. The poverty line is then suitable for a single adult from a household having the same consumption structure as this national average. According to Deaton (2003), Deaton and Zaidi (2002), and Ravallion (2015), the use of this reference household as a pivot should be combined with the equivalence scales for more accurate estimates of poverty. The identification of such a household is much more difficult for the international poverty line, which is based on the average of the national reference households of 15 countries.

How can we measure global or regional poverty more accurately, especially among children? Are poverty comparisons between age groups and between countries appropriate given the large demographic disparities observed? Most studies on child poverty focus on one or few countries (Ray, 2000; Streak et al, 2009), without addressing the issue from a regional or a global perspective. Using household surveys collected during 1995-2005 from 73 developing countries, Batana et al (2013) found that, when conservative estimates of economies of scales and discount factors are used instead of the per capita approach, global poverty may dramatically fall while child-adult gaps are reduced. Other studies with similar results include Olinto et al (2013) and Evans and Palacios (2016). More recently, Newhouse et al (2017) present new estimates of child poverty across the developing world based on the new international poverty line of $1.90 a day in terms of 2011 purchasing power parity (PPP), and using the World Bank's Global Micro Database (GMD), which contains micro-data from surveys collected between 2009 and 2014 in 89 developing countries. Various equivalence scales are considered based on the commonly expression used, as introduced by Culter and Katz (1992), which is appropriate to perform the analysis of poverty sensitivity according to two parameters (scale factor and child discount factor). Unlike previous studies, Newhouse et al (2017) adjust the poverty line as suggested by Ravallion (2015). They find that poverty rates for children remain significantly greater than adult poverty rates even when considering several alternative equivalence scales.

Do the Newhouse et al (2017) findings remain robust when considering Africa only, where households tend to be larger and contain a large share of children? That is what this study aims to investigate, using the World Bank's African poverty database including the most recent survey in 35 African countries over the period 2007-2012, which accounts for around 75 percent of the total population of Sub-Saharan Africa. This will be done using the equivalence scales and adjustment method suggested by Deaton (2003), Deaton and Zaidi (2002) and Ravallion (2015). Even if the choice of a pivot household different from a single adult household can mitigate the methodological bias caused by demographics in poverty measurement, there is no consensus rule to guide the choice of a particular equivalence scale method (Coulter et al, 1992; Deaton, 2003;

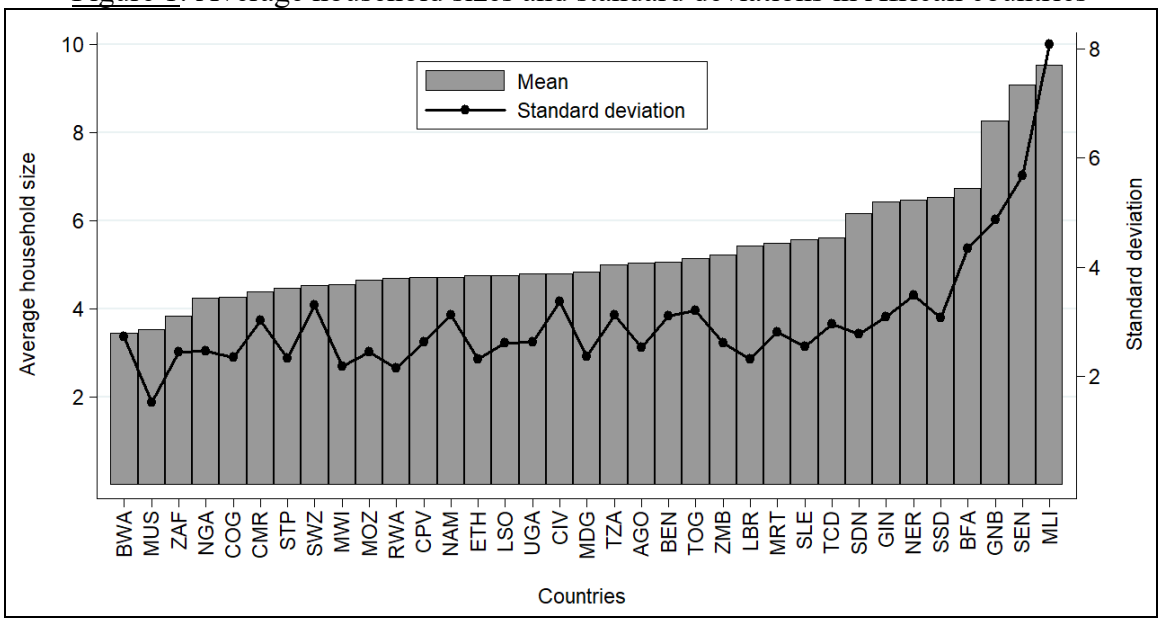
Deaton and Zaidi, 2002). Moreover, even when a method is adopted, the equivalence scales are not easily comparable between countries insofar as there is no certainty that the needs of individual households, in relation with their size and composition, are identical in all countries. Indeed, Lancaster et al. (1999) find that equivalence scales, while varying according to child age groups, also differ according to countries. The same result is obtained by Duclos and Mercader-Prats (1999), who compare Spain and the United Kingdom. In this situation, some authors (De Vos and Zaidi, 1997; Streak et al, 2009) advise considering several definitions of equivalence scales to analyze the sensitivity of poverty measurement. Two equivalence scales are considered, namely the FAO/WHO equivalence scales adopted by Batana et al (2013), and the square root equivalence scales. The former takes account of the size and composition of households while the latter incorporates only size effects. According to Ray (2000) and Meenakshi and Ray (2002), the square root method may be suitable for countries where large families comprise relatively many children (for instance developed countries), since the effects of the size and composition of households tend to be linked. It is different for most developing countries where, with the existence of extended and polynuclear families, a household may include many adults. The study will also allow to analyze to what extent comparisons between countries are affected by the selected approach. Indeed, as pointed out by Coulter et al (1992), choosing different equivalence scales may affect not only the level of poverty of a country or a group of individuals, but also the rankings between groups or countries. The study will finally investigate the sensitivity of poverty measurement to demographics and to several alternative equivalence scales.

The next section describes current demographics in African countries, as well as past and future trends. The third section describes the methodological approach used to adjust poverty estimates to account for demographics. The fourth section presents the main results including comparisons between various poverty estimates and some sensitivity analyses. Section five concludes the paper.

2 Main demographic features in Africa

Demographics are not homogeneous in Africa since there are significant disparities between and within countries. There are countries with large household sizes, including Mali, Senegal, and Guinea-Bissau with more than 8 household members on average, while countries such as Botswana, Mauritius and South Africa appear to be smallest, with fewer than 4 members on average (Figure 1). In all, the average household size varies from 3.5 to 9.5, which matters for the methodological choice for poverty measurement, especially when comparing poverty between various age groups or between countries. We also note significant variation within countries, as shown by the high standard deviations. Since most poverty lines are established based on a reference household with a given size and composition, when the per capita approach is used, poverty may be underestimated for households that are smaller or have a larger share of children than the reference household, and overestimated for larger households or households with proportionally fewer children.

Figure 1: Average household sizes and standard deviations in African countries

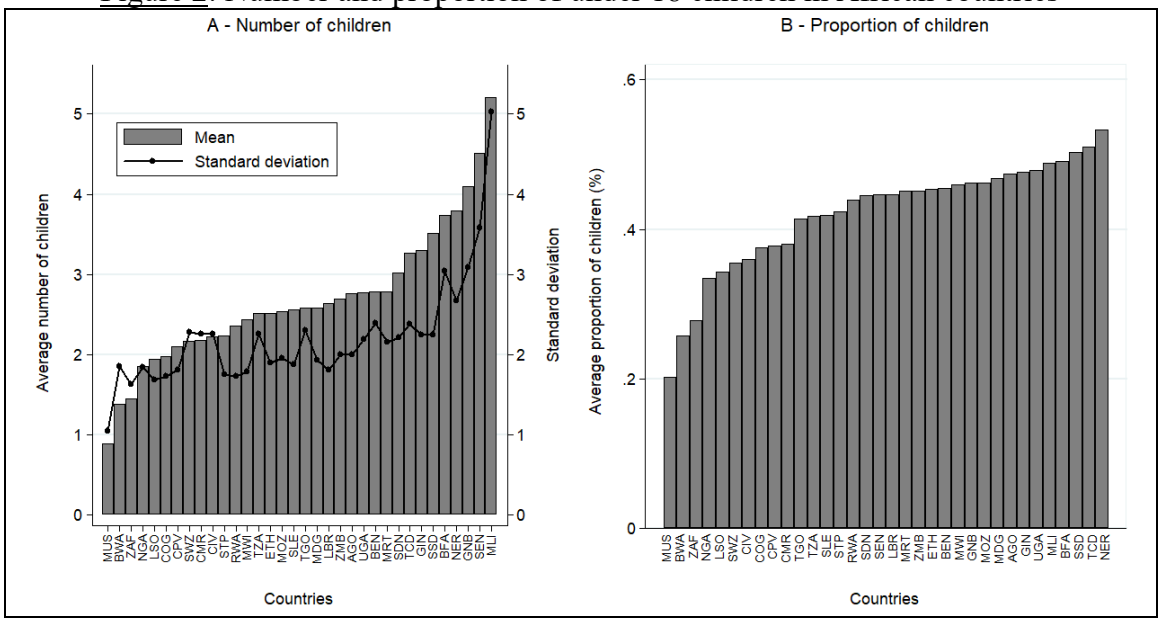


Source: World Bank's African Poverty Database.

Moreover, the composition of the household, as captured by the average number and proportion of children, varies significantly between countries as shown in Figure 2. The

Part A of the figure reveals large disparities between countries, with the average number of under 18 years children varying from just under 1 (Mauritius) to more than 5 (Mali). The relatively high standard deviations indicate significant variations within countries even for those with lowest average numbers of children. The share of children in the total population ranges from about 20 percent in some countries such as Mauritius to more than 50 percent in Chad, Niger, and South Sudan (see Part B of Figure 2). In fact, countries with small household sizes tend also to have the highest average age, which does not seem to be true for the largest household size countries.

Figure 2: Number and proportion of under 18 children in African countries

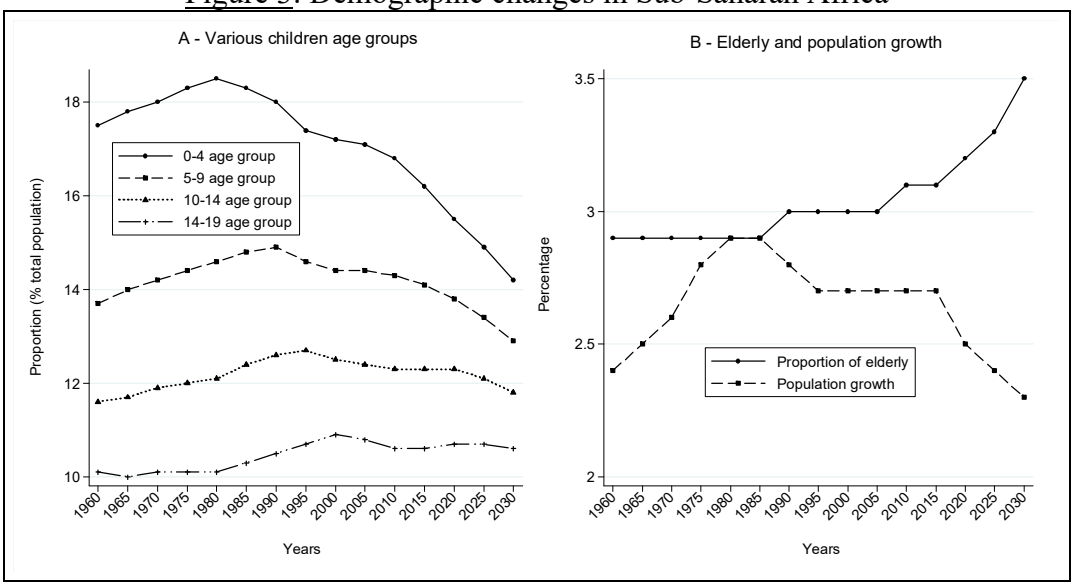


Source: World Bank's African Poverty Database.

The demographic transition results in population growth and changes in the age structure of the population. Since people's economic needs and contributions vary depending on the life cycle, demographic change may have effects on economic performance (Bloom and Canning, 2004). For instance, large youth and elderly cohorts tend to be associated with slow pace of economic growth unlike large working-age cohorts. Moreover, given the links with poverty measures, demographic change may particularly affect estimates of the evolution of these rates, which may be overestimated if the equivalence scale leads to an overestimation of poverty rates and gaps in large and child-intensive households.

Some African countries also seem to be experiencing some demographic transition. As shown in Figure 3, the proportion of individuals under 20 years has increased since the 1960s to reach a peak during the 1980s and 1990s, before experiencing a gradual decline. This decline is mainly due to change in the number of children under 10. For example, it is expected that the proportion of under five will represent only 14 percent in 2030 against about 18 percent in 1960. This decrease was also observed for the age group of 5 to 9 years. In contrast, it is rather observed a very slight increase for older children (10 to 19 years). Conversely, the proportion of elderly is expected to rise by more than one percentage point, from less than 2.5 percent to just over 3.5 percent between 1960 and 2030. These trends coincide with an increase in population growth rate since 1960, followed by a decline from 1980. In total, it is expected that the proportion of working age population (here 20 to 64 age group) will increase from 44 percent to 47 percent, which represents a certain demographic dividend.

Figure 3: Demographic changes in Sub-Saharan Africa



Source: World Bank: Health Nutrition and population Statistics.

Data to conduct a similar analysis of the evolution of household sizes were not available but, with declining fertility rates, these will be trending downwards, although likely at rates that differ from country to country. Again, this could introduce biases in studies on the evolution of poverty, and cross-country variations therein, depending on the choice of equivalence scale.

3 Methodology

Let's consider, for a given household, the adult equivalent (AE) structure as follows:

$$N^{eq} = \left[\sum_{i=1}^{n_a} \alpha_i + \sum_{j=1}^{n_c} \gamma_j \right]^{\theta} . \quad (1)$$

In this equation, i stands for each additional adult in the household, while j represents each child. The parameters α_i and γ_j are then the relative costs respectively for an adult i and for a child j of the household, with α equal one for the first adult. These relative costs generally depend on a set of social and demographic characteristics such as age and gender. The variables n_a and n_c represent respectively the number of adults and the number of children in the household. The parameter θ is the size-elasticity which captures the economies of scale in the household. The per capita approach which is often used for poverty assessment studies in developing countries corresponds to the case where α_i, γ_j and θ are all equal to one. But in assuming that economies of scale exist in the household, many equivalence scales can be derived from this general formula. Two equivalence methods are considered here, namely the FAO/WHO approach and the square root approach. In the first case, α_i and γ_j will be provided by the required calories intake for each adult and each child regarding their age and sex. In the second case, α_i and γ_j are set to one, while θ is equal to 0.5. Equation (1) becomes:

$$N^{eq} = \left[n_a + n_c \right]^{0.5} \quad (2)$$

As suggested by Deaton (2003), Deaton and Zaidi (2002) and recently by Ravallion (2015), a straightforward way to adjust consumption by the number of adult equivalents is to select a reference household as "pivot", such that poverty in households with the same demographics remains unaffected by changes in the parameters. This adjustment may be done through two equivalent procedures. The first one is to reflect information on the "pivot" in the equivalence scale such that the expenditure per AE is unchanged for the "pivot" households. The second procedure is to keep the usual expenditure per AE and to use information on the "pivot" rather to alter the poverty line of each household. In that case, the poverty line will be changed for "pivot" households in the same proportion as

the expenditure per AE, leaving unchanged the poverty rate for them as compared with the poverty rate from the per capita approach. Unlike Newhouse et al (2017) who opted for adjustment by the poverty line following the approach proposed by Ravallion (2015), this study considers rather the first procedure based on the alteration of the expenditure per AE. Let N_{ref} and N_{ref}^{Eq} be respectively the household size and the number of AE for the reference household, then $y*$, the scaled version of the expenditure per AE for any household, could be expressed as follows:

$$y* = y_{AE}\frac{N_{ref}^{Eq}}{N_{ref}} = \frac{y}{N^{Eq}}\frac{N_{ref}^{Eq}}{N_{ref}}, \quad (3)$$

where y is the total household expenditure, while y_{AE} is the usual expenditure per AE. Then, the expenditure per AE will be the same as the expenditure per capita, while poverty will remain unchanged for the "pivot" households. A crucial question is determining the demographics of the reference household. Given the way the international poverty line was derived, there is no dedicated theoretical method to determine the pivot or reference household. In practice, the choice of a specific method is based on value judgments. This led this study to explore two approaches.

The first approach is to define the "pivot" as the household whose average caloric requirements are around 2,100 calories.[1] The analysis of the distribution in terms of demographics of a sample of households whose caloric needs are around this figure allows to characterize the "pivot" as households typically comprising three members, two adults and one under-five child. The modal number of adults and children are chosen among households with average caloric requirements between 2090 and 2110 calories.

The second approach, based on Ravallion's (2015) suggestion, rather considers households whose per capita consumption is around the international poverty line. This time, the modal numbers of adults and children are determined among households whose per capita consumption is between 1.85 and 1.95. The distribution analysis leads to

[1] The caloric needs of 2,100 calories per person per day appears to be the most common base to derive the international poverty line (Ravallion, Chen and Sangraula, 2008).

defining as "pivot" a household of five members, two adults and three children (one under-five years child, one child between five and nine, and one over nine child). This second approach has been retained for poverty estimation.

To perform sensitivity analyses, Equation (1) could be written in accordance with the formulation of Cutler and Katz (1992) as follows:

$$N^{eq} = \left(n_a + \alpha n_c\right)^{\theta} \quad (4)$$

In this case, the effect of the household size is captured by θ while the effect of the household composition is captured by a single discount factor α.

The study is based on data from the World Bank's African Database. Only surveys over the period 2007-2012 are considered, which represents 35 African countries and accounts for around 75 percent of the total population of Sub-Saharan Africa. The main variables include household consumption and other socioeconomic and demographic characteristics of households.

4 Results

4.1 Poverty estimates and age group comparisons

Table 1 shows initial and adjusted poverty rates in Africa by various age groups. Poverty is based on the international poverty line ($1.90 a day, 2011 PPP). With the initial poverty based on the per capita approach, there are some statistically significant differences between various age groups of children, as well as between children and adults. In fact, the poverty incidence appears to be higher for under-five children, followed by the poverty incidence for children aged 5 to 9 years. All together, all under 18 children have a poverty incidence of 50.4 percent, which is higher than that of adults by 11.4 percentage points. When poverty is adjusted using the FAO/WHO equivalence scale, gaps between groups of children disappear, while the difference between children and adults is reduce to 6.7 percentage points. A similar pattern is observed for the square-root equivalence scale with somewhat lower poverty rates.

Table 1: Poverty rates in Africa by age group ($1.90 a day, 2011 PPP)

Age groups	Per capita approach	FAO/WHO equivalence scale	Square-root equivalence scale
0-4	52.8	46.4	43.8
5-9	50.1	46.6	43.0
10-17	48.8	46.8	40.2
0-17	50.4	46.6	42.1
+18	39.0	39.9	37.0
All	44.5	43.2	39.5

Source: World Bank's African Poverty Database

Tables 2 and 3 show the distribution of poverty among adults and children according to respectively the number of children in the household and the household size. In the per capita approach, poverty increases naturally with the number of children in the household. The same trend may be observed in the case of the FAO/WHO equivalence scale, except that its slope is less marked. Importantly, the results show that proper accounting for economies of scale tends to increase the poverty rate of children in households with fewer than three children, while it reduces it in those with three or more children. As a result, the poverty gap according to the number of children decreases. The adult poverty distribution follows the same pattern. This in turn leads to the reduction of poverty gaps between the different categories of households. It appears also that, with households with more than five children, poverty tends to decrease. The same patterns may be observed when poverty is broken down by household size.

Table 2: Poverty rates for children and adults by number of children in household

Number of children	Per capita approach		FAO/WHO equivalence scale		Square-root equivalence scale	
	Children (0-17)	***Adults (+18)***	***Children (0-17)***	***Adults (+18)***	***Children (0-17)***	***Adults (+18)***
0 child	-	16.7	-	26.5	-	30.2
1 child	24.2	26.4	33.0	34.0	36.8	34.6
2 children	36.2	37.2	39.6	40.0	40.8	38.4
3 children	46.0	45.9	45.2	44.9	43.7	41.2
4 children	52.5	51.3	48.3	47.1	44.9	41.9
5 children	58.9	57.5	52.0	50.6	45.8	42.6
6 children	63.2	60.9	51.4	48.6	38.9	34.8

Source: World Bank's African Poverty Database

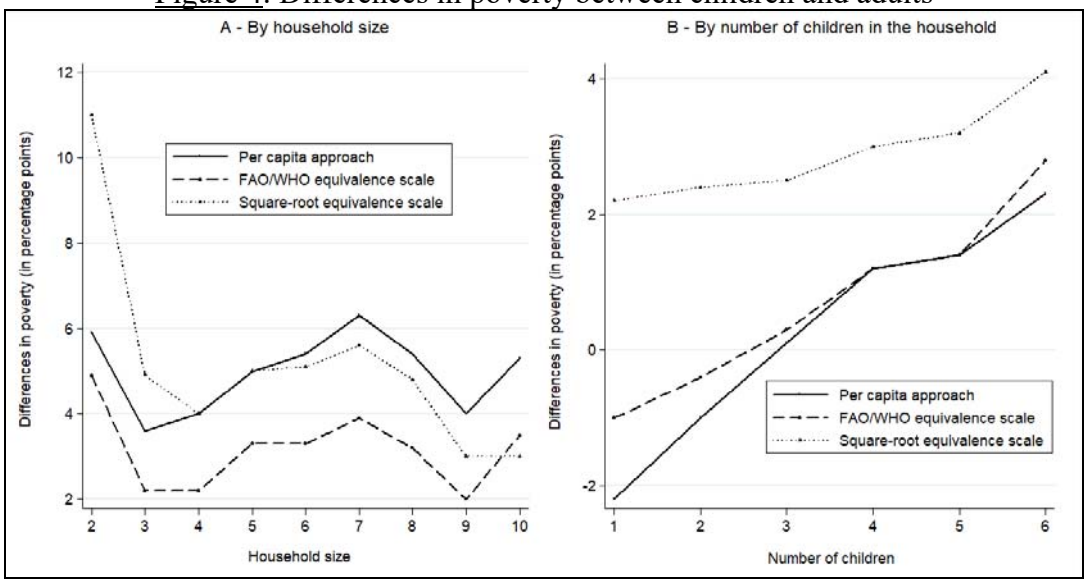
Table 3: Poverty rates for children and adults by household size

Household size	Per capita approach		FAO/WHO equivalence scale		Square-root equivalence scale	
	Children (0-17)	***Adults (+18)***	***Children (0-17)***	***Adults (+18)***	***Children (0-17)***	***Adults (+18)***
1 member	5.4	5	16.7	15.9	36.9	28.5
2 members	18.8	12.9	29.6	24.7	43	32
3 members	27.1	23.5	35.4	33.2	42.2	37.3
4 members	36.9	32.9	40.2	38	43.1	39.1
5 members	45.1	40.1	44.8	41.5	45.1	40.1
6 members	51.2	45.8	48.4	45.1	45.7	40.6
7 members	54.6	48.3	49.5	45.6	44.3	38.7
8 members	58.2	52.8	51.5	48.3	44.2	39.4
9 members	59.8	55.8	52.3	50.3	43.1	40.1
10 or more	60.6	55.3	48.1	44.6	32.4	29.4

Source: World Bank's African Poverty Database

The difference in poverty between children and adults may vary depending on the number of children in the household or the size of the household (see Figure 4). When considering the per capita approach, the gap between children and adults is about 6 percentage points for households with two members. It is reduced to less than 4 for households with 3 members, but gradually increases to a little more than 6 percentage points for households with 7 members. When poverty is adjusted using the FAO/WHO equivalence scale, the distribution of poverty according to the household size keeps the same pattern. However, the gap is reduced, varying only between 2 and 4 percentage points for households with 3 or more members. With the square-root equivalence scale, the children-adults gap follows a trend closer to those of the per capita approach for households with 3 members or more, probably given that both approaches do not take account of the household composition. The breakdown by the number of children shows a growing trend of children-adults differences as the number of children increases, regardless of the approach retained. If, for households with 2 or fewer children, adult poverty appears somewhat higher than that of children according to the FAO/WHO equivalence and per capita approaches, the poverty rates of the two groups become similar for households with exactly 3 children. The gap becomes unfavorable for children for households with more than 3 members.

Figure 4: Differences in poverty between children and adults



Source: World Bank's African Poverty Database.

Table 4 presents changes in poverty as a function of the share of children in the household instead of the number of children. The results show as expected that poverty rates are higher for households with higher proportions of children. As in the previous tables, the use of the equivalence approach reduces poverty rates significantly for households with high youth dependency. For both children and adults, poverty decreases on average by more than 10 percentage points when children account for half or more of the household size.

Table 4: Poverty rates for children and adults by household size

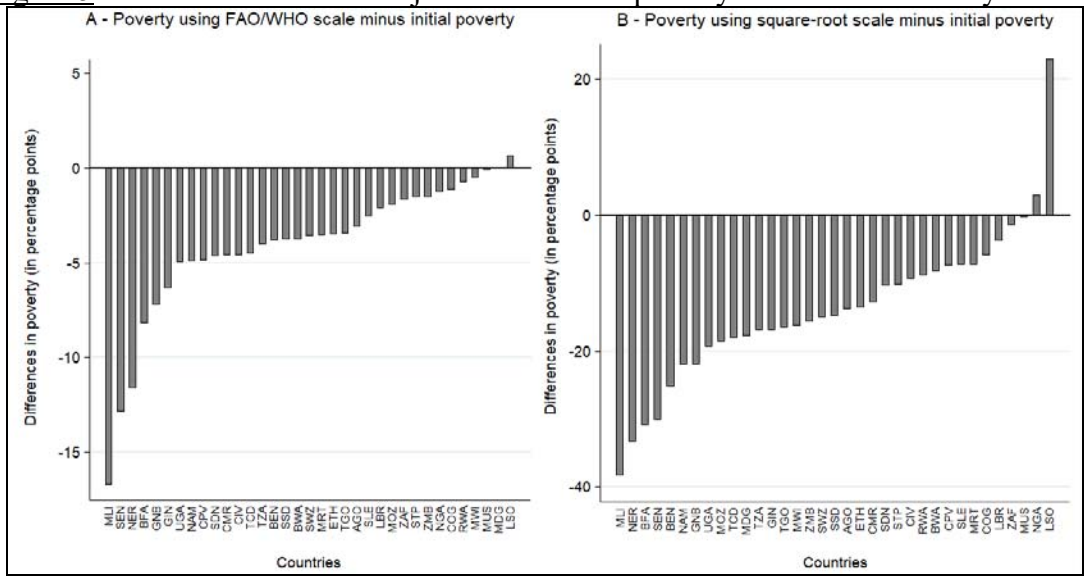
Share of children (%)	**Proportion of households (%)**	**Per capita approach**			**FAO/WHO equivalence scale**		
		Children (0-17)	***Adults (+18)***	***Difference***	***Children (0-17)***	***Adults (+18)***	***Difference***
[0 - 30]	7	40.7	43.3	-2.6	38	41.5	-3.4
]30 - 40]	9	44.5	44.6	-0.1	41.6	41.7	-0.1
]40 - 50]	19	50	49.7	0.3	43	42.7	0.3
]50 - 60]	9	56.6	56.5	0.1	45	44.9	0.1
]60 - 70]	33	63.6	63.4	0.2	53.6	53.5	0.1
]70 - 100]	23	65.2	65.2	0	53.8	53.8	0

Source: World Bank's African Poverty Database

4.2 Poverty estimates and comparisons between countries

The poverty incidences for each country using the two approaches (FAO/WHO, square-root), are compared with the initial per capita approach through Figure 5. The figure suggests that the adjustment resulted in a lower poverty rate for children in almost all countries. The most important decreases were recorded in countries with the highest average household sizes and relatively high child shares. With the FAO/WHO equivalence scale, Mali experienced a reduction of more than 16 percentage points, while Senegal and Niger followed with declines of more than 10 percentage points. In contrast, countries such as Mauritius, Madagascar and Malawi showed only a marginal reduction, while Lesotho experienced rather a slight increase in children poverty. These variations appear much more pronounced with the square-root scale. Adjustment may therefore change country poverty rankings for children resulting from the per capita approach.

Figure 5: Differences between adjusted and initial poverty rates for children by country

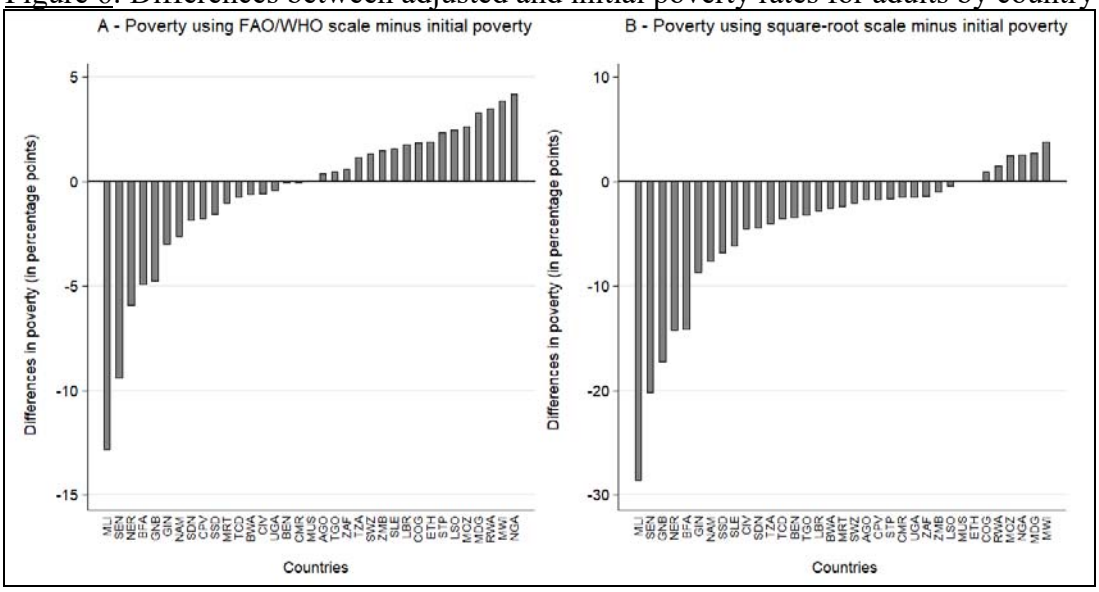


Source: World Bank's African Poverty Database.

The direction of changes in adult poverty is not as clear as for children. While with the FAO/WHO adjustment, almost half of the countries see adult poverty declining, the other half shows some increase (Figure 6). As previously, Mali experiences the largest drop with just over 12 percentage points, followed by Senegal with just under 10 percentage points. Other countries where the decline is also relatively significant are Niger and

Burkina Faso, with a reduction around 5 percentage points. On the other hand, Nigeria, Malawi and Rwanda record the highest increase, even though the latter remains relatively low. Given the trend observed among children, this dynamic of increasing poverty among adults is likely to reduce poverty gaps between children and adults in these countries.

Figure 6: Differences between adjusted and initial poverty rates for adults by country

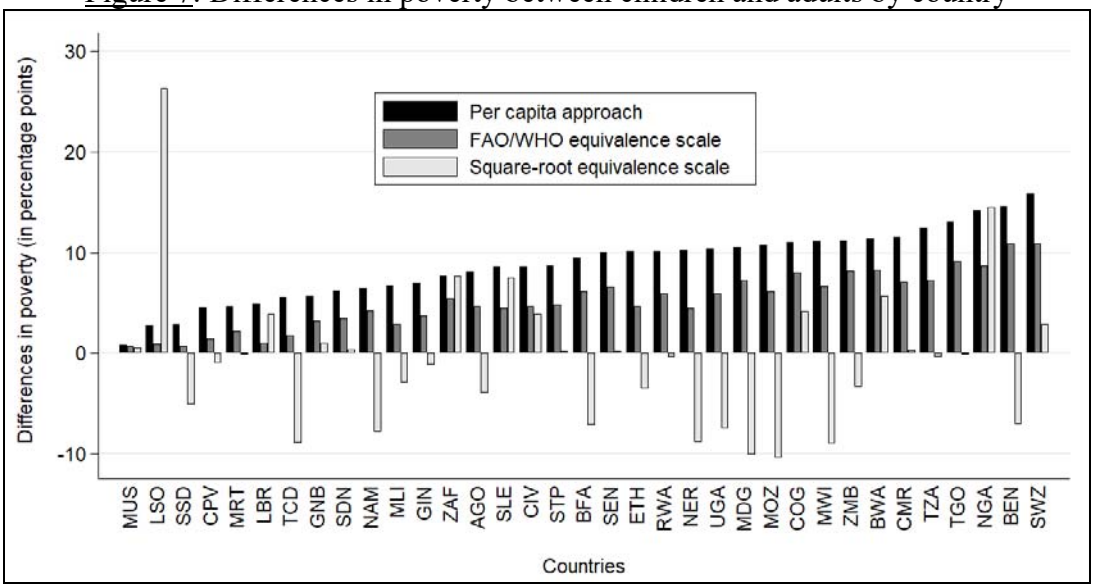


Source: World Bank's African Poverty Database.

With the per capita approach, child-adult poverty gaps are positive for all countries, meaning that poverty is everywhere more important for children (see Figure 7). However, these gaps expressed in percentage points vary importantly from a country to another, and may also depend on initial poverty levels, especially when they are very low. For example, Mauritius, with poverty rates of 1.2 percent among children and 0.3 percent among adults, shows a marginal difference of almost 1 percentage point, while Swaziland experiences the highest difference with around 15 percentage points. When the FAO/WHO equivalence scale is used, the gaps are reduced by more than half in 9 countries (Cabo Verde, Chad, Ethiopia, Lesotho, Liberia, Mali, Mauritania, Niger, and South Sudan) of the 35 countries in the sample. Liberia, Lesotho, and South Sudan see the gap reduced at less than 1 percentage point. The use of the square-root equivalence scale produces results that do not appear consistent. In fact, with this kind of adjustment,

adult poverty becomes higher than child poverty in almost half of the countries in the sample.

Figure 7: Differences in poverty between children and adults by country



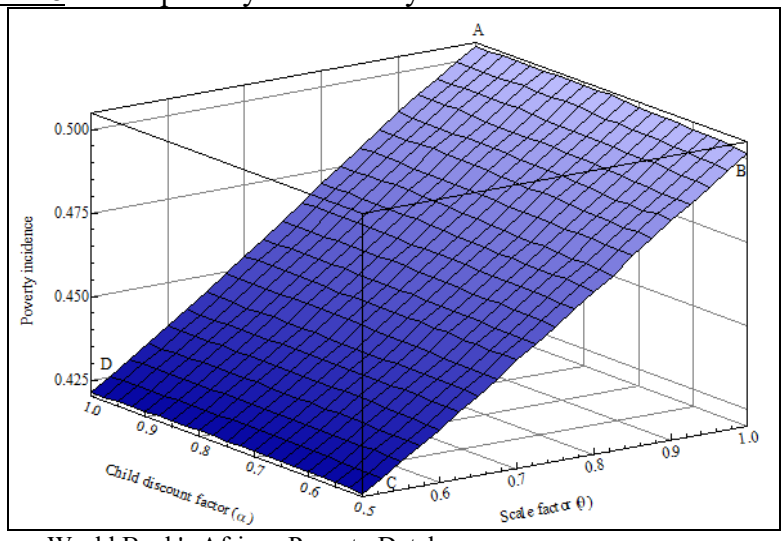
Source: World Bank's African Poverty Database.

4.3 Sensitivity analysis

The sensitivity analysis is performed by addressing change incurred in poverty measurement based on the child discount factor (α) and the scale factor (θ) and using the expression in Equation (4). Both factors capture the respective effects of household composition and size. The smaller is θ, the greater is the effect of the size in terms of economies of scale. Similarly, small values of α intensify the effect of household composition in particular when the household includes many children. Figure 8 presents child poverty in African countries as a function of the two factors. Point A in the figure represents a situation where the per capita poverty is measured. Point B is rather a situation where poverty is estimated under the assumptions that the child discount factor is equal to 0.5, while the scale factor is 1, denoting an absence of economies of scale. Point C corresponds to the incidence of poverty when both, child and scale factors, are assumed to be equal to 0.5. Finally, point D is simply the poverty adjusted using the square-root equivalence scale. It appears that child poverty is not very sensitive to the choice of child discount factor, since it changes only marginally when this factor is varied

from 0.5 to 1 all things equal otherwise. On the other hand, child poverty is sensitive to the variation of the scale factor and may vary by about 10 percentage points when the scale factor is varied from 0.5 to 1.

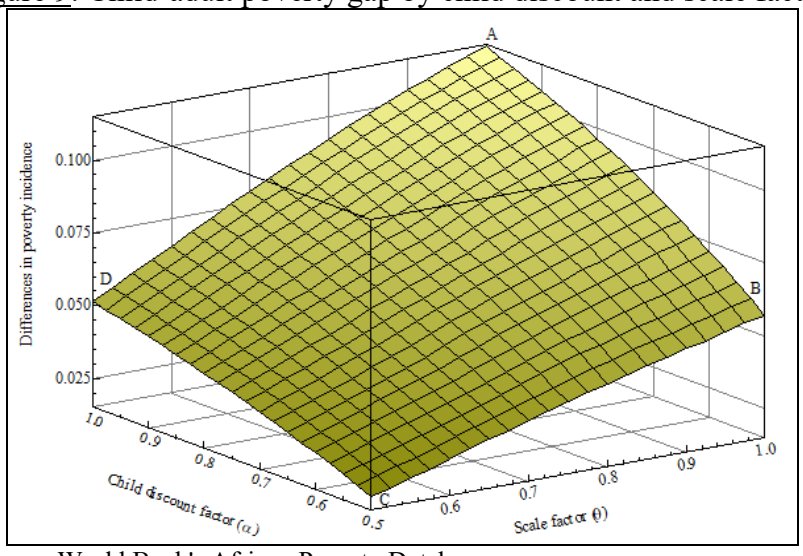
Figure 8: Child poverty in Africa by child discount and scale factors



Source: World Bank's African Poverty Database.

The child-adult poverty gap appears to be sensitive to the two factors. It is at its peak when the per capita approach is used to measured poverty, with a value of more than 11 percentage points (Figure 9). On the other hand, the gap is at its lowest level when the two factors are equal to 0.5, with a little less than 2 percentage points.

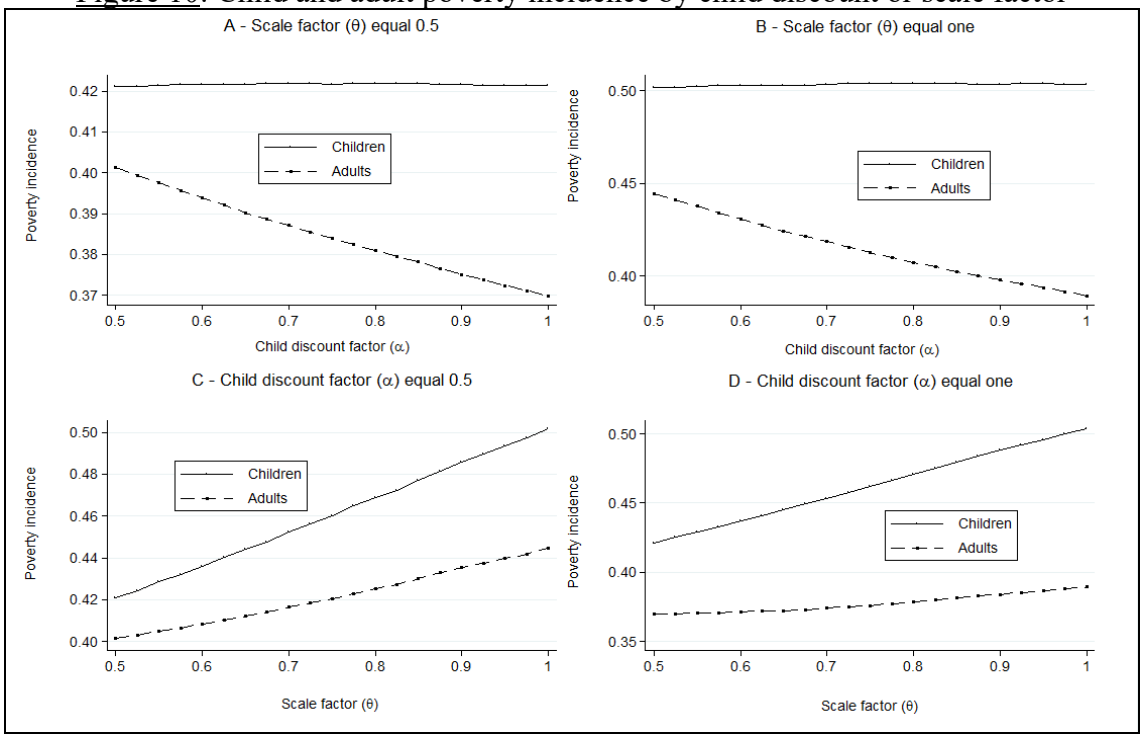
Figure 9: Child-adult poverty gap by child discount and scale factors



Source: World Bank's African Poverty Database.

The sensitivity of the gap partly reflects the sensitivity of adult poverty to the child discount factor, unlike child poverty. Indeed, when the scale factor is set to 0.5 or 1, and the child discount factor is varied, Figure 10 (Parts A and B) shows that the adult poverty varies as a function of the effect of household composition. When this effect increases, meaning that α decreases, adult poverty is adjusted downward up to a maximum between 3 and 5 percentage points depending on the level of the scale factor. The situation is different from child poverty, which remains almost unchanged. When the situation is reversed by setting the child discount factor to 0.5 or 1 while varying the scale factor, there is a sensitivity of poverty for both age groups. As shown by Parts C and D in the Figure 10, child poverty may vary by 8 percentage points while adult poverty variation can reach a little more than 4 percentage points.

Figure 10: Child and adult poverty incidence by child discount or scale factor



Source: World Bank's African Poverty Database.

5 Conclusion

Demographics can matter for estimates of African child poverty for several reasons. First, the international poverty line is a threshold actually based on the needs of an adult from an unspecified reference household. The poverty status of a given household may therefore be biased when its demographic characteristics are different from that of the reference household if an adequate equivalence scale is not adopted. Moreover, comparisons among African countries may not be valid, given their significant demographic disparities.

The accuracy of poverty estimates can be further challenged when considering the welfare of an individual of a specific age group, such as children. Indeed, there is a natural correlation between the number of children and poverty within the household, since children usually contribute less than adults to the income generation process in the household. Thereby, a household consisting mainly of children will tend to have a relatively high level of poverty.

In addition to this correlation, poverty measurement itself may be affected by demographics, as the needs of the household vary according to its size and composition. It is then necessary not only to identify the plausible reference or pivot household, but also to adjust household consumption by taking account of both the relative cost of children and the economies scale. Failing to properly deal with this issue may bias poverty estimates, especially for children in Africa where household size and composition vary significantly from a household to another, as well as from a country to another.

The results of the study show that adjustments by the equivalence scale approach, using a hypothetical pivot household, do not eliminate child-adult poverty gaps at the regional level. However, the gaps may be significantly reduced, especially at the country level. Child-adult poverty gaps narrowed at less than 1 percentage for three countries, while they are reduced by more than half for several countries. Sensitivity analysis shows that

the gap declines for low levels of the relative cost of children and high levels of economies of scale.

References

Batana, Y., Bussolo, M. and J. Cockburn (2013), "Global Extreme Poverty Rates for Children, Adults and the Elderly," *Economics Letters*, 120: 405-407.

Bloom, D. E. and D. Canning (2004), "Global Demographic Change: Dimensions and Economic Significance," Working Paper 10817, Cambridge: NBER.

Chen, S. and M. Ravallion (2010), "The Developing World Is Poorer Than We Thought, but No Less Successful in the Fight Against Poverty," *The Quarterly Journal of Economics*, 125: 1577-1625.

Coulter, F., Cowell, F. and S. Jenkins (1992), "Differences in needs and assessment of income distributions," *Bulletin of Economic Research*, 44: 77-124.

Cutler, D. M. and L. F. Katz (1992), "Rising Inequality? Changes in the Distribution of Income and Consumption in the 1980s," NBER Working Papers Series, Working Paper No 3964

Deaton, A. (2003), "Household Surveys, Consumption, and the Measurement of Poverty," *Economic Systems Research*, 15: 135-159.

Deaton, A. and S. Zaidi (2002), "Guidelines for construction consumption aggregates for welfare analysis," Living Standards Measurement Study Working Paper 1135, Washington DC: World Bank.

De Vos, K. and M. A. Zaidi (1997), "Equivalence Scale Sensitivity of Poverty Statistics for the Member States of the European Community," *Review of Income and Wealth*, 43:319-333.

Duclos, J. and M. Mercader-Prats (1999), "Household needs and poverty: With application to Spain and the U.K.," *Review of Income and Wealth*, 45: 77-98.

Evans, B. and R. Palacios (2016), "Who is poorer? Poverty by age in the developing world," Social Protection and Labor Policy Note No 18, World Bank, Washington DC.

Klasen, S. (2000), "Measuring Poverty and Deprivation in South Africa," *Review of Income and Wealth*, 46: 33-58.

Lanjouw, P. and M. Ravallion (1995), "Poverty and Household Size," *The Economic Journal*, 105: 1415-1434.

Lancaster, G., Ray, R. and M. R. Valenzuela (1999), "A Cross-Country Study of Equivalence Scales and Expenditure Inequality on Unit Record Household Budget Data," *Review of Income and Wealth*, 45: 455-482.

Meenakshi, J. V. and R. Ray (2002), "Impact of household size and family composition on poverty in rural India," *Journal of Policy Modeling*, 24: 539-559.

Newhouse, D., Becerra, P. S. and M. Evans (2017), "New global estimates of child poverty and their sensitivity to alternative equivalence scales," *Economic Letters*, 157: 125-128.

Olinto, P., Beegle, K., Sobrado, C. and H. Uemastu (2013), "The state of the poor: Where are the poor, where is extreme poverty harder to end, and what is the current profile of the world's poor?," Economic Premise Note Series No 125, Poverty Reduction and Economic Management Network, The World Bank, Washington DC.

Ravallion, M. (2015), "On testing the scale of sensitivity of poverty measures," *Economics Letters*, 137: 88-90.

Ravallion, M., Chen, S. and P. Sangraula (2008), "Dollar a Day Revisited," Policy Research Working Paper 4620, Washington DC: World Bank.

Ray, R. (2000), "Household Size and Child Welfare in India," *Economic Political Weekly,* 35: 3511-3520.

Streak, J. C., Yu, D. and S. Van der Berg (2009), "Measuring Child Poverty in South Africa: Sensitivity to the Choice of Equivalence Scale and an Updated Profile," *Social Indicators Research*, 94: 183-201.

White, H. and E. Masset (2003), "The Importance of Household Size and Composition in Constructing Poverty Profiles: An Illustration from Vietnam," *Development and Change*, 34: 105-126.