Who Are the World's Poor? A New Profile of Global Multidimensional Poverty

Gisela Robles Aguilar and Andy Sumner

Abstract

Who are the world's poor? This paper presents a new global profile of multidimensional poverty using three specifications of multidimensional poverty. The paper draws comparisons with the global monetary poverty profile and with the new World Bank measure of combined monetary and non-monetary poverty; discusses how global poverty differs by specification, the extent of multidimensionality, and presents a set of estimates of the disaggregated characteristics of global multidimensional poverty in 2015. We find the following: (i) at an aggregate level, the overall characteristics of global multidimensional poverty are similar to those of global monetary poverty at $1.90 per day; (ii) at a disaggregated level, we find that poverty in rural areas tends to be characterized by overlapping deprivations in education and access to decent infrastructure (water, sanitation, electricity, and housing) and counterintuitively, given the proximity, in principle, to better health care and economic opportunities, it is child mortality and malnutrition that is more frequently observed within urban poverty; and (iii) the extent of the multidimensionality of poverty differs substantially by region; moreover, some deprivations frequently overlap while others do not.

Keywords: Monetary poverty; Multidimensional poverty; deprivation

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Who Are the World's Poor?
A New Profile of Global Multidimensional Poverty

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Contents

Executive Summary

Who are the world's poor? This paper presents a new global profile of multidimensional poverty using three specifications of multidimensional poverty. The paper draws comparisons with the global monetary poverty profile and with the new World Bank measure of combined monetary and non-monetary poverty; discusses how global poverty differs by specification, the extent of multidimensionality, and presents a set of estimates of the disaggregated characteristics of global multidimensional poverty in 2015. We find the following:

i. At an aggregate level, the overall characteristics of global multidimensional poverty are similar to those of global monetary poverty at $1.90 per day, in that poor households tend to be larger-than-average rural households formed predominantly by young people (half of the world's multidimensional poor are under 18 years of age, and three-quarters are under 40); two-thirds of poor households have a member employed in agriculture; perhaps surprisingly, given that one would expect higher incomes outside agriculture, one-third of poor households have no member employed in agriculture. The most frequent deprivations are a lack of access to sanitation, lack of improved cooking fuel, and undernutrition.

ii. At a disaggregated level, we find that poverty in rural areas tends to be characterized by overlapping deprivations in education and access to decent infrastructure (water, sanitation, electricity, and housing). In contrast, and counterintuitively, given the proximity, in principle, to better health care and economic opportunities, it is child mortality and malnutrition that is more frequently observed within urban poverty.

iii. The extent of the multidimensionality of poverty differs substantially by region; moreover, some deprivations frequently overlap while others do not. The infrastructure-related dimensions of poverty (water, sanitation, electricity, and housing), not surprisingly, often overlap with each other. More surprising is that deprivations in health indicators overlap least frequently with other dimensions of poverty.

1. Introduction

Who are the world's poor? Castañeda et al. (2018) provide a global monetary poverty profile of the 766 million people who were estimated to live in "extreme poverty" in 2013, using the World Bank's new global monetary poverty line of $1.90 per day (2011 purchasing power parity [PPP]). They find the world's "extreme" poor, living under $1.90 per day, to be primarily rural, young, working in agriculture, and having no or little formal education.[i] The global poverty headcount at the $1.90-per-day line is sensitive to changes in the precise value of the $PPP line taken. Every 10 cents added to the global poverty line above $1.90 would add 100 million people, up to approximately $3.50 per day, due to the density of the world population up to that level (Edward & Sumner, 2015). This sensitivity to where the line is drawn also affects geographical composition, as first identified by Deaton (2010) for 2005 PPP poverty estimates, and updated by Edward and Sumner (2015) for 2011 PPP poverty estimates. Specifically, if the poverty line is moved slightly, the geographical composition of global monetary poverty changes. Slightly lower poverty lines "push" global poverty (i.e., raise the proportion of global poverty accounted for) into sub-Saharan Africa, and into low-income and least developed countries, whereas very slightly higher lines "Asianize" global poverty, as Deaton put it, and raise the proportion of global poverty in middle-income countries. Castañeda et al.'s (2018) estimates for the $3.10 "moderate" global poverty line illustrate these issues.[ii]

In light of these points, and also for the same reasons that Sen (1999) originally elucidated—the importance of capabilities and functionings—this paper presents a new global poverty profile using multidimensional poverty. To be clear, this paper is not arguing that this is more "precise" or "better," because different methodologies for defining and measuring poverty may not identify the same individuals.[iii] Further, multidimensional poverty, like monetary poverty, is also sensitive to specification. Our paper thus makes three specifications of the Alkire-Foster multidimensional poverty measure (see Alkire & Foster 2011a) to estimate a new global poverty profile for multidimensional poverty in 2015 based on 106 countries that account for 92 percent of the developing world's population.[iv] Most of the survey data (almost 90 percent) were collected in the 2010–2016 period. In order to extend the coverage, surveys from 2005–2010 were added. The data come from internationally comparable household surveys such as the Demographic and Health Surveys (DHS) and the Multiple Indicators Cluster Survey (MICS) (see information on data sources in the methodological annex).

It is possible to compare our profile of global multidimensional poverty with two other profiles: the global monetary poverty profile of Castañeda et al. (2018), and the new World Bank (2018) estimate of combined monetary and non-monetary poverty. The intended contribution of our paper is twofold: first, as comparator to the global monetary poverty profile of Castañeda et al. and the new World Bank measure (though the latter should be treated as tentative since the measure only covers 45 percent of the relevant population and has low coverage of two regions that are home to much of global non-monetary poverty, sub-Saharan Africa and South Asia); second, as an assessment the extent of the multidimensionality of global poverty.

The paper is structured as follows. Section 2 discusses the extent of the multidimensionality of global poverty. Section 3 then presents our three specifications of multidimensional poverty, each with a justification. Section 4 presents a new global poverty profile of multidimensional poverty in 2015 using the three specifications. Section 5 concludes. A methodological annex outlines and discusses the data sources used and robustness checks conducted.

2. How Multidimensional Is Poverty?

The rationale for measuring poverty in a multidimensional way is that people experience multiple deprivations simultaneously. Just how true is that assertion? In this section the extent to which poverty is multidimensional is discussed and then a global poverty profile is presented, using the Alkire–Foster multidimensional poverty measure (see Alkire & Foster 2011a; Alkire & Santos, 2014). Henceforth this measure is referred to as MPI-1—the global Multidimensional Poverty Index annually reported by the Oxford Poverty and Human Development Initiative (OPHI).[1] This measure aggregates 10 poverty indicators in the dimensions of health (undernutrition and child mortality); education (years of schooling completed and school attendance); and "standards of living" (which includes access to infrastructure such as electricity, sanitation, water, housing, and use of improved cooking fuel, as well as ownership of household assets). Table 1 compares the Alkire–Foster/MPI-1 approach with the new World Bank poverty measure.

The definitions proposed by Alkire and Santos (2014) and World Bank (2018) are similar, though some of the components and thresholds vary. In the case of living standards, World Bank (2018) does not consider shared sanitation, nor the time taken to reach the source of water. Alkire and Santos (2014) consider more conditions to classify someone as deprived in water and sanitation, and thus one would expect to see slightly larger numbers in the latter. In the case of years of schooling, World Bank (2018) considers completion of primary as threshold and because primary schooling may take five or more years of education in many countries, one would expect to see slightly larger deprivations. Our estimate of the number of people deprived in each MPI-1 indicator across 106 countries by their urban or rural residency is shown in figure 1. Bars are ordered from the least frequent deprivation in urban areas on the left to the most frequent deprivation on the right.[v]

[1] Since 2010 a Global MPI has also been reported annually in the UNDP Human Development Report. In late 2018 OPHI and UNDP (see OPHI, 2018) sought to align the MPI with the UN Sustainable Development Goals. Three changes were made: a housing indicator was developed from data on flooring, roof and walls; computer and animal carts were added to assets and the age to determine undernutrition was extended to 70 years old.

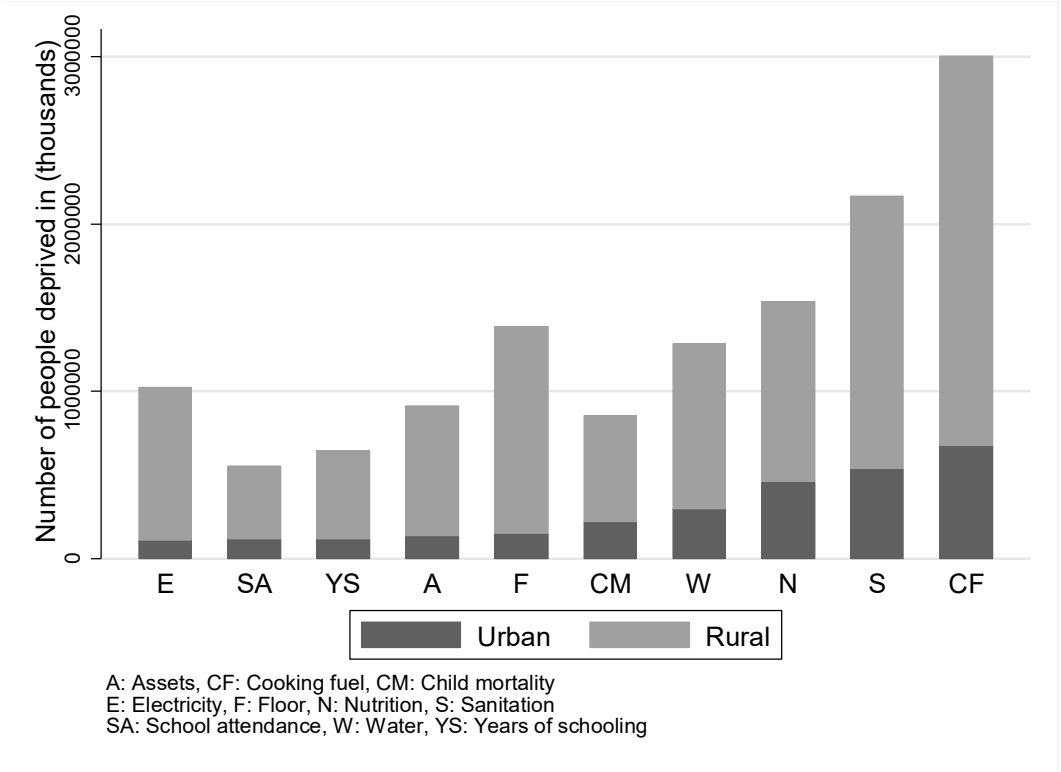
Table 1. Components of the Alkire–Foster (MPI-1) and new World Bank (2018) poverty measure

		Deprivations	
Dimension	**Indicator**	**MPI-1**	**World Bank (2018)**
Health	Nutrition	Any adult or child in the household with nutritional information is undernourished	
	Child mortality	Any child has died in the household	
Education	Years of schooling	No household member (age 10 or older) has completed five years of schooling	No household member (age of grade 9 or above) has completed primary education
	School attendance	Any school-aged child in the household is not attending school up to class 8	At least one school-age child up to the age of grade 8 is not enrolled in school
Standard of living	Electricity	The household has no electricity	The household has no electricity
	Sanitation	The household's sanitation facility is not improved, or it is shared with other households	The household lacks access to "limited-standard" sanitation
	Water	The household does not have access to safe drinking water, or safe water is more than a 30-minute walk, round trip	The household lacks access to "limited-standard" drinking water
	Floor	The household has a dirt, sand, or dung floor	
	Cooking fuel	The household cooks with dung, wood, or charcoal	
	Assets	The household does not own more than one of the following: radio, TV, telephone, bike, motorbike, or refrigerator, and does not own a car or truck	
Monetary poverty	Income / Consumption		Daily consumption or income is less than US$1.90 per person

Source: Adapted from Alkire and Santos (2014) and World Bank (2018).

We estimate that the most frequent deprivation experienced of the 10 indicators in the MPI-1 (the Alkire–Foster measure) is lack of access to improved cooking fuel, which affects more than 3 billion people, of which 0.7 billion are located in urban areas, and more than 2.3 billion are located in rural areas. The second most frequent deprivation is sanitation, affecting over 2 billion people, of which 0.5 billion people live in urban areas and 1.6 billion live in rural areas. Nutrition is the third most frequent deprivation affecting 1.5 billion people and it is more frequently observed in rural areas. Other living standard deprivations are also frequent in rural areas, such as poor-quality housing (using flooring as proxy), access to water, electricity, or ownership of assets. The number of people deprived in electricity and better-quality housing (flooring as a proxy) is low in urban areas. In rural areas, it exceeds the number of people deprived in nutrition. We compare MPI-1 and World Bank (2018) using a like-for-like dataset later.

Figure 1. MPI-1: Number of people experiencing a given deprivation, urban and rural areas, 2015



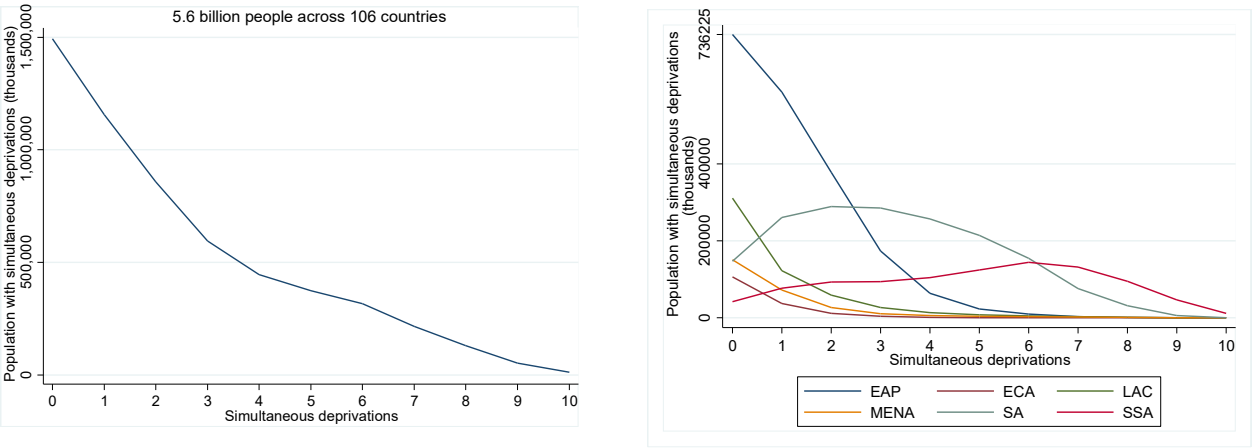
Source: Authors' estimates.

Note: Urban figures include the totals for Argentina and Libya, which cannot be disaggregated by rural/urban

We can also assess whether deprivations occur simultaneously in the MPI-1 (see also Battiston, Cruces, Lopez-Calva, Lugo, & Santos 2013; Chakravarty & D'Ambrosio, 2006) and how this contrasts with the World Bank (2018) measure which includes monetary poverty. Figure 2 shows the distribution of concurrent deprivations across the 106 country

data sets analyzed. Overall, as the number of overlapping deprivations increases, we observe fewer people. However, this picture masks important variations across different regions of the world, as reflected in the right-hand panel of figure 2. For most regions, we estimate a sharp reduction in the number of people identified with more than one (concurrent) deprivation, which means that we would find fewer people affected by each additional overlapping deprivation. However, this is not the case in sub-Saharan Africa (SSA) and South Asia (SA), where the number of people with additional concurrent deprivations increases. In short, the extent of the multidimensionality of poverty differs in different parts of the developing world. Again, we compare later MPI-1 and World Bank (2018) using a like-for-like dataset.

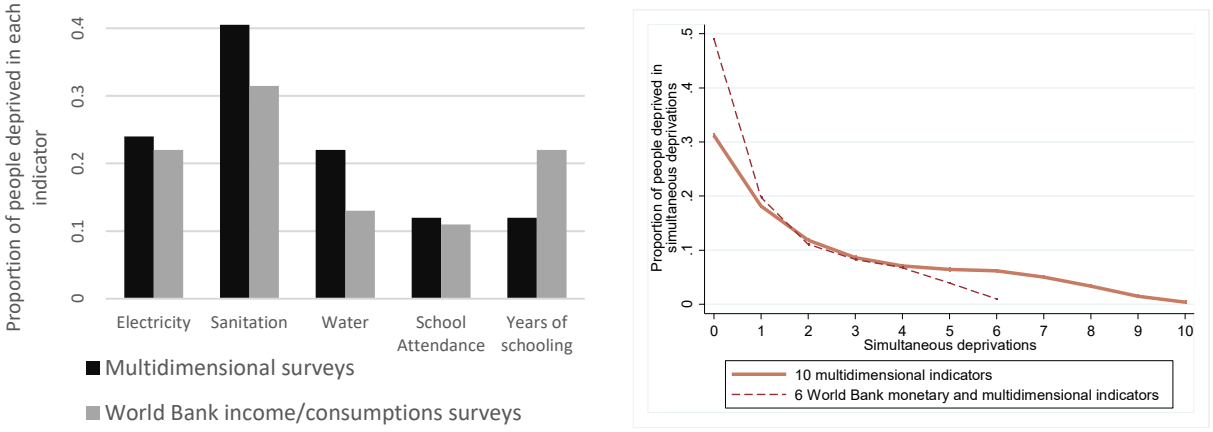
Figure 2. MPI-1: Number of people experiencing concurrent deprivations from 0 to 10, 2015



Source: Authors' estimates.

If one wishes to compare MPI-1 and the World Bank (2018) measure one needs to compare across a like-for-like data set (as best we can). We therefore take the same 70 countries (42 percent of the world's population based on 2015 population figures) and the five indicators that are included in both MPI-1 and World Bank (2018). One limitation of this comparison is that estimates come from different household surveys. Only nine of the surveys were conducted in the same year for a given country. The remainder have a time lag of one to six years between surveys.[vi] Figure 3 below show the comparison. The bar chart on the left-hand side considers any single deprivation in each of the five common indicators. We see that surveys (shown in black in the figure) tend to estimate larger proportions of deprivation for living standards, whereas the WB (2018) measure (shown in grey) estimates greater years of schooling deprivation, as a result of setting a higher (primary) threshold of deprivation.

Figure 3. MPI-1 vs. World Bank (2018) measure



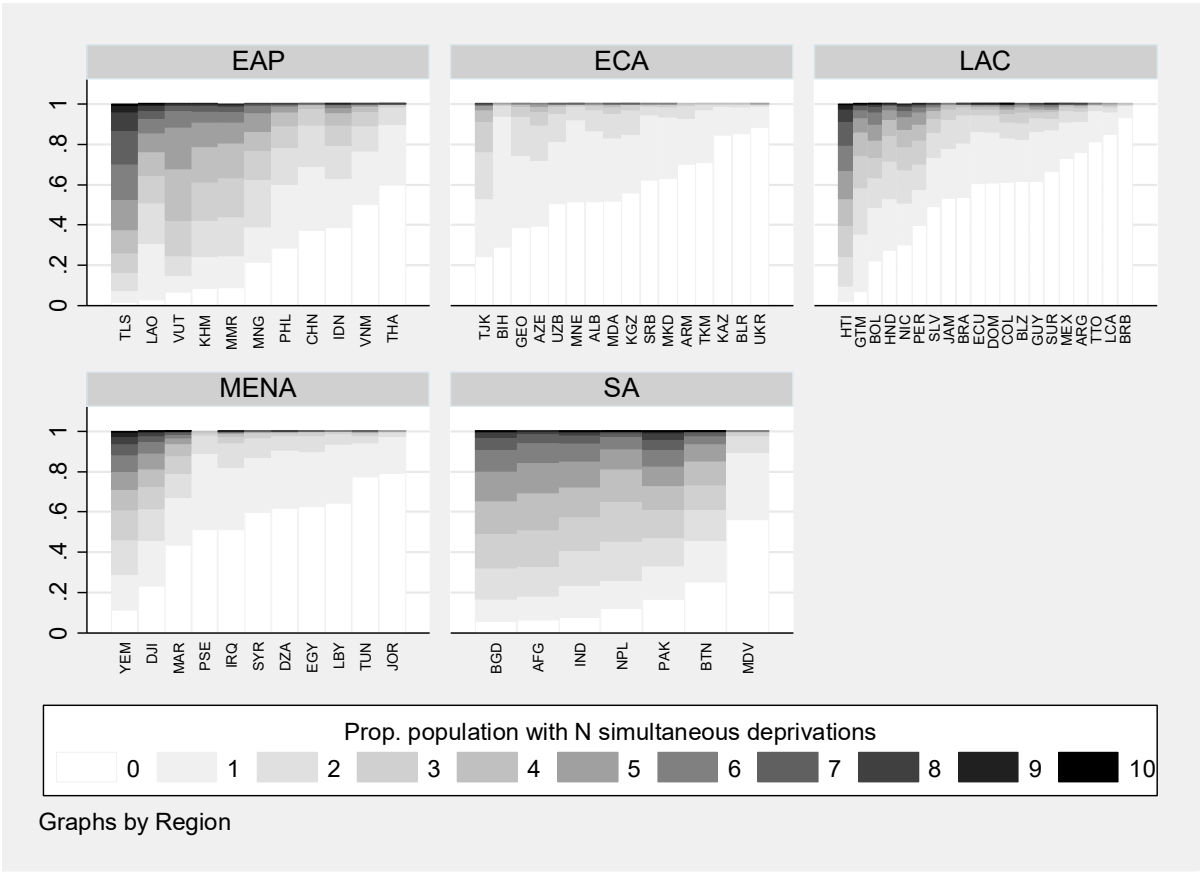
Source: Authors' estimates and World Bank (2018, tables 4C.3 and 4C.4).

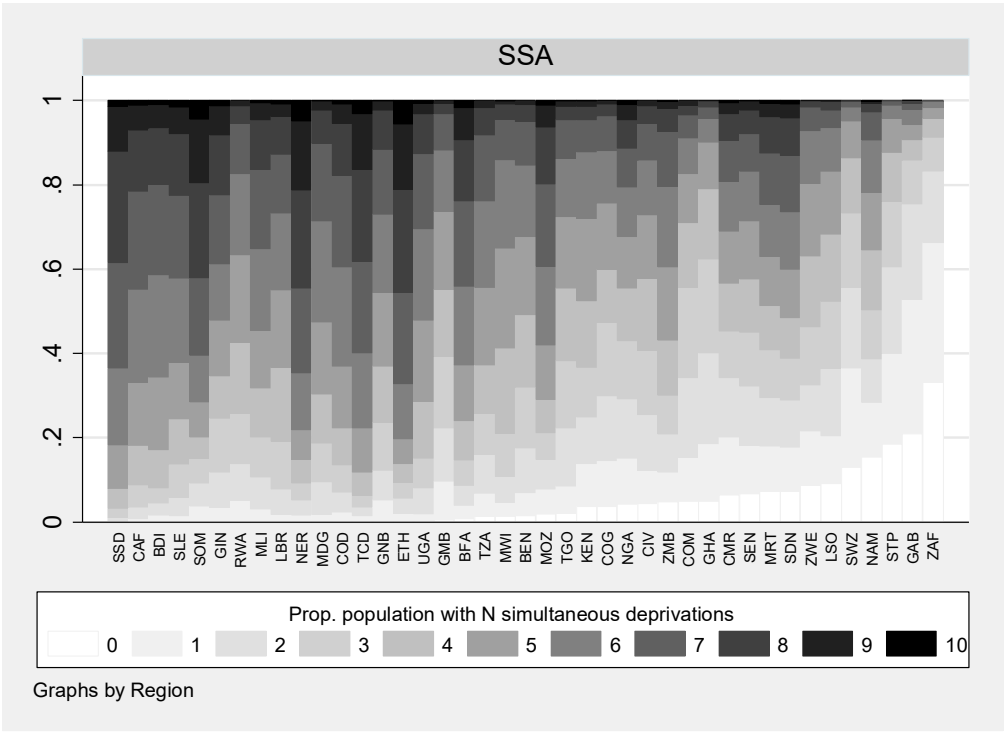
The line chart on the right of figure 3 offers a different comparison between MPI-1 and World Bank (2018), estimating the proportion of people identified as experiencing simultaneous deprivations by each list of indicators: the 10 multidimensional poverty indicators are shown in the solid line, and the six monetary and multidimensional indicators are shown as a dashed line. The list of six indicators has fewer indicators, so it identifies a larger proportion of population (50 percent) having none of the six deprivations, some of whom may be also deprived in the remaining 4 indicators that are used in the 10-indicator index. In contrast, only 30 percent of population do not have any of the 10 deprivations. When we identify two, three or four concurrent deprivations, both sets of indicators concur in identifying a similar proportion of the population. When we identify five or more simultaneous deprivations, we see that the multidimensional indicators identify a larger proportion of the population experiencing severe deprivation. This analysis confirms the consistency of poverty estimates at least for an intermediate range of overlapping deprivations, whereas different sets of indicators would plausibly yield different estimates, at least at extreme values of simultaneous deprivations—either very low (0), or very large (all indicators).

A comparison of the pattern of simultaneous deprivations across MPI-1 and 106 countries grouped by regions of the world is presented in figure 4. It shows that patterns for a middle range of simultaneous deprivations would be stable even if we were to add a monetary poverty dimension into the analysis. Each segment indicates the proportion of the population experiencing N overlapping deprivations, starting with zero deprivations in white at the bottom of each bar, and adding up segments of concurrent deprivations to reach 100 percent of the population. As segments become progressively darker, any additional deprivation is considered until reaching 10 overlapping deprivations at the top (black) segment of the bar. The figure shows that regions such as Europe and Central Asia (ECA), Latin America and the Caribbean (LAC), and the Middle East and North Africa (MENA) have 20 percent or more of the population without any deprivation (except for Haiti and Yemen). In ECA, we hardly see any grey segments, and in LAC and MENA grey segments

are visible only for a handful of countries, indicating that the proportion of population with five or more deprivations is minimal. However, in East Asia and the Pacific (EAP), SA and SSA, the overlap of deprivations is more common and shows more variation across countries in the same region. In EAP and SA, more than half of the population in each country experience at least one deprivation (except for Thailand, Vietnam, and the Maldives), and in SA, the proportion of people experiencing two or more deprivations is larger than 50 percent in every country except for the Maldives. In SSA, we observe a large variation of overlapping deprivations, from 5 percent of people deprived in five or more indicators in South Africa to 92 percent in South Sudan.

Figure 4. MPI-1: Proportion of population with overlapping deprivations, 2015





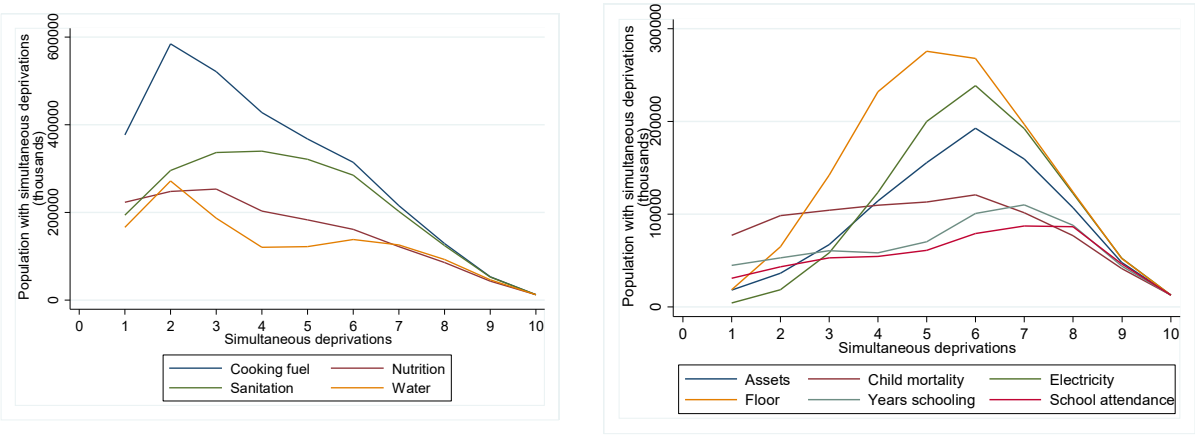
Source: Authors' estimates.

The fact that populations across different countries and regions of the world experience different patterns of concurrent deprivations raises the question: of the 10 indicators used here, what the most frequent deprivations that overlap? Figure 5 depicts each indicator with a line which shows the number of people who are deprived in that particular indicator (on the vertical axis) among people who simultaneously endure N deprivations, where N can take values from zero to 10 deprivations (on the horizontal axis). It is divided into two panels to facilitate the visualization of indicators, and the vertical scale is different for each panel. On the left-hand panel, we have the most frequently observed deprivations, and we see rapidly increasing lines that reach a maximum value between two and three simultaneous deprivations, to decline steadily afterwards. It is important to note that the rate of decline is less sharp for the nutrition deprivation or water access indicators. The right-hand panel presents least frequent deprivations. Child mortality reaches a peak at six deprivations although this frequency is very similar across those who have two deprivations. Years of education reaches its maximum frequency across those deprived in seven indicators and school attendance reaches its maximum among the group with eight deprivations. We can infer that, because the number of people deprived in five, six, or eight simultaneous deprivations is small, these deprivations are largely common to those people with acute levels of deprivation.

Further, we estimate that only 4 percent of those deprived in any one indicator would be deprived in years of education. However, we also estimate that half of those deprived in seven indicators would live in households whose members have less than five years of schooling, and almost all of these people would also be deprived of improved cooking fuel, as well as access to sanitation. There are implications for policy from this analysis: public policy interventions which address the indicators of the "living standards" dimension would offer an opportunity for reducing poverty for people experiencing a wide range of overlapping deprivations.

In sum, there are deprivations which tend to endure and overlap more frequently with others. Again, the global conclusions hide regional and country differences. Regions with fewer poor households would also see that the overlap of deprivations is less frequent, although some indicators such as electricity and assets would identify households with four or more deprivations. In SA, households deprived in any of the 10 indicators also tend to have three or more concurrent deprivations, but in SSA, all indicators tend to identify six or more concurrent deprivations. For detailed analysis, see the methodological annex.

Figure 5. MPI-1: Number of people deprived in each indicator and N simultaneous deprivations, 2015



Source: Authors' estimates.

The occurrence of simultaneous deprivations has a different pattern for each indicator. We next consider the underlying empirical association between the indicators. Table 2 shows the mean value of the Cramer's V coefficient presented for each pair of indicators. We observe the largest correlation coefficients across living standards: these are electricity, housing (flooring), and assets, which have coefficients of .28 or larger. Improved cooking fuel and sanitation access also have comparatively strong correlation coefficients, which is to be expected as those are the most frequently observed deprivations. We also observe that the correlation coefficients between deprivations in health and education tend to be below .2, except for the association of years of education with assets and electricity which is .2.

Table 2. Cramer V correlation coefficient for each pair of indicators across population in 106 countries

	Electricity	Floor	Assets	Cooking Fuel	Sanitation	Water	Years of schooling	School Attendance	Child Mortality	Nutrition
Electricity		0.35	0.37	0.27	0.22	0.25	0.21	0.13	0.08	0.07
Floor	0.35		0.28	0.26	0.20	0.20	0.18	0.12	0.08	0.07
Assets	0.37	0.28		0.20	0.19	0.17	0.25	0.10	0.04	0.05
Cooking Fuel	0.27	0.26	0.20		0.17	0.16	0.12	0.09	0.08	0.06
Sanitation	0.22	0.20	0.19	0.17		0.17	0.15	0.08	0.05	0.05
Water	0.25	0.20	0.17	0.16	0.17		0.13	0.10	0.06	0.05
Years Schooling	0.21	0.18	0.25	0.12	0.15	0.13		0.12	0.03	0.05
School Attendance	0.13	0.12	0.10	0.09	0.08	0.10	0.12		0.09	0.07
Child Mortality	0.08	0.08	0.04	0.08	0.05	0.06	0.03	0.09		0.07
Nutrition	0.07	0.07	0.05	0.06	0.05	0.05	0.05	0.07	0.07	

Source: Authors' estimates. Excludes Argentina.

Historically, multidimensional poverty has described various dimensions and not necessarily aggregated them into a single headline figure. The lack of a perfect association between the 10 indicators here points to the value of conveying each of these different aspects of poverty.[vii] That said, there is an important caveat: as noted above and in the methodological annex, although almost 90 percent of the survey data are in the 2010–2016 period, some are from the 2005–2010 period in order to extend geographical coverage and to maintain comparability with the most recent data available. We are thus making a large assumption that population characteristics have remained constant across households in different country-year estimates between the survey date and 2015. Countries might have experienced changes in individual or household characteristics between the survey year and 2015. Thus, the strong assumption of constant characteristics may overestimate the rural nature of the population analyzed, for example. There is no systematic evidence to our knowledge on how best to account for these changes in the absence of more recent survey data; these are issues also inherent in monetary poverty measurement even if one shortens the time window to five years rather than the 2005–2016 window we use.[viii]

3. A Set of Specifications of Multidimensional Poverty

We next present three specifications of multidimensional poverty in order to estimate a new profile of global poverty; the composition of that profile will differ according to the specification. First, we estimate MPI-1, the global Multidimensional Poverty Index annually reported by the OPHI. This is a nested-weights index that defines global poverty at 33 percent of weighted indicators and identifies a headcount of 1.5 billion poor people in 2015. The rationale for this measure is to provide estimates in keeping with the annual estimates of the OPHI global Multidimensional Poverty Index.

Second, we estimate an equally weighted Multidimensional Poverty Index which we call MPI-2. This is based on the same 10 indicators as the MPI-1 above but it defines the poor as those living with five *or more* of the 10 deprivations on the basis that these people are poor in the majority of indicators measured. MPI-2 estimates the global poverty headcount at 1.1 billion people in 2015. The rationale for MPI-2 is to provide a measure of highly multidimensional poverty in light of the preceding discussion. MPI-2 builds upon the specification of indicators used in MPI-1, but we have chosen a different specification of equal weighting as we are interested in the multidimensional aspects of global poverty. The MPI-2 thus assigns equal weights to each of the 10 deprivations of the MPI-1 faced simultaneously, namely 1/10 weight to each indicator. This effectively gives a larger preponderance in the index to the six indicators of living standards, as they will jointly aggregate 60 percent of the overall weighting structure, compared to 33 percent in the MPI-1. The remaining four indicators for health and education account for 40 percent.

Finally, we also estimate a non-health Multidimensional Poverty Index which we call MPI-3. The rationale behind this measure is data limitations. Of the 106 countries, 89 countries have all 10 indicators,[ix] with health indicators being the most frequently missing indicators. MPI-3 is an equally weighted index based on eight education and living standards indicators of the MPI-1 above but excluding the health indicators. We consider those people living with five

or more of the eight deprivations as being poor, identifying 0.8bn in 2015, on the basis that these people are poor in the majority of indicators measured. In terms of the countries with missing data: nutrition has limited coverage as it is typically based on the nutrition of children under five years. In approximately half of the data sets (those data sets which are DHS) we find nutrition data for women aged 15–49 years, and a few DHS have nutrition data for males aged 15–59. In contrast, years of education is typically assessed across people aged 10 years and upward, while school is assessed within the school-aged population. This third specification (MPI-3) assigns equal weights to the indicators in the education and living standards dimensions, giving eight indicators in total. In MPI-3, two education indicators accumulate 1/4 of the weighting structure, while living standards accumulate the remaining 3/4.

Table 3 describes each specification, and further details and robustness checks are provided in the methodological annex. In table 3, the first two columns describe the nested structure of weights of the MPI-1. This structure of weights gives equal importance to each of the three *dimensions*, but the importance of each indicator differs in the index. Living standards indicators have an effective lower weight of 1/18 compared to 1/6 for each of the health and education indicators.

Table 3. Weighting structure for each specification of Multidimensional Poverty Index

MPI-1	
Global multidimensional poverty (Alkire–Foster weightings and 33%+ threshold)	
Weights for global MPI	
Dimension	Indicator
Health (1/3)	Nutrition (1/6)
	Child mortality (1/6)
Education (1/3)	Schooling (1/6)
	Attendance (1/6)
Standard of living (1/3)	Electricity (1/18)
	Sanitation (1/18)
	Water (1/18)
	Floor (1/18)
	Cooking fuel (1/18)
	Assets (1/18)

MPI-2	
Multidimensional poverty (equal weightings and 50%+ threshold)	
Weights for 10 indicators	
Dimension	Indicator
Health (2/10)	Nutrition (1/10)
	Child mortality (1/10)
Education (2/10)	Schooling (1/10)
	Attendance (1/10)
Standard of living (6/10)	Electricity (1/10)
	Sanitation (1/10)
	Water (1/10)
	Floor (1/10)
	Cooking fuel (1/10)
	Assets (1/10)

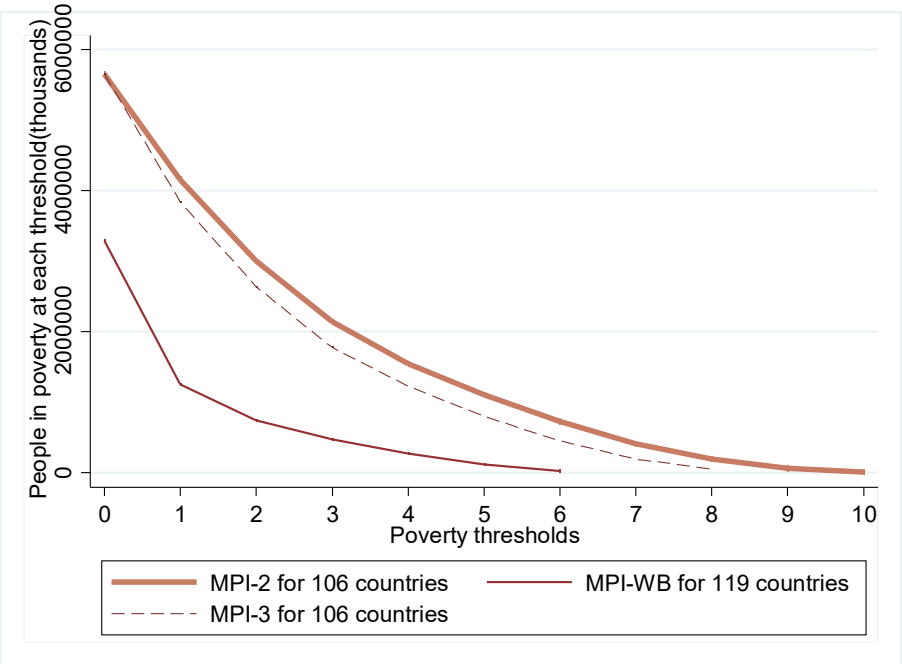
MPI-3	
Non-health multidimensional poverty (equal weightings and 50%+ threshold)	
Weights for eight indicators	
Dimension	Indicator
Health (0)	
Education (2/8)	Schooling (1/8)
	Attendance (1/8)
Standard of living (6/8)	Electricity (1/8)
	Sanitation (1/8)
	Water (1/8)
	Floor (1/8)
	Cooking fuel (1/8)
	Assets (1/8)

Source: Alkire and Santos (2014) and authors.

How sensitive is the global poverty count to the choice between these three specifications? An intuitive illustration is to consider 10, eight, or six equally weighted indicators, and aggregate the number of people who accumulate simultaneous deprivations. Figure 6 plots the change in the number of people across 106 countries that endure these concurrent deprivations. The solid thick line illustrates the changing total number of people identified as poor on the basis of 10 equally weighted indicators (MPI-2). We observe that almost 1.6 billion people are deprived in four or more indicators, whereas 1.1 billion are deprived in five or more indicators, but only 0.4 billion people are deprived in seven or more indicators. The dashed line illustrates the MPI-3 specification of eight indicators, in which 2.6 billion people have two deprivations; approximately 0.5 billion people can be subtracted for each additional deprivation considered until we reach 0.8 billion people deprived in five of the eight indicators. The removal of the health component of the index (MPI-3) has the effect of reducing the number of people identified as poor by approximately 0.3 billion from the 10 equally weighted indicators specification (MPI-2) at every poverty threshold. The solid thin line in the figure indicates the number of people identified as poor by being deprived in one or more of the six monetary and multidimensional indicators proposed by World Bank (2018) across 119 countries. The gap between the dashed and the solid thin line is large because the population included is much smaller (45 percent instead of 78 percent of 2015

world population figures). Yet, the shape of the line confirms a tendency for the three approaches to identify similar patterns of overlapping deprivations. This is potentially an effect of the large correlation between deprivations in education and living standards as seen in Table 2, which is followed by an important overlap between monetary indicators and both living standards and education (World Bank, 2018, figure 4.1). Removing the education component of the index has the effect of reducing the number of people identified as poor by approximately 0.1 billion from the eight equally weighted indicators specification of MPI-3.

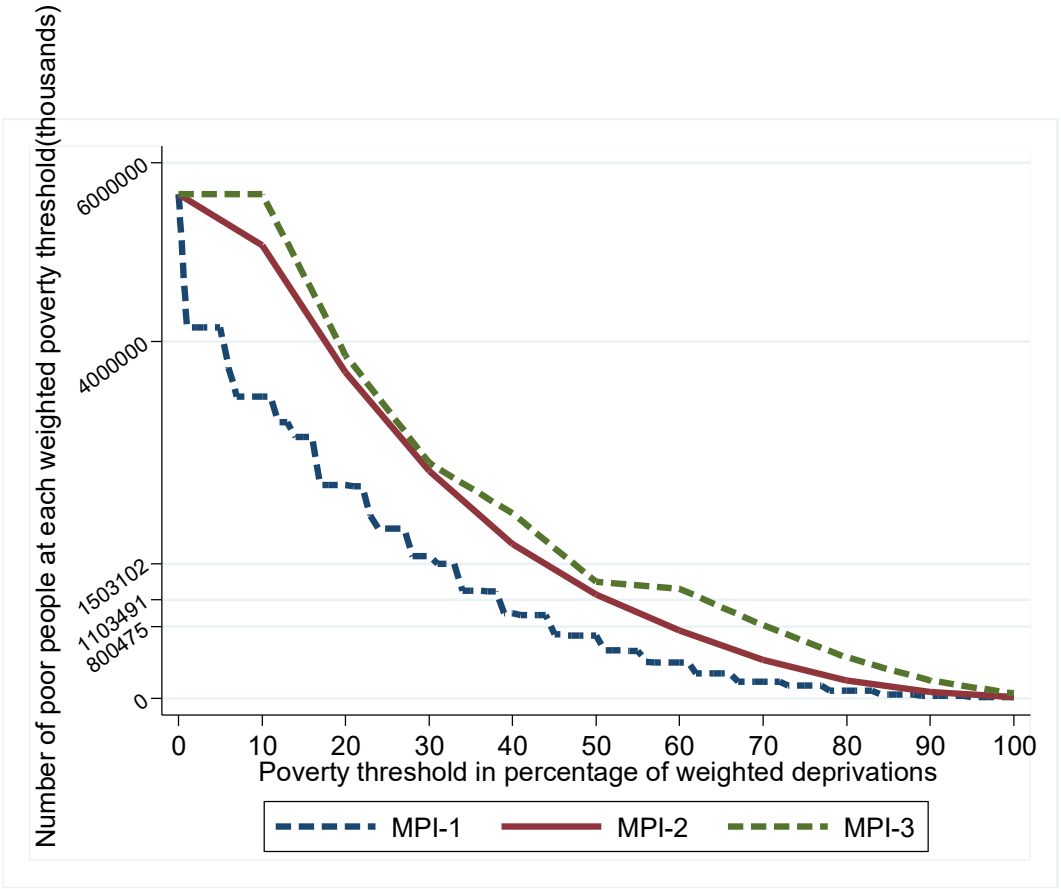
Figure 6. Number of poor people at a given number of concurrent deprivations, 2015



Source: Authors' estimates.

Figure 6 shows the gradient of total number of poor people at different *k* poverty thresholds. MPI-1 has a poverty threshold k value of 33 percent, which indicates that people are considered to be poor if deprived in 33 percent or more of the weighted indicators, identifying 1.5 billion people as poor (Alkire & Robles, 2016). Figure 7 compares the number of people identified as poor by the different specifications proposed above. MPI-1 identifies fewer people as poor at every *k* threshold because the living standard indicators which tend to identify more people as deprived have been assigned a lower weight. MPI-2 is closely followed by MPI-3 as the difference in weights between those two specifications is less pronounced. This figure also shows that poverty thresholds above 50 percent for MPI-2 and MPI-3 identify approximately 1 billion people in poverty, fewer than identified by the 33 percent MPI-1 poverty threshold. Since any specification will exclude many people who may be regarded as poor by another specification, we compare the three different specifications by describing the extent to which each of these indices identifies the same people (see methodological annex for robustness checks).

Figure 7. Number of people identified as poor for different poverty thresholds, 2015



Source: Authors' estimates.

4. Who Are the Poor? A New Global Profile of Multidimensional Poverty

4A. Urban–Rural and Age Characteristics

Table 4 presents estimates of the urban–rural and age characteristics of the whole sample by MPI-1, MPI-2, MPI-3, $1.90 per day poverty (Castañeda et al., 2018) and the World Bank (2018) measure. The sample population has similar urban/rural, gender and age composition to the population estimates of UNDESA (2015) (see methodological annex). The sample is 56.3 percent rural. However, the proportion of global poverty accounted for by rural areas is much higher, ranging from 75.7 percent ($1.90-per-day measure) to 92.3 percent (MPI-3 measure). The structure of the population is predominantly rural in SSA and SA, and hence we would expect to identify more rural poverty in those regions. However, the high rural composition of global poverty holds across regions in general, although in Latin America and the Caribbean almost 40 percent of poverty by MPI-1 is urban (See table 5). MPI-1 identifies a more "urbanized" poverty profile globally and in Latin America than the other specifications of multidimensional poverty due to the fact that MPI-1 assigns a larger weight

to undernutrition which is more frequent in urban areas. As figure 1 showed earlier, the set of 10 indicators tends to identify deprivations that are predominantly located in rural areas. This could mean that urban poverty has other characteristics not included here.

Table 4. Overview of characteristics by different poverty measures, 2015

	Rural	Urban	Age					Gender		
			0–4	5–17	18–39	40+	Missing	Female	Male	Missing
All population in sample	56.3%	43.7%	10.1%	23.9%	33.5%	32.4%	0.0%	49.2%	50.8%	0.0%
MPI-1	84.4%	15.6%	14.1%	33.6%	28.4%	23.8%	0.0%	48.7%	51.2%	0.0%
MPI-2	90.9%	9.1%	15.4%	35.3%	27.4%	21.8%	0.0%	48.6%	51.4%	0.0%
MPI-3	92.3%	7.7%	16.3%	35.8%	26.4%	21.4%	0.0%	48.4%	51.6%	0.0%
			0-14	15-24	25-34	35-44	45+			
US$1.90 / day	75.7%	24.3%	44.2%	17%	13.4	10.3	15.1	50%	50%	-
WB (2018)	83.5%	16.5%	Poor households home to 1 or more children: 94%					-	-	-

Source: Authors' estimates, Castañeda et al. (2018) and World Bank (2018).

Table 5. Rural–urban disaggregation for different specifications of poverty, 2015

	Rural/Urban (%)		Age groups (years, % of total)				
	Rural	Urban	0–4	5–17	18–39	40+	Missing
All population in sample							
East Asia & Pacific	48.4	51.4	7.8	15.4	34.4	42.3	0.0
Europe & Central Asia	48.2	51.8	7.8	19.8	31.8	40.6	0.0
Latin America & Caribbean	30.5	69.5	9.5	24.1	33.9	32.4	0.0
Middle East & North Africa	49.6	50.2	12.3	28.0	35.1	24.7	0.0
South Asia	69.2	30.8	9.3	27.0	34.3	29.4	0.0
Sub-Saharan Africa	67.1	32.9	16.6	35.1	29.7	18.6	0.0
MPI-1							
East Asia & Pacific	75.2	24.8	9.0	24.1	28.2	38.7	0.0
Europe & Central Asia	76.6	23.4	13.3	29.5	31.7	25.5	0.0
Latin America & Caribbean	61.7	38.1	12.2	32.2	26.6	29.0	0.0
Middle East & North Africa	79.1	20.5	15.7	38.2	28.1	18.0	0.0
South Asia	88.0	12.0	11.5	31.6	30.8	26.1	0.0
Sub-Saharan Africa	83.7	16.3	18.6	38.3	25.6	17.5	0.0
MPI-2							
East Asia & Pacific	92.8	7.2	12.5	30.6	26.5	30.3	0.1
Europe & Central Asia	95.0	5.0	15.1	32.0	29.1	23.7	0.0
Latin America & Caribbean	86.9	13.2	14.4	33.7	25.4	26.5	0.0
Middle East & North Africa	96.1	3.8	15.6	38.3	27.1	19.0	0.0
South Asia	93.9	6.1	12.0	32.6	29.5	26.0	0.0
Sub-Saharan Africa	88.2	11.8	18.7	38.1	25.7	17.5	0.0
MPI-3							
East Asia & Pacific	93.2	6.8	13.1	30.6	26.0	30.2	0.1
Europe & Central Asia	95.0	5.0	11.4	30.4	26.0	32.2	0.0
Latin America & Caribbean	88.9	11.0	14.0	32.8	24.9	28.3	0.0
Middle East & North Africa	96.7	3.3	15.2	38.1	26.5	20.1	0.0
South Asia	95.1	4.9	12.6	32.4	28.0	26.9	0.0
Sub-Saharan Africa	90.7	9.3	18.6	38.1	25.6	17.7	0.0

Source: Authors' estimates.

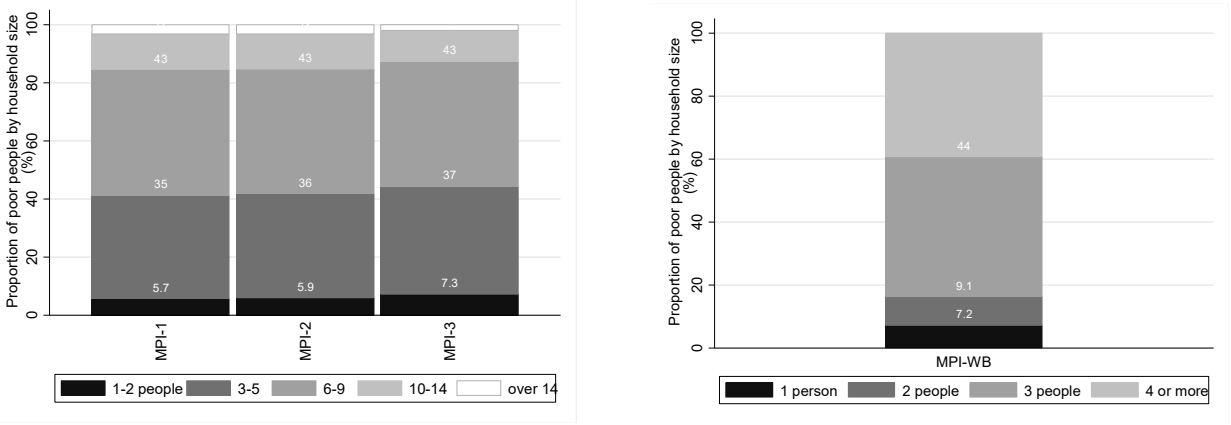
Table 4 shows that the age structure of the sample population is predominantly adult.[x] Children under 18 years old account for a third of the sample population (34 percent), according to any of the MPI specifications, but at least half of the poor are children (under 18 years). Table 5 shows that the age structure by regions has a preponderance of adult and old age (60 percent or above of the total population), except for SSA, where we observe a

larger composition of younger people (52 percent of the population). All three MPI specifications identify larger proportions of the young population than non-young populations among the poor. The MPI-1 specification identifies a slightly older population across the poor, especially in EAP and LAC, which is due to the fact that nutrition and child mortality deprivations have a higher weight in the measure. Equally weighted MPI-2 and MPI-3 show a similar age structure, indicating that infrastructure and education deprivations identify similar people.

4B. Household Size Characteristics

The large proportion of young people in poor households points toward the possibility of identifying larger households among the poor. Figure 8 disaggregates the poor population in five household-size groups (details of this disaggregation across regions of the world are provided in the methodological annex). We estimate that while only 40 percent of the population live in households of six or more members, any of the MPI specifications proposed identifies more than 55 percent of the poor population as concentrated in those households of six to nine members. This is beyond the share of that household size in the whole population. When we disaggregate by regions, we see that both poor and non-poor households in SSA tend to be larger than in other regions. In EAP, poorer households tend to have three to five members. For SA and LAC, the average household size across the poor population fluctuates between three to five and six to ten members.

Figure 8. Proportion of people identified as poor according to household size, 2015



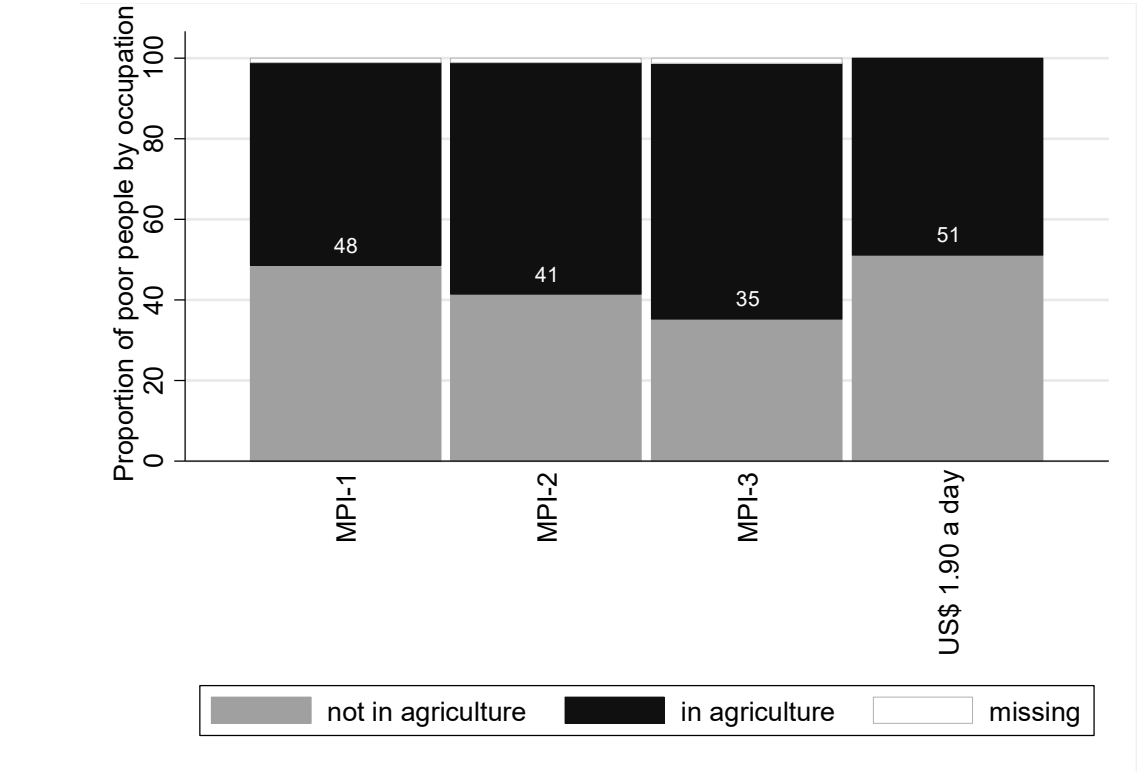
Source: Authors' estimates and World Bank (2018, table 4C.2).

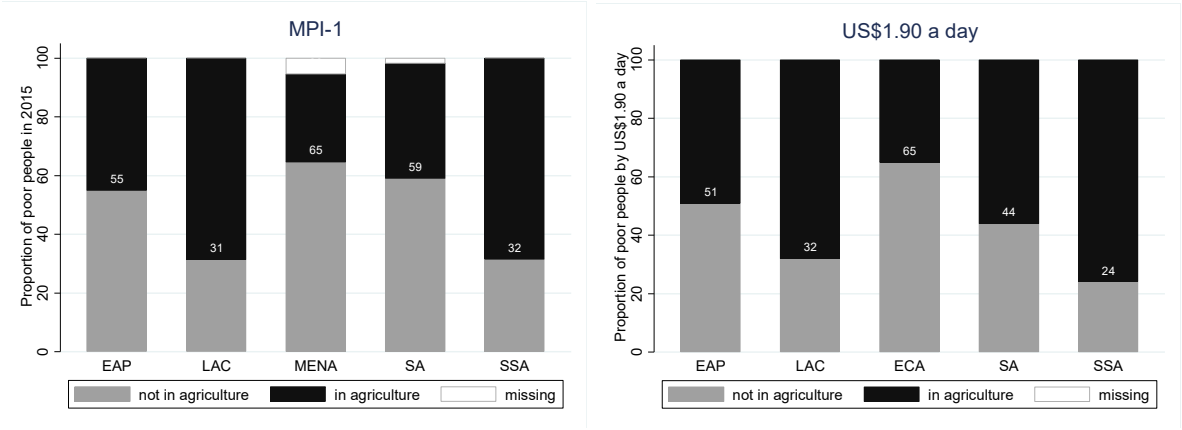
4C. Estimates by Occupation

In 35 countries, DHS questionnaires ask interviewees whether they are employed or not and their type of occupation; this is for eligible women interviewed (aged 15 to 49 years) and for their husbands.[xi] Where the DHS implements a questionnaire for males, this information is also available for eligible men (aged 15 to 59) in the household.[xii]

We make estimates of the proportion of households which have a "usual resident" who is eligible to answer questions on being employed in agriculture. If no usual resident is eligible, then we consider this to mean that the household does not engage in agricultural activities as we have no information to infer the contrary; information is only considered missing if all eligible residents have missing information on occupation, which represents approximately 1 percent of the sample. Across the sample population, approximately one in every three households has an eligible member engaged in agriculture, but this average can be as low as 14 percent across MENA or as high as 52 percent in SSA. We find that, for any of the MPI specifications, on average, one in every two poor households will have an eligible resident occupied in agriculture (see figure 9). This proportion tends to be larger among those identified by the MPI-2 measure, in which almost two of every three (64 percent) of households deprived in five or more of the eight indicators would have a member occupied in agriculture. By contrast, the figure is lower among those identified by the MPI-1, which assigns more weight to nutrition and child mortality deprivations. The data are consistent with a hypothesis that agricultural activities may protect households against nutrition poverty, which would prevent them from being identified as poor by MPI-1. That said, MPI-1 poor households still have someone engaged in agriculture more frequently than non-poor households.

Figure 9. Proportion of people identified as poor by MPI-1, MPI-2, MPI-3 and $1.90 a day according to their occupation and region





Source: Authors' estimates and Castañeda et al. (2018).

Note: MPI-1, MPI-2 and MPI-3 estimates include MENA countries whilst $1.90 estimates do not. $1.90 a day includes ECA countries whilst MPI-1, MPI-2 and MPI-3 estimates do not.

In SSA and LAC, approximately three of every four (74 percent) of MPI-2 and MPI-3 poor households have an eligible "usual resident" occupied in agriculture. In contrast, less than one in every two MPI-2 or MPI-3 poor households are employed in agriculture in SA and EAP. Further details on regional disaggregation are available in the methodological annex. It is not surprising that agriculture is a common occupation across a population which is predominantly rural. What is surprising is that agricultural occupations occur frequently,

even in high urbanized regions such as LA or EAP. Castañeda et al. (2018) reach similar conclusions, despite the fact that they analyze survey data for 64 countries for which the population shows a smaller share of agricultural occupation. The conclusion in terms of agricultural occupation of the poor is remarkably similar for the EAP, LAC, and SSA regions despite larger shares of agricultural occupation across the poor and the population in SA.

5. Conclusion

We have presented a new global poverty profile based on three specifications of multidimensional poverty. We find similarities with the global monetary $1.90 poverty profile. We draw three conclusions. First, at an aggregate level, the overall characteristics of global multidimensional poverty are similar to global monetary poverty at $1.90 per day in that poor households tend to be larger-than-average rural households formed predominantly by young people; two-thirds of poor households have a member employed in agriculture and—perhaps surprisingly, given that one would expect higher incomes outside agriculture—one-third of poor households have no member employed in agriculture. The more frequent deprivations are undernutrition, a lack of access to sanitation, and a lack of access to clean water. It is important to add that urban poverty might have other characteristics not included here. Second, on the extent and nature of multidimensionality, we find that the extent of the multidimensionality of poverty differs substantially by region and that some deprivations frequently overlap while others do not. For example, deprivations in electricity and housing overlap frequently between themselves and with other deprivations in "living standards" or infrastructure. Deprivations in terms of years of education and school attendance overlap frequently and also overlap with living standards. It is deprivations in health indicators which overlap least frequently with other indicators. Third, at a disaggregated level, rural poverty tends to be characterized by overlapping deprivations in education and in access to decent infrastructure (water, sanitation, electricity and housing). In contrast, and counterintuitively, given proximity to better health care and economic opportunities (at least in principle), child mortality and malnutrition are more frequently observed within urban poverty.

Methodological Annex

A1. Data Sets

In order to construct the analysis, we build upon 10 internationally comparable indicators that form part of the Alkire–Foster measure of multidimensional poverty (see Alkire & Foster, 2011a; Alkire & Santos, 2014). These assess household living standards and an individual's health and education well-being as described in Table 1 (in the text). As with monetary poverty at $1.90 per day, if conditions of deprivation are experienced by one household member, the status of deprivation is assigned to all members of the household. The assessment of some indicators is confined to specific demographic groups: school attendance is assessed only on school-aged household members, and nutrition and child mortality are assessed on eligible household members, commonly children and women of reproductive age.

The data sources are 106 surveys. Of these 106 surveys, 56 are Demographic and Health Surveys (DHS), 40 are Multiple Indicator Cluster Surveys (MICS), three are Pan-Arab Project on Family Health Surveys (PAPFAM) and seven are national surveys. The seven national surveys that are used are as follows: the Argentinean National Survey on Health and Nutrition, the Chinese Family Panel Survey, the Ecuadorian Quality of Life Survey, the Indian Human Development Survey, the Jamaican Survey of Living Conditions, the South African National Income Dynamics Study (NIDS), and the Brazilian National Household Survey. The survey sources have missing data on Western China, Northern Mali, Western Sahara, Vakaga in the Central African Republic, the Federally Administered Tribal Areas of Pakistan, and North and South Sinai in Egypt. Data sources older than 2005 are excluded to maintain comparability across estimates.

The majority (89 percent) of the data sets were collected in 2010–2016. The remainder are from 2005–2010. The coverage of the 106 country surveys represents 78 percent of the population of the world in 2015 (UNDESA, 2015) and 92 percent of the developing world. The coverage per geographic region is as shown in table A1.

Table A1. Population coverage by region, 2015

	% of population coverage
East Asia & Pacific	88
Europe & Central Asia	18
Latin America & Caribbean	87
Middle East & North Africa	66
North America	0
South Asia	99
Sub-Saharan Africa	96
Total: World	78
Total: Developing Countries	92

Source: Authors' estimates.

Among these 106 country data sets, 89 have information on 10 comparable indicators, 14 of them have information on nine indicators, and three of them have comparable information on eight indicators. This is summarized in table A2 which also presents the missing values for each indicator. Fourteen country data sets have information on nine out of 10 indicators: Bosnia and Herzegovina, Macedonia, Barbados, Saint Lucia, and Suriname have no information on child mortality; Ukraine, Trinidad and Tobago, Indonesia, Afghanistan, Vietnam, and the Dominican Republic have no information on nutrition; China has no information on flooring; Egypt lacks an indicator for cooking fuel; and there is no indicator of electricity for Honduras. Three additional country survey data have information on eight indicators: Jamaica lacks information on child mortality and flooring; Brazil lacks information on nutrition and flooring; and the Philippines lacks information on school attendance and nutrition. Rural and urban residency is not available for Argentina and Libya, and the occupation of eligible household members is only available in 35 country data sets.

Table A2. Availability of indicators across survey data

	No. data sets with information available	No. data sets with missing values	Mean percentage missing (unweighted)	Mean percentage missing (population weighted)
10 indicators across the full survey data set				
Nutrition	98	95	2.3%	1.4%
Child mortality	100	88	1.9%	1.5%
Improved flooring	103	94	0.9%	1.0%
Cooking fuel	105	89	0.7%	0.7%
Electricity	105	88	0.7%	0.6%
School attendance	105	68	0.8%	0.6%
Assets	106	76	0.7%	0.5%
Years of schooling	106	94	1.5%	1.2%
Sanitation	106	93	0.7%	0.7%
Water	106	74	0.8%	0.6%
Characteristics across the sample population with no missing indicator				
Rural residency	104	4	0.1%	0.1%
Age	106	22	0.0%	0.0%
Gender	106	12	0.0%	0.0%
Occupation	35	28	1.1%	1.1%

Source: Authors.

A2. Robustness Checks

Table A3 presents the population-weighted mean Cramer V coefficient of association between the deprivations experienced by each household according to each of the specifications. We see that the association between both 10-indicator specifications (MPI-1 and MPI-2) is the closest to one, indicating the strongest association. Hence, having a similar list of indicators increases the chances of identifying the same people as poor, regardless of the changing weights. The association between the MPI-1 and MPI-3 is the second strongest, indicating that suppressing the health indicators does have implications on who is identified as poor. The association between the equally weighted 10 indicators (MPI-2) and eight indicators (MPI-3) is the weakest, indicating that similar weights (the dimensions of education and living standards have similar weights) does not have a strong impact.

Table A3. Cramer V coefficients of associations for household deprivations in each specification, 106 countries

	World		SSA		SA		EAP		MENA		LAC		ECA	
	MPI2	MPI3	MPI2	MPI3	MPI2	MPI3	MPI2	MPI3	MPI2	MPI3	MPI2	MPI3	MPI2	MPI3
MPI1	0.94	0.78	0.93	0.75	0.93	0.73	0.97	0.84	0.94	0.77	0.89	0.78	0.88	0.77
MPI2	.	0.69		0.68		0.66		0.69		0.71		0.80		0.82

Source: Authors' estimates.

We confirm that these conclusions apply to the regions of SSA, SA, and EAP, three world regions with the largest numbers of people experiencing concurrent deprivations, and also to MENA. In the case of the two regions with fewer people experiencing multiple deprivations, namely ECA and LAC, the association between the 10-indicator specifications is still the strongest, but weaker if compared to other regions. And the association between the two equally weighted indexes is still the weakest one, but including or excluding the health indicator does not change the correlation coefficient much. The health indicator may convey less information in such regions. We also note that, as seen in figure 2 (in the text), the population in these two regions seldom experiences more than three overlapping deprivations. The change of weight in the health indicators neither strengthens nor weakens the association in poor people identified by one index or the other, but a change in the list of indicators does have influence. The changing weights of indicators do not tend to determine whether a household is classified as poor, as long as the list of indicators remains the same.

We also compare the extent to which the ranking of the number of poor people identified per country differs among the three poverty thresholds used; namely, (a) 33 percent of weighted deprivations, (b) 5/10 simultaneous deprivations, and (c) 4/8 simultaneous deprivations. Table A4 provides the Kendall Tau-B rank correlation coefficients between the ordering of 106 countries and within regions.

Table A4. Kendall Tau-B coefficient for three different poverty thresholds

	World		SSA		SA		EAP		MENA		LAC		ECA	
	MPI2	MPI3	MPI2	MPI3	MPI2	MPI3	MPI2	MPI3	MPI2	MPI3	MPI2	MPI3	MPI2	MPI3
MPI1	0.84	0.81	0.93	0.9	0.90	0.90	0.76	0.67	0.75	0.71	0.76	0.77	0.63	0.63
MPI2	.	0.96		0.95		1.00		0.93		0.89		0.98		0.85

Source: Authors' estimates.

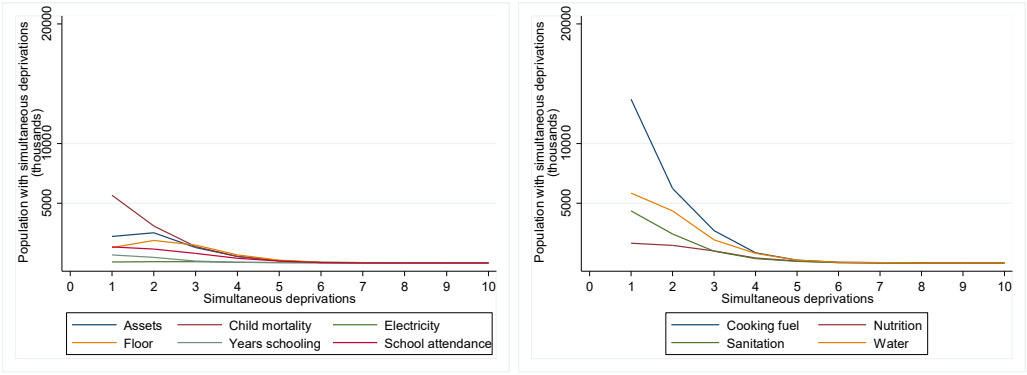
In general, the equally weighted indexes give a similar ordering of countries by the number of poor people identified. This agreement is larger in the regions that have most people identified as poor, namely SSA, SA, and EAP. In SSA and SA, the index that suppresses the health indicator yields a very similar ordering of countries to the one that includes them, as long as the indicators have similar weights. The ordering of countries also depends on the size of population of each country, as heavily populated countries (such as India) would tend to rank higher than smaller countries (such as South Sudan). If we adjust the specification to compare rates rather than numbers, the correlation coefficients are more conservative and similar to Cramer V correlations on an individual level. In regions with fewer people identified as poor, the ordering of countries is more frequently consistent with the equally weighted specifications. In regions such as SA and LAC, in which countries have a similar distribution of concurrent deprivations (figure 4), changes in weights have a larger impact than the exclusion of the health indicator. Given a similar poverty profile in terms of health, changing the weight to closely related indicators of education and living standards has a greater impact on the number of poor people identified across countries. It also reflects the specificity of each national survey in identifying deprivations at national level, which may differ from other surveys in the same region.

A3. Concurrent Deprivations at Regional Level

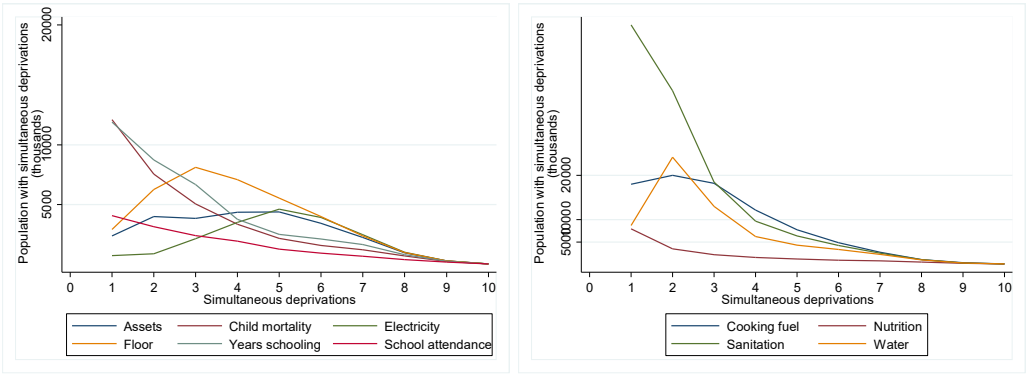
The pattern of overlapping deprivations varies according to region. Figure A1 covers ECA, MENA and LAC regions and its vertical axis identifies people at each simultaneous deprivation threshold. In ECA and MENA, the overlap of three or more deprivations is seldom identified by any indicator. In LAC, most indicators tend to identify households experiencing between two and three deprivations, while households that lack electricity and assets would tend to also experience four or more simultaneous deprivations; this also occurs in the MENA region.

Figure A1. Number of people deprived in each indicator and N simultaneous deprivations by selected regions, 2015

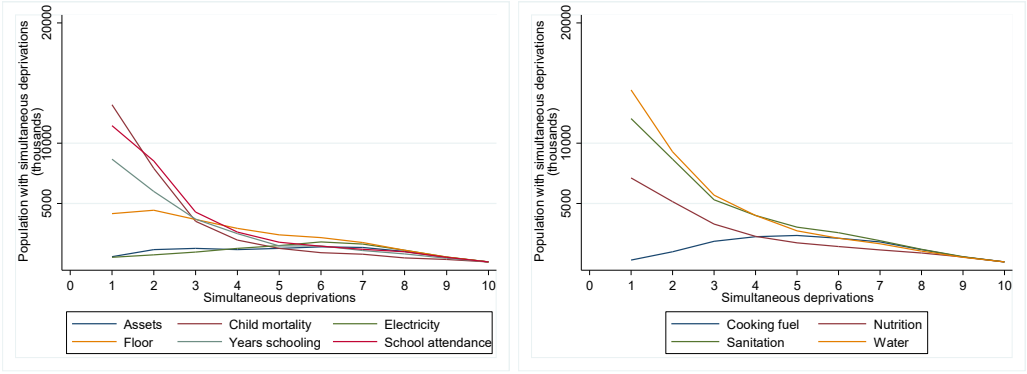
Europe and Central Asia



Latin America and the Caribbean



Middle East and North Africa

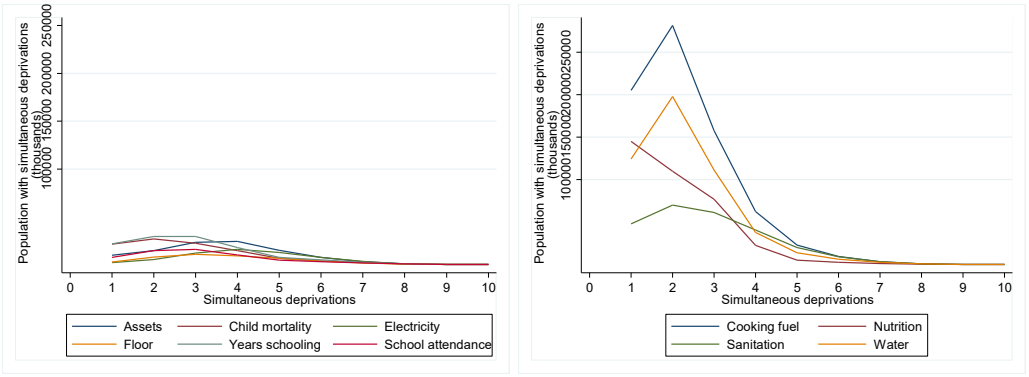


Source: Authors' estimates.

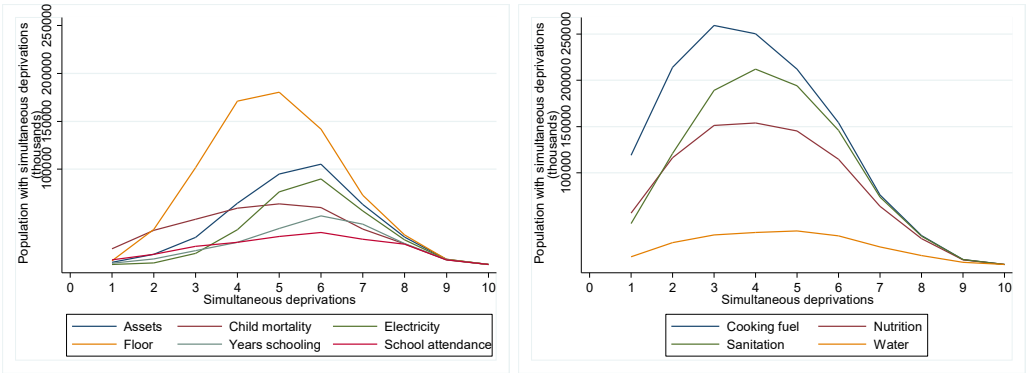
Figure A2 shows EAP, SA, and SSA which are the regions in which larger populations experience multiple deprivations. In SSA, almost every single indicator identifies people in households enduring between six and eight concurrent deprivations. In SA all indicators identify large amounts of people deprived in four or more simultaneous deprivations, while assets, electricity and school attendance identify the population enduring six or more deprivations simultaneously. In EAP, the average number of simultaneous deprivations decreases for all indicators to between two and four. Sanitation, nutrition, water and cooking fuel are the only deprivations that are prevalent across more than 50,000 people in the EAP region.

Figure A2. Number of people deprived in each indicator and N simultaneous deprivations by selected regions, 2015

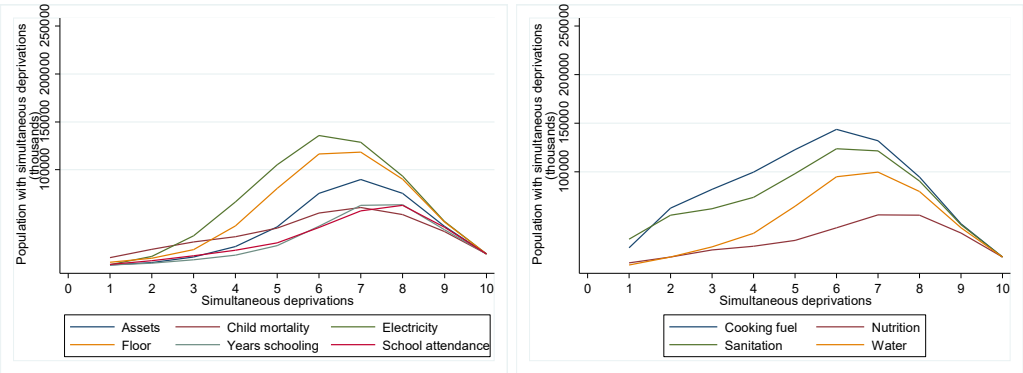
East Asia and Pacific



South Asia



Sub-Saharan Africa



Source: Authors' estimates.

A4. Characteristics of Households

Table A5. Household size by poverty status, % population, 2015

	Household size				
	1–2	3–5	6–9	10–14	over 14
All population in sample	10.2%	50.5%	31.4%	6.5%	1.4%
MPI-1	5.7%	35.5%	43.3%	12.2%	3.3%
MPI-2	6.0%	36.3%	43.8%	11.3%	2.7%
MPI-3	7.3%	37.0%	43.2%	10.5%	2.1%
All population in sample					
East Asia & Pacific	15.2%	60.8%	21.8%	2.1%	0.1%
Europe & Central Asia	18.7%	51.6%	25.0%	4.1%	0.5%
Latin America & Caribbean	14.5%	60.9%	21.8%	2.6%	0.2%
Middle East & North Africa	5.2%	41.8%	40.8%	9.8%	2.4%
South Asia	4.8%	45.2%	38.6%	9.3%	2.1%
Sub-Saharan Africa	7.2%	35.3%	42.0%	12.2%	3.3%
MPI-1					
East Asia & Pacific	12.0%	44.9%	36.5%	6.2%	0.4%
Europe & Central Asia	4.3%	28.9%	41.9%	18.4%	6.5%
Latin America & Caribbean	11.7%	43.4%	36.6%	7.5%	0.8%
Middle East & North Africa	2.2%	21.3%	46.9%	21.1%	8.4%
South Asia	5.2%	37.5%	43.0%	11.3%	3.0%
Sub-Saharan Africa	4.7%	30.8%	45.5%	14.7%	4.3%
MPI-2					

East Asia & Pacific	12.2%	45.8%	36.7%	5.0%	0.3%
Europe & Central Asia	5.7%	19.7%	56.4%	11.4%	6.9%
Latin America & Caribbean	12.2%	38.3%	40.6%	7.8%	1.0%
Middle East & North Africa	3.7%	22.2%	49.3%	19.8%	5.1%
South Asia	6.4%	40.1%	42.1%	9.3%	2.1%
Sub-Saharan Africa	5.0%	32.5%	45.7%	13.5%	3.3%
MPI-3					
East Asia & Pacific	15.1%	45.4%	34.8%	4.6%	0.2%
Europe & Central Asia	15.4%	20.6%	55.0%	8.9%	0.0%
Latin America & Caribbean	14.5%	39.4%	38.3%	7.0%	0.8%
Middle East & North Africa	4.9%	24.0%	51.7%	16.7%	2.6%
South Asia	9.4%	42.4%	39.5%	7.5%	1.1%
Sub-Saharan Africa	5.5%	33.6%	45.6%	12.5%	2.7%

Source: Authors' estimates.

Table A6. Occupation of eligible household members by poverty status, 2015

Occupation	% population 2015			Millions in 2015		
	Non-agriculture	Agricul-ture	missing	Non-agriculture	Agricul-ture	Missing
All population in sample	66.0%	32.9%	1.1%	1680.3	836.6	27.2
MPI-1	48.3%	50.6%	1.1%	546.8	572.6	12.1
MPI-2	41.2%	57.7%	1.1%	357.1	500.4	9.6
MPI-3	35.1%	63.5%	1.4%	212.9	385.0	8.2
All population in sample						
East Asia & Pacific	72.3%	27.7%	0.0%	123.0	47.1	0.1
Latin America & Caribbean	55.2%	44.8%	0.0%	14.9	12.1	0.0
Middle East & North Africa	83.5%	14.4%	2.2%	105.1	18.1	2.7
South Asia	72.5%	26.0%	1.5%	1110.6	398.5	23.4
Sub-Saharan Africa	47.4%	52.4%	0.1%	326.6	360.9	0.9
MPI-1						
East Asia & Pacific	54.9%	45.1%	0.1%	17.8	14.6	0.0
Latin America & Caribbean	31.4%	68.6%	0.0%	2.9	6.4	0.0

Middle East & North Africa	64.7%	29.8%	5.5%	10.2	4.7	0.9
South Asia	59.1%	39.3%	1.7%	379.8	252.5	10.9
Sub-Saharan Africa	31.6%	68.3%	0.1%	136.2	294.4	0.3
MPI-2						
East Asia & Pacific	50.4%	49.5%	0.1%	9.0	8.9	0.0
Latin America & Caribbean	27.1%	72.9%	0.0%	2.0	5.4	0.0
Middle East & North Africa	59.0%	32.8%	8.1%	4.6	2.5	0.6
South Asia	53.4%	44.6%	2.0%	225.6	188.3	8.6
Sub-Saharan Africa	28.2%	71.8%	0.1%	115.9	295.3	0.3
MPI-3						
East Asia & Pacific	52.7%	47.3%	0.1%	6.5	5.9	0.0
Latin America & Caribbean	25.9%	74.1%	0.0%	1.5	4.4	0.0
Middle East & North Africa	58.4%	32.4%	9.2%	3.2	1.8	0.5
South Asia	48.0%	48.7%	3.3%	108.9	110.5	7.4
Sub-Saharan Africa	26.1%	73.8%	0.1%	92.7	262.5	0.3

Source: Authors' estimates.

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Endnotes

[i] To give more detail to these summary characteristics: 80.1% of the total poor are found to be primarily rural, compared to 44% of the 'non-poor' (defined as those above the 'moderate' monetary poverty line of $3.10 per day); 44.2% of the poor are 0–14 years of age and 61.2% are under 24 years, compared to 21.6% and 38.8% respectively of the non-poor; 64.6% of the total poor are working in agriculture, compared to 20.2% of the non-poor; and 60.9% of the poor have no education or incomplete primary education, compared to 34.6% of the non-poor. Castañeda et al. also find that 50.0% of the poor are women, compared to 50.7% of the non-poor. The sample for these estimates is based on household surveys from 2009–2014 covering 89 developing countries, of which 30 have income data and the remaining 59 are consumption based. One difference between our underlying data set and that of Castañeda et al. is that Castañeda et al. have a larger coverage of regions such as East Asia and the Pacific (EAP) and Europe and Central Asia (ECA), but smaller coverage of the Middle East and North Africa (MENA), South Asia (SA), and sub-Saharan Africa (SSA) regions. That said, the populations in our estimates are similar in age and gender composition to those in Castañeda et al. (2018), but less rural and less frequently employed in agriculture.

[ii] The use of the $3.10-per-day poverty line 'urbanizes' the profile of global poverty by 4.4 percentage points; reduces the proportion of the poor under 14 years of age by almost 10 percentage points; and dramatically reduces the proportion of the global poor working in agriculture by 13 percentage points (from 64.6% to 51.5%). There would also be a fall of almost 12 percentage points in the proportion of global poor with no or little formal education. Data on the regional distribution of the entire sample are given by Castañeda et al. (2018), but the proportion of global poverty by region is not presented, making it impossible to test the Deaton thesis vis-à-vis an 'Africanization' of global poverty, although estimates using the PovCal data set in Edward and Sumner (2015) show how lower poverty lines 'Africanize' global poverty.

[iii] In fact, several studies show relatively little overlap between the monetary and the multidimensional poor: 7.7% of the population in China are both monetarily and multidimensionally poor (Alkire, Wang, Feng, & Xia, 2016); 14–25% of the population are both monetarily and multidimensionally poor in Ethiopia and Vietnam, depending on the precise periods studied between 1999 and 2009 (Roelen, Gassmann, & de Neubourg, 2012); and 22% of the population in Lao PDR are both monetarily and multidimensionally poor (Bader, Bieri, Wiesmann, & Heinimann, 2016). We make comparisons with $1.90 poverty simply to show how the composition of global poverty differs (or not) to that at the $1.90-per-day line, and not because they are comparable directly.

[iv] We thus update, expand, and extend the global poverty profile of Alkire and Santos (2014) which made estimates for 2007. Different multidimensional poverty methodologies have been used to carry out aggregation of different dimensions of poverty (Bourguignon & Chakravarty, 2003; Tsui, 2002). The most comprehensive attempts to estimate global multidimensional poverty include the global Multidimensional Poverty Index (MPI) (Alkire & Santos, 2014; UNDP, 2010) and UNICEF's Multidimensional Overlapping Deprivation Analysis (MODA) (de Neubourg, Chai, de Milliano, Plavgo, & Wei, 2012; see also Gordon, Nandy, Pantazis, Pemberto, & Townsend, 2003). Both indexes are based on the Alkire and Foster (2011b) counting methodology, and have regional and national adaptations for developing and developed countries. The Alkire–Foster multidimensional poverty measure, like any poverty measure, is not without its critics; notably, that data are taken from different years and not interpolated/extrapolated as there is no accepted way to do this. Further, the choice of components themselves, the weighting, and the cut-offs have been subject to considerable debate (for critique, see Ravallion, 2011; for reply, see Alkire & Foster, 2011b).

[v] The analysis in this section includes Argentina and Libya entirely as urban population, as survey data for these two countries cannot be disaggregated into urban and rural areas.

[vi] For Argentina, Belarus, and Georgia the time lag is nine years between multidimensional surveys and income surveys. These three countries have been excluded from this comparison, so the time lapse between surveys varies from one to six years.

[vii] Normative decision making involved in the aggregation step has been discussed elsewhere (Alkire & Foster, 2011b; Atkinson, 2003; Ravallion, 2011). Our analysis is based on the counting approach proposed by Alkire and Foster (2011a).

[viii] The age and gender structure estimates from the survey data show a maximum difference of 2% of country age and gender groups published by UNDESA (2015). Although we validate age and gender groups in each country against the population projections published by UNDESA (2015), we do not adjust survey sampling weights to match population projections. Instead, we use survey estimates to characterize deprivation rates and household profiles of country population, and we simply re-scale these to reflect the UNDESA (2015) total country population figures in 2015. Further research should analyze the sensitivity of alternative approaches such as matching population projections or accounting for changes between survey years and the reference year in the analysis, although some sensitivity analysis shows only minor differences to full alignment to reference year population estimates (Castañeda et al., 2018). The survey data used contain missing information for the 10 indicators selected and the characteristics profiled in this analysis. These missing data are sometimes attributable to the fact that survey questionnaires do not cover specific demographic groups. This is a

weakness in the specification of indicators above, or a limitation of the profiles described in the annex. A compromise has been reached in including indicators for specific demographic groups partly with the aim of enhancing the geographical coverage of this analysis. If the missing data that occur are attributable to non-response, households are excluded from the analysis and this is reported in the methodological annex.

[ix] The countries with missing data are as follows. Bosnia and Herzegovina, Macedonia, Barbados, Saint Lucia, and Suriname have no information on child mortality; Ukraine, Trinidad and Tobago, Indonesia, Afghanistan, Vietnam, and the Dominican Republic have no information on nutrition; China has no information on flooring; Egypt lacks an indicator for cooking fuel; there is no indicator of electricity for Honduras; Jamaica lacks information on child mortality and flooring; Brazil lacks information on nutrition and flooring; and the Philippines lacks information on school attendance and nutrition. Cooking fuel has no specification on cooking outside or with ventilation.

[x] The age structure of most geographic regions shows a difference of 1–2% relative to that which is published by UNDESA (2015), except for Europe and Central Asia. Twenty-two country data sets are missing the age of people interviewed which represents 1,000–6,000 people in each country. However, the missing age of interviewees in South Africa and Indonesia represents 11,000 people. See methodological annex for more detail.

[xi] The country data sets analyzed are Afghanistan, Benin, Burkina Faso, Cambodia, Chad, Comoros, DR Congo, Egypt, Ethiopia, Gambia, Ghana, Guatemala, Guinea, Haiti, India, Jordan, Kenya, Liberia, Lesotho, Liberia, Malawi, Mali, Mozambique, Myanmar, Namibia, Nigeria, Pakistan, the Philippines, Rwanda, Senegal, Sierra Leone, Togo, Tanzania, Yemen, Zambia, and Zimbabwe.

[xii] The male questionnaire is not present in the surveys of Yemen, Egypt, Jordan, and the Philippines. In the case of India, the questionnaire asks eligible men and women (aged respectively 15–49 and 15–59 years) about the time devoted to income-generating activities in the past year, and it is assumed that interviewees have agriculture as their occupation if they devoted one hour or more to agriculture as an income-generating activity.