



Multidimensional Poverty Index – Winter 2016: Brief Methodological Note and Results

MPI Methodological Notes 43

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Introduction

The Multidimensional Poverty Index (MPI) Winter 2016 updates use the same parameters (dimensions, indicators, cutoffs and weights) and the same functional form (Alkire and Foster Adjusted Headcount Ratio M_0) as in previous years.¹ This brief methodological note presents the Winter 2016 MPI updates, and releases the tables with the full results: national MPI, destitution and vulnerability results, rural, urban, subnational region, changes over time, and complete estimations, as well as complementary data, dimensional breakdowns, and confidence intervals. Destitution data are now available for 102 countries. It first explains the main updates in the Winter 2016 MPI, following the guidelines for updates presented in the 2014 Methodological Note (Alkire, Conconi and Seth 2014b). It uses the MPI methodology that has been presented in detail in previous methodological notes (Alkire and Santos 2010; Alkire, Roche, Santos and Seth 2011; Alkire, Conconi and Roche 2013; Alkire, Conconi and Seth 2014b; Alkire and Robles 2015; Alkire, Jindra, Robles and Vaz 2016). Then it briefly describes the methodological assumptions considered for the estimation of each dataset. The results of these estimations are presented in the form of 7 main tables, 103 country briefings and the interactive databank, all available on OPHI's website (www.ophi.org.uk).

1. 2016 MPI Updates

Updated MPIs from new data

The 2016 Winter MPI presents updated estimations for 9 countries including Algeria, which was not reported in the June 2016 dataset, and 15 datasets for 14 countries were updated in June 2016. Thirty-eight

¹ From January 2015, the global MPI estimations are updated twice per year. This methodological note appends the considerations for the new country estimations.

datasets for 37 countries were updated in June 2015. Thirty-three countries were updated in 2014; in 2013 there were updates for 16 countries and in 2011, for 25 countries. MPI estimations for 13 countries are carried out with data that are 2005 or 2006, 30 estimations are carried out with data collected between 2007 and 2010, and the number of analyses with data from 2011 onwards has increased to 58.

The countries in December 2016, together with the surveys used and years are as follows.²

Updated countries: Algeria (MICS 2012-13), Chad (DHS 2014-15), Dominican Republic (2014), Guyana (MICS 2014), Lesotho (DHS 2014), Mongolia (MICS 2013), Sudan (MICS 2014), Sao Tome and Principe (MICS 2014), Thailand (MICS 2012). The survey data used to estimate the Winter 2016 MPI is dated from 2005 to 2015.³

Policies regarding population figures and complementary information

As stated in the 2014 Methodological Note, the surveys are dated according to the year in which the fieldwork took place, as detailed in the survey report. If the fieldwork took place during two calendar years, the data will be labelled with both years, e.g. 2010-11.

In this case, the population figures indicated as those of the year of the survey, as well as the complementary information, will correspond to the second calendar year, or the closest available year with information.

Population figures are reported for 2012 and 2013, using the 2015 Revision of World Population Prospects (UNDESA 2015). When, for illustrative purposes, regional aggregates are presented, 2012 population data are employed. Aggregate MPI estimates in 2015 used 2011 population data, in 2014 used 2010 population data, and in 2013 used 2009 population data. The population year used for aggregate estimates changes by one year annually in the summer updates.

2. The MPI Methodology: Poverty, Vulnerability, and Severe Poverty

The MPI is a measure of acute global poverty developed by the Oxford Poverty and Human Development Initiative (OPHI) with the United Nations Development Programme's *Human Development Report* Office (Alkire and Santos 2010, 2014; UNDP 2010 and previous methodological notes). The index belongs to the family of measures developed by Alkire and Foster (2007, 2011); Alkire, Foster, Seth, Santos, Roche

² Recent surveys for other countries/years (Nigeria MIS 2014) were also considered but eventually dismissed from the calculations of the MPI 2016 because they do not satisfy the policies for updating, which are explained in the 2013 Methodological Note.

³ In 2014, the MPI reported estimations from 2003 to 2013 along with China WHS 2002. In 2013, MPI estimations were carried out using data from 2002-2011; in 2011 from 2000-2010; and in 2010 from 2000-2008.

and Ballon (2015). In particular, it is an application of the adjusted headcount ratio, M_0 . This methodology requires determining the unit of analysis (here the household), identifying the set of indicators in which each person is deprived at the same time and summarizing their poverty profile in a weighted deprivation score. Persons are identified as multidimensionally poor if their deprivation score exceeds a cross-dimensional poverty cutoff. The proportion of poor people and their average deprivation score (i.e. the ‘intensity’ of poverty or percentage of simultaneous deprivations they experience) become part of the final poverty measure. A more formal explanation of the methodology is presented in Alkire and Santos (2014) and in Alkire and Foster (2011).

The Winter 2016 global MPI assesses multidimensional poverty for people in 103 countries for which data from 2005 onwards are available.⁴ As summarized in Table 1, the MPI uses information from 10 indicators which are organised into three dimensions:⁵ health, education and living standards, following the same dimensions and weights as the Human Development Index (HDI). Each person is identified as deprived or non-deprived in each indicator based on a deprivation cutoff (See Table 1 and Alkire and Santos 2010). Health and Education indicators reflect achievements of all household members. Then, each person’s deprivation score is constructed based on a weighted average of the deprivations they experience using a nested weight structure: equal weight across dimension and equal weight for each indicator within dimensions. Finally, a poverty cutoff of 33.33% identifies as multidimensionally poor those people whose deprivation score meets or exceeds this threshold.

The MPI reflects both the **incidence** or headcount ratio (H) of poverty – the proportion of the population that is multidimensionally poor – and the average **intensity** (A) of their poverty – the average proportion of indicators in which poor people are deprived. The MPI is calculated by multiplying the incidence of poverty by the average intensity across the poor ($H \times A$). A person is identified as poor if he or she is deprived in at least one third of the weighted indicators. Those identified as ‘Vulnerable to Poverty’ are deprived in 20% – 33.33% of weighted indicators and those identified as in ‘Severe Poverty’ are deprived in 50% or more of the dimensions.

Table 1 presents the dimensions, indicators, deprivation cutoffs, and weights used in the global MPI 2016, which have not changed.

⁴ MPI estimations prior to 2004 are available on table 7 of the MPI online resources.

⁵ For a more detailed description of the indicator definitions, see Alkire and Santos (2010) and Alkire Roche Santos and Seth (2011).

Table 1: The dimensions, indicators, deprivation cutoffs and weights of the global MPI

Dimensions of poverty	Indicator	Deprived if...	Weight
Education	Years of Schooling	No household member aged 10 years or older has completed five years of schooling.	1/6
	Child School Attendance	Any school-aged child ⁺ is not attending school up to the age at which he/she would complete class 8.	1/6
Health	Child Mortality	Any child has died in the family in the five-year period preceding the survey	1/6
	Nutrition	Any adult under 70 years of age, or any child for whom there is nutritional information is undernourished in terms of weight for age*.	1/6
Living Standard	Electricity	The household has no electricity.	1/18
	Improved Sanitation	The household's sanitation facility is not improved (according to MDG guidelines), or it is improved but shared with other households**.	1/18
	Improved Drinking Water	The household does not have access to improved drinking water (according to MDG guidelines) or safe drinking water is at least a 30-minute walk from home, roundtrip***.	1/18
	Flooring	The household has a dirt, sand, dung or 'other' (unspecified) type of floor.	1/18
	Cooking Fuel	The household cooks with dung, wood or charcoal.	1/18
	Assets ownership	The household does not own more than one radio, TV, telephone, bicycle, motorbike or refrigerator and does not own a car or truck.	1/18

Note for Table 1:

⁺ Data Source for age children start school: United Nations Educational, Scientific and Cultural Organization, Institute for Statistics database, Table 1. Education systems [UIS, <http://stats.uis.unesco.org/unesco/TableViewer/tableView.aspx?ReportId=163>].

*Adults are considered malnourished if their BMI is below 18.5 m/kg². Children are considered malnourished if their z-score of weight-for-age is below minus two standard deviations from the median of the reference population.

**A household is considered to have access to improved sanitation if it has some type of flush toilet or latrine, or ventilated improved pit or composting toilet, provided that they are not shared.

***A household has access to clean drinking water if the water source is any of the following types: piped water, public tap, borehole or pump, protected well, protected spring or rainwater, and it is within a distance of 30 minutes' walk (roundtrip).

Source: Alkire and Santos (2010). For details on the rationale behind each indicator, please see Alkire and Santos (2010, 2014). If survey reports use other definitions of 'adequate' sanitation or 'safe' drinking water we follow the survey reports.

3. The Measurement of Destitution and of Inequality among the Poor

Since 2014, to illustrate the ability of the MPI to consider the 'depth' of deprivations rigorously although data may be ordinal, OPHI have estimated a linked poverty measure, referred to as 'destitution'. The destitution measure has precisely the same dimensions, indicators, weights, and poverty cutoffs as the MPI. Only one set of parameters changes: the deprivation cutoffs. The cutoffs for 8 of the 10 indicators

reflect more extreme deprivations. As a result, the destitution measure identifies a strict subset of the MPI poor who are also deprived in at least one-third of the indicators according to the destitution cutoffs.

That is, those identified as ‘destitute’ are deprived in at least one third or more of the same weighted indicators with more extreme deprivation cutoffs (as described in Table 2). Data on destitution is available for 102 of the 103 countries analysed in the 2016 MPI. For details, see Alkire, Conconi and Seth (2014b).

Table 2: The dimensions, indicators, deprivation cutoffs and weights for measuring destitution

Dimensions of poverty (same as for standard MPI)	Indicator (same as for standard MPI)	Deprived if...
Education	Years of Schooling	No household member has completed at least one year of schooling.
	Child School Attendance	No children are attending school up to the age at which they should finish class 6 .
Health	Child Mortality	2 or more children have died in the household.
	Nutrition	There is severe undernourishment of any adult under 70 years of age (BMI < 17 kg/m²) or of any child (-3 standard deviations from the median).
Living Standard	Electricity	The household has no electricity (no change).
	Improved Sanitation	There is no sanitation facility (open defecation) .
	Improved Drinking Water	The household does not have access to safe drinking water, or safe water is more than a 45-minute walk (round trip).
	Flooring	The household has a dirt, sand, or dung floor (no change).
	Cooking Fuel	The household cooks with dung or wood (coal/lignite/charcoal are now non-deprived).
	Assets ownership	The household has no assets (radio, mobile phone, refrigerator, etc.) and no car.

Since 2014 OPHI has also reported the level of inequality in deprivation scores among the poor, both at the national level and within subnational regions, by using a separate, decomposable inequality measure. OPHI also uses the measure to assess disparity across subnational MPIs. Seth and Alkire (2014) proposed an additively decomposable inequality measure which is a positive multiple of “variance” and which can be broken down into a within-group and a between-group component. For measuring inequality among the poor at the national or subnational level, the inequality measure I^q uses the vector of deprivation scores of the q poor people $c_i(k)$.

$$I^q = \frac{\tilde{\beta}}{q} \sum_{i=1}^q [c_i(k) - A]^2.$$

The difference between each poor person's deprivation score and average intensity is squared, and the squared distances summed and multiplied by a constant $\tilde{\beta}$ to create the measure of inequality. The deprivation scores of the poor range between 1/3 and 1, and so we set $\tilde{\beta} = 1/9$. This is the maximum possible value the inequality measure can take given the range of deprivation scores and thus ensures that the inequality measure is bounded between zero and one. In the 2015/16 MPI estimations, inequality among the poor at the national level varies from 0.006 to 0.300, and inequality among the poor at the subnational level varies from 0 to 0.351.

A lower level of inequality among the poor or a reduction in the level of inequality among the poor, however, may not mean that poverty has uniformly gone down in all regions or population subgroups.

For further details of the measure and how it is applied, see Seth and Alkire (2014).

4. Considerations by Country

This section comments on the methodological details for the analysis of 9 country datasets updated in December 2016.

a) New country datasets

Algeria (MICS 2012-13): Information on child mortality was collected among ever married women aged 15 to 49 years. Anthropometric information was collected among all eligible children under 5 years old. Toilets which 'flush to somewhere else' are not considered improved sources of sanitation in the survey report and are considered as such for the MPI. The usage of bottled water as the main source of drinking water was classified as improved or non-improved according to the main source of non-drinking water. Fuels coded 'en beton, tole and djebbs' were not considered as solid fuels. Following our guidelines to compute subnational figures (Alkire, Roche and Seth 2011), subnational figures are not reported given the fact that the multidimensional headcount ratio for the entire country is smaller than 1.5%. This MPI was first published in December 2016.

Chad (DHS 2014-15): Height and weight information was collected for children under 5 and women aged 15 to 49 years old who were not living in households selected for male and HIV questionnaire, the latter represented 1/3 of the total sample. Following guidelines from the Methodological Note 2013 (Alkire, Conconi and Roche 2013), this MPI estimation is based on such sample with anthropometric information. Child mortality information is provided by eligible women aged 15 to 49 living in all households sampled and eligible men aged 15 to 59 living in a third of the households sampled for male and HIV questionnaires. Table 2.2 on page 16 establishes that toilet which 'flush to somewhere else / do not know where' and 'other' types of toilets are not improved

sources of sanitation and are considered as such for the MPI. Table 2.1 on page 15 states all cases of bottled water are considered as improved water source while 'other' source of water is considered as unimproved in the report and for the MPI. Table 2.3 on page 19 of the report does not consider 'no food cooked' and 'other' responses to types of fuel to reflect inadequate clean cooking fuel, and this MPI estimation follows that categorization for cooking fuel. Survey estimates are disaggregated by rural and urban areas, 20 districts and the capital city. This MPI was first published in December 2016.

Dominican Republic (MICS 2014): This survey lacks of information on nutrition. Child mortality information is provided women aged 15 to 49. The MICS report does not consider 'no food cooked' and 'other' responses to types of fuel to reflect inadequate clean cooking fuel, and this MPI estimation follows that categorization for cooking fuel. The same report states that sources of non-drinking water define whether source of water is non-improved when drinking water is bottled, and so likewise it is considered for the purpose of MPI. Survey estimates are disaggregated by rural and urban areas and 10 health areas. This MPI was first published in December 2016.

Guyana (MICS 2014): Anthropometric information was collected for all children under 5. Child mortality information was collected from all women aged 15-49, and from men in the similar age group living in 1/2 of the households sampled as stated on page 50 of the report. The country report establishes that toilets that 'flush to somewhere else' is not improved. Page 147 states that 'bottled water' as a main source of drinking water is unimproved if the source of non-drinking water is unimproved. Definitions of non-improved toilet and source of drinking water for the MPI followed those in the report. Page 166 of the report establishes 6 as the age to start primary education. 'No food cooked in household' and 'other' sources of fuel are not considered as solid fuel according to the report and this approach was followed in this estimation. Survey estimates are disaggregated by rural and urban areas, by coastal and interior areas, and standard errors can also be reported for 9 regions in the country, as the 7th and 8th regions are advised to be reported jointly by the country report. Missing values to the extent of 10% in child mortality and of 12% in nutrition in Barima-Waini, and of 13% in Potaro-Siparuni were not found to be concentrated only among the most deprived population, so we concluded that disaggregation and inference to 9 regional areas is robust. This MPI was first published in December 2016.

Lesotho (DHS 2014): The DHS report establishes that people in households eligible for biomarkers test were eligible for anthropometric measurements. We also identified a 37.9% of the people in the survey were non-usual members of households, which is not the population of interest of the MPI. Page 11 of the Lesotho DHS 2014 report confirms that 21% of eligible men and women listed in

the household schedule were not usual members of households. We also identified that some non-usual residents of those households selected for anthropometric measures were not eligible for measurement based on the eligibility variables hv117, hv118 and hv120. These two criteria defined the sample on which the MPI was calculated following guidelines from the Methodological Note 2013 (Alkire, Conconi and Roche 2013). As a result we are left with 62% (60% unweighted cases) of the initial sample, a large reduction of sample compared to other surveys. We did not consider this loss of sample in our bias analysis as it is not originated by missing information of usual residents. Child mortality information was provided by eligible men aged 15 to 59 years and women aged 15 to 49 years. Table 2.2 on p. 17 does not specify whether composting toilet is an improved source of sanitation or not, so this MPI estimation considers composting toilet as improved following the guidelines of Alkire and Santos (2014). All bottled water is considered as improved on table 2.1 of page 16. Table 2.3 of the report does not consider 'no food cooked at home' as solid fuel (p. 18), and this MPI calculation follows the report. Survey estimates are disaggregated by rural and urban areas and 10 districts (subnational areas). This MPI was first published in December 2016.

Mongolia (MICS 2013): Anthropometric information was collected from all children under 5 years. Information on child mortality was collected among women aged 15 to 49 years and men aged 15 to 54 years. 84 respondents that attended school levels classified as 'NFEEP' were considered with missing value in education as the report had no information on pages 82 and 83. Type of toilet and water were considered in terms of their definition in the report instead of international standards. Public water kiosks and designated water truck are classified as improved since hygienic procedures in the tanker trucks and tanks in the kiosks are conducted regularly as stated on p. 42 of the report. Page 47 of the report states that pit latrine with slab is classified as unimproved as it often does not meet the international standards. Finally the differentiated type of flooring between two different types of housing, git and ger, was considered when defining unimproved flooring as those with natural flooring. Time to water cannot differentiate between 30 mins and 45 mins, which is the threshold for destitution. 'No food cooked in household' and 'other' types of fuel are not considered as solid fuels. Information is disaggregated at urban and rural level and for 5 regions. This MPI was first published in December 2016.

Sao Tome and Principe (MICS 2014): Anthropometric information was collected from all children under 5 years. Information on child mortality was collected among men and women aged 15 to 49 years. The MICS report does not consider 'no food cooked' and 'other' responses to types of fuel to reflect inadequate clean cooking fuel, and this MPI estimation follows that categorization for cooking fuel. The same report states that sources of non-drinking water define whether source of

water is non-improved when drinking water is bottled, and so likewise it is considered for the purpose of MPI. Information is disaggregated at urban and rural level and for 4 regions although the report expresses that Principe is not a domain of this survey. This MPI was first published in December 2016.

Sudan (MICS 2014): Anthropometric measures are available for all children under five. Child mortality is only available for married women aged 15 to 49. The MICS report considers that ‘no food cooked’ and ‘other’ types of fuel do not reflect inadequate cooking fuel. The report states that ‘bottled water’ as a main source of drinking water is unimproved if the source of non-drinking water is unimproved. This MPI follows the report on this. Information is disaggregated at urban and rural level and to 18 states. 11% of the sample had missing values in child mortality and in nutrition in North Darfor, as well as 10% of sample had missing values in nutrition in North Kordofan and in Red Sea. However, bias of these values was not concentrated uniquely amongst those deprived in the remaining indicators. Therefore, we concluded that estimates disaggregated for 18 states were robust. This MPI was first published in December 2016.

Thailand (MICS 2012) Anthropometric information was collected from all children under 5. Information on child mortality was collected from women aged 15 to 49. Page 53 of the report does not establish that ‘no food cooked in household’ and ‘other’ fuels are inadequate cooking fuel; and the MPI follows this definition. Households in which bottled water is the main source of drinking water are considered as with improved sources of water depending on the source of non-drinking water, according to page 56 of the report. Page 61 establishes that “flush somewhere else” is a non-improved source of sanitation and so does this estimation of MPI. Information is disaggregated for urban (or municipal) and rural (or non-municipal) areas. Following our guidelines to compute subnational figures (Alkire, Roche and Seth 2011), subnational figures are not reported given the fact that the multidimensional headcount ratio for the entire country is smaller than 0.005. This MPI was firstly published in December 2016.

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OPHI's Global MPI Data Bank

www.ophi.org.uk/multidimensional-poverty-index/

OPHI's Global MPI Databank contains a wealth of resources on multidimensional poverty in more than 100 developing countries, enabling users to see how poverty is experienced in different parts of the world, zoom in on sub-national regions, or explore the character of poverty by different indicators. Follow the links below to find out more.

- ✓ **[MPI Country Briefings](#)**: Short, country-specific summaries on the results of the MPI analyses. A number of the briefings include data at the sub-national level.
- ✓ **[MPI Interactive Databank](#)**: An interactive databank that enables you to navigate the world according to the MPI as a whole or by individual dimensions and indicators of MPI poverty. You can zoom in on individual countries, and choose whether you want to see how multidimensional poverty has changed over time.
- ✓ **[MPI Policy Briefings](#)**: The key policy briefings from the 2015 analysis include Alkire and Shen (2015) 'Exploring Multidimensional Poverty in China'; Alkire, Conconi, Robles and Vaz (2015) 'Destitution: Who and Where are the Poorest of the Poor?'
- ✓ **[MPI Data Tables - Main MPI Results](#)**: A table which presents the basic MPI results and sorts 101 countries from low to high.
- ✓ **[MPI Data Tables – MPI at the Sub-national Level](#)**: This table reports the MPI, its two components - the Headcount Ratio and the Intensity of Deprivation among the poor - and other indicators of multidimensional poverty for nearly 990 regions of 78 countries.
- ✓ **[MPI Data Tables – rural-urban areas](#)**: This table gives a breakdown of MPI results by rural and urban areas for 101 countries.
- ✓ **[MPI Methodology](#)**: OPHI's MPI methodological notes explain how the global MPI is calculated and shares the updates that have taken place since it was first reported in 2010.
- ✓ **[MPI Resources](#)**: MPI publications collected in one place, including working papers and exchanges, and training material for producing a global or national MPI.
- ✓ **[MPI Background](#)**: A brief history of the MPI, including how it came to be developed for publication in UNDP's *Human Development Report*, and how it is being used now.
- ✓ **[MPI Case Studies](#)**: Stories of people who are poor according to the MPI in their country: their hopes, strengths and challenges.
- ✓ **[Making your own MPI](#)**: Adaptations of the global MPI for other purposes, such as national poverty measurement, targeting, child poverty measurement and empowerment.
- ✓ **[Online training portal](#)**: Resources on multidimensional measurement techniques, including video and audio files, lecture slides, exercises and reading lists.

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