Multidimensional Poverty Index – Winter 2017-18:  
Brief Methodological Note and Results

MPI Methodological Notes 45

Sabina Alkire and Usha Kanagaratnam

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This analysis, as part of the 2017-18 winter update, uses data from the USAID Demographic and Health Surveys (DHS).


* The Oxford Poverty and Human Development Initiative (OPHI), Oxford Department of International Development, University of Oxford. Contact details: ophi@qeh.ox.ac.uk Tel +44 1865 271915.

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Introduction

The Multidimensional Poverty Index (MPI) 2017-18 uses 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 2017-18 MPI updates and releases tables with the full results in these categories: national MPI, destitution and vulnerability, disaggregation for rural, urban, subnational regions, and complete estimations, as well as complementary data, dimensional breakdowns, and confidence intervals.\(^2\) Destitution data are available for all 104 countries. This brief methodological note first explains the main updates in the 2017-18 MPI, following the guidelines for updates presented in the 2014 Methodological Note (Alkire, Conconi and Seth 2014b). It then summarises the MPI methodology that has been presented in detail in other documents (Alkire and Santos 2010; Alkire, Roche, Santos and Seth 2011). This note then briefly describes the methodological assumptions for the estimation of each updated country dataset. The results of these estimations are presented in Tables 1-5 and 7, 104 country briefings and the interactive databank, all available on OPHI’s website (www.ophi.org.uk).

\(^1\) Since January 2015, the global MPI estimations have been updated twice a year. This methodological note appends the considerations for the new country estimations updated during the winter 2017-18.

\(^2\) The tables on changes over time (Tables 6.1-6.6) and disaggregation by different age groups (Table 8) are not updated in this round. These tables are based on previous updates. Specifically, the changes over time for 22 countries was first made available in the MPI 2013 (Alkire and Roche, 2013) and was updated to include 34 countries in 2014 (Alkire, Roche and Vaz, 2014) and 50 countries in 2015. The disaggregation by different age groups was first made available in the MPI 2017 (Alkire, Jindra, Robles and Vaz (2017).
1. Global MPI 2017-18 Winter Updates

Updated MPIs from new data

The 2017-18 Winter MPI presents updated estimations for 5 countries. The list of updated countries, surveys used and survey years are as follows: Angola (DHS 2015-16), Armenia (DHS 2015-16), Ethiopia (DHS 2016), Nepal (DHS 2016), and Senegal (DHS 2016). In general, the 2017-18 MPI estimates are based on a total of 104 survey country data that is dated from 2006 to 2016. Among the 104 countries, the analyses for five countries are carried out with 2006 data; 18 countries have estimations based on data collected between 2007 and 2011, and 81 countries are based on data from 2012 onwards.

Policies regarding population figures and complementary information

As in previous years, 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. 2015/16. In this case, the population figures indicated as those of the year of the survey, as well as the complementary information, correspond to the second calendar year, or the closest available year with information.

Population figures are reported for 2013 and 2014, using the 2017 Revision of World Population Prospects (UNDESA 2017). When, for illustrative purposes, regional aggregates are presented, 2013 population data are employed. Aggregate MPI estimates in 2017 used 2013 population data; 2016 used 2012 population data; 2015 used 2011 population data; 2014 estimations used 2010 population data, and 2009 population data in 2013. 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). The index belongs to the family of measures developed by Alkire and Foster (2007, 2011); Alkire, Foster, Seth, Santos, Roche 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 global MPI 2017-18 winter update assesses multidimensional poverty for people in 104 countries for which data from 2006 onwards are available. As summarized in Table 1, the MPI uses information from ten indicators that are organized into three dimensions: 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 2014). Health and education indicators reflect the achievements of all household members. 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 dimensions 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.

Table 1 presents the dimensions, indicators, deprivation cutoffs, and weights used in the global MPI. It is useful to note that three consistent changes have been implemented in the indicator deprivation cutoff starting in this update. First, households using bottled water for drinking are classified as using an improved or unimproved source according to their water source for non-drinking activities. In previous rounds, most survey data lacked information on water source for non-drinking activities. However, in more recent surveys, this information is consistently made available. It is also important to note that households using bottled water for drinking are classified as unimproved source if this is explicitly made clear in the survey report. This was also done in previous rounds. The second consistent change that has been adopted in this update is that households are considered deprived if members have to walk 30 minutes or more in a roundtrip (>=30 minutes) to obtain drinking water. In previous rounds of estimation, households are considered deprived only if the roundtrip distance to water is more than 30 minutes (> 30 minutes). Finally, starting from this round of updates, ‘other’ flooring material is considered as deprived. In previous rounds of update, the category of ‘other’ flooring material was considered improved flooring.

3 All ever-published MPI estimations are available in Table 7 of the MPI online resources.
4 For a more detailed description of the indicator definitions, see Alkire and Santos (2010, 2014) and Alkire, Roche, Santos, and Seth (2011).
## Table 1: The dimensions, indicators, deprivation cutoffs, and weights of the global MPI

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

### Note for Table 1:


* Adults are considered malnourished if their BMI is below 18.5 m²/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.

** Unless the survey report definitions change, 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 less than 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.
In sum, the MPI reflects 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 \(H \times A\). Two additional poverty cutoffs are reported in addition to the MPI cutoff by which 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.

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

Since 2014, to illustrate the ability of the MPI to consider the ‘depth’ of deprivations rigorously even if data is ordinal, OPHI has 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 eight of the ten indicators reflect more extreme deprivations. As a result, the destitution measure identifies a 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 all 104 countries analysed in the 2017-18 MPI. For details, see Alkire, Conconi and Seth (2014b).

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 disparities across subnational MPIs. Seth and Alkire (2014) proposed an additively decomposable inequality measure that is a positive multiple of ‘variance’ and that 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, \(c_i(k)\).

\[
I^q = \frac{\hat{\beta}}{q} \sum_{i=1}^{q} [c_i(k) - A]^2
\]
Table 2: The dimensions, indicators, deprivation cutoffs, and weights for measuring destitution

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

The difference between each poor person’s deprivation score and average intensity is squared and the squared distances are 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 to 0.300, and inequality among the poor at the subnational level varies from 0 to 0.375.

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 fallen uniformly 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 methodological issues in the 5 country datasets updated in January 2018.

a) New country datasets

**Angola** (DHS 2015-16): Nutrition indicator is limited to children under 5. The DHS country report states that anthropometric information was collected only from children under five in 50 percent of the households not selected for interviewing men (p.4). Child mortality information was provided by ever-married women aged 15 to 49 and by a subsample of men aged 15-54 years. Table 2.1 of the DHS report (p.18) classifies 'public fountain' as safe drinking water and is considered as such for the MPI. On the other hand, Table 2.1 (p.18) classifies drinking water that is delivered using 'three-wheel-motorcycle' as deprived and the same is considered for the MPI. Table 2.3 of the DHS report (p.19) indicate that ‘flush’ are improved toilet no matter where the flushed material goes to and all others are non-improved toilets. As such, the category ‘flush to open pit (ditch or river)’ is coded as improved in this estimation. The DHS report states (p.7) that the subnational data is representative up to the 18 provinces in Angola. As such, in the context of Angola, MPI estimates are disaggregated by rural and urban areas, and by the 18 provinces. This MPI was first published in January 2018.

**Armenia** (DHS 2015-16): The DHS report establishes that anthropometric measures were collected from all ever married women aged 15 to 49 years and their children aged zero to five (p. 149). Child mortality information was collected from all eligible women and a subsample of men aged 15 to 49 years living across one-half of the households. Table 2.3 on page 14 indicate that 'flush to somewhere else' and 'flush to do not know where' as non-improved sources of sanitation and are considered as such in this estimation. MPI estimates are disaggregated by rural and urban areas and 11 regional (marz) level. This MPI was first published in January 2018.

**Ethiopia** (DHS 2016): As stated in page 4 of the DHS report, anthropometric measures were collected in all households from women aged 15-49 years, men aged 15-59 years and children under the age of 5. Child mortality information was collected from all women aged 15-49 years. Table 2.3 on page 20 indicate that 'flush somewhere else' and 'flush do not know where' as non-improved sources of sanitation and are considered as such in this estimation. MPI estimates for Ethiopia are disaggregated by rural and urban areas, nine geographical regions and two administrative cities. This MPI was first published in January 2018.
Nepal (DHS 2016): Anthropometric information was collected from a subsample of households selected for the male survey. Specifically, the information was collected from all women and men aged 15-49 years and children under the age of 5 living in half of the households sampled as stated in page 4 of the report. Following guidelines from the Methodological Note 2013 (Alkire, Conconi and Roche, 2013), this MPI estimation is based on such samples with anthropometric information. It is worth mentioning that the inclusion of adult (male and female) mortality greatly increased the reported poverty, highlighting a very strong prevalence of nutritional deficits. Still, considering the standardized data over time, Nepal shows strong reduction since 2006, all of which is statistically significant as shown in Table 3.

Table 3: Reduction in MPI, over time, Nepal, 2006-2016

<table>
<thead>
<tr>
<th>Survey</th>
<th>Year</th>
<th>MPI</th>
<th>H</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>DHS</td>
<td>2006</td>
<td>0.348</td>
<td>65.1</td>
<td>53.5</td>
</tr>
<tr>
<td>DHS</td>
<td>2011</td>
<td>0.216</td>
<td>44.1</td>
<td>48.9</td>
</tr>
<tr>
<td>DHS</td>
<td>2016</td>
<td>0.158</td>
<td>35.0</td>
<td>45.0</td>
</tr>
</tbody>
</table>

Source: OPHI's calculation using DHS Nepal data of various years.

Note for changes overtime: Nepal DHS 2006 lacks information on male nutrition. As such, for the purpose of changes over time, male nutrition is dropped from the 2011 and 2016 data. The MPI computed in Table 3 is based on nutrition indicator that is composed only based on women’s and child’s nutrition. This is to ensure compatibility between 2006, 2011 and 2016. However, if the MPI were computed from DHS 2016 using only child nutrition, like MICS 2014, the headcount ratio would be 26.1%.

Child mortality information was collected from all women aged 15-49 years and from a subsample of men of the same age group. Table 2.3 of the report (p.22) indicate that 'flush to somewhere else' and 'flush to don't know where' are non-improved toilet categories and are considered as such in this estimation. The report (p.1) indicates that the data allowed calculation of key demographic indicators, particularly fertility and under-5 mortality rates, at the national level, for urban and rural areas, and for the country's seven provinces. In September 2015, Nepal’s Constituent Assembly approved that Nepal is administratively divided into 7 provinces. The provinces are labelled as Province 1-7. Following this, MPI estimates are disaggregated by rural and urban areas and the seven provinces. This MPI was first published in January 2018.

Senegal (DHS 2016): Anthropometric measures were collected from all children under 5 years. Child mortality information was collected from all women aged 15-49 years and from a subsample of men of the same age group. Table 2.2 of the report (p.17) indicates that the only unimproved toilets are traditional latrines or no toilet/nature. The report considers the category other toilet as
neither improve nor non-improved. However, in this estimation, other toilet is considered as non-improved to be consistent with the indicator for destitution. Senegal has 14 administrative regions, but the data is representative by 4 "grands regions" or categories of regions, as defined on page 7 of the report. This MPI was first published in January 2018.

References


OPHI. (2017). ‘Multidimensional poverty index data bank’, Oxford Poverty and Human Development Initiative. Available at OPHI Global MPI.


OPHI's Global MPI Databank
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 subnational 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 subnational 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 see how multidimensional poverty has changed over time.

- **MPI Policy Briefings**: The key policy briefings from the 2017 analysis.

- **MPI Data Tables – Main MPI Results**: A table that presents the basic MPI results and sorts 104 countries according to their MPI score.

- **MPI Data Tables – MPI at the Subnational 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 more than 1000 regions of more than 80 countries.

- **MPI Data Tables – rural-urban areas**: This table gives a breakdown of MPI results by rural and urban areas for 104 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 the 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.

- **Policy Uses of the 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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