OPHI MPI METHODOLOGICAL NOTE 47

The Global Multidimensional Poverty Index (MPI) 2019

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1. Overview

This document presents the methodology and technical decisions behind the global Multidimensional Poverty Index (MPI) 2019, the Stata do-files and the results presented in Tables 1–5. This document is part of OPHI's Methodological Notes series. A Methodological Note is published for every release of the global MPI.

The first global MPI was developed in 2010 by OPHI (Alkire and Santos, 2010) in collaboration with the UNDP's Human Development Report Office (HDRO). The global MPI is a leading practical example of a multidimensional poverty measurement method established by Sabina Alkire and James Foster (Alkire and Foster, 2011). The index measures non-monetary dimensions of poverty directly (Alkire and Santos, 2014). The global MPI uses information from ten indicators, which are grouped into three equally weighted dimensions: health, education and living standards. These dimensions are the same as those used in the UNDP's Human Development Index. The MPI has two indicators for health, two for education and six for living standards.

In 2018, the global MPI underwent its first major revision since its inception, in order to take into account progress in the availability of data in micro surveys. The purpose was to better align the index to the Sustainable Development Goals (SDGs), thereby improving its usefulness for evaluating poverty and acting effectively to end it (Alkire and Jahan, 2018). The 2018 revision consisted of adjustments in five out the ten considered indicators, namely nutrition, child mortality, years of schooling, housing and assets (Alkire et al., 2018; OPHI, 2018). The number of dimensions and indicators, the weighting scheme (equal dimensional weights and equal indicator weights within the dimensions) and the poverty cutoff (a person is poor if they experience deprivations in at least 33.33% of the weighted indicators) remained unchanged.

The global MPI 2019 primarily applies the 2018 methodology. However, two minor changes have been introduced in this 2019 round. First, we have slightly revised the definition of the child mortality indicator, by including an age cutoff in addition to the time cutoff introduced in 2018. Second, building upon OPHI's 2018 data preparation Stata do-files, a set of improvements to the Stata codes has been applied for the nutrition indicator in this round. It is also useful to mention that a multidimensional inequality measure has been estimated in this 2019 round, based on the methodology discussed in Alkire and Foster (2019); Seth and Alkire (2017); and Alkire et al. (2015).

This document is structured as follows. Section 2 presents the global MPI measures and structure, and explains how the global index differs from national MPIs. Section 3 outlines policies that guide the inclusion, management and estimation of the country datasets included in the global MPI.

Section 4 provides a summary of the new surveys included in the global MPI 2019. Section 5 highlights the specific changes introduced in the global MPI 2019. Section 6 summarises the country-specific technical decisions that were applied for each of these new surveys. In Section 7 we present concluding remarks in relation to the global MPI 2019.

2. The global MPI: Measures and structure[1]

2.1 Indices and sub-indices

The global MPI is an index designed to measure acute poverty. Acute poverty has two main characteristics. First, it includes people living under conditions where they do not reach **the minimum internationally agreed standards in indicators of basic functionings,**[2] such as being well nourished, being educated or drinking clean water. Second, it refers to people living under conditions where they do not reach the minimum standards in **several** aspects **at the same time**. In other words, the global MPI ordinarily measures those experiencing **multiple deprivations** – people who, for example, are both undernourished and do not have safe drinking water, adequate sanitation and clean fuel.

The global MPI is an overall headline indicator of poverty that enables poverty levels to be compared across places and shows quickly and clearly which groups are poorest. Having one at-a-glance indicator is tremendously useful for communicating poverty comparisons to policy actors and civil society. The MPI also is a 'high-resolution lens' because it can be broken down in different intuitive and policy-relevant ways. The most important breakdowns are **incidence/intensity** and **dimensional** composition.

For incidence/intensity, the MPI combines two key pieces of information to measure acute poverty. The **incidence** of poverty is the proportion of people (within a given population) who are identified as poor on the basis of the multiple deprivations they experience. It is denoted *H* for **headcount ratio**. The **intensity** of poverty is the average proportion of (weighted) deprivations poor people experience – *how* poor people are, on average. It is denoted *A* for **average deprivation share**. The MPI is the product of both: **MPI = H x A**.

1 The text in this section is drawn from methodological notes published for previous rounds of the global MPI. It is useful to include such a text in each methodological note, in order to provide an overview of the MPI and its indices to first-time users of the global MPI data.

2 In Amartya Sen's capability approach, **functionings** are the valuable beings and doings that a person can achieve.

Both the incidence and the intensity of these deprivations are highly relevant pieces of information for poverty measurement. The percentage of people who are poor *H* is a necessary measure. It is intuitive and understandable by anyone. People always want to know how many poor people there are in a society as a proportion of the whole population. Yet that is not enough.

Imagine two countries: in both, 30% of people are poor (incidence). Judged by this piece of information, these two countries are equally poor. However, imagine that in one of the two countries poor people are deprived – on average – in one-third of the dimensions, whereas in the other country, the poor are deprived – on average – in two-thirds. By combining the two pieces of information – the intensity of deprivations and the proportion of poor people – we know that these two countries are not equally poor, but rather that the second is poorer than the first because the intensity of poverty is higher among the poor.

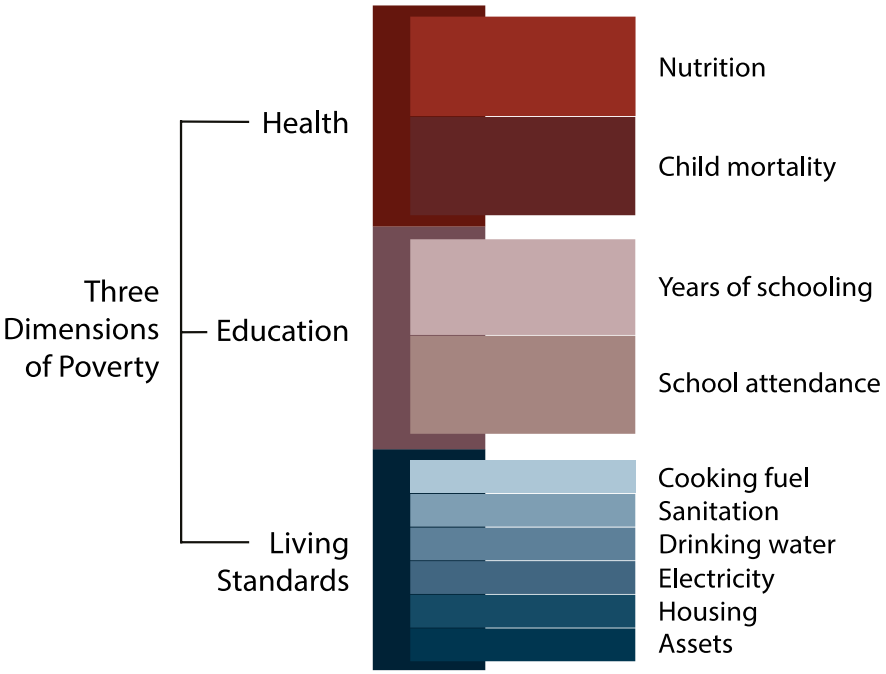
With respect to **dimensional** composition, the MPI can be consistently broken down by each of its indicators. One particular number that is of interest is what percentage of people are poor and are deprived in each component indicator (j). This is the censored headcount ratio h_j. The MPI is made by adding up the censored headcount ratios of each indicator, where, before adding, each is multiplied by its proportional weight. MPI = sum $[w_j(h_j)]$ for all j, where w_j add up to 1.

Because of its robust functional form and direct measures of acute deprivation, insofar as the indicators are comparable, the MPI can be used for **comparisons** across countries or regions of the world, as well as for within-country comparisons between subnational regions, rural and urban areas, different age groups, and other key household demographics such as ethnicity, religion and household headships. Furthermore, it enables analysis of **patterns of poverty**: how much each indicator and each dimension contributes to overall poverty.

2.2 The global MPI structure

The global MPI measures acute poverty using information from ten indicators, which are grouped into three equally weighted dimensions: health, education and living standards. The MPI has two indicators for health: nutrition and child mortality; two for education: years of schooling and school attendance; and six for living standards: cooking fuel, sanitation, drinking water, electricity, housing and assets (Figure 1).

Figure 1. Composition of the global MPI – dimensions and indicators



The global MPI begins by establishing a deprivation profile for each person, which shows which of the ten indicators they are deprived in. Each person is identified as deprived or non-deprived in each indicator on the basis of a deprivation cutoff (Table 1). In the case of health and education, each household member may be identified as deprived or not deprived according to available information for other household members. For example, if any household member for whom data exist is malnourished, each person in that household is considered deprived in nutrition. Taking this approach – which was required by the data – does not reveal intrahousehold disparities, but it is intuitive and assumes shared positive (or negative) effects of achieving (or not achieving) certain outcomes.

Next, looking across indicators, each person's **deprivation score** is based on a weighted average of the deprivations they experience. The indicators use a nested weight structure: equal weights across dimensions and an equal weight for each indicator within a dimension.

The MPI reflects both the **incidence** or headcount ratio (H) of poverty – the proportion of the population who are 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% to 33.33% of weighted indicators, and those identified as being in 'severe poverty' are deprived in 50% or more of the dimensions.

Table 1. Global MPI 2019 – Dimensions, indicators, deprivation cutoffs and weights

Dimensions of poverty	Indicator	SDG Area	Deprived if…	Weight
Health	Nutrition	SDG 2	Any person under 70 years of age, for whom there is nutritional information, is malnourished.[1]	1/6
	Child mortality	SDG 3	A child under 18 years of age has died in the family in the five-year period preceding the survey.[2]	1/6
Education	Years of schooling	SDG 4	No household member aged 10 years or older has completed six years of schooling.	1/6
	School attendance	SDG 4	Any school-aged child is not attending school up to the age at which he/she would complete class 8.[3]	1/6
Living Standards	Cooking fuel	SDG 7	A household cooks with dung, agricultural crops, shrubs, wood, charcoal or coal.	1/18
	Sanitation	SDG 11	The household's sanitation facility is not improved (according to SDG guidelines) or it is improved but shared with other households.[4]	1/18
	Drinking water	SDG 6	The household does not have access to improved drinking water (according to SDG guidelines) or safe drinking water is at least a 30-minute walk from home (as a round trip).[5]	1/18
	Electricity	SDG 7	The household has no electricity.[6]	1/18
	Housing	SDG 11	The household has inadequate housing: the floor is made of natural materials or the roof or wall are made of rudimentary materials.[7]	1/18
	Assets	SDG 1	The household does not own more than one of these assets: radio, TV, telephone, computer, animal cart, bicycle, motorbike, or refrigerator, and does not own a car or truck.	1/18

Notes:

[1] Adults 20 to 70 years are considered malnourished if their Body Mass Index (BMI) is below 18.5 m/kg2. Those aged 5 to 19 are identified as malnourished if their age-specific BMI cutoff is below minus two standard deviations. Children under 5 years of age are considered malnourished if their z-score of either height-for-age (stunting) or weight-for-age (underweight) is below minus two standard deviations from the median of the reference population. In the global MPI, most surveys had anthropometric information for children under 5 years. In addition, most DHS surveys had nutrition information for women 15 to 49 years of age, and a few had nutrition information for adult men.

[2] The child mortality indicator of the global MPI is based on birth history data provided by mothers aged 15–49. In most surveys, men have provided information on occurrence of child mortality as well but this lacks the date of birth and death of the child. Hence, the indicator is constructed solely from mothers. However, if the data from the mother are missing, and if the male in the household reported no child mortality, then we identify no occurrence of child mortality in the household.

[3] Data source for age children start compulsory primary school: DHS or MICS survey reports; UIS.Stat

[4] 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. If survey report uses other definitions of adequate sanitation, we follow the survey report.

[5] 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 30 minutes' walk (round trip). If survey report uses other definitions of clean or safe drinking water, we follow the survey report.

[6] A number of countries do not collect data on electricity because of 100% coverage. In such cases, we identify all households in the country as non-deprived in electricity.

[7] Deprived if floor is made of mud/clay/earth, sand, or dung; or if dwelling has no roof or walls or if either the roof or walls are constructed using natural materials such as cane, palm/trunks, sod/mud, dirt, grass/reeds, thatch, bamboo, sticks, or rudimentary materials such as carton, plastic/polythene sheeting, bamboo with mud, stone with mud, loosely packed stones, adobe not covered, raw/reused wood, plywood, cardboard, unburnt brick, or canvas/tent.

In recent years, besides the global MPI, other MPI estimations have increased in prominence. These are the national MPIs, whose design reflects the national policy priorities of each country. The national MPIs are country-level initiatives that correspond to Goal 1.2 of the SDGs. This goal emphasises the need to reduce poverty in all its dimensions according to national definitions. Both the global MPI and the many national MPIs are constructed using the Alkire-Foster method. The Alkire-Foster method is a flexible approach which can be tailored to a variety of institutional and policy requirements and which allows for the selection of different dimensions (e.g. vaccination), indicators of poverty within each dimension (e.g. type of vaccination received by child), indicator cutoffs (e.g. a child lacking age-appropriate vaccinations is considered deprived) and poverty cutoffs. It is useful to conclude this section by summarising the differences between the global MPI and the national MPIs.

The **global MPI** is a global assessment of multidimensional poverty covering over 100 developing countries, using internationally comparable datasets. The global index is updated at least once in a year. In the future, we propose that the global MPI should include at least two different specifications, an MPI for **acute** poverty and one for **moderate** poverty, so that it is relevant to countries or regions with different levels of multidimensional poverty.[3]

The **national MPIs** are multidimensional poverty measures that have been created by adapting the Alkire-Foster method to better address local realities and needs and to make good use of the data available. National MPIs vary in terms of the number and specifications of dimensions and indicators, and have different deprivation cutoffs and poverty cutoffs. Their purpose is to assess multidimensional poverty levels in specific countries or regions in the indicators most relevant and feasible locally. Many governments already publish official national MPIs and use them proactively for policy. The Multidimensional Poverty Peer Network connects many countries that are in the process of considering or designing such official national poverty measurement tools. Countries are the custodian agency for SDG indicator 1.2.2, and a number of countries have stated in their voluntary national reports an intention to report either their national MPI and/or the global MPI or some other multidimensional poverty statistic for that indicator.

3 Latin America and the Arab States have each published regional MPIs with specifications more aligned to moderate poverty definitions. In 2014, the Economic Commission for Latin America and the Caribbean published a regional MPI for Latin America in their Social Panorama (ECLAC, 2014), which covers 17 countries and measures moderate rather than acute poverty, in ways appropriate for that region. A regional report on Arab poverty was published by the UN's Economic and Social Commission for Western Asia.

3. Policies for the global MPI

Calculating the global MPI involves producing numerous measures for over 100 countries, disaggregated for over 1,000 subnational regions, rural/urban areas and age groups, followed by compulsory sensitivity checks to multiple parametric choices at a given time. A well-conceived workflow is vital for a large-scale project like the global MPI. The policies related to the global MPI undergird the efficiency of the workflow for every round of updates. In this section, we highlight key policies that relate to the use of new surveys, the use of new information to improve existing indicators, the computation of the global poor population, the exclusion of non-usual household members, the treatment of household members about whom information in certain indicators is lacking, the treatment of datasets that lack any one of the ten global MPI indicators and the treatment of households with missing indicators.

3.1 New survey data

The global MPI is updated when new data become available from the following sources: Demographic and Health Surveys (DHS) (including Continuous DHS, such as in Senegal); and Multiple Indicator Cluster Surveys (MICS). In the 2019 round, updated survey data were available for 14 countries. Ten of these updated surveys were released by DHS, while four were released by MICS in a period of eight months, that is, from August 2018 to April 2019. We also explore whether there are new national surveys in the public domain that have indicators comparable to those included in the global MPI. National surveys are considered in the absence of surveys produced by DHS and MICS, or if DHS and MICS data are more than three years older than the national surveys. The latter is a criterion introduced in 2019, so as to maximise the possibility of using internationally comparable surveys such as the DHS and MICS.

3.2 Improvements in data sources or survey instruments

Survey instruments such as DHS and MICS improve over time. Our policy is to use as much of the information that is available for the ten global MPI indicators and to incorporate improvements in the new surveys. In 2019, one important improvement in MICS relates to the cooking fuel indicator. The survey now collects information on a) whether a household's cookstove is designed for clean or solid fuel; and b) the type of fuel or energy source used for the cookstove. The combination of this information helps to determine the treatment of cases where the design of the cookstove is for solid fuel and the type of fuel used by the household is not made clear in the survey.

Another example relates to the availability of additional categories of a particular asset. In newer surveys, ownership of a computer may cover desktop computers, laptops and iPads; ownership of a television may include normal televisions and smart TVs; or ownership of a mobile telephone may include smartphones. Similarly when data on ownership of a computer or any hitherto missing asset becomes available, these will be incorporated into the assets indicator. As a result, the MPI estimation for a given year will be the most accurate possible figure using the available data but may not be comparable across time.

3.3 Population-weighted global aggregates

Since 2010 we have used a fixed population year to produce the global aggregations, and have also provided the population data for the year of the survey in the tables, for those who want this information. The headcount ratio for each country in the global MPI 2019 is multiplied by the total population for 2017, regardless the year of the survey, in order to identify the number of MPI poor in any given country or across countries:

$$\text{Number of MPI poor} = H * \text{Total Population}$$

This approach has the important advantage of comparison: it is possible to aggregate across countries to develop regional rankings, to analyse country groupings such as low-income countries, and to aggregate across regions. For example, using this approach we can generate the figure that 23% of the inhabitants in the 101 countries are MPI poor. If the year of the population count (2017) is after the year of the survey, this approach provides an incentive for governments to update their poverty data, because the 'number of poor' will decline if poverty rates have gone down, and will do so more steeply in countries that have strong population growth. The approach also has limitations. In using a headcount ratio that is older than (or more recent than) the reference year of the survey, the assumption is being made that the level of poverty in the year of the survey and the year of population count are identical. We acknowledge that this is a strong assumption, but it is clear. Evidence to date on changes in the global MPI over time do not justify alternative assumptions such as linear extrapolation.

The population count years used for aggregate estimates of the global MPI are updated by one year, annually. As in past years, the current data tables also include the population during the year of the survey, as well as population figures for both the reference year and the year before it (in this case, 2016 and 2017). The source of population data is the World Population Prospects, which is published by the Population Division of the Department of Economic and Social Affairs of the United Nations.

3.4 Excluding *non-usual* residents

The DHS datasets define ***de jure*** residence as **usual** or legal residence. The hv102 variable in DHS datasets distinguishes *de jure* (usual) from non-*de jure* (non-usual) household members. In the global MPI, we only use information from usual residents, and exclude information from non-usual household members. We exclude the information from the non-usual members because this makes it comparable to MICS, which collect information only from usual household members. In addition, the achievement of an occasional visitor (for example, in years of schooling) could cause the household be non-deprived (in education), and this would be arbitrary.

3.5 Applicable and non-applicable populations

Four of the ten indicators are not applicable to the whole population. Households that do not have the relevant population are classed as non-deprived in that indicator.

School attendance is not applicable to households without children of school age. We identify households that did not have children of school age as non-deprived (we consider an eight-year span starting at the age at which a child should begin school in each country). The data source for the age at which children start compulsory primary school is MICS and DHS country survey reports, followed by confirmation using the UIS Global Database.

Children's nutrition is not applicable to households with no children within the eligibility criteria (under five years old for most surveys) to be weighed and measured. We consider households that did not have any eligible children as non-deprived in child nutrition.

Adult BMI is not applicable to households where there were no eligible women or men to be measured anthropometrically. In the global MPI, data on adult BMI is mostly taken from DHS surveys and national surveys. In DHS surveys, information on adult nutrition is usually collected from eligible women aged 15 to 49 years who are *de jure* (usual) members of the household. Women eligible for anthropometric measures are identified using the *eligibility* variable provided by DHS data providers. In some countries, such as Egypt, eligibility criteria exclude women who have never been married. In a number of DHS surveys, nutrition data are also collected from a subsample of adult men. In some other national surveys, nutrition data are collected from all members of the household (e.g. China and Mexico). The global MPI uses all available data on nutrition, up to the age of 70 years (<=840 months in age) to construct the nutrition indicator. The aim of the global MPI is to capture an accurate representation of the household situation with maximum information from members of the household. We consider households that have no members eligible to have their anthropometric measurements collected as non-deprived in adult BMI. For

example, if the household was surveyed by DHS and had only women older than 50 years, who were not eligible to have their anthropometric measurements collected, then the household is identified as non-deprived.

Child mortality is not applicable to households that did not have eligible women who provided this information. For example, in DHS and MICS surveys, child mortality information was only collected from women aged 15 to 49 years who were eligible for individual interview using the women's questionnaire. The questionnaire collects information on birth history, including the date of birth and death of each child. This tells us how old the child was when they died and how long before the survey year the death occurred. We consider households having no eligible women available to be interviewed as non-deprived in child mortality. In a few country surveys, detailed data on birth history were not collected. In such cases, we have constructed the child mortality indicator using any child death reported by eligible women and men. In these countries, households that did not have eligible women and men for individual interviews are identified as non-deprived.

3.6 Treatment of dataset with missing indicators

If a survey dataset is missing any of the ten indicators that make up the global MPI, then that indicator cannot be used in the computation of the poverty measure. Weights are re-adjusted accordingly, such that each dimension continues to be given a weight of one-third. For example, if one living standards indicator is missing, then while originally each of the living standards indicators received a relative weight of 1/18 (5.56%), the remaining indicators will receive a relative weight of 1/15 (6.66%). If one health or education indicator is missing, the other indicator will receive the full weight of one-third. If both indicators in health or education are missing, the dataset does not qualify to be included in the global MPI.

3.7 Dropping households who are missing any indicator

Once each indicator has been constructed, we only use households that have complete information in all the constructed indicators for the poverty estimates. Households that lack data on any indicator are dropped from the final analytical sample. The percentage of the sample that is dropped is reported in the relevant data tables. However, it is timely to review the definition of missing information for future global MPIs. For instance, if households are deprived in 33.33% of the weighted indicators despite having missing indicators, then perhaps it is useful to identify these household as multidimensionally poor. This decision is now under review through our on-going analysis on sample drop and bias analysis.

4. Survey details of global MPI 2019

4.1 Surveys excluded from previous round

The 2019 global MPI estimations are based on survey data from 101 countries. By contrast, the global MPI 2018 covered 105 countries. Four countries from the 2018 round were excluded in this round, namely Azerbaijan, Djibouti, Somalia and Uzbekistan, as their surveys were very out of date. All four surveys were fielded in 2006.

4.2 New country surveys in 2019

From the pool of 101 countries, 14 countries had updated surveys (Table 2). Seventy-five of the countries had surveys that were carried out in the last five years, that is, between 2013 and 2018. Four surveys were fielded earlier than 2010 – the survey in Vanuatu was carried out in 2007; in Bolivia, in 2008; in Madagascar, in 2008–09; and in Syria, the survey year was 2009. We have made use of these surveys as they were collected in the last decade, and with the hope that the countries will be motivated to replace them with updated ones whose results are made available in the public domain.

Table 2. List of updated surveys used in the global MPI 2019

	Country	Survey	Year
1	Albania	DHS	2017–18
2	Benin	DHS	2017–18
3	Congo Republic	MICS	2014–15
4	Haiti	DHS	2016–17
5	Iraq	MICS	2018
6	Jordan	DHS	2017–18
7	Lao PDR	MICS	2017
8	Maldives	DHS	2016–17
9	Pakistan	DHS	2017–18
10	Philippines	DHS	2017
11	Senegal	DHS	2017
12	Sierra Leone	MICS	2017
13	Tajikistan	DHS	2017
14	South Africa	DHS	2016

The global MPI relies on datasets that are publicly available and comparable for developing countries. Mostly we draw on the DHS and MICS, although for three countries, the source of the data is the Pan Arab Project for Family Health (PAPFAM) surveys. In the countries for which

none of these internationally comparable surveys were available, country-specific surveys that contained information on the MPI indicators were used if high-quality surveys with the same indicators were available, if this was requested and if the data were in the public domain. In 2019, for example, we have used national data for Brazil, China, Ecuador, Jamaica and Mexico.

4.3 Countries that qualify for subnational disaggregation

Out of the 101 countries included in the 2019 global MPI, disaggregation was possible for **83** countries at the subnational level (states, districts, regions or provinces, depending on the country). For subnational disaggregation, countries must satisfy three criteria that were established in preceding rounds of the global MPI (see Alkire et al., 2015 and Alkire et al., 2011).

The first criterion for disaggregation is that the survey report must establish that the sample is representative at the subnational level following the survey metadata on sample design and to basic tabulations in the country survey report. In 2019, 98 country surveys fulfilled this criterion. Three countries – Armenia, Bosnia and Herzegovina, and Saint Lucia – have sample sizes that are representative at the national level but not at the subnational level. Hence, these three countries were excluded at this stage.

The second criterion that qualifies countries for subnational disaggregation is that the national poverty headcount ratio (*H*) and the MPI must be large enough (*H* more than 1.5% and MPI greater than 0.005) so that a meaningful subnational analysis can be pursued. Of the 98 country surveys for which we know the sample allows for disaggregation, the results indicate that 86 countries fulfilled this criterion. The 12 countries that did not satisfy it are Albania, Jordan, Kazakhstan, Republic of Moldova, Maldives, Montenegro, the State of Palestine, Serbia, Thailand, Turkmenistan, Trinidad and Tobago, and Ukraine; these countries showed a combination of H<=1.5% and $M0_0$<=0.005. Note that this second criterion is under revision: we have the standard errors for subnational regions and we will consider whether to publish these for subnational regions and then disaggregate all countries, so users can see whether or not subnational regions' values are significantly different from zero.

The third criterion emphasises that the sample size after the treatment of missing data must be reasonably high, both at the national level and at the subnational level. The national sample size must be at least 85% of the original sample after missing data are treated. This is because a lower sample size may affect accurate comparability across subnational estimations. Following this specific criterion, we identified three countries that did not meet this cutoff. In **South Africa**, the retained sample was 81%. The survey report for South Africa (DHS 2019) corroborates that the

low percentages of valid data for children under five were mainly the result of missing or incomplete data (p. 177), while only some 82% of women and 78% of men consented to being anthropometrically measured (p. 332). In **South Sudan** and **Vanuatu**, the retained samples were 71% and 79% respectively. In South Sudan, close to 24% of the individuals were identified as living in households where there was a child or children under five years, but nutrition data were lacking for those children. Furthermore, close to 8% of the individuals lived in households where eligible women did not provide information on child mortality. In Vanuatu, the high non-response rate is associated with the lack of under-five nutrition information.

Next, every subnational region in a country must have a retained sample size that is at least 75% of the original sample. A smaller sample generates a problem of representativeness for that particular subnational region, which may distort the subnational comparisons. Table 5.6 (of global MPI 2019) indicates that a total of ten subnational regions across three countries fall short by this sub-criterion. The samples retained in two of the nine provinces in South Africa – Western Cape and Gauteng – were 56% and 71% respectively. Six of the ten regions of South Sudan had retained samples of between 70% and 59%. In each of these regions, more than a quarter of the population had missing nutrition information. In two of Vanuatu's eight subnational regions – Torba and Luganville – the retained samples were 74% and 63%. Given that all **10 subnational regions** are within the **three countries** with retained national samples of less than 85%, we pursued a formal test.

A bias analysis test is carried out for each region whose sample size is lower than 75% of the original. We identify the major cause of the sample reduction (in this case nutrition for all three countries), divide the entire sample into two groups based on this cause and check the headcount ratios of the other indicators across these two groups. If there is a systematic and statistically significant difference (at a significance level of 1%) between the headcount ratios across these two groups, then that region does not satisfy the bias analysis test. If a region with a large population share (more than 20%) within a country does not pass the test, we completely exclude the country from our analysis. Following this sub-criterion, we carried out the bias test for the three countries with low retained sample. The results indicated that the likelihood of being deprived in child mortality (as well in other indicators) was not the same for those who had missing nutrition indicators and those who did not. Those without missing nutrition indicators were systematically more likely to be deprived in child mortality (or in other indicators). Following this, all three countries were excluded from the subnational analysis.

In summary, three countries did not meet the first criterion, 12 countries did not meet the second criterion, and three countries had high national and subnational sample loss. As such, only 83 countries with 1,119 regions satisfied all three criteria and are thus used for our subnational analysis.

5. Revisions introduced in the global MPI 2019

This section transparently outlines the changes applied in the global MPI 2019. The revisions in this round of updating are broadly grouped into two categories: revisions to the child mortality indicator and revisions to the Stata codes.

5.1 Revisions to the child mortality indicator

In the revised 2018 global MPI, we introduced a time cutoff for the child mortality indicator. Individuals were identified as deprived in the child mortality indicator if they were living in a household where an eligible mother who had been successfully interviewed had reported child mortality that had occurred during the five years preceding the survey year. In this round of updating, we have sharpened the indicator to include an *age* cutoff: the child had to be a child – that is, under the age of 18 – when they died. For example, using data from the Niger DHS 2012, we identified members of household as deprived if any eligible mother within the household reported the death of any of her children *under the age of 18* between 2007 and 2012, that is, in the five-year period preceding the survey.

The motivation behind the revision of this indicator cutoff is to adopt the international definition of 'child', making the indicator more relevant for child-related health policies. This indicator now reflects the incidence of mortality among children under 18 in the five years preceding the survey year and identifies the extent to which households that experience this significant loss are deprived in other dimensions of their lives as well. The empirical implications of this change are very small.

5.2 Revisions to the Stata codes

These revisions are based on the original Stata codes applied in 2018 to construct the global MPI indicators for estimation. In the global MPI workflow, this step is identified as data preparation. Managing the datasets and constructing the indicators accurately are important for efficiency and accuracy in estimation.

5.2.1 Child anthropometrics and the DHS PR recode

In previous rounds of the global MPI that used DHS, we computed the z-scores for children under five using observations and data from the KR recode data file. The KR recode is limited to the children of eligible women who are usual members of the household. On the other hand, the PR recode data from DHS contain more respondents under five. This is because the PR recode data also include children under five living in an eligible household whose mother may not be present in the household or whose mother has died. The principles of the global MPI are about using all possible information provided by members of a household. As such, we now compute child anthropometric measures using all eligible observations from the PR recode data file. This has led to a small but visible increase in malnutrition in a number of DHS countries.

5.2.2 Anthropometrics for young people aged 15–19 and the DHS PR recode

In 2018, we computed the z-scores for young individuals aged 15–19 years using observations and data from DHS IR recode data for females and MR recode data for males. The IR and MR recodes cover eligible females and males who are usual members of the household and who, in addition, had slept in the household the night before the survey. The DHS, however, apply the biomarker questionnaire to all usual members regardless of where they slept the night before the survey. All individuals who are measured are present in the PR recode data file. Following the principles of the global MPI of using all household information, we construct the nutrition variable of females (and males, if data are present) aged 15–19 using DHS PR recode data file.

5.2.3 Eligibility to provide nutrition data

Most DHS datasets apply the biomarker questionnaire to all usual members of a household. However, data from individual interviews are limited to eligible women (and men, where data were available) who are usual members of the household and who, in addition, had slept in the household the night before the survey. This suggests that in DHS datasets, there are more adults measured (identified through the ha13 and hb13 variables) than are eligible for individual interviews (identified through the hv117and hv118 variables). In our earlier work, we identified the women and men eligible for the nutrition measure by using the hv117 and hv118 variables respectively. Following the principle of making the best use of existing data, we now identify the women and men eligible for the nutrition measure by using the ha13 and hb13 variables respectively.

It should be noted that in DHS datasets, the child mortality information is usually collected from individual interviews. MICS dataset, on the other hand, applies the women's (and men, where relevant) questionnaire to all usual residents. This suggests that because of the survey designs, we

have child mortality information from all females aged 15–49 who are usual residents in MICS, while the information is limited to usual residents who had slept in the household the night before the survey in DHS surveys.

5.2.4 Treatment of missing information related to nutrition indicator

In cases where children under five who were eligible for anthropometric measure but for various reasons were not measured or had unreliable measurement data, and who live in a household that has no adult eligible for anthropometric data, are now identified as missing. Previously those households were identified as ineligible, hence not deprived, owing to the ineligible adult. Similarly, adult women (and men, where data were available) who should have provided anthropometric data but did not, and who live in a household where there is no child eligible to provide anthropometric data, are now identified as missing. Previously those households were identified as ineligible following the ineligible child. However, it should be noted that this revision has led to a substantial increase in missing observations in the final nutrition indicator. For example, following this revision, the sample loss for India 2015–16 increased from less than 1% to slightly more than 3%.

It is also useful to review the treatment of missing observations for anthropometric measurements. Increasingly surveys are documenting a high non-response rate among the population eligible for anthropometric measurement, particularly those living in urban areas. There are several reasons for this: firstly, the respondent is not at home when enumerators turn up to implement the biomarker questionnaire; secondly, respondents refuse to be measured; and finally respondents are incapacitated, which prevents enumerators from measuring them.

In 2019 the change was made to align the code with the stated nutritional definition. This will be reviewed in future, in part because of its strong impact on disaggregation. A preliminary analysis indicated that non-responders for nutrition tended to have low deprivation in other indicators, hence had they been measured and identified as deprived it would not have changed their household's status as non-poor. But further in-depth study is required.

5.2.5 Identifying school age when the school year started

In the school attendance indicator, we identify an out-of-school child as a child who is not attending school until the age at which they should complete class 8. For most countries, we identify the age at which school should be started by using the age reported in the MICS and DHS country survey reports, followed by confirmation using the UIS Global Database.

Of course, there are children who have reached the official age at which they should start school but who are not attending school. This could be a) because they were not of school age when the school year started; or b) because they should be attending but are not. Only the latter are actually

deprived. For MICS surveys we now use the *schage* variable to decrease the errors of inclusion. The *schage* variable was constructed using the date of birth (anonymised in the public data) and information on the academic year in a country. We have used the *schage* variable at this point in time to the four MICS datasets updated in global MPI 2019, namely Congo Republic, Iraq, Lao PDR, and Sierra Leone.

6. Country-specific considerations

The first part of this section details the country-specific decisions with regard to indicator availability and data treatment for each of the 14 updated surveys included in the global MPI 2019. All table and page numbers cited in this section refer to the country survey reports that are either published by DHS or MICS. The second part of this section details the corrections carried out for a number of countries based on mistakes identified in the 2018 data work.

6.1 Updated surveys for 2019

Albania (DHS 2017–18): Anthropometric information was collected among all eligible children under 5 and all women aged 15 to 49. A subsample of men aged 15 to 49, representing 50% of the households sampled, were also measured. Following the principles of the global MPI, we used all available anthropometric information to construct the nutrition indicator. In other words, the nutrition indicator was constructed using the full sample. The report indicates that only some 90 to 93% of the eligible children had complete and valid height, weight and age data (p.155–156). This affected the size of missing observations for the final nutrition indicator. Some 3.4% of the individuals lived in households where there was missing nutrition data. The survey collected child mortality data only from women aged 15 to 49 years despite interviewing women aged 50 to 59 years (p. 3). The survey did not collect information on electricity. We identified all households in the sample as non-deprived in electricity. This is because data from the World Bank and the UN indicate that 100% of the population in Albania has had access to electricity since 1990. The survey estimates are disaggregated by rural and urban areas. The very low national MPI value meant that we did not disaggregate the results by the 12 prefectures.

Benin (DHS 2017–18): In all households, children under five were weighed and measured to determine their nutritional status (p. 3). This has allowed us to construct the nutrition indicator using the whole survey sample. In addition, in a subsample of 50% of the households selected for the domestic violence module, all women aged 15 to 49 years were eligible for anthropometric measurement. The final nutrition indicator is based on the anthropometric information from

children as well as the subsample of women. Survey estimates are disaggregated by urban and rural areas and by twelve administrative departments (p. 2).

Congo, Republic (MICS 2014–15): Anthropometric data was collected from all eligible children under five years of age. For 182 children (2% of the under-five sample), information on age in days was missing. This means it was not possible to construct the nutrition indicator for these children. However 80 of the 182 children have data on age in months. We made use of these data for these 80 children to minimise the sample drop. In Congo, the report considers the category 'open defecation' as neither improved nor non-improved sanitation (p. 141). We consider it as non-improved as this is clearly a deprived standard. The data lack information on ownership of computers. MPI estimates are disaggregated by rural and urban areas and for 12 subnational regions or departments.

Haiti (DHS 2016–17): Height and weight measurements were collected from all children aged 0–5 in the sample. They were also collected from women (15–49) living in two-thirds of the sampled households, as well as from children (5–14), women (35–64) and men (35–64) living in one-third of the sampled households (p. 6). Following the principles of the global MPI, we used all available anthropometric information to construct the nutrition indicator. This indicator was thus constructed using all households that were sampled as part of this survey. We computed the BMI-for-age measure for children aged 5 to 14 years. The child mortality indicator was constructed using data from women aged 15 to 49 years. Survey estimates are disaggregated by rural and urban areas, and by 11 subnational regions, corresponding to the 10 departments, and to the Metropolitan Area.

Iraq (MICS 2018): Anthropometric measures are available for all children under five. For 75 children (0.4% of the under-five sample), information on age in days was missing. This means it was not possible to construct the nutrition indicator for these children. However nine of the 75 children have data on age in months. We made use of the age in months for these nine children to minimise the sample drop. The survey report indicated that packaged water (bottled water and sachet water) and delivered water (tanker truck and cart with small drum/tank) were treated as an improved source of water (p. 281). This estimate follows the report. None of the households that reported that they had no electricity answered questions on televisions and refrigerators. We identified these households as lacking televisions and refrigerators, given that there was no electricity in these households. Survey estimates are disaggregated by rural and urban areas, and by 18 governorates of the country.

Jordan (DHS 2017–18): Height and weight measurements were recorded for all children aged 0–59 months (p. 2) and ever-married women aged 15 to 49 within a subsample consisting of 50% of the households that were sampled by the survey (p. 3). However, an analysis of the anthropometric data for children revealed that estimates of children's nutritional status were unreliable, owing to anomalies in the individual values (p. 197). Therefore, the data file for children under five was not available in the public domain. Furthermore, the country report only published results on the nutritional status of ever-married women. Following this, in the global MPI, the nutrition indicator for Jordan was solely constructed using information from adult women living in a subsample of the households. The survey did not collect information on electricity. We identified all households in the sample as non-deprived in electricity. This is because recent data from the World Bank indicate that 100% of the population in Jordan has access to electricity. In addition, a national report prepared for the UN in 2015 indicated that all areas in Jordan had been covered by electricity network that met international standards, with 99.9% of the homes receiving electricity at suitable and sustainable prices (p. 49). The data lack information on the ownership of bicycles, motorbikes and animal carts. The survey estimates are disaggregated by rural and urban areas. Table 11.8 (p. 216) of the report summarises the nutritional status of women by the 12 governorates in Jordan, suggesting that anthropometric estimates based on the nutrition subsample were representative at the governorate level. However, the very low national MPI value meant that we did not disaggregate the results by the 12 governorates.

Lao People's Democratic Republic (MICS 2017): Anthropometric measures are available for all children under five. For rural areas, the data make a distinction between those with roads and those without roads. For the purpose of the global MPI, we merge these categories to form a single rural category. The data on whether households have access to electricity are grouped into three categories: yes, off-grid; yes, interconnected; and no electricity. For the purpose of the global MPI, the first two categories have been grouped to form a single category that represents access to electricity. In Laos, packaged water (bottled water and sachet water) and delivered water (tanker truck and cart with small drum/tank) are treated as improved sources in the report (p. 306–307). As such, we have followed the report. Some 2,047 individuals reported using other types of unidentified cookstoves to prepare their food. A cross-tab indicates that 2,008 of them had used solid fuel on the cookstove, while 39 of them had used some other type of unidentified fuel. It is very likely that these 39 individuals had also used some form of fuel that is not clean. As such, in the context of Laos, we identify all individuals who reported using other fuel in cookstoves as deprived. None of the households that reported having no electricity answered questions on televisions and refrigerators. We identified these households as lacking televisions and

refrigerators, given that there was no electricity there. The MPI results are disaggregated at urban and rural levels, and into 18 subnational regions.

Maldives (DHS 2016–17): Height and weight measurements were collected from women and men aged 15 to 49, as well as children under aged five, in all households that were sampled (pp. 3–4). According to the Maldives DHS 2016–17 report, either height or weight data were missing for some 32% of children under five (p. 155). The response rates for the anthropometric measurements for women and men were quite low as well. Of all the women and men aged 15–49 in the surveyed households, valid heights and weights were obtained for only about 75% of women and 55% of men. The main reason for non-response was that the individual was not at home. A sizeable proportion of respondents refused to be measured (p. 162). This resulted in a high level of missing observations (13%) for the final nutrition indicator. In terms of assets, the survey lacks information on the ownership of animal carts. It should be noted that in the Maldives, there is no urban/rural designation for residential households. In place of urban/rural location of residence, for this survey, the residence variable was defined as Malé region or other atolls. This corresponds with the urban/rural residence categories used in the 2009 survey. In the global MPI 2019, subnational figures are not reported for the Maldives because the national MPI value is very low and the final number of observations used to estimate the MPI was below 85% of the total observations in the analytical sample.

Pakistan (DHS 2012–13): One in three households in the survey was selected for a male survey. Height and weight information was collected from all ever-married women aged 15–49 years and all children aged 0–59 months living in the households selected for male survey (p. 2). The standard sample weight variable in Pakistan DHS 2017–18 is representative for six of the regions in Pakistan: Punjab, Sindh, Khyber Phaktunkhwa, Balochistan, Islamabad Capital Territory (ICT) and the Federally Administered Tribal Areas (FATA). In other words, the sample weight applied for these six regions will result in nationally and subnationally representative results for Pakistan. MPI estimates are disaggregated by rural/urban areas and by the six subnational regions mentioned above.

Philippines (DHS 2017): This survey did not gather information on nutrition. This means the child mortality indicator is the only indicator within the health dimension, and as such it receives one-third of the dimensional weight. The global MPI estimation for the Philippines is based on nine of the 10 global MPI indicators. MPI estimates are disaggregated by rural/urban areas and by 17 subnational regions.

Senegal (DHS 2017): Anthropometric measures were collected from all children under five years. Some 5% of eligible children under five have missing anthropometric information. As such, when the nutrition results were aggregated to the household level, we found that close to 2% of the population lived in households with missing nutrition information. MPI estimates are disaggregated by rural/urban areas and by 14 administrative regions.

Sierra Leone (MICS 2017): Nutritional information was collected from all children under five. The report does not provide clarity on whether sanitation facilities that flushed to an open drain were improved or not improved (p. 284). We have coded it as unimproved facility, following the SDG definition. In Sierra Leone, packaged water (bottled water and sachet water) and delivered water (tanker truck and cart with small drum/tank) are treated as improved sources in the report (p. 268–269). We have followed the report. In addition, there were six individuals who did not respond on the type of toilet, but they did indicate that they shared their toilet facilities. We therefore identified these individuals as deprived. In terms of cooking fuel, 39 individuals reported using other type of unidentified cookstove. Of these, 36 used solid fuel as a source of energy for the cookstove, while three of them did not report the type of fuel. It is very likely that these three individuals also used some form of fuel that is not clean. As such, we identify all individuals who reported using other type of unidentified cookstove as deprived. In addition, we have also identified 36 individuals as deprived in cooking fuel because they were using the three stone stoves or an open fire. The nature of the stove suggests that the fuel used probably wasn't clean. Finally, the 15 individuals who did not respond to type of cookstove and type of energy source for cookstove have been identified as missing. None of the households that reported having no electricity answered the questions on televisions and refrigerators. We identified these households as lacking televisions and refrigerators, given that there is no electricity there. MPI estimates are disaggregated by rural/urban areas and by 14 subnational regions.

Tajikistan (DHS 2017): Anthropometric information was recorded for a full sample of eligible children aged under five years and women aged 15 to 49 (p. 3). In terms of assets, the dataset had information on both cars and trucks, which was grouped together. The MPI result is disaggregated for urban/rural areas and for five subnational regions.

South Africa (DHS 2016): Anthropometric testing was incorporated into 50% of households selected for the male survey and adult health module (p. 39). Within this subsample, height and weight measurements were recorded for children under five and for men and women aged 15 years and older who consented to be measured (p. 39). Following the global MPI criteria, we take account of the anthropometric data for women and men aged 15 years and up to the age of 70

years only. The final nutrition indicator has 16.5% missing values. This corresponds with the report, where it is stated that the low percentages of valid data for children under five were mainly the result of missing or incomplete data (p. 177). In addition, only some 82% of women and 78% of men consented to being measured (p.332). In addition, child mortality has close to 5% missing observations. This is because some 14% of eligible women did not provide information on their birth history. Therefore, it is not surprising to observe a high missing value. Under sanitation, there were two unique categories – pit latrine with a slab without ventilation pipe, and chemical toilet. Both categories are classified as improved, following the survey report (Table 2.3, p. 56). In the global MPI 2019, subnational figures are not reported for South Africa because the final number of observations used to estimate the MPI was below 85% of the total observations in the analytical sample.

6.2 Corrections to non-updated surveys

BMI-for-age for males aged 15-19 years. For the first time in 2018, we applied the Body Mass Index (BMI) measure adjusted by age for adults aged 15–19 years. However, the codes that were applied to merge the information from women and men 15–19 for eight DHS datasets in 2018 contained an error. Our final work retained the BMI information, instead of the age-adjusted measure for males 15–19 years. We revised the code that would allow for the variables to be merged correctly. This revision was carried out for eight of the country datasets that had this issue, namely, Ethiopia (DHS 2016), India (DHS 2015–16), Liberia (DHS 2013), Namibia (DHS 2013), Nepal (DHS 2016), Rwanda (DHS 2014–15), Uganda (DHS 2016), and Zimbabwe (DHS 2015).

Excluding nutrition information from adults above 70 years living with younger members who were measured. In a few of the countries in the global MPI, nutrition data was collected from all individuals. Following the principles of the global MPI, we only make use of anthropometric data for individuals up to the age of 70 years. In 2018, our data code was structured in such a way that it identified households whose nutrition information came from individuals above 70 years as ineligible, hence the household is identified as nutritionally non-deprived. However, the code is problematic for households where eligible individuals younger than 70 years and individuals older than 70 years were measured. The household was identified as eligible because of the presence of eligible individuals younger than 70 years, but the identification of deprivation in nutrition was based on information collected from older members. We revised the code that would exclude information from older adults living with eligible younger adults. This revision was carried out for three of the country datasets that had this issue, namely, China (CFPS 2014), Mexico (ENSANUT 2016), and Nepal (DHS 2016).

Cambodia DHS 2014. In the global MPI 2018, we wrongly coded walls constructed from metal as improved material despite the survey report indicating the material as rudimentary material. We have made the correction in this round of the global MPI. As a result of this revision, in Cambodia we observe an increase in housing deprivation.

Colombia (DHS 2015–16). In global MPI 2018, we wrongly coded households that reported having no walls as improved rather than unimproved. We have made the correction in this round of the global MPI. As a result of this revision, in Colombia we observe another slight increase in housing deprivation.

Congo, Democratic Republic (DHS 2013–14). In the global MPI 2018, we wrongly coded households that reported having walls made of wood as improved rather than unimproved. We have made the correction in this round of the global MPI. As a result of this revision, in the Democratic Republic of Congo we observe a slight increase in housing deprivation.

Egypt (DHS 2014). In the global MPI 2018, we identified unmarried women as having missing information on child mortality. However, this is inaccurate since the individual questionnaire was only administered on ever-married women. As such, all unmarried women who were ineligible for the individual interview should have been identified as ineligible, hence non-deprived in child mortality indicator. We have applied the correction in this round of global MPI. This particular revision resulted in a slightly larger sample estimation in this round and slight decrease in child mortality deprivation in Egypt.

Ghana (DHS 2014). In Ghana, among adults, anthropometric information was recorded for all eligible women aged 15–49 and men aged 15–59 living in half of the sampled households (p. 6). In global MPI 2018, we identified households that did not have eligible women 15–49 years as non-deprived. This means, in half of the sampled households where there were eligible men 15–59 but no eligible women 15–49, if these men had provided nutrition information and were identified as malnourished, their household were identified replaced as non-deprived owing to the ineligible women. As such, we underestimated the rate of deprivation in nutrition among households with adult men. In this round of the global MPI, we have now corrected for this mistake.

Libya (DHS 2014). In the global MPI 2018, 2.88% of the individuals were identified as living in households with missing child mortality information. We had wrongly identified eligible women who reported child mortality more than five years preceding the survey as missing. They should have been identified as not deprived, following the definition of child mortality. We have corrected

this now. As a result, the missing value for the final child mortality indicator is now 1,283 people (1.26% of the sample). As such, the sample estimation is slightly larger in this round.

Nigeria (MICS 2016–17). In the global MPI 2018, a pool of individuals were identified with unusually high levels of years of schooling. This is because the recoding of the variable ed4b was inaccurate. We have corrected the related code in this round of the global MPI.

Concluding remarks

In sum, the global MPI 2019 updates figures for 14 countries. It uses the global MPI 2018 revisions, with certain modifications. Most of these have very small empirical effects. For example, the restriction of child mortality to children who died before the age of 18, does not exclude many observations. However the change to include nutritional information from all children does strengthen the global MPI by bringing into view more anthropometric data on more children – and in so doing does affect some results. Also the change to nutrition, in 2019, which entailed coding some children and adults as missing instead of non-deprived, has an effect both on the figure and on the ability to disaggregate some countries. Hence this decision will be reviewed in future.

References

Alkire, S. and Foster, J.E. (2019). 'The role of inequality in poverty measurement', OPHI Working Paper 126, Oxford Poverty and Human Development Initiative, University of Oxford.

Alkire, S. and Jahan, S. (2018). 'The new global MPI 2018: Aligning with the Sustainable Development Goals', OPHI Working Paper 121, University of Oxford.

Alkire, S., Kanagaratnam, U. and Suppa, N. (2018). 'The Global Multidimensional Poverty Index (MPI): 2018 revision', OPHI MPI Methodological Notes 46, Oxford Poverty and Human Development Initiative, University of Oxford.

Alkire, S., Foster, J.E., Seth, S., Santos, M.E., Roche, J.M. and Ballon, P. (2015). *Multidimensional Poverty Measurement and Analysis: A Counting Approach,* Oxford: Oxford University Press.

Alkire, S., Conconi, A., Robles, G., Roche, J.M., Santos, M.E., Seth, S. and Vaz, A. (2015). 'The global Multidimensional Poverty Index (MPI): Five-year methodological note', OPHI Briefing 37, University of Oxford.

Alkire, S. and Santos, M.E. (2014). 'Measuring acute poverty in the developing world: Robustness and scope of the Multidimensional Poverty Index', *World Development,* vol. 59, pp. 251–274.

Alkire, S. and Foster, J.E. (2011). 'Counting and multidimensional poverty measurement', *Journal of Public Economics*, vol. 95(7–8), pp. 476–487.

Alkire, S., Roche, J.M., Santos, M.E. and Seth, S. (2011). 'The Global Multidimensional Poverty Index (MPI): 2018 revision', Brief Methodological Note (OPHI Briefing 05), Oxford Poverty and Human Development Initiative, University of Oxford.

Alkire, S. and Santos, M.E. (2010). 'Acute multidimensional poverty: A new index for developing countries', OPHI Working Paper 38, University of Oxford.

ECLAC (2014). *Social Panorama of Latin America*, Santiago, Chile: Economic Commission for Latin America and the Caribbean.

ICF. 2008-2017. Demographic and Health Surveys (various) [Datasets]. Funded by USAID. Rockville, Maryland: ICF [Distributor].

OPHI (2018). *Global Multidimensional Poverty Index 2018: The most detailed picture to date of the world's poorest people*, Oxford: Oxford Poverty and Human Development Initiative.

Seth, S. and Alkire, S. (2017). 'Did poverty reduction reach the poorest of the poor? Complementary measures of poverty and inequality in the counting approach', in (S. Bandyopadhyay, ed.), Research on Economic Inequality, Vol. 25, pp. 63–102. Bingley: Emerald Publishing.

World Bank (2018). *Poverty and Shared Prosperity 2018: Piecing Together the Poverty Puzzle.* Washington, DC: World Bank.