OPHI MPI METHODOLOGICAL NOTE 49

The Global Multidimensional Poverty Index (MPI) 2020

Sabina Alkire, Usha Kanagaratnam, and Nicolai Suppa

July 2020

Acknowledgements

We foremost acknowledge the technical and research assistance we received from Charles-Alexis Couvreur and Juliana Milovich in the global MPI 2020 work. Juliana Milovich's leadership in preparing the Peru national data for initial estimation and Ross Jennings's careful work on the Nigerian dataset followed by an insightful data discussion deserves a special mention. The support of Ricardo Nogales, who advised on the sample bias analysis of the global MPI, was indispensable. We are grateful to Bilal Malaeb for leading the update of the online interactive databank and to Maarit Kivilo for the layout edits and timely uploads of the project outputs on the web. Maya Evans's editorial leadership and coordination of the global MPI 2020 OPHI-UNDP joint report was a monumental achievement for the project. Corinne Mitchell, Monica Pinilla-Roncancio, and Christian Oldiges's help in connecting us with national data providers is much appreciated.

We are very thankful to Cecilia Calderon from the UNDP's Human Development Report Office (HDRO) for jointly cleaning and preparing 25 survey data sets for estimation and cross-checking the national-level estimates. We are truly in debt to the teams at the Demographic Health Surveys (under Sunita Kishor) and the Multiple Indicator Cluster Surveys (under Attila Hancioglu) for their continuous dedication and support. We are deeply appreciative to Maria Payet from the National Bureau of Statistics Seychelles; Dilhanie Deepawansa from the Department of Census and Statistics, Sri Lanka; Moffat Malepa and Kutlwano Sebolaaphuti from Statistics Botswana; Maria del Carmen Franco Suarez from the National Statistics Office of Cuba; and Trevor Croft from ICF International for their timely feedback on queries related to national datasets.

We are grateful to have received shape files from Bangladesh Bureau of Statistics, Statistics Botswana, Dr Bidyadhar Dehury for India and Dilhanie Deepawansa for Sri Lanka.

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.

This note has been prepared within the OPHI theme on multidimensional poverty measurement.

Citation for this document and global MPI 2020 data tables, namely Table 1 (National Results), Table 2 (Other k Values), Table 3 (Age Results), Table 4 (Area Results), Table 5 (Subnational Results), and Table 7 (All MPI Data Published Since 2010):

Alkire, S., Kanagaratnam, U., and Suppa, N. (2020). 'The global Multidimensional Poverty Index (MPI) 2020', OPHI MPI Methodological Note 49, Oxford Poverty and Human Development Initiative, University of Oxford.

Citation for Table 6 (Changes over time):

Alkire, S., Kovesdi, F., Mitchell, C., Pinilla-Roncancio, M., and Scharlin-Pettee, S. (2020). 'Changes over time in the global Multidimensional Poverty Index', OPHI MPI Methodological Note 50, Oxford Poverty and Human Development Initiative, University of Oxford.

Contents

1. Overview

This document presents the methodology and technical decisions behind the global Multidimensional Poverty Index (MPI) 2020, 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 global MPI measures multidimensional poverty in over 100 developing countries, using internationally comparable datasets and is updated annually. The global MPI 2020 applies the 2019 methodology (Alkire, Kanagaratnam, and Suppa, 2019), in addition to minor technical innovations in 2020. Since 2019, we also have been estimating a multidimensional inequality measure that follows the methodology established by Seth and Alkire (2017) and extended by Alkire and Foster (2019). A new element in this 2020 round is that we have also estimated a destitution measure, building on the work by Alkire, Conconi, and Seth (2014).

The first global MPI was developed by Alkire and Santos (2014, 2010) in collaboration with the UNDP's Human Development Report Office (HDRO). The global MPI is a leading policy tool that applies the multidimensional poverty methodology developed by Alkire and Foster (2011). The MPI measures non-monetary dimensions of poverty directly and emphasises the joint deprivations experienced by individuals (Alkire and Santos, 2014). Since its inception in 2010, the global MPI has used information from 10 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.

In 2018, the global MPI underwent its first major revision in order to take into account progress in the availability of data in micro-surveys. The purpose was to better align the index with the Sustainable Development Goals (SDGs), thereby placing the MPI as an appropriate tool to assess the extent of multidimensional poverty in the developing world. A comprehensive empirical analysis of the consequences of this revision by Alkire, Kanagaratnam, Nogales, and Suppa (2020) concludes that the country orderings based on the 2018 revised specifications are robust to the 2010 specifications. The conclusion of that study validates the robustness of the revised global MPI measure to changes in the poverty cutoff and weights, hence establishing it as a relevant policy tool for measuring the state of multidimensional poverty in the developing regions of the world.

This document is structured as follows. Section 2 presents the global MPI methodology, its structure, and related measures. 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 2020. Section 5 highlights the minor methodological innovations implemented in the global MPI 2020. Section 6 summarises the country-specific technical decisions that were applied for each of these new surveys. In Section 7 we present concluding remarks.

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

2.1 Indices and sub-indices

The global MPI is an adjusted headcount ratio measure 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 able to attend school, or using clean fuel for cooking. Second, it refers to people living under conditions where they do not reach the minimum standards in **several** aspects of poverty **at the same time**. In other words, the global MPI measures those experiencing **multiple joint deprivations** – people who, for example, are undernourished, have a school-aged child out of school, do not have safe drinking water, have inadequate sanitation, and lack clean cooking fuel – all at the same time.

The global MPI is an overall headline indicator of poverty that enables poverty levels to be compared across countries and subnational regions insofar as data permit (see Alkire, Kanagaratnam, Nogales, and Suppa, 2019; 2020). It also 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 global MPI also is a 'high-resolution lens' because it can be broken down into its component parts to zoom in on poverty in different intuitive and policy-relevant ways. The most important breakdowns are **incidence**, **intensity**, and **dimensional** composition.

[1] The text in this section draws on 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.

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**.

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. Media tend to pick up on the headcount ratio easily. Yet the headcount ratio as the headline figure 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.

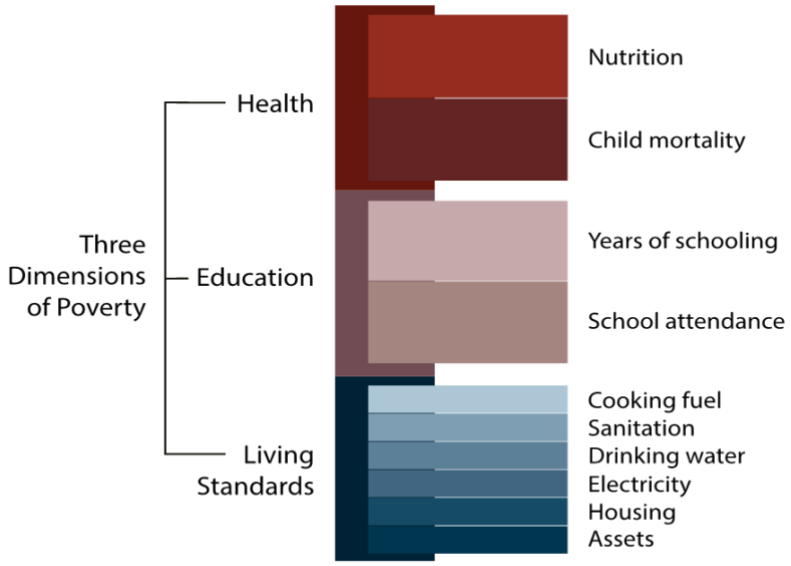
Because of its robust functional form and direct measures of acute deprivation, insofar as the indicators are comparable, the MPI can be used for **comparisons** across countries or regions of the world, as well as for within-country comparisons between subnational regions, rural and urban areas, different 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 10 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



Source: OPHI, 2018

The global MPI begins by establishing a deprivation profile for each person, which shows which of the 10 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 global MPI specifies that a person is identified as **MPI poor** if he or she is deprived in at least one-third of the weighted indicators. In addition, the measure also identifies those who are close to the one-third threshold, that is, individuals are **vulnerable** to multidimensional poverty if they are deprived in 20% to 33.33% of weighted indicators. The measure also specifies a higher poverty cutoff to identify those in **severe** poverty, that is, those deprived in 50% or more of the dimensions.

Table 1. Global MPI 2020 – Dimensions, Indicators, Deprivation Cutoffs, and Weights

Dimensions of poverty	Indicator	Deprived if...	SDG area	Weight
Health	Nutrition	Any person under 70 years of age for whom there is nutritional information is **undernourished**.[1]	SDG 2	1/6
	Child mortality	A child **under 18** has **died** in the household in the five-year period preceding the survey.[2]	SDG 3	1/6
Education	Years of schooling	**No** eligible household member has completed **six years** of **schooling**.[3]	SDG 4	1/6
	School attendance	Any school-aged child is **not attending** school **up to** the age at which he/she would complete **class 8**.[4]	SDG 4	1/6
Living Standards	Cooking fuel	A household cooks using **solid fuel**, such as dung, agricultural crop, shrubs, wood, charcoal, or coal.[5]	SDG 7	1/18
	Sanitation	The household has **unimproved** or **no** sanitation **facility** or it is improved but **shared** with other households.[6]	SDG 6	1/18
	Drinking water	The household's source of **drinking water** is **not safe** or safe drinking water is a **30-minute** or **longer walk** from home, roundtrip.[7]	SDG 6	1/18
	Electricity	The household has **no electricity**.[8]	SDG 7	1/18
	Housing	The household has **inadequate** housing materials in **any** of the three components: **floor**, **roof**, or **walls**.[9]	SDG 11	1/18
	Assets	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.	SDG 1	1/18

Notes: The global MPI is related to the following SDGs: No Poverty (SDG 1), Zero Hunger (SDG 2), Health and Well-being (SDG 3), Quality Education (SDG 4), Clean Water and Sanitation (SDG 6), Affordable and Clean Energy (SDG 7), and Sustainable Cities and Communities (SDG 11).

1 Children under 5 years (60 months and younger) are considered undernourished 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. Children 5–19 years (61–228 months) are identified as deprived if their age-specific BMI cutoff is below minus two standard deviations. Adults older than 19 to 70 years (229–840 months) are considered undernourished if their Body Mass Index (BMI) is below 18.5 m/kg^2.

2 The child mortality indicator of the global MPI is based on birth history data provided by mothers aged 15 to 49. In most surveys, men have provided information on 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 child mortality in the household.

3 If all individuals in the household are in an age group where they should have formally completed 6 or more years of schooling, but none have this achievement, then the household is deprived. However, if any individuals aged 10 years and older reported 6 years or more of schooling, the household is not deprived.

4 Data source for the age children start compulsory primary school: DHS or MICS survey reports; and http://data.uis.unesco.org/.

5 If the survey report uses other definitions of solid fuel, we follow the survey report.

6 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 the survey report uses other definitions of adequate sanitation, we follow the survey report.

7A household has access to clean drinking water if the water source is any of the following types: piped water, public tap, borehole or pump, protected well, protected spring, or rainwater, and it is within a 30-minute walk, round trip. If the survey report uses other definitions of clean or safe drinking water, we follow the survey report.

8A 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.

9 Deprived if floor is made of natural materials or if dwelling has no roof or walls or if either the roof or walls are constructed using natural or rudimentary materials. The definition of natural and rudimentary materials follows the classification used in country-specific DHS or MICS questionnaires.

2.3 Destitution measure

The aim of the destitution measure is to assess the situation of the poorest of the poor within the multidimensional poverty framework (Alkire, Conconi, and Seth, 2014). The destitution measure has precisely the same structure as the global MPI but applies extreme deprivation cutoffs for key indicators capturing the depth and extremity of a person's deprivation (Table 2). This allows the measure to identify a subset of the MPI poor who are deprived in at least one-third or more of the same weighted indicators that are defined with destitution deprivation cutoffs. In other words, the destitute are all MPI poor but also experience a more extreme level of deprivation for some indicators. A comparison of the global MPI indicator cutoffs and the destitution cutoffs are presented in Table 3.

Table 2. Dimensions, Indicators, Deprivation Cutoffs, and Weights for Measuring Destitution

Dimensions of poverty	Indicator	Deprived if...	Weight
Health	Nutrition	Any person under 70 years of age for whom there is nutritional information is **severely undernourished**.[1]	1/6
	Child mortality	A child **under 18** has **died** in the household in the five-year period preceding the survey.[2]	1/6
Education	Years of schooling	**No** eligible household member has completed at least **one year** of schooling.	1/6
	School attendance	Any school-aged child is **not attending** school **up to** the age at which he/she would complete **class 6**.	1/6
Living Standards	Cooking fuel	A household cooks using **solid fuel**, such as dung, agricultural crop, shrubs, wood, charcoal, or coal.[2]	1/18
	Sanitation	The household practices **open defecation**.	1/18
	Drinking water	The household's source of **drinking water** is **not safe** or safe drinking water is **more than a 45-minute walk** from home, roundtrip.	1/18
	Electricity	The household has **no electricity**.[2]	1/18
	Housing	The household has **inadequate** housing materials in **any two** of the three components: **floor**, **roof,** or **walls**.	1/18
	Assets	The household does **not own any 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] Children under 5 years (60 months and younger) are considered undernourished if their z-score of either height-for-age (stunting) or weight-for-age (underweight) is below minus three standard deviations from the median of the reference population. Children 5–19 years (61–228 months) are identified as deprived if their age-specific BMI cutoff is below minus three standard deviations. Adults older than 19 to 70 years (229–840 months) are considered undernourished if their Body Mass Index (BMI) is below 17.0 m/kg^2.

[2] The deprivation cutoff is the same as the global MPI.

Table 3. Global MPI 2020 – A Comparison of the Deprivation Cutoffs between Measures

	Global MPI Deprived if…	Destitution Deprived if…
Nutrition	Any person under 70 years of age for whom there is nutritional information is **undernourished**.	Any person under 70 years of age for whom there is nutritional information is **severely undernourished**.
Child mortality	A child **under 18** has **died** in the household in the five-year period preceding the survey.	
Years of schooling	**No** eligible household member has completed **six years** of schooling.	**No** eligible household member has completed at least **one year** of schooling.
School attendance	Any school-aged child is **not attending** school **up to** the age at which he/she would complete **class 8**.	Any school-aged child is **not attending** school **up to** the age at which he/she would complete **class 6**.
Cooking fuel	A household cooks using **solid fuel**, such as dung, agricultural crop, shrubs, wood, charcoal, or coal.	
Sanitation	The household has **unimproved** or **no** sanitation **facility** or it is improved but **shared** with other households.	The household practises **open defecation**.
Drinking water	The household's source of **drinking water** is **not safe** or safe drinking water is a **30-minute** or **longer** walk from home, roundtrip.	The household's source of **drinking water** is **not safe** or safe drinking water is **more than a 45-minute walk** from home, roundtrip.
Electricity	The household has **no electricity**.	
Housing	The household has **inadequate** housing materials in **any** of the three components: **floor**, **roof**, or **walls**.	The household has **inadequate** housing materials in **any two** of the three components: **floor**, **roof**, or **walls**.
Assets	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.	The household does not own **any** of these **assets**: radio, TV, telephone, computer, animal cart, bicycle, motorbike, or refrigerator, and does not own a car or truck.

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 10 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), Multiple Indicator Cluster Surveys (MICS), and national surveys. 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 DHS and MICS.

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 10 global MPI indicators and to incorporate improvements in the new surveys. An 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 tablets, and ownership of vehicles may cover cars, vans, and lorries, to name a few. Similarly when data on ownership of a computer or any hitherto missing asset in the past becomes available in recent surveys, 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.

3.2 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 prefer this information. The headcount ratio for each country in the global MPI 2020 is multiplied by the total population for 2018, regardless of 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 107 countries are MPI poor. If the year of the population count (2018) 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, 2017 and 2018). 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.

3.3 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 to be non-deprived (in education), and this would be arbitrary.

3.4 Applicable and non-applicable populations

Four of the 10 global MPI 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 sources for the age at which children start compulsory primary school are the 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 5 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 is also collected from a subsample of adult men. In some other national surveys, nutrition data is collected from all members of the household (e.g. China, Ecuador, 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.

If a household is deprived in children's nutrition, adult BMI or both, then the household is deprived in nutrition. We consider households that have no eligible members to assess children's nutrition or adult BMI to be non-deprived.

Child mortality is based on birth history data provided by mothers aged 15 to 49. The birth history data has 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 most DHS and MICS surveys, men have provided information on 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 child mortality in the household. In a few country surveys, detailed birth history data was not collected, such as the date of birth and date of death of the child. In such cases, we have constructed the child mortality indicator using any child death reported by eligible women and men as we cannot distinguish deaths that occurred in the past five years and the age of the child who died. In these countries, households that did not have eligible women and men for individual interviews are identified as non-deprived.

3.5 Treatment of dataset with missing indicators

If a survey dataset is missing any of the 10 indicators that make up the global MPI, then that indicator cannot be used in the computation of the poverty measure. Indicator 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.

3.6 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, there is a need 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 households as multidimensionally poor. This decision is under review through our on-going investigation of sample drop and bias analysis. This methodological exploration is also timely as it corresponds with increasing non-response rates observed among urban householders in indicators related to anthropometric measures in recently released surveys. For example, in the Montenegro MICS 2018 data, the final nutrition indicator showed that some 14% of individuals lived in households where children under 5 who should have been measured were not measured. More than two-thirds of the individuals with missing information are living in urban areas of the country.

4. Survey details of global MPI 2020

4.1 New country surveys in 2020

The global MPI 2020 covers 107 countries. This round covers seven new countries and 18 more recent survey datasets (Table 4). Collectively, the 25 new and updated surveys represent close to 913 million or 16% of the population living in the developing regions of the world. Fourteen of these new or updated surveys were released by MICS, while six were released by DHS in a period of 12 months, that is, from 1 April 2019 to the 1 April 2020. In addition, four national surveys were made available by national statistical agencies and one national survey – Peru – was open access.

4.2 Survey coverage in 2020

The survey coverage for global MPI 2020 is between 2008 and 2019. Eighty-one of the countries, representing 93% of the developing world's population, had surveys that were carried out in the last five years, that is, between 2014 and 2019. Two surveys were fielded earlier than 2010: the survey in Bolivia was carried out in 2008, and in Syria the survey year was 2009. We have made

use of these surveys as they were collected in the last decade, and we hope that the countries will be able to replace them with updated surveys whose results are made available in the public domain.

Table 4. List of New and Updated Surveys Used in the Global MPI 2020

	Country	Survey	Year
1	Bangladesh	MICS	2019
2	Botswana	BMTHS	2015–16
3	Congo, Democratic Republic of the	MICS	2017–18
4	Cuba	ENO	2017
5	Gambia	MICS	2018
6	Georgia	MICS	2018
7	Guinea	DHS	2018
8	Indonesia	DHS	2017
9	Kiribati	MICS	2018–19
10	Kyrgyzstan	MICS	2018
11	Lesotho	MICS	2018
12	Madagascar	MICS	2018
13	Mali	DHS	2018
14	Mongolia	MICS	2018
15	Montenegro	MICS	2018
16	Nigeria	DHS	2018
17	Papua New Guinea	DHS	2016–18
18	Peru	ENDES	2018
19	Seychelles	QLFS	2019
20	Sri Lanka	SLDHS	2016
21	Suriname	MICS	2018
22	Togo	MICS	2017
23	Tunisia	MICS	2018
24	Zambia	DHS	2018
25	Zimbabwe	MICS	2019

The primary data sources for the global MPI are the DHS (47 countries) and MICS (47 countries) surveys that are open access. 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, national surveys that contained information on the MPI indicators were used if high-quality surveys with the same indicators were available, and if they were in the public domain or if countries requested to be included in the global MPI. In the global MPI 2020, for example, we have used national data for 10 countries, namely Botswana, Brazil, China, Cuba, Ecuador, Jamaica, Mexico, Peru, Seychelles, and Sri Lanka.

4.3 Surveys excluded from previous round

The 2020 global MPI estimations are based on survey data from 107 countries. By contrast, the global MPI 2019 covered 101 countries while the global MPI 2018 covered 105 countries. We excluded Vanuatu from the 2019 round as the survey was fielded in 2007 and is considered out of

date. This approach follows the decision made for the global MPI 2019. Four countries from the 2018 round were excluded in the 2019 publication, namely, Azerbaijan, Djibouti, Somalia and Uzbekistan, as their surveys were very out of date. All four surveys were fielded in 2006.

4.4 Countries that qualify for subnational disaggregation

The global MPI 2020 covers 107 countries. The estimates go beyond national figures. These numbers are disaggregated by age groups, rural-urban areas, and subnational regions. All 107 countries included in the global MPI are disaggregated by four major age categories: 0 to 9 years, 10 to 17 years, 18 to 59 years, and 60+ years. In addition, from 2020 onwards, we also publish the disaggregation by two major age groups: for children age 0 to 17 years and for adults 18 years and older. Out of the 107 countries included in the 2020 global MPI, disaggregation results by urban and rural areas were produced for 106 countries – all except Seychelles. Information on the division between rural and urban areas were not available in Seychelles QFLS 2019 datasets.

Disaggregation of results was possible for 98 countries at the subnational level. The decision whether national estimates could be disaggregated at the subnational level was determined by three criteria that were established in our earlier work.[3] These criteria were (1) the sample was representative of subnational regions; (2) the national MPI and H estimates were large enough for a meaningful subnational analysis, though, as is explained below, this criterion is no longer applicable in the present work; and (3) the sample size after the treatment of missing data was reasonably high. We review each of these qualifying criteria.

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. In 2020, 103 country surveys fulfilled this criterion. Four countries – Armenia, Bosnia and Herzegovina, Saint Lucia, and Seychelles – have sample sizes that are representative at the national level but not at the subnational level. Hence, these four countries were excluded at this stage.

In the previous rounds, the second criterion establishes 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) to allow for a meaningful subnational analysis. We indicated in our last methodological note that this criterion was under review (Alkire, Kanagaratnam, and Suppa, 2019). Since 2018, our estimates are reported along with standard errors estimates and confidence intervals. Poverty measures should be accompanied by standard errors to evaluate their precision and properly rank regions of a

[3] See Alkire and Santos (2014); Alkire, Roche, Santos and Seth (2011).

country. Because of this, from 2020 we retain countries with low poverty levels for disaggregation, hence dropping this criterion. In cases where the subnational estimates are zero, the standard errors establish whether these are true zeros. However, it is useful to review the number of countries that have H<=1.5% and MPI<=0.005.

Of the 103 country surveys for which we know the sample allows for disaggregation, the results indicate that 15 countries showed a combination of H<=1.5% and MPI<=0.005. These are Albania, Georgia, Jordan, Kazakhstan, Kyrgyzstan, Maldives, Republic of Moldova, Montenegro, the State of Palestine, Serbia, Thailand, Trinidad and Tobago, Tunisia, Turkmenistan, and Ukraine. Collectively, these countries have 106 subnational regions representing 3.25% of the population living in the developing regions of the world. Despite recording low levels of poverty, the standard errors for 99 of the 106 subnational regions in these 15 low poverty countries were significantly different from zero. Four of the seven subnational regions that had zero poverty are located in Kazakhstan (Astana City, East Kazakhstan, Karaganda, and West Kazakhstan), while the other three are in Kyrgyzstan (Bishkek, Chui, and Naryn).

In the earlier rounds of the global MPI, we would have excluded these 15 countries from the disaggregation analysis. However, from this 2020 round onwards, we retain such countries despite the low headcount ratio and low MPI value. We publish the standard errors estimates by which users can assess the extent of multidimensional poverty in the subnational regions of low poverty countries.

The third and final 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. For borderline cases, bias analyses are conducted to exclude those cases where the sample reduction leads to statistically significant bias. We specify the third criterion in three ways.

First, the national sample size must be at least 85% of the original sample after missing data is treated. This is because a lower sample size may affect accurate comparability across subnational estimations. Following this specific criterion, we identified five countries that did not meet this cutoff. In Maldives, we retained 83% of the weighted sample for estimation after dropping observations that had missing data in any of the 10 global MPI indicators. For Georgia MICS 2018, the weighted retained sample at the national level was 82%. In South Africa, the retained sample was 81%. In Montenegro and South Sudan, the retained samples were 80% and 71%, respectively. Montenegro MICS 2018 was updated in this round, replacing MICS 2013 from the last round. Montenegro had the lowest retained weighted sample among the latest updated surveys in this round of the global MPI.

Second, every subnational region in a country must have a retained sample size that is at least 75% of the original sample. A smaller sample creates a problem of representativeness for that particular subnational region, which may distort the subnational comparisons. Our analyses indicate that a total of 11 subnational regions across four countries fall short with respect to this sub-criterion. Two of the six regional islands of Maldives had a retain sample of 74% for Malé and 74% in the Central region. The retained sample in two of the nine provinces in South Africa – Western Cape and Gauteng – was 56% and 71%, respectively. In Montenegro, the Centre region recorded a sample drop of 27%. Six of the 10 regions of South Sudan have a retained sample between 70% to 59%. Given that all 11 subnational regions are within the countries that have a retained national sample of less than 85%, we move on to the final step.

Third, a bias analysis test is carried out for each region whose sample size is lower than 75% and whose national sample size is lower than 85% of the original. We identify the major cause of the sample reduction (in this case, nutrition for all four countries listed above) and 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 exclude the country from our analysis.

Following this sub-criterion, we carried out the bias test for the four countries with a low retained sample, as well as for Georgia. The results for the four countries (Maldives, South Africa, Montenegro, and South Sudan) indicate that the likelihood of being deprived in child mortality (as well in other indicators) is not the same for those who are missing the nutrition indicator and those who are not missing this indicator. Those without a missing nutrition indicator are systematically more likely to be deprived in child mortality (or in other indicators). This suggests that the sampling structure would need to be revised to assure representativity. Thus, these four countries are excluded from the subnational analysis.

Georgia has a weighted sample loss of more than 15% at the national level, leaving it at the borderline. Two of the 10 subnational regions within the country had a retained sample of 76.71% (Kakheti) and 76.91% (Shida Kartli). Both regions had the highest missing values for nutrition and child mortality. Those without missing nutrition indicators are systematically more likely to be deprived in child mortality, suggesting that non-poor people are being excluded. Given that the national sample loss is high and two of its subnational regions indicate biased estimates, we exclude Georgia from subnational disaggregation.

In summary, although disaggregations are theoretically possible for 103 countries, only 98 countries with 1,279 regions satisfy all three criteria and are thus used for our subnational analysis.

5. Minor technical innovations

This section transparently outlines the minor innovations applied in the 2020 technical files. However, these minor innovations are implemented only in 25 countries, that is, countries with new and updated surveys in this round.

5.1 Revisions to the years of schooling indicator

In past rounds, we constructed the indicator by taking into account all household members age 10 years and older. In this round, we identify the minimum age eligibility based on whether householders are in an age group where they should have formally completed six or more years of schooling based on their primary school entrance age. The minimum age eligibility for this indicator will vary across countries depending on the age at which individuals start primary schooling. However we continue to recognise the achievement of young members. If any children as young as 10 years reported six years or more of schooling, then the household is not deprived. This motivation to count the achievement of young children relates to the possibility that some parents enrol their children in school at an early age. The empirical implications of this change are negligible, as shown in Table 5. A trial analysis covering 12 countries representing 36% of the population living in the developing regions indicate that if there is a change, it is observed for the headcount ratio and it happens at the second decimal.

5.2 Revisions to the treatment of missing values related to the sanitation and drinking water indicators

It may be the case that there are individuals who did not provide information on the type of toilet, but they indicated that they share their toilet facilities. In such cases, we identify these individuals as deprived, following the information on the shared toilet. Similarly, it may be the case that there are individuals who did not respond about their source of drinking water, but they indicated that the water source is 30 minutes or more (roundtrip) from home. In such cases, we identify these individuals as deprived, following the information on distance to water. In the past, we identified these observations as missing in the respective final indicators. However, it should be noted that these cases are rare and this change made no differences to the final estimates.

A number of MICS survey reports present the 'missing' category for source of drinking water and/or toilet facility as unimproved in their tabulation tables. In previous rounds, we coded these 'missing' categories as unimproved following the survey report. However, we received feedback from MICS teams that the 'missing' category is classified under the unimproved column due to formatting issues with their tabulation tables. As such, we have coded 'missing' categories for water and toilet as 'missing' values in all new surveys included in the global MPI 2020, regardless of what is shown in the tables of the survey report. It should be noted that this issue was only present in five countries and the change made no difference to the final estimates.

Table 5. Results of the MPI Trial on the Change in Years of Schooling Indicator

Country	Survey	Year	Eligibility	MPI	Headcount ratio (H)	Intensity (A)
Bangladesh	MICS	2019	10 years and older	0.104	24.64	42.23
			new criteria	0.104	24.64	42.23
Cuba	ENO	2017	10 years and older	0.002	0.44	36.85
			new criteria	0.002	0.44	36.85
Gambia	MICS	2018	10 years and older	0.204	41.61	48.95
			new criteria	0.204	41.60	48.96
Georgia	MICS	2018	10 years and older	0.001	0.34	36.59
			new criteria	0.001	0.34	36.59
India	DHS	2015–2016	10 years and older	0.123	27.91	43.95
			new criteria	0.123	27.91	43.95
Indonesia	DHS	2017	10 years and older	0.014	3.62	38.71
			new criteria	0.014	3.62	38.71
Mali	DHS	2018	10 years and older	0.376	68.34	55.03
			new criteria	0.376	68.33	55.03
Nigeria	DHS	2018	10 years and older	0.254	46.42	54.81
			new criteria	0.254	46.42	54.81
Peru	ENDES	2018	10 years and older	0.029	7.37	39.59
			new criteria	0.029	7.37	39.59
Papua New Guinea	DHS	2016–2018	10 years and older	0.263	56.64	46.50
			new criteria	0.263	56.63	46.49
Zambia	DHS	2018	10 years and older	0.232	47.98	48.39
			new criteria	0.232	47.91	48.36
Zimbabwe	MICS	2019	10 years and older	0.110	25.80	42.61
			new criteria	0.110	25.80	42.61

5.3 Changes in survey questionnaire

MICS, *cooking fuel*. The MICS surveys now collect 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. If individuals use a cookstove that is designed for solid fuel but they use clean fuel for cooking, these individuals are identified as non-deprived. If individuals use a cookstove that is designed for clean fuel but they use solid fuel for cooking, these individuals are identified as deprived. The focus in both cases is the type of fuel used for cooking rather than the type of cookstove as the type of fuel used may affect the health of householders.

However, the combination of these two pieces of information – type of cookstove and type of cooking fuel used – is useful because it allows us 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 (those who indicated using other types of fuel). We identify individuals as deprived in cooking fuel if they reported using a traditional solid fuel cookstove with an unidentified type of fuel. It is very likely that these individuals have used some form of fuel that is not clean as the stove is designed for use with solid fuel. If individuals reported using 'other' for the type of cookstove and an unidentified type of fuel, then very likely these individuals used some form of fuel that is not clean. Hence, we identify them as deprived in cooking fuel. 'Missing' values were applied when individuals lacked information for both.

MICS, *electricity*. In recent rounds of MICS surveys, all households that reported lacking electricity skipped questions on ownership of televisions and refrigerators. We identified these households as lacking televisions and refrigerators, given that there was no electricity in these households.

Drinking water. The WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP) recognizes that bottled water and tanker truck water can potentially deliver safe water, but has previously treated them as unimproved due to a lack of data on accessibility, availability, and quality (JMP, 2017). Survey reports published since 2018 identify the source of drinking water delivered by tanker/truck/cart as an improved source of water, following the updated SDG definition. We follow the survey reports. In addition, previously households using bottled water were only considered to be using improved water if they used water from an improved source for cooking and personal hygiene as well. However, increasingly survey reports now indicate that bottled water and sachet water are improved sources (non-deprived). As such, we do not need to take into account non-drinking activities, following the survey reports.

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 25 new or updated surveys included in the global

MPI 2020. 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 implemented for eight countries based on mistakes identified from the previously published round. The first revision is the age cutoff applied for computing children's nutritional status in six countries where the data covered children up to 60 months. The second revision is the age cutoffs applied for the BMI-for-age in the same six countries so that the range now includes individuals from 61 to 228 months of age. Minor revisions were also carried out for Ecuador's school attendance age, Nepal's housing material, and Tanzania's quality of bottled water based on non-drinking activities. The changes in the estimates, including those of the headcount ratio (H) and MPI, are mostly very minor. We present the changes in estimates following these revisions in Table 6.

6.1 Updated surveys for 2020

Bangladesh (MICS 2019): Anthropometric data was collected from all eligible children under 5 years of age. The child mortality indicator was constructed using information from ever-married women. This is because birth history was collected only for women aged 15 to 49 years who are married or were married in the past, rather than all women in the age group. The survey report by the Bangladesh Bureau of Statistics (BBS) and UNICEF Bangladesh (2019) considers toilet facilities with a flush system that connects to an open drain as unimproved (p.295). We have followed the definition provided in the survey report. MPI estimates are disaggregated by the first level of administration covering eight divisions including Barishal, Chattogram, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, and Sylhet. The survey report indicates that most variables are representative at the second level of administration as well, that is, for 64 districts (p.27). However, there is a large variation in the margins of error among the 64 districts. This is because of the small number of events in selected variables at the district level. Hence, we limit our current subnational disaggregation analysis to eight major administrative districts.

Botswana (BMTHS 2015–16): The Botswana Multi-Topic Household Survey (BMTHS) data is not available on a public platform. The microdata was provided by Botswana's National Bureau of Statistics (NBS) through a joint agreement between OPHI and NBS solely for computing and publishing the global MPI aggregates. In three of the households in the sample, all members are recorded as non-usual members. We assume this is not possible because a household should have at least one usual resident. As such, we have retained these three households in our final work by assuming that these are usual residents. Anthropometric data was collected from all children up to the age of 17 years. As such, we compute the underweight and stunting measure for children aged

0 to 60 months and the BMI-for-age measure for children aged 6 to 17 years. There were significant mismatches between the variables age in years, age in months, and eligibility for measurement. There are cases where the same child is identified as younger than 60 months but is captured as older than 6 years elsewhere. As such, we applied a combination of age in years, age in months, and eligibility to identify children 60 months and younger, and children 6 to 17 years. We applied this approach after reviewing the observations case by case. In terms of years of schooling, we identified all individuals with a non-formal or religious education as having zero years of schooling since these categories are not counted as formal education in Botswana. In the BMTHS questionnaire, the child mortality information was collected at the individual and household level. At the individual level, all women aged 12 to 49 years were asked three questions that were applied in our work: (i) did she give birth in the last five years (question labelled as q03_84 in the questionnaire); (ii) did a child born in the last five years die (q03_85); and (iii) is the child alive (q03_88). At this level, we identified all child mortality reported by eligible women in the last five years. At the household level, the information was collected from the household head or spouse who reported recent deaths of household members 12 years and older. In this section, we identified households as deprived in child mortality if any members between the age of 12 and 17 died recently. The individual-level questions allowed us to identify a death that occurred in the last five years but not the age of the child, while the household-level question specified recent deaths but not the time of death. We captured all deaths in the last five years reported by mothers without the age of the child, and all deaths of children aged 12 to 17 years reported by the head/spouse without the exact timeline of death. We argue that by using a combination of individual- and household-level data, we are closely in line with the global MPI definition that specifies a household as deprived if any child under 18 years died in the last five years preceding the survey. In constructing the electricity indicator, we used a combination of information from four questions: (i) connected to BPC grid? (question labelled as q09_29 in questionnaire); (ii) main source of lighting (q09_26); (iii) fuels for cooking (q09_27); and (iv) fuel for heating (q09_28). The usual technical decision would have been to construct the electricity indicator based on whether households were connected to the grid. However, the data indicated that a significant number of households are not on the grid but were generating electricity to power their lights, heat, and cooking. As such, we opted to use a combination of information to construct the final electricity indicator. For housing, the national survey report lacked a classification that would allow us to identify whether materials used to build the floor, walls, and roof are improved or non–improved. As such, we followed the classification provided in the DHS report, using Zambia as our reference. For example, we have identified walls built using mud bricks as a non-improved material because

of a lack of clarity as to whether it is burnt brick or not and because, in neighbouring Zambia, mud brick is considered a non-improved material. The MPI results are disaggregated by 26 subnational districts. We observed that the incidence of multidimensional poverty ranges from 0% in Jwaneng and Orapa to 46% in Ngamiland West. Jwaneng and Orapa are secluded towns where most of the residents are employees of the world's largest diamond mines. The NBS confirmed that all basic services such as electricity, health, and education are easily accessible in the mining districts, hence the absence of multidimensional poverty.

Congo, Democratic Republic of the (MICS 2017–18): Anthropometric data was collected from all eligible children under 5 years of age. For 32 children (0.15% of the under-5 sample), information on age in days was missing. This means it was not possible to construct the nutrition indicator for these children. However, 21 of the 32 children have data on age in months. We made use of the data for these 21 children to minimise the sample drop. Survey estimates are disaggregated by 26 provinces, following the survey report by INS (2019). The capital city, Kinshasa, is administratively equivalent to a province.

Cuba (ENO 2017): The Encuesta Nacional De Ocupacion (ENO) data is not available on a public platform. The microdata was provided by the National Statistics and Information Office (ONEI) through a joint agreement between OPHI and ONEI solely for computing and publishing the global MPI aggregates. This survey did not gather information on nutrition. This means the global MPI estimation for Cuba is based on nine of the 10 global MPI indicators. The child mortality indicator is the only indicator within the health dimension, and, as such, it receives the dimension's full weight (one-third). The question on years of schooling was captured using the question on the highest grade or year of study passed. These were divided into 'no grade passed', 'elementary grades' (1st to 6th), 'elementary secondary grades' (7th to 9th), 'skilled worker degrees', 'pre-university grades', 'middle technician grades', and 'university degrees'. We identified a household as deprived if the highest education level achieved by all eligible members is at the elementary level, as this translates to less than six years of schooling. The electricity indictor was constructed using the question on the power source for household lighting. We identified households as having electricity if their lighting was powered by an 'electrical connection', 'industrial plant', 'own plant', 'mini hydroelectric', and 'other' energy sources. Only households that reported not having any power source for lighting were identified as having no access to electricity. The survey questionnaire does not provide clarity on the source of water from wells, that is, whether the well is protected or unprotected. Following advice from the data provider, we identified water drawn from a well as an improved facility. In recent years, water delivered by truck is recognised as an improved drinking water facility by the SDG standards established by the WHO/UNICEF Joint

Monitoring Programme for Water Supply and Sanitation (JMP). However, following the advice of the survey provider, we identified water delivered by truck as an unimproved facility in the context of Cuba. The data lacks specific information on the ownership of motorbikes and animal carts. Bicycle ownership is defined broadly in this data, that is, it specifies ownership of non-motorised transport. In addition, car ownership also had a broad definition, that is, ownership of all motored transport. This suggests, the definition very likely captured ownership of any sort of motorised vehicle including motorbike. MPI estimates are disaggregated by 16 subnational regions since the survey sample is representative at this level.

Gambia (MICS 2018): Anthropometric data is available for all children under 5. However, it was not possible to construct the nutrition indicator for 2.5% of the under-5 sample. Further checks reveal that the majority of eligible children were not measured because they were not present in the household during the anthropometric measurement. This resulted in some 2% missing observations for the final nutrition indicator. The MPI results are disaggregated by eight local government areas since the survey sample is representative at this level (see survey report by the Gambia Bureau of Statistics, 2019).

Georgia (MICS 2018): Anthropometric data is available for all children under 5. However according to the survey report by the National Statistics Office of Georgia (2019), anthropometric measurement was successfully completed for only some 90% of the under-5 sample (p.iii). This is because the large majority who were not measured were either not at home or refused to be measured. In addition, some 18% of children who were successfully measured had missing weight and height data. As a result, the final nutrition indicator, which was constructed using all possible anthropometric information from eligible children in the household, showed that 8% of individuals lived in households where there is at least one eligible child under 5 who was not successfully measured. In addition, some 9% of individuals live in households where there is missing child mortality information. This corresponds with the low response rate among women aged 15 to 49 years who provide the birth history data (p.iii). Collectively, the high missing observations for nutrition and children mortality indicators meant that we were only able to retain 82% of the analytical sample. This is because the global MPI only retains observations that are complete across the 10 indicators. We do not report estimates for Georgia's 10 subnational regions. This is because the estimates were biased at the subnational level.

Guinea (DHS 2018): Anthropometric data was collected from children 0 to 59 months in age and women aged 15 to 49 years living in the 50% of households sampled for the male interview. The survey report by INS and ICF (2018) presents the nutritional status of children (p.220) and the

nutritional status of women (p.231) by the eight administrative regions in Guinea. This suggests that anthropometric estimates based on the subsample of households are representative at the subnational level. As such, the global MPI estimation for Guinea is based on this 50% subsample. According to the survey report by INS and ICF (p.26), the category 'flush to don't know where' is considered an improved toilet facility, while 'flush to somewhere else' is an unimproved facility. We have followed the guideline provided in the survey report while constructing the final sanitation indicator. The MPI results are disaggregated by eight subnational regions since the survey sample is representative at this level.

Indonesia (DHS 2017): This survey did not gather information on nutrition. This means the global MPI estimation for Indonesia is based on nine of the 10 global MPI indicators. The child mortality indicator is the only indicator within the health dimension, and, as such, it receives the dimension's full weight (one-third). The type of toilet facility that was part of the data included 'flush to septic tank', 'flush with no septic tank', 'flush toilet that was shared/public', 'ventilated improved pit latrine', 'no facility', and 'other'. The survey report by the National Population and Family Planning Board (BKKBN), Statistics Indonesia (BPS), Ministry of Health (Kemenkes), and ICF (2017) considers 'flush to septic tank' and 'flush with no septic tank' as improved toilet facilities (p.8). We have followed the guideline provided in the survey report when constructing the final sanitation indicator. In addition, we also identified 'flush toilet that was shared/public' as an unimproved facility since the facility is shared. The global MPI estimates are disaggregated by 34 provinces since the survey sample is representative at the province level.

Kiribati (MICS 2018–19): Anthropometric data is available for all children under 5. The category for source of drinking water entitled 'desalination plant' is listed as an improved source in the survey report by the Kiribati National Statistics Office (2019, p.325). This MPI estimation follows the report. The data lacks information on the ownership of animal carts. This type of asset is irrelevant on this island nation. The global MPI estimates are disaggregated by five district/island groups of the country including South Tarawa, Northern Gilbert, Central Gilbert, Southern Gilbert, and the Line and Phoenix Group.

Kyrgyzstan (MICS 2018): Anthropometric data is available for all children under 5. The survey report by the National Statistical Committee of the Kyrgyz Republic and UNICEF (2019) considers (p.266) toilet facilities with a flush system that connects to the open drain as unimproved. We have followed the guideline provided in the report. The survey sample is representative up to the seven subnational regions and for Bishkek and Osh, which are administratively independent cities. As such, the global MPI estimates are disaggregated by nine subnational regions.

Lesotho (MICS 2018): Anthropometric data is available for all children under 5. Close to 10% of eligible children were not measured. This is in line with the survey report that states only 91% of eligible children under 5 were measured (Bureau of Statistics, 2019, p. iv). As a result, the final nutrition indicator showed that 4% of individuals lived in household where there is at least one eligible child under 5 who was not successfully measured. The years of schooling variable was constructed using a combination of highest educational level attended and highest grade attended at that level. The data listed 141 individuals who have vocational training as their highest educational level, but there was no information on their grade. However, we know from the data that individuals must have completed seven years of primary schooling before pursuing vocational training. As such we identify those with vocational training as having completed six years or more of schooling and hence not deprived in the indicator. This survey lacks information on the type of cooking fuel. This means the global MPI estimation for Lesotho is based on nine of the 10 global MPI indicators, where the living standards dimension has only five indicators. As such each of the living standards indicators receives one-fifteenth of the dimension's weight, as opposed to a one-eighteenth weight if there were six complete indicators under this dimension. The survey sample was designed to provide estimates for four ecological zones (Lowlands, Foothills, Mountains, and Senqu River Valley) (p.4 of the survey report). The data also contains information on the 10 provinces in Lesotho. However, the survey report does not explicitly state whether the sample is representative at the province level. In addition, the results tables in the report refer to these ecological zones rather than to the provinces. Following this, the MPI estimates are disaggregated only by the four ecological zones.

Madagascar (MICS 2018): Anthropometric data is available for all children under 5. Close to 10% of eligible children were not measured. As a result, the final nutrition indicator showed that some 3% of individuals lived in households where there is at least one eligible child under 5 who was not successfully measured. In addition, some 4% of individuals live in households where there is missing child mortality information. This is because all eligible women aged 15 to 49 years living in those households did not respond to their birth history questions. The MPI estimates are disaggregated by 22 regions since the survey sample is representative at this level (INSTAT and UNICEF, 2019).

Mali (DHS 2018): Height and weight measurements were collected from all children under 5 and for women aged 15 to 49 living in the 50% of households sampled for the male interview (INSTAT, CPS/SS-DS-PF and ICF, 2019, p. 3). All children under 5 have anthropometric measurements, regardless whether the household was selected for the male interview or not. As such, our estimation work is not limited to the subsample of households. The survey estimates are

disaggregated by eight administrative regions and the capital city of Bamako since the survey sample is representative at this level. However, in the region of Kidal, there have been difficulties in accessing the rural population due to security issues. Therefore, only the urban area has been sampled (p. 1). As such, the MPI estimation for Kidal is representative only for the urban areas of the region.

Mongolia (MICS 2018): Anthropometric data is available for all children under 5. The final nutrition indicator showed that some 3% of individuals lived in households where there is at least one eligible child under 5 who was not successfully measured. This corresponds with the non-response rate published in the survey report by NSO (2019, p.3). 'Pit latrine with slab' is identified as non-improved in Mongolia (p.265 of the survey report). There is a porous lining that usually exists in improved pit latrines. However, the porous lining does not exist in most of the pit latrines in the ger district households, leaving the excreta in these latrines to mix with the soil (p.266). Hence while the name matches the international convention for an improved facility, the 'pit' structure does not match the international convention. As such, the national guideline in Mongolia identifies this type of toilet facility as unimproved. We follow the classification of the national guideline since the structure of the toilet qualifies as unimproved under international standards. We identified 'drinking water drawn from water kiosk', 'connected with piped water', and 'not connected with piped water' as improved following the survey report. In Mongolia, individuals living in gers are considered deprived if the floor is natural or made from other materials. Householders living in gers are considered deprived if the walls are single-layered and non-deprived if the walls are multi-layered, in line with the survey report. Householders living in gers are considered deprived if the roofs are single-layered and non-deprived if the roofs are multi-layered. Mobile telephone ownership includes owning a smartphone or analogue phone. Car or truck ownership includes owning a sedan car or a truck. The sample was designed to provide estimates for five major regions of the country, that is, the regions of Eastern, Western, Central, Khangai, and the capital city Ulaanbaatar.

Montenegro (MICS 2018): Anthropometric data is available for all children under 5. However, the final nutrition indicator showed that some 14% of individuals lived in households where the 'all eligible children under 5' category was not successfully measured. This corresponds with the non-response rate published in the survey report (MONSTAT and UNICEF, 2019, p.3). In addition, some 12% of individuals live in households where there is missing child mortality information. This is because all eligible women aged 15 to 49 years living in those households did not respond to their birth history questions. In fact, the survey report indicates that the response rate among women of that age group was only 78% (p.3). Computer ownership includes laptops and tablets

as well. Collectively, the high missing observations for nutrition and child mortality indicators meant that we were only able to retain 80% of the analytical sample. This is because the global MPI only retains observations that are complete across the 10 indicators. We do not report estimates for Montenegro's three major subnational regions. This is because the estimates were biased at the subnational level.

Nigeria (DHS 2018): In this survey, the men's questionnaire was administered to one-third of all sampled households. Within this subsample, all children aged 0 to 59 months and all women aged 15 to 49 years were eligible for height and weight measurements. The survey report by the National Population Commission (NPC) and ICF (2019) presents the nutritional status of children (p.271) and nutritional status of women (p.289) by the 36 states and the Federal Capital Territory (FCT) in Nigeria. This suggests that anthropometric estimates based on the subsample of households are representative at the state level. The global MPI estimation for Nigeria is based on one-third of all sampled households. In addition, the MPI results are disaggregated by states since the survey sample is representative at this level. The survey report identifies sachet water as unimproved (p.21). We have followed the definition provided in the survey report.

Papua New Guinea (DHS 2016–18): The data collection covered a period of 26 months, that is, between October 2016 and December 2018. We identify the survey period as 2016 to 2018. Height and weight measurements were recorded for all children aged 0 to 59 months living in the 50% of households that were sampled by the survey. However, the results are not published in the survey report owing to data quality concerns (NSO Papua New Guinea and ICF, 2019, p.189 and pp.341–2). As such, the final estimation for Papua New Guinea is based on nine of the 10 global MPI indicators. The child mortality indicator is the only indicator within the health dimension, and as such it receives the dimension's full weight (one-third). According to the survey report (p.18), the category 'flush to don't know and 'flush to somewhere else' is an unimproved toilet facility. We have followed the definition provided in the survey report. Some 5% of individuals live in households where there is missing child mortality information. The high missing value corresponds to the low response rate (84%) among eligible women aged 15 to 49 years who usually provide information on their birth history (p.5). The MPI estimates are disaggregated by 22 provinces since the survey sample is representative at this level.

Peru (ENDES 2018): This is a national survey that is open access. Height and weight measurements were collected from all children under 5 and for all women aged 12 to 49 years living in the households sampled. Information on child mortality was collected for all women aged 12 to 49 who slept the night before in the household. This survey defines the eligibility of women

in the fertile age group from 12 to 49 years instead of the usual 15 to 49 years. We have used information provided by all eligible women. Households using bottled water for drinking are classified as using an improved or unimproved source according to their water source for non-drinking activities. The MPI estimates are disaggregated by 24 administrative regions and the capital district of Callao since the survey sample is representative at this level.

Seychelles (QLFS 2019): The Seychelles Quarterly Labor Force Survey (QLFS) is a national survey. The microdata is not available on the public platform. The microdata was provided by the National Bureau of Statistics (NBS) through a joint agreement between OPHI and NBS solely for computing and publishing the global MPI aggregates. Anthropometric information was recorded for all individuals. For the purpose of the global MPI, we have used nutrition data when the data is available for all individuals but up to the age of 70 years. Hence, we make use of the anthropometric data for women and men aged 15 to 70 years. The child mortality indicator was constructed using information from women and men 15 years and older. We identified a household as deprived if any child died in the last five years from the survey year. The household is not deprived if women and men in the household reported (i) no child mortality or (ii) if any child died more than five years before the survey year. The survey did not collect the age of the child who died. We take into account the information provided by women and men since we are able to identify all reported child mortality in the last five years. The educational-related information was collected from all individuals aged 15 years and older. The years of schooling indicator was constructed using the highest level of education that has been completed. Seven categories were provided in the data: 'no schooling/ineligible', 'primary', 'secondary', 'advanced level', 'national diploma', 'polytechnic', '1st degree', and 'postgraduate and higher'. Since the data lacks information on years in school, we assume all members who reported that they completed primary schooling corresponds to completing six years of education. This was further confirmed by NBS: the highest level of completion translates to completion of the final grade within each level of education. As such, we identify the entire household as deprived if no household member aged 15 years or older has completed primary school. This survey did not gather information on school attendance. The years of schooling indicator is the only indicator within the education dimension, and, as such, it receives the dimension's full weight (one-third). This survey lacks information on the type of cooking fuel. This means the living standards dimension has only five of the six indicators. As such, each indicator within this dimension receives one-fifteenth of the dimension's weight, as opposed to a one-eighteenth weight if there were six complete indicators under this dimension. The global MPI estimation for Seychelles is based on eight of the 10 global MPI indicators given that the survey lacks school attendance and cooking fuel. The survey data

lacked information on whether a toilet facility was shared. Our final sanitation indicator is solely constructed using information on the type of toilet, but not whether it is shared or not. The data lacks information on bicycle, computer, and animal cart ownership. This means the final assets indicator was constructed using data related to five of the eight small assets. The survey sample does not make a distinction between urban and rural areas. This is the only country data among the 107 surveys covered in the global MPI 2020 that lacked disaggregation by urban and rural areas. Following the advice of the survey providers, we did not disaggregate the MPI estimates at the subnational level.

Sri Lanka (SLDHS 2016): The Sri Lanka Demographic and Health Survey (SLDHS) is a national survey. The microdata is not available on the public platform. The microdata was provided by the Department of Census and Statistics through a joint agreement between OPHI and the Department solely for computing and publishing the global MPI aggregates. All children under 5 and ever-married women aged 15 to 49 years were selected for anthropometric measurement. The survey report identifies the rural water supply project as an improved source of drinking water and rain water as an unimproved source of drinking water. Furthermore, households using bottled water for drinking are classified as using an improved or unimproved source according to their water source for non-drinking activities. We have followed the definition provided in the report while constructing the drinking water indicator. The variable on car ownership was constructed using two sets of information. This includes whether the household owns car, and whether the household owns a bus/lorry/truck. The MPI estimates are disaggregated by nine administrative regions since the survey sample is representative at this level.

Suriname (MICS 2018): Anthropometric data is available for all children under 5. However, it was not possible to construct the nutrition indicator for 21% of the under-5 sample. An analysis of the missing observations revealed that a majority of eligible children were measured but had incomplete dates of birth, implausible measurements, and/or missing weight and/or height data. These findings are affirmed by the conclusion presented in the survey report as well (Ministry of Social Affairs and Public Housing, 2019, p.251). This meant that some 11% of observations were missing for the final nutrition indicator. The survey report considers (p.295) toilet facilities with a flush system that connects to an open drain as unimproved. We have followed the definition provided in the survey report. The data lacks information on the ownership of animal carts. This type of asset is irrelevant on this island nation. The data makes a distinction between rural coastal and rural interior areas. These were grouped into a single rural category, allowing us to maintain the binary rural and urban categories. The MPI results are disaggregated for the 10 districts of the country. Despite the high percentage of missing values in the nutrition indicator, we observed that

child nutrition is estimated at the district level in the survey report (p.252). The results presented in the report suggest that the district-level estimation for child nutrition is still meaningful, hence validating our decision for disaggregation.

Togo (MICS 2017): Anthropometric data is available for all children under 5. The MPI results are disaggregated for the seven economic regions of the country since the survey sample is representative at this level (INSEED, 2018).

Tunisia (MICS 2018): Anthropometric data is available for all children under 5. The MPI results are disaggregated for the seven regions of the country since the survey sample is representative at this level (Institut National de la Statistique and UNICEF, 2019).

Zambia (DHS 2018): In all households, height and weight measurements were recorded for children aged 0 to 59 months. Anthropometric measurements for adults were not included in the survey (Zambia Statistics Agency, MOH Zambia, and ICF, 2019, p. 177). This is in contrast with the earlier Zambian survey (DHS 2013–14) where anthropometric data was collected from children under 5, as well as women aged 15 to 49 years. It was not possible to construct the nutrition indicator for 5.5% of the under-5 sample. The survey report affirms that valid anthropometric measurements were obtained only for 95% of eligible children (p.179). As a result, the final nutrition indicator showed that some 3% of individuals lived in households where there is at least one eligible child under 5 who was not successfully measured. The MPI results are disaggregated for the 10 provinces of the country since the survey sample is representative at this level.

Zimbabwe (MICS 2019): Anthropometric data is available for all children under 5. The MPI results are disaggregated for the 10 regions of the country since the survey sample is representative at this level (ZIMSTAT and UNICEF, 2019).

6.2 Corrections to non-updated surveys

Anthropometric measures for children 0 to 60 months. Children 0 to 60 months must be included in the WHO igrowup_stata ado files to correctly construct the child anthropometric measures. However, the codes that were applied in the past round captured only children up to the age of 59 months. This revision was carried out for six country datasets: China (CFPS 2014), Ecuador (ECV 2013–14), Libya (PAPFAM 2014), Mexico (ENSANUT 2016), Morocco (PAPFAM 2011), and Syria (PAPFAM 2009).

BMI-for-age measure for individuals 61 to 228 months. The nutritional status of individuals 61 to 228 months old should be captured in the BMI-for-age measure that is computed using the

who2007_stata ado files. However, the codes that were applied in the past included children from 60 to 239 months. This meant individuals whose age was 60 months and those whose age was 229 to 239 months were excluded from the ado program and replaced with missing values. In this round, we made the correction to the six country datasets that were affected: China (CFPS 2014), Ecuador (ECV 2013–14), Libya (PAPFAM 2014), Mexico (ENSANUT 2016), Morocco (PAPFAM 2011) and Syria (PAPFAM 2009). These countries were affected because anthropometric data was collected from a wider age group. This is in contrast with DHS and MICS, which limits their anthropometric data collection to children aged 0 to 59 months and/or to adults 180 to 228 months. The mistake occurred by adopting codes that were designed for DHS and MICS surveys. Despite these revisions, the MPI estimates changed minimally (Table 6).

Ecuador ECV 2013–14. According to UIS website, the official entrance age to primary school in Ecuador is 6 years. However, we incorrectly applied 5 years as the starting age in the previous rounds. Basic education in Ecuador has four cycles: 'Preparatoria', 'Elemental', 'Media', and 'Superior'. 'Preparatoria' is one preparatory grade that starts at age 5 and lasts one year but corresponds to pre-primary education. 'Elemental' is the first stage of primary education and starts at age 6 and lasts three years. We have made the correction in this round of the global MPI.

Table 6. Comparing Estimates of Countries with Corrections from the Past Round

Country	Survey	MPI Publication	MPI	Headcount ratio (H)	Intensity (A)	Correction implemented in 2020
China	CFPS 2014	2019	0.016	3.86	41.32	recomputed child nutrition 0–60 months; recomputed BMI-for age for those 61–228 months
		2020	0.016	3.89	41.36	
Ecuador	ECV 2013–2014	2019	0.018	4.49	39.99	recomputed child nutrition and BMI-for-age; revised the starting age of school attendance from 5 to 6 years
		2020	0.018	4.58	39.88	
Libya	PAPFAM 2014	2019	0.007	2.00	37.12	recomputed child nutrition 0–60 months; recomputed BMI-for-age for those 61–228 months
		2020	0.007	2.00	37.13	
Mexico	ENSANUT 2016	2019	0.025	6.30	39.22	recomputed child nutrition 0–60 months; recomputed BMI-for-age for those 61–228 months
		2020	0.026	6.56	39.02	
Morocco	PAPFAM 2011	2019	0.085	18.57	45.68	recomputed child nutrition 0–60 months; recomputed BMI-for-age for those 61–228 months
		2020	0.085	18.60	45.68	
Nepal	DHS 2016	2019	0.148	33.99	43.62	recoded metal/galvanised used for construction of walls from improved to unimproved material
		2020	0.148	33.99	43.63	
Syria	PAPFAM 2009	2019	0.029	7.39	38.93	recomputed child nutrition 0–60 months; recomputed BMI-for-age for those 61–228 months
		2020	0.029	7.39	38.94	
Tanzania	DHS 2015–2016	2019	0.273	55.45	49.31	incorporated non-drinking activities to assess the quality of bottled water
		2020	0.273	55.45	49.31	

Nepal (DHS 2016). In the previous round, we coded the material for exterior walls metal /galvanised sheets as an improved material. However, the survey report indicated that metal/galvanised sheets used for the construction of walls is a rudimentary material, hence it is identified as an unimproved material. We have corrected this mistake in this round.

Tanzania (DHS 2015–16). Because the quality of bottled water is not known, households using bottled water for drinking are classified as using an improved or unimproved source according to their water source for non-drinking activities such as cooking and hand washing. In the previous round, information on non-drinking activities was not considered. We have corrected the related code in this round of the global MPI. The estimation did not change (Table 6).

Concluding remarks

In sum, the global MPI 2020 covers 107 countries, of which 25 countries have new or updated surveys representing some 913 million individuals living in the developing regions. Estimates are disaggregated by six age groups across all countries, by rural and urban areas for 106 countries, and 1279 subnational regions across 98 countries. The country and subnational coverage is extensive compared to the 2018 and 2019 rounds. The global MPI 2020 uses the 2019 specifications, with minor innovations in the years of schooling, drinking water, and sanitation indicators. These innovations did not have an effect on the estimations. Minor corrections were also carried out for eight non-updated countries where the changes in estimates are mostly negligible.

References

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, Oxford Poverty and Human Development Initiative, University of Oxford.

Alkire, S., Conconi, A. and Seth, S. (2014). 'Measuring destitution in developing countries: An ordinal approach for identifying linked subset of multidimensionally poor', OPHI Research in Progress 42a, Oxford Poverty and Human Development Initiative, University of Oxford.

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

Alkire, S., Kanagaratnam, U., Nogales, R., and Suppa, N. (2019). Sensitivity analyses in poverty measurement: The case of the global multidimensional poverty index. Paper prepared for the Special IARIW-World Bank Conference 'New Approaches to Defining and Measuring Poverty in a Growing World', Washington DC, November 7–8, 2019. http://www.iariw.org/c2019washington.php

Alkire, S., Kanagaratnam, U., Nogales, R. and Suppa, N. (2020). 'Revising the global Multidimensional Poverty Index: Empirical insight and robustness', OPHI Research in Progress 56a, Oxford Poverty and Human Development Initiative, University of Oxford.

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

Alkire, S., Kanagaratnam, U. and Suppa, N. (2019). 'The Global Multidimensional Poverty Index (MPI) 2019', OPHI MPI Methodological Note 47, Oxford Poverty and Human Development Initiative, University of Oxford.

Alkire, S., Roche, J.M., Santos, M.E., Seth, S. (2011). 'Multidimensional Poverty Index 2011: Brief methodological note', OPHI MPI Methodological Note 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, Oxford Poverty and Human Development Initiative, 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.

Bangladesh Bureau of Statistics (BBS) and UNICEF Bangladesh. (2019). *Progotir Pathey, Bangladesh Multiple Indicator Cluster Survey 2019, Survey Findings Report.* Dhaka, Bangladesh: Bangladesh Bureau of Statistics (BBS).

Bureau of Statistics. (2019). *Lesotho Multiple Indicator Cluster Survey 2018, Survey Findings Report.* Maseru, Lesotho: Bureau of Statistics.

The Gambia Bureau of Statistics. (2019). *The Gambia Multiple Indicator Cluster Survey 2018, Survey Findings Report.* Banjul, The Gambia: The Gambia Bureau of Statistics.

ICF. (2008–2018). Demographic and Health Surveys (various) [Datasets]. Funded by USAID. Rockville, Maryland: ICF [Distributor].

Institut National de la Statistique (INSTAT), Cellule de Planification et de Statistique Secteur Santé-Développement Social et Promotion de la Famille (CPS/SS-DS-PF) and ICF. (2019). Enquête Démographique et de Santé au Mali 2018. Bamako, Mali et Rockville, Maryland, USA: INSTAT, CPS/SS-DS-PF et ICF.

Institut National de la Statistique and UNICEF. (2019). *Enquête par grappes à indicateurs multiples (MICS), 2018, Rapport Final.* Tunisie: le Ministère du Développementde l'Investissement et de la Coopération Internationale (MDICI).

Institut National de la Statistique (INS) and ICF. (2018). Enquête Démographique et de Santé en Guinée 2018. Conakry, Guinée, et Rockville, Maryland, USA: INS et ICF.

Institut National de la Statistique and des Etudes Economiques et Démographiques (INSEED). (2018). *MICS6 Togo 2017 Rapport final.* Lomé, Togo.

INS (2019). *Enquête par grappes à indicateurs multiples (MICS), 2017–2018, Rapport de résultats de l'enquête.* Kinshasa, République Démocratique du Congo.

INSTAT and UNICEF. (2019). Enquête par grappes à indicateurs multiples (MICS) Madagascar, 2018, Rapport final. Antananarivo, Madagascar: INSTAT et UNICEF.

Kiribati National Statistics Office. (2019). *Kiribati Social Development Indicator Survey 2018–19, Survey Findings Report.* South Tarawa, Kiribati: National Statistics Office.

Ministry of Social Affairs and Public Housing. (2019). Suriname Multiple Indicator Cluster Survey 2018, Survey Findings Report. Paramaribo, Suriname: Ministry of Social Affairs and Public Housing.

National Population and Family Planning Board (BKKBN), Statistics Indonesia (BPS), Ministry of Health (Kemenkes), and ICF. (2018). *Indonesia Demographic and Health Survey 2017*. Jakarta, Indonesia: BKKBN, BPS, Kemenkes, and ICF.

National Population Commission (NPC) [Nigeria] and ICF. (2019). *Nigeria Demographic and Health Survey 2018*. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF.

National Statistical Committee of the Kyrgyz Republic and UNICEF. (2019).*Kyrgyzstan Multiple Indicator Cluster Survey 2018, Survey Findings Report.* Bishkek, Kyrgyzstan: National Statistical Committee of the Kyrgyz Republic and UNICEF.

National Statistics Office of Georgia. (2019). *Georgia Multiple Indicator Cluster Survey 2018, Survey Findings Report.* Tbilisi, Georgia: National Statistics Office of Georgia.

National Statistical Office (NSO) [Papua New Guinea] and ICF. (2019). *Papua New Guinea Demographic and Health Survey 2016–18*. Port Moresby, Papua New Guinea, and Rockville, Maryland, USA: NSO and ICF.

National Statistical Office (NSO). (2019). *Social Indicator Sample Survey-2018, Survey Findings Report.* Ulaanbaatar, Mongolia: National Statistical Office of Mongolia.

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, University of Oxford.

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.

Statistical Office of Montenegro (MONSTAT) and UNICEF. (2019). *2018 Montenegro Multiple Indicator Cluster Survey* and *2018 Montenegro Roma Settlements Multiple Indicator Cluster Survey, Survey Findings Report*. Podgorica, Montenegro: MONSTAT and UNICEF.

WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP). (2017). *Safely Managed Drinking Water - Thematic Report on Drinking Water 2017*. Geneva, Switzerland: World Health Organization.

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

Zambia Statistics Agency, Ministry of Health (MOH) Zambia, and ICF. (2019). *Zambia Demographic and Health Survey 2018*. Lusaka, Zambia and Rockville, Maryland, USA: Zambia Statistics Agency, Ministry of Health, and ICF.

Zimbabwe National Statistics Agency (ZIMSTAT) and UNICEF. (2019). *Zimbabwe Multiple Indicator Cluster Survey 2019, Survey Findings Report*. Harare, Zimbabwe: ZIMSTAT and UNICEF.