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Moderate Multidimensional Poverty Index: Paving the Way out of Poverty

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Abstract

This paper introduces a trial Moderate Multidimensional Poverty Index (MMPI) that provides a meaningful superset of existing global multidimensional poverty indices. Eradicating poverty in all its forms everywhere requires indicators that measure sustainable pathways out of poverty, not only the absence of extreme deprivation. The MMPI increases the deprivation cutoff of nine of the ten indicators of the global Multidimensional Poverty Index (gMPI) to reflect moderate rather than acute levels of multidimensional poverty, in line with the ambitions outlined in the Sustainable Development Goals (SDGs). The MMPI is constructed as a superset to the global MPI maintaining the three dimensions of health, education and living standards, but adjusting nine of the indicators to reflect a meaningful change in the level of ambition. The trial MMPI is data-constrained, but provides a methodology and discusses potential indicators for an MMPI that would: i) be globally comparable across countries at all income levels, ii) align the indicators with the higher standards for development as defined in the Agenda 2030, and iii) allow us to study some aspects of intrahousehold deprivation. The trial MMPI is illustrated empirically using nationally representative household surveys from Thailand, Iraq, Tanzania, Serbia, Guatemala, and Bangladesh. The empirical results in the six countries show the added value of having three layered measures of destitution, acute poverty, and moderate poverty. The MMPI aligns reasonably well with the established monetary poverty levels in lower middle-income countries (\$3.2 / day) and in upper middle-income countries (\$5.5/day), yet with some informative differences. The results demonstrate that the MMPI is feasible, has desirable properties as a global poverty index, and allows to unearth thus far hidden aspects in poverty measurement, such as intrahousehold deprivations in education. Still, challenges remain in terms of data availability for certain indicators and a study across additional countries is required before an MMPI structure can be finalized.

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1. Introduction

The 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) set a high standard for human development with the pledge “to end poverty and hunger, in all their forms and dimensions, and to ensure that all human beings can fulfil their potential in dignity and equality and in a healthy environment” (UNGA 2015). This vision does not only imply a life free from abject poverty, but a reality where all are empowered to lead a life they value, make their own choices, and grow into their full potential. The first and overarching goal of this agenda is to end poverty in all its forms, everywhere.

The Human Development Report (2019) calls *basic* capabilities a minimum floor of achievement in human development, where remarkable progress has been recorded during the past decades. In many middle-income countries the headcount ratio using the global Multidimensional Poverty Index (MPI) – which focuses on acute poverty – is in low single digits as a result of prudent policy making and a rapidly increasing quality of life. While the progress towards these basic capabilities is laudable, the report calls attention to widening inequalities in reaching so-called *enhanced* capabilities that are required to ensure a life free from poverty and social exclusion as it is understood in most societies. Reaching the minimum floor of attainment reflected by the global MPI is insufficient in a world where advanced capabilities are a requirement for obtaining productive employment and being part of the society at large. For example, at the same time as the world is about to reach the target of universal primary education, large inequalities persist in access to secondary education that would provide functional skills for today’s labor market. Similarly, many now have access to mobile phones, but similar convergence cannot be seen for smart phones, fixed broadband or other forms of access to the internet that would guarantee access to information and services.

A new measure of poverty is thus needed to capture higher levels of ambition for development, and to guarantee one can lead a life free from moderate poverty, thus aligning with the goals of the Agenda 2030 for sustainable poverty eradication. The aim of this paper is to suggest a new Moderate Multidimensional Poverty Index (MMPI) that captures, insofar as data permit, *enhanced* capabilities for human development and provides three important strengths compared to previous efforts of measuring poverty: (i) it introduces a *global* measure that is comparable across countries in all income categories, (ii) it aligns the indicators for human development with the higher level of ambition in line with the SDGs, and (iii) it includes indicators that capture intrahousehold inequalities.

The trial MMPI presented in this paper for six countries illustrates in-depth the proposed methodology for creating a moderate MPI that is linked to the global MPI (in that all persons who are poor by the global MPI are still identified as poor), and uses the same datasets (so that it is feasible). Although a range of indicator combinations were empirically implemented, further investigation of the data that are available for the full set of countries is required in order to finalize the indicator structure of a proposed MMPI.

The paper is organized as follows: Section 2 describes the background and motivation for the new measure. Section 3 introduces the main features of the proposed MMPI. Section 4 reviews the methodology for calculating the index and introduces the proposed choice of indicators and cutoffs. Section 5 presents the data and empirical findings using the new index in selected pilot countries. Section 6 draws conclusions on the empirical results and discusses further elaborations of the work in a broader policy framework.

2. Background and Motivation

Many of the current poverty measures used to track progress towards the Agenda 2030 fall short of its ambition to end poverty in all its forms. Instead, poverty is most often measured in monetary terms using a poverty line of \$1.9 a day¹ according to the international extreme poverty line established by the World Bank (2020). The 1.9-dollar line is an average of the national poverty lines in the poorest countries and covers the minimum set of basic needs. However, even in low-income countries the international poverty line does not correspond to the level needed for sustainable poverty reduction ‘in all its forms, everywhere’, and in most middle-income countries, the national poverty lines are drawn higher reflecting a higher level of income required to meet basic needs in these societies. Two additional international poverty lines have been constructed by the World Bank to better capture the realities of absolute poverty in middle income countries. These higher poverty lines are intended to weakly reflect the relatively higher overall living standards in those countries compared to low income countries. The poverty line of \$3.20 a day [2011 PPP] reflects such poverty in a typical lower-middle income country and the line of \$5.50 a day [2011 PPP] reflects such poverty in a typical upper-middle income country. In addition, the World Bank introduced a so-called societal poverty line (SPL) that considers the median level of consumption in a country². The societal poverty line moves up as countries grow, to capture the

¹ The poverty line is measured using constant international US dollars in purchasing power parity (PPP) terms using 2011 as the base year.

² An individual is considered poor if he or she lives on less than US\$1.00 plus half of the value of median consumption (or income) per day in their country (World Bank 2020).

higher cost of performing the same function (such as housing) across countries with different overall levels of development (World Bank 2020). These higher poverty lines correspond to the realities for people living in middle-income countries, and also provide more general measures of vulnerability to ‘extreme poverty’ by capturing individuals above the \$1.90/day line. According to the latest global estimates of monetary poverty, while 9.2 percent of the world’s population lived on less than \$1.90/day in 2017, this figure was nearly a quarter (24.1%) for the higher poverty line of \$3.20/day, and close to half (43.6%) of the world’s population for the \$5.50/day measure. Partially relative measures of monetary poverty are expected to capture additional differences across countries (World Bank 2020).

Ending poverty in all its forms requires us to view poverty not solely in relation to income and consumption, but relating to multiple aspects of human livelihoods. Consequently, multidimensional poverty measures were included within the SDG framework to measure the non-monetary dimensions of poverty such as deprivations in health, education or living standards. However, while the SDG indicators to monitor progress towards ending poverty includes both the global \$1.90/day and national poverty lines for monetary poverty, only national definitions are included for multidimensional poverty, thus preventing comparison across countries.³ Nevertheless, a global measure of multidimensional poverty exists, that allows comparison across 5.9 billion people, and is relevant to the first goal of Agenda 2030 that aims to ‘End poverty’. The global Multidimensional Poverty Index (global MPI) developed by the Oxford Poverty and Human Development Initiative (OPHI) in partnership with the United Nations Development Program (UNDP) has been used since 2010 to measure non-monetary dimensions of poverty. The global MPI was developed with the objective to measure ‘acute’ multidimensional poverty globally and reflect aspirations formulated during the era of the Millennium Development Goals (MDG). It measures poverty in terms of health, education and living standards using 10 indicators, and is intended to complement existing international monetary poverty measures by providing an estimate of other essential dimensions of poverty across developing countries. The index was revised in 2018, at the start of the Third United Nations Decade for the Eradication of Poverty (2018–2027), to better align its indicators with the Sustainable Development Goals (SDGs) and the 2030 Agenda for Sustainable Development insofar as data permit (Alkire and Jahan 2018, Alkire, Kanagaratnam and Suppa 2018).

³ In fact, many European countries submitted their AROPSE measure against SDG 1.2.2, and this subset of measures are probably comparable. Two countries submitted the global MPI as their national measure.

The global MPI is an acute measure of multidimensional poverty, where indicators and cut offs were designed to capture grave deprivations. While two of the poorest countries according to the global MPI still have over 90% of their population living in multidimensional poverty, as of 2020, there are 38 countries where the incidence of multidimensional poverty by the global MPI is below 5 percent, including China using 2014 data, and 17 of the countries have under one percent incidence (Alkire Kanagaratnam and Suppa 2020). These results signal that while useful for many developing countries, the global MPI cannot fully capture the aspirations of governments and citizens in countries where more acute deprivations have already been eradicated with development. Not only is the deprivation threshold often set higher in middle income countries, but also the lived experience that a certain level of deprivation implies changes due to the context. As noted by Sen (1983) *relative* deprivation in terms of commodities, incomes, and resources relates to *absolute* deprivation in terms of capabilities. In other words, while deprivation in all measured indicators are defined in absolute terms, they translate into differences in terms of capabilities depending on the overall level of development in the given context. For example, obesity might not be an indicator of poverty in all countries, and many may not feel that lack internet access implies poverty, if only the very elite enjoy it, while in other contexts where internet access is the norm, the same deprivation can effectively exclude one from crucial interaction, opportunities, and basic services and thereby constitute an important dimension of poverty.

A new measure of “moderate multidimensional poverty” is therefore needed to complement the current measure of acute poverty, and to capture deprivations in countries with low MPIs, as well as urban regions and low poverty subnational provinces, even in high MPI countries. Such a measure, together with the global MPI, offers a more complete depiction of how “all human beings can fulfil their potential in dignity and equality and in a healthy environment” as envisioned in the Agenda 2030, and reflect a standard of living that allows one to lead a life free from poverty in all its forms.

Previous exercises explored possible ways to design such a moderate measure of poverty. Recall that the precursor to the global MPI, the Human Poverty Index (HPI) (Anand and Sen 1997), had two forms: HPI-I and HPI-II precisely to provide measures that were relevant across the entire distribution of countries. Other measures have aimed to expand the scope of the poverty measurement by adding new dimensions to capture the deprivations faced by people living in poverty in different contexts.⁴ However, such efforts have commonly faced serious limitations in

⁴ An example of this was the Middle Income Countries MPI by OPHI and UNDP Latin American that trialled an MPI structure with new indicators (including employment) in six countries of the region.

data availability that have restricted their use beyond a handful of countries (see e.g. the Multidimensional Poverty Measure introduced by the World Bank in 2018 that added human security as a new and exciting dimension but could be calculated only for six countries where data was available). Additionally, some regional indices have been developed to cater for the similarities across countries. In 2009-10, when the global MPI was developed a European MPI was also estimated using the EU-SILC dataset (for subsequent work using EU-SILC see Alkire and Apablaza 2016), and later attempts at regional measures include MPIs for Latin America (Santos and Villatoro 2016) and the Arab region (UN ESCWA 2017). These indices either include higher levels of achievement for indicators of the global MPI, or add new indicators and dimensions reflecting the realities of poverty in the region. However, due to their nature, their comparability is limited to countries in the region, and as such, cannot replace the need for internationally comparable measures of moderate poverty.

The new index, here called Moderate MPI (MMPI), builds on the basic capabilities included in the global MPI and introduces enhanced capabilities anchored in the SDGs that are needed for sustainable poverty reduction. For instance, the indicator for Years of Schooling increases the level of ambition from basic education for one member of the household to lower secondary education for both male and female members of the household in working age, as a proxy for functional skills needed for employment. The MMPI is intended to provide a complementary measure of poverty globally but will be most meaningful for middle-income countries where acute poverty is already low and possibly no longer reflects a valid level of ambition for national development. Additionally, the new index is also intended to add value in developing countries with great regional variations in acute poverty, such as Uganda, where the incidence of multidimensional poverty at provincial level ranges from 6.0 to 96.3% (Alkire, Kanagaratnam and Suppa 2020). By raising the deprivation cutoff for the indicators compared to the global MPI, the MMPI aims to parallel the higher poverty lines for monetary poverty and provide a more relevant measure of welfare for countries and regions where acute multidimensional poverty is low, as well as giving an estimate of those vulnerable to falling into acute poverty.

3. Characteristics of the Moderate MPI

3.1 Methodological considerations: The Alkire-Foster Method

The proposed MMPI takes as its starting point the revised global MPI by relying on the same methodology and structure for the index. The revised global MPI provides the most detailed picture of globally comparable multidimensional poverty in the era of the SDGs. The MMPI is

based on the Alkire-Foster method (AF method from here onwards), that allows us to look at overlapping deprivations for the same unit of analysis to better understand the reality of people living in poverty (Alkire and Foster 2011). Different deprivations reinforce each other, creating poverty traps or vulnerabilities to impoverishment that are difficult to break without a solid understanding of the different drivers of poverty and how they relate to each other. While the index allows us to see the joint distributions of deprivations, it also allows us to decompose the results by regions, population groups, age groups and income cohorts, to better understand poverty in context.

The AF method is a flexible approach that allows poverty to be measured in different dimensions and summarized in one index characterizing the overall level of deprivation. Each dimension is measured by different indicator, with the choice of dimensions and indicators reflecting the context in which poverty is measured. Weights are assigned to both dimensions and indicators, corresponding to their relative importance. As a counting-based approach, the index relies on a **deprivation score** for each individual or household that is produced by counting and adding up the different weighted deprivations across the indicators for each person. A **cross-dimensional poverty threshold** is chosen to determine the minimum deprivation score at which a person or a household is considered multidimensionally poor. The headline measure of MPI is the product of its two components – the headcount ratio or **incidence** of multidimensional poverty (H) which describes the proportion of people who are identified as poor using the cross-dimensional poverty line, and **intensity** or average deprivation share (A) that describes the average proportion of (weighted) deprivations faced by the population identified as multidimensionally poor. The MPI is simply the product of the incidence (H) and the intensity (A) of poverty and represents the so-called **adjusted headcount ratio** ($MPI = H \times A$). The MPI can be broken down by each of its indicators, a useful property that analysis of poverty in detail. The **censored headcount ratio** presents the percentage of people who are poor and deprived in each component indicator, while the weighted sum of the censored headcount ratios makes up the MPI. Further, the **percentage contribution** to poverty depicts the censored headcount ratio *and* the weight assigned to each indicator, showing the relative value of each indicator to the MPI. Whenever the contribution to poverty of a certain indicator exceeds its weight, there is a relatively high censored headcount in this indicator, meaning that the poor are more deprived in this indicator than in others. Finally, the **uncensored headcount ratio** aggregates both the deprivations of the poor and non-poor and presents the proportion of the entire population that is deprived in each indicator (Alkire and Foster 2011).

The best known application of the AF method is the global MPI, where poverty is defined in three dimensions and measured by 10 indicators: health (nutrition and child mortality), education (years of schooling and school attendance), and living standards (electricity, sanitation, drinking water, housing, cooking fuel, and assets). A nested weighting structure is applied, where all dimensions are given equal weights (1/3), and all indicators within a dimension are weighted equally. A person is considered to be multidimensionally poor if he or she is deprived in at least one third of the weighted indicators (33.33 percent or more) (Alkire, Kanagaratnam and Suppa 2020).

The dual-cutoff approach of the AF method, combining deprivation cutoffs for each indicator and a cross-dimensional cutoff to identify the multidimensionally poor, can be used to distinguish two differently-defined subsets of the poor. As Alkire and Seth (2016) clarify, one set is identified by using a different poverty threshold while the other uses a different vector of deprivation thresholds.

1. **Changing the poverty cutoff (intensity approach):** The poverty cutoff defines the minimum amount of joint deprivations a person needs to suffer to be classified as multidimensional poor. This cutoff can range from being deprived in one indicator (any deprivation is enough to classify the person as poor) to being deprived in all indicators (a person must be deprived in all measured indicators to be classified as poor). The level of ambition can be changed by altering the required weighted share of deprivations for the poverty cutoff. The global MPI includes the poverty cutoff for multidimensional poverty, set at 33.33 percent, as well as a measure for 'severe' multidimensional poverty (set at 50 percent of weighted indicators) to identify the poorest among the MPI poor. Thus, the severe poverty cutoff identifies a subset of the poor and by design, everyone who is severely poor is also MPI poor. This is similar to the \$3.20 and \$1.90/day measures for monetary poverty. Additionally, the global MPI includes a third cutoff (set at 20 percent) to identify those not poor but 'vulnerable' to multidimensional poverty and deprived in 20-33.32% of the weighted indicators.
2. **Changing the deprivation cutoffs (depth approach):** Instead of changing the (cross-dimensional) poverty cutoff, another way of identifying the poorest of the poor is to change the vector of deprivation cutoffs in at least some indicators. The 'Destitution' measure, first designed in 2014 and updated since (Alkire, Conconi and Seth 2014, Alkire, Kanagaratnam and Suppa 2020) identifies people as destitute by using more extreme criteria in seven indicators, such as severe undernutrition (instead of undernutrition required in the global MPI), open defecation (as opposed to enhanced sanitation required

for the global MPI), or one year of schooling (compared to less than six years in the global MPI). As the adjusted vector is used with the same weights and poverty cutoff, everyone who is destitute is also MPI poor by definition.

While OPHI developed and launched the ‘destitution’ measures in 2014, a corresponding moderate MPI was not designed due to serious data limitations at the time. With improvements in many of the surveys on which the global MPI relies such as the Demographic and Health Surveys (DHS), Multiple Indicators Cluster Surveys (MICS) and selected national surveys, the decision was made in 2020 to reassess the construction of a global moderate MPI (MMPI). Instead of looking at a subset of the poor, i.e. the poorest of the poor, the proposed MMPI adopts the depth approach. By changing the vector of deprivation cutoffs at indicator level, it broadens the group identified as poor by the global MPI, including people who lack the enhanced capabilities required for a life free from poverty as defined in the Agenda 2030. As such, the MMPI will identify the superset of the poor and shall accompany the ‘vulnerable to poverty’ measure already reported in the global MPI.

In sum, this paper aims to fill the gap in multidimensional poverty measurement by providing the first empirical application of a global Moderate MPI. The proposed MMPI adopts the same index structure as the global MPI with regards to the selection of dimensions, nested weights and poverty cutoff in order to ensure comparability across indices. The value added of the new index lies in the higher level of ambition that is achieved by changing the deprivation cutoff of indicators where this is desirable and feasible to capture enhanced capabilities, building on the same data as the global MPI. The measure presented here identifies people as deprived by more aspirational criteria in nine out of the ten indicators, expanding the definition of poverty to include obesity, schooling up to class 10, water piped into the dwelling, and access to internet among others. Hence, the MMPI constitutes a *superset* of the multidimensionally poor, and in doing so, complements the structure of available multidimensional indices as a meaningful gradient. By implementing the three different poverty cutoffs (20%, 33.33%, 50%) and vectors of deprivation cutoffs (destitution, acute, moderate), the MMPI also aligns the dual-cutoff multidimensional poverty measures with the structure of monetary poverty identified by the three international cutoffs. Moreover, it sets a meaningful threshold for identifying people living in poverty across the different development contexts by providing an alternative measure of moderate poverty.

3.2 Dimensions, Indicators, and Deprivation Cutoffs

The global MPI is grounded in Amartya Sen’s capability approach, focusing on human capabilities understood as people’s real opportunities to do and be what they have reason to value (Alkire and

Santos 2014). The index includes 10 indicators grouped into three dimensions of poverty – health, education, and living standards – in line with the dimensions of the Human Development Index (Alkire, Kanagaratnam and Suppa 2020). The proposed MMPI builds on the same principles and aligns itself with these three dimensions of well-being. This choice of dimensions enables comparisons between the global MPI and MMPI estimates of poverty and facilitates communication around the indices as the main structure is widely known in the international policy fora. One drawback of keeping to the established dimensions of the global MPI, is the limited choice for indicators and the exclusion of some aspects of poverty that are decisive for people living in countries with higher income or development levels. For instance, most of the national multidimensional poverty indices of middle-income countries include employment as an important dimension of poverty (see e.g. National Poverty Index in Colombia described in Angulo et al. 2016). However, employment is not included in the revised global MPI due to severe data limitations that remain, despite considerable improvements in DHS, MICS and national surveys in recent years (see Alkire and Jahan 2018).

While we recognize the importance of national variations in how poverty manifests itself, the MMPI – like the global MPI – is geared towards defining a set of universal, enhanced capabilities required to enable people to move out of poverty in any development context. The MMPI uses internationally comparable data and indicators that allow comparison across countries and over time, and facilitate policy measures aimed at achieving the increased ambitions reflected in international commitments. The choice of the modified indicators is based on Atkinson’s proposals for comparable policy-relevant indicators as well as other considerations derived from literature, different expert agencies, as well as the normative goals set in the international development agenda. However, the choice of indicators has also been heavily restricted by the availability of data, which limits the set of possible indicators to a subset of desirable indicators and renders the presented MMPI as a trial measure.

The indicators in the MMPI build on the existing indicators used in the global MPI, while the deprivation cutoffs are raised to reflect a higher level of ambition. This means that the demands to be classified as non-deprived in the revised indicators are made stricter to create a meaningful qualitative difference in the level of ambition required to eradicate poverty sustainably and in higher income contexts. Such difference is achieved either by raising the deprivation cutoff (e.g. school attendance from a minimum of class 8 to a minimum of class 10), or by adding new requirements to an existing indicators (e.g. adding internet as a requirement to electricity access, or gender parity in education). From this follows that any person or household identified as poor

by the global MPI is automatically identified as poor by the MMPI, with additional groups identified as poor according to the new measure, thus creating a *superset* of the poor.

Table 1 presents a summary of each indicator and its deprivation cutoff for the global and moderate MPIs, while the section below provides a detailed discussion of the changes in indicators and poverty cutoffs across the three dimensions compared to the global MPI.

Table 1. Dimensions, indicators, and poverty cutoffs for Global MPI and MMPI

Dimension	Indicator	Deprived if (Global MPI)	Deprived if (MMPI)	Relative weight
Education	Years of schooling	A household is deprived if no household member aged 10 years or older has completed six years of schooling	A household is deprived if it does not have at least <i>one man and one woman of working age (16-60) who have completed at least 9 years of schooling</i> OR, if there is not a member of each gender in working age, someone of that gender of non-working age does not have at least 6 years of schooling OR, if it is a single-gender household, deprivation depends solely upon that person, who must have the appropriate years of schooling for their age.	1/6
	Child school attendance	Any school-aged child is not attending school up to the age at which he/she would complete class 8	Any school-aged child is not attending school up to the age at which he/she would complete class 10	1/6
Health	Undernourishment and Obesity	A household is deprived if any person under 70 years of age, for whom there is nutritional information, is malnourished	A household is deprived if any person under 70 years of age, for whom there is nutritional information, is malnourished or obese	1/6
	Child mortality and health insurance	A household is deprived if a child under 18 years of age has died in the family in the five-year period preceding the survey	A household is deprived if: 1) a child under 18 years of age has died in the family in the five-year period preceding the survey, or 2) <i>if all eligible household member aged 15-49 (man and woman) are not covered by health insurance</i>	1/6
Living Standards	Sanitation	A household is deprived if its sanitation facility is not improved (according to SDG guidelines) or it is improved but shared with other households	A household is deprived if it does not have a flush toilet that is not shared by more than 4 households	1/18
	Drinking water	A household is deprived if it does not have access to improved drinking water (according to SDG guidelines) or safe drinking water is at least a 30-minute walk from home (as a round trip)	A household is deprived if it does not have a safe supply of piped drinking water that is on premises	1/18
	Housing and overcrowding	A household is deprived if it has inadequate housing: the	A household is deprived if it has inadequate housing: the	1/18

		floor is made of natural materials or the roof or wall are made of rudimentary materials	floor or the roof or wall are made of natural or rudimentary materials OR there are more than 3 persons per sleeping room	
	Assets and access to finance	A household is deprived if it does not own more than one asset (radio, TV, telephone, computer, animal cart, bicycle, motorbike, refrigerator) and does not own a car or truck	A household is deprived if it does not own more than one of (radio, TV, telephone, bicycle, motorbike, refrigerator, computer, or animal cart) OR does not own more than two of (radio, TV, telephone, bicycle, motorbike, refrigerator, computer, animal cart, washing machine, or bank account) AND does not own a car or truck	1/18
	Electricity and Internet	A household is deprived if it does not have electricity	A household is deprived if it does not have electricity AND access to the internet or a smartphone	1/18
	Cooking fuel	A household is deprived if it cooks with dung, agricultural crops, shrubs, wood, charcoal or coal	A household is deprived if it cooks with dung, agricultural crops, shrubs, wood, charcoal or coal	1/18

Source: Based on Alkire, Kanagaratnam and Suppa 2020, modified by the authors.

Education

Education is a widely used dimension of multidimensional poverty measuring non-monetary aspects of deprivation and some suggest that “school attendance and adult schooling achievement of the household are basic pieces of information that need to be included among indicators of non-monetary poverty” (Santos 2019). Education is widely considered as a basic human right, but also an enabling human right (UNESCO et al. 2015) due to its close links to other dimensions of wellbeing, such as employment, health and social participation. Education is also clearly linked to public policy and is thus an actionable lever for poverty reduction. Individuals with more years of schooling are found to be more productive and have higher incomes in the labor market (World Bank 2018: 38-39) and thus better able to lift themselves and their families out of poverty. According to estimations by UNESCO (2017), the global monetary poverty rate could be more than halved if all adults completed secondary school. Yet, wide inequalities persist in access and completion of secondary education, and poorer households are still significantly disadvantaged (UNESCO 2015a). Further, recent studies have highlighted the intrahousehold differences in educational achievements and participation, with women and girls having lower mean years of education than their male counterparts (Alkire, Ul Haq and Alim 2019). However, to reach the goals outlined in the Agenda 2030, both girls and boys are required to have access to free, equitable and quality primary and (lower) secondary education, skills levels of adult population should substantially increase, and gender disparities in education should be removed. More specifically, in

words of the SDG4-Education Steering Committee, “living up to the commitment to ensure the provision of 12 years of free, publicly funded, inclusive, equitable primary and secondary education – of which at least nine years are compulsory, leading to relevant outcomes - without discrimination is crucial. The provision of free education includes the removal of cost-related barriers to primary and secondary education”.⁵ This message originates from the Incheon Declaration and the Framework for Action for the Implementation of the SDG 4 (UNESCO 2015b) where nine years of compulsory education was highlighted as the minimum requirement, and gender equality lifted as a central guiding principle.

In the global MPI, educational achievement is measured through two indicators: one focusing on educational attainment of the household members and one relating to school attendance among the children (if any) of the household. Thus, in the global MPI, a household is considered non-deprived in years of schooling if at least one member of the household aged 10 or over has completed six years of schooling, equivalent to primary education. The indicator encapsulates the idea of effective literacy described in Basu and Foster (1998), where all members of the household benefit if at least one member is literate. For school attendance, a household is considered non-deprived if all school-age children in the household are attending school up to class 8. As such, none of the education indicators in the global MPI require household members to be enrolled or have achieved any secondary education (beyond class 8), and falling short of the increased achievement to ensure a minimum of 9 years of free compulsory public education across the world as outlined in the Incheon framework (UN 2015b).

In light of this, the proposed MMPI includes revised cutoffs for both indicators that capture the level of ambition in the SDGs (as opposed to the MDGs) and intra-household inequalities in educational achievements. The MMPI indicators for education consider the household to be deprived if it does not have at least *one man and one woman*⁶ in working age (16-60) who have completed nine years of schooling, or if children of the household do not attend school up to class 10, which in many countries mark the completion of lower secondary education. In households with no working-aged adults, the required years of schooling is lowered to six years for up to two eligible members recognizing that elderly members of the households may not have had the same possibilities for schooling as younger generations. The new specification allows us to identify gaps in education up to the level where household members can be expected to have functional and marketable skills. Further, the new MMPI specifications also shed light on the gendered disparities

⁵ See the [SDG-Education 2030 Steering Committee website](#).

⁶ If one gender is absent, household needs 2 of the other gender; if it is a singleton household the singleton must have completed the required years of schooling.

in deprivation by requiring the same achievement by at least one male and one female member of the household. It is the first such attempt to account for intrahousehold levels of achievements in an internationally comparable poverty index. The revised indicators recognize that inequalities in education inhibit progress in poverty reduction and eradication, and celebrate headways being made in narrowing this gap (a feature that remains invisible in previous indices). Importantly, the new indicator designs will cause the uncensored headcount ratio in years of schooling to be higher in societies with greater gender disparities in education, underscoring the importance of achieving gender equality in the fight against poverty.

An important caveat from the global MPI also applies to the educational dimension of the MMPI. While years of schooling provides an important indication of educational achievement, it does not provide information about the quality of schooling and the learning outcomes. This is an important part of development outcomes where no comparable data is available in the household surveys used to calculate the global MPI or the MMPI, and thus the index is unable to capture this aspect of learning. However, when drawing conclusions for policy recommendations, the quality of schooling should be carefully considered.

Health

Great progress has been recorded in improving the health outcomes globally, for instance, indicated by the rapidly declining cases of child and maternal mortality, although at varying speeds in different parts of the world (UNDP 2019:39). Despite such improvements, challenges remain in access to essential health services that could bring down the burden of disease, and in tackling non-communicable ‘lifestyle’ health problems that are gaining ground especially in high income countries. In the global MPI, deprivation in health is measured by two indicators: undernutrition and child mortality. A household is deprived in health if any person under 70 years of age, for whom there is nutritional information, is undernourished, or if a child under 18 years of age has died in the family in the five-year period preceding the survey. Both of these indicators capture acute forms of health deprivation, and many countries, especially middle-income countries, have made great progress towards reducing the prevalence of such deprivations. Bangladesh – an upper-middle income country – had an annual reduction of 1.5 percentage point reduction in the proportion of people deprived in nutrition between 2014 and 2019, and 0.2 per year reduction in the percentage of people living in households where a child has died in the last five years (Alkire, Kovesdi et al 2020). This improvement, however, does not imply absence of deprivation in health in a broader sense. Still 9.5% and 1.3% of the population of Bangladesh were deprived in nutrition

and child mortality respectively in 2019, according to the most recent global MPI results (Alkire, Kanagaratnam and Suppa 2020).

Moving beyond these acute deprivations, the MMPI adds two additional criteria to the existing health indicators, health insurance and obesity, to proxy access to health care and the increasing burden of non-communicable diseases. The new measure thus broadens the definition to cover the ability to access health care, in line with the SDG goal 3.8 on universal health coverage. As noted by Santos (2019), lack of access to health care is one aspect of poverty, and the notion of access to health coverage is a fundamental element of social protection that is supported by the UN Human Rights approach⁷ for both intrinsic and instrumental reasons. For instance, lack of access to health care can deprive people the opportunity to remain healthy and employable leading to new poverty traps and deprivations in other dimensions of poverty (Banerjee and Duflo 2011). Furthermore, promoting universal health coverage has linkages to reducing poverty (SDG 1), universal educational access and better educational quality (SDG 4), advancing gender equality (SDG 5), inclusive growth and productive employment (SDG 8) and inclusive societies (SDG 16) (WHO and World Bank 2017).

Moreover, adding obesity aligns the definition of malnourishment with the SDG standard that defines malnutrition as both over- and underweight, and SDG Goal 2 that strives to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture. In this paper, however, a stricter definition is used, with the indicator focusing on obesity instead of overweight. This is motivated by the rapid increase in obesity as a major health problem in the developing world and middle-income countries. According to WHO, worldwide obesity has almost tripled since 1975, and 13 percent of adults aged 18 and over were obese in 2016. Today, most of the world's population live in countries where overweight and obesity kills more people than underweight⁸ - a condition exacerbated by the novel coronavirus pandemic. For the purposes of this paper, obesity is measured for adults as body-mass index (BMI) greater than equal to 30, for youth (5-19) as BMI-for-age greater than two standard deviations above the WHO Growth Reference median, and for children under 5 as weight-for-height greater than three standard deviations above WHO Child Growth Standards median. This definition is in line with WHO definition of obesity.

Importantly, notable data limitations exist in the expanded health-related indicators due to sample coverage and variation in the modules administered in each country. When it comes to obesity,

⁷ See Article 25 of the UN Declaration of Human Rights in UNGA (1948).

⁸ See the [World Health Organization Obesity and Overweight website](#).

data limitations restrict us from capturing the full scale of the problem in countries with MICS surveys that record the nutritional status only for children. Since obesity is mostly a problem later in life, this leads to underreporting of the deprivation in the revised nutrition indicator in countries with MICS surveys, while countries with DHS data portray a more realistic picture of malnutrition as data is usually collected for men and women as well as children. Meanwhile, the health insurance coverage was not reported for Bangladesh, Serbia, and Thailand, and only partially measured in Iraq, all of which are MICS surveys. This lowers the accuracy of the revised indicator with substantial consequences on the interpretation of the new poverty estimates in the different countries. We retain health insurance in this trial MPI due to the upcoming wave of household surveys in which data on health insurance will be captured in a more reliable manner. Hence, despite the current data limitations health insurance is maintained here for normative reasons and because current data constraints may shift. Alternative health indicators that also feature in the global agenda, such as smoking and vaccination coverage, were considered in earlier trial measures for the MMPI but none of these indicators were appropriate as a general indicator of population health and were thus excluded from the final specification due to data limitations and small reference population.

Living standards

Living standard is measured in the global MPI by using six complementary indicators: sanitation, drinking water, housing, assets, electricity, and cooking fuel. These indicators capture essential aspects of potential deprivations that are also relevant for a moderate measure of poverty. In the new measure, however, the level of ambition is increased either by raising the required standard or broadening the category of assets and services needed for a life free from moderate poverty.

For **sanitation** and **drinking water** the MMPI indicator raises the level of ambition by requiring a higher SDG standard of the facilities that are reasonable to expect in middle-income countries. According to the global MPI, a household is considered deprived if it uses an unimproved sanitation facility (according to SDG guidelines) or the facility is improved but shared with other households. In contrast, the MMPI defines a household deprived if it does not have a flush toilet that is shared by no more than four households. For drinking water, the global MPI classifies people as deprived if they live in a household that does not have access to improved drinking water (according to SDG guidelines) or safe drinking water is a 30-minute or longer walk from home (as a round trip). The MMPI raises the standard by requiring the household to have a safe supply of piped drinking water that is on premises. This is in line with the SDG goal of safely managed drinking water that is defined as an “improved basic drinking water source which is located on

premises, available when needed and free of faecal (and priority chemical) contamination”⁹, although data on measured water purity is not available for a sufficient number of countries.

For the **housing** indicator, the global MPI defines a household as deprived if it has inadequate housing, i.e. the floor is made of natural materials or the roof or walls are made of natural or rudimentary materials. The MMPI adopts the same standard of housing but adds the aspect of overcrowding to the definition of adequate housing. According to UN-HABITAT (2006: 70-71), overcrowding is a hidden form of homelessness that affects mainly urban dwellers in developing countries, and overcrowding tends to be less prevalent as areas develop and gain higher level of prosperity. The SDG agenda includes overcrowding in its definition of adequate housing, according to which “a dwelling unit provides sufficient living area for the household members if not more than three people share the same habitable room”¹⁰. The same definition is adopted by the MMPI as a definition of overcrowding.

For **assets**, the global MPI defines a household as deprived if it does not own more than one of these assets (radio, TV, telephone, computer, animal cart, bicycle, motorbike, refrigerator), and does not own a car or truck. The choice of items in the assets schedule of the global MPI were rigorously tested in the revision of the global MPI 2018 (see Vollmer and Alkire, 2018). The schedule is thus maintained as a minimum floor in the MMPI. Additionally, the MMPI also adds a washing machine (a higher end possession item) and a bank account (as a proxy for access to finance) to the assets schedule, items that can be associated with greater material wealth particularly in middle income countries. To accommodate the increase of the assets schedule from nine to eleven, the minimum threshold for being non-deprived in the expanded moderate assets indicator is raised to two items. In other words, a household is expected to have more and better assets in order not to be deprived. Adding a bank account to the list of assets is not straightforward, as in some countries mobile phones rather than bank accounts are used, whereas in other contexts bank accounts are opened automatically even if transportation is difficult or some account holders cannot properly use them. But in many middle income countries, financial inclusion through bank account or similar is frequently found to be an important pathway out of poverty (see e.g. Shepherd et al. 2019). Also, the SDG agenda highlights the importance of financial access in Goal 8 that aims to “expand access to banking, insurance and financial services for all”. Therefore, bank account is included in the assets indicator of the MMPI.

⁹ Metadata for SDG 6.1, p.1, downloaded from the [United Nations Statistics Division > SDG indicators > Metadata Repository > Goal 6.1.1 \(PDF\)](#).

¹⁰ Metadata for SDG 11.1, p. 4. downloaded from the [United Nations Statistics Division > SDG indicators > Metadata Repository > Goal 11 \(website\)](#).

For **electricity**, the global MPI defines a household as deprived if it does not have electricity. While lack of electricity is a sign of deprivation, finding pathways out of poverty requires *using* electricity for productive purposes to enhance one's employability, resource base, or income, and to access information. As data on the usage of electricity, as well as on electricity cuts and interruptions, is only scarcely available, the MMPI indicator cannot improve the access to electricity indicator directly. To reflect the increased level of ambition and to recognize the importance of access to information and communication technology as an important tool in the fight against poverty, the MMPI considers a household to be deprived if it does not have electricity and no access to the internet or a smartphone. Recognizing its increasing importance as a tool to access public and market information, and a means to protect fundamental freedoms, using the internet is part of the SDG agenda and Goal 9 strives to "provide universal and affordable access to the Internet in least developed countries by 2020". In the time of Covid-19 pandemic, internet is also a key to various other options like remote working or virtual schooling. Including this indicator in the MMPI allows decision-makers to effectively track the digital divide and ensure that nobody is left offline.

The final living standards indicator included in the global MPI is **cooking fuel**, with a household considered deprived if it cooks with dung, agricultural crops, shrubs, wood, charcoal or coal. The same definition is used for the MMPI. This indicator provides an alternative to proxy indoor air pollution and respiratory health by assessing the reliance on unclean cooking fuels for cooking and heating. Being non-deprived, i.e. not using any of the listed fuels, ensures a cleaner indoor air quality and thus removes the source of deprivation. No grading of alternative cooking fuels is deemed necessary in this regard.

4. Empirical findings

4.1 Data and selection of countries

The MMPI was tested on a group of pilot countries that represent different contexts and levels of economic development (see Table 2). The sample covers different geographic regions and countries from lower middle-income (LMIC) and upper middle-income country groups (UMIC) according to World Bank classification. While the pilots are not intended to provide a representative sample of all country contexts, they serve as illustrative examples of the differences in development challenges that the new index helps to highlight.

Table 2. Typology of countries

Country	Type of Survey	Year of Survey	Income category ¹¹	Region
Bangladesh	MICS	2019	Lower Middle Income	South Asia
Guatemala	DHS	2014/15	Upper Middle Income	Latin America & Caribbean
Iraq	MICS	2018	Upper Middle Income	Middle East & North Africa
Serbia	MICS	2014	Upper Middle Income	Europe & Central Asia
Tanzania	DHS	2015/16	Lower Middle Income	Sub-Saharan Africa
Thailand	MICS	2015/16	Upper Middle Income	East Asia & Pacific

Source: Authors' compilation.

In this paper, we include six countries – Bangladesh, Guatemala, Iraq, Serbia, Tanzania and Thailand – for which the MMPI is calculated. The selection of countries was based on the ambition to sample countries from different geographic regions and income groups. All of our pilot countries have conducted a survey relatively recently (2014 or later). The surveys used were either Multiple Indicator Cluster Surveys (MICS) or Demographic and Health Surveys (DHS) because roughly equal number of both surveys are used in the global MPI. Both are nationally representative household surveys providing information about multiple dimensions of poverty for the same households and individuals – a requirement for calculating an MPI. However, the MICS and DHS surveys have somewhat different objectives, and hence, different samples and questionnaires. For instance, in MICS, nutritional data is only collected for children under 5 years old, whereas the DHS surveys also collect nutritional data for men and women in a particular age group (most often 15-49 but can vary by country). The surveys also differ in the way they record health insurance as some record it both for women and men, some only for women, and some exclude it altogether. Thus, cross-country comparisons in the empirical results of these indicators should be done with caution. More details on data comparability are presented in Appendix 1.

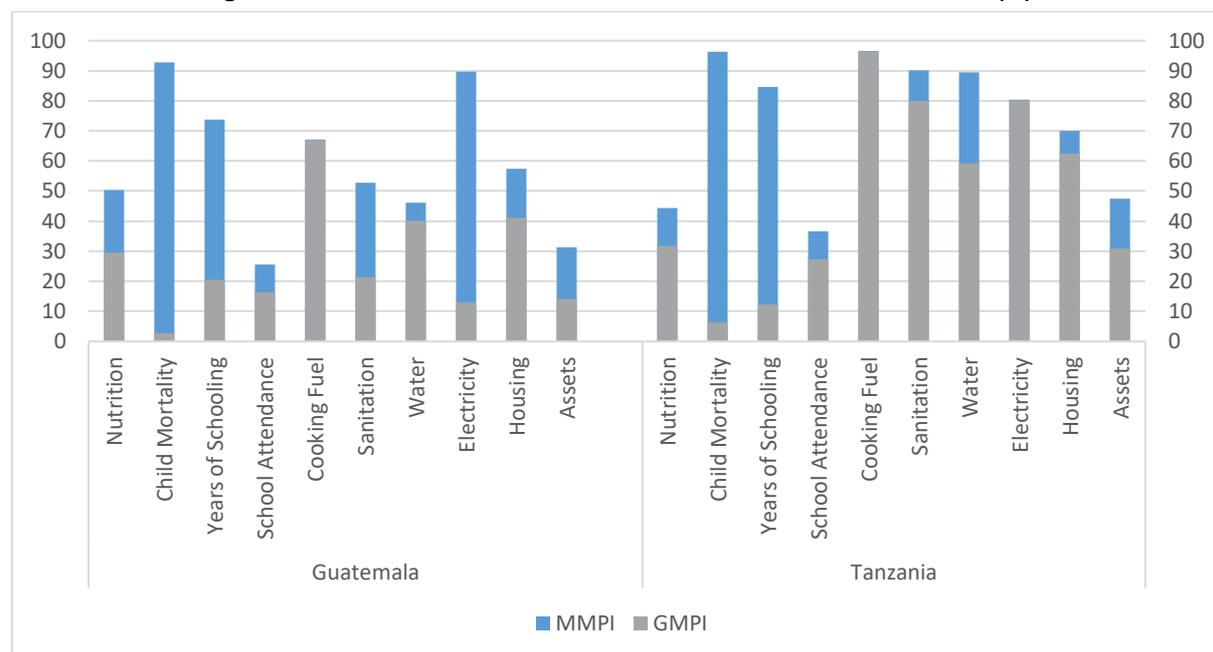
4.2 Uncensored headcount ratios for the new indicators

Raising the deprivation threshold for nine out of the 10 indicators led to some substantial changes in the uncensored headcount ratios of the revised indicators as shown in Figure 1 below (see Appendix 2 for headcount ratios of the MMPI and gMPI for all pilot countries). Recall that the indicators were revised either by adjusting the deprivation cutoffs upwards, such as in years of

¹¹ Based on most recent World Bank classification (1 July 2020 release), obtained from the [World Bank Country and Lending Groups website](https://data.worldbank.org/indicators).

schooling or school attendance, or by introducing new requirements like adding health insurance to child mortality, internet to electricity, or gender parity to years of schooling.

Figure 1. Uncensored Headcount Ratios for Guatemala and Tanzania (%)



Source: Authors' calculations. GMPI figures from Alkire, Kanagaratnam and Suppa (2020).

Figure 1 presents the uncensored headcount ratios (the proportion people suffering a deprivation) for two selected countries, Guatemala and Tanzania. Starting with indicators in the health dimensions, including obesity as part of the nutrition indicator caused an increase of 20.8 percentage points in Guatemala and 12.7 percentage points in Tanzania, the two pilot countries with DHS surveys that includes nutritional data for both children and adults. These increases seem reasonable in light of obesity data from WHO, with the prevalence of obesity among children and adolescents (5–19 years) being 9.9 % and 2.2% in Guatemala and Tanzania respectively, and 21.2% among adults (18+ years) in Guatemala¹² (WHO 2020).

The prevalence of child mortality in the five middle income countries is rather low, ranging from 1.5% in Serbia to 3.1% in Iraq. In the MMPI measure, child mortality was complemented with a requirement of all eligible household members having a health insurance, which appeared to be a considerably more demanding requirement¹³. In Guatemala, Iraq and Tanzania, the countries with data on health insurance, the percentage of people living in a household with that deprivation climbed sharply to over 90%. This reflects a serious lack of health insurance coverage across the whole population, especially in Guatemala and Tanzania, where data were collected from both

¹² In Tanzania, the data for adults (18+) was not available in the cited reference (WHO, 2020).

¹³ If data were available for two eligible household members (man and woman), only one member needed to report a health insurance for the entire household to be considered covered by it.

men and women. In four other pilot countries however, information about health insurance for the male members of the households was not recorded and an underreporting can thus be assumed. Basic healthcare provided by the government also varies across the pilot countries. In Iraq for instance this is a service free of charge, possibly disincentivizing taking out a private insurance, which is reflected in the data.

Moving on to the education dimension, the increased deprivation threshold in the years of schooling indicator, where one woman and one man are required to have at least lower secondary education in order for the household not to be deprived, yielded substantial increases in the uncensored headcount ratios. Table 3 presents a step-by-step comparison of the years of schooling achievements for men and women in the six pilot countries. It shows information at the individual level with the percentage of working age (16 to 60 years) women and men who have completed 6 years of schooling, 8 years of schooling and eventually 9 years of schooling. It also presents the percentage of households for the different achievements both with and without accounting for gender.

Table 3. Attainments in Years of Schooling, Step by Step Guide

	6 YoS women aged 10 years or older	6 YoS men aged 10 years or older	Household has at least one member with 6 yos (GMPI)	Household has at least two members with 6 yos	Household has at least one female and one male member with 6 yos	8 YoS women aged 10 years or older	8 YoS men aged 10 years or older	Household has at least one member with 8 yos	Household has at least two members with 8 yos	Household has at least one female and one male member with 8 yos	Household has one man and one woman of working age (16-60) who have completed at least 9 years of schooling (MMPI)
Bangladesh	47.3%	48.3%	78.8%	53.6%	45.4%	33.4%	37.7%	64.6%	39.2%	32.7%	26.0%
Tanzania	60.7%	65.6%	87.5%	67.9%	64.1%	20.1%	23.6%	40.9%	20.8%	17.8%	15.5%
Iraq	52.2%	68.0%	88.7%	72.1%	61.8%	31.6%	46.3%	70.8%	49.2%	37.5%	30.1%
Thailand	63.5%	69.7%	88.1%	74.4%	71.8%	44.8%	47.2%	77.2%	51.8%	47.5%	47.6%
Guatemala	49.0%	56.5%	79.5%	58.1%	50.7%	28.4%	32.8%	53.6%	32.6%	27.2%	26.2%
Serbia	86.2%	92.7%	97.4%	90.7%	93.1%	83.1%	89.7%	97.1%	89.5%	91.7%	81.5%

Source: Authors' calculations.

Two observations demonstrate the added value of taking intra-household achievements into account. First considering 6 and 8 years of schooling, five of the six pilot countries have less than 8% difference in years of schooling attainments between men and women. For 6 years, the difference between men and women ranges from 1 percentage point in Bangladesh to 7.5 percentage points in Guatemala, while for 8 years of schooling, the difference is between 2.5

percentage points in Tanzania and 6.6 percentage points in Serbia. However, intra-household differences become more visible with the final indicator specification that requires two household members, one man and one woman, to be educated. In Bangladesh, the difference between having any two members with six years of schooling (53.6%) and two members of different genders (45.4%) reveals a large difference that remains visible, albeit somewhat smaller, for the indicator requiring eight years of schooling. Therefore, including a gendered condition in the household specification sheds a light on intrahousehold gender inequalities even in countries characterized by moderate inequalities across the population.

Beyond these two dimensions, the new or increased deprivation thresholds of the MMPI have also resulted in interesting findings for the living standards indicators. For instance, while less than 3% of the population in Bangladesh are deprived in the global MPI indicator for drinking water, meaning they have no access to improved water sources according to MDG standards, the uncensored headcount ratio for drinking water indicator in the MMPI is much higher, with 90% of people living in households that lack access to piped water on their premises, one of the goals included in the SDG agenda. Next, adding internet to complement access to electricity revealed a wide gap in access to information technology and highlighted the fact that large number of people have been left offline. Overcrowding, another addition to living standards, had considerable variation across countries, as shown in the table in Appendix 3 with a large share of the population being affected by these conditions in Iraq (40.7%) and Guatemala (41.7%). The table also presents the percentage people living in households that experience overcrowding but are classified as non-deprived in the global MPI housing indicator, that only considers the type of housing materials. This ranges between 15.5% in Bangladesh and 90.7% in Serbia. As many of these households are classified as deprived according to the housing indicator of the MMPI, this causes increases in the uncensored headcount ratios of the indicator across the countries, and particularly in Iraq and Thailand.¹⁴

A final observation can be dedicated to the censoring of the indicators. Table 4 present the uncensored as well as the *censored headcount ratios* for each of the ten indicators, showing the percentage of people who are classified as poor by the MMPI and also deprived in a given indicator. The indicator with the highest censored headcount ratio is drinking water in Bangladesh, child mortality in Guatemala, Iraq and Tanzania, and years of schooling in Serbia and Thailand.

¹⁴ Note that the revised MMPI housing indicator also uses an updated floor definition of "Household is considered deprived if it has floor that it is natural or rudimentary material". In the case of Thailand, this results in a large increase of the uncensored headcount ratio as "wood planks" are a common floor material (17.6% of households reported their floor material to be wood planks).

Overall, censoring is quite modest, with a few notable exemptions such as the child mortality indicator in Iraq, and years of schooling and drinking water in Thailand. The censoring of cooking fuel in Bangladesh, Serbia and Thailand is also notable and worth highlighting, as it is the only indicator of the MMPI that was not revised.

Table 4. Uncensored and Censored Headcount Ratios of the Six Pilot countries of the MMPI

Country		Nutrition	Child Mortality	Years of Schooling	School Attendance	Cooking Fuel	Sanitation	Water	Electricity	Housing	Assets
Bangladesh	<i>Uncensored</i>	15.6%	1.9%	74.0%	14.0%	81.4%	64.3%	89.9%	60.8%	74.0%	49.6%
	<i>Censored</i>	14.4%	1.8%	68.1%	13.6%	66.4%	56.9%	69.3%	54.6%	64.8%	46.9%
Guatemala	<i>Uncensored</i>	50.3%	92.7%	73.8%	25.5%	67.0%	52.8%	46.2%	89.8%	57.5%	31.3%
	<i>Censored</i>	49.2%	85.1%	73.0%	25.5%	65.5%	51.9%	38.3%	82.7%	56.6%	31.2%
Iraq	<i>Uncensored</i>	13.1%	97.7%	69.9%	24.6%	0.4%	14.5%	46.9%	46.1%	43.7%	3.3%
	<i>Censored</i>	13.1%	75.5%	68.7%	24.6%	0.4%	13.6%	38.5%	41.7%	38.3%	3.1%
Serbia	<i>Uncensored</i>	1.6%	1.5%	18.5%	1.0%	34.4%	8.0%	17.8%	32.6%	5.3%	0.7%
	<i>Censored</i>	0.7%	0.5%	5.2%	0.7%	4.7%	3.1%	1.9%	4.5%	1.7%	0.6%
Tanzania	<i>Uncensored</i>	44.3%	96.3%	84.5%	36.5%	96.5%	90.1%	89.5%	80.4%	70.0%	47.4%
	<i>Censored</i>	44.2%	93.9%	84.4%	36.5%	94.6%	88.9%	88.1%	80.2%	69.9%	47.4%
Thailand	<i>Uncensored</i>	4.2%	2.1%	52.4%	3.0%	21.5%	2.9%	72.1%	24.7%	28.3%	1.2%
	<i>Censored</i>	2.2%	1.5%	17.5%	2.2%	11.6%	1.5%	16.1%	12.1%	11.4%	0.9%

Source: Authors' calculations.

4.3 National Level Results

Table 5 below presents the main results of the MMPI for the six pilot countries, with an additional column comparing results to headcount ratio from the most recent global MPI. Some expected outcomes are observed, such as the incidence of poverty increasing in all countries. The highest increase in MPI in absolute terms is for Tanzania, Guatemala, Iraq Bangladesh, with smaller increases in MPI for some of the countries with very low incidences of acute poverty as measured in the global MPI (Serbia and Thailand), showing that the MMPI is also raising the standards in the least poor countries. The ordering of countries by their level of poverty remains mostly the same, with the exception of Bangladesh and Iraq (both have similar poverty headcount ratios by the global MPI) who change places when ordered by the MMPI instead of the global MPI. This change is likely to be caused by the fact that data from Bangladesh did not include information about health insurance and thus the indicator reflects no difference in the uncensored headcount ratio to the child mortality indicator of the global MPI. In Iraq the lack of health insurance caused a significant increase in the uncensored headcount ratio of child mortality compared to the global MPI, yet data were only collected in the women's recode of the MICS survey, possibly hiding the fact that some families may be covered under the health insurance in the name of the husband.

The relative stability in the ranking of the countries by MMPI and incidence may suggest that the difference in poverty headcount ratios between the MMPI and global MPI is indeed caused by the gradual increase in the deprivation cutoffs along the same dimensions. However, further tests are required to analyze this assumption, particularly considering the data limitations described above.

Table 5. MPI, H (Headcount Ratio), and A (intensity of poverty or average share of weighted deprivations among the poor)

Country	Moderate MPI (MMPI)	Confidence intervals		Headcount ratio (H) MMPI	Confidence intervals		Intensity of poverty (A) MMPI	Confidence interval		No of people in moderate poverty, thousands (2018)	Headcount ratio (H) GMPI
Bangladesh	0.363	0.358	0.367	72.9%	72.2%	73.6%	49.7%	49.5%	49.9%	117,652	24.6%
Guatemala	0.569	0.560	0.579	87.6%	86.7%	88.5%	65.0%	64.4%	65.6%	15,109	28.9%
Iraq	0.379	0.368	0.389	75.7%	74.1%	77.3%	50.0%	49.4%	50.6%	29,109	8.6%
Serbia	0.021	0.017	0.025	5.3%	4.4%	6.2%	39.1%	37.9%	40.3%	471	0.3%
Tanzania	0.692	0.683	0.701	97.0%	96.4%	97.6%	71.4%	70.7%	72.1%	54,630	55.5%
Thailand	0.069	0.064	0.074	18.1%	17.0%	19.3%	38.1%	37.7%	38.5%	12,585	0.8%

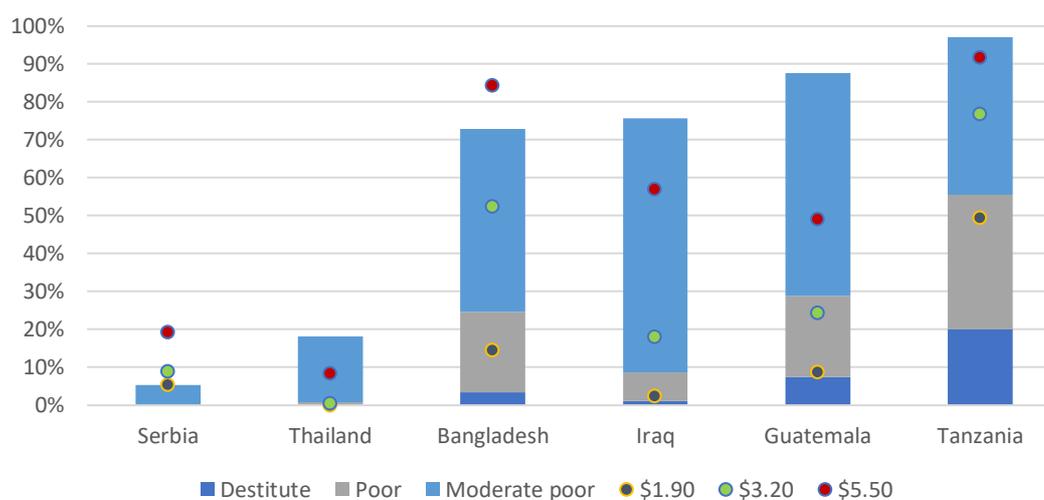
Source: Authors' calculations. GMPI figures from Alkire, Kanagaratnam and Suppa (2020).

Figure 2 below presents the headline results for the MMPI and compares it with the existing multidimensional measures (destitution and acute poverty), as well as international monetary poverty figures. Even across only six countries, the incidence of MMPI ranges from 5.3% to 97%, suggesting that, like the global MPI, it will be able to distinguish between a wide range of countries and conditions. The three colored stripes in each bar illustrate that indeed the MMPI is a 'superset' as all of the people who were destitute or MPI poor are also classified as poor by the MMPI. It appears that the MMPI creates the largest increment in the incidence of poverty for all countries. Furthermore, some differences with respect to the depth of poverty can be seen at-a-glance. While Bangladesh and Guatemala had similar levels of poverty and Iraq was lower according to the global MPI, Bangladesh and Iraq have similar levels of MMPI. Although differences may have been shaped by data availability (as we explain below), it is these kinds of differences that, we hope, the final MMPI would elucidate.

Overall, the MMPI appears as a meaningfully designed gradient of multidimensional poverty, ranging from a subset of the acute poor in destitution over the acute poor to the superset of the acute poor in moderate poverty. While strict parallels to the monetary measures of \$1.90, \$3.20 and \$5.50 a day are applied by changing the cross-dimensional poverty cutoff for the MPI (vulnerable, acute, severe), the gradient of destitution, acute and moderate multidimensional poverty forms an alternative classification displaying the differences in poverty levels due to changes in the vector of deprivation cutoffs. Thus while not strictly parallel, they can be compared to the monetary measures to offer complementary information on the nature and level of poverty

in a given country. It is interesting that the MMPI shows levels of poverty that are not dissimilar to monetary poverty levels as defined by the \$5.5 a day cutoff. However, monetary poverty measures do not appear to clearly map onto the deprivations captured by the moderate MPI and its accompanying multidimensional indices (destitution, global MPI). Perhaps due to the small number of countries included in the pilot and the aforementioned data concerns, no definitive pattern emerges about the relationship between the monetary and multidimensional poverty. In four out of six countries (Thailand, Iraq, Guatemala and Tanzania), the incidence of poverty according to the MMPI is higher than by the \$5.50 measures, while in two of the countries (Serbia and Bangladesh), the \$5.50 measure shows a higher prevalence of poverty than the moderate MPI. In fact, in Serbia, all monetary measures (even the \$1.90 a day) have a higher headcount ratio, while in Tanzania, more people are living in poverty according to the MMPI than any of the monetary measures. These are interesting empirical overlaps and diversions between the gradients that point to the varying nature of poverty across country and development contexts and the added value of the new measure to assess deprivations.

Figure 2. Headcount poverty ratio by different poverty measures



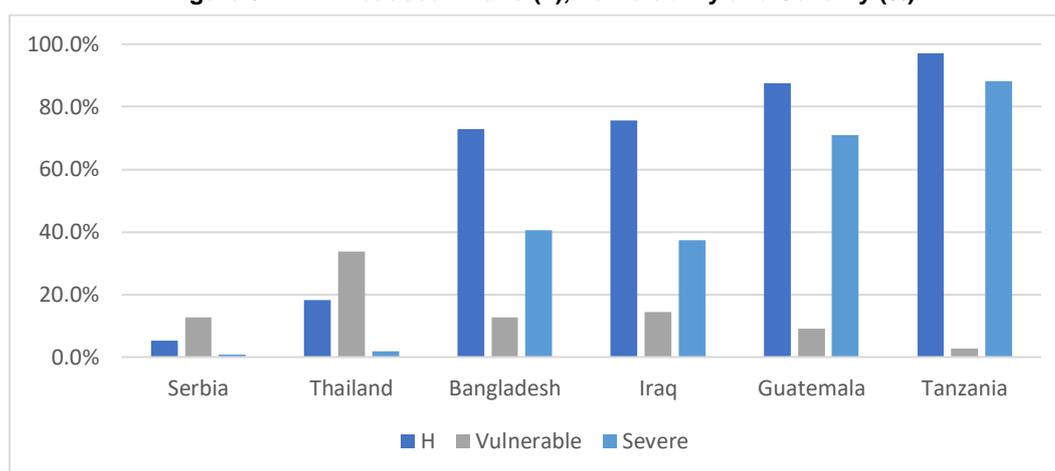
Source: Authors' calculations. Global MPI figures from Alkire, Kanagaratnam and Suppa (2020). Monetary poverty figures from the World Bank PovcalNet¹⁵.

Figure 3 below presents three poverty lines using the new MMPI indicators: first, the incidence for the MMPI (H) that captures the percentage of the population that experiences deprivation in 33% or more of the weighted indicators. Second, the measure of vulnerability that captures the percentage of the population deprived in 20-33.32% of the weighted indicators (as opposed to

¹⁵ Latest available data for monetary figures are from 2018 (Thailand), 2017 (Serbia, Tanzania), 2016 (Bangladesh), 2014 (Guatemala), and 2012 (Iraq).

33.33% or more) i.e. people who are close to the MMPI poverty line but not in poverty; and third, a measure of severe poverty that counts the percentage of people who are deprived in more than half of the weighted indicators (50% or more), i.e. a subsection of the MMPI poor. The two countries with the lowest levels of moderate poverty (Serbia and Thailand), show a higher share of people as vulnerable to moderate poverty, while the two poorest countries (Guatemala and Tanzania), have a substantial share of their poor population (70.9% and 88.2% respectively) experiencing severe moderate poverty. In comparison, the percentage of people living in severe multidimensional poverty according to the global MPI (a more acute measure) is 11.2% for Guatemala and 25.9% for Tanzania. What this portrays is that although less than or one in four people suffer from severe acute poverty, nearly or more than three out of four suffer from severe moderate poverty. Such change in values underlines the power of increasing indicator thresholds to project the journey ahead in reducing poverty in all its forms, and going beyond acute deprivations that require only the most basic conditions and capabilities for human wellbeing.

Figure 3. MMPI headcount ratio (h), Vulnerability and Severity (%)



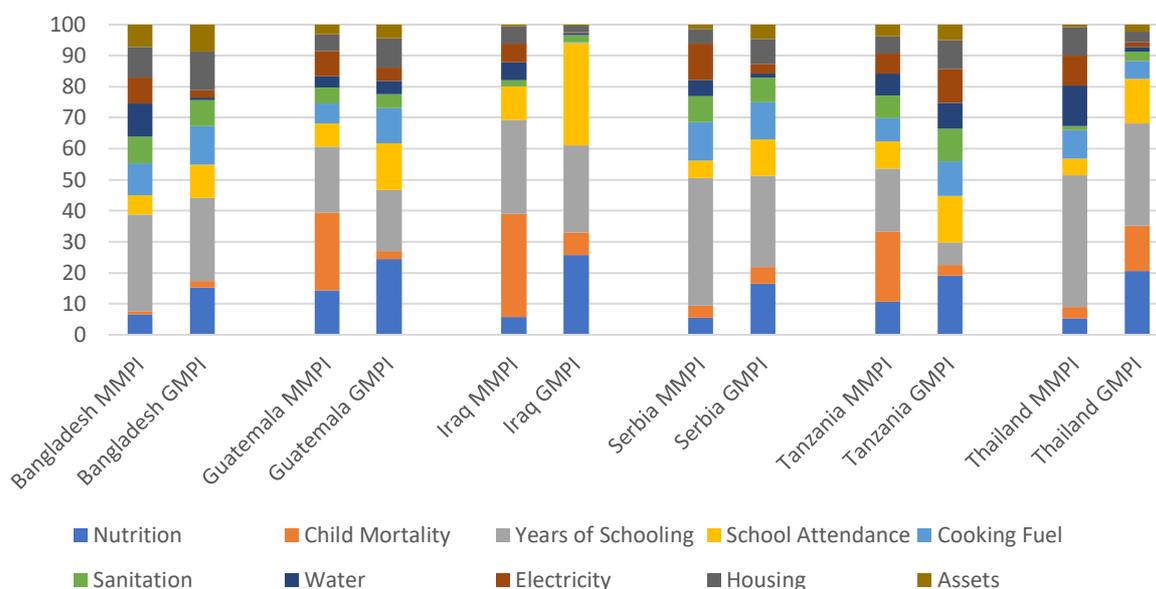
Source: Authors' calculations.

The greatest overlap between the moderate poverty headcount ratios and the percentage of people in severe moderate poverty is in Guatemala and Tanzania where between 37.4% and 88.2% of the population experience deprivation in half or more of the new indicators, followed by Bangladesh and Iraq, where more than a third of the population are in severe poverty. In Serbia and Thailand, this figure approximates to roughly one and two in every 10 people of the population, respectively. The relationship between headcount ratio and vulnerability is perhaps more interesting for countries where the MMPI is relatively low, as it signals the percentage of the population who are relatively close to the poverty cutoff and could fall into poverty if they acquire deprivations in additional indicators. For instance, in Serbia, twice as many people are vulnerable than those in moderate poverty according to the MMPI, while a third of the population in Thailand falls into the

vulnerable classification. This signals that while efforts to reduce moderate poverty are important and some have made great progress in this direction, further work needs to focus on cementing this achievement by implementing sustainable policies and practices that prevent people falling back into poverty.

The indicators that contribute the most to poverty provide important insights into possible policy measures that have the greatest impact on reducing moderate poverty if designed meaningfully and triangulated with further data sources and expert opinions. Looking at the percentage contribution of indicators to the MMPI (Figure 4), the profile of moderate poverty varies greatly across the six pilot countries. In Thailand, deprivation in the years of schooling indicator is the main driver of poverty (with 42.4 percentage contribution to overall moderate poverty). Differences also appear with the global MPI, for instance in Tanzania, where the contribution of years of schooling to moderate poverty is substantially larger (20.3%) than the contribution to acute poverty (7.2%) measured by the global MPI. In Guatemala, on the other hand, health related indicators are more dominant. It should be noted that the large contribution of child mortality to moderate poverty in Guatemala, Iraq and Tanzania reflects the large proportion of the population who lack health insurance, which is a requirement for this indicator in the MMPI. In Bangladesh, Serbia and Thailand information on health insurance is not available, thus the contribution to overall poverty reflects child mortality only.

Figure 4. Percentage contributions - Percentage of the MMPI that each indicator is contributing



Source: Authors' calculations. GMPI figures from Alkire, Kanagaratnam and Suppa (2020).

4.4 Disaggregation by Area, Age groups and subnational regions

Rural-urban divide persists in moderate poverty

A strong characteristic of acute poverty is that incidence is substantially higher in rural areas. Of the 1.3 billion MPI poor people across 107 countries analyzed in the 2020 update of the global MPI, 84 percent lived in rural areas (OPHI and UNDP, 2020). This difference between rural and urban areas is prevalent across all developing world regions, with both the incidence and intensity of poverty being higher in rural areas. This distinction was particularly prominent in Sub-Saharan Africa, where the intensity of poverty in rural areas was more than seven percentage points higher than in urban settings according to the 2020 global MPI.

An interesting observation from the empirical results of the six pilot countries is that the rural-urban divide persists in moderate poverty for the most part, with a few noteworthy exceptions. Table 6 shows the MMPI, incidence and intensity of moderate poverty by area, in comparison to the headline figures of acute poverty. The incidence of rural moderate poverty is higher in all six countries. In Tanzania, the only pilot country from Sub-Saharan Africa, the incidence in both rural and urban areas is greater than 90%. The gap between rural and urban moderate poverty is thus less pronounced. Another interesting observation is Serbia, where the intensity of moderate poverty was found to be higher in urban areas – a trend that was only present for acute poverty in Thailand.

Table 6. Rural Urban disaggregation

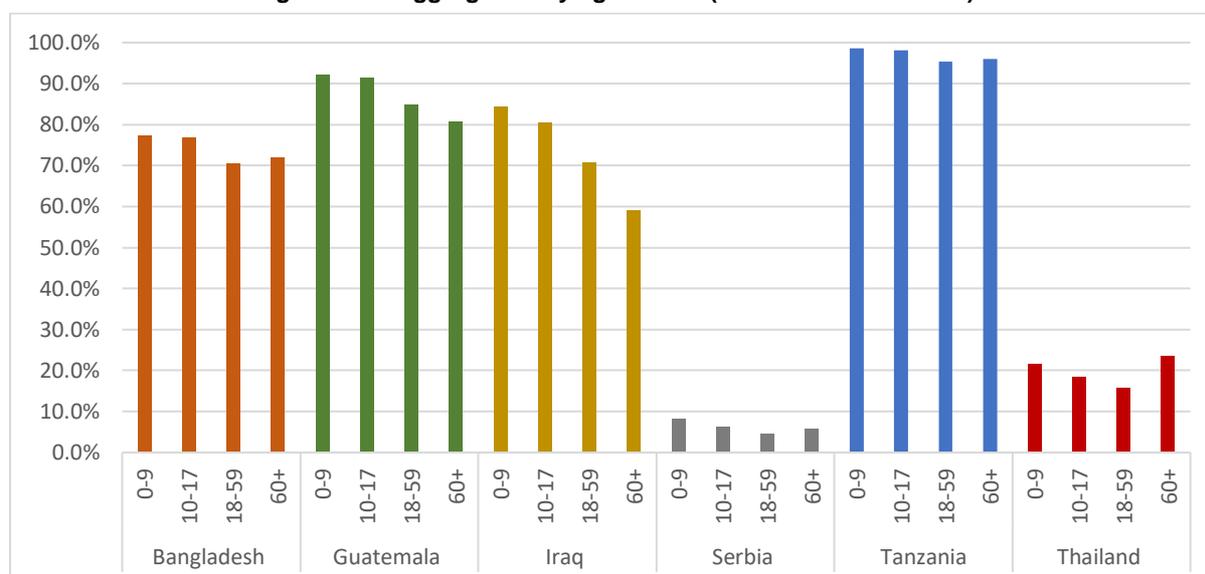
Country	Area	MMPI	H	A	GMPI	H	A
Bangladesh	rural	0.397	79.2%	50.2%	0.233	48.6%	47.9%
Bangladesh	urban	0.236	50.1%	47.2%	0.103	23.0%	44.9%
Tanzania	rural	0.744	99.1%	75.1%	0.34	67.6%	50.3%
Tanzania	urban	0.564	91.8%	61.4%	0.112	26.0%	43.2%
Iraq	rural	0.468	87.3%	53.6%	0.05	12.6%	39.3%
Iraq	urban	0.339	70.6%	48.0%	0.025	6.9%	36.7%
Thailand	rural	0.089	23.3%	38.1%	0.004	1.0%	38.9%
Thailand	urban	0.046	12.1%	38.0%	0.002	0.5%	39.5%
Guatemala	rural	0.669	96.0%	69.6%	0.193	41.3%	46.6%
Guatemala	urban	0.434	76.1%	57.0%	0.053	11.9%	44.3%
Serbia	rural	0.036	9.4%	38.0%	0.003	0.7%	42.8%
Serbia	urban	0.011	2.5%	42.0%	0.001	0.1%	41.4%

Source: Authors' calculations. GMPI figures from Alkire, Kanagaratnam and Suppa (2020).

Children are the poorest age group in moderate poverty, but the gap to the other age groups is less pronounced than in acute poverty

Among all age groups, children tend to be the most affected by acute poverty across the world. According to the 2020 global MPI, half of all multidimensionally poor people (644 million) worldwide are children under the age of 18, and one in three children were found to live in multidimensionally poor households compared with one in six adults (OPHI and UNDP 2020). To assess how moderate poverty affects children and others, we disaggregate the MMPI by four age groups: 0-9, 10-17, 18-59 and 60+. Figure 5 below shows the headcount ratios of the MMPI in the six pilot countries disaggregated by age groups. By comparing the countries individually across the four age groups, children appear most affected by moderate poverty in every country except Thailand. However, the differences between the age groups is less pronounced compared to results from the global MPI. The greatest difference according to the MMPI is in Iraq, with over 25 percentage point difference in the incidence between children aged 0-9 (84.3%) and those aged 60 and over (59.1%). In other countries, the gap between the age groups with the highest and lowest incidence is much smaller, ranging from a 3.6 percentage point difference in Serbia to 11.4 percentage point difference in Guatemala. Additionally, ranking of countries by incidence – where Tanzania is the poorest and Serbia the least poor – remains stable, with the only difference occurring in the ranking of the 60+ age group between Bangladesh and Iraq.

Figure 5. Disaggregation by age cohort (headcount ratios in %)



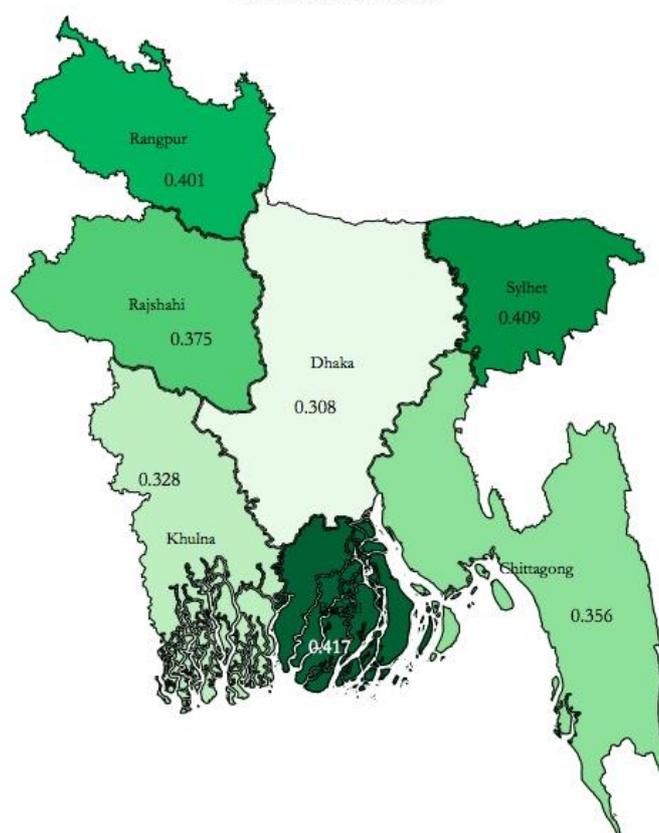
Source: Authors' calculations.

Variation across regions increases as countries are more affected by moderate poverty

The MMPI, as the global MPI, is disaggregated by subnational regions to reveal variation in poverty within a country, enabling more focused and tailored analysis and response by governments. Appendix 4 details the results at the subnational level for all six pilot countries. Some of the countries, such as Thailand, show a clear geographic divide with moderate poverty concentrated in the North and Northeastern regions of the country (MMPIs of 0.109 and 0.110 respectively) as opposed to Bangkok (0.013), the Central (0.043) and South (0.048) regions that have much lower poverty levels. In Guatemala, multidimensional poverty is more prevalent in the North and Northwestern regions of the country, as show in the map below (Fig. 6b). In other countries, like Bangladesh (see in Fig. 6a), poverty is not geographically concentrated in one area, but spread across the different parts of the country.

Figure 6a and 6B. MMPI Values in Bangladesh and Guatemala¹⁶

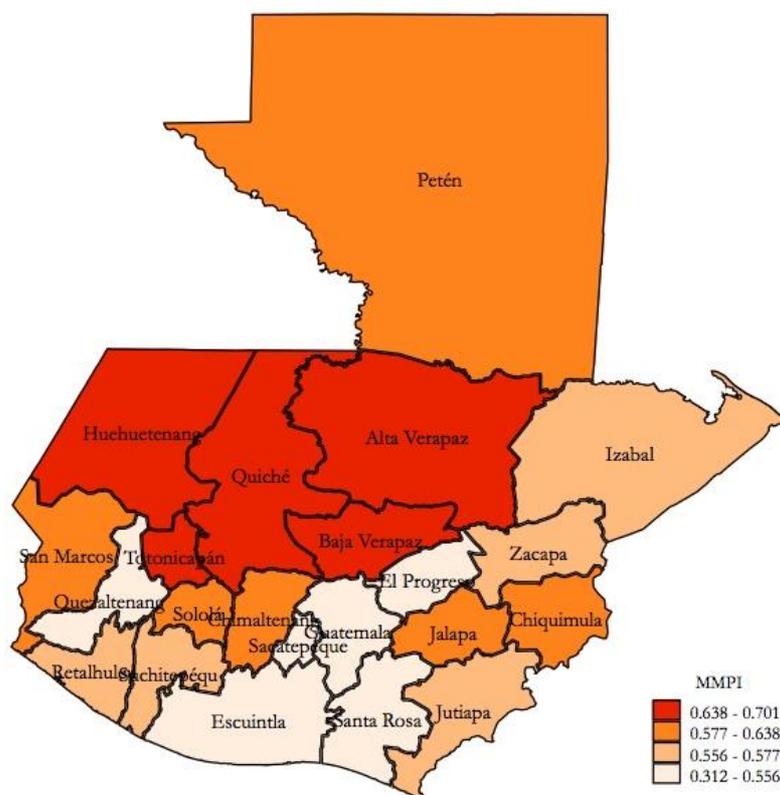
Mapping MMPI Value by Subnational Region in Bangladesh
National MMPI 0.363



¹⁶ Note: Bangladesh region 'Mymensingh' not depicted on map (MMPI 0.442). Underlying shapefiles obtained from the DIVA-GIS.org > gdata website.

Mapping MMPI Value by Subnational Region in Guatemala

National MMPI 0.569



Source: Authors' compilation.

Dispersion in MMPI values and incidence varies, with poorer countries showing higher levels of regional disparity. In Serbia, the country with the lowest level of moderate poverty (0.021), subnational variation ranges from an MMPI of 0.006 in Belgrade to 0.030 in South and East Serbia. Figure 6 presents the subnational MMPI values in Bangladesh, the third poorest country in our pilot (MMPI of 0.363), and Guatemala, the poorest middle income country with an MMPI of 0.569. Both countries have greater variations in their MMPI at subnational level, ranging from 0.308 in Dhaka to 0.409 in Sylhet and 0.442 in Mymensingh in Bangladesh, and from 0.312 in Guatemala Municipio to 0.701 in Alta Verapaz in Guatemala, showing the importance of decomposing national results to poverty.

5. Conclusions and way forward

The MMPI correspond to the spirit of the Agenda 2030, and in particular to its core aspiration of eradicating poverty in all its forms, everywhere. While the need for a moderate multidimensional poverty measure has been widely recognized, such a measure has not been broadly applied as of

yet. This paper seeks to prove that it is possible to construct such a measure for global comparisons. The proposed Moderate Multidimensional Poverty Index (MMPI) increases the deprivation cutoff for nine of the ten indicators of the global MPI with the intention of starting a discussion towards defining a generally accepted and globally adopted measure of moderate poverty.

Data limitations still inhibit our ability to fully measure and track progress towards every person's right to lead a life free from poverty, and the vulnerability to impoverishment. Several important dimensions of poverty, such as human security, employment, and shocks are not included in the internationally comparable surveys and thus cannot be included in the current global indices. In addition, many existing indicators are scarcely populated or are unreliable, which lowers their credibility and inhibits their efficient use in poverty monitoring. Additionally, differences in coverage and measurement of particular indicators, such as nutrition, health insurance, and overall internet access in DHS and MICS, can present a challenge for comparability across countries. Further efforts to improve the available data for poverty monitoring are thus called for.

To live up to the spirit of the Agenda 2030, we suggest that a new moderate index for multidimensional poverty is added to the global monitoring of human development. The MMPI proposed here, or a similar alternative that draws on forthcoming data improvements, could add value to the global debate on sustainable poverty reduction, and set a realistic level of ambition beyond the more acute measures of poverty. The MMPI will not replace the global MPI and measure of destitution; rather it creates a superset that adds to the existing knowledge on multidimensional poverty. Moreover, the index presented here does not aim to replace other efforts that strive to expand the scope of indicators with new dimensions, or regional or country variations of applicable multidimensional indices that all have their comparative merits. Instead, the MMPI introduces an alternative to the field of poverty analysis by presenting an index that is globally comparable, anchored in the common goals articulated in the Agenda 2030, and allows the inclusion of intrahousehold deprivations and decomposition of results by subgroups. The results presented in this paper show that constructing a global Moderate Multidimensional Poverty Index is possible, and demonstrates the index's value by showing new aspects of poverty – such as gendered disparities in education – across countries, not otherwise captured by existing measures. Such efforts strengthen the visibility and highlight the urgency of reaching equal rights and development for all. Nevertheless, further work remains to ensure that all dimensions and indicators are robust and reliable before the index can be adopted for wider use.

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Appendices

Appendix 1: Overview of and notes on data availability for revised indicators

Country	Survey	Year	Nutrition	Child Mortality	Years of Schooling	School Attendance	Cooking Fuel	Sanitation	Drinking Water	Electricity
Bangladesh	MICS	2019	Data is only from children under 5 years	No male questionnaire; no data on health insurance						
Guatemala	DHS	2014/15	Data is from children under 5 and women 15-49	Includes health insurance information for women 15-49 and a 1/2 subset of men 15-54 (those who answered the men's questionnaire)						
Iraq	MICS	2018	Data is only from children under 5 years	No male questionnaire, so all data on child mortality and health insurance comes from women						
Serbia	MICS	2014	Data is only from children under 5 years	No birth history file or male questionnaire, so child mortality is from all years, not past 5 years, and only as reported by women; No data on health insurance						
Tanzania	DHS	2015/16	Data is from children under 5 and women 15-49							No data on internet, so only captures electricity
Thailand	MICS	2015/16	Data is only from children under 5 years	No data on health insurance						No data on internet, so smartphone is used instead

Appendix 2: Uncensored Headcount Ratios MMPI and GMPI: Percentage of the population that is deprived in a given indicator (regardless of their poverty status)

MMPI

Country	Nutrition	Child Mortality	Years of Schooling	School Attendance	Cooking Fuel	Sanitation	Water	Electricity	Housing	Assets
Bangladesh	15,6%	1,9%	74,0%	14,0%	81,4%	64,3%	89,9%	60,8%	74,0%	49,6%
Guatemala	50,3%	92,7%	73,8%	25,5%	67,0%	52,8%	46,2%	89,8%	57,5%	31,3%
Iraq	13,1%	97,7%	69,9%	24,6%	0,4%	14,5%	46,9%	46,1%	43,7%	3,3%
Serbia	1,6%	1,5%	18,5%	1,0%	34,4%	8,0%	17,8%	32,6%	5,3%	0,7%
Tanzania	44,3%	96,3%	84,5%	36,5%	96,5%	90,1%	89,5%	80,4%	70,0%	47,4%
Thailand	4,2%	2,1%	52,4%	3,0%	21,5%	2,9%	72,1%	24,7%	28,3%	1,2%

GMPI

Country	Nutrition	Child Mortality	Years of Schooling	School Attendance	Cooking Fuel	Sanitation	Water	Electricity	Housing	Assets
Bangladesh	15.5%	1.9%	21.2%	9.0%	81.4%	35.7%	2.9%	7.8%	70.3%	29.5%
Guatemala	31.2%	2.8%	20.5%	16.4%	67.0%	21.4%	40.1%	13.0%	41.2%	14.0%
Iraq	12.7%	3.1%	11.3%	17.2%	0.4%	8.2%	1.9%	0.1%	7.9%	0.4%
Serbia	1.3%	1.5%	2.6%	0.5%	34.3%	3.1%	2.1%	0.3%	2.4%	0.3%
Tanzania	35.8%	6.4%	12.5%	27.4%	96.5%	79.9%	59.3%	80.3%	62.7%	31.0%
Thailand	3.7%	2.1%	11.9%	1.1%	21.5%	2.8%	1.9%	0.3%	3.6%	0.6%

Appendix 3: The Impact of Overcrowding on the Housing Indicator

	Deprived in overcrowding (Frequency)	Deprived in Overcrowding (%)	Deprived in overcrowding but non-deprived in housing GMPI (Frequency)	Deprived in overcrowding but non-deprived in housing GMPI (%)	Uncensored Headcount Ratio Housing GMPI (%)	Uncensored Headcount Ratio Housing MMPI (%)
Bangladesh	42,810	17.3%	6,653	15.5%	70.26	74.0
Tanzania	16,635	27.4%	4,346	26.1%	62.71	70.0
Iraq	52,936	40.7%	47,253	89.3%	7.93	43.7
Thailand	17,207	16.6%	15,550	90.4%	3.63	28.3
Guatemala	40,863	41.7%	15,165	37.1%	41.21	57.5
Serbia	1,248	6.1%	1,132	90.7%	2.36	5.3

Appendix 4: MMPI results by subnational regions in six countries: MMPI, H, A and Percentage Contribution

Country	Subnational region	MMPI	H	A	Nutrition	Child Mortality	Years of Schooling	School Attendance	Cooking Fuel	Sanitation	Water	Electricity	Housing	Assets
Bangladesh	Barishal	0.417	81.2%	51.3%	6.6%	0.7%	29.2%	4.6%	10.7%	10.0%	10.8%	8.7%	10.3%	8.6%
Bangladesh	Chattogram	0.356	70.5%	50.5%	7.8%	1.1%	30.4%	7.8%	9.7%	8.6%	10.5%	7.3%	9.6%	7.3%
Bangladesh	Dhaka	0.308	64.5%	47.8%	6.7%	0.7%	33.2%	7.2%	8.6%	9.1%	10.0%	8.0%	10.2%	6.4%
Bangladesh	Khulna	0.328	70.2%	46.7%	5.2%	0.7%	33.6%	4.2%	11.7%	8.2%	11.8%	8.8%	9.8%	6.2%
Bangladesh	Mymensingh	0.442	83.4%	53.0%	6.7%	0.6%	29.4%	7.9%	10.2%	8.6%	10.3%	8.6%	10.0%	7.7%
Bangladesh	Rajshahi	0.375	76.9%	48.8%	5.6%	0.6%	32.2%	4.3%	11.1%	8.9%	10.9%	9.3%	10.1%	7.0%
Bangladesh	Rangpur	0.401	80.4%	49.8%	5.6%	0.7%	30.8%	4.1%	11.0%	8.8%	11.0%	9.9%	10.4%	7.7%
Bangladesh	Sylhet	0.409	75.5%	54.1%	9.1%	1.5%	29.0%	9.1%	9.8%	7.7%	10.0%	7.0%	8.9%	8.0%
Tanzania	Central	0.723	99.1%	73.0%	9.3%	21.3%	20.7%	8.1%	7.6%	7.4%	7.3%	7.2%	6.3%	4.8%
Tanzania	Eastern	0.581	92.0%	63.1%	11.7%	25.7%	20.3%	7.7%	8.0%	6.7%	7.8%	4.8%	4.3%	3.0%
Tanzania	Lake	0.742	98.8%	75.1%	10.8%	21.8%	20.0%	9.8%	7.4%	7.1%	7.1%	6.6%	5.9%	3.5%
Tanzania	Northern South West	0.631	94.8%	66.6%	11.8%	23.8%	21.2%	6.3%	7.8%	7.5%	6.2%	6.0%	5.3%	4.1%
Tanzania	Highlands	0.724	98.9%	73.2%	10.5%	22.1%	20.4%	8.8%	7.5%	7.3%	7.1%	6.8%	5.1%	4.6%
Tanzania	Southern Southern	0.711	98.6%	72.2%	8.2%	22.6%	21.1%	8.3%	7.6%	7.3%	7.4%	7.0%	6.5%	3.9%
Tanzania	Highlands	0.659	97.1%	67.8%	9.9%	23.8%	21.3%	6.2%	8.1%	7.3%	7.2%	6.8%	5.1%	4.2%
Tanzania	Western	0.767	99.0%	77.5%	10.3%	20.5%	20.1%	12.0%	7.2%	6.9%	6.8%	6.7%	6.2%	3.3%
Tanzania	Zanzibar	0.542	88.9%	61.0%	14.6%	27.3%	15.3%	7.2%	8.8%	7.1%	6.0%	5.2%	4.9%	3.5%
Iraq	Anbar	0.392	81.5%	48.1%	5.1%	34.6%	32.0%	10.4%	0.0%	0.6%	0.9%	8.3%	6.8%	1.2%
Iraq	Babil	0.407	75.6%	53.8%	4.2%	30.9%	28.4%	12.0%	0.0%	3.9%	7.3%	7.4%	5.5%	0.4%
Iraq	Baghdad	0.353	71.0%	49.7%	7.7%	33.4%	29.5%	11.9%	0.0%	1.3%	6.1%	4.9%	4.8%	0.3%
Iraq	Basrah	0.433	80.4%	53.9%	6.5%	30.8%	27.4%	12.5%	0.0%	3.0%	10.2%	4.0%	5.2%	0.3%
Iraq	Diala	0.373	77.5%	48.1%	3.4%	34.6%	32.4%	9.3%	0.1%	0.9%	5.6%	7.4%	5.9%	0.4%

Iraq	Duhok	0.301	68.8%	43.8%	5.5%	38.0%	34.6%	9.6%	0.1%	0.4%	0.6%	3.8%	7.2%	0.3%
Iraq	Erbil	0.295	68.5%	43.1%	3.3%	38.7%	36.7%	8.6%	0.0%	0.7%	0.8%	4.1%	7.0%	0.1%
Iraq	Karbalah	0.410	78.3%	52.4%	5.2%	31.6%	29.7%	10.3%	0.0%	2.2%	8.9%	6.0%	5.8%	0.3%
Iraq	Kirkuk	0.284	62.1%	45.8%	5.5%	36.1%	34.2%	9.9%	0.0%	1.6%	1.5%	6.9%	3.6%	0.7%
Iraq	Misan	0.482	88.5%	54.5%	6.3%	30.3%	27.3%	12.5%	0.0%	3.0%	8.2%	6.0%	5.8%	0.5%
Iraq	Muthana	0.484	90.9%	53.3%	6.1%	31.0%	26.8%	11.6%	0.0%	1.5%	8.9%	6.7%	6.9%	0.4%
Iraq	Nainawa	0.375	76.2%	49.2%	6.5%	33.9%	31.8%	11.5%	0.0%	1.2%	0.6%	7.4%	5.9%	1.2%
Iraq	Najaf	0.429	81.2%	52.8%	5.5%	31.4%	28.5%	11.5%	0.6%	3.5%	8.0%	6.0%	4.9%	0.2%
Iraq	Qadisyah	0.416	79.5%	52.3%	6.1%	31.7%	27.6%	11.5%	0.1%	4.6%	6.6%	6.8%	4.5%	0.5%
Iraq	Salahaddin	0.366	77.9%	47.0%	4.2%	35.3%	32.9%	10.8%	0.0%	1.0%	2.2%	8.4%	4.8%	0.5%
Iraq	Sulaimaniya	0.267	63.2%	42.3%	2.8%	39.4%	37.8%	5.4%	0.0%	0.7%	2.3%	5.6%	5.8%	0.2%
Iraq	Thiqar	0.440	81.5%	54.0%	7.9%	30.8%	26.7%	9.4%	0.0%	3.3%	8.9%	7.3%	5.6%	0.2%
Iraq	Wasit	0.438	81.2%	53.9%	4.2%	30.7%	28.5%	11.2%	0.1%	2.8%	8.4%	7.2%	6.4%	0.5%
Thailand	Bangkok	0.013	3.5%	37.1%	3.8%	3.3%	43.1%	11.9%	0.6%	7.5%	9.3%	7.9%	9.9%	2.6%
Thailand	Central	0.044	11.3%	38.9%	5.5%	3.9%	41.8%	8.7%	4.6%	2.0%	13.2%	9.7%	9.6%	1.0%
Thailand	North	0.109	28.6%	38.0%	3.5%	4.4%	42.8%	4.6%	10.9%	1.0%	11.4%	9.9%	10.7%	0.7%
Thailand	Northeast	0.110	29.2%	37.5%	4.9%	2.7%	42.7%	3.4%	12.7%	0.4%	14.3%	10.2%	8.2%	0.4%
Thailand	South	0.048	12.3%	39.3%	12.6%	5.0%	40.5%	8.4%	1.7%	1.7%	11.9%	8.4%	8.6%	1.1%
Guatemala	Municipio Guatemala	0.312	61.7%	50.6%	19.2%	30.9%	21.4%	5.0%	0.7%	2.7%	7.1%	8.3%	4.0%	0.8%
Guatemala	Resto	0.419	76.0%	55.1%	16.5%	28.5%	22.7%	5.1%	3.1%	3.6%	5.5%	8.8%	4.8%	1.4%
Guatemala	El Progreso	0.511	86.0%	59.4%	14.3%	27.4%	23.1%	4.8%	6.4%	4.5%	3.1%	8.8%	5.0%	2.7%
Guatemala	Sacatepéquez	0.473	80.5%	58.7%	16.0%	27.5%	22.5%	6.2%	5.3%	3.2%	3.4%	8.7%	5.1%	2.1%
Guatemala	Chimaltenango	0.578	89.5%	64.5%	15.4%	25.2%	21.6%	8.2%	6.8%	5.0%	2.7%	8.2%	4.6%	2.2%
Guatemala	Escuintla	0.522	86.5%	60.3%	14.4%	24.8%	23.8%	5.9%	5.6%	4.2%	5.1%	8.8%	5.4%	1.9%
Guatemala	Santa Rosa	0.553	88.4%	62.5%	12.4%	26.4%	22.6%	6.4%	6.8%	4.3%	3.8%	8.7%	5.7%	3.0%

Guatemala	Sololá	0.605	94.0%	64.4%	14.5%	25.5%	20.4%	7.5%	8.1%	5.9%	1.4%	8.3%	4.6%	3.6%
Guatemala	Totonicapán	0.639	94.8%	67.4%	14.6%	24.5%	20.3%	8.3%	7.6%	6.4%	2.5%	8.0%	5.5%	2.3%
Guatemala	Quetzaltenango	0.556	87.3%	63.7%	14.4%	25.8%	21.2%	8.2%	6.9%	5.0%	3.2%	8.3%	4.8%	2.1%
Guatemala	Suchitepéquez	0.577	90.4%	63.8%	14.0%	24.1%	22.2%	6.7%	6.6%	4.4%	5.3%	8.3%	5.8%	2.6%
Guatemala	Retalhuleu	0.575	90.5%	63.6%	13.6%	25.0%	20.6%	6.1%	7.3%	5.5%	5.9%	8.4%	5.7%	1.9%
Guatemala	San Marcos	0.638	93.8%	68.0%	13.8%	24.3%	21.1%	8.7%	7.4%	5.2%	2.8%	7.9%	5.6%	3.2%
Guatemala	Huehuetenango	0.689	94.0%	73.3%	15.1%	22.4%	20.7%	9.8%	7.0%	5.6%	2.4%	7.4%	5.5%	4.1%
Guatemala	Quiché	0.685	95.3%	71.9%	14.9%	23.0%	20.6%	8.6%	7.3%	6.0%	2.0%	7.5%	6.3%	3.8%
Guatemala	Baja Verapaz	0.639	94.4%	67.7%	13.0%	24.3%	21.4%	7.7%	7.1%	5.8%	3.1%	7.9%	6.0%	3.8%
Guatemala	Alta Verapaz	0.701	95.5%	73.4%	12.6%	22.5%	20.1%	8.3%	7.2%	6.0%	4.4%	7.4%	6.5%	5.0%
Guatemala	Petén	0.636	93.8%	67.8%	12.8%	24.2%	19.9%	6.9%	7.2%	6.4%	5.3%	7.9%	6.1%	3.4%
Guatemala	Izabal	0.558	87.4%	63.8%	12.9%	25.3%	21.6%	7.6%	6.2%	5.1%	3.7%	8.2%	6.2%	3.2%
Guatemala	Zacapa	0.566	88.5%	64.0%	13.6%	25.6%	22.5%	6.9%	6.5%	4.5%	3.3%	8.3%	5.6%	3.3%
Guatemala	Chiquimula	0.629	91.0%	69.2%	13.9%	23.9%	21.7%	7.8%	6.7%	4.7%	3.3%	7.7%	6.0%	4.3%
Guatemala	Jalapa	0.627	91.5%	68.5%	13.4%	24.1%	21.6%	8.3%	6.9%	5.2%	3.0%	7.9%	5.9%	3.7%
Guatemala	Jutiapa	0.575	91.1%	63.2%	13.3%	25.7%	22.3%	5.7%	7.3%	4.9%	3.9%	8.4%	5.6%	3.0%
Serbia	Belgrade	0.006	1.6%	37.4%	9.8%	0.7%	41.6%	18.6%	8.0%	3.3%	5.5%	7.5%	4.0%	0.9%
Serbia	South And East	0.030	8.1%	37.8%	3.3%	3.1%	42.2%	1.4%	14.5%	10.8%	5.2%	13.8%	4.1%	1.8%
Serbia	Sumadija And	0.021	5.8%	36.8%	2.7%	3.1%	43.9%	4.8%	14.2%	8.1%	6.3%	12.9%	2.8%	1.1%
Serbia	West Serbia	0.024	5.5%	43.7%	9.8%	5.9%	37.1%	8.8%	9.4%	6.7%	4.0%	9.9%	6.8%	1.6%