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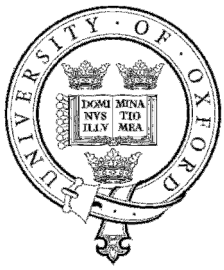

OPHI WORKING PAPER NO. 61

Where Do the World's Multidimensionally Poor People Live?

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Abstract

This paper asks where do the world's multidimensionally poor people live? The paper considers how the global distribution of multidimensional poverty differs from the global distribution of income poverty and assesses the sensitivity of findings to widely used (although somewhat arbitrary) country classifications. Surprisingly perhaps, only a quarter of multidimensionally poor people and just one-third of *severely* multidimensionally poor people live in the world's poorest countries – meaning Low Income Countries (LICs) *or* Least Developed Countries (LDCs). The sensitivity of findings about country thresholds for low and middle-income countries is discussed. The paper argues that there is a split of distribution poverty between both stable Middle-Income Countries (MICs) and low-income fragile states and that there is a 'multidimensional bottom billion' living in stable MICs.

The analysis is based on 83 countries and uses the 2011 MPI poverty estimates of the UNDP *HDR*.

Keywords: Multidimensional poverty, middle-income countries, low-income countries, geography of poverty, fragile states, aid.

JEL classification: I32

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Acronyms

A	Intensity of deprivation among the poor
DHS	Demographic Health Survey
H	Headcount ratio
HDR	Human Development Report
MPI	Multidimensional Poverty Index
MICs	Middle-Income Countries
LDCs	Least Developed Countries
LICs	Low Income Countries
LMICs	Lower Middle Income Countries
MICS	Multiple Indicators Cluster Survey
PINCIs	Pakistan, India, Nigeria, China and Indonesia
OPHI	Oxford Poverty and Human Development Initiative
UMICs	Upper Middle Income Countries
UNDP	United Nation Development Program
WHS	World Health Survey

The Oxford Poverty and Human Development Initiative (OPHI) is a research centre within the Oxford Department of International Development, Queen Elizabeth House, at the University of Oxford. Led by Sabina Alkire, OPHI aspires to build and advance a more systematic methodological and economic framework for reducing multidimensional poverty, grounded in people's experiences and values.

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1. Introduction

A series of papers since late 2010 have discussed a shift in the location (or 'geography') of global poverty: The majority of the world's poor, by both income and multidimensional poverty measures, live in countries officially classified by the World Bank as middle-income countries (MICs) (Sabina Alkire, Roche, & Seth, 2011; Chandy & Gertz, 2011; Glasman, Duran, & Sumner, 2011; Kanbur & Sumner, 2011; A Sumner, 2010; A. Sumner, 2012a).

Such patterns matter beyond the (somewhat) arbitrary country income thresholds because higher levels of average per capita income imply substantially more domestic resources available for poverty reduction, and the international aid system treats countries differently at higher levels of average per capita income. Countries' analytical classifications are widely used – in multiple and complex ways – by aid agencies so there is a potential disconnect between aid allocation and the mass of the world's poor. Furthermore, one could note that many middle-income countries have substantial untaxed capital flight – meaning the untaxed and accumulated private wealth held overseas may be substantial and the opportunity cost may be mass poverty (see the discussion in Henry, 2012).

Two perspectives are plausible (and not necessarily mutually exclusive). First, the country analytical categories are moribund. Second, severe poverty (of whatever kind) is becoming less about a lack of resources and increasingly about national inequality, growth patterns, and voice/governance especially with reference to public finances.

In light of such debates, this paper thus does the following: (i) It updates the global distribution of multidimensional poverty; (ii) it assesses how the global distribution of poverty differs by income and multidimensional poverty; and (iii) it assesses the sensitivity of findings to the (widely used) country classifications.

The paper intends to complement new estimates of the global distribution of income/expenditure poverty based on the 2012 World Bank Povcal dataset (Chen & Ravallion, 2012; A. Sumner, 2012a, 2012b) with a new dataset that contains the current estimate of the global distribution of world poverty using multidimensional poverty based on the Multidimensional Poverty Index (see Sabina Alkire, Roche, & Seth, 2011).

The paper is structured as follows. Section 2 outlines the Multidimensional Poverty Index (MPI) and our methodology. Section 3 presents data on the distribution of MPI poverty across countries and Section 4 compares MPI poverty with income poverty. Section 5 discusses the sensitivity of the global distribution of poverty to various country income thresholds. Section 6 concludes.

2. Multidimensional Poverty Measures

The Multidimensional Poverty Index is a measure of acute global poverty developed by the Oxford Poverty and Human Development Initiative (OPHI) with the United Nations Development Programme's Human Development Report Office (see for details, Sabina Alkire, Roche, Santos, & Seth, 2011; Sabina Alkire & Santos, 2010; UNDP, 2010b). The measure follows the form of the adjusted headcount ratio, which is the simplest measure within the family of poverty measures developed by Alkire and Foster (2007, 2011a). The methodology begins at the level of the person or household, identifies the set of indicators in which they are deprived at the same time, and summarizes their poverty profile in a weighted deprivation score. If their deprivation score exceeds the poverty cutoff, they are identified as multidimensionally poor. The number of poor people and their deprivation score – which shows the 'intensity' of poverty they

experience – becomes part of the final adjusted headcount ratio. The formal mathematical explanation of the methodology is presented in detail in the methodological annex. The MPI, like any poverty measure, is not without its critics, but has been subject to numerous robustness tests (see discussion in the June and September issues of the Journal of Economic Inequality 2011, as well as S. Alkire, 2011; Sabina Alkire & Foster, 2011b; Sabina Alkire, Foster, & Santos, 2011).

The Multidimensional Poverty Index methodology

The global MPI 2011 assesses multidimensional poverty for people in 109 developing countries for which data are available. As summarized in Table 1, the MPI uses information from ten indicators which are organised into three dimensions: health, education, and living standards, following the same three dimensions as the Human Development Index (HDI). Each individual is identified as deprived in each dimension based on a *deprivation cutoff* (see Table 1). So for example, a person is deprived of improved drinking water if the household does not have access to safe drinking water according to the Millennium Development Goals (MDGs) guidelines or safe drinking water is more than a 30-minute walk from home, round trip. Having constructed a deprivation profile, each person's deprivation score is constructed based on a weighted average of the deprivations they experience. The weights follow a nested weight structure: equal weight across each of the three dimensions and equal weight on each indicator within a dimension. Finally a poverty cutoff is used to identify the subgroup of population who are poor because their deprivation score exceeds this threshold. The 2011 and 2013 *Human Development Reports* (HDR) actually apply different cutoffs to distinguish the MPI 'poor' and the MPI 'severe poor' (UNDP 2011). The MPI poor refer to people who are in acute poverty and are deprived in at least one-third (33%) of the weighted dimensions listed above. A subset of the MPI poor are identified as experiencing severe poverty because they are deprived in at least one-half (50%) of the weighted indicators at the same time.[1]

Finally, the aggregation step results in one measure composed of two partial indices. The first partial index is *the headcount ratio* (H) which indicates the percentage of people who have been identified as poor. The second, named *intensity of deprivation among the poor* (A), indicates the average percentage of deprivations experienced by the poor. The Multidimensional Poverty Index follows the adjusted headcount ratio of the Sabina Alkire and Foster (2007, 2011a) measures which can be expressed as the product of the headcount ratio and the intensity of deprivation among the poor (M_0 = H * A). The MPI ranges from 0 to 1 and expresses poverty in terms of the share of deprivations experienced by the poor in comparison to the total potential deprivations (if all people were deprived in all indicators at the same time). For example, an M_0 of 0.300 conveys that the multidimensionally poor in this society experience 30% of the total possible deprivations. It could be because 60% of people were on average deprived in 50% of the deprivations (.6 x .5 = .3), for example. In this paper we present the results for those identified as MPI poor (poverty cutoff: 33%) and MPI severe poor (50%).[2]

The MPI is updated in each *Human Development Report* as new data become available. It complements the $1.25/day and $2/day poverty figures presented in the World Bank Povcal dataset (see Chen & Ravallion, 2008, 2012). It adds value in the sense that it measures deprivations directly in ten non-monetary indicators that are associated with non-income outcomes of development such as avoiding malnourishment or child mortality, being educated,

[1] The *HDR* identifies an additional group as people who are 'vulnerable to poverty' – those who are deprived in more than 20% but less than 33% of the dimensions. In the following analysis, we will focus on the MPI poor and MPI severe poor only.

[2] In the *HDR* the intensity of deprivation and adjusted headcount ratio is only presented for the MPI poor.

or access to adequate water or sanitation. The final measure reflects multiple deprivations faced at the same time, and so it is sensitive to the intensity of deprivation among the poor. Because the measure is direct, it does not require additional adjustments for rural-urban prices, inflation, imputation, or PPPs (see S. Alkire, 2011; Sabina Alkire, Foster, et al., 2011). It can be decomposed easily by region or group.

Table 1: Multidimensional poverty: Dimensions, indicators and definitions

Dimensions of poverty	Indicator	Deprived if…
Education	Years of Schooling	No household member has completed five years of schooling
	Child School Attendance	Any school-aged child is not attending school up to class 8[+]
Health	Child Mortality	Any child has died in the family
	Nutrition	Any adult or child for whom there is nutritional information is malnourished
Living Standard	Electricity	The household has no electricity
	Improved Sanitation	The household's sanitation facility is not improved (according to MDG guidelines), or it is improved but shared with other households
	Improved Drinking Water	The household does not have access to improved drinking water (according to MDG guidelines) or safe drinking water is more than a 30-minute walk from home, roundtrip
	Flooring	The household has a dirt, sand or dung floor
	Cooking Fuel	The household cooks with dung, wood or charcoal
	Assets ownership	The household does not own more than one radio, TV, telephone, bike, motorbike or refrigerator and does not own a car or truck

Note: Further details in the methodological annex.

Subset of countries in our analysis

The analysis in this paper is based on MPI figures published in 2011 (Sabina Alkire, Roche, Santos, et al., 2011; 2011; UNDP, 2011). While MPI estimates are available for a total of 109 countries, we limit our analysis in this paper to 83 countries. This subset of countries has relatively recent MPI poverty estimates and represents a good coverage of population from LICs and MICs. First, we drop the eight high-income countries included in the list of 109 countries, so the final set of countries are only LICs and MICs.[3] Second, we drop countries where the MPI estimations are older than 2005. The one exception is China, which we keep due to its global significance, although the data for China is for 2002.[4] Hence an additional 18 LICs and MICs countries were also excluded because the MPI estimates were older than 2005: Angola, Cameroon, Central African Republic, Chad, Comoros, Ecuador, Gabon, Guatemala, Latvia, Malawi, Myanmar, Paraguay, Russian Federation, Sri Lanka, Tunisia, Turkey, Uruguay, and Viet Nam. It is important to note that none of these countries have sufficient multidimensional poverty to impact the overall poverty picture.

[3] The list of eight high income countries for which there are MPI estimates are: Croatia, Czech Republic, Estonia, Hungary, Slovakia, Slovenia, Trinidad and Tobago, and United Arab Emirates. Note that MPI estimates for most of these countries are based on WHS 2003 data, with the exception of Trinidad and Tobago, which is based on a MICS from 2006.

[4] As we will explain later, there are some caveats regarding the poverty estimates from China.

Data and reference date: The reference year for the MPI estimates of each country is based on the date of fieldwork used for the household survey's computation. Survey data for the 83 countries included in our analysis comes from 49 Demographic and Health Surveys (DHS), 27 Multi-Indicator Cluster Surveys (MICS), and 1 World Health Survey (WHS) (China). Additionally, these are supplemented by six special surveys covering urban Argentina (ENNyS), Brazil (PNDS), Mexico (ENSANUT), Morocco (ENNVM), Occupied Palestinian Territory (PAPFAM), and South Africa (NIDS).

How good is the coverage of our analysis? The subgroup of 83 countries used in the analysis in this paper represents 70.9% of the world's population and 84.8% of the population in LICs and MICs (see Table A1 in the appendix). Coverage among the 45 Fragile States (identified using the current OECD 'non-official' list) and LDCs is very high, with over 78% of the population living in Fragile States or LDCs. Where indicated, we undertake robustness tests with the 101 LICs and MICs for which MPI estimates are available and compare these with results from our 83 countries.

Caveat regarding China: Due to its global significance we included China, although data pre-dates 2005. Table A1 in the appendix shows in detail the coverage of our analysis with and without China. Because of its size, if we exclude China the world coverage is reduced to 51.1% overall and 61.2% of those living in LICs and MICs – the reduction occurs among the upper middle income countries (UMICs) where China is located. Therefore, during the analysis we should take into account that data for China is for 2002 and that it overlooks the poverty reduction experienced in the recent years.[5] It is also important to note that the household survey used for China is not nationally representative as it only covers nine provinces and it lacks information on children's school attendance (see discussion in: Sabina Alkire & Santos, 2010).

In conclusion, our analysis is based on a subset of 83 countries which all have recent MPI estimates (2005 onwards) – with the one exception of China (2002) – and that together have a high coverage of the world population living in developing countries, or more precisely LICs and MICs.

Country categories and population data

The *Income Categories* we use in this paper correspond to the World Bank income categories from the financial year 2012. These are based on the Gross National Incomes from 2010 using the Atlas Method.[6] The Fragile States classification corresponds to the non-official OECD list for 2011 (OECD, 2011). This is a compilation of the two lists: the Harmonised List of Fragile Situations (2009 World Bank, African Development Bank, Asian Development Bank) and the 2009 Fund for Peace Failed States Index. The list includes Pakistan, Nigeria and Bangladesh, which together represent one-third of the total population living in these 45 countries.[7] The list of *Least Developed Countries* corresponds to the one from the UN Office of the High

[5] According to estimates of poverty with $1.25 a day, China reduced poverty from 28% in 2002 to 13% in 2008. The MPI incidence of poverty for China in 2002 is 12.5%

[6] Figures were downloaded from PovCat Net (WORLD BANK 2012).

[7] The list of fragile states included in our analysis are: Bangladesh, Burkina Faso, Burundi, Congo, DR Congo, Cote d'Ivoire, Ethiopia, Georgia, Guinea, Haiti, Iraq, Kenya, Liberia, Nepal, Niger, Nigeria, Occupied Palestinian Territory, Pakistan, Sao Tome and Principe, Sierra Leone, Somalia, Tajikistan, Timor-Leste, Togo, Uganda, Uzbekistan, Yemen and Zimbabwe (OECD 2011).

Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, UN General Assembly.[8] It corresponds to the 2012 triennial review.

In terms of population figures, because the MPI is drawn from different survey years in order to provide an absolute number of poor and population, it is possible to follow different approaches. Here we use population data for a fixed year (2008) as it corresponds to an intermediate year in the series of countries considered. So, for example, Colombia's headcount ratio is multiplied by the Colombia's population for this fixed year. In using a headcount that is older than (or more recent than) the reference year of the survey, the assumption being made is that the level of poverty in the year of the survey and the year of population are the same. This approach allows us to aggregate across countries to develop regional ranks, to analyse country groupings such as low income countries, and even to aggregate across regions. For example, using this approach we can generate the figure that 33% of the inhabitants in the 83 countries are MPI poor.

In what follows we make the assumption of no change in poverty rates since the survey, which, if MPI has been reduced, will correspond to an over-estimation of MPI in countries with the oldest data (presuming the poverty has declined) and a potential underestimation in countries with data later than the population year. While 2008 population data was used for the analyses, robustness tests were conducted with 2010 population data and with population data from the year the survey was implemented. Population figures are taken from UNDESA World Population Prospects 2010 (United Nations, 2011).

As many of our results rely upon the population aggregation techniques used, it is worth discussing our methodology further. Given available data, there would be three other methods of proceeding. (i) In the first method, population data could correspond to the year of the survey. This is the approach that was used in the 2011 *Human Development Report* in Table 5 (on MPI) under the title 'Headcount (thousands)'. So, for example, for Colombia, whose MICs is dated 2010, the number of MPI poor is calculated by multiplying Colombia's MPI headcount ratio by their 2010 population data. In this approach, the MPI values and the number of MPI poor all refer to the date of the survey. This has the advantage of consistency: no assumptions are made regarding poverty trends subsequent to the survey. This approach also has limitations: the number of MPI poor can only be aggregated across countries having surveys in the same year. This limits the possibility of international comparisons, which is one of the motivations for creating internationally comparable poverty measures. (ii) Alternatively, as is done for the global income poverty figures, country MPI data could be extrapolated by using a model or by combining the trend data for individual indicators taken from different data sources (without knowing their joint distribution). The extrapolated or interpolated MPI rates could then be applied to population data for that respective year. This option is technically feasible, but the approach is very questionable. The reason is that recent trend data for relevant MDGs and for the MPI over time have shown sharp 'elbows' in trajectories over time, reflecting new social policies, natural disasters and conflict, or other forces. As one report put it, MDG trends show that "progress is neither linear or monotonic" (UNDP, 2010a). Also, indicator trend data do not allow us to predict changes in the joint distribution. Hence we do not apply these techniques here because their accuracy may not improve upon our current methods. (iii) A final option would be

[8] UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, UN General Assembly (http://www.unohrlls.org/en/ldc/25/) Accessed on 1 July 2012. It corresponds to the 2012 triennial review. The list of LDC countries included in our analysis are: Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, DR Congo, Djibouti, Ethiopia, Gambia, Guinea, Haiti, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Mali, Mauritania, Mozambique, Nepal, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Somalia, Tanzania, Timor-Leste, Togo, Uganda, Vanuatu, Yemen and Zambia.

to use average actual regional rates of poverty reduction based on time series comparisons. However this option is also of dubious accuracy: our initial 20+ country study of inter-temporal reduction in MPI shows very different rates of MPI reduction within the same region (A. Alkire & Roche, forthcoming 2013).

3. Where Do the Multidimensionally Poor Live?

First we present an overview of the MPI poverty level among the 83 countries and across country analytical categories (low and middle income country classifications). Figure 1 plots the incidence of MPI poverty versus the intensity of poverty among the poor for each of the 83 countries considered in the analysis. As highlighted elsewhere (Sabina Alkire & Santos, 2010), there is an association between the incidence of poverty and the intensity of poverty among the poor. However, some countries with relatively equal incidences of poverty have different intensities of poverty as in the case of Bangladesh and Nigeria.

What is perhaps surprising is that countries which fall in the same country analytical category by income can have quite different poverty levels. Among upper middle income countries (UMICs) the percentage of poverty ranges from almost 0% in Belarus to 39.6% in Namibia and among lower middle income countries (LMICs) the percentage of MPI poor ranges from 0.8% in Georgia to 68.1% in Timor-Leste. In contrast, among low income countries (LICs), MPI ranges from 4.9% in Kyrgyzstan to 92.4% in Niger. In the figure below, the size of the bubble represents the total absolute number of MPI poor people (which is a function of the country population and the incidence of MPI poverty). India has the largest bubble size as it has a large population and a high percentage of the Indian population are MPI poor. China has a considerably smaller bubble because the percentage of Chinese population that are MPI poor is much lower. Other countries with high absolute numbers of MPI poor are the low income countries of Ethiopia, DR Congo, Bangladesh and the middle income countries of Nigeria, Pakistan, and Indonesia.

Next, we can note four characteristics of the global distribution of poverty. First, the MPI poor and severe MPI poor are both heavily concentrated in a relatively small number of 10–20 populous countries (see Table 2). Over 80% of the MPI poor and MPI severe poor live in ten countries and over 90% of the MPI poor and MPI severe poor live in just 20 countries. Indeed, 40% of the MPI poor and of the MPI severe poor live in India. Five of the top ten countries in terms of numbers of MPI poor and seven of the top 20 countries are countries that have recently 'graduated' from low income to middle income country status.[9]

Further analysis of the top 20 countries by MPI poor (see Table A2 in the appendix) shows that MPI poverty rates range from 50% to 90% in those countries with the exception of China, the Philippines, and Indonesia. One could also note some surprising levels of MPI severe poverty in a number of MICs – typically up to a quarter or a third of the population live in severe MPI poverty in MICs such as India (28.6% MPI severe poor), Nigeria (33.9%), Pakistan (27.4%), Cote d'Ivoire (39.3%), and Yemen (31.9%). Rates of severe multidimensional poverty are, however, higher in low income countries, with the highest rates in Ethiopia (72%) and Niger (82%) (see Table A2 in the appendix).

[9] The following countries graduated from low income status to middle income status in the last decade: India in 2007, Pakistan in 2008, Nigeria in 2008, Indonesia in 2003, Yemen in 2009, and Côte d'Ivoire in 2008. China graduated from low income status to lower middle income status between 1997 and 1999, and then to upper middle income status in 2010. Note the year corresponds to the calendar year for GNI.

Regional analysis and analysis by income categories shows that over half of the multidimensionally poor live in South Asia and over a quarter live in Sub-Saharan Africa (see Table 3). When we look at the subset of people who experience severe MPI poverty, over half are in South Asia and the proportion rises to just over one-third in Africa. East Asia and the Pacific account for 15% of MPI poor and 11% of severe poor. However, these findings on the MPI poor by region must be noted with a caveat on the Chinese data (noted earlier).

In terms of country income categories, close to three-quarters of the MPI poor and over two-thirds of the total severe MPI poor live in MICs (see Table 3). There are 1.56bn MPI poor people across these 83 countries, of whom just over a billion live in MICs and 0.42bn live in LICs. There are 830 million people in severe MPI poverty, of whom over 560m live in MICs and over 260m live in LICs. The overwhelming majority of the MICs MPI poor and MICs severe MPI poor live in 'new MICs' (meaning countries attaining MIC status in the last decade) or LMICs. Indeed new MICS and LMICs account for about 60% of MPI poverty and severe poverty in these 83 countries.[10]

Analysis of global poverty with and without India and China shows that when India is removed (thus removing approximately 640m MPI poor and 340m MPI severe poor) from the LMICs and China is removed from the UMICs group, the MPI poor split somewhat more equally between LICs and MICs by both MPI poor and MPI severe poor:

- The MPI poor are divided between: LICs (423m), India (640m), China (166m), LMICs minus India (302m) and UMICs minus China (28m)

- The MPI severe poverty are divided between: LICs (268m), India (341m), China (60m), LMICs minus India (157m) and UMICs minor China (4.4m)

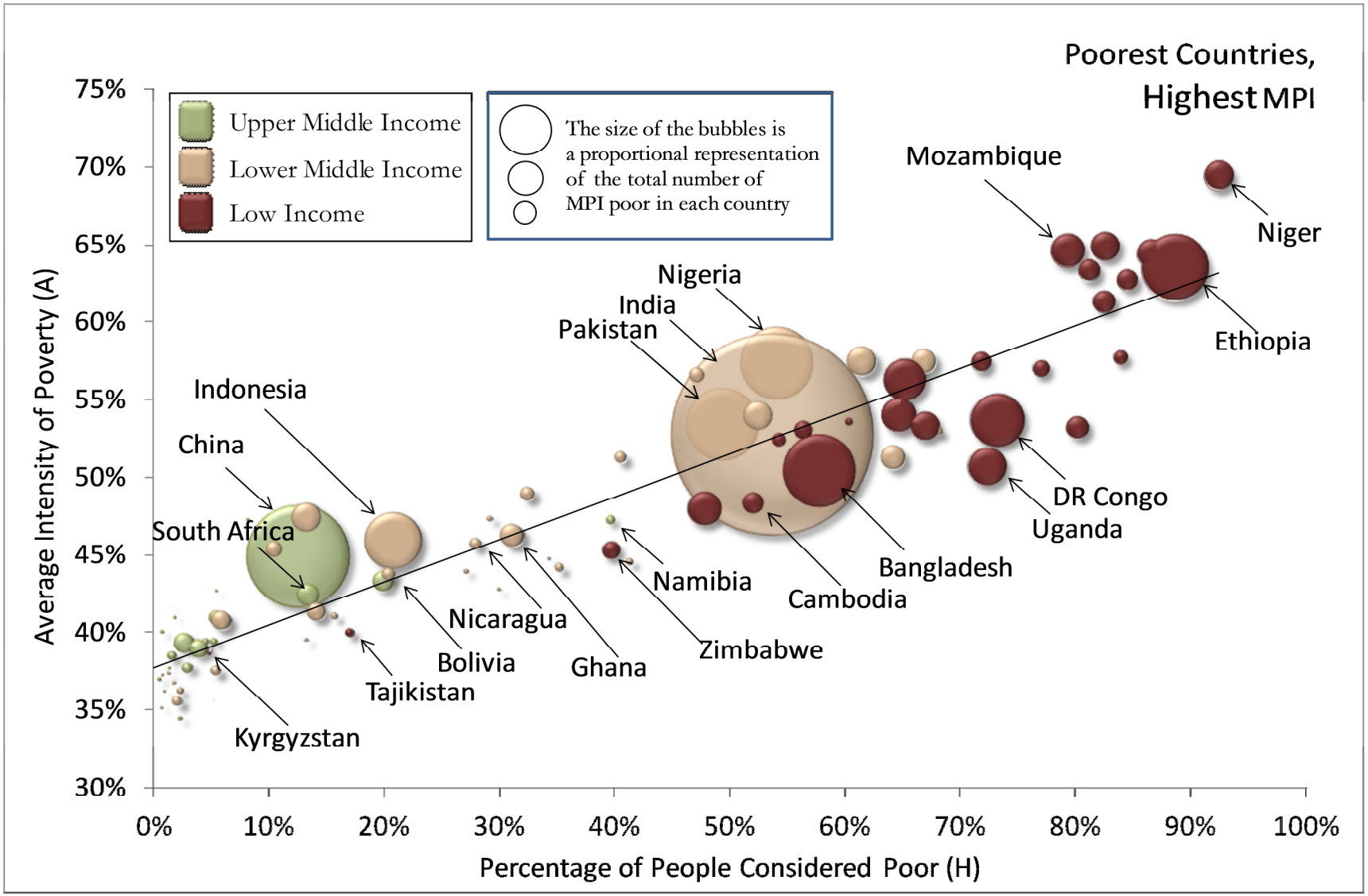
Estimates of MPI poor in the categories of fragile states (here the 'non-official' OECD group of 45 countries) and the UN least developed countries (49 countries) show that the group of LDCs account for about a quarter of the MPI poor (433m) or a third (279m) of MPI severe poor (see Table 3). The group of fragile states (OECD 'non-official' list) account for a third of MPI poor (525m) or almost two-fifths of MPI severe poor (320m). Underlying this is a considerable geographic concentration: most of the fragile states' MPI poor live in just five fragile states which are a mix of low and middle income countries: Nigeria (MIC), DRC (LIC), Bangladesh (LIC), Pakistan (MIC) and Kenya (LIC) (see Table 4).

Analysis of combinations of LIC/MIC and fragile/stable show that 81.5% of MPI poor people live either in low income fragile states or in stable MICs (see Table 5). Furthermore, of the poor in LICs almost 80% are in fragile LICs whereas only a fifth of the poor in LMICs are in fragile LMICs (and the same is true for severe MPI poor). It is also notable that of the poor in Sub-Saharan Africa, more than 70% live in fragile states. One in five of MPI poor people live in a fragile LIC (330m) and 60% in a stable MIC (940m). And one in four of the severe MPI poor live in a fragile LIC (206m) and more than half of the severe poor in a stable MIC (448m) (see Table 5).

[10] Note that all figures in Table 3 correspond to the subset of 83 countries analysed in this paper. If the analysis is performed based on the full set of 109 countries for which MPI data is available the distribution of world's poverty would change only slightly. Out of the 1.65bn total MPI poor in the 109 set of countries, 50% live in South Asia, 29% in Sub-Saharan Africa, and 16% in South East Asia; and with respect to income categories the distribution is 72% in MICs and 28% in LICs.

In sum, three-quarters of the MPI poor and two-thirds of the severe MPI poor live in MICs. Also, surprisingly, there are almost a billion MPI poor in stable MICs. However, there is also a concentration of MPI poor in low income fragile states. The distribution across the world's regions shows that almost a half of the MPI poor live in South Asia and over a quarter in Sub-Saharan Africa.

Figure 1: Incidence and intensity of multidimensional poverty by income categories for all 83 countries in the analysis



Sources: MPI figures correspond to those published in 2011 (Alkire, Roche, Santos, et al., 2011; UNDP, 2011). World Bank income categories figures from financial year 2012 (World Bank, 2012). Population figures correspond UN Estimates for 2008 (United Nations, 2011).

Table 2. Top 20 poor countries (by number of MPI poor people), country classifications and GDP per capita PPP

Rank[1]	Country	% total MPI Poor[2]	% total Severe Poor[2]	Country classification based on data for calendar year)[3]		GNI per capita, Atlas method (current US$)[4]		GDP, PPP (constant 2005 international $)[4]	
		2008	2008	1990	2010	1990	2008	1990	2008
1	India	41.0	41.1	L	LM	380	1040	1209	2662
2	China	10.7	7.2	L	UM	330	3040	1101	5712
3	Bangladesh	5.4	4.6	L	L	290	570	747	1356
4	Pakistan	5.3	5.5	L	LM	410	940	1620	2317
5	Nigeria	5.2	6.2	L	LM	260	1170	1417	1946
6	Ethiopia	4.5	6.9	L	L	250	290	545	814
7	Indonesia	3.1	2.2	L	LM	600	1950	2008	3570
8	Congo (DR)	2.9	3.5	L	L	230	160	631	298
9	Tanzania	1.8	2.2	L	L	200	460	860	1201
10	Uganda	1.5	1.5	L	L	320	420	563	1079
11	Nepal	1.2	1.3	L	L	210	400	709	1021
12	Kenya	1.2	0.9	L	L	380	740	1421	1440
13	Mozambique	1.1	1.6	L	L	170	380	400	776
14	Niger	0.9	1.4	L	L	300	330	702	652
15	Madagascar	0.8	0.8	L	L	250	400	1037	950
16	Burkina Faso	0.8	1.2	L	L	310	470	681	1058
17	Mali	0.8	1.2	L	L	260	520	665	930
18	Philippines	0.8	0.6	LM	LM	730	1770	2552	3382
19	Yemen	0.8	0.9	L	LM	N/A	980	1812	2255
20	Cote d'Ivoire	0.7	0.9	L	LM	740	1070	1911	1657
	Top 10	81.4	80.9						
	Top 20	90.5	91.8						
	New MICs (post-2000)	58.48	58.83						
	New MICs + China	69.13	66.04						
	PINCIs	60.11	55.97						

Sources:
[1] Countries are ranked by total number of MPI poor (column 3). See Tables A5 and A6 in the appendix for the same distribution with $1.25 and $2 a day poverty, using the closest figures to MPI and latest figures available.
[2] Author calculations based on MPI figures published in 2011 (Alkire, Roche, Santos, et al., 2011; UNDP, 2011) and UN Population Estimates for the year 2008 (United Nations 2011).
[3] World Bank income categories from the calendar year indicated. These are based on the Gross National Incomes from the given year using the Atlas Method (World Bank, 2012).
[4] Data from PovCal Net (World Bank, 2012).

Table 3. Distribution of global population, multidimensional poverty and severe MPI poverty

	Total population (83 countries)[1]		MPI poor people[2]		People in severe MPI poverty[2]	
	Thousands	% total population	Thousands	% total population	Thousands	% total population
Total	4,773,323	100	1,558,992	100	829,210	100
Geographic Regions:						
Middle East and North Africa	201,240	4.22	32,906	2.1	16,027	1.9
East Asia and Pacific	1,745,488	36.57	239,335	15.4	88,156	10.6
Eastern Europe & Central Asia	149,565	3.13	3,936	0.3	455	0.1
Latin American & the Caribbean	458,877	9.61	29,706	1.9	7,884	1.0
South Asia	1,533,698	32.13	825,205	52.9	435,366	52.5
Sub-Saharan Africa	684,455	14.34	427,904	27.4	281,322	33.9
Income Categories[3]:						
Low income countries	624,043	13.07	423,384	27.16	267,593	32.27
Middle income countries	4,149,280	86.93	1,135,608	72.84	561,617	67.73
Other Categories:						
New MICs (post-2000)	1,961,818	41.10	911,730	58.48	487,819	58.83
LMICs	2,215,769	46.42	941,901	60.42	497,410	59.99
LMICs minus India	1,024,905	21.47	302,407	19.40	156,823	18.91
UMICs	1,933,511	40.51	193,707	12.43	64,207	7.74
UMICs - China	27,672	0.58	27,672	1.77	4,434	0.53
China	1,328,276	27.83	166,035	10.65	59,772	7.21
India	1,190,864	24.95	639,494	41.02	340,587	41.07
PINCIs[4]	2,921,533	61.21	937,115	60.11	464,095	55.97
Fragile states[5]	916,065	19.19	525,133	33.68	319,984	38.59
Least developed countries[6]	622,504	13.04	433,301	27.79	278,527	33.59
Total	4,773,323	100	1,558,992	100	829,210	100

Sources:
[1] Based on UN Population Estimates for the year 2008 (United Nations 2011).
[2] Author calculations based on MPI figures published in 2011. (Alkire, Roche, Santos, et al., 2011; UNDP, 2011) and UN Population Estimates for the year 2008 (United Nations 2011).
[3] It corresponds to the World Bank income categories from the financial year 2012. These are based on the Gross National Incomes from 2010 using the Atlas Method (World Bank 2012).
[4] Pakistan, India, Nigeria, China, and Indonesia
[5] It corresponds to the non-official OECD list for 2011 (OECD 2011).
[6] UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, UN General Assembly. http://www.unohrlls.org/en/ldc/25/ Accessed on 1 July 2012. It corresponds to the 2012 triennial review.

Table 4. Distribution of global multidimensional poverty and severe poverty in OECD (2011) fragile states across different country categories

	MPI poor[1]		Severely poor[1]	
	Thousands of people	% from fragile states	Thousands of people	% from fragile states
LICs[2]	423,384	78.0	267,593	77.0
LMICs[2]	941,901	20.7	497,410	22.9
Fragile states[3]	525,133	100	319,984	100
Total in five countries: Nigeria, DRC, Bangladesh, Pakistan and Kenya	312,425	100	171,735	100
Middle East and North Africa	32,906	71.2	16,027	87.3
East Asia and Pacific	239,335	0.3	88,156	0.5
Eastern Europe & Central Asia	3,936	45.6	455	51.5
Latin American & the Caribbean	29,706	18.5	7,884	39.9
South Asia	825,205	22.5	435,366	21.8
Sub-Saharan Africa	427,904	72.0	281,322	73.7
Total	1,558,992	58.8	829,210	38.6

Sources:
[1] Author calculations based on MPI figures published in 2011 (Alkire, Roche, Santos, et al., 2011; UNDP, 2011) and UN Population Estimates for the year 2008 (United Nations 2011).
[2] It corresponds to the World Bank income categories from the financial year 2012. These are based on the Gross National Incomes from 2010 using the Atlas Method (World Bank 2012).
[3] It corresponds to the non-official OECD list for 2011 (OECD 2011).

Table 5. Distribution of global multidimensional poverty and severe poverty by low and middle income and fragile states combinations

MPI poverty				Severe poverty			
	LICs	MICs	Totals		LICs	MICs	Totals
% total MPI poverty (%)				% total Severe poverty (%)			
Fragile states	21.2	12.5	33.7	Fragile states	24.9	13.7	38.6
Non-fragile states	6.0	60.3	66.3	Non-fragile states	7.4	54.0	61.4
	27.2	72.8	100		32.3	67.7	100
MPI poor (millions)				Severely poor (millions)			
Fragile states	330,063	195,070	525,133	Fragile states	206,081	113,903	319,984
Non-Fragile states	93,321	940,538	1,033,859	Non-Fragile states	61,512	447,714	509,226
	423,384	1,135,608	1,558,992		267,593	561,617	829,210

Sources: Author calculations based on MPI figures published in 2011 (Alkire, Roche, Santos, et al., 2011; UNDP, 2011) and UN Population Estimates for the year 2008 (United Nations 2011). World Bank income categories from the financial year 2012 which are based on the Gross National Incomes from 2010 using the Atlas Method (World Bank 2012). Fragile states according to the non-official OECD list for 2011 (OECD 2011).

4. How Much Does the Global Distribution of Multidimensionally Poor Differ from the Global Distribution of Income Poverty?

One question is whether the distribution of poverty across LICs and MICs is similar, whether one uses MPI poor/MPI severe poor or $1.25/$2 poverty. How should one compare MPI and $1.25/$2 poverty figures? The two measures for any given country are normally based on different household surveys. The $1.25/$2 poverty measure is estimated from a household survey – usually conducted by the national statistics office – and includes relevant information on income or consumption and expenditure. The MPI generally draws on Demographic Health Surveys or Multiple Indicators Cluster Surveys data or another survey that contains the information required for its construction, as explained in Section 2. Issues in comparison arise because often the year of the surveys do not coincide.[11] For the 83 countries in our analysis:

- A total of 12 countries have older data than 2005 for $1.25/$2 poverty estimates.
- Only 29 countries have data for the exact same year available for MPI and $1.25/$2 poverty.
- A total of 65 countries (including the 29 mentioned above) have data for MPI and $1.25/$2 poverty estimates that are within three years (plus or minus) of each other.
- Of the remaining, two countries have data that are more than three years older in MPI than $1.25/$2 (China and India).
- Ten countries have data that are more than three years older in $1.25/$2 than MPI.
- Six countries do not have $1.25/$2 estimations but do have MPI estimates (in MPI these are: Maldives, Mongolia, Somalia, Uzbekistan, Vanuatu, Zimbabwe).

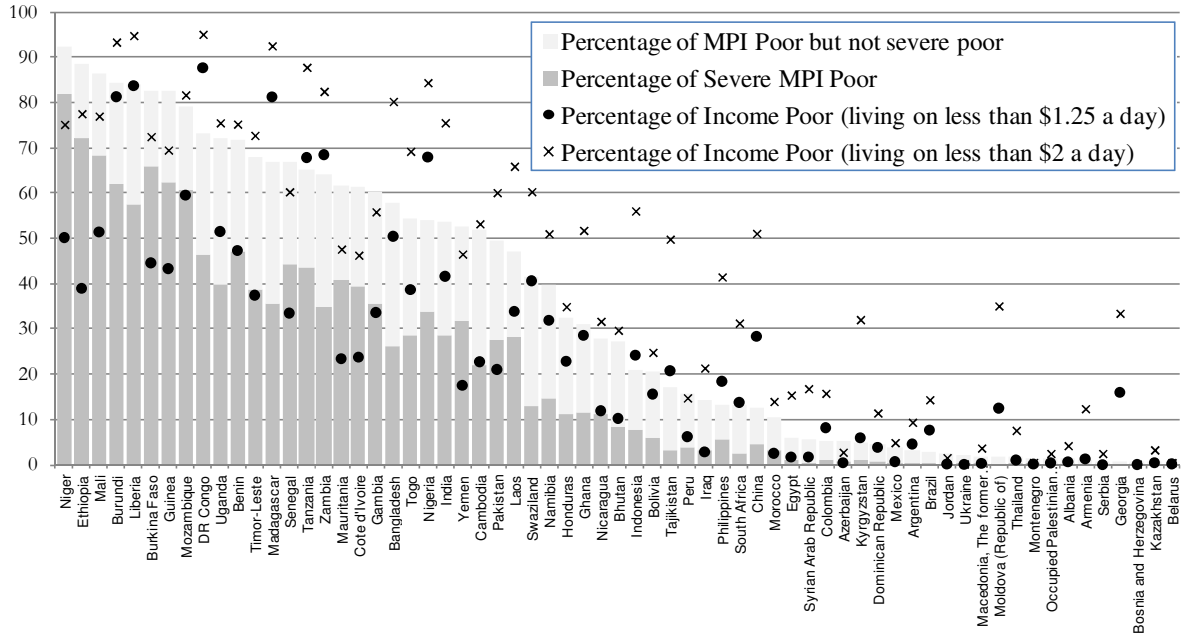
In what follows, in order to check robustness, we present the distribution of poverty by $1.25/$2 using two sets of measures: the 'closest' $1.25/$2 poverty figures to the MPI year and the 'latest' $1.25/$2 poverty figures available. As mentioned above we choose not to undertake interpolations/extrapolations in MPI figures. It may seem questionable that we ignore the interpolation/extrapolation of income poverty measures. We do so because we want to treat both datasets the same – if we do not interpolate/extrapolate MPI data, it follows that we treat income poverty data the same. Of course not everyone will agree with this approach.

The differences between the headcount ratio in MPI poverty and $1.25/$2 a day poverty are as follows. For this we shall restrict the exercise to only those countries for which MPI and income poverty figures are no more than three years apart (a total of 65 countries, see Figure 2). While generally among these countries $2 poverty is higher than MPI poverty and $1.25 poverty is higher than severe poverty, there are also some cases where the reverse is true. There is, of course, a level of association between the aggregate incidence of multidimensional and monetary

[11] There are $1.25/$2 poverty estimates available for 143 countries, but only 114 correspond to estimates that are 2005 or later (according to the year of the survey). A total of 20 countries out of these 114 do not have MPI estimates. A total of 12 countries in our list of 83 LICs and MICs have older data than 2005 in $1.25/$2 poverty estimates. A remaining six countries do not have $1.25/$2 poverty estimates available at all.

poverty, but they do not always go hand by hand (see Table A4 in the appendix).[12] If we look at the rank correlation between both measures, we find that the ranking with MPI and $1.25 results in 86% of concordant pairs.[13] However, the association is lower among LICs where the concordance is reduced to 68% of the pairs, and among LDCs and Fragile States with 70% and 78%, respectively (see detail of Kendall Tau-b correlation in Table A4 in the appendix). When the differences are more prominent, one can expect each measure may be telling different stories.[14] This is common in standard comparisons between economic and social indicators. For example, Bourguignon et al. (2008) and Ranis and Stewart (2012) show how performance in economic dimensions of poverty may not go hand in hand with progress in social dimensions. The extent to which economic growth or an increase in income per capita is associated with improvements in social indicators depends on various factors, including investment in public goods such as infrastructure, education, health, or access to improved sanitation and water; the quality of social protection and safety net programs; the quality of governance; and how much aid is delivered and how it well is used (see Bourguignon et al. 2008).

Figure 2. Comparison of percentage of MPI poor, MPI severe poor, $1.25 poor and $2 poor



Sources: MPI figures correspond to those published in 2011 (Alkire, Roche, Santos, et al., 2011; UNDP, 2011). Income figures ($1.25 a day) were taken from PovCal Net (World Bank 2012).

Note: The comparison is based only on the 65 LICs and MICs countries that have MPI and $1.25 figures that are within +/- 3 years from the MPI estimate.

[12] Note that even if the headcounts match, they do not necessarily identify the same households as being poor and often the households that are poor by both measures comprise 50% or less of those identified as poor by either measure. See for example Klasen 2000 and Whelan, Layte, Maitre 2004 and Alkire and Klasen *mimeo.*

[13] Ideally, we would use standard errors to assess whether rankings are significantly different. However whereas MPI does have standard errors, Povcal does not provide standard errors for $1.25/$2 day poverty measures, making this procedure impossible. Note that with standard errors, the match could only increase, so the results presented are the minimum matches.

[14] Naturally, there is also the possibility of measurement error and the extent to which each measure incurs in error type I or type II.

Table 6. Comparison of distribution of world poverty by MPI and $1.25/$2 poverty

	MPI poor[1]	MPI severe poor[1]	$2 poor (Closest)[2]	$2 poor (Latest)[3]	$1.25 poor (Closest)[2]	$1.25 poor (Latest)[3]
	% population	% population	% population	% population	% population	% population
World Regions:						
Middle East and North Africa	2.1	1.9	1.4	1.7	0.5	0.7
East Asia and Pacific[4]	15.4	10.6	33.1	25.3	30.9	21.1
Eastern Europe and Central Asia	0.3	0.1	0.4	0.3	0.2	0.1
Latin American and the Caribbean	1.9	1.0	2.4	2.4	2.2	2.5
South Asia	52.9	52.5	43.3	47.5	41.4	43.7
Sub-Saharan Africa	27.4	33.9	19.4	22.9	24.7	31.9
Income Categories[5]:						
Low income countries	27.2	32.3	18.0	20.9	21.6	26.8
Middle income countries	72.8	67.7	82.0	79.1	78.4	73.2
Other Categories:						
New MICs (post-2000)	58.5	58.8	50.6	55.3	49.2	53.5
LMICs	60.4	60.0	53.3	58.4	50.8	55.5
LMICs minus India	19.4	18.9	18.9	21.3	17.2	21.1
UMICs	12.4	7.7	28.7	20.7	27.6	17.7
UMICs - China	1.8	0.5	2.8	2.7	2.1	2.4
China	10.7	7.2	25.9	18.0	25.5	15.3
India	41.0	41.1	34.4	37.1	33.6	34.4
PINCIs[6]	60.1	56.0	69.2	64.6	65.3	56.6
Fragile states[7]	33.7	38.6	23.7	27.7	26.4	33.0
Least developed countries[8]	27.8	33.6	13.2	15.3	15.3	18.6
Total	100	100	100.0	100.0	100.0	100.0

Sources:
[1] Authors' estimates based on MPI figures published in 2011 (Alkire, Roche, Santos, et al., 2011; UNDP, 2011) and UN Population Estimates for the year 2008 (United Nations 2011).
[2] Authors' estimates based on PovCal Net $1.25 and $2 a day poverty figures that are closest in time to the year of the MPI estimation (World Bank 2012).
[3] Authors' estimates based on the most recent available data from PovCal Net on $1.25 and $2 a day poverty (World Bank 2012).
[4] Note that MPI estimates for China have been under-emphasised due to the age of the survey and uncertainty regarding its quality (see discussion in the methodological section).
[5] It corresponds to the World Bank income categories from the financial year 2012. These are based on the Gross National Incomes from 2010 using the Atlas Method (World Bank 2012).
[6] Pakistan, India, Nigeria, China and Indonesia
[7] It corresponds to the non-official OECD list for 2011 (OECD 2011).
[8] UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, UN General Assembly. http://www.unohrlls.org/en/ldc/25/ Accessed on 1 July 2012. It corresponds to the 2012 triennial review.

The comparison in the distribution of global poverty with MPI and $1.25/$2 poverty confirms the thesis that the world's poor are concentrated in MICs as opposed to LICs is indeed robust to the type of measure that is used (see Table 6). However, a key difference is that the concentration of the world's poor in MICs is relatively higher when we look at monetary measures instead of multidimensional measures. While three-quarters of the MPI poor and two-thirds of the severe MPI poor live in MICs, around four-fifth of the $1.25 a day poor and about three-quarters of the $2 a day poor live in MICs (figures vary slightly depending on 'closest' and 'latest' estimates).

Another key difference is that the MPI poor and severe poor concentrate relatively more in Sub-Saharan Africa and South Asia while $1.25/$2 poverty concentrates more in East Asia and the Pacific (see Table 6). In order to assess the robustness of this conclusion with respect to the year of the MPI estimates for China and India, we undertake a careful analysis of the 'closest' and 'latest' income figures. The MPI estimate for India corresponds to 2005–2006 while the 'closest' income estimate is 2004–2005 and the latest income estimate is 2010. So the contribution of India decreases as income poverty was reduced between 2005 and 2010 (the poverty reduction in the incidence of $1.25 a day poverty went from 42% to 33%). MPI estimates for China and the 'closest' $1.25 figures are for 2002, but the 'latest' $1.25 estimate is for 2008. According to $1.25 a day, China reduced poverty sharply from 28% in 2002 to 13% in 2008. Interestingly, Table 6 shows that, by shifting from 'closest' to 'latest' income figures, the contribution of East Asia and the Pacific falls from 31% to 21% in $1.25 a day, and increases in South Asia from 41% to 44% in $2 a day. We see that 53% of MPI poor live in South Asia while 15% live in East Asia and Pacific. Based on either figure, the percentage of MPI poor people is *relatively* higher in South Asia than $1.25 a day and *relatively* lower in East Asia and Pacific. This is an interesting finding which makes us wonder what the distribution would be with more recent MPI data for China and India.

Finally, Table 6 also shows that there is a higher concentration of multidimensionally poor in LDCs and Fragile States than income poor. Figures with and without India and China vary which may be affected by differences in the years of reference for each measure.

In summary, these figures show that the thesis that poverty is increasingly concentrated in MICs is robust to the type of poverty measure used. However, the distribution is slightly different with a greater concentration in MICs and in the East Asia and Pacific (EAP) region (noting the earlier caveat on China given), when we look at monetary measures, while the multidimensionally poor are relatively more concentrated in LICs, LDCs, Fragile States and in two worlds regions: Sub-Saharan Africa and South Asia.

It is worth highlighting that the distribution of poverty is a function of the incidence of poverty and the population size in each country. Hence, populous countries and highly poor countries contribute more. Therefore, the match between the world's distribution according to MPI and world's distribution according to $1.25 a day is the result of both: a degree of association between multidimensional and income poverty (which is expected) and the population factor.

5. How Sensitive is the Distribution of Global Multidimensional Poverty to the Various Country Thresholds?

How sensitive is the concentration of MPI poor and MPI severe poor in MICs to the LIC/MIC country income category thresholds? We again compare the headcount ratio of MPI poor with $2 poverty and MPI severe poor with $1.25 poverty. Figures 3 through 6 explore these matters using a density curve. If we consider the sensitivity by taking the GNI per capita (Atlas method), which is the basis of the country thresholds, we find that, by either MPI or MPI severe poor, the poor are not clustered near the thresholds for LIC/LMIC (Figures 3 and 4).[15] We also observe that there is greater concentration of MPI poor and severe MPI poor in LICs than there is when assessing poverty by $2 or $1.25. The latest available data for income poverty concentrates more in LICs than the closest available data for income poverty suggesting that the concentration is changing overtime (*ceteris paribus* the country category and population). An alternative approach is to consider the distribution of MPI poor and severe poor by GDP PPP per capita and multiples of the income poverty line to average income in order to assess in which countries the MPI poor and MPI severe poor live in (Figure 5). This is based on the logic that if *average* income is below $1.25 or $2 per capita, then a country is either an *extremely poor* country (average income below $1.25 per capita) or a *poor* country (average income below $2 per capita). What these figures show is that the distribution of poverty between MICs and LICs is robust to the income category thresholds.

One might still wonder if the size of India and China might be driving the conclusions. A further analysis can be made which considers the sensitivity of including India or China in the distribution of MPI poor by country categories. Figure 6 shows the cumulative distribution which starts from zero every time it passes the county income threshold while together still adding to 100%. The solid line shows the distribution of MPI poor with all countries included. The way to read this figure is to observe where the line crossed the income threshold and so the per cent of the cumulative at that point for each income category. So in the case of the solid dark line (MPI with all countries), LICs have together nearly 27% of the cumulative MPI poor while the LMICs have nearly 60% of the cumulative MPI poor as we noted in the previous section (see Table 3). Being a populous country, we might wonder how much the scenario changes if we do not include China. The dotted line shows this scenario, where the cumulative distribution is computed without including China. In this case, the LMICs are just below 70% and LICs are almost 30%. Dropping China has only a small effect by reducing the contribution of UMICs (see figures in Table 3). If we drop India only (leaving China in), we get a slightly different scenario (dashed line). Dropping India means reducing the denominator (total of global poor) so LICs represent now close to 45% of the global poor without India, and MICs are now reduced to slightly over 30%. What we see is that excluding India makes a difference, but there is still quite a significant proportion of poor in other LMICs. Finally if we drop both India and China we get the joint effect represented by the dash-dotted line. In this scenario the distribution of poverty is slightly different, with around 55% in LICs and around 40% in LMICs. In conclusion, there are still a significant number of poor people living in MICs even when one excludes India and China.

These findings raise issues for further research. They appear to suggest that upper middle income countries normally largely eradicate acute multidimensional poverty as measured by MPI. However from the country data presented in Figure 1, we know that rates of poverty in UMICs can approach 40% and that poverty rates in LICs can be as low as 5%.

[15] The current thresholds are as follows in GNI per capita thresholds in US$ (Atlas methodology; World Bank: fiscal year 2012; data calendar year 2010): LICs: <=$1,005; LMICs: $1,006-3,975; UMICs: $3,976-12,275; HIC: >$12,475.

In sum, we can conclude that (i) poverty does concentrate in MICs – this is robust to the poverty measure we use and to the income threshold; (ii) India is a large proportion but even if we exclude it the conclusion holds; and (iii) China has a very small contribution in either case.

Figure 3. Distribution of MPI poor and $2 poor by country classifications and GNI pc

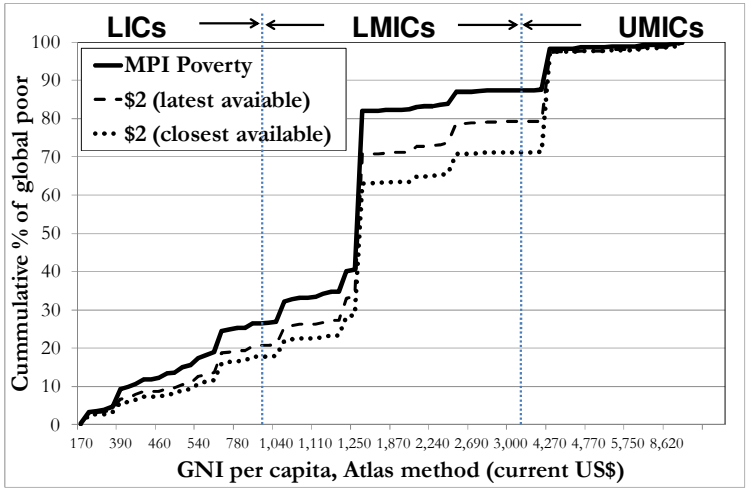


Figure 4. Distribution of MPI severe poor and $1.25 poor by country classifications and GNI pc

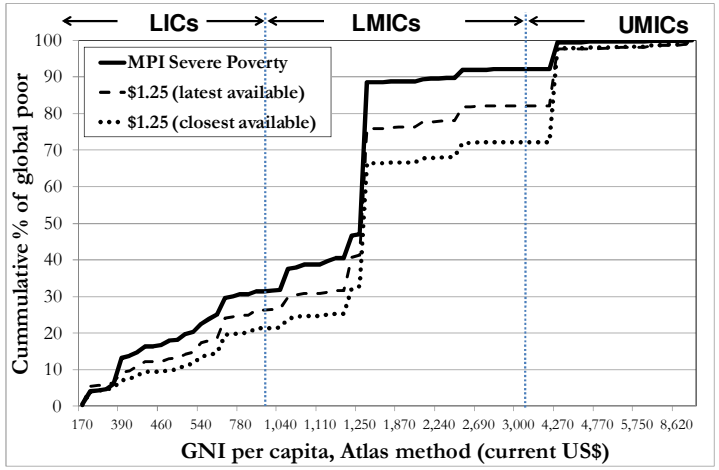


Figure 5: Distribution of MPI severe poor by country classifications and GDP pc

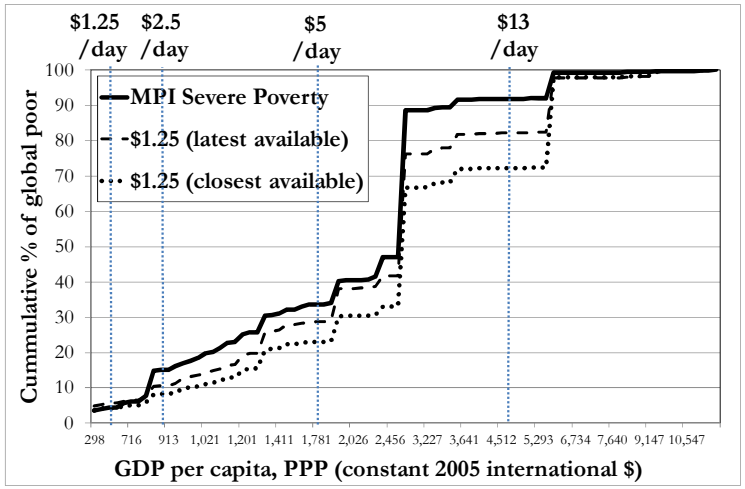
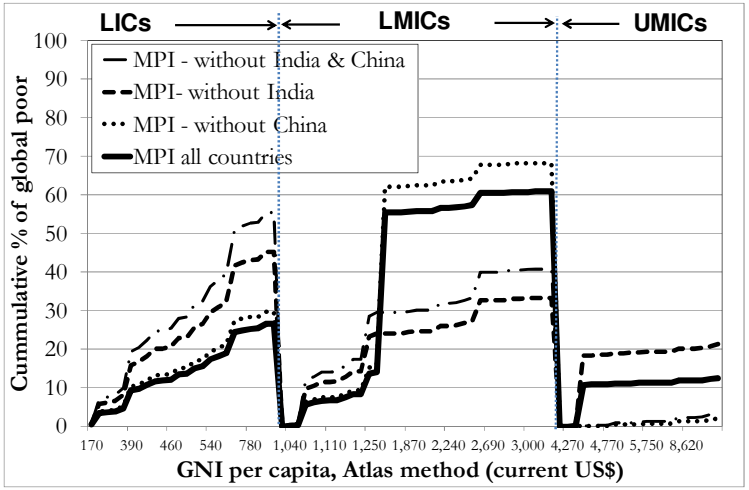


Figure 6. Sensitivity of the effect of India and China in the distribution of MPI poor by country classifications and GDP pc



6. Conclusions

Since late 2010 a set of papers have outlined a 'new geography of poverty' – meaning the shifting 'location' of poverty away from low-income countries or the Least Developed Countries. Indeed, three-quarters of the world's poor – around a billion people – live in middle income countries.

This paper has updated the global distribution of poverty using multidimensional measures and compared distribution based on MPI poor and MPI severe poor with those made with $1.25 and $2 poverty.

Why look at multidimensional poverty with reference to the distribution of global poverty? To see if it presents a similar or different picture to income poverty, to see where the poor live, and to assess the nature of the shift in global poverty.

What did we conclude? This paper found that three-quarters of the world's MPI poor and two-thirds of the world's severe MPI poor live in middle income countries – at total of one billion MPI poor in stable MICs. Further, there is a three-way split of the world's poor between (i) stable MICs; (ii) India and China; and (iii) low income fragile states.

At the outset we noted that the shift in global poverty could be interpreted in two ways that are not necessarily mutually exclusive. The first is that the country analytical categories are moribund. The second is that, over time, extreme poverty is becoming less about a lack of resources and increasingly about national inequality, growth patterns, and voice/governance – especially related to public finances.

Our findings suggest that an alternative to the categorisation of countries by LICs and MICs that is worth exploring might be a categorisation by the level of intensity of multidimensional poverty, because the country analytical categories are disconnected from the geographic location of poverty. Countries do not, of course, suddenly change when they cross arbitrary thresholds, be these thresholds of income per capita or structural characteristics. However, aid agencies do treat countries differently if they are middle income.

Further, that poverty in (some) MICs may no longer be about a lack of resources but about issues of politics/distribution/allocation of public finances. Thus, the changing pattern of global poverty raises various questions that are about whether 'global poverty' requires reframing now or in the next decade as a national distribution issue in a world of fewer and fewer aid-dependent countries and/or whether the dominant analytical country categories are outdated.

What next? First, we can say the country categories of LICs and MICs are no longer a clear guide to where the poor live. However, the picture of poverty in MICs is not sensitive to the current thresholds – such thresholds could be drastically increased and the poor would still live in middle income countries. This would suggest that an alternative to the categorisation of countries by LICs and MICs worth exploring might be a categorisation by the level or intensity of multidimensional poverty.

Second, in terms of future research, a hypotheses worth pursuing is one that posits that the nature of the global poverty 'problem' is changing to one of 'poverty pockets' by which we mean LICs within MICs, fragility within stable countries, and most importantly poverty within prosperity.

In order to explore this further three questions pose themselves: (i) Who are the poorest people? The multidimensional bottom billion can be further investigated in subnational MPI analysis or

by looking at the intensity of poverty; (ii) How much does inequality matter? This could be explored by considering the cost of ending multidimensional poverty and then looking into how governments spend (and tax) in the countries where the world's poverty is concentrated; (iii) Who will be the future bottom billion? Recently there have been a number of papers projecting income poverty to 2030 and beyond. One key argument is that the poor with little prospects ought to be the concern of the international community. To date, such extrapolations of multidimensional poverty have been limited to use of S-curves and malnutrition, child mortality, and secondary education (see: Karver, Kenny, & Sumner, 2012; Klasen & Lange, 2011).

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Annex 1: Data Tables

Table A1: Population coverage of MPI by country classifications (% population covered by category, current country classifications)

	Total of Countries[1]	World Population (2008 figures in thousands)	% Population Coverage by category		
			All countries with MPI estimations[2]	Countries included in the analysis[3]	Countries included in the analysis - except China [4]
Total	231	6,736,905	78.7	70.9	51.1
Income Categories [5]					
LICs	35	761,255	92.1	82.0	82.0
LMICs	55	2,440,321	97.5	90.8	90.8
UMICs	54	2,427,007	89.8	79.7	24.9
MICs	109	4,867,328	93.6	85.2	58.0
LICs and MICs	144	5,628,583	93.4	84.8	61.2
Fragile states [6]	45	1,163,286	90.3	78.7	78.7
Least developed countries [7]	48	796,504	90.1	78.2	78.2
Quartile 1 by GDP PPP pc [8]	44	999,772	92.2	82.7	82.7
Quartile 1 by GNI PPP pc [9]	42	989,369	92.1	82.4	82.4
Quartile 1 by GNI Atlas pc [10]	44	1,026,905	96.4	83.3	83.3

Notes:

[1] It corresponds to the whole list of countries included in United Nations (2011).
[2] It includes all 109 countries for which there are MPI estimations available (years vary from 2000–2010). MPI figures published in 2010 (Alkire, Roche, Santos, et al., 2011; UNDP, 2011).
[3] It includes 83 countries which correspond to only LIC and MIC countries with MPI estimations for the period 2005–2010, plus China 2002. MPI figures published in 2010 (Alkire, Roche, Santos, et al., 2011; UNDP, 2011). World Bank income categories figures from financial year 2012 (WORLD BANK, 2012).
[4] It includes 82 countries which correspond to only LIC and MIC countries with MPI estimations for the period 2005–2010 (Excluding China 2002). MPI figures published in 2010 (Alkire, Roche, Santos, et al., 2011; UNDP, 2011). World Bank income categories figures from financial year 2012 (WORLD BANK, 2012).
[5] It corresponds to the World Bank income categories from the financial year 2012. These are based on the Gross National Incomes from 2010 using the Atlas Method (WORLD BANK, 2012).
[6] It corresponds to the non-official OECD list for 2011 (OECD, 2011).
[7] UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, UN General Assembly. http://www.unohrlls.org/en/ldc/25/ Accessed on 1 July 2012. It corresponds to the 2012 triennial review.
[8] Own categories based on 2008 GDP per capita in PPP (current international $) from WORLD BANK (2012). The quintiles are based only on countries with available data for 2008.
[9] Own categories based on 2008 GNI per capita in PPP (current international $) from WORLD BANK (2012). The quintiles are based only on countries with available data for 2008.
[10] Own categories based on 2008 GNI per capita Atlas Method (current US$) from WORLD BANK (2012). The quintiles are based only on countries with available data for 2008.

Table A2: MPI poverty and severe poverty for the top 10 and top 20 countries

		MPI Poverty					Severe Poverty			
	Ranking	Multidimensional Poverty Index MPI = (H*A)	% Poor (H)	% Intensity among the MPI poor (A)	Total Poor	% World Poverty	% Severe Poverty	% Intensity among the severely poor	Total Severe Poverty	% World Severe Poverty
1	India	0.283	53.7	52.7	639,494	41.0	28.6	64.8	340,587	41.1
2	China	0.056	12.5	44.9	166,035	10.7	4.5	56.1	59,772	7.2
3	Bangladesh	0.292	57.8	50.4	84,086	5.4	26.2	62.7	38,115	4.6
4	Pakistan	0.264	49.4	53.4	82,716	5.3	27.4	65.7	45,879	5.5
5	Nigeria	0.310	54.1	57.3	81,510	5.2	33.9	68.2	51,076	6.2
6	Ethiopia	0.562	88.6	63.5	70,389	4.5	72.3	68.5	57,439	6.9
7	Indonesia	0.095	20.8	45.9	48,870	3.1	7.6	58.9	17,856	2.2
8	Congo (DR)	0.393	73.2	53.7	45,732	2.9	46.5	62.4	29,051	3.5
9	Tanzania	0.367	65.2	56.3	27,559	1.8	43.7	65.3	18,471	2.2
10	Uganda	0.367	72.3	50.7	22,658	1.5	39.7	60.3	12,442	1.5
	Top 10				**144,819**	**9.3**			**77,820**	**9**
11	Nepal	0.350	64.7	54	18,702	1.2	37.1	64.9	10,724	1.3
12	Kenya	0.229	47.8	48.0	18,381	1.2	19.8	60.7	7,614	0.9
13	Mozambique	0.512	79.3	64.6	17,710	1.1	60.7	72.1	13,556	1.6
14	Niger	0.642	92.4	69.4	13,352	0.9	81.8	73.2	11,820	1.4
15	Madagascar	0.357	66.9	53.3	13,076	0.8	35.4	64.1	6,919	0.8
16	Burkina Faso	0.536	82.6	64.9	12,815	0.8	65.8	71.4	10,209	1.2
17	Mali	0.558	86.6	64.4	12,522	0.8	68.4	70.9	9,891	1.2
18	Philippines	0.064	13.4	47.4	12,083	0.8	5.7	58.4	5,140	0.6
19	Yemen	0.283	52.5	53.9	11,879	0.8	31.9	64.6	7,218	0.9
20	Cote d'Ivoire	0.353	61.5	57.4	11,677	0.7	39.3	67.3	7,462	0.9
	Top 20				**249,933**	**16.0**			**150,035**	**18.1**

Sources: Author calculations based on MPI figures published in 2011 (Alkire, Roche, Santos, et al., 2011; UNDP, 2011) and UN Population Estimates for the year 2008 (United Nations 2011). World Bank income categories from the financial year 2012 which are based on the Gross National Incomes from 2010 using the Atlas Method (World Bank 2012). Fragile states according to the non-official OECD list for 2011 (OECD 2011).

Table A3: Multidimensional poverty indicators by country categories

	Multidimensional poverty indicators[1]				
	Multidimensional Poverty Index (MPI = H*A)	**Headcount ratio: Population in multidimensional poverty (H)**	**Intensity of deprivation among the poor (A)**	**Population vulnerable to poverty (who experience 20-32.9% intensity of deprivations)**	**Population in severe poverty (with intensity higher than 50%)**
	Range 0 to 1	% Population	Average % of weighted deprivations	% Population	% Population
World Regions:					
Middle East and North Africa	0.083	16.4	43.5	9.7	8.0
East Asia and Pacific	0.062	13.7	45.0	7.6	5.1
Eastern Europe and Central Asia	0.010	2.6	36.8	5.5	0.3
Latin American and the Caribbean	0.028	6.5	40.0	7.9	1.7
South Asia	0.283	53.8	52.6	16.2	28.4
Sub-Saharan Africa	0.359	62.5	55.6	16.3	41.1
Income Categories:					
Low income countries	0.382	67.8	55.0	16.5	42.9
Middle income countries	0.140	27.4	47.1	10.9	13.5
Other Categories:					
New MICs (post-2000)	0.245	46.5	51.4	14.9	24.9
LMICs	0.223	42.5	50.6	14.4	22.4
LMICs minus India	0.154	29.5	48.1	12.1	15.3
UMICs	0.044	10.0	43.2	7.0	3.3
UMICs - China	0.019	4.6	39.4	8.5	0.7
China	0.056	12.5	44.9	6.3	4.5
India	0.283	53.7	52.7	16.4	28.6
PINCIs	0.164	32.1	48.6	11.2	15.9
Fragile states (OECD 2011)	0.319	57.3	53.7	15.2	34.9
Least developed countries	0.395	69.61	55.82	15.47	44.74
Poorest quartile by GDP pc in PPP	0.361	64.10	55.25	16.76	40.13
Poorest quartile by GNI pc in PPP	0.359	63.80	55.21	16.66	39.92
Poorest quartile by GNI pc AtlasM.	0.306	56.63	53.18	15.92	32.23
Total	0.172	32.7	48.1	11.7	17.4

Sources: Author calculations based on MPI figures published in 2011 (Alkire, Roche, Santos, et al., 2011; UNDP, 2011) and UN Population Estimates for the year 2008 (United Nations 2011). World Bank income categories from the financial year 2012 which are based on the Gross National Incomes from 2010 using the Atlas Method (World Bank 2012). Fragile states according to the non-official OECD list for 2011 (OECD 2011).

Table A4: Measures of association between MPI poverty and $1.25/$2 a day

	Pearson	Spearman's rank	Kendall's rank (Tau b)
Measures of association between incidence in MPI and $1.25			
All countries	0.861	0.903	0.718
LICs	0.628	0.493	0.357
LMICs	0.756	0.808	0.618
UMICs	0.848	0.803	0.614
LDCs	0.551	0.571	0.396
Fragile States	0.715	0.733	0.556
Measures of association between incidence in MPI and $2			
All countries	0.907	0.900	0.720
LICs	0.746	0.504	0.380
LMICs	0.827	0.810	0.624
UMICs	0.823	0.820	0.633
LDCs	0.660	0.568	0.410
Fragile States	0.833	0.716	0.521
Measures of association between incidence in Severe MPI and $1.25			
All countries	0.801	0.883	0.688
LICs	0.490	0.361	0.252
LMICs	0.701	0.792	0.597
UMICs	0.855	0.744	0.596
LDCs	0.391	0.410	0.268
Fragile States	0.633	0.654	0.469
Measures of association between incidence in Severe MPI and $2			
All countries	0.834	0.877	0.689
LICs	0.605	0.372	0.275
LMICs	0.776	0.788	0.603
UMICs	0.811	0.780	0.617
LDCs	0.497	0.397	0.283
Fragile States	0.723	0.611	0.434

Sources: Author calculations based on MPI figures published in 2011 (Alkire, Roche, Santos, et al., 2011; UNDP, 2011) and UN Population Estimates for the year 2008 (United Nations 2011). World Bank income categories from the financial year 2012 which are based on the Gross National Incomes from 2010 using the Atlas Method (World Bank 2012). Fragile states according to the non-official OECD list for 2011 (OECD 2011).

Note: Pearson's correlation coefficient measures the linear relationship between two variables and is normally used for interval variables. Spearman's rank correlation coefficient is a non-parametric measure of association based on the ranks between a pair of rankings (also measures nonlinear relations). Kendall's Tau coefficient is calculated by comparing each pair of countries in a pair of rankings (Tau-b makes further adjustments for ties).

Table A5: Latest income poverty figures for the top 10 and top 20 countries

	$1.25 a day (latest figure)					$2 a day (latest figure)			
	Ranking	% Poor (H)	Total Poor	% World Poverty		Ranking	% Poor (H)	Total Poor	% World Poverty
1	India	32.67	389,055	34.4	1	India	68.72	818,362	37.1
2	China	13.06	173,473	15.3	2	China	29.79	395,693	18.0
3	Nigeria	67.98	102,423	9.1	3	Nigeria	84.49	127,298	5.8
4	Bangladesh	43.25	62,919	5.6	4	Bangladesh	76.54	111,349	5.1
5	Congo (DR)	87.72	54,803	4.8	5	Indonesia	46.12	108,359	4.9
6	Indonesia	18.06	42,432	3.8	6	Pakistan	60.19	100,783	4.6
7	Pakistan	21.04	35,230	3.1	7	Ethiopia	77.63	61,674	2.8
8	Ethiopia	38.96	30,952	2.7	8	Congo (DR)	95.15	59,445	2.7
9	Tanzania	67.87	28,687	2.5	9	Philippines	41.53	37,449	1.7
10	Kenya	43.37	16,678	1.5	10	Tanzania	87.87	37,141	1.7
	Top 10		**936,653**	**82.9**		**Top 10**		**1,857,553**	**84.3**
11	Philippines	18.42	16,610	1.5	11	Kenya	67.21	25,846	1.2
12	Madagascar	81.29	15,889	1.4	12	Brazil	10.82	20,725	0.9
13	Mozambique	59.58	13,306	1.2	13	Uganda	64.74	20,289	0.9
14	Uganda	38.01	11,912	1.1	14	Mozambique	81.77	18,262	0.8
15	Brazil	6.14	11,761	1.0	15	Madagascar	92.62	18,104	0.8
16	Zambia	68.51	8,482	0.8	16	Nepal	57.25	16,548	0.8
17	Mali	50.43	7,292	0.6	17	South Africa	31.33	15,452	0.7
18	Nepal	24.82	7,174	0.6	18	Egypt	15.43	12,085	0.5
19	Burkina Faso	44.6	6,920	0.6	19	Ghana	51.84	12,060	0.5
20	South Africa	13.77	6,791	0.6	20	Mali	78.66	11,374	0.5
	Top 20		**996,984**	**88.2**		**Top 20**		**1,961,438**	**89.0**

Source: Authors' estimates based on the most recent available data from PovCal Net on $1.25 and $2 a day poverty (World Bank 2012) and UN Population Estimates for the year 2008 (United Nations 2011).

Table A6: Closest income poverty figures for the top 10 and top 20 countries

	$1.25 a day (closest to MPI)					$2 a day (closest to MPI)			
	Ranking	% Poor (H)	Total Poor	% World Poverty		Ranking	% Poor (H)	Total Poor	% World Poverty
1	India	41.64	495,876	31.9	1	India	75.62	900,531	32.7
2	China	28.36	376,699	24.2	2	China	51.15	679,413	24.7
3	Nigeria	67.98	102,423	6.6	3	Indonesia	56.13	131,878	4.8
4	Bangladesh	50.47	73,423	4.7	4	Nigeria	84.49	127,298	4.6
5	Indonesia	24.2	56,858	3.7	5	Bangladesh	80.32	116,848	4.2
6	Congo (DR)	87.72	54,803	3.5	6	Pakistan	60.19	100,783	3.7
7	Pakistan	21.04	35,230	2.3	7	Ethiopia	77.63	61,674	2.2
8	Viet Nam	40.05	34,424	2.2	8	Congo (DR)	95.15	59,445	2.2
9	Ethiopia	38.96	30,952	2.0	9	Viet Nam	68.71	59,058	2.1
10	Tanzania	67.87	28,687	1.8	10	Philippines	41.53	37,449	1.4
	Top 10		**1,289,375**	**83.0**		**Top 10**		**2,274,377**	**82.6**
11	Kenya	43.37	16,678	1.1	11	Philippines	41.53	37,449	1.4
12	Philippines	18.42	16,610	1.1	12	Tanzania	87.87	37,141	1.3
13	Uganda	51.53	16,149	1.0	13	Brazil	14.42	27,621	1.0
14	Madagascar	81.29	15,889	1.0	14	Kenya	67.21	25,846	0.9
15	Brazil	7.64	14,634	0.9	15	Uganda	75.6	23,692	0.9
16	Mozambique	59.58	13,306	0.9	16	Mozambique	81.77	18,262	0.7
17	Malawi	73.86	10,344	0.7	17	Madagascar	92.62	18,104	0.7
18	Angola	54.31	9,796	0.6	18	Nepal	57.25	16,548	0.6
19	Zambia	68.51	8,482	0.5	19	South Africa	31.33	15,452	0.6
20	Mali	51.43	7,437	0.5	20	Malawi	90.45	12,668	0.5
	Top 20		**1,369,262**	**88.1**		**Top 20**		**2,404,947**	**87.4**

Source: Authors' estimates based on PovCal Net $1.25 and $2 a day poverty figures that are closest in time to the year of the MPI estimation (World Bank 2012) and UN Population Estimates for the year 2008 (United Nations, 2011).

Annex 2: Methodological Annex

Note: *This Annex provides the methodology for easy reference in the Working Paper version of this manuscript only, and is adapted from Alkire and Foster 2007, 2011a, to which the readers are referred.*

The Adjusted Headcount (M_0)

Deprivation Matrix: Consider a matrix of deprivations presented in Alkire and Foster 2011, such that when the vector of deprivation cutoffs is applied to the achievement matrix, we express the data in terms of binary deprivations. For any given y, let $g^0=[g_{ij}^0]$ denote the *matrix of deprivations* associated with y, whose typical element g_{ij}^0 is defined by $g_{ij}^0=w_j$ when $y_{ij}<z_j$, while $g_{ij}^0=0$ otherwise. Clearly, g^0 is an $n\times d$ matrix whose ij^{th} entry is w_j when person i is deprived in the j^{th} dimension, and 0 when the person is not. The i^{th} row vector of g^0, denoted g_i^0, is person i's *deprivation vector*. From the matrix g^0 we construct a column vector c of *weighted deprivation counts*, whose i^{th} entry $c_i=|\ g_i^0\ |$ represents the sum of the weights for the dimensions in which i is deprived.

Identification: A second cutoff k is used to identify the poor. For $0<k\leq d$, let ρ_k be the identification method defined by $\rho_k(y;z)=1$ whenever $c_i\geq k$, and $\rho_k(y;z)=0$ whenever $c_i<k$. In other words, ρ_k identifies person i as poor when the count c_i is at least k; if not, i is not poor according to ρ_k. For $k\leq(\min w_j)$, we obtain the union identification case, and for $k=d$, the intersection; thus ρ_k includes both of these methods given any w.

Censoring: Let $g^0(k)$ be the matrix obtained from g^0 by replacing its i^{th} row g_{ij}^0 with a vector of zeros whenever $\rho_k(y;z)=0$, so that $g_{ij}^0(k) = g_{ij}^0\rho_k(y;z)$. As the cutoff k rises from its lowest value to d, the number of nonzero entries in the associated matrix $g^0(k)$ falls, reflecting the progressive censoring of data from persons who are not meeting the dimensional poverty requirement presented by ρ_k. Similarly, define the *censored vector of deprivation counts* $c(k)$ by $c_i(k)=\rho_k(y;z)c_i$ for $i=1,\ldots,n$.

Aggregation: The *adjusted headcount ratio* is the mean of the censored deprivation matrix: $M_0=\mu(g^0(k))$. M_0 can also be expressed as the product of two intuitive partial indices: the headcount ratio and the average deprivation share across the poor. The headcount ratio $H=H(y;z)$ is defined by $H=q/n$, where $q=q(y;z)=\Sigma_{i=1}^n\rho_k(y_i,z)$ is number of persons in the set Z_k, and hence the number of the people identified as poor. The *average deprivation share* across the poor is given by $A=|c(k)|/(qd)$, and reflects the intensity of poverty, or the percentage of deprivations the average poor person experiences. We can equivalently express the adjusted headcount ratio as: $M_0=HA=\mu(g^0(k))$.

Table Annex 2-A1: The dimensions, indicators, deprivation thresholds, and weights of the MPI

Dimension	Indicator	Deprived if…	Related to…	Relative Weight
Education	Years of Schooling	No household member has completed five years of schooling.	MDG2	1/6
	Child School Attendance	Any school-aged child is not attending school up to class 8.[+]	MDG2	1/6
Health	Child Mortality	Any child has died in the family.	MDG4	1/6
	Nutrition	Any adult or child for whom there is nutritional information is malnourished.[*]	MDG1	1/6
Living Standard	Electricity	The household has no electricity.		1/18
	Improved Sanitation	The household's sanitation facility is not improved (according to MDG guidelines), or it is improved but shared with other households.[**]	MDG7	1/18
	Safe Drinking Water	The household does not have access to safe drinking water (according to MDG guidelines) or safe drinking water is more than a 30-minute walk from home, roundtrip.[***]	MDG7	1/18
	Flooring	The household has a dirt, sand or dung floor.		1/18
	Cooking Fuel	The household cooks with dung, wood or charcoal.	MDG7	1/18
	Assets ownership	The household does not own more than one radio, TV, telephone, bike, motorbike or refrigerator and does not own a car or truck.	MDG7	1/18

Note: MDG1 is Eradicate Extreme Poverty and Hunger; MDG2 is Achieve Universal Primary Education; MDG4 is Reduce Child Mortality; MDG7 is Ensure Environmental Sustainability.

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

[*] Adults are considered malnourished if their BMI is below 18.5 m/kg^2. Children are considered malnourished if their z-score of weight-for-age is below minus two standard deviations from the median of the reference population.

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

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

Source: Alkire and Santos (2010). For details on the rationale behind each indicator please see Alkire and Santos (2010).