WHERE DO THE WORLD'S POOREST LIVE?

A MULTIDIMENSIONAL APPROACH TO THE BOTTOM BILLON

Sabina Alkire, José Manuel Roche, Suman Seth and Andy Sumner

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Abstract

If development is about poverty reduction, where the poorest live is an important question, especially so amid policy debates on what might follow the UN Millennium Development Goals. It is now well known that most of the poor do not live in low income nor fragile states, whether one uses income poverty or multi-dimensional poverty to assess this. However, low income and fragile states typically have higher rates of poverty and poverty severity than stable middle income countries which raises the question, even if middle income countries are home to the world's poor, where do the world's *poorest* live? This paper seeks to answer this question taking a multi-dimensional approach to poverty. Three approaches to identifying the 'Bottom Billion': by countries (eg low and middle income); by sub-national regions (as the poor may live in low-income regions of otherwise prosperous countries) and by poverty profiles of individuals from every survey household across 104 countries. Although the different approaches produce different findings there are notable commonalities across the approaches that are of relevance to the discussions of post-2015 development goals.

Key words: Multi-dimensional Poverty: Low-Income Countries; Middle-Income Countries

1. INTRODUCTION

If development is about poverty reduction, where the poorest live is an important question, especially so amid policy debates on what might follow the UN Millennium Development Goals. The conventional wisdom, to date, has been that the world's 'Bottom Billion', the poorest poor, live in the world's poorest countries, generally defined to be low income or fragile states (eg Collier, 2007).

It is now well known that most of the poor do not live in low income nor fragile states, whether one uses income poverty (see Sumner, 2012) or multi-dimensional poverty to assess this (see Alkire et al., 2011; 2013).

However, low income and fragile states typically have higher rates of poverty and poverty severity than stable middle income countries which raises the question, even if middle income countries are home to the world's poor, where do the world's *poorest* live?

This paper seeks to answer this question taking a multi-dimensional approach to poverty as developed by OPHI/UNDP. Specifically, the Multidimensional Poverty Index (MPI) which is a measure of acute poverty in over 100 developing countries, which includes information on health, education, and living standard. As we show, the MPI allows us to undertake subnational and individual level analyses, to go beyond national averages that hide inequality.

This paper does two things: first, it zooms in on the poorest billion based on a multidimensional approach. Second, we go beyond national aggregates and look at the 'Bottom Billion' at the subnational level, and for the first time using individual poverty profiles.[1]

The paper is structured as follows: Section 2 outlines approach and methodology. Section 3 discusses the findings. Section 4 discusses and concludes.

[1] This is possible because the MPI is a direct measure of poverty, and because it does not require adjustments for prices, exchange rates or inflation, it can be easily compared across subnational regions and indeed across individuals living in different countries. Note that the MPI uses the most recent DHS or MICS data available, so years vary across countries.

2. APPROACH AND METHODOLOGY

2a. Measuring multi-dimensional poverty

The Multi-dimensional Poverty Index (MPI) uses particular dimensions, indicators, weights and cut-offs to implement a general multidimensional measure called the Adjusted Headcount Ratio (M_0) proposed by Alkire and Foster (2011, 2007).[2] We outline the methodology in this section and discuss the dimensions, indicators, weights and cut-offs.

Suppose there are n people in a hypothetical country and well-being is assessed by d indicators.[3] The achievements of all n persons in all d indicators are summarized by an $n \times d$–dimensional matrix X, x_{ij} is the achievement if person i in dimension j. Thus, row i of X represents the achievement vector of person i, summarizing the person's achievement in all d indicators. Similarly, column j of X represents the vector containing the achievements of all n persons in indicator j. Any person i is deprived in any indicator j if her achievement falls below a threshold z_j (or $x_{ij} < z_j$), which we refer as the *deprivation cut-off* of indicator j.[4] The deprivation cut-offs are summarized by the *deprivation cut-off vector* z. We denote the relative weight or value attached to indicator j by w_j, such that $w_j > 0$ for all j and $\sum_{j=1}^{d} w_j = 1$. The weights are summarized by the *weight vector* w.

Given the achievement matrix X, the deprivation cut-off vector z, and the weight vector w, we attach a *deprivation status value* g_{ij} to each person i in each indicator j, such that $g_{ij} = 1$ if $x_{ij} < z_j$ and $g_{ij} = 0$, otherwise. Then a *deprivation score* c_i is computed for each person i such that $c_i = \sum_{j=1}^{d} w_j \, g_{ij}$. Thus, the deprivation score of a person is a weighted average of deprivations that the person faces. The *deprivation score vector*, containing all n deprivation scores, is denoted by c. Person i is identified as multidimensionally poor using a *poverty cut-off* (denoted

[2] Alkire and Foster (2011, 2007), in fact, proposed an entire class of multidimensional poverty indices, which is an extension of the class of single-dimensional FGT measures (Foster, Greer and Thorbecke, 1984). The Adjusted Headcount Ratio is one multidimensional poverty measure in their class.

[3] Alkire and Foster denote each column of an achievement matrix as a 'dimension'. In this report, we change terminology and refer to each column of an achievement matrix as an 'indicator'; whereas the term 'dimensions', in the current context, refers to conceptual groupings of indicators that do not appear in the matrix.

[4] In the single-dimensional analysis of poverty, a person is identified as poor if and only if the person is deprived in that dimension. However, this equivalence does not hold in multidimensional context.

by $k \in (0,1]$) if $c_i \geq k$.[5] This means that in order to be identified as multidimensionally poor, the deprivation score of a person has to be larger than or equal to the poverty cut-off. The focus axiom allows us to construct a *censored deprivation score vector* $c(k) = (c_1(k), \ldots, c_n(k))$ such that $c_i(k) = c_i$ if $c_i \geq k$ and $c_i(k) = 0$, otherwise.[6] The MPI of X given deprivation cut-off vector z, poverty cut-off k and weight vector w is:

$$\text{MPI}(X) = \frac{1}{n}\sum_{i=1}^{n} c_i(k) \; = \frac{q}{n} \times \frac{1}{q}\sum_{i=1}^{n} c_i(k) = H \times A,$$

where q is the number of poor.[7] Thus, $H = q/n$ is simply the proportion of the population that is identified as multidimensionally poor or the *Multidimensional Headcount Ratio* (H) and $A \; = \sum_{i=1}^{n} c_i(k) \, / q$ is the *average deprivation score* among the poor, which intuitively reflects the average 'intensity' of poverty among the poor.

In this paper, one of our principal interests is in dividing the entire country's population into different population subgroups to understand sub-national poverty.[8] The MPI is helpful in this respect as it is *subgroup decomposable*. Suppose, there are m mutually exclusive and collectively exhaustive population subgroups. Let us denote the achievement matrix of subgroup ℓ by X^{ℓ} which has a population size of n^{ℓ} for all $\ell = 1, \ldots, m$. Then we can express the overall MPI as:

$$\text{MPI}(X) = \sum_{\ell=1}^{m} \frac{n^{\ell}}{n} M_0(X^{\ell})$$

The share of subgroup ℓ to the overall poverty is given by $(n^{\ell}/n) \times [\text{MPI}(X^{\ell})/ \text{MPI}(X)]$.

[5] If the poverty cut-off $k \in (0, \min_j\{wj\}]$, then the approach for identifying the poor is called the *union approach*; if the poverty cut-off $k = 1$, then the identification approach is referred as the *intersection approach*.

[6] This property is known as *poverty focus*, which requires that an increment in the achievement of a non-poor person in any indicator should not change the level of poverty in a country.

[7] When the Adjusted Headcount Ratio is estimated from a sample survey, where each person n has a different weight W_i, then $MPI(X) = [\sum_{i=1}^{n} W_i \times c_i(k)]/[\sum_{i=1}^{n} W_i]$.

[8] Subgroup decomposability is related to subgroup consistency, which requires overall poverty to increase if poverty increases in one subgroup and remains fixed in the others, if the population is constant. See Foster and Sen (1997).

The MPI was developed by Alkire and Santos (2010) has three dimensions of well-being: *health*, *education*, and *standard of living*, and ten indicator as described in Table 1. The health and education dimensions consist of two indicators each and the standard of living dimension consists of six indicators.[9] Each of the three dimensions is equally weighted (1/3 each) under the implicit assumption that each of them is equally important to a person's well-being. Similarly, each indicator within a dimension is also equally weighted. Out of the ten indicators, eight are directly related to the Millennium Development Goals.

Table 1: Dimensions, Indicators, Deprivation Cut-offs, and Weights of MPI

Dimension (Weight)	**Indicator (Weight)**	**Poverty Cut-off**
Health (1/3)	Nutrition (1/6)	*Any adult or child in the household with nutritional information is undernourished*[10]
	Child mortality (1/6)	*Any child has died in the household*[11]
Education (1/3)	Years of schooling (1/6)	*No household member has completed five years of schooling*
	Child school attendance (1/6)	*Any school-aged child in the household is not attending school up to class 8*[12]
Standard of Living (1/3)	Access to electricity (1/18)	*The household has no electricity*
	Access to improved sanitation (1/18)	*The household´s sanitation facility is not improved or it is shared with other households*
	Access to safe drinking water (1/18)	*The household does not have access to safe drinking water or safe water is more than 30 minutes walk round trip*
	Type of flooring material (1/18)	*The household has a dirt, sand or dung floor*
	Type of cooking fuel (1/18)	*The household cooks with dung, wood or charcoal.*
	Asset ownership (1/18)	*The household does not own more than one of: radio, TV, telephone, bike, motorbike or refrigerator, and does not own a car or truck*

[9] For a thorough and detailed presentation of the indicators and poverty cut-offs, as well as the treatments of households lacking eligible members and of missing responses see Alkire, Santos, Roche, and Seth (2011).

[10] An adult is considered undernourished if his/her BMI is below 18.5 m/kg^2. A child is considered undernourished if his/her body weight, adjusted for age, is more than two standard deviations below the median of the reference population. Precisely, a z-score is calculated for each child and the child is identified as deprived in nutrition if and only if his/her z-score is less than −2. If a household has no woman or child whose nutritional status has been measured, we treat the household to be non-deprived in this indicator. To guarantee strict comparability of the nutritional indicators for children across surveys, the z-score has been estimated following the algorithm provided by the WHO Child Growth Standards. This algorithm uses a reference population constructed by the WHO Multicentre Growth Reference Study (MGRS).

[11] If no woman in a household has been asked this information, we treat the household to be non-deprived in this indicator.

[12] If a household has no school-aged children, we treat the household as non-deprived in this indicator. The data source used to determine the age children start schooling is: 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 accessed 20-12-2011].

The poverty cut-off of MPI is $k = 1/3$. Thus, a person is identified as poor if the deprivation score of that person is larger than or equal to 1/3. The justification behind this poverty cut-off is as follows: Given that there are three dimensions, the weight of each dimension is 1/3 and a poverty cut-off of 1/3 implies that a person is identified as poor if she is deprived only in one health indicator and three standard of living indicators, then his/her deprivation score is 1/3 and the person is identified as poor.

2b. The dataset

In the estimates we take three approaches to identifying the ‘‘Bottom Billion’’. First, by countries (eg low and middle income). Second by sub-national regions (as the poor may live in low-income regions of otherwise prosperous countries. Third, by poverty profiles. For the computation of MPI, information on all indicators should be available from the same survey. Our *country level and individual level analyses* are based on 104 countries for which data are available since 2003. Datasets from three main sources has been used to compute the MPI: the Demographic and Health Surveys (DHS) for 51 countries, the Multiple Indicators Cluster Surveys (MICS) for 30 countries, and the World Health Survey (WHS) for 17 countries. Country-specific surveys have been used for six countries.[13]

Our overall sample of 104 countries covers 77.7% of the world population or 5.4 billion people, using UN population figures for the year 2010 (UN 2011). The data covers nearly 90 per cent of the population from upper middle-income countries, 98% of those in lower MICs and 86% of people in LICs.

Like all similar exercises, this exercise requires very important computational caveats, because the surveys used for the computations were collected from different years and not all ten indicators were available across all surveys (97 countries have 9 or 10 indicators). When we use the older survey with the population of year 2010, we implicitly assume that the level of poverty has remained unchanged.

For sub-national analysis, however, we could not decompose all 104 countries. In light of this we conducted the decomposition analysis for 65 countries using

[13] Argentina: National Survey of Nutrition and Health (ENNyS) 2005; Brazil: National Survey of Demographic and Health (PNDS) 2006; Mexico: National Health and Nutrition Survey (ENSANUT) 2006; Morocco: National Study on Household Living Standards (ENNVM) 2007; Occupied Palestinian Territory: Pan Arab Population and Family Health Project (PAPFAM) 2007; and South Africa: National Income Dynamics Study (NIDS) 2008.

surveys that satisfy three criteria: (i) the survey of the country is representative at the sub-national level, (ii) the incidence of poverty (H) and the MPI are both large enough so that a meaningful sub-national analysis can be pursued, and (iii) the sample size after the treatment of missing and non-response data is reasonably high both at the national level and at the sub-national level. For borderline cases, we performed additional bias analyses to exclude those cases where the sample reduction leads to statistically significant bias.

The *first criterion* requires that the survey dataset should be representative at the sub-national level according to the metadata of the sample design and to basic tabulates in the country survey report.[14] The first criteria, thus, excludes 23 country surveys from our analysis, out of which 17 are World Health Surveys, two Demographic Health Surveys, a Multiple Indicator Cluster Survey (MICS), the ENNYS survey of Argentina, the NIDS survey of South Africa, and the ENNVM survey of Morocco. This leaves 82 countries with a survey design representative at the sub-national level. The *second criterion* requires that we only include those countries for the decomposition analysis whose MPI is larger than 0.005 and the incidence of poverty is higher than 1.5 percent. The survey dataset may not have enough observations on the poor for conducting any statistically significant inter-regional analysis otherwise. This eliminates a further eight countries from our analysis, out of which two are DHS, five are MICS, and the PAPFAM survey.

The third criterion prevents computation bias arising from missing and non-response data. One requirement of the MPI computation is that the data for all indicators under consideration must be available from the same survey. The second requirement is that only the intersection of non-missing data for all indicators can be used. In other words, if usable data for a respondent are available for some indicators under consideration and are missing for the rest, then we treat the respondent as having missing data and drop the respondent from the MPI calculations. We assume that a sample drop of more than 15 percent at the national level affects the accuracy of

[14] The report had to explicitly indicate that the sample design allows for representative results at the sub-national level for which MPI decompositions were estimated. In addition, the report also had to provide estimations at this level among the basic tabulates on child mortality rate or a similar indicator.

the estimate and comparability across sub-national estimations. This requirement eliminates three more surveys, out of which one is DHS and two are MICS.[15]

We apply the same rule to sub-national regions but with minor adjustments. Among the remaining countries with less than a 15 percent sample drop, some countries have sub-national regions with more than a 15 percent sample drop. We face a trade-off here. On the one hand, inclusion of these countries could cause the statistics of these sub-national regions to be biased; on the other hand, eliminating these countries would cause a loss of more than a hundred sub-national regions. Therefore, we select two more lenient sub-criteria for the sub-national regions. One is that we definitely eliminate those countries which have at least one region with more than a 25 per cent sample drop, which eliminates four additional countries (three are MICS and the other is the PNDS survey of Brazil). In the second sub-criteria, we conduct a *bias test* for the remaining sub-national regions with sample size between 75 and 85 per cent.

We identify the major cause of the sample reduction in a region and divide the entire sample of that region into two groups based on this major cause. For example, if a majority of the sample has been dropped due to the nutrition and toilet indicators, then the entire sample is divided into two groups: one that contains the sample with missing values of nutrition and toilet indicators and the other that contains the sample with non-missing values of nutrition and toilet indicators. Then we check the headcount ratios of the remaining indicators and the share of urban and rural population across these two groups. If there is systematic and statistically significant (at a 1 percent significance level) difference between the headcount ratios across these two groups, then that region does not satisfy the bias test. If a sub-national region with more than 20 percent of a country's population share (measured by the weighted sample share before sample drop) does not pass the bias test, we exclude the country from our analysis. This excludes one MICS survey only. A few regions of Mauritania and the Dominican Republic did not pass the bias test, but none of these has a population share of more than 9 percent of its country's population. Hence, these countries are retained in our analysis.[16]

[15] The weighted sample shares before and after the treatment of missing samples of some of the sub-national regions in each of these seven countries varied from 8 to 15 percent. Such large disparities may cause a loss of representativeness while computing the sub-national statistics.

[16] The sub-national regions that failed the bias test (apart from the Northern region of Somalia) are Independencia and Pedernales of the Dominican Republic and Hodh El GharbiInchiri of Mauritania.

In the end, 65 survey datasets with 663 sub-national regions satisfy all three selection criteria. Out of these survey datasets 43 are DHS, 21 are MICS, and one is the ENSANUT survey.[17] Out of the surveys, six are from 2011, eight are from 2010, nine are from 2009, six are from 2008, nine are from 2007, fifteen are from 2006, ten are from 2005, one each is from 2004 and 2003.

3. WHERE DO THE WORLD'S POOREST LIVE?

3a. Poor countries: the 'bottom billion' by countries

To start with, we rank the countries by their MPI values, starting with the poorest countries. We find that the poorest one billion people – according to national poverty averages – live in 30 countries.[18] The average MPI of these countries is 0.322. Of these people, 62.4% are from South Asia, 36.4% live in Sub-Saharan Africa and merely 1.2% live in other geographic regions. India alone is home to 55.2% of these people, and has the second highest GNI per capita of the 30 countries after Timor-Leste. If we look across income categories, 65.8% are from lower middle income countries and 34.2% are from low income countries. No upper middle income or high income countries are among the 30 poorest countries (**Error! Reference source not found.**).

However, country aggregates overlook a great deal of variation in poverty levels. For example, if we look inside Tanzania, we find that in the Kilimanjaro region in 2010, 32.4% of people are poor; whereas in the Dodoma region a staggering 87.4%

The population share of the Northern region of Somalia was more than 20 percent and so Somalia was eliminated. The rest of the regions failed the test, but are retained because their weighted sample shares were not large enough. However, caution should be taken when drawing any conclusion based on these sub-national regions.

[17] Countries for which Demographic and Health Surveys has been used are Bangladesh (2007), Benin (2006), Bolivia (2008), Cambodia (2010), Cameroon (2004), Colombia (2010), Cote d'Ivoire (2005), Dominican Republic (2007), Egypt (2008), Ethiopia (2011), Ghana (2008), Guinea (2005), Guyana (2009), Haiti (2006), Honduras (2006), India (2005), Indonesia (2007), Jordan (2009), Kenya (2009), Lesotho (2009), Liberia (2007), Madagascar (2009), Malawi (2010), Mali (2006), Moldova (2005), Mozambique (2009), Namibia (2007), Nepal (2011), Nicaragua (2011), Niger (2006), Nigeria (2008), Pakistan (2007), Philippines (2008), Republic of Congo (2009), Rwanda (2010), Sao Tome and Principe (2009), Senegal (2011), Sierra Leone (2008), Timor Leste (2009), Turkey (2003), Ukraine (2007), Zambia (2007), Zimbabwe (2011). Countries for which Multi-Indicator Cluster Surveys has been used are Belize (2006), Burkina Faso (2010), Burundi (2005), DR Congo (2010), Djibouti (2006), Gambia (2006), Lao (2006), Macedonia (2005), Mauritania (2007), Mongolia (2005), Montenegro (2005), Suriname (2006), Swaziland (2010), Tajikistan (2005), Tanzania (2010), Thailand (2005), Togo (2006), Trinidad and Tobago (2006), Uganda (2011), Uzbekistan (2006), Viet Nam (2011).

[18] Because of country sizes, this method actually identifies 1.19 billion people.

are poor. Compounding this further, poor people in Kilimanjaro are on average deprived in 41% of the dimensions, whereas the average intensity in Dodoma is over 54%.

This first section supports findings of recent studies that shows that the geography of poverty is changing, and increasingly a higher number of the world poor are living in Middle Income Countries (Alkire et al., 2011, 2013; Glassman et al 2011; Sumner 2012; Kanbur and Sumner 2012).

Table 2: Distribution of 'Bottom Billion' in the poorest Sub-national regions

World Region	Number of Countries	Number of Sub-nat. Regions	Total Population		'Bottom Billion' MPI Poor		Average MPI
			Thousands	% of world population	Thousands	% of 'Bottom Billion'	
Total	**44**	**265**	**1,439,539**	**26.9%**	**1,007,293**	**100%**	**0.395**
World Region							
Europe and Central Asia	0	0	-	-	-	-	-
Arab States	2	2	33,384	0.6%	20,204	2.0%	0.348
Latin America and Carib.	4	13	7,290	0.1%	4,898	0.5%	0.363
East Asia and Pacific	3	18	5,672	0.1%	3,466	0.3%	0.335
South Asia	4	19	896,722	16.7%	583,715	57.9%	0.355
Sub-Saharan Africa	31	213	496,471	9.3%	395,009	39.2%	0.472
Income Category							
High Income	0	0	-	-	-	-	-
Upper Middle-Income	2	4	631	0.0%	400	0.04%	0.315
Lower Middle-Income	15	79	924,020	17.2%	620,576	61.6%	0.375
Low Income	27	182	514,887	9.6%	386,318	38.4%	0.431

3b. Poor regions: the 'bottom billion' by sub-national regions

Next, we break down the countries that we can by sub-national regions. A preliminary analysis on national disparities and world's distribution of multidimensional poverty was undertaken in Alkire, Roche and Seth (2011). Here we rank all sub-national regions from poorest to least-poorest according to the MPI.[19] We then identify the one billion people living in the poorest subnational regions. Our results change

[19] We were not able to decompose three countries (Yemen, Somalia and Chad) at the sub-national level, but included them in the sub-national 'Bottom Billion' analysis as their poverty levels were high and each had less than 25 million people, making them smaller than a number of sub-national regions we did use.

significantly (See table 3). Now, we find that the one billion people living in poorest subnational regions are distributed across 265 sub-national regions from 44 countries, including the thirty countries identified by the previous method. Only 2.8% of these one billion people are from outside South Asia and Sub Saharan Africa (**Error! Reference source not found.**). On average, the MPI of these poorest regions is 0.395. Nationally, the average MPIs in Sub Saharan Africa and in Low Income regions are much higher than this average. Subnational decompositions are tremendously useful as they clearly reveal the existing disparity in poverty within countries and show the need for varied policies within a country. Decomposition by other subgroups of population (rural-urban, ethnicity, etc) is possible and could add even further insights.

Yet even looking at poverty at the sub-national region conceals inequality across the poor within that subnational region. It is highly unlikely that all poor people in a sub-national region would share the average intensity of poverty of that region. Therefore, we go one step further, by looking at the poverty profiles of individuals from every survey household across our 104 countries in order to identify where the poorest billion people live.

Table 3. Distribution of 'Bottom Billion' in the poorest countries by World Region and Income Category

World Region	**Number of Countries**	**Total Population**		**'Bottom Billion' MPI Poor**		**Average MPI**
		Thousands	% of World Population	Thousands	% of 'Bottom Billion'	
Total	**30**	**2,020,720**	**37.7%**	**1,192,272**	**100%**	**0.322**
World Region						
Europe and Central Asia	0	-	-	-	-	-
Arab States	1	9,331	0.2%	7,573	0.6%	0.514
Latin America and Caribbean	1	9,993	0.2%	5,641	0.5%	0.299
East Asia and Pacific	1	1,124	0.0%	765	0.1%	0.360
South Asia	2	1,373,306	25.6%	744,174	62.4%	0.284
Sub-Saharan Africa	25	626,966	11.7%	434,119	36.4%	0.401
Income Category						
High Income	0	-	-	-	-	-
Upper Middle-Income	0	-	-	-	-	-
Lower Middle-Income	7	1,449,021	27.0%	784,871	65.8%	0.289
Low Income	23	571,699	10.7%	407,401	34.2%	0.405

3c. Poor people: the 'bottom billion' by individual poverty profiles.

Finally, we rank the population in all of the 104 country surveys according to the intensity of their poverty profile. This is solely the deprivation score c_i for any person i.[20] That is, we start by taking the people in all 104 countries who are deprived in all ten indicators (or deprivation score of $c_i = 1$). The total number of people deprived in all ten indicators is 17 million people (of whom 4 million live in each of Ethiopia and India). We then add people with deprivation score of $c_i = 0.95$, and so on until we have identified the poorest 'Bottom Billion' people (those deprived in 44.44% or more of the indicators or $c_i \geq 0.4444$). This method is the most precise at the individual level and also puts an emphasis on poor people rather than poor countries or poor regions[21].

When we identify the poorest one billion people based on the intensity of their multiple deprivations the corresponding poverty cut-off that identifies the 'Bottom Billion' poor is 44.4 percent of weighted deprivations.[22] Surprisingly, the poorest billion people are distributed across 100 countries. Among these, 51.6% reside in South Asia, 32.7% reside in Sub-Saharan Africa, 12.3% reside in East Asia and Pacific. India and China are home to the largest numbers of 'Bottom Billion' poor: nearly 40% of the 'Bottom Billion' poor reside in India. Alongside the number of 'Bottom Billion' poor in a country, we can see the average intensity of deprivation, which varies. What these results show is that there is a considerable number of people with a high intensity poverty profile in a rather large number of countries.

Also, surprisingly, 9.5% of the 'Bottom Billion' poor people reside in upper middle income countries, and 41,000 of the poorest 'Bottom Billion' live in five high income countries (Table 4). Only four out of 104 countries have zero 'Bottom Billion' poor people: Belarus, Hungary, Slovenia, and Slovakia.

[20] Using household surveys, we actually rank weighted respondents.
[21] The trade off is that now we can only report the number of people and intensity of their poverty, not the percentage of poor people hence not the MPI.
[22] Thus each person in the 'Bottom Billion' is deprived in *at least* one health or education indicator and five standard of living indicators, or two health and education indicators and two standard of living indicators. Note that the poverty cut-off of 44 percent in fact identifies 1.13 billion people instead of precisely 1 billion people because 264 million people across 100 countries share exactly the same deprivation score of 44.4 percent!

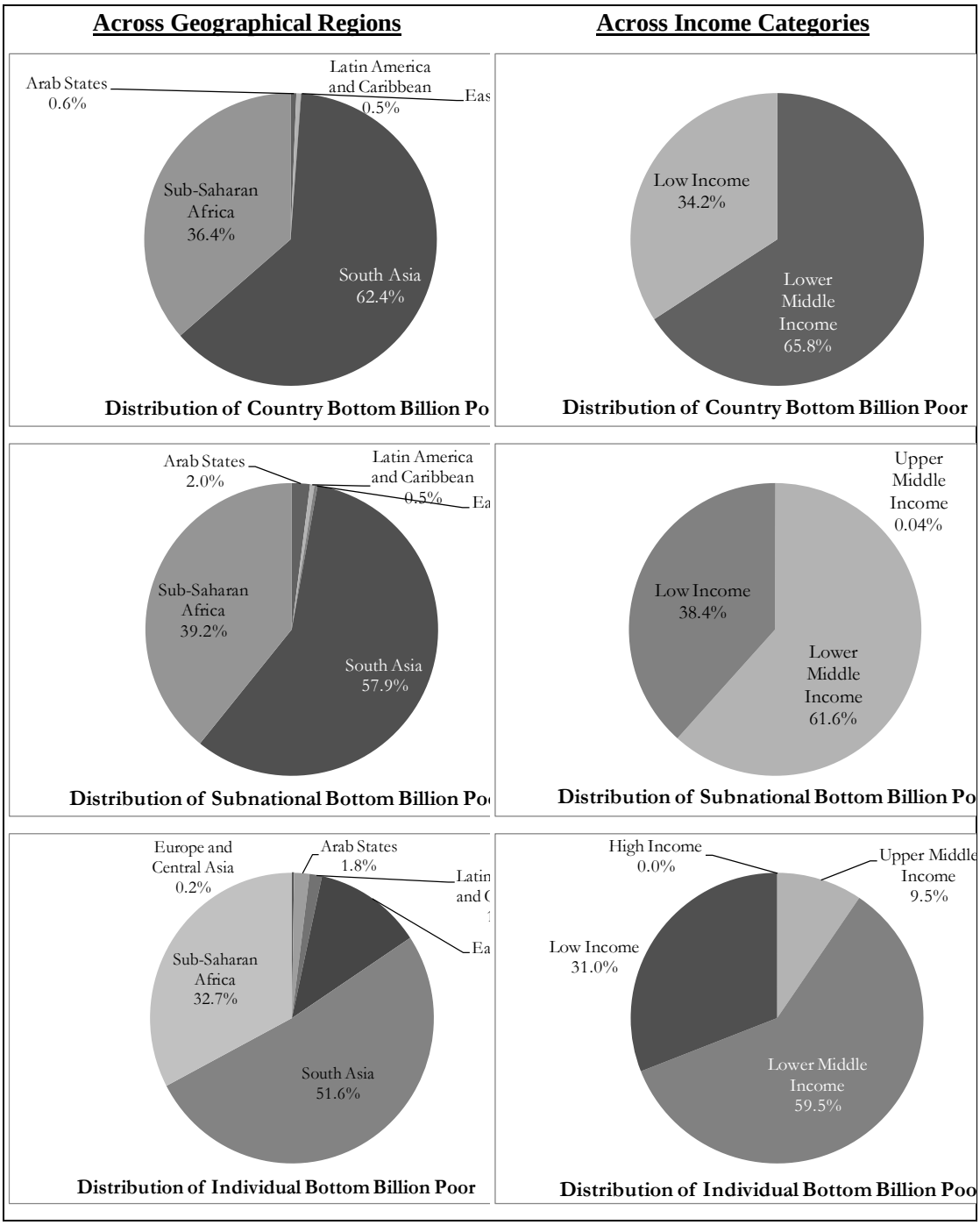
Table 4: Distribution of 'Bottom Billion' according to individual poverty profile

World Region	Number of Countries	'Bottom Billion' MPI Poor	
		Thousands	% of 'Bottom Billion'
Total	**100**	**1,133,060**	**100%**
World Region			
Europe and Central Asia	20	2,715	0.24%
Arab States	11	19,946	1.76%
Latin America and Caribbean	18	16,103	1.42%
East Asia and Pacific	10	139,293	12.29%
South Asia	7	584,519	51.59%
Sub-Saharan Africa	34	370,483	32.70%
Income Category			
High Income	5	41	0.00%
Upper Middle-Income	25	107,161	9.46%
Lower Middle-Income	41	674,708	59.55%
Low Income	29	351,150	30.99%

3d. Comparison of approaches

In sum, the answer to the question 'where do the poorest live?' depends on whether we identify the 'Bottom Billion' living in poorest countries, the 'Bottom Billion' living in poorest sub-national regions or the 'Bottom Billion' by individual poverty profiles (See figures 1-6). If we consider national poverty averages, the 'Bottom Billion' live in 30 poorest countries. If we disaggregate national poverty at sub-national levels, we find that the 'Bottom Billion' live in 265 subnational regions across 44 countries. Finally, when we consider the intensity of poverty experienced by each poor person, we find that the billion poorest people are actually distributed across 100 countries, including high income countries. This analysis shows the importance of creating global poverty estimates that can be disaggregated in different ways to show disparities across groups and inequalities among the poor.

Figures 1-6. Distribution of 'Bottom Billion' Poverty by Different Approaches



4. CONCLUDING DISCUSSION

What can we conclude from the discussion? From the perspective of debates about post-2015 development goals, across all analyses, some consistent findings emerge. First, South Asia has the largest contribution to world poverty as it is home to 52-62 per cent of the 'Bottom Billion' by various estimates. Even when the 'Bottom Billion' are identified most precisely, using individual poverty profiles, India is home to 40% of the world's poorest billion people. India is followed by Africa, with 33-39 per cent of the 'Bottom Billion'. Second, we find that most of the *poorest* billion people live in Middle Income Countries (MICs). This is an important finding as to some donors the crossing of the arbitrary thresholds is sufficient reason to question aid to a country and focus solely on Low Income Countries (LICs), that are home to between 31-38 per cent of the 'Bottom Billion'.

All of which points towards how poverty measures enable us to identify who is poor, how poor they are, and thus to some considerable extent what policies will most effectively eradicate their poverty. The three-method calculations of the 'Bottom Billion' show the importance of having poverty measures that can be disaggregated. It also demonstrated the flexibility of the MPI methodology. Because MPI is a direct measure of poverty and is not mediated by prices or other location-specific markers, in essence we can dissolve national boundaries, and undertake direct comparisons using people's deprivation profiles. One should not forget this exercise remains constrained by the incomparabilities across the datasets in terms of indicator and variable definition. These are particularly acute for the World Health Survey MPI estimates, and for countries lacking indicators.[23] Naturally, the accuracy of the MPI will also vary in different contexts; however it provides a starting point for undertaking such comparisons, and can be improved as data improve. For targeting or policy it can be useful also to consider MPI at different levels of geographic or social disaggregation, and these are also easily computed and analysed which is of direct relevance to post-2015 discussions.

[23] See discussion in Alkire and Santos (2010), Alkire *et al* (2011, 2013).

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