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UNIVERSITY OF OXFORD

Case Studies:
The International MPI

Maria Emma Santos & Jose Manuel Roche

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How much do we know?

- What is the MPI?
- What is the difference between MPI & AF methodology?
- What is the purpose of the MPI? Did it replace any previous poverty measure?
- What data does it use?
- What indicators/dimensions does it include?
- What type of anaysis does it allow to undertake?
- Can you recall the main finding highlights?

Multidimensional Poverty Index (MPI)

Alkire & Santos 2010, 2013
Alkire, Roche, Santos & Seth 2011
Alkire, Conconi & Roche 2013
Alkire, Roche & Sumner 2013

What is the MPI?

- The MPI is an internationally comparable index of poverty for 100+ developing countries.
- It was launched in 2010 in the *Human Development Report*, and updated in 2011
- The MPI methodology is being adapted for national poverty measures – using better indicators for that policy context.
- The MPI stands on the shoulders of past measures, such as the HPI.

OPHI – MPI Team 2013

OPHI Research Team: Sabina Alkire (Director), James Foster (Research Fellow), John Hammock (Co-Founder and Research Associate), José Manuel Roche (coordination MPI 2011-13), Maria Emma Santos (coordination MPI 2010), Adriana Conconi, Suman Seth, Paola Ballon, Gaston Yalonetzky, Diego Zavaleta, Mauricio Apablaza.

Data analysts and MPI calculation since 2011: Akmal Abdurazakov, Cecilia Calderon, Iván Gonzalez De Alba, Usha Kanagaratnam, Gisela Robles Aguilar, Juan Pablo Ocampo Sheen, Christian Oldiges and Ana Vaz.

Special contributions: Adriana Conconi (computation MPI 2013), Heidi Fletcher (preparation of the maps), Esther Kwan and Garima Sahai (research assistance and preparation of graphs), Christian Oldiges (research assistance for regional decomposition and standard error), John Hammock (new Ground Reality Check field material), Yadira Diaz (helping in map preparation).

Communication Team: Paddy Coulter (Director of Communications), Emmy Feeny (Research Communications Officer), Heidi Fletcher (Web Manager), Moizza B Sarwar (Research Communications Assistant), and Cameron Thibos (Design Assistant).

Administrative Support: Tery van Taack (OPHI Project coordinator), Laura O'Mahony (OPHI Project Assistant)

OPHI prepare the MPI for publication in the UNDP *Human Development Report* and we are grateful to our colleagues in HDRO for their support.

Multidimensional Poverty Index (MPI)

- acute poverty in developing countries -

1. The MPI Methodology
2. Where the poor live
3. Disparities
4. Changes over Time
5. Bottom Billion
6. Conclusions

MPI METHODOLOGY

1. Data: Surveys (MPI 2013)

Demographic & Health Surveys *(DHS - 51)*
Multiple Indicator Cluster Surveys *(MICS - 30)*
World Health Survey *(WHS – 17)*

Additionally we used 6 special surveys covering urban Argentina (ENNyS), Brazil (PNDS), Mexico (ENSANUT), Morocco (ENNVM), Occupied Palestinian Territory (PAPFAM), and South Africa (NIDS)

Constraints: Data are 2002-2011. Not all have precisely the same indicators.

Data constraints

The MPI is deeply affected by the lack of **comparable** data.

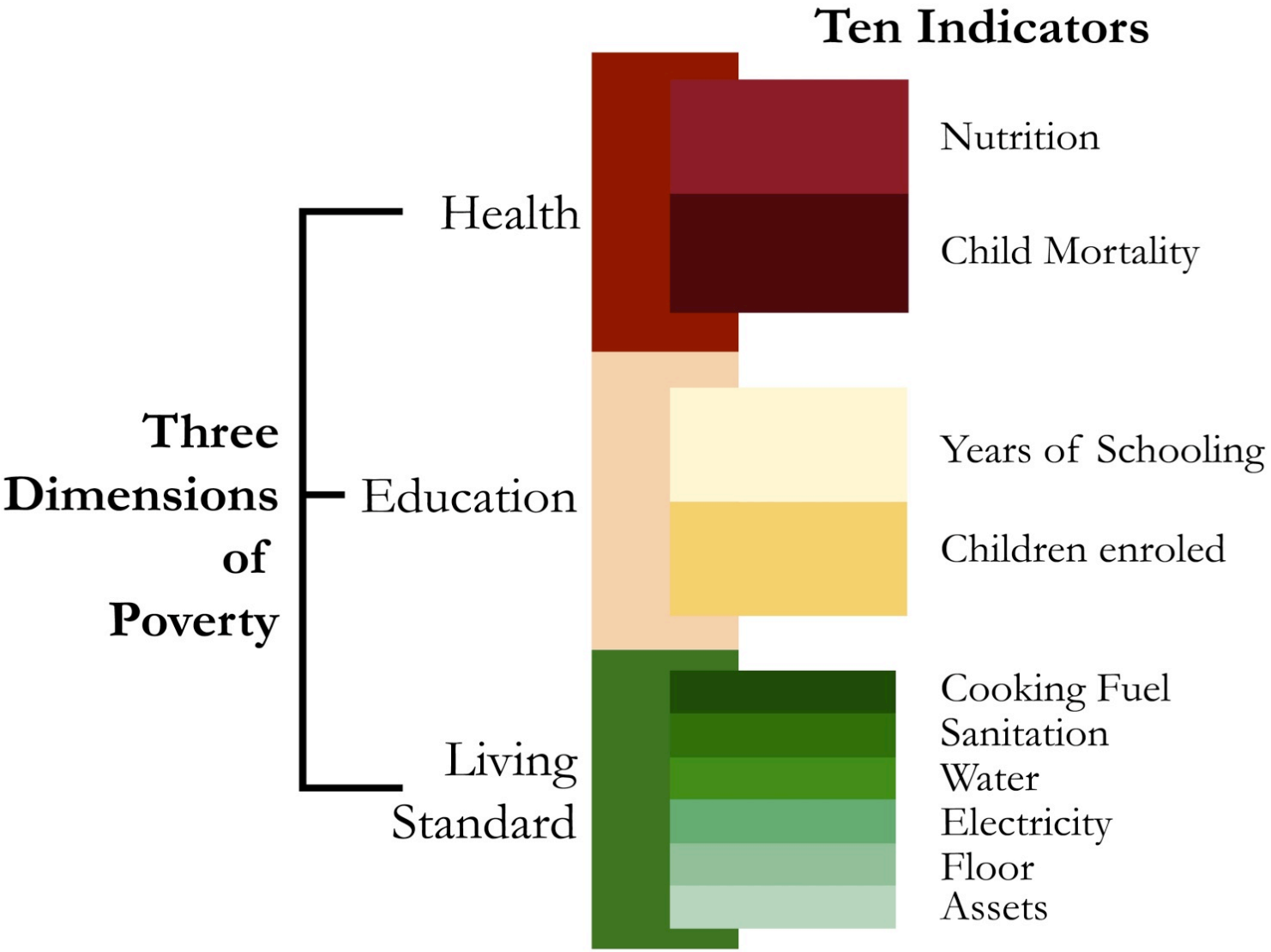
- Key **indicators** are not collected (stock, quality)
- Data for some dimensions are **missing** for 100+ countries
- **Missing values** lead to sample size reduction/biases
- **Respondent(s)** vary; individual level data is sparse
- Surveys **updated** every 3-5 years, and in different **years**
- Data exclude certain populations (elders, institutionalized)
- **Income/consumption** surveys lack MPI health indicators.

These can be addressed at a national level for national measures.

"**Improving data gathering and its quality in all countries should be a central focus ...**"

Bourguignon *et al.* 2008 page 6

Dimensions and Indicators of MPI



Dimensions Indicators, Weights, Cutoffs

Dimension (Weight)	Indicator (Weight)	Deprivation Cut-off
Health (1/3)	Nutrition (1/6)	*Any adult or child in the household with nutritional information is undernourished*[1]
	Child mortality (1/6)	*Any child has died in the household*[2]
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*[3]
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*

MPI Indicators are connected to the MDGs

- **Health**
  - Nutrition MDG 1 (Eradicate Extreme Poverty and Hunger)
  - Mortality MDG 4 (Reduce Child Mortality)
- **Education**
  - Attendance to school and Years of Education MDG 2 (Achieve Universal Primary Education)
- **Standard of Living**
  - Electricity *not MDG*
  - Cooking Fuel MDG 7
  - Sanitation MDG 7 (Ensure Environmental Sustainability)
  - Drinking Water MDG 7
  - Floor *not MDG*
  - Assets MDG 1
  - ***MDG omissions: gender, infectious disease, income, maternal mortality, environment, tenure***

MPI Indicators are connected to the MDGs

Note that...

- Departing from the MDG indicators, the MPI indicators use the **same base population**: the total population.
- The **household** is the **unit of analysis to identify the poor** so that everyone living in a household which has been identified as poor, is considered poor.
- This assumes shared Thus, the MPI uses any available information on all members of each household in order to identify all household members as poor or not. This allows for interaction, smoothing, and mutual sharing within the household, and can create policy efficiencies.
- Our estimates are reported in terms of people (not hh).

Example of data constraints (MPI 2011)

Examples of the constraints (109 countries):
66 countries have all 10 indicators;
101 have 9 or 10 indicators (35 lack one indicator)
107 have 8-10 indicators (6 lack two indicators)
2 countries lack three indicators (Latvia and Myanmar)

Biases from sample size reduction:
13 countries are lower or upper bound estimates of poverty.
These include China & Morocco (lower bound).

Pakistan is also a lower bound due to lack of nutrition.

Weights and deprivation cutoffs

"the interpretation of the set of indicators is greatly eased where the individual components have degrees of importance that, while not necessarily exactly equal, are not grossly different."

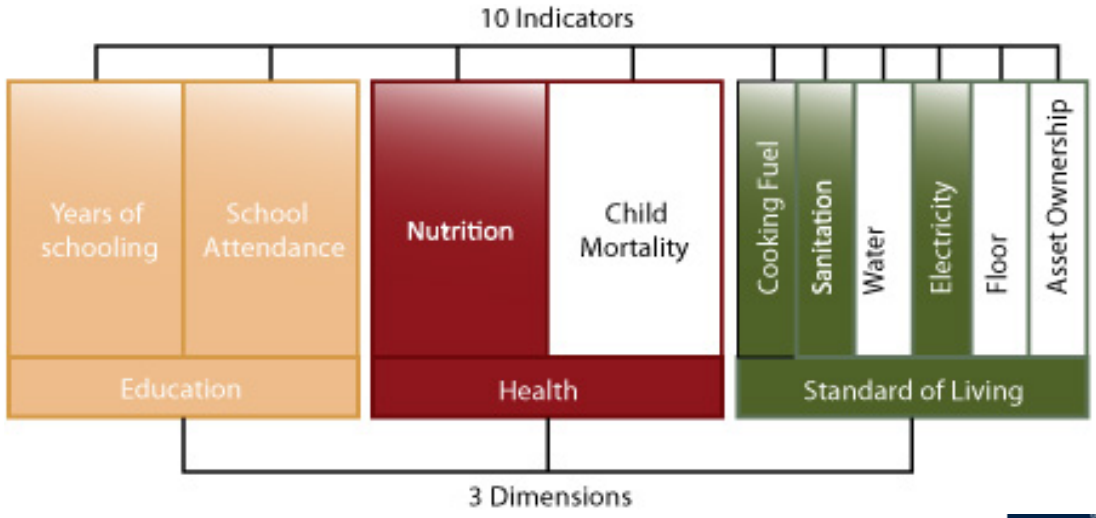
Atkinson, Cantillon, Marlier and Nolan 2002, p 25.

Robustness test to alternative cutoffs and weights were performed during the analysis

Identification: Who is poor?

People are multidimensionally poor if they are deprived in 33% of the dimensions.

Phuba's deprivation score (c_i/d):
3*(1/6)+3*(1/18)=
(9+3)/18=12/18=67% >33%, then
POOR

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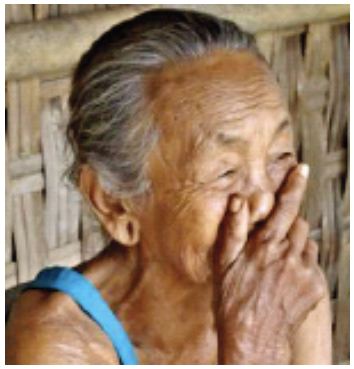
Others' Stories



Methodology: MPI

- MPI has the structure of the M0 measure.

- It is one possible application of M0, with a particular selection of dimensions, indicators, cutoffs and weights.

Methodology: MPI $g_0(k)$ matrix

Adjusted Headcount Ratio = M_0 = HA = **.442**

k=33% (have MPI for all k values)

$$g^0(k) = \begin{array}{c} \text{Indicators} \\ \left[\begin{array}{cccccccccc} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1.67 & 1.67 & 1.67 & 1.67 & .55 & 0 & 0 & 0 & 0 & .55 \\ 0 & 1.67 & 0 & 1.67 & .55 & 0 & .55 & .55 & .55 & 0 \\ 0 & 0 & 0 & 1.67 & .55 & .55 & .55 & 0 & .55 & .55 \end{array}\right] \end{array} \begin{array}{cc} c(k) & c(k)/d \\ 0 & 0 \\ 7.76 & .776 \\ 5.53 & .553 \\ 4.42 & .442 \end{array}$$

H = headcount = ¾ = **75%**

A = average deprivation share among poor =

(0.776+0.553+0.442)/3=0.59 = 59%

M0= HA = **.442**

How do you calculate the MPI?

- The MPI uses the Alkire Foster method:

Formula: MPI = $M_0 = H \times A$

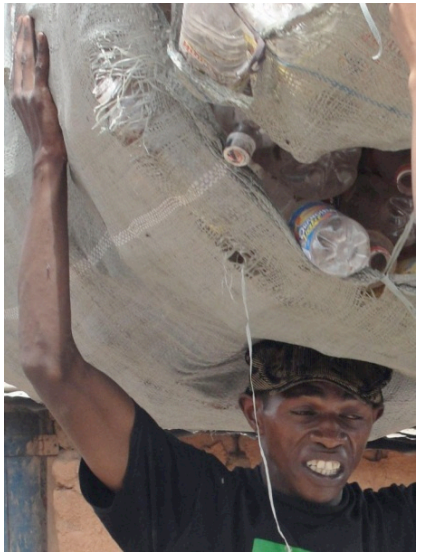
- H is the percent of people who are identified as poor, it shows the *incidence* of multidimensional poverty.
- A is the average proportion of weighted deprivations people suffer at the same time. It shows the *intensity* of people's poverty – the *joint distribution* of their deprivations.

Note that...

- The MPI (which uses M_0) is appropriate for ordinal data, and satisfies properties like subgroup consistency, dimensional monotonicity, poverty & deprivation focus.

- MPI is like the poverty gap measure – but looks at breadth instead – what batters a person at the same time.

What is new?
Intensity (A)!



The MPI starts with each person, and constructs a deprivation profile for each person.

Some people are identified as poor based on their joint deprivations. The others are identified as non-poor.

- Most multidimensional poverty measures like HPI look at deprivations **one by one**, not at the household level.
- Counting measures do look at coupled deprivations (at the identification step) but **only** provide a **headcount**, giving no incentive to target those who are deprived in most things at the same time or to reduce intensity.

The MPI: High Resolution

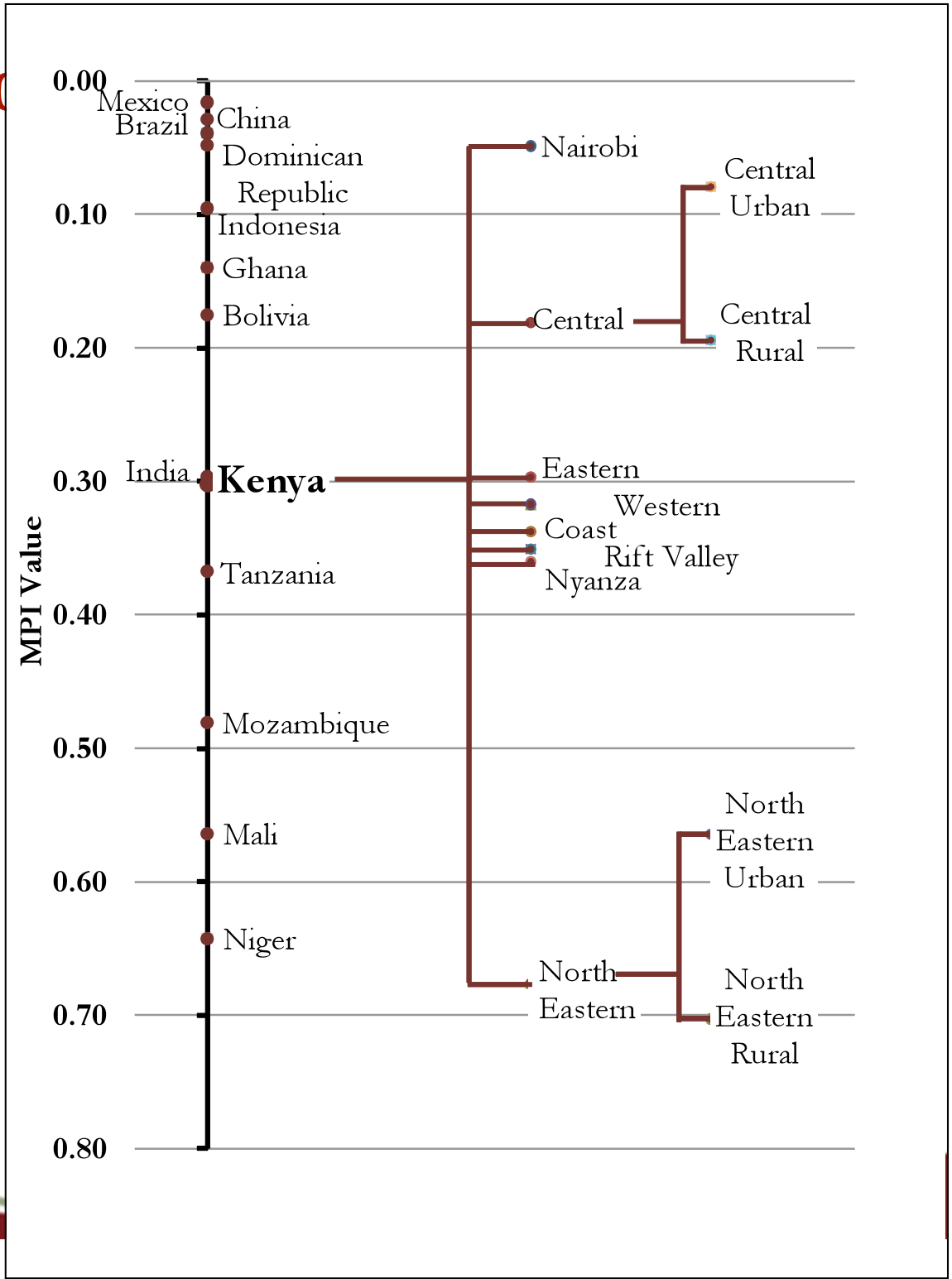
The MPI can be broken down in different ways:

1. By Headcount – to show *how many* are poor
2. By Dimension – to show *how* people are poor
3. By Intensity – to show *who* has greatest intensity
4. By Sub-group – to show how groups vary (in headcount, intensity, and composition)

In fact, it is the MPI *Plus* a dashboard (a set) of consistent subindices that unpack the AF analysis and supply powerful analysis.

Some impo
Subgroup

- *The national MPI value can be 'decomposed' by age, gender, region, ethnicity, rural/urban etc.*



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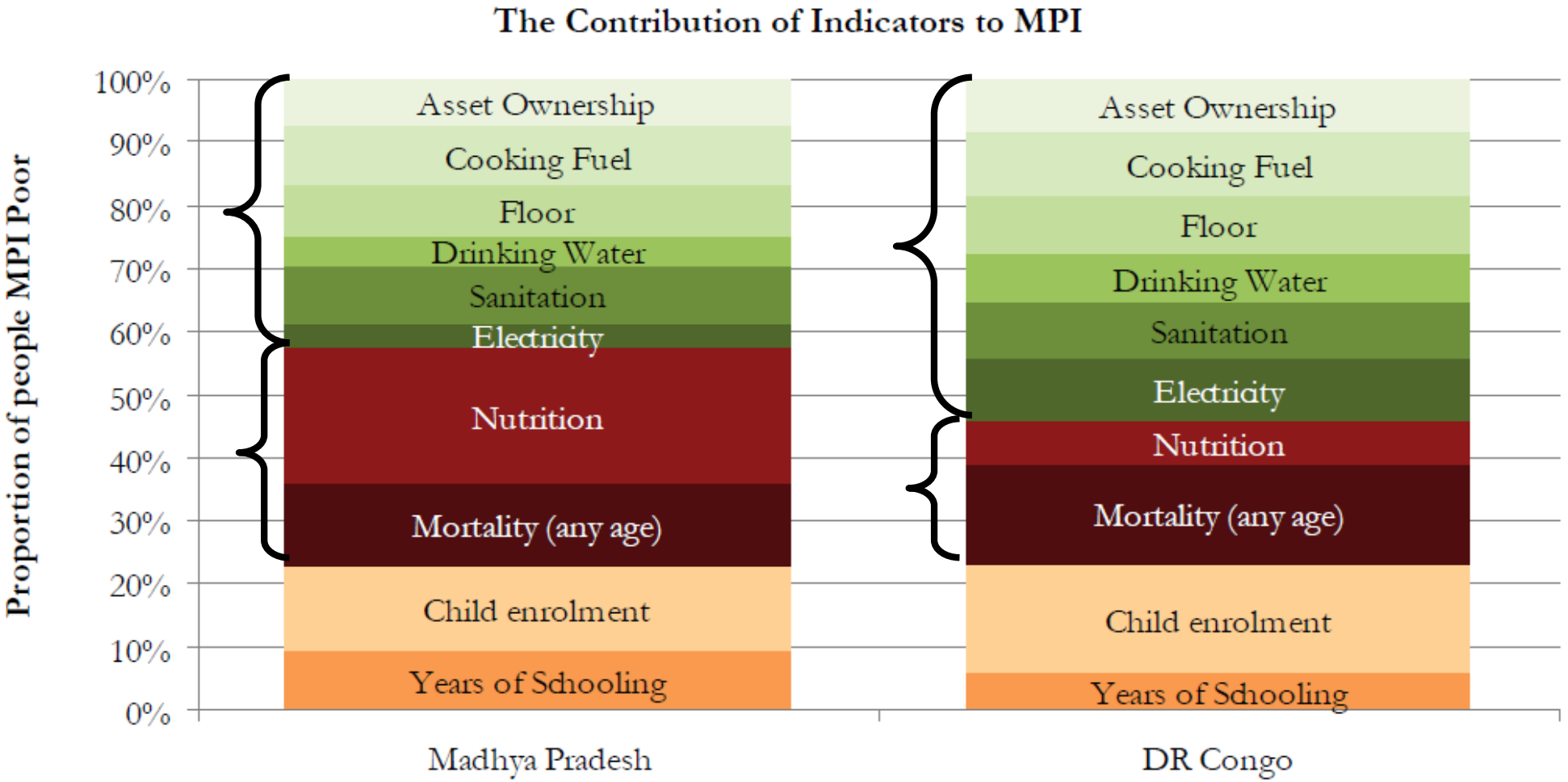
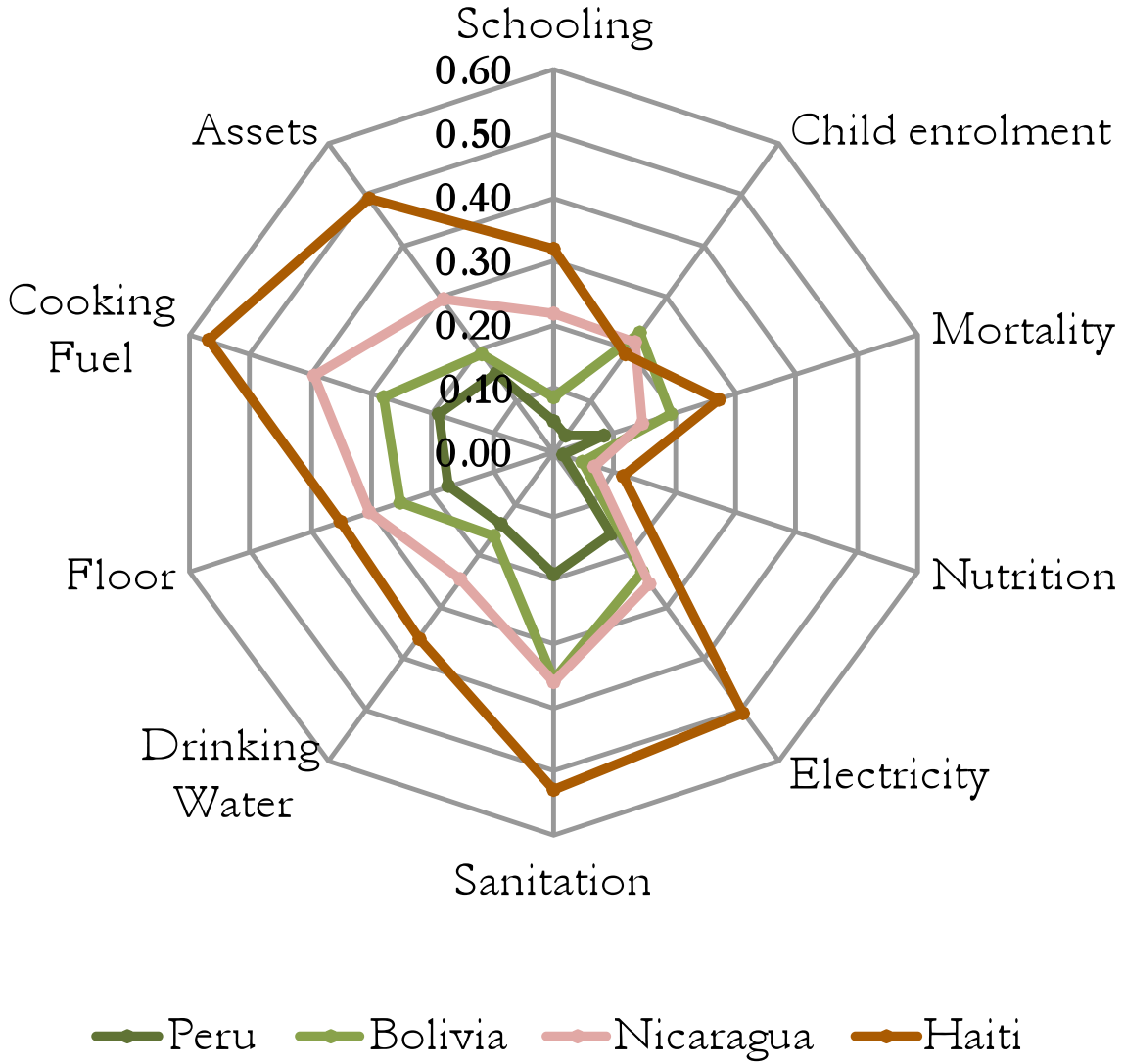
Comparisons

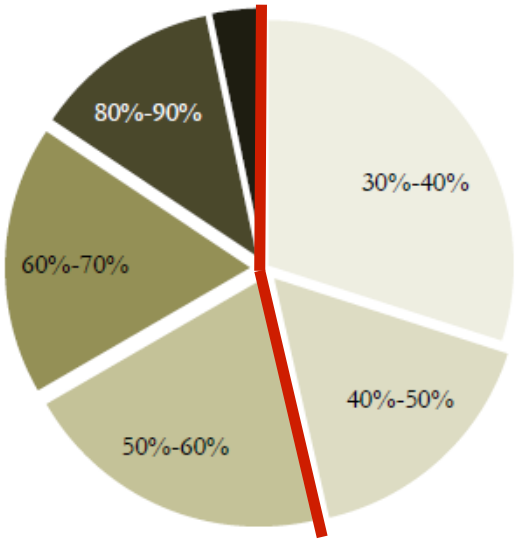
	Madhya Pradesh, India	DR Congo
Population 2007	70M	63M
MPI	0.39	0.39
MPI Headcount	69.5%	**73.2%**
Avg Intensity	**56%**	53.7%

Some important properties:
Dimensional Break-down
Composition of Poverty: key for policy

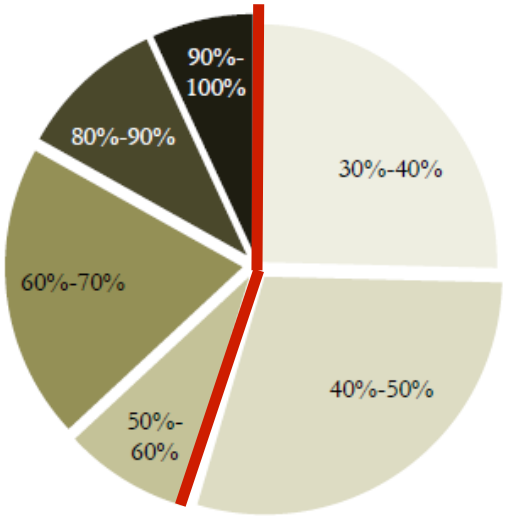



Schooling
Child enrolment
Mortality
Nutrition
Electricity
Sanitation
Drinking Water
Floor
Cooking Fuel
Assets
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Peru
Bolivia
Nicaragua
Haiti

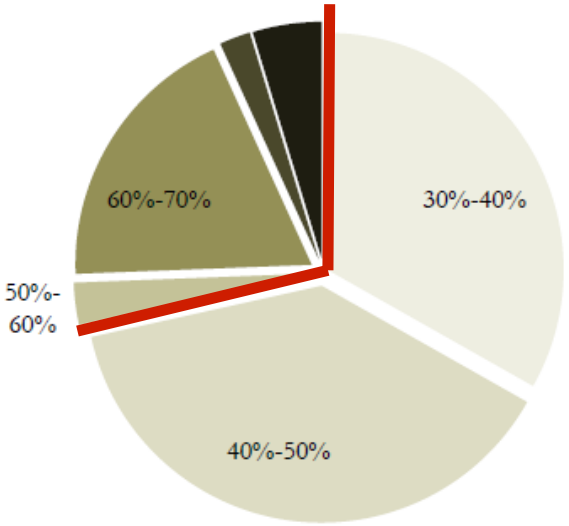
Break down of intensity



Intensity of Deprivation Among MPI Poor



Intensity of Deprivation Among MPI P



F. Intensity of Deprivation Among MPI Poor

	India	Cameroon	Kenya
MPI =	0.296	0.299	0.302
A =	53.5%	54.7%	50%

WHERE THE POOR LIVE

104 Developing Countries:

~ 29 **Low Income Countries**, (681M), 86%

~ 67 **Middle Income Countries**, (4634), 93%:

- ~ 42 **Lower Middle Income** (2433M) 98%
- ~ 28 **Upper Middle Income** (2201M) 89%

~ 8 **High Income Countries** (43M), of which:

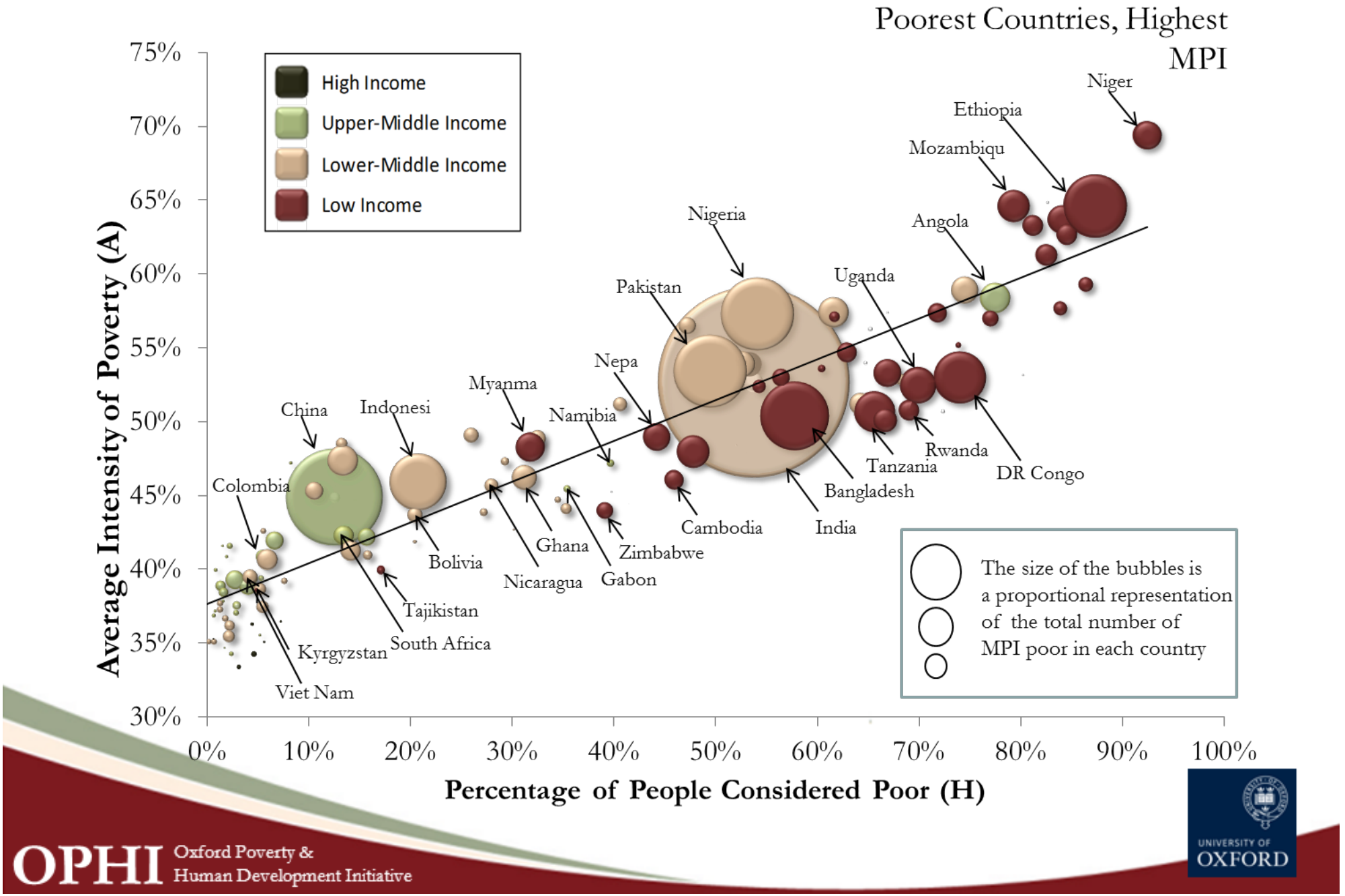
- ~ 5 **OECD** (29M)
- ~ 3 **non-OECD** (13M)

Total Population: 5.4 Billion people

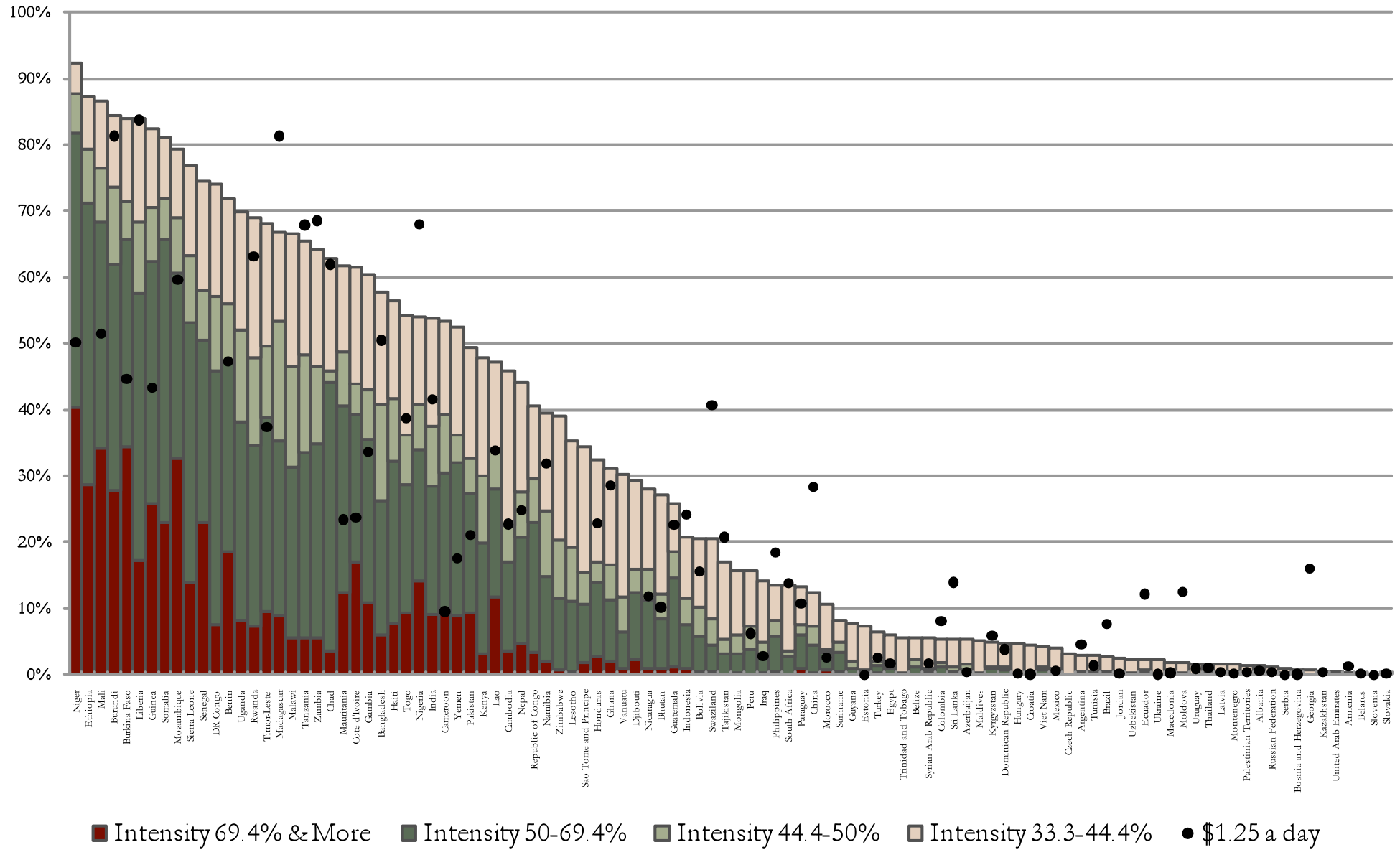
Which is 78% of the world's population

(population figures from 2010; data from 2002-2011).

MPI varies greatly within income categories

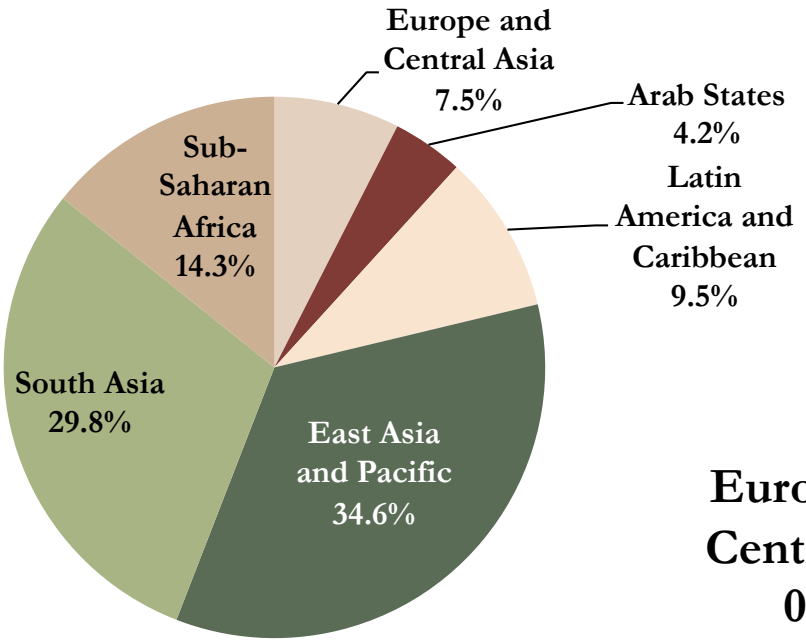


Comparing the Headcount Ratios of MPI Poor and $1.25/day Poor

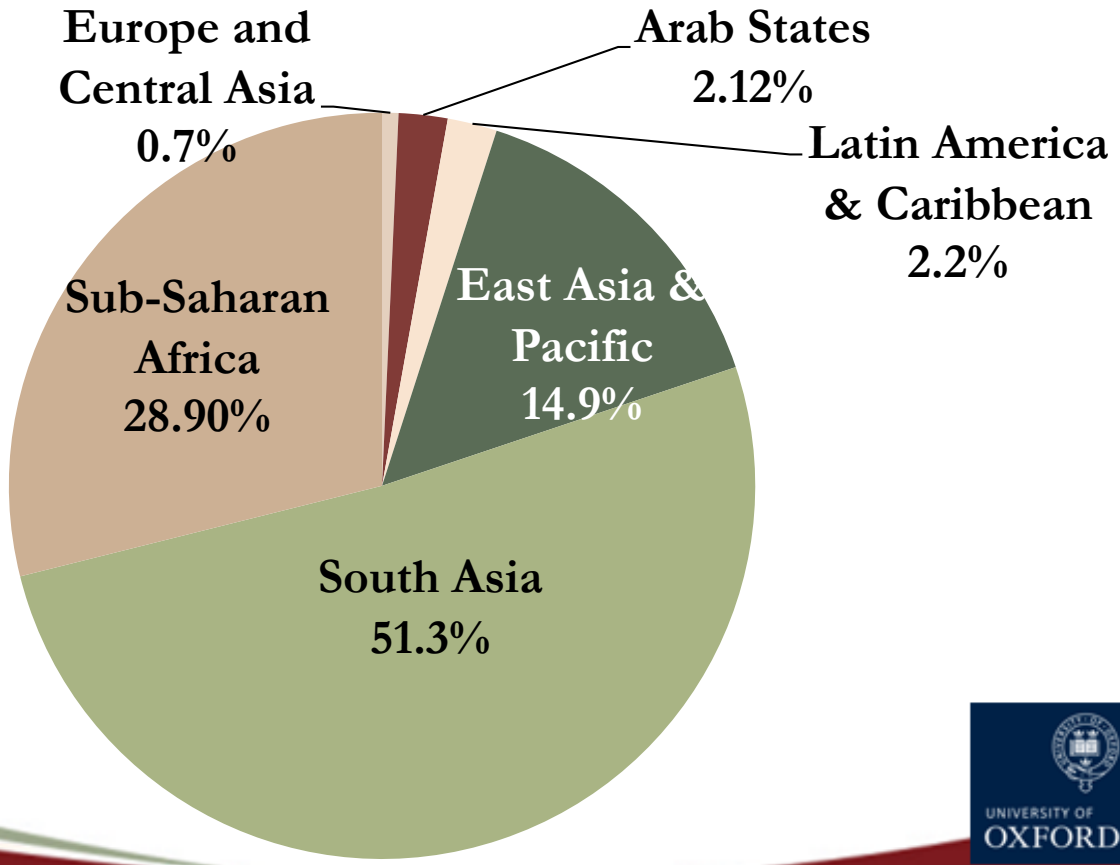


Half of the world's MPI people live in South Asia, and 29% in Sub-Saharan Africa

Total Population in 104 MPI countries



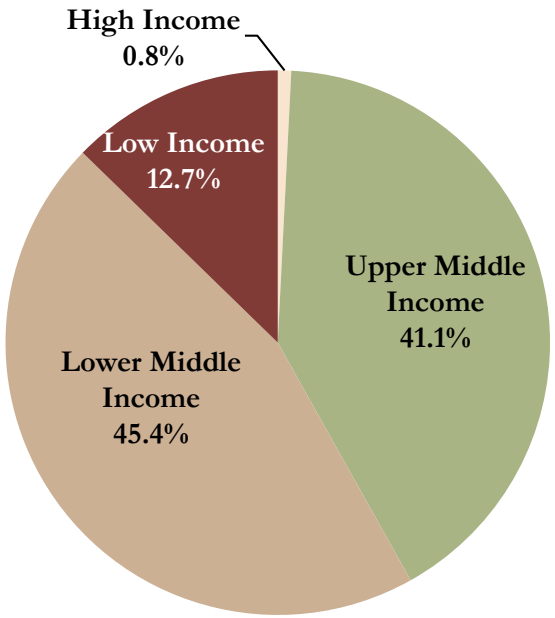
MPI poor people by region



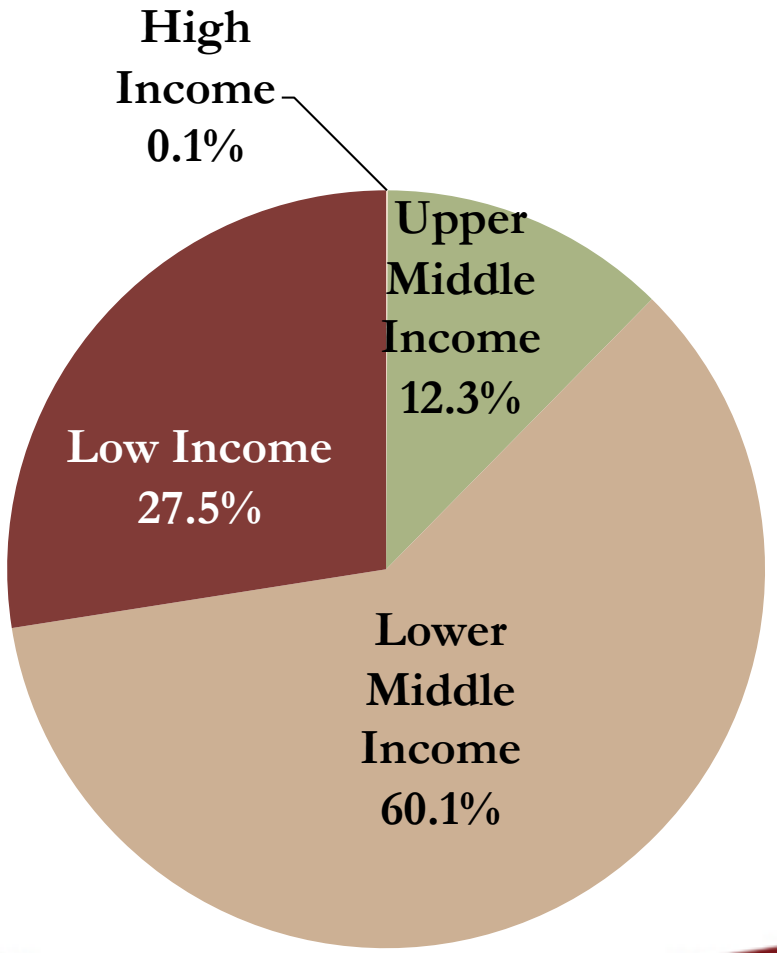
Most poor people live in middle-income countries.

72% of MPI poor people live in Middle Income Countries

Total Population by Income Category



MPI Poor Population



2010 Population Data

Bottom Billion: Beyond National Averages

(Alkire, Roche & Seth 2013)

Where do the bottom billion poor live?

- The majority of the world's poor live in countries officially classified by the World Bank as middle-income countries. (Chandy & Gertz, 2011; Glasman, Duran, & Sumner, 2011; Kanbur & Sumner, 2011; A Sumner, 2010; A. Sumner, 2012a).
- Multidimensional poverty analysis (Alkire, Roche and Sumner 2013).
- Most analyses remain at the country level – another approach is also possible by focusing on the poorest regions or the poorest people (Alkire, Roche, Seth 2013)

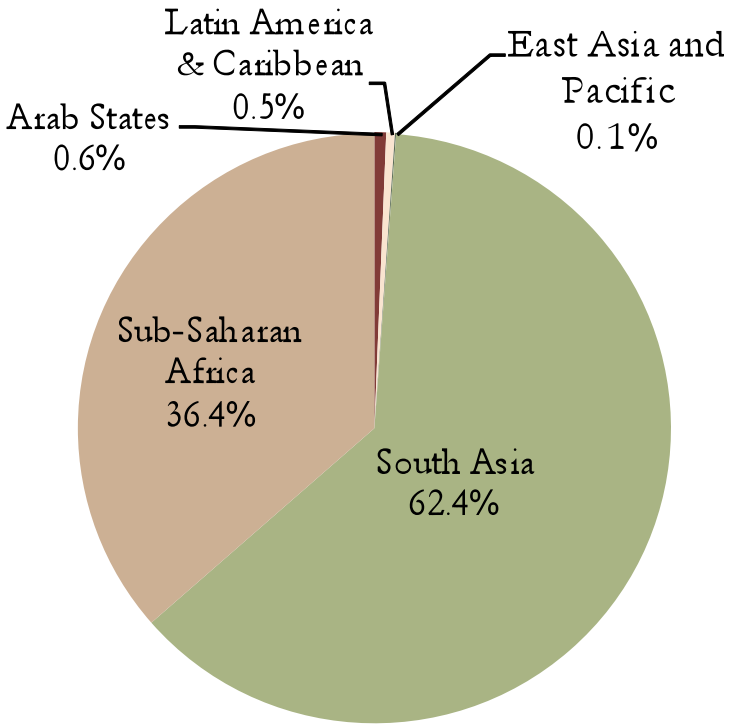
How to Identify the Poorest One

By poor living in poorest countries

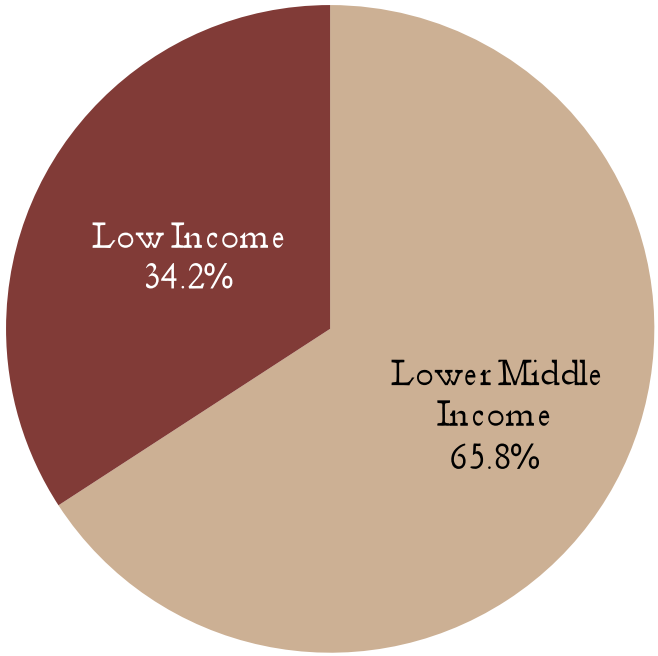
By poor living in poorest sub-national regions

By poor with largest intensity

Poorest Billion in Poorest Countries



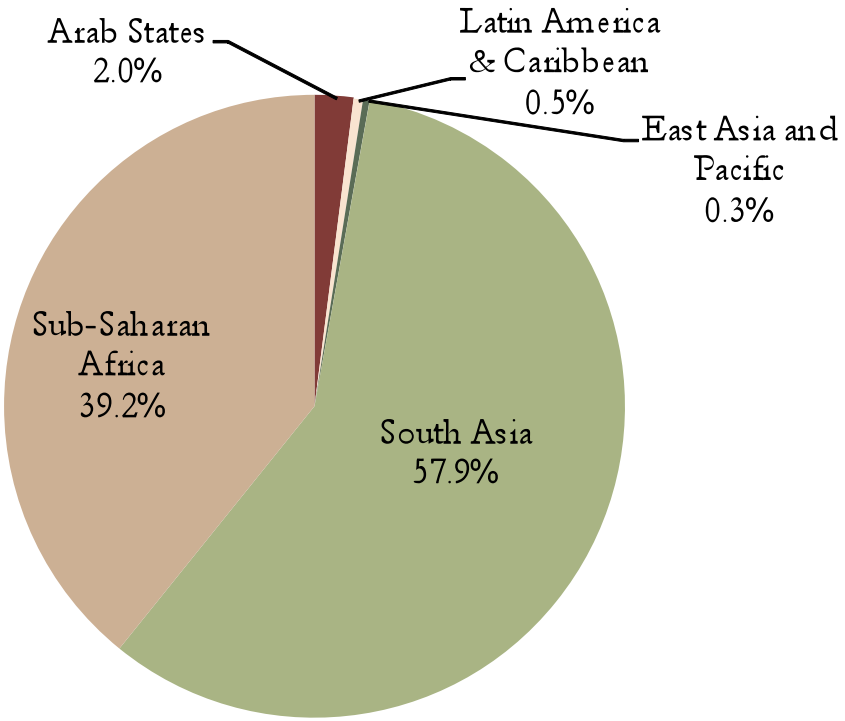
Distribution of Bottom Billion Poor across 30 Countries by Geographical Regions



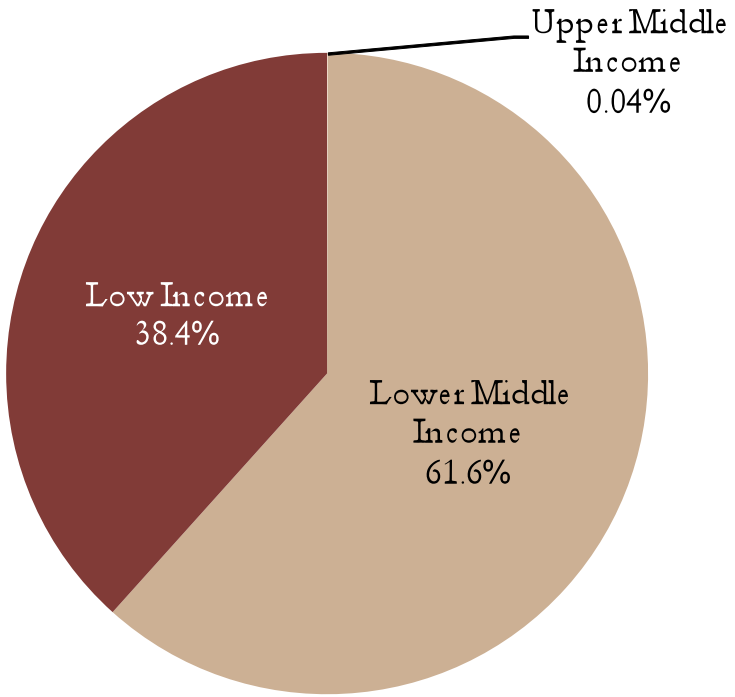
Distribution of Bottom Billion Poor across 30 countries by Income Categories

All countries fall in low or lower-middle income category

Poorest Billion in Poorest Sub-national Regions



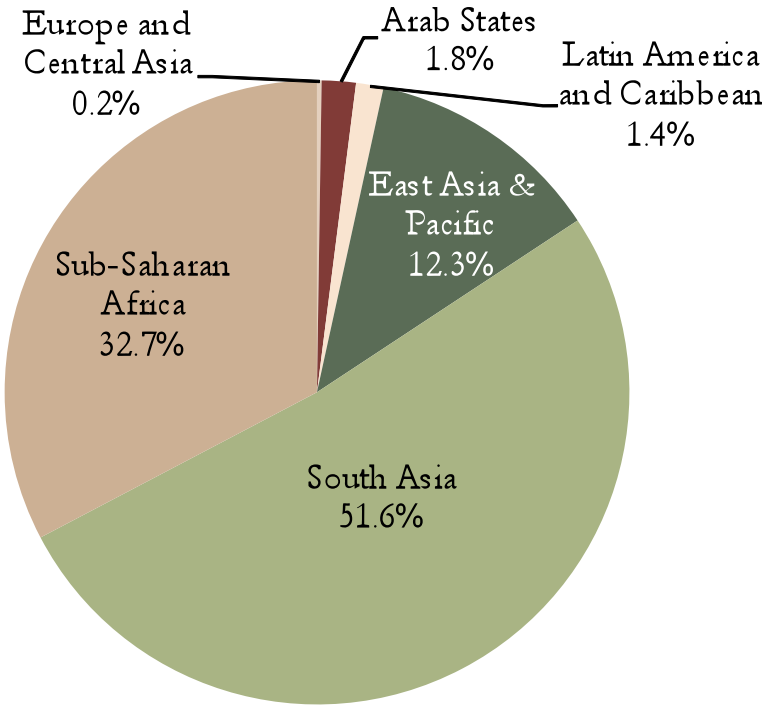
Distribution of Subnational Bottom Billion Poor across Geographical Regions



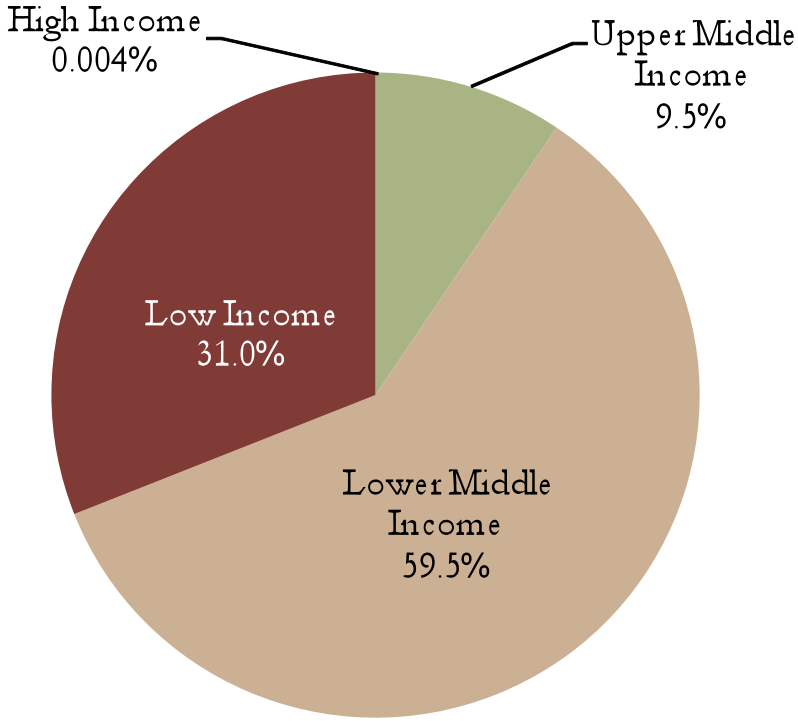
Distribution of Subnational Bottom Billion Poor across Income Categories

Some sub-national regions are in upper-middle income countries

Poorest Billion by Individual Poverty Profiles



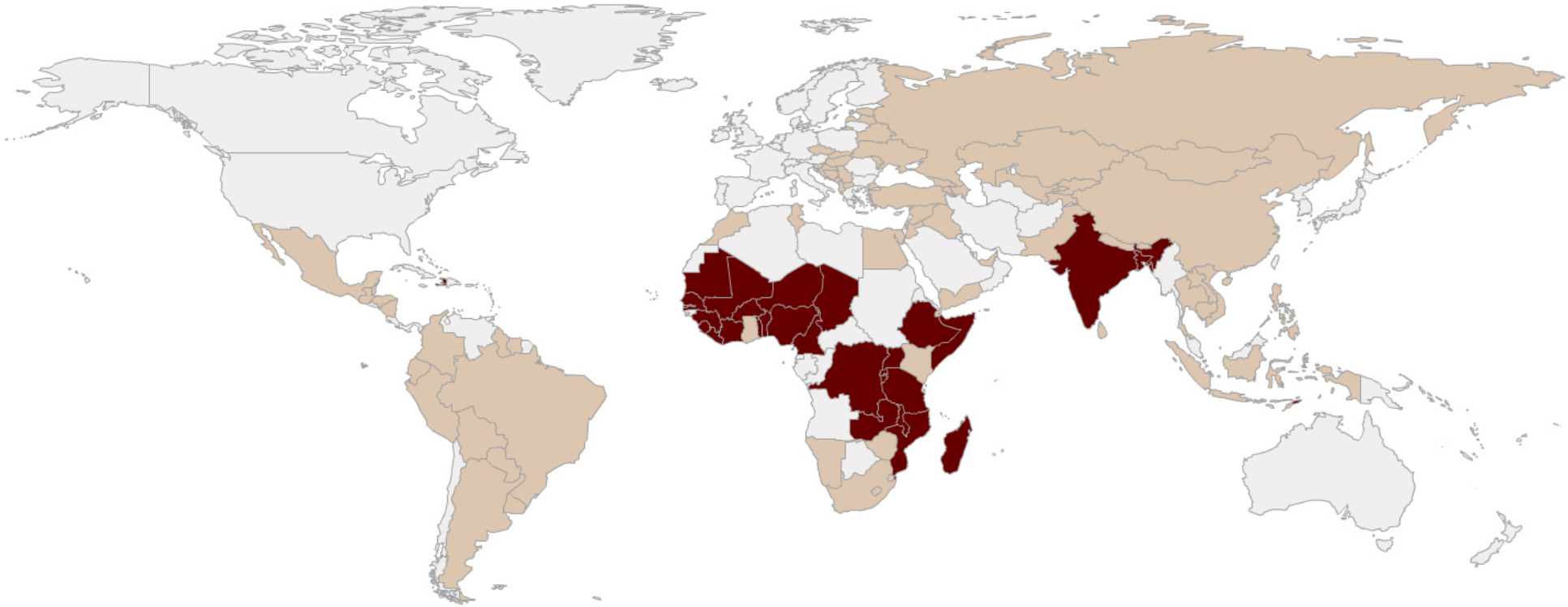
Distribution of Individual Bottom Billion Poor across Geographical Regions



Distribution of Individual Bottom Billion Poor across Income Categories

9.5 percent of Poorest Billion live in Upper-Middle income countries

Poorest Billion in Poorest Countries



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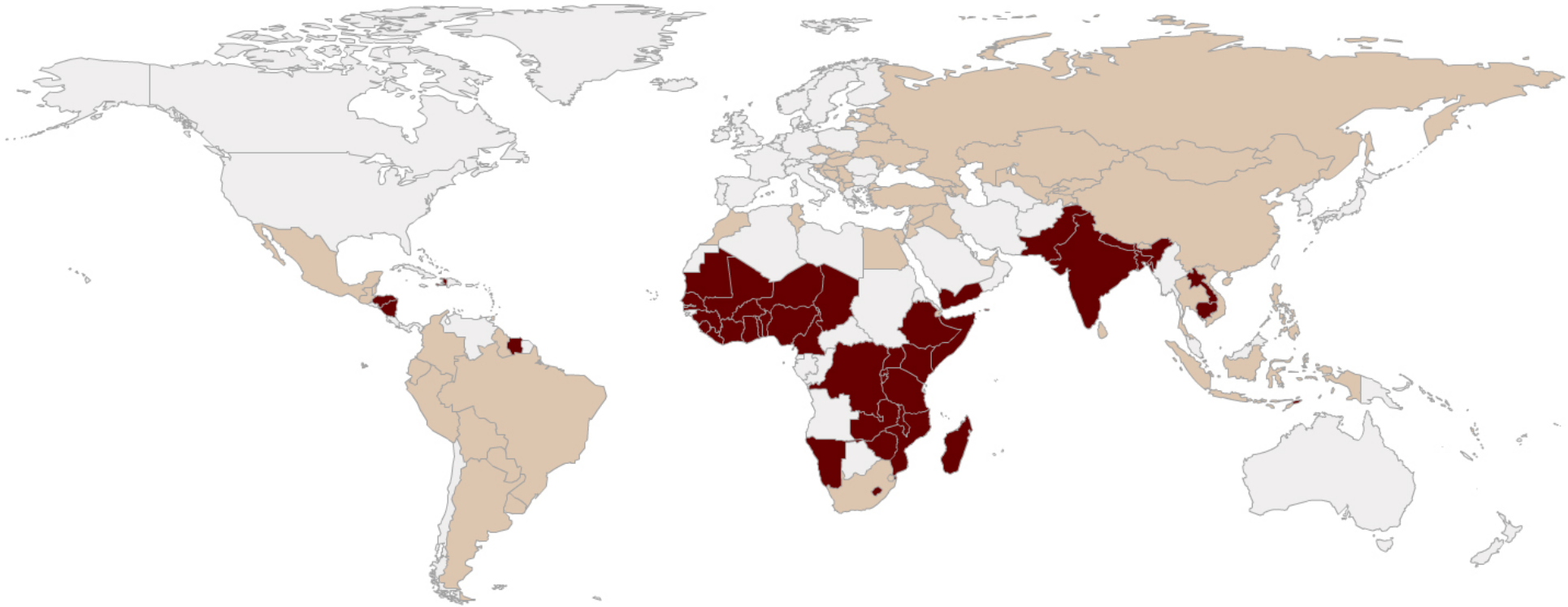
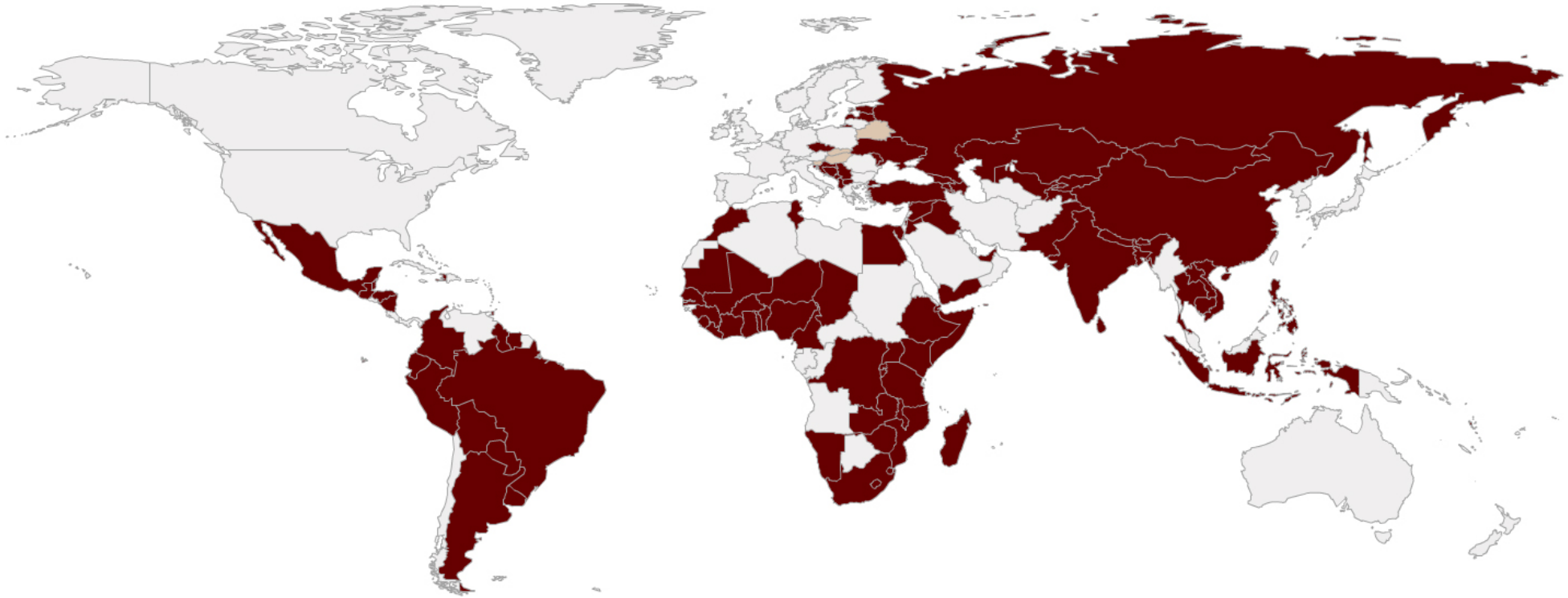
Poorest Billion in Poorest Sub-national Regions



Poorest Billion by Individual Poverty Profiles



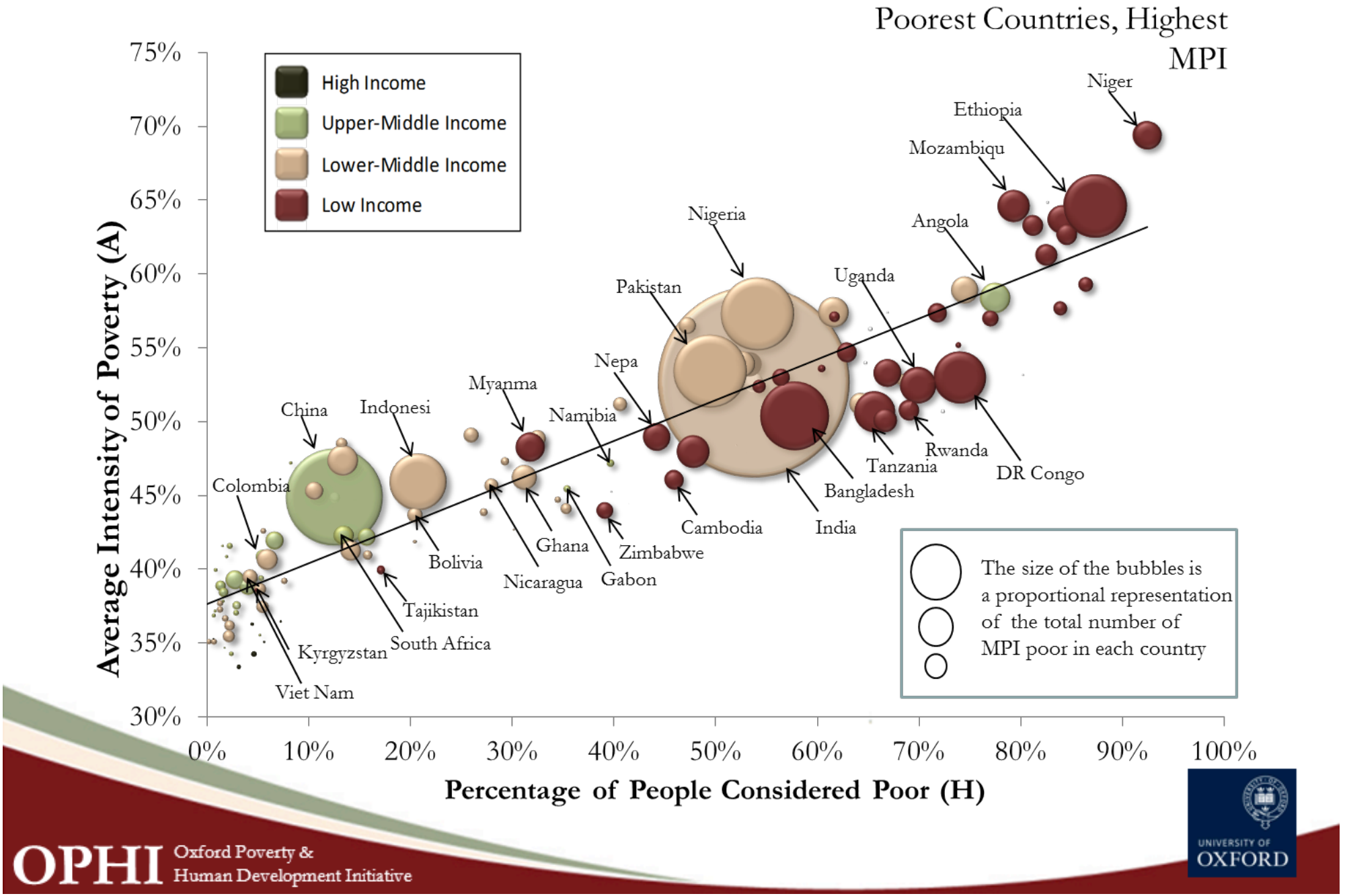
CHANGES OVER TIME

Alkire & Roche (2013)

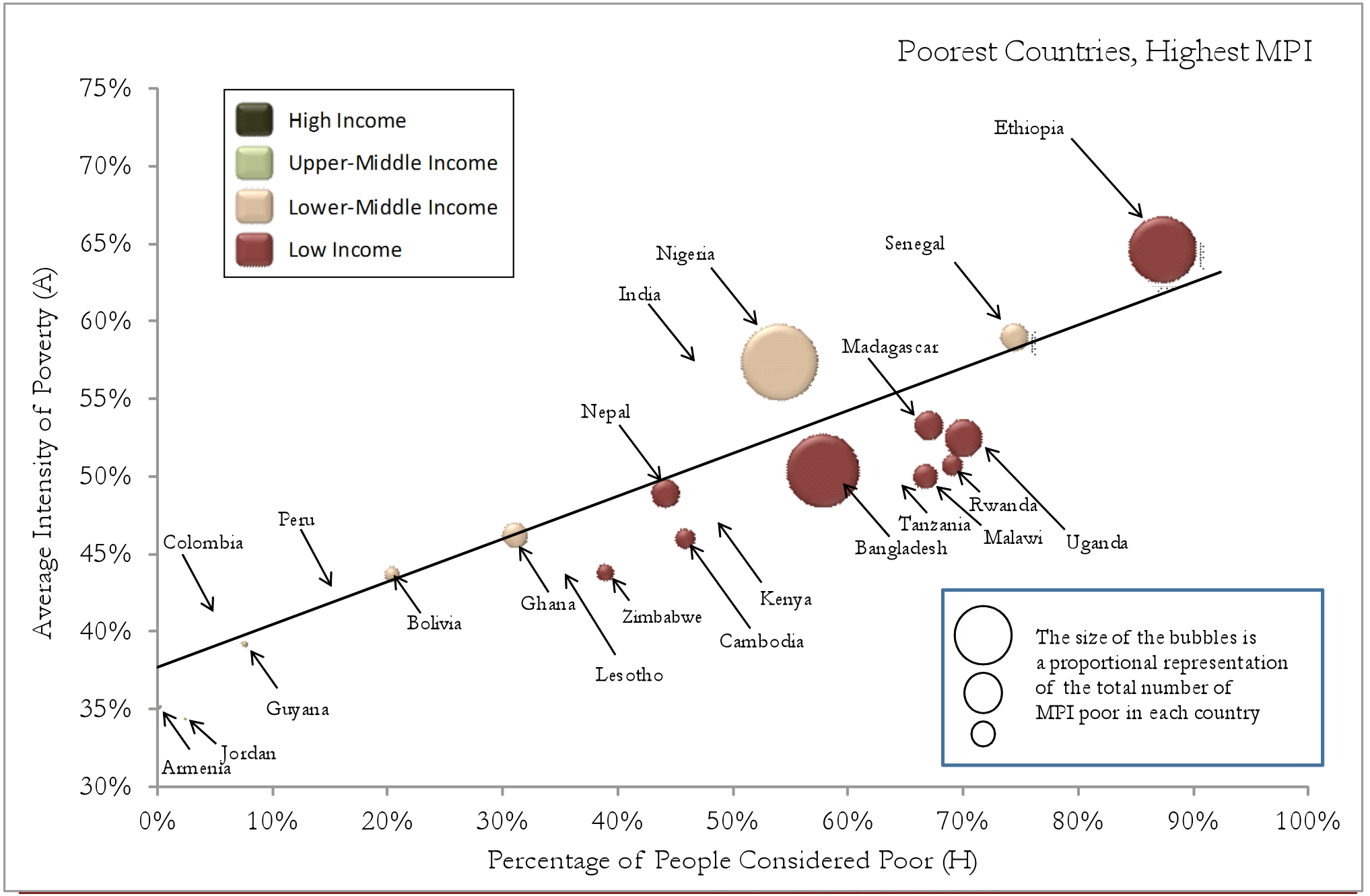
Comparing MPI across time

- 22 countries have two or more comparable DHS datasets.
- Indicator definitions often vary
- We *adjust* published MPIs to create rigorous comparisons
- Hence these often differ from published MPI figures.
- Newest data: 2007 – 2011
- 18 countries go back 5 to 7 years in time, the remaining four comparisons cover 2 to 4 years
- Oldest data: 1998/9 - 2008
- Ethiopia: has two periods 2000-2005 and 2005-2010.
- Additional data for comparisons are taken from WDI unless otherwise noted
- All population data are 2010.

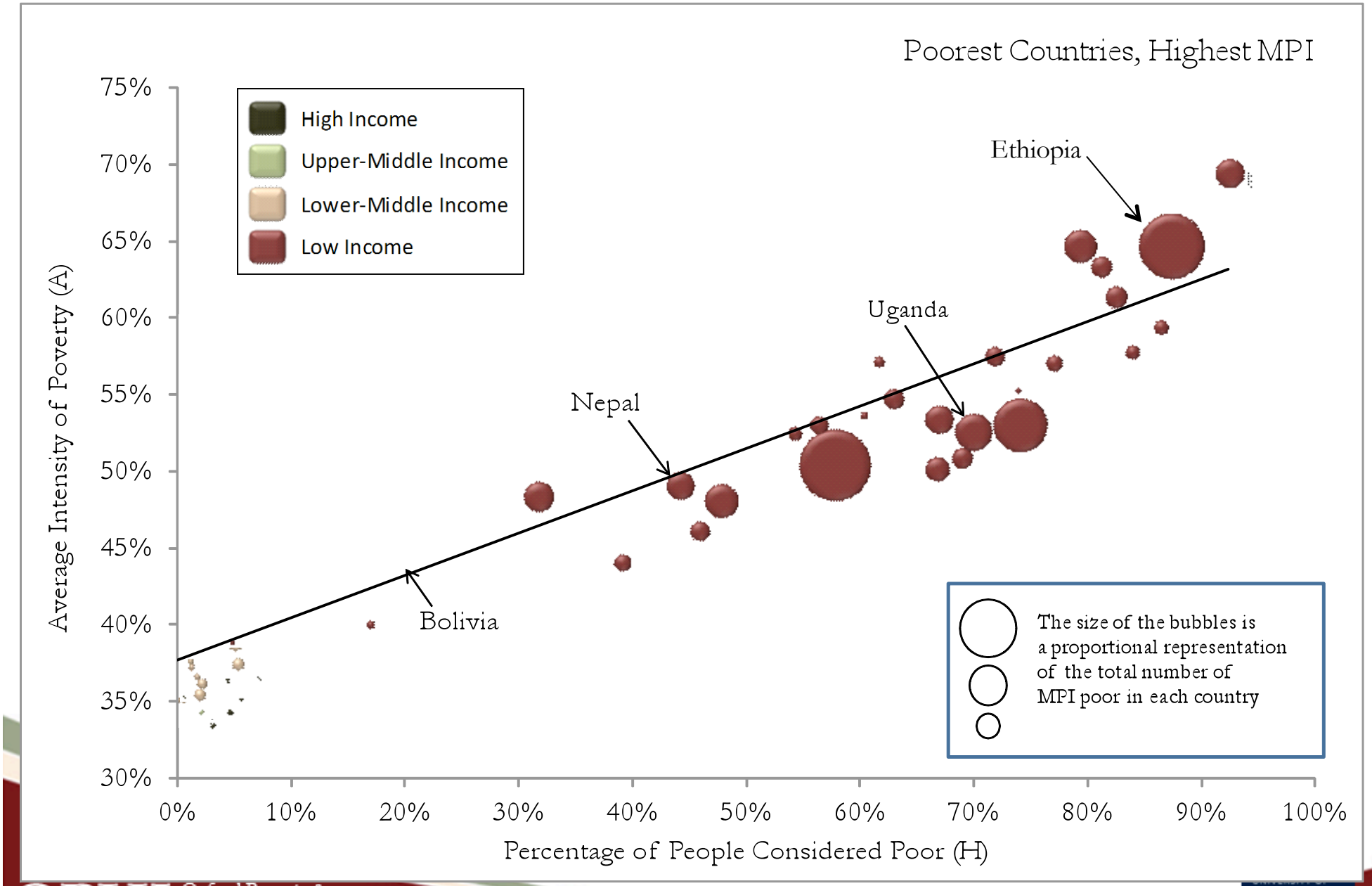
MPI varies greatly within income categories



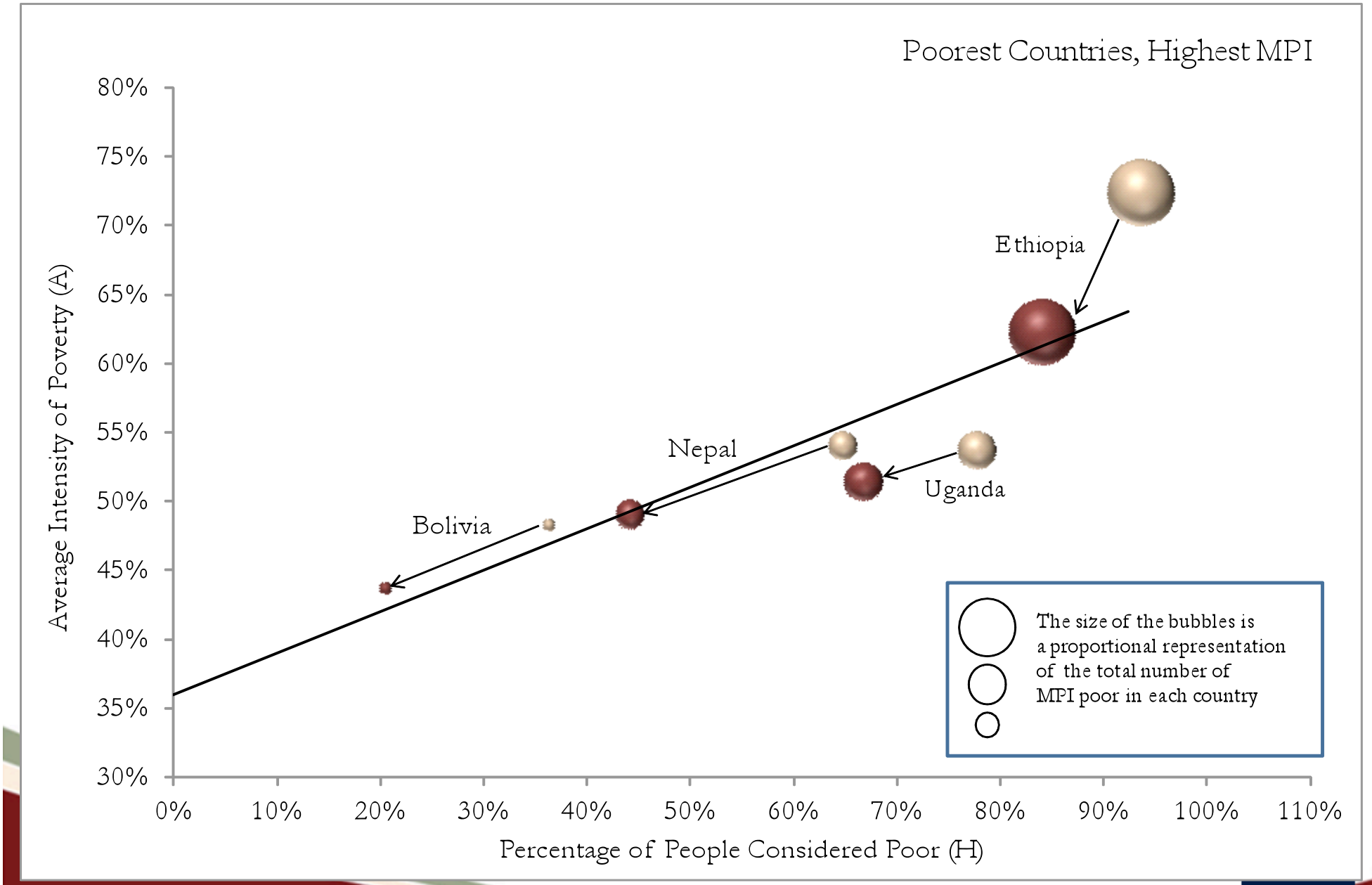
Analysis over time in 22 countries



Changes in Bolivia, Ethiopia, Nepal and Uganda



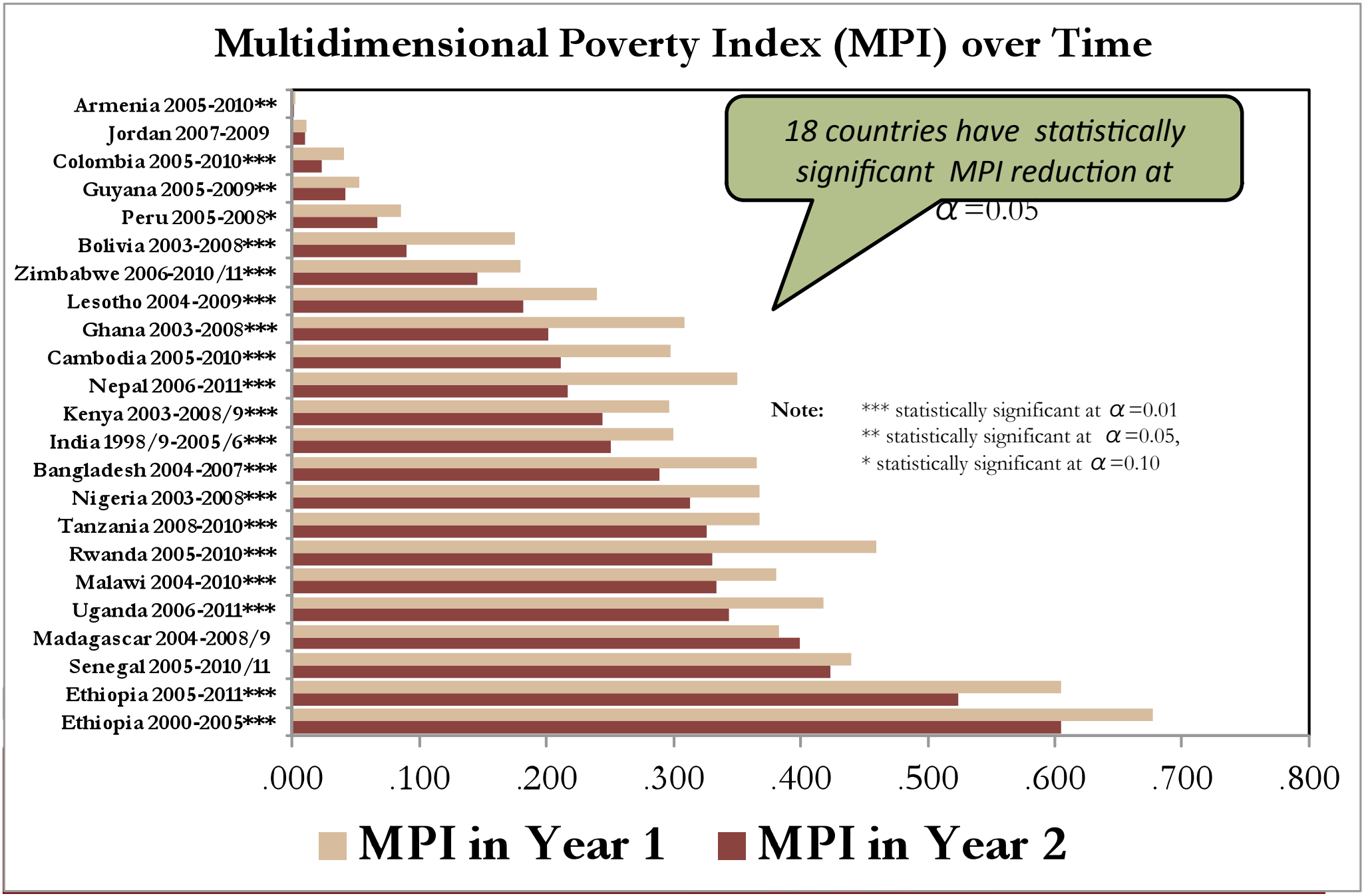
Changes in Bolivia, Ethiopia, Nepal and Uganda



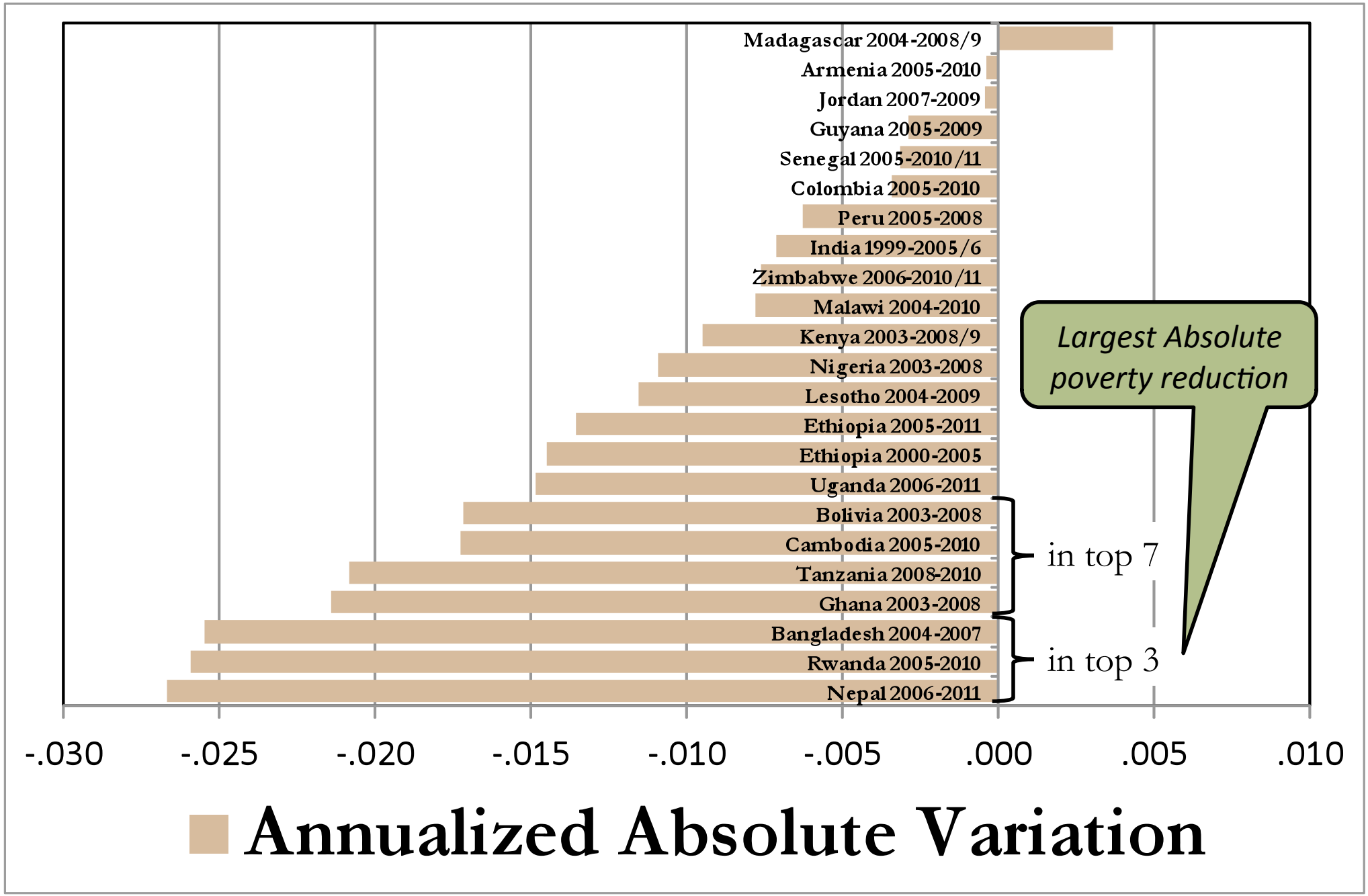
	Multidimensional Poverty Index (MPI)		Annualized variation		t-statistics for difference	
	Year 1	Year 2	Absolute	% Relative		
Armenia 2005-2010	.003 (.001)	.001 (.000)	.000	-12.9%	2.36	**
Bangladesh 2004-2007	.365 (.007)	.289 (.006)	-.025	-7.0%	7.51	***
Bolivia 2003-2008	.175 (.005)	.089 (.003)	-.017	-9.8%	13.68	***
Cambodia 2005-2010	.298 (.006)	.212 (.006)	-.017	-5.8%	10.03	***
Colombia 2005-2010	.040 (.002)	.023 (.001)	-.003	-8.4%	8.38	***
Ethiopia 2000-2005	.677 (.004)	.605 (.005)	-.014	-2.1%	6.66	***
Ethiopia 2005-2011	.605 (.005)	.523 (.007)	-.014	-2.2%	8.26	***
Ghana 2003-2008	.309 (.007)	.202 (.007)	-.021	-6.9%	10.43	***
Guyana 2005-2009	.053 (.005)	.041 (.002)	-.003	-5.4%	2.23	**
India 1998/9-2005/6	.300 (.002)	.251 (.003)	-.007	-2.4%	12.81	***
Jordan 2007-2009	.011 (.002)	.011 (.001)	.000	-3.6%	0.36	
Kenya 2003-2008/9	.296 (.008)	.244 (.010)	-.009	-3.2%	4.10	***
Lesotho 2004-2009	.239 (.005)	.182 (.007)	-.012	-4.8%	6.34	***
Madagascar 2004-2008/9	.383 (.016)	.400 (.007)	.004	1.0%	1.03	
Malawi 2004-2010	.381 (.006)	.334 (.005)	-.008	-2.0%	6.06	***
Nepal 2006-2011	.350 (.013)	.217 (.012)	-.027	-7.6%	7.61	***
Nigeria 2003-2008	.368 (.011)	.313 (.006)	-.011	-3.0%	4.04	***
Peru 2005-2008	.085 (.007)	.066 (.004)	-.006	-7.3%	1.83	*
Rwanda 2005-2010	.460 (.005)	.330 (.006)	-.026	-5.6%	15.55	***
Senegal 2005-2010/11	.440 (.019)	.423 (.010)	-.003	-0.7%	1.04	
Tanzania 2008-2010	.367 (.008)	.326 (.007)	-.021	-5.7%	3.96	***
Uganda 2006-2011	.417 (.007)	.343 (.009)	-.015	-3.5%	5.70	***
Zimbabwe 2006-2010/11	.180 (.006)	.145 (.005)	-.008	-4.2%	4.50	***

Note: *** statistically significant at α=0.01, ** statistically significant at =0.05, * statistically significant at α=0.10

Changes over time in MPI

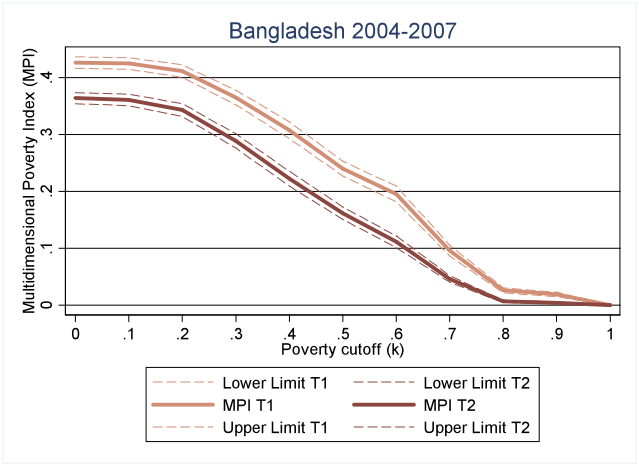


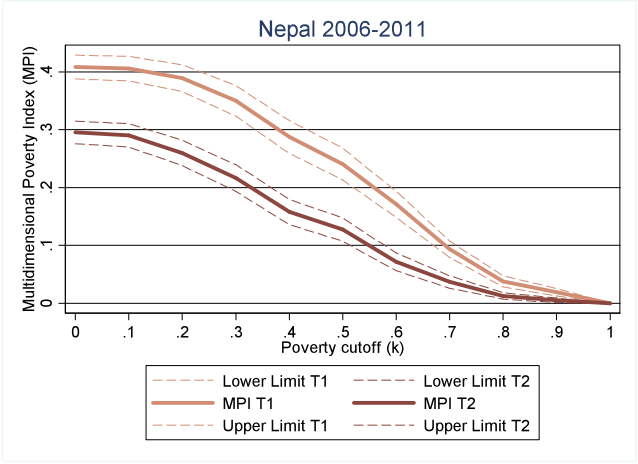
Changes over time in MPI

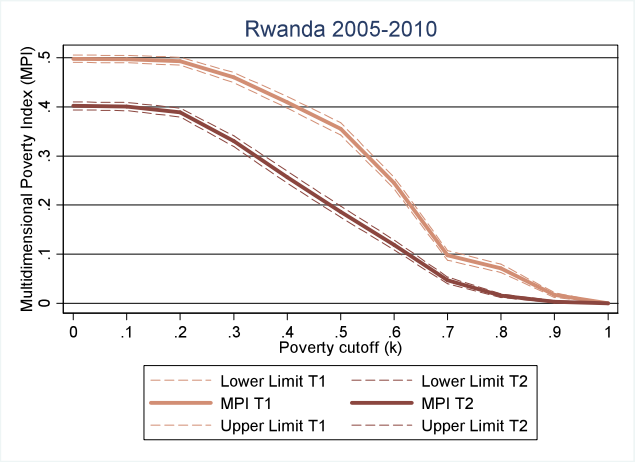


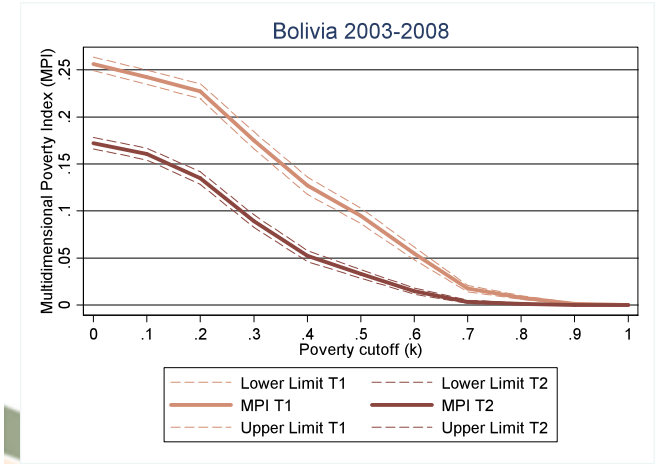
Robustness Analysis – changes poverty cutoff (k)

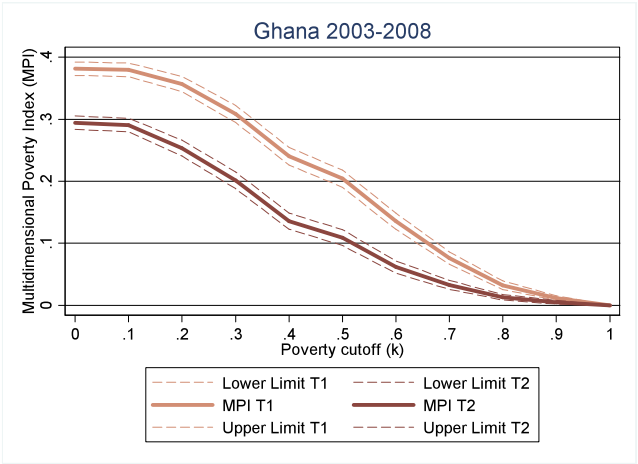
Among countries with substantial progress

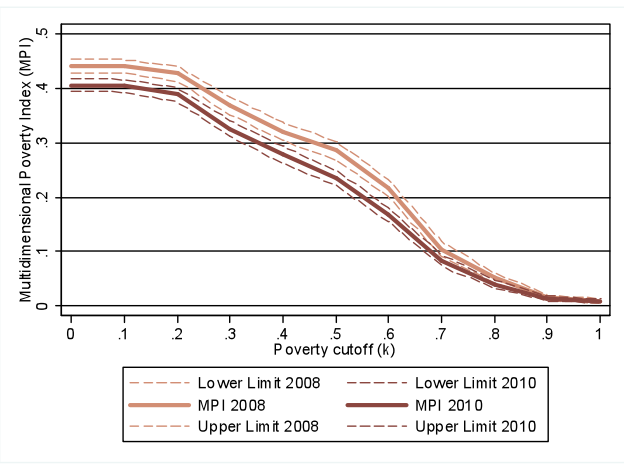






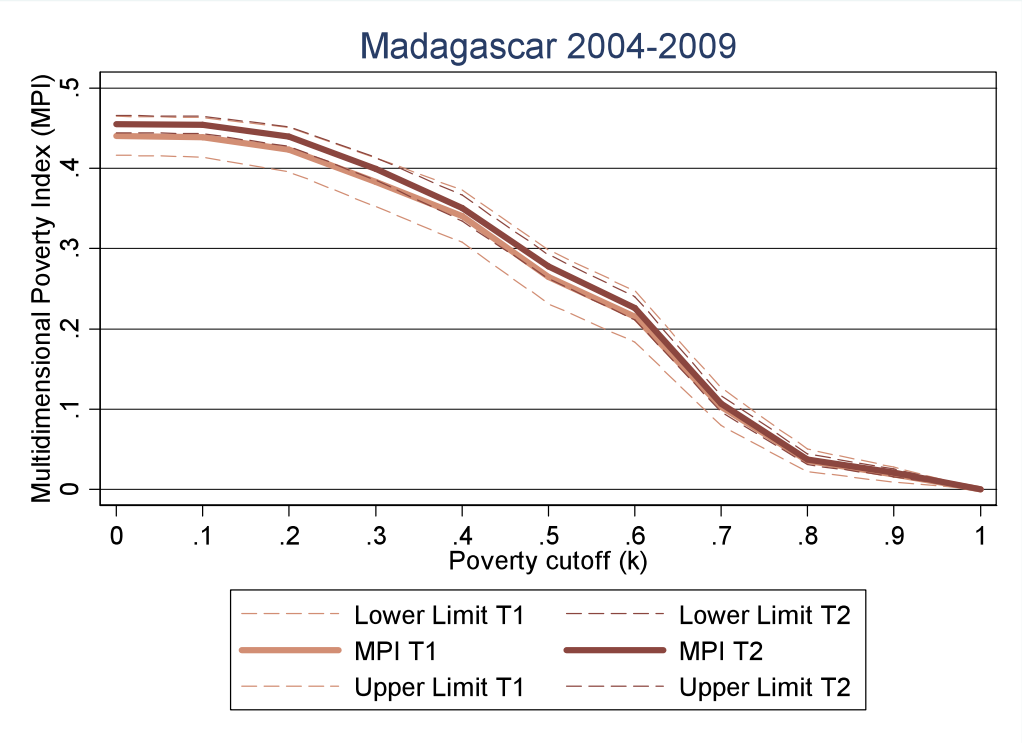


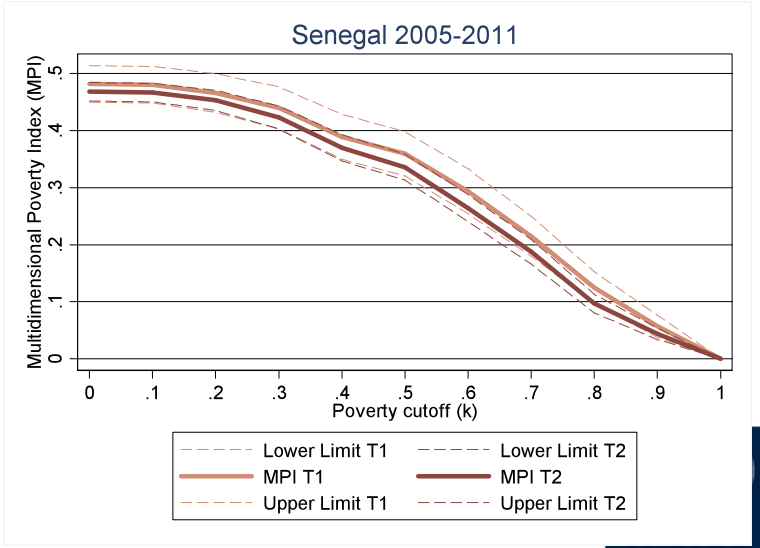




Robustness Analysis – changes poverty cutoff (k)

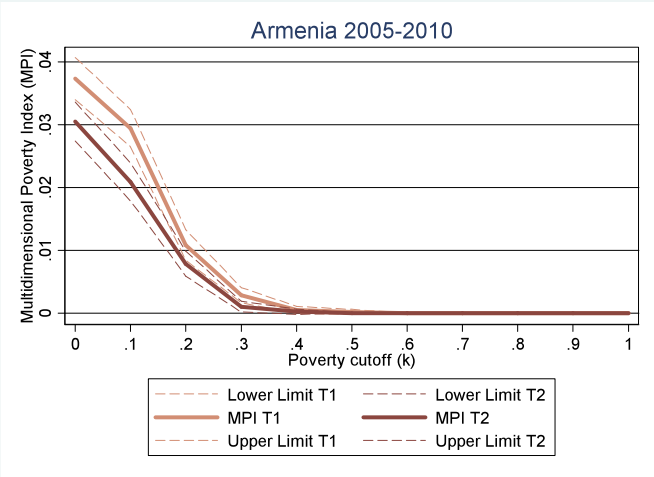
Among countries lacking significant progress

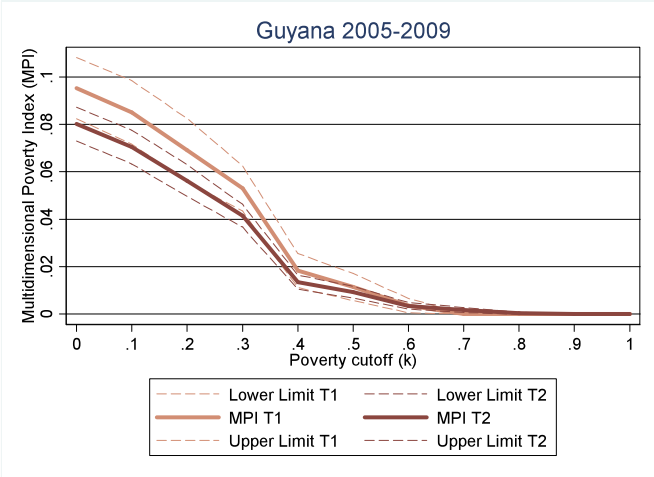


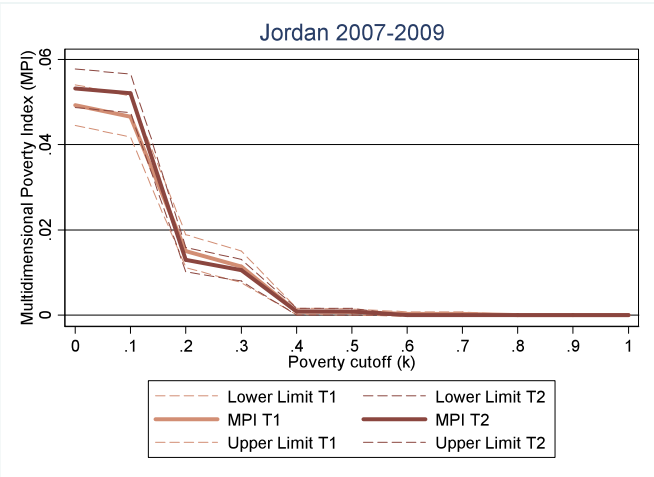


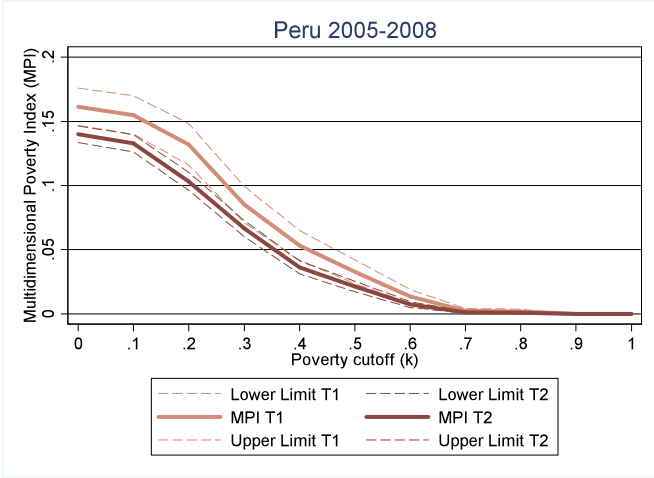
Robustness Analysis – changes poverty cutoff (k)

Some border line cases: all have low MPI values (<0.09)









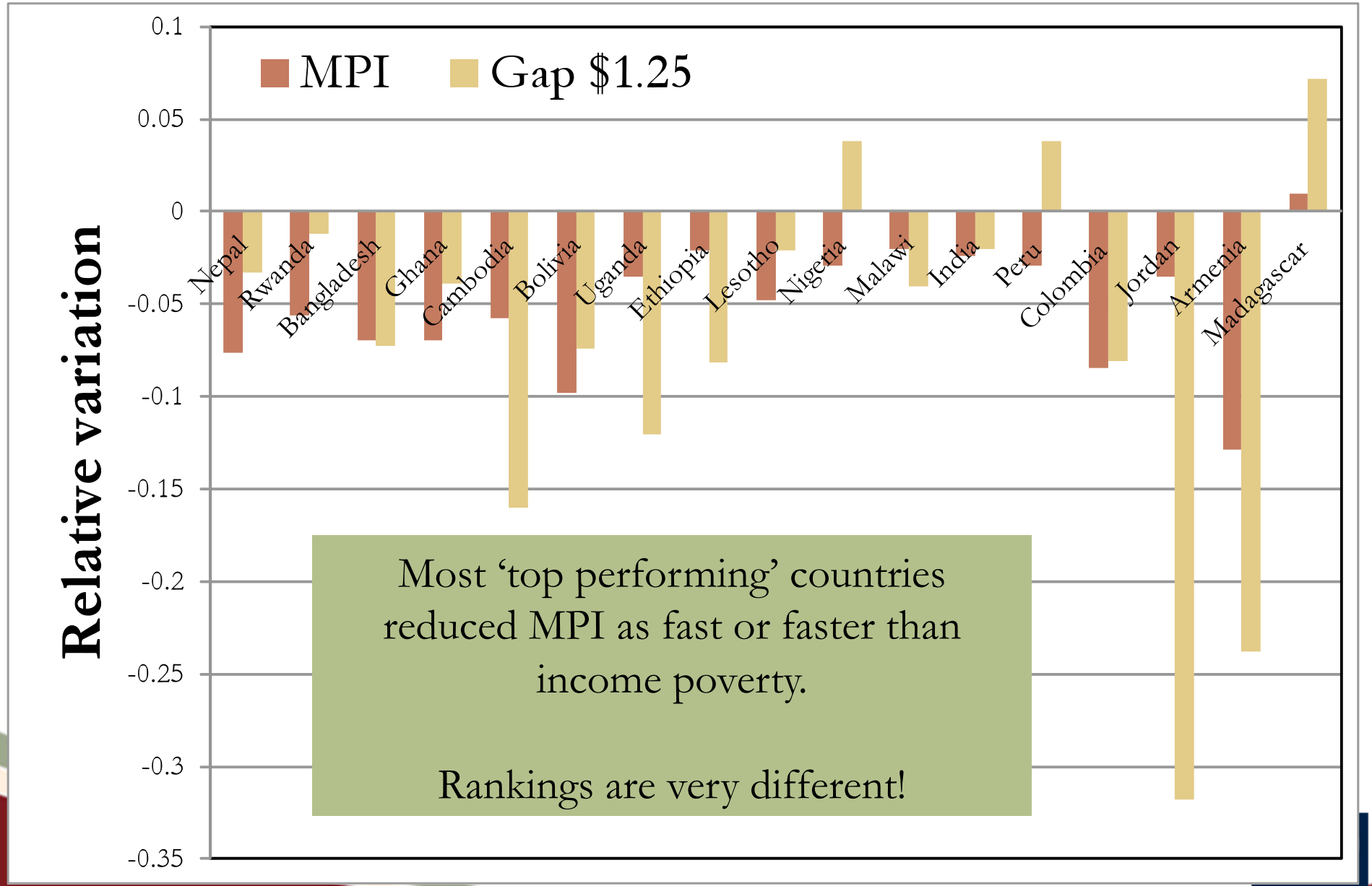
MPI and $1.25 a day: complementary

MPI vs $1.25/day: 16 comparisons

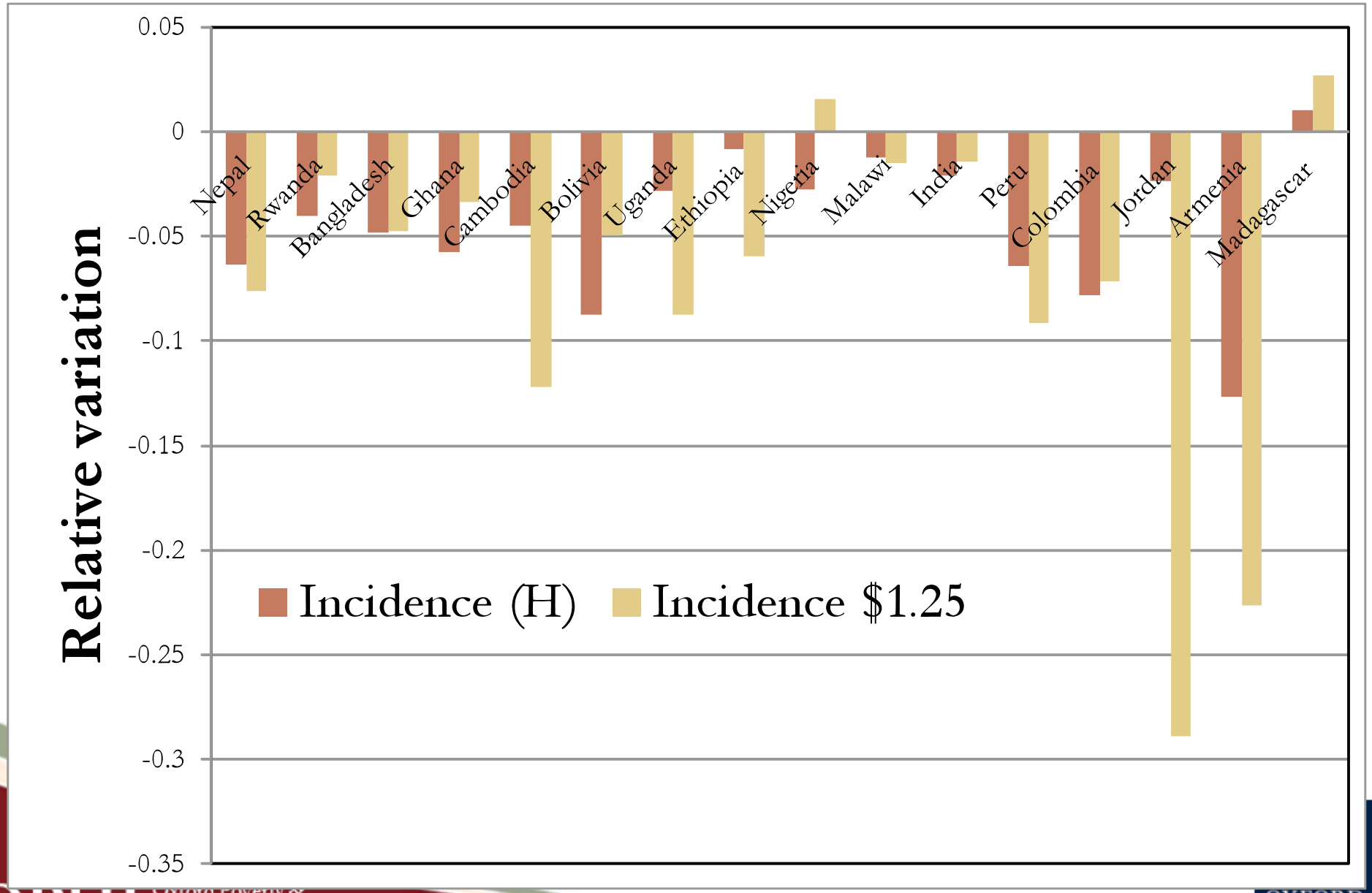
- Difficult to compare MPI vs $1.25 trends due to infrequent poverty data

  - Matching year comparisons are only available for Peru and Colombia.
  - There is no $1.25 data for Zimbabwe
  - For 8 countries, $1.25 data are older than the comparable MPI: Armenia, Ghana, Guyana, Kenya, Lesotho, Malawi, Tanzania and Uganda.
  - Since periods are different, we use $1.25 interpolation for 7 countries: Bangladesh, Bolivia, Cambodia, Jordan, Malawi, Nigeria and Rwanda

Changes in MPI vs $1.25 poverty gap (relative)



Changes in H (MPI) vs $1.25 headcount (Relative)



How MPI changes:

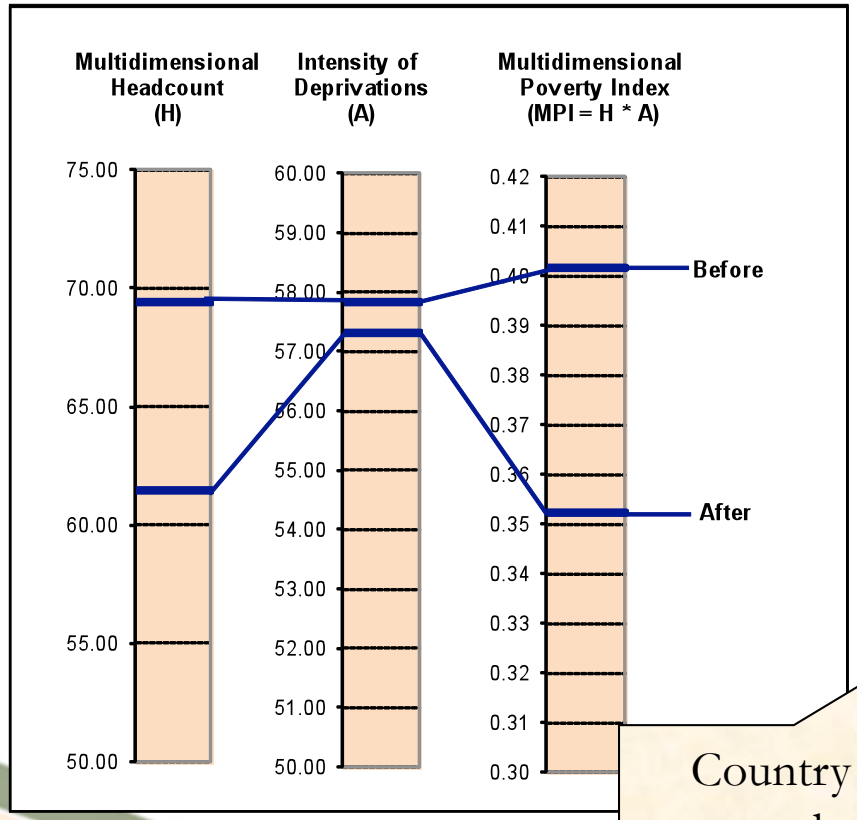
- Reductions in incidence

- Reductions in intensity

Reducing incidence and intensity

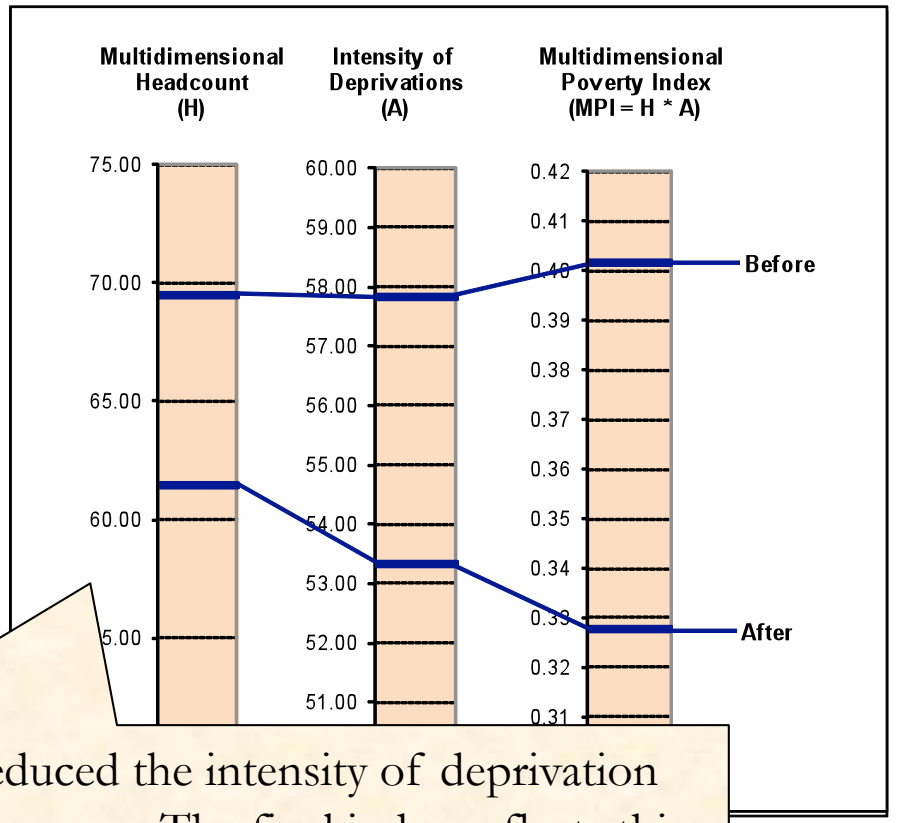
Country A:

Poverty reduction policy
(without inequaliy focus)



Country B:

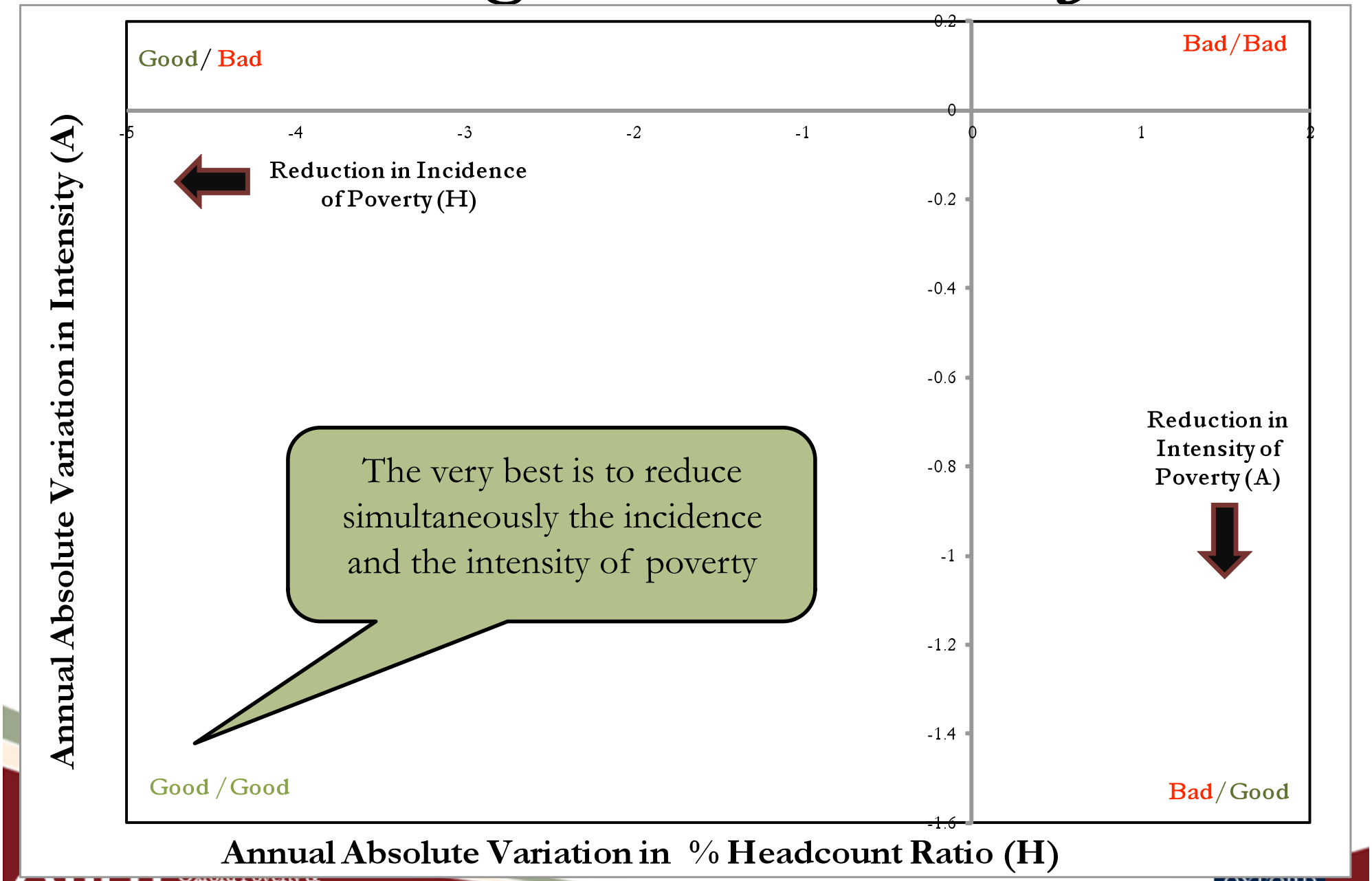
Policy oriented to the poorest of the poor



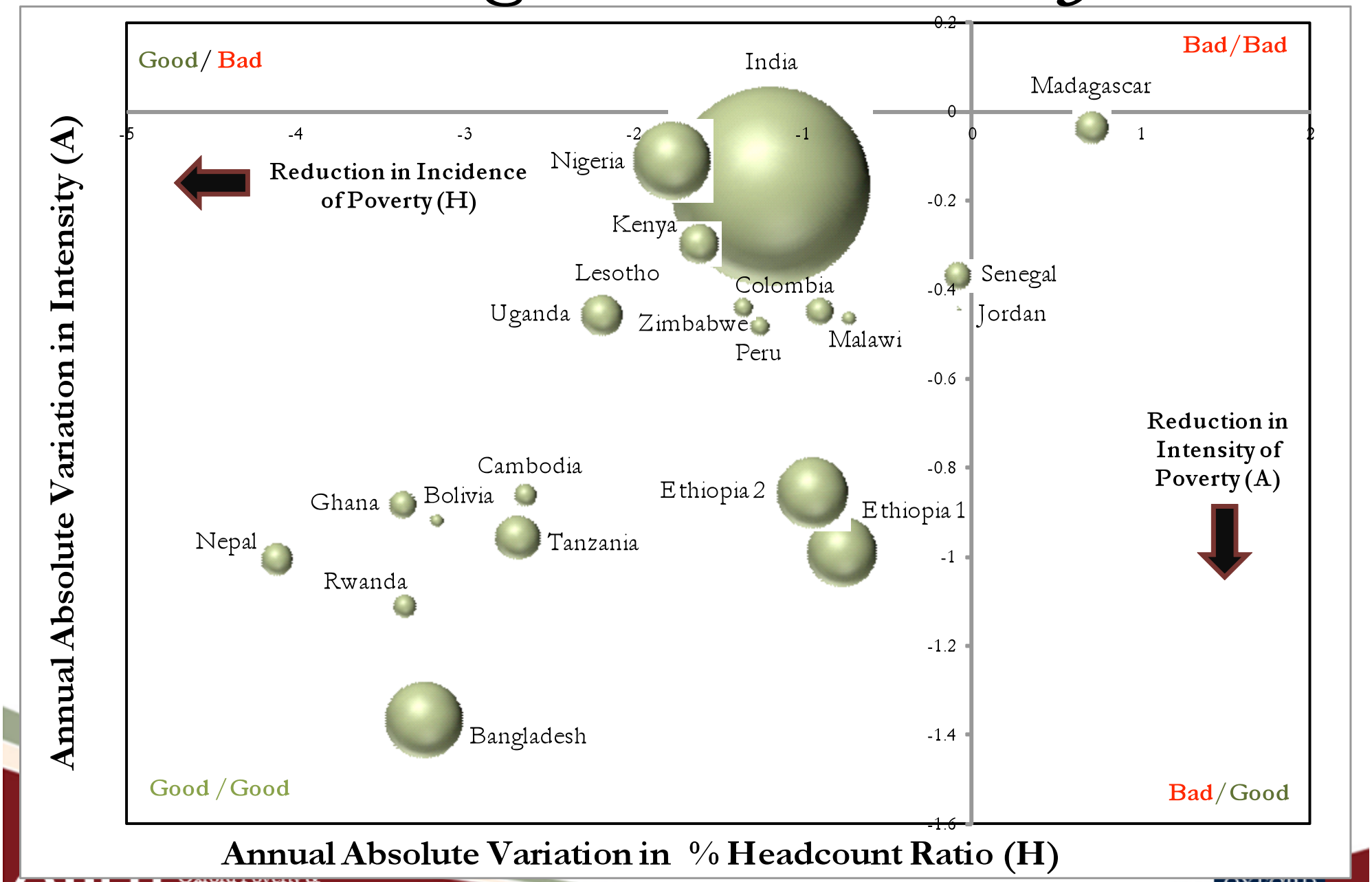
Country B reduced the intensity of deprivation among the poor more. The final index reflects this.

(MPI satisfies **Dimensional Monotonicity**)

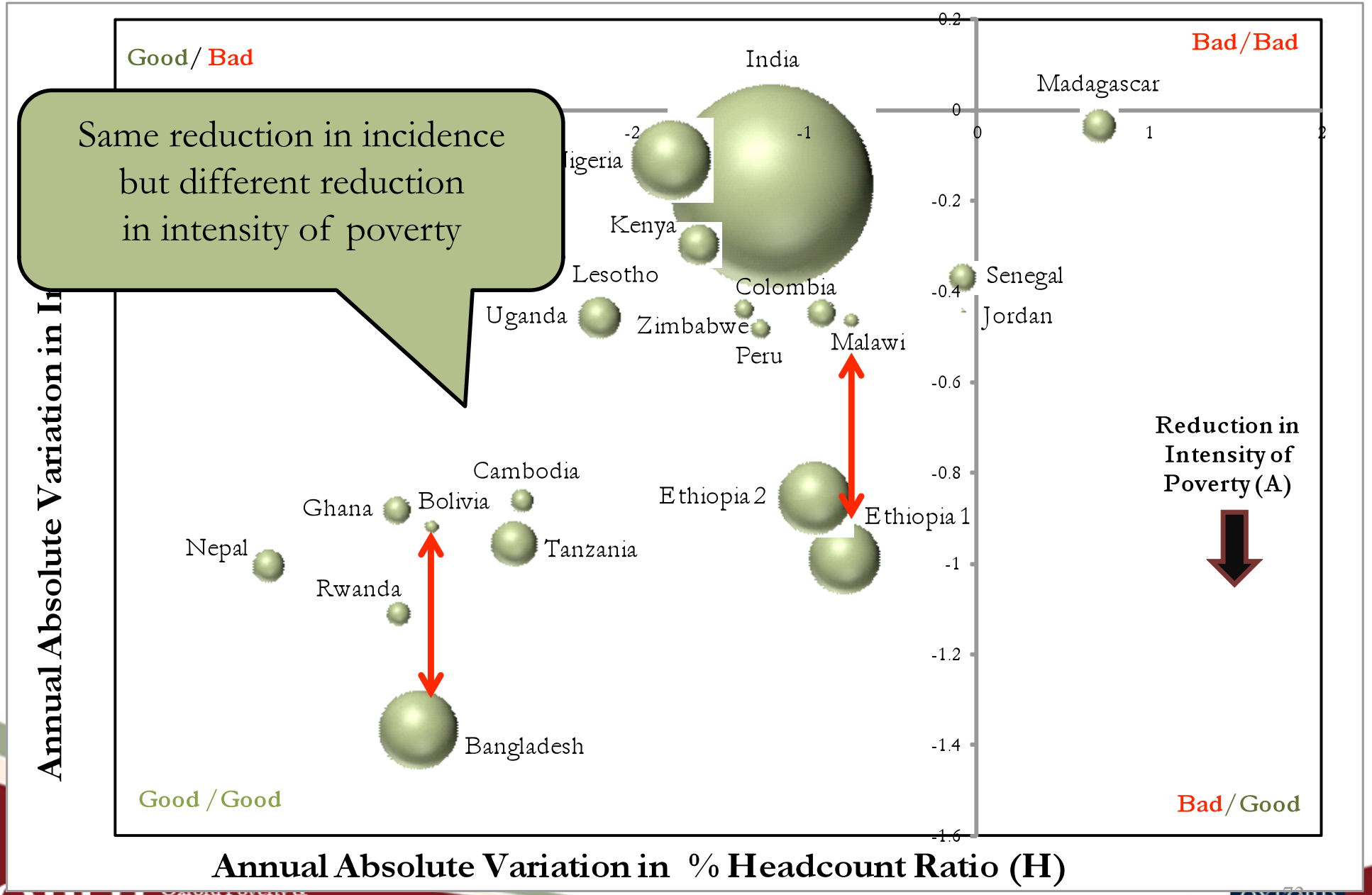
Reducing incidence or intensity?



Reducing incidence or intensity?

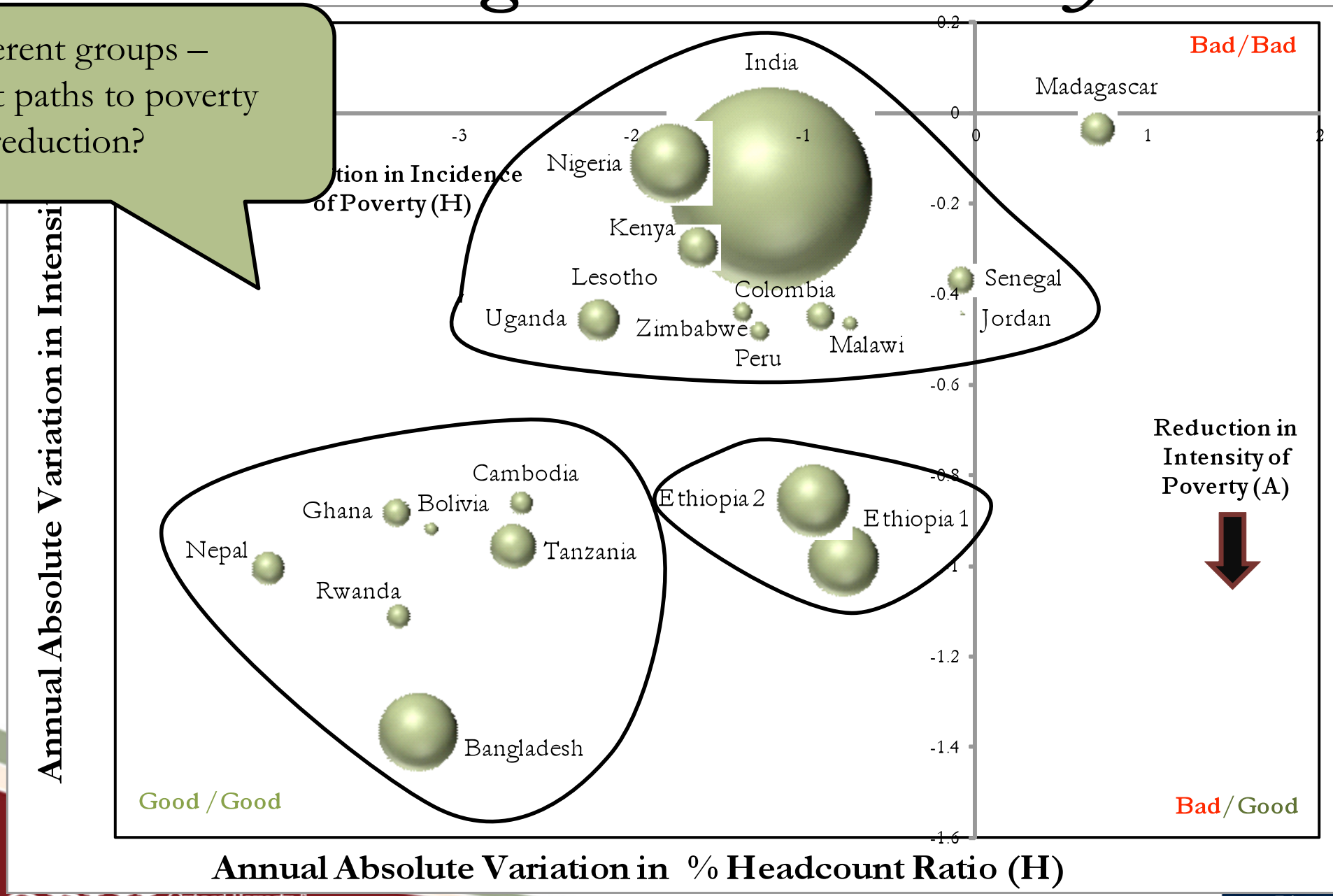


Reducing incidence or intensity?

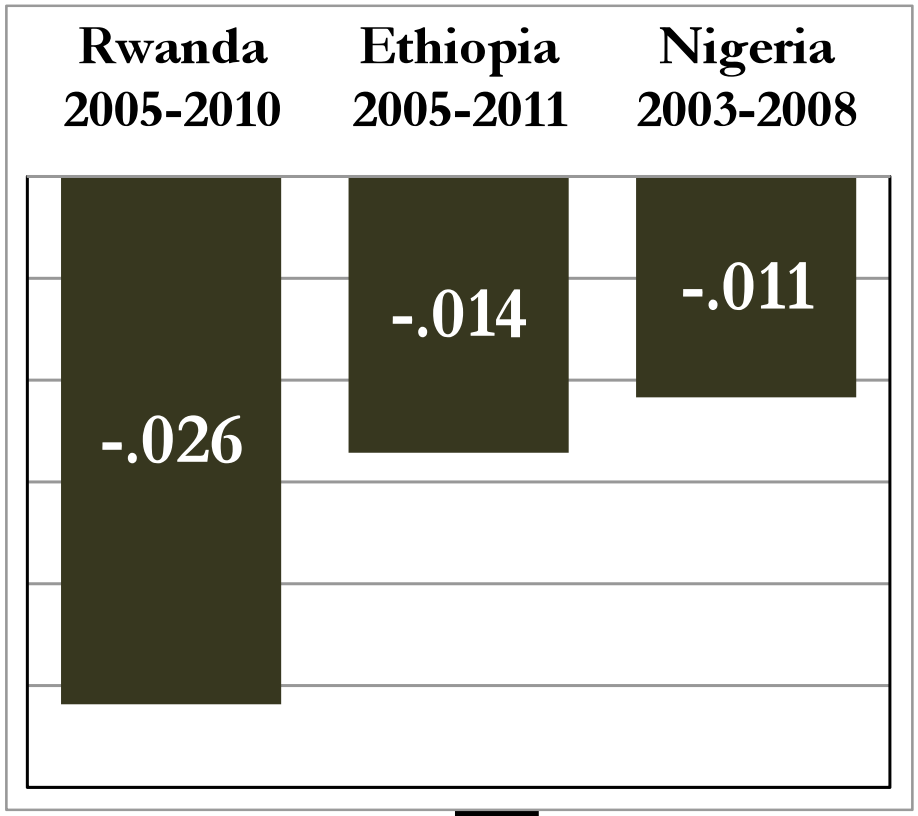


Reducing incidence or intensity?

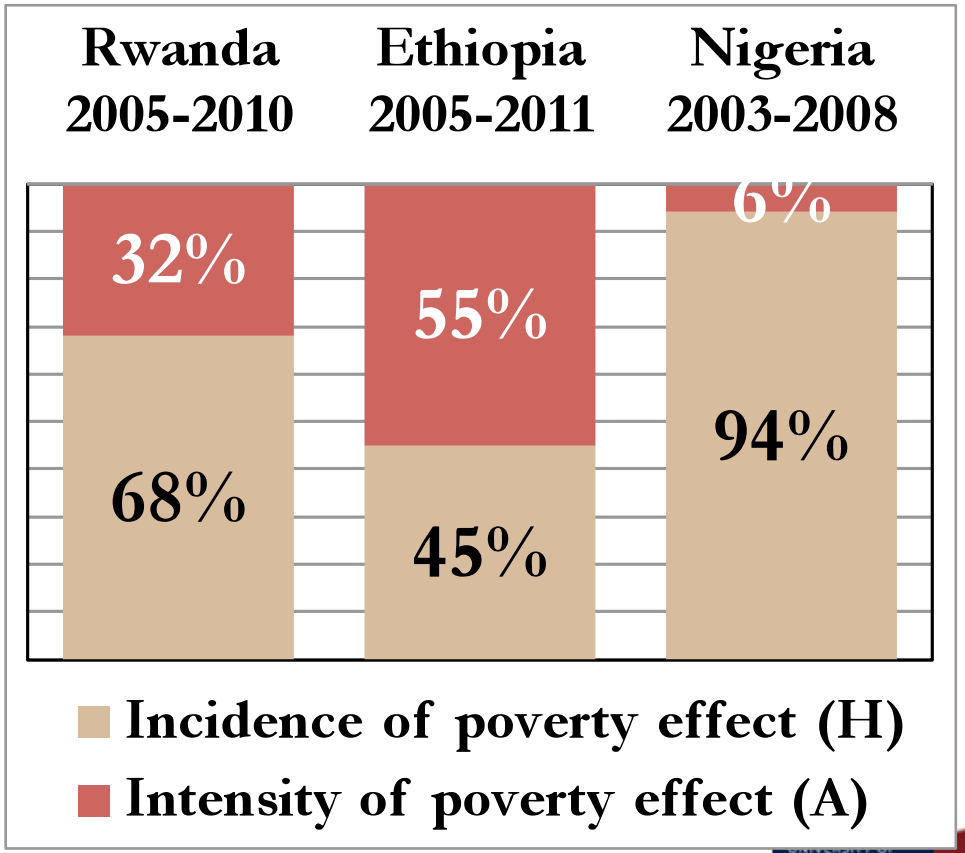
Different groups – different paths to poverty reduction?



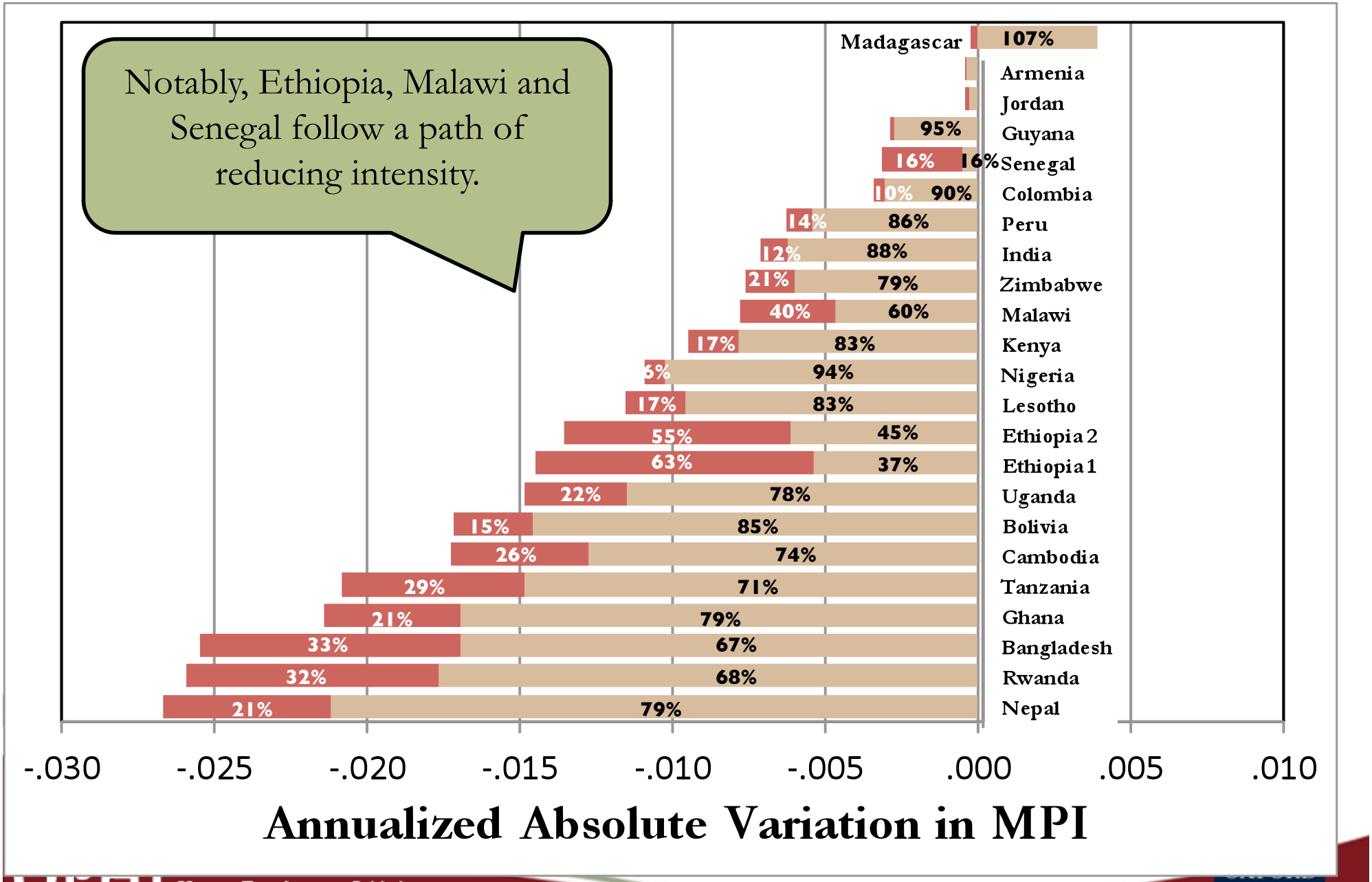
MPI Reduction



Different path to poverty reduction

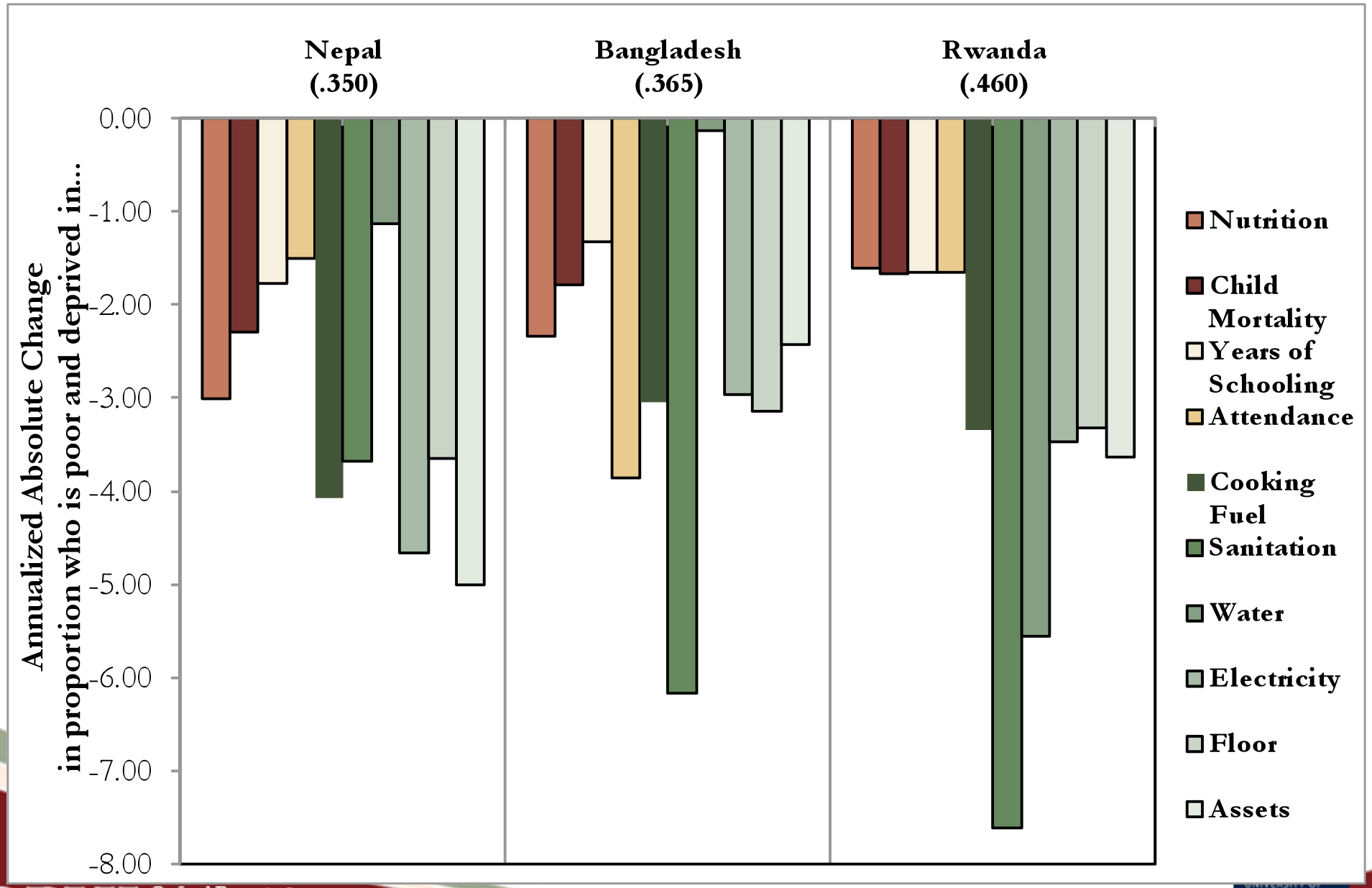


Intensity and Incidence: both reduce MPI

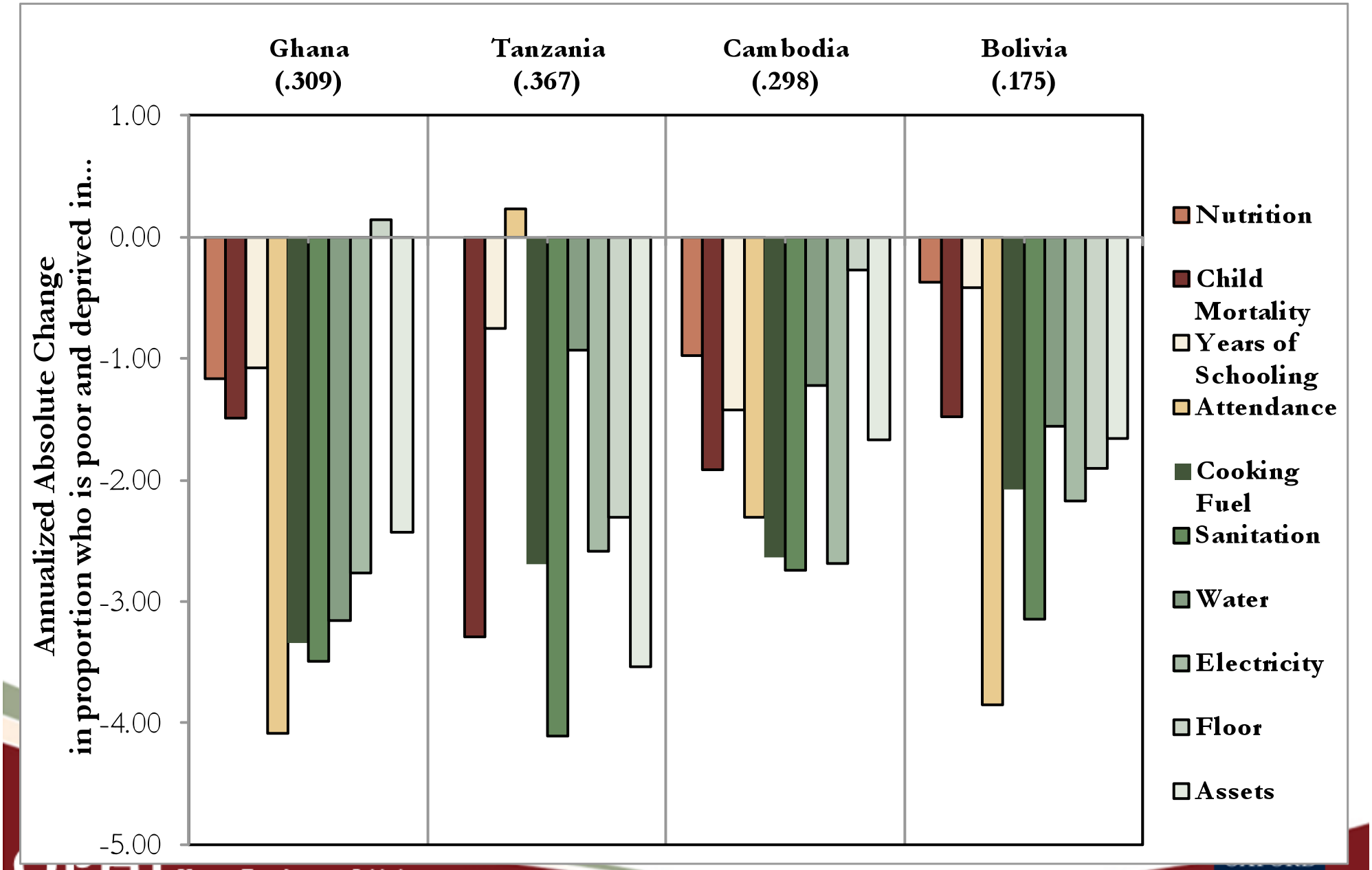


How MPI changes:
- Reductions in each indicator

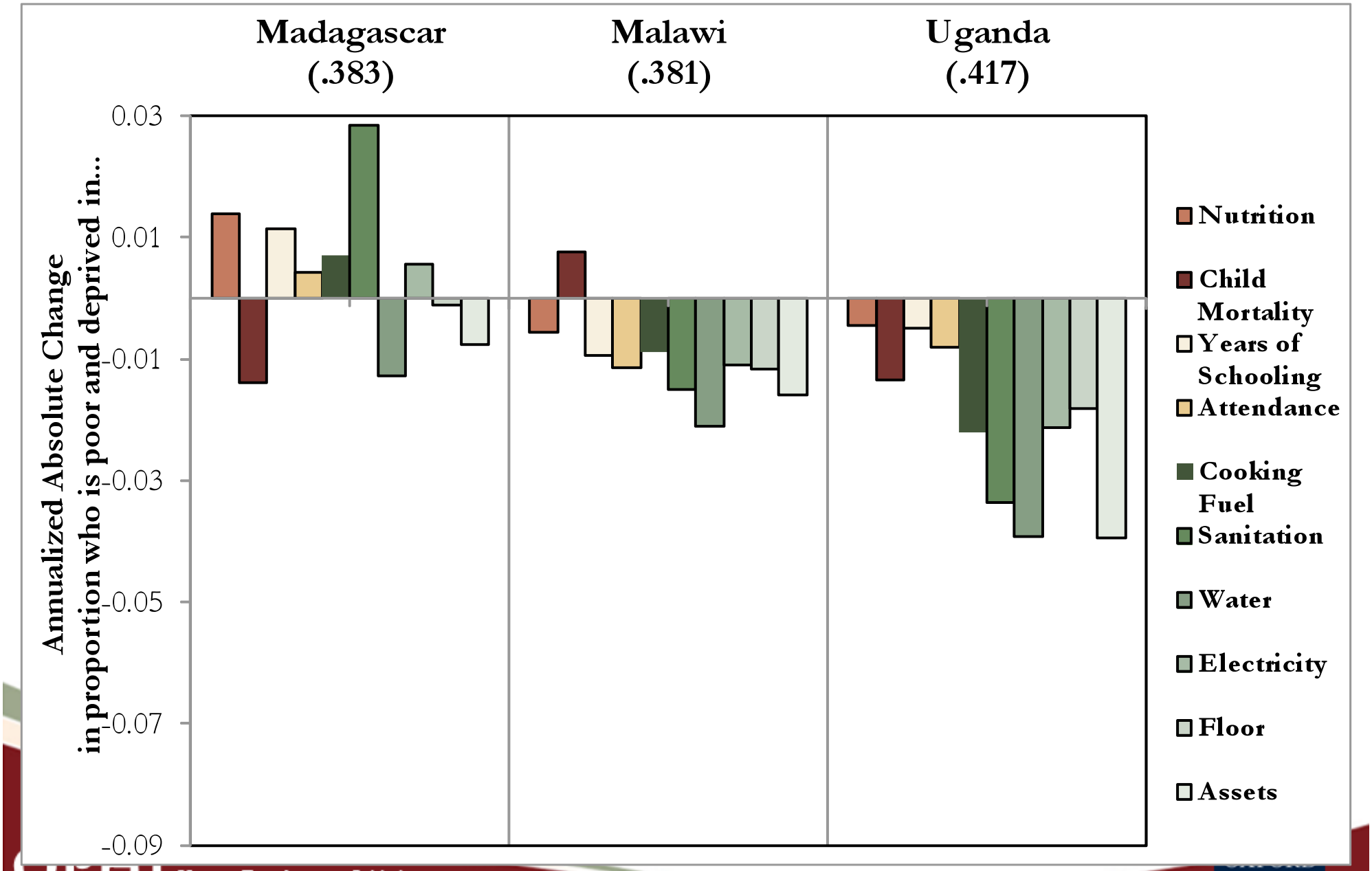
How the best countries reduced MPI



Other reduction patterns



Other reduction patterns

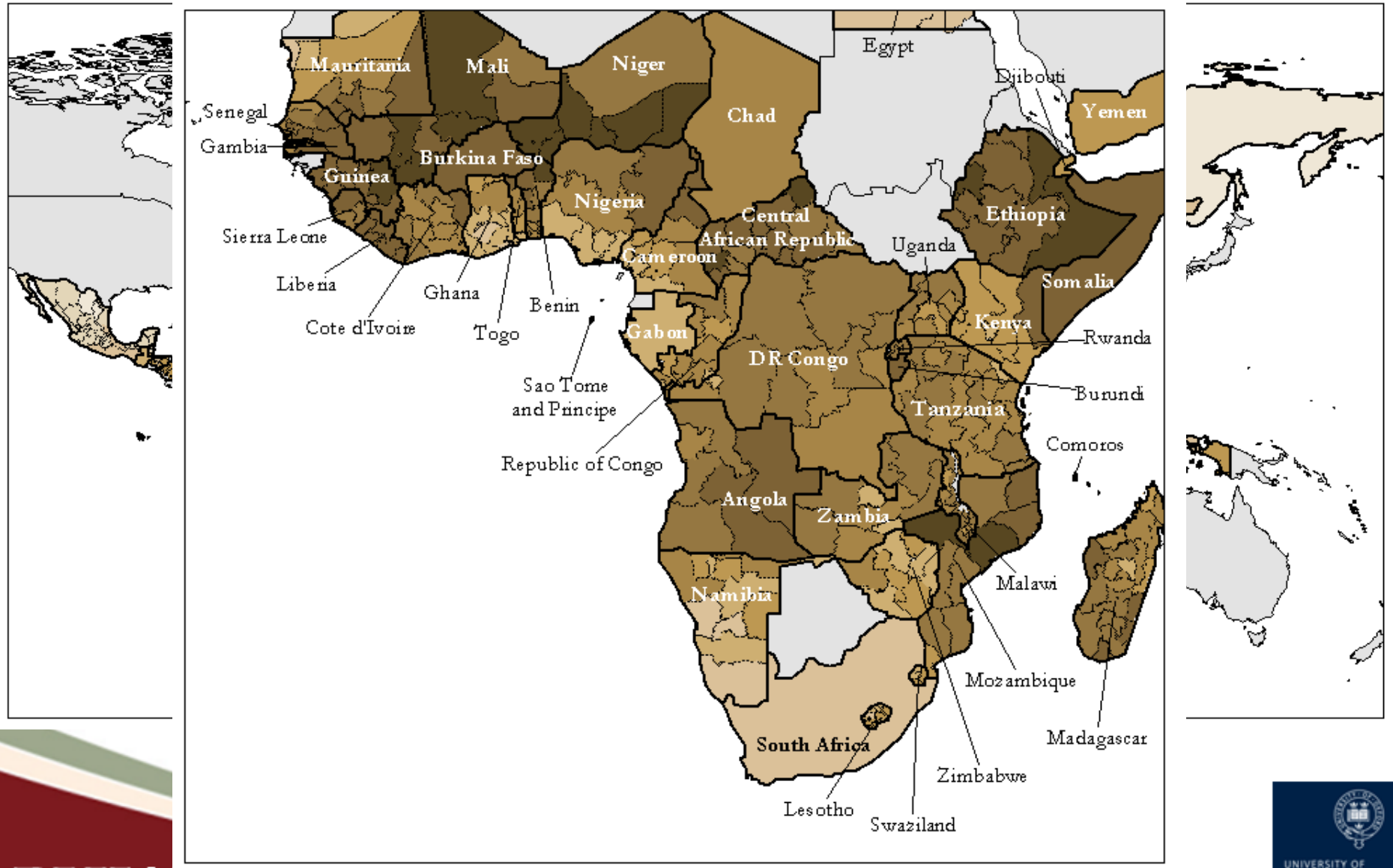


Subnational MPI Changes:

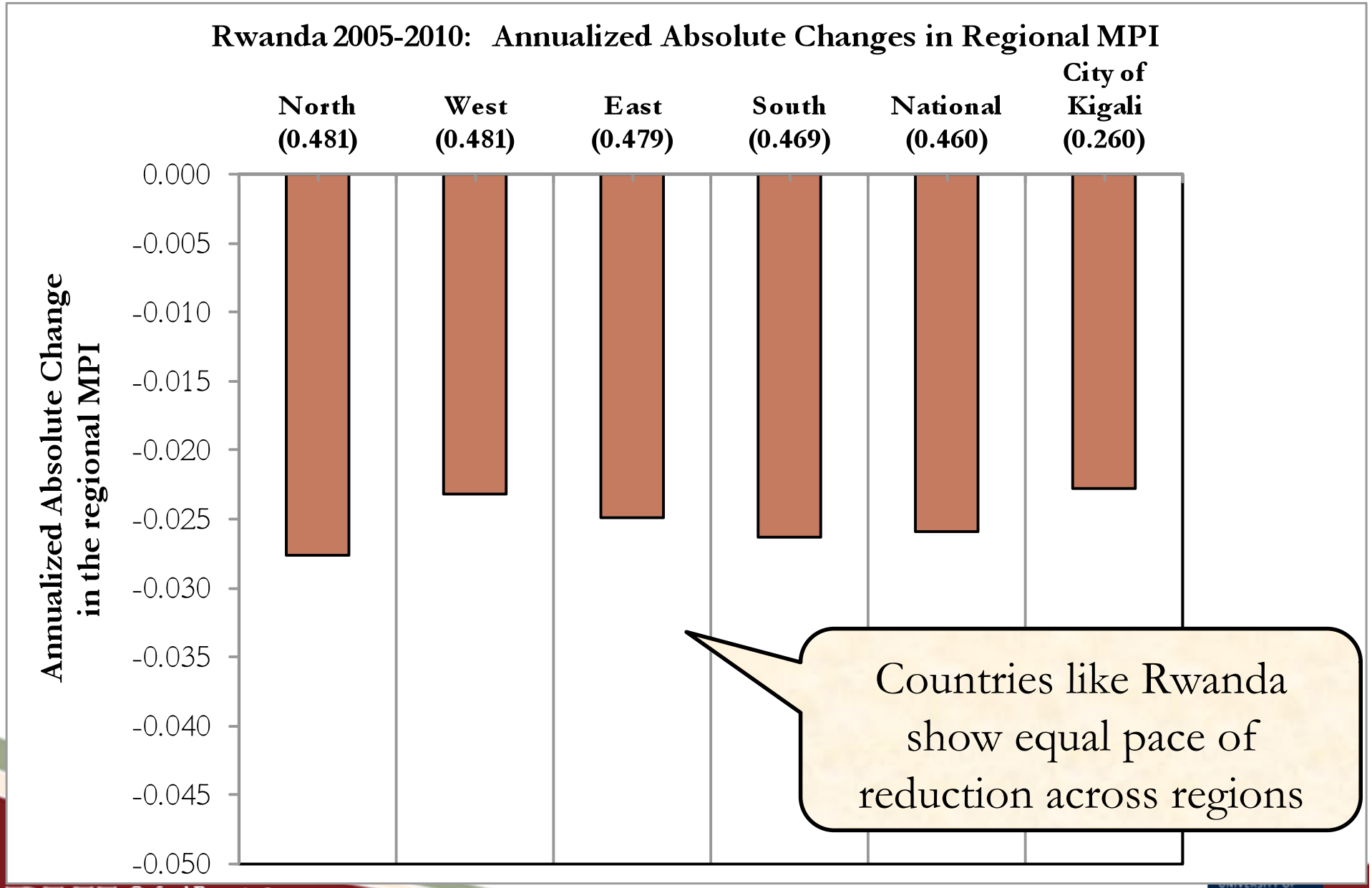
- Going beyond averages

- Showing disparity

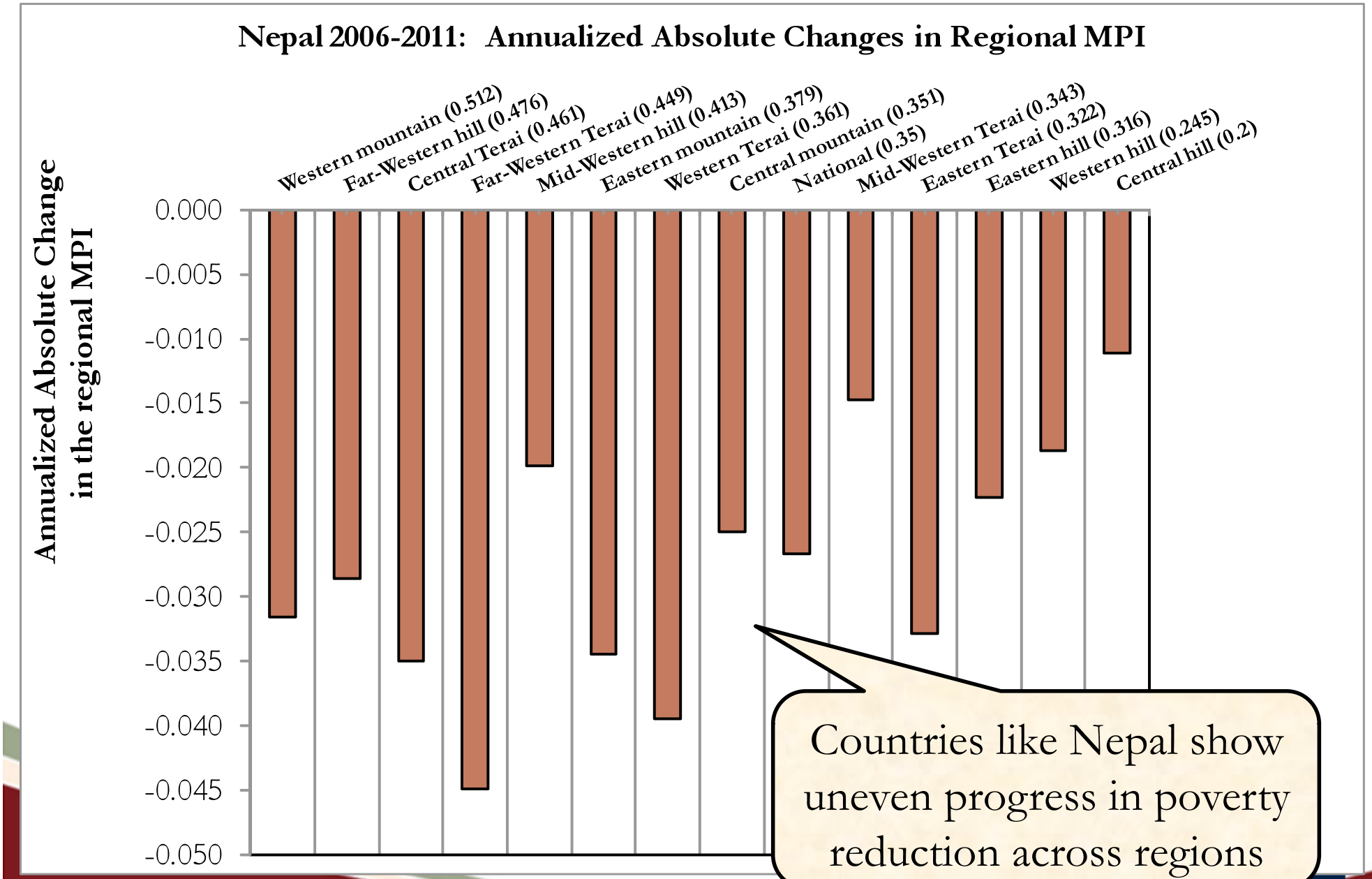
“Leave no one behind” (HLP2015)



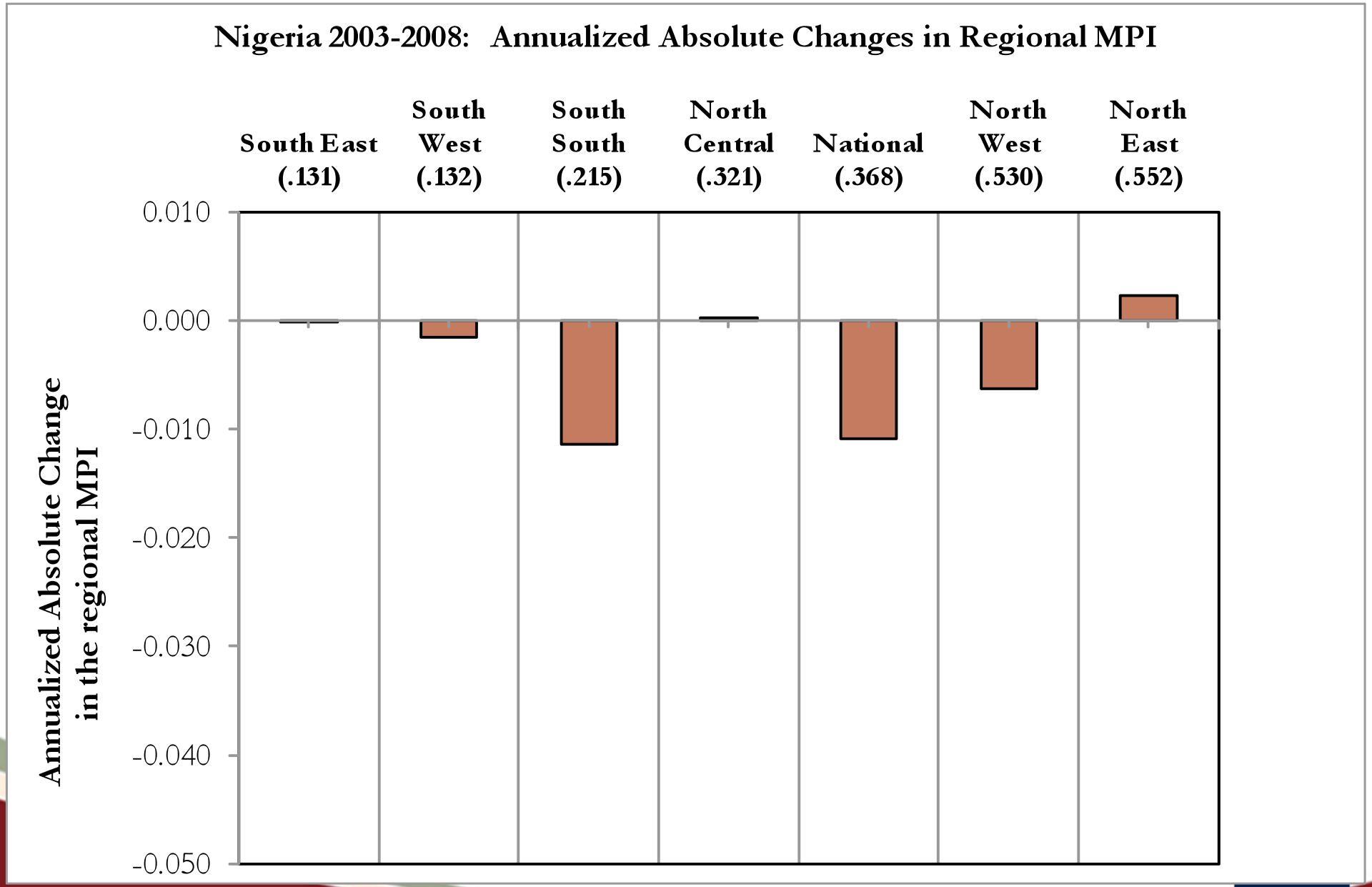
Changes over time in Rwanda



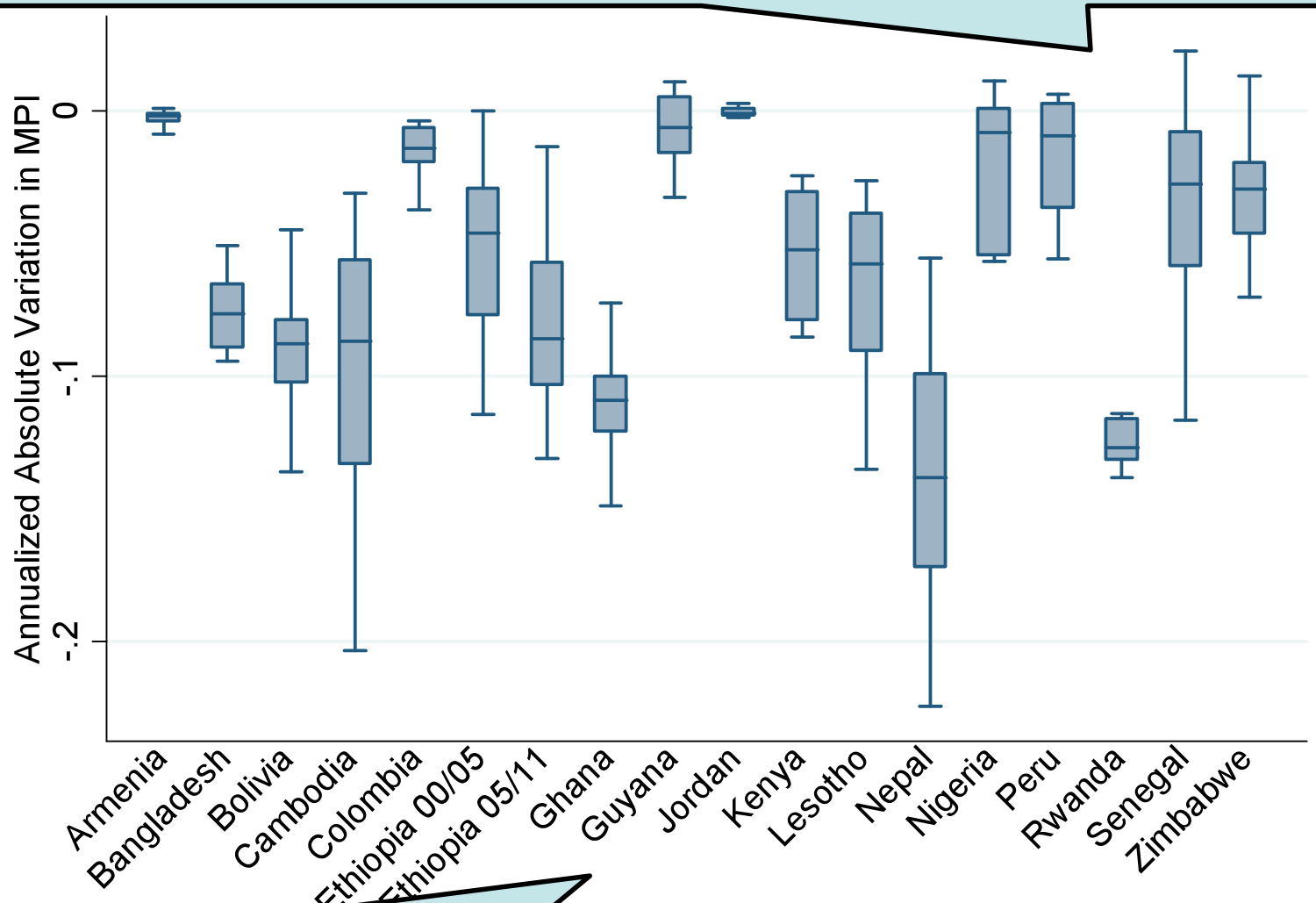
Changes over time in Nepal



Changes over time in Nigeria



In some countries we observe increase and decrease in poverty simultaneously, notably: Senegal, Nigeria and Zimbabwe



While comparison must be done with cautions, wide disparity in progress can be observed in Cambodia, Ethiopia, Nepal, and Senegal

MPI Data Bank

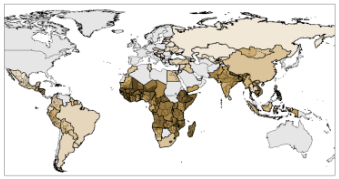
http://www.ophi.org.uk/multidimensional-poverty-index/mpi-data-bank/

MPI Data Bank:

http://www.ophi.org.uk/multidimensional-poverty-index/mpi-data-bank/

Web Tables : 1) National results (104 countries); 2) Sub-national results (65); 3) Time comparison results (22)

Country Profiles: briefing with results, graphs and poverty maps for each country



Poverty Maps: 1)Interactive online Maps – StatPlanet; 2) Printable version – MapInfo/PDF

Case Studies: qualitative in-depth interview

Robustness checks

Robustness Checks

- An international measure of multidimensional poverty is quite a crude instrument.

- As this is a new methodology, we tried to scrutinize the measure, and tune it to reflect multidimensional poverty with sufficient accuracy to add value for policy.

Some basic checks:

- **Quality Checks** – triangulating our results with other data sources
- **Robustness** of measure to different z cutoffs In the 2010 round we implemented a total of 18 measures, having different indicators and cutoffs.
- **Robustness** to changes in the k **cutoff**
- **Identification of the poor**: does it identify the same households as poor as a) income poor; and b) bottom quintile by the DHS wealth index?

MPI is robust to varying k= 20% to 40%

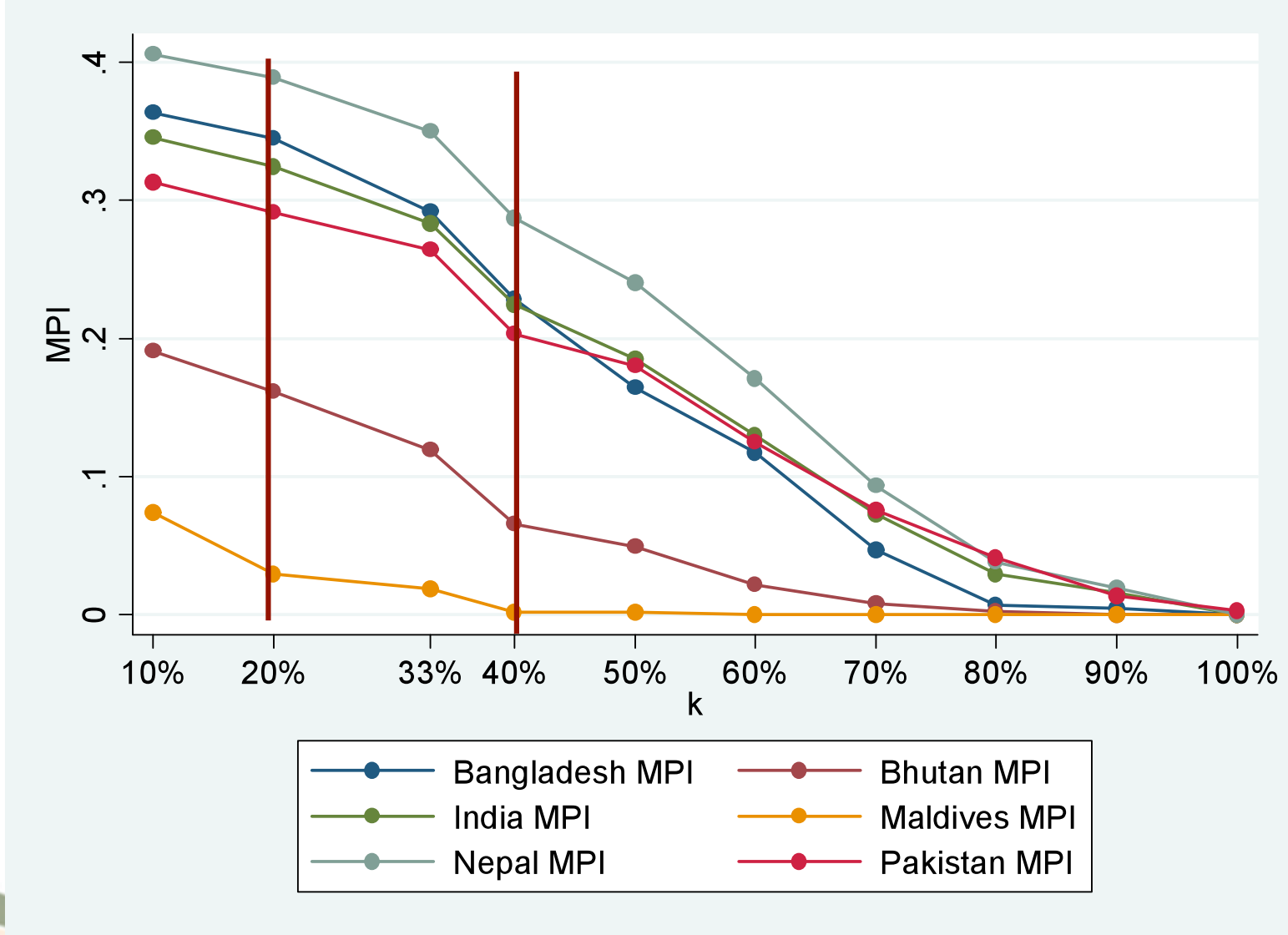
- 90% of the possible pairs of countries have a dominance relation for k 2 to 4. That is, we can say that one country is unambiguously poorer than another regardless of whether we require to be poor in 20, 30 or 40% of the weighted indicators.

MPI is robust to varying k= 20% to 40%

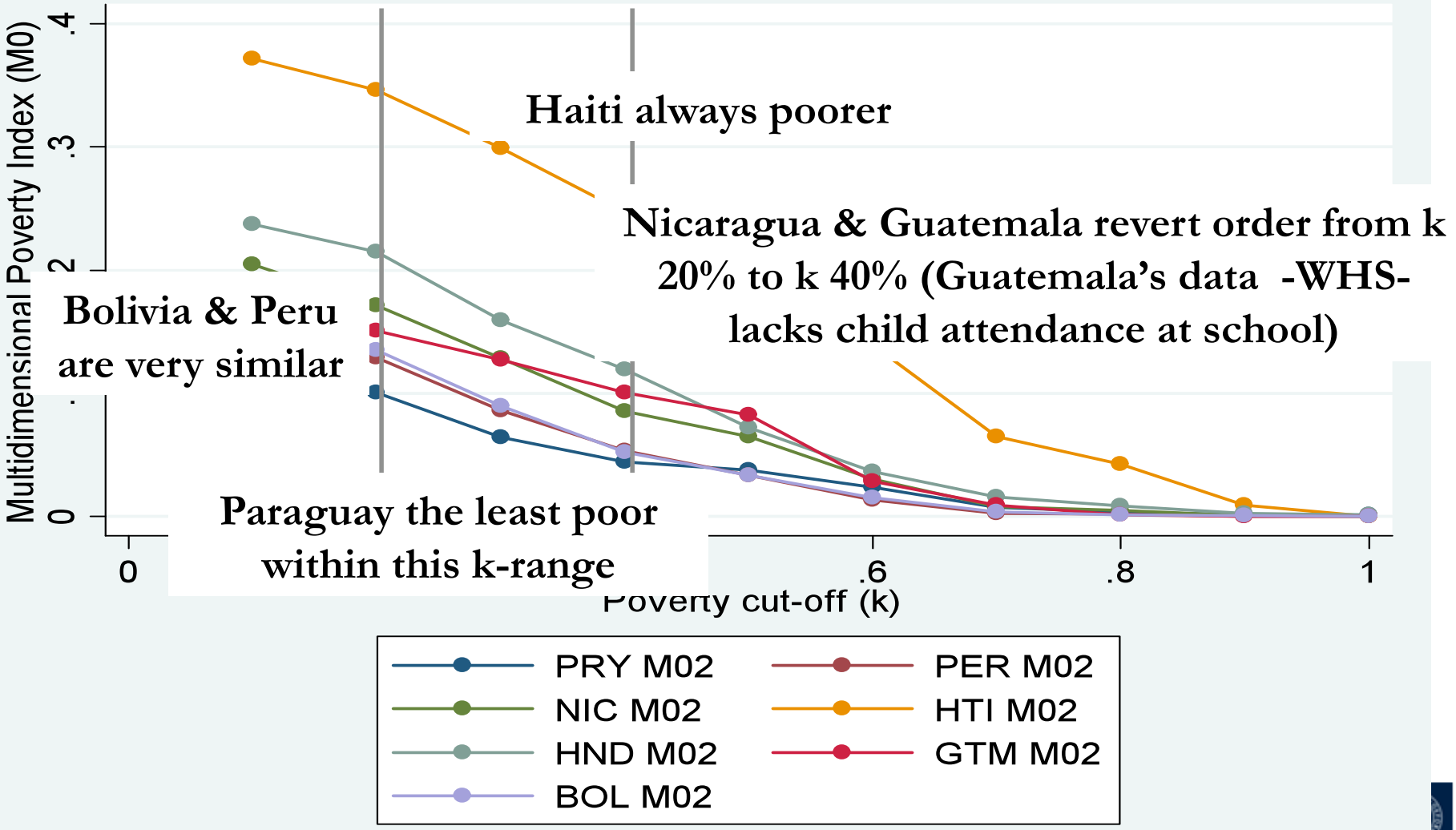
By region:

- Sub-Saharan Africa: 97% of pairwise comparisons are robust (38 countries)
- South Asia: 100% (7 countries)
- Latin America and Caribean: 92% (18 countries)
- Arab States: 94.5% (11 countries)
- East Asia and Pacific: 87% (11 countries)
- Central Europe and CIS: 68% (24 countries)

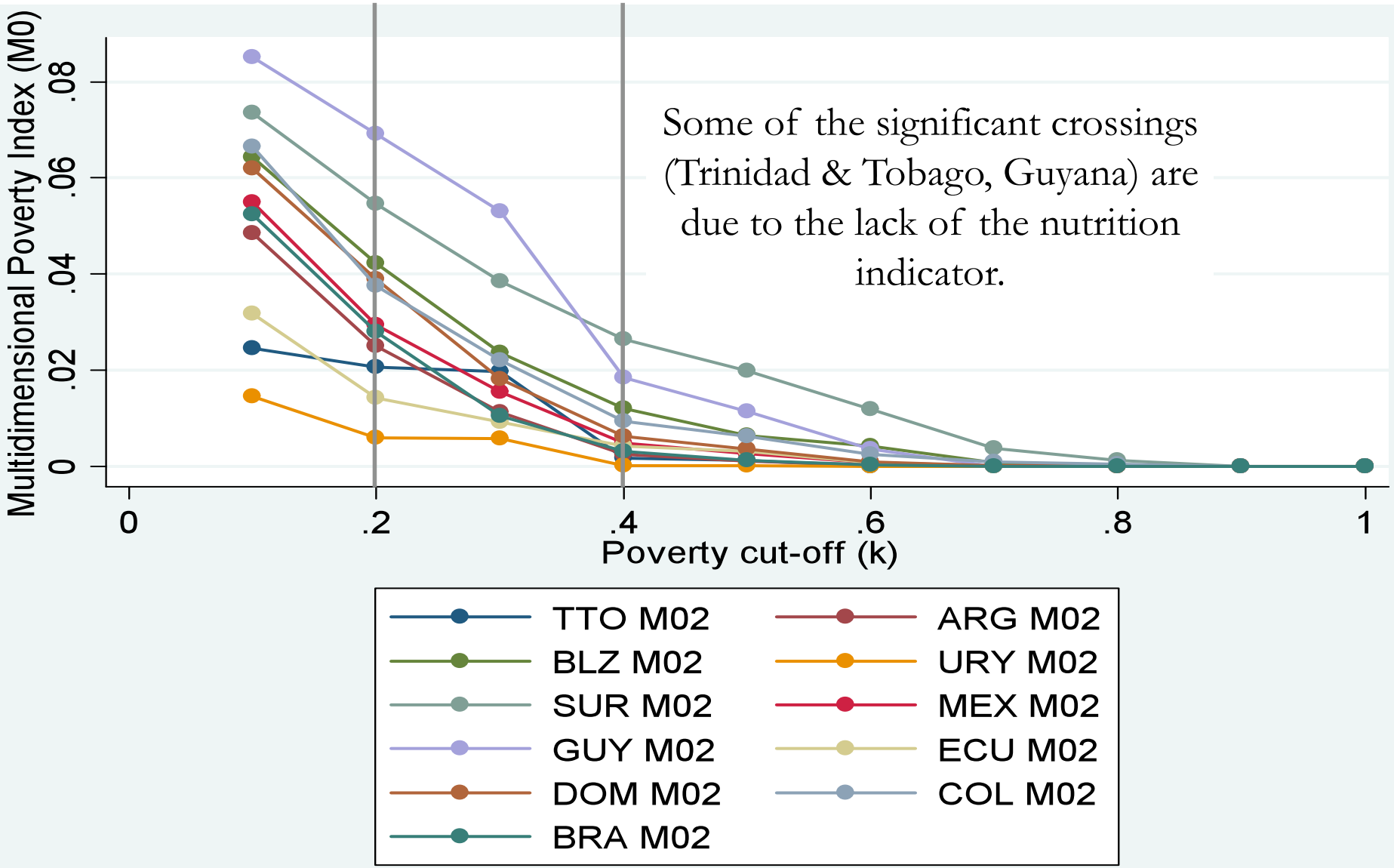
Robustness of MPI in South Asia



LAC Countries with High MPI (0.064-0.30)

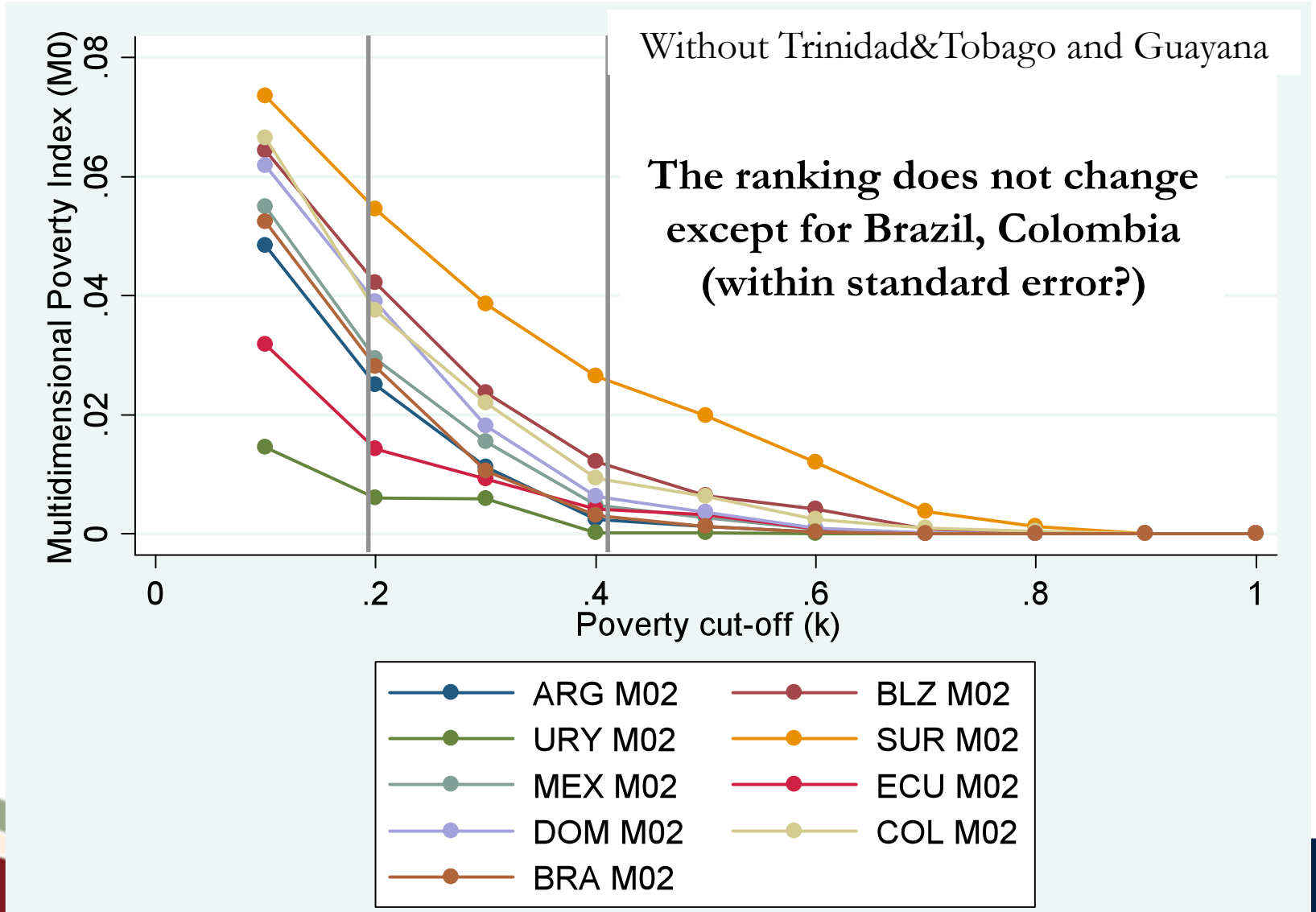


LAC Countries with Low MPI (0.006-0.04)



Further on LAC countries (Roche and Santos forthcoming)

LAC Countries with Low MPI (0.006-0.04)



Further on LAC countries (Roche and Santos forthcoming)

Robustness to Weights

- Recall: MPI varies from 0 to 0.642 and the headcount varies from 0 to 93%.
- Re-weight each dimension:
  - 33% 50% 25% 25%
  - 33% 25% 50% 25%
  - 33% 25% 25% 50%
- How does this affect:
  - MPI, H, A
  - Ranking of countries

Robustness to Weights

			MPI Weights 1	MPI Weights 2	MPI Weights 3
			Equal weights: 33% each **(Selected Measure)**	50% Education 25% Health 25% LS	50% Health 25% Education 25% LS
MPI Weights 2	50% Education 25% Health 25% LS	Pearson	0.992		
		Spearman	0.979		
		Kendall (Taub)	0.893		
MPI Weights 3	50% Health 25% Education 25% LS	Pearson	0.995	0.984	
		Spearman	0.987	0.954	
		Kendall (Taub)	0.918	0.829	
MPI Weights 4	50% LS 25% Education 25% Health	Pearson	0.987	0.965	0.975
		Spearman	0.985	0.973	0.968
		Kendall (Taub)	0.904	0.863	0.854
Number of countries:		**109**			

Robustness to Weights

Summary:

- High Correlations: 0.97 and above
- High Rank Concordance: 0.90 and above
- 85% of all possible pairwise comparisons are robust

www.ophi.org.uk