

# Why Multidimensional Poverty?

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*Nuevas Metodologías para Entender la Pobreza en Chile*

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# Traditional Monetary Poverty

## **Longstanding** concept

Dating back to Booth and Rowntree (Foster, 1984)

## Official methods in many **countries**

## Complementary **global** methods

World Bank's \$1.25 a day

FGT:  $P_0$ ,  $P_1$ ,  $P_2$

Colossal effort

Remarkable collection of data points over time and space

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# Traditional Monetary Poverty

## Note

There is **more to poverty** than inadequate monetary resources

Eg

**Capability** deprivations

Sen (eg, Foster and Sen 1997)

Heckman (eg, Heckman and Mosso 2014)

Basic **social services**

Human and social **rights**

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# Traditional Monetary Poverty

## Alternative question

Should poverty refer only to those advantages that can be valued in **monetary** terms?

Many voices, including those of the poor, would say **no**

## **Practical** issues

### Thin markets

Health insurance in the US

Housing in developing countries

### PPP and other index problems

How to value money over time and space?

### Missing markets

Malnourished children in India

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# Another Voice

“The task, then, for the governments of the developing countries is to reorient their development policies in order to attack directly the personal poverty of the most deprived 40% of their populations. This the governments can do without abandoning their goals of vigorous overall economic growth. But they must be prepared to give greater priority to **establishing growth targets in terms of essential human needs: in terms of nutrition, housing, health, literacy, and employment** - even if it be at the cost of some reduction in the pace of advance in certain narrow and highly privileged sectors whose benefits accrue to the few.

Such a reorientation of social and economic policy is primarily a political task, and **the developing countries must decide for themselves if they wish to undertake it**. It will manifestly require immense resolve and courage.”

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Robert McNamara (1972, p. 30)

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# Revealed Preference

Many countries **are** deciding for themselves!

<b>Countries</b> with their own MPIs	<b>Date</b>
Mexico	2009
Bhutan	2010
Colombia	2011
Philippines	2014
Vietnam	Soon
El Salvador	Soon
Honduras	Working
Costa Rica	Working
Dominican Republic	Working
South Africa, China, and many others....	

Shared methodology with country to country technical support  
Multidimensional Poverty Peer Network

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# Multidimensional Poverty

## **Longstanding** concept

Implicit in Booth and Rowntree (Foster, 1984)

## Official methods in several **countries**

## Complementary **global** method

UNDP's Multidimensional Poverty Index (**MPI**)

Colossal joint effort by HDRO and OPHI

Remarkable collection of results over time and space

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# Outline: Why Multidimensional Poverty?

## Poverty Measurement

- Unidimensional

- Multidimensional

## Examples

- MPI

- Mexico

- Colombia

## Conclusions

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# Poverty Measurement

Traditional poverty framework of Sen (1976)

Two steps

Identification: “Who is poor?”

Targeting

Aggregation “How much poverty?”

Evaluation and monitoring

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# Unidimensional Poverty Measurement

Typically uses **poverty line** for identification

Poor if income below the cutoff

Example: Income distribution  $\mathbf{x} = (7, 3, 4, 8)$  poverty line  $\mathbf{p} = 5$

Who is poor?

# Unidimensional Poverty Measurement

Typically uses **poverty line** for identification

Poor if income below the cutoff

Example: Income distribution  $\mathbf{x} = (7,3,4,8)$  poverty line  $\mathbf{p} = 5$

Who is poor?

Typically uses **poverty measure** for aggregation

Formula aggregates data to poverty level

Examples: Watts, Sen

Example: **FGT**  $P_a(x; p) = m(g_1^a, \dots, g_n^a) = m(g^a)$

Where:  $g_i^\alpha$  is  $[(p - x_i)/p]^\alpha$  if  $i$  is poor and 0 if not, and  $\alpha \geq 0$  so that

$\alpha = 0$  headcount ratio

$\alpha = 1$  per capita poverty gap

$\alpha = 2$  squared gap, often called FGT measure

# Unidimensional Poverty Measurement

## Example

**Incomes**  $x = (7, \underline{1}, \underline{4}, 8)$

**Poverty line**  $p = 5$

**Deprivation vector**  $g^0 = (0, 1, 1, 0)$

**Headcount ratio**  $P_0(x; p) = m(g^0) = 2/4$

**Normalized gap vector**  $g^1 = (0, 4/5, 1/5, 0)$

**Poverty gap = HI**  $= P_1(x; p) = m(g^1) = 5/20$

**Squared gap vector**  $g^2 = (0, 16/25, 1/25, 0)$

**FGT Measure**  $= P_2(x; p) = m(g^2) = 17/100$

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# Multidimensional Poverty Measurement

How to evaluate poverty with many dimensions?

**Aggregation** focus of previous work

Atkinson (2003), Bourguignon and Chak (2003)

Not **identification**

All use cutoffs to identify **deprivations**

Then identify **poor** in one of two ways

Poor if have *any* deprivation (union)

Poor if have *all* deprivations (intersection)

Problem

**Impractical** when there are many dimensions

Need intermediate approach

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# AF Methodology

Alkire and Foster (2011) methodology addresses these problems

It specifies an **intermediate** identification method that is consistent with **ordinal** data often found

**Dual cutoff** identification

**Deprivation cutoffs**  $z_1 \dots z_j$  one per each of  $j$  deprivations

**Poverty cutoff**  $k$  across aggregate weighted deprivations

Idea

A person is poor if multiply deprived enough

Example

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# AF Methodology

Achievement Matrix (assume each dim. equally important)

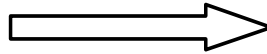
$$Y = \begin{matrix} & \text{Dimensions} & & \\ & \begin{bmatrix} 13.1 & 14 & 4 & 1 \\ 15.2 & \underline{7} & 5 & \underline{0} \\ \underline{12.5} & \underline{10} & \underline{1} & \underline{0} \\ 20 & \underline{11} & 3 & 1 \end{bmatrix} & \text{Persons} \end{matrix}$$
$$z = (13 \quad 12 \quad 3 \quad 1) \quad \text{Cutoffs}$$



# AF Methodology

Deprivation Matrix

$$g^0 = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 \end{bmatrix} \quad \begin{bmatrix} 0 \\ 2 \\ 4 \\ 1 \end{bmatrix}$$



Censored Deprivation Matrix,  $k=2$

$$g^0(k) = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix} \quad \begin{bmatrix} 0 \\ 2 \\ 4 \\ 0 \end{bmatrix}$$

**Identification** Who is poor?

If poverty cutoff is  $k = 2$

Then the two middle persons are poor

Now censor the deprivation matrix

Ignore deprivations of nonpoor

# AF Methodology

If data cardinal, construct two additional censored matrices

Censored Gap Matrix

$$g^1(k) = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0.42 & 0 & 1 \\ 0.04 & 0.17 & 0.67 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Censored Squared Gap Matrix

$$g^2(k) = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0.42^2 & 0 & 1^2 \\ 0.04^2 & 0.17^2 & 0.67^2 & 1^2 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

## Aggregation

$$M_{\alpha} = \mu(g^{\alpha}(k)) \text{ for } \alpha \geq 0$$

**Adjusted FGT**  $M_{\alpha}$  is the mean of the respective censored matrix

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# AF Methodology

## Note

The poverty measures with  $\alpha > 0$  use gaps, hence require **cardinal** data

**Impractical** given typical data quality

Focus here on measure with  $\alpha = 0$  that handles **ordinal** data

## Adjusted Headcount Ratio $M_0$

Practical and applicable

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# Adjusted Headcount Ratio

$$\text{Adjusted Headcount Ratio} = M_0 = \text{HA} = m(g^0(k))$$

Domains				c(k)	c(k)/d	Persons
$g^0(k) =$	0	0	0	0		
	0	1	0	<u>2</u>	2 / 4	
	1	1	1	<u>4</u>	4 / 4	
	0	0	0	0		

H = multidimensional headcount ratio = 1/2

A = average deprivation share among poor = 3/4

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# Multidimensional Poverty: Overview

## Identification – Dual cutoffs

Deprivation cutoffs - each deprivation counts

Poverty cutoff - in terms of aggregate deprivation values

## Aggregation – Adjusted FGT

Reduces to FGT in single variable case

Natural **generalization** of FGT to multidimensional case

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# Adjusted Headcount Ratio

Concept - Poverty as **multiple deprivations**

Mirrors identification used by **NGOs** – BRAC

Depends on **joint** distribution

**Ordinal** data

Dirt floors vs covered floors

Qualitative data into quantitative data

**Transparent**

Defined by variables, deprivation cutoffs,  
deprivation values, poverty cutoff

Can be replicated and tested for robustness

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# Adjusted Headcount Ratio

Has been implemented

**Cross country** – MPI in the HDR's since 2010

**Country** – Mexico, Bhutan, Colombia, etc.

**State/Metro** – Sao Paulo, Minas Gerais, Ho Chi Minh City (next week)

**Other measures** – Gross National Happiness Index (Bhutan), Women's Empowerment in Agriculture Index (USAID/IFPRI), Service delivery performance measure (Allwine and Foster, 2011)

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## Example 1: - Global MPI

**Headline** number for communication and monitoring  
**Coordinated dashboard** for policy analysis



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# Example 1 – Global MPI

## Description

Internationally **comparable** index of **acute** poverty  
100+ developing countries.

Launched 2010 in **UNDP's** *Human Development Report* (HDR)  
Updated 2011, 2013 and 2014.

Methodology is being **adapted** for national poverty measures –  
Using better indicators for country's own policy context.

SDG discussion include monetary and multidimensional poverty  
Separate indicators and targets

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# Example 1 – Global MPI

## Data Sources

### Global Surveys

Demographic & Health Surveys (**DHS** - 52)

Multiple Indicator Cluster Surveys (**MICS** – 34)

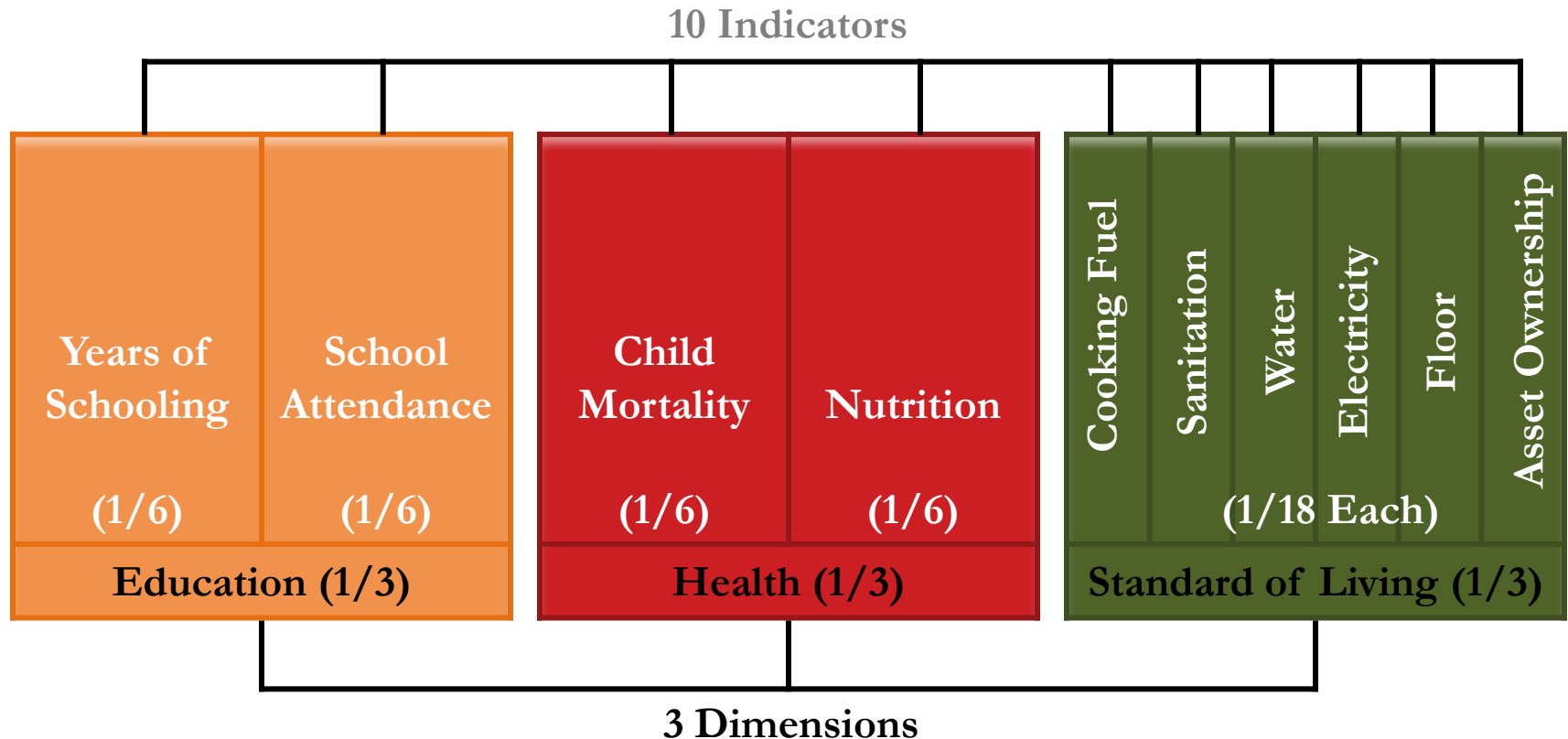
World Health Survey (**WHS** – 16)

### Country Surveys

Urban Argentina (ENNyS), Brazil (PNDS), Mexico (ENSANUT), Morocco (ENNVM/LSMS), Occupied Palestinian Territory (PAPFAM), and South Africa (NIDS).

Constraints: Data are 2002-2013. Not all have precisely the same indicators.

# Constructing the MPI - Overview

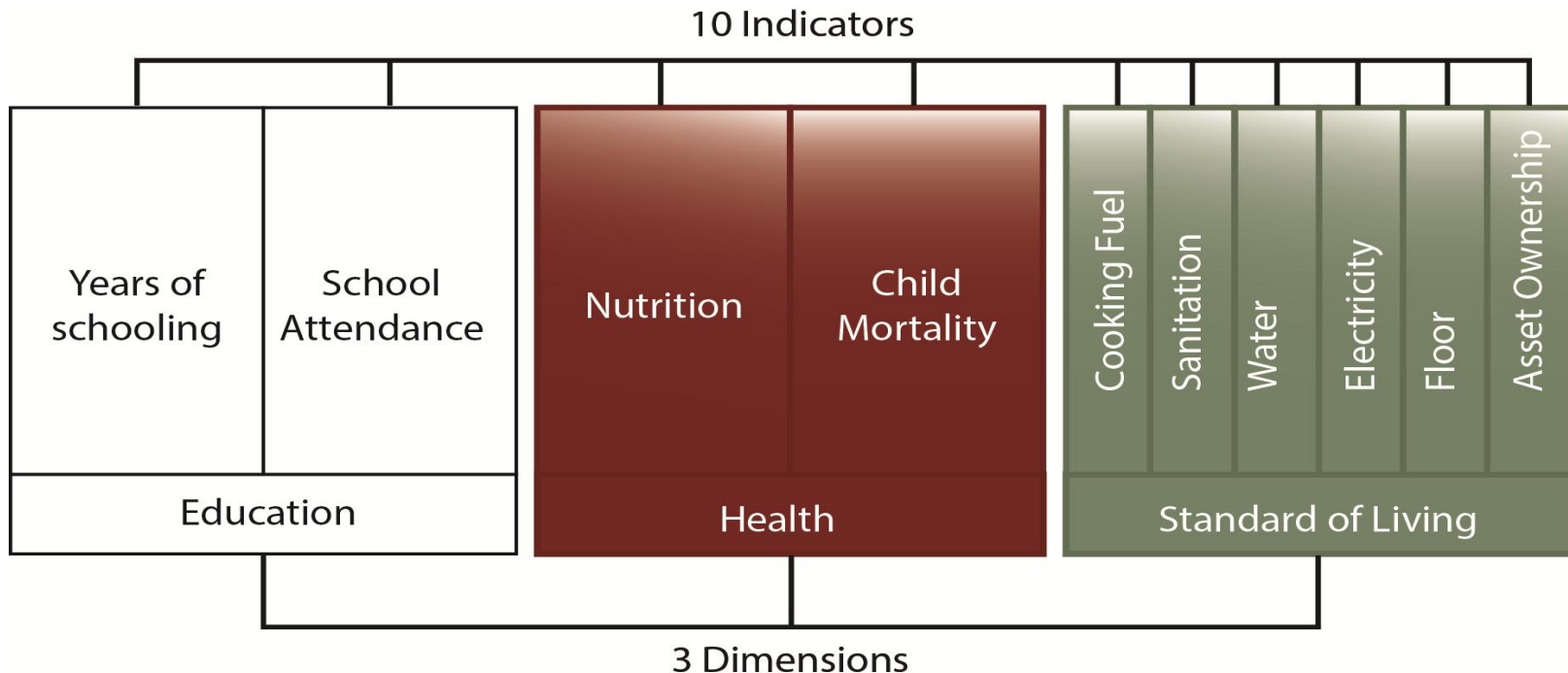


# Constructing the MPI



## 1. Build a deprivation score for each person

*Ex: Nathalie faces multiple deprivations in health and living standards*

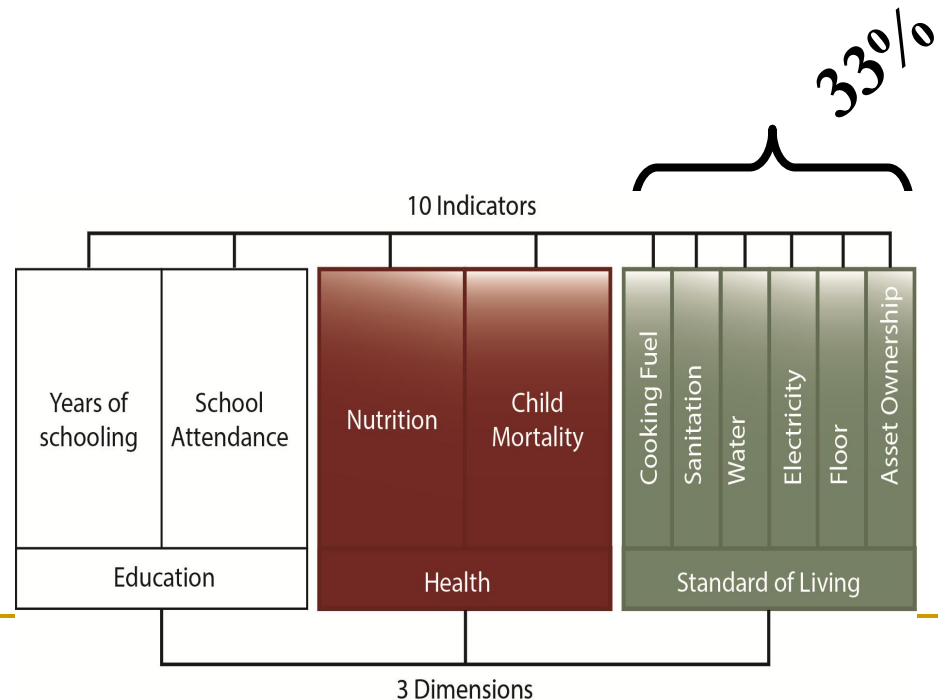


# Constructing the MPI

## 2. Identify who is poor

A person is multidimensionally poor if deprived in 33% or more of the dimensions.

*Ex: Nathalie's deprivation score is 67% > 33% so Nathalie is poor*



# Constructing the MPI

3. **Compute**  $MPI = M_o$  as the product of two components:

$$MPI = H \times A$$

***Incidence  $H$***

percentage of people who are poor

***Intensity  $A$***

average percentage of dimensions in which poor people are deprived

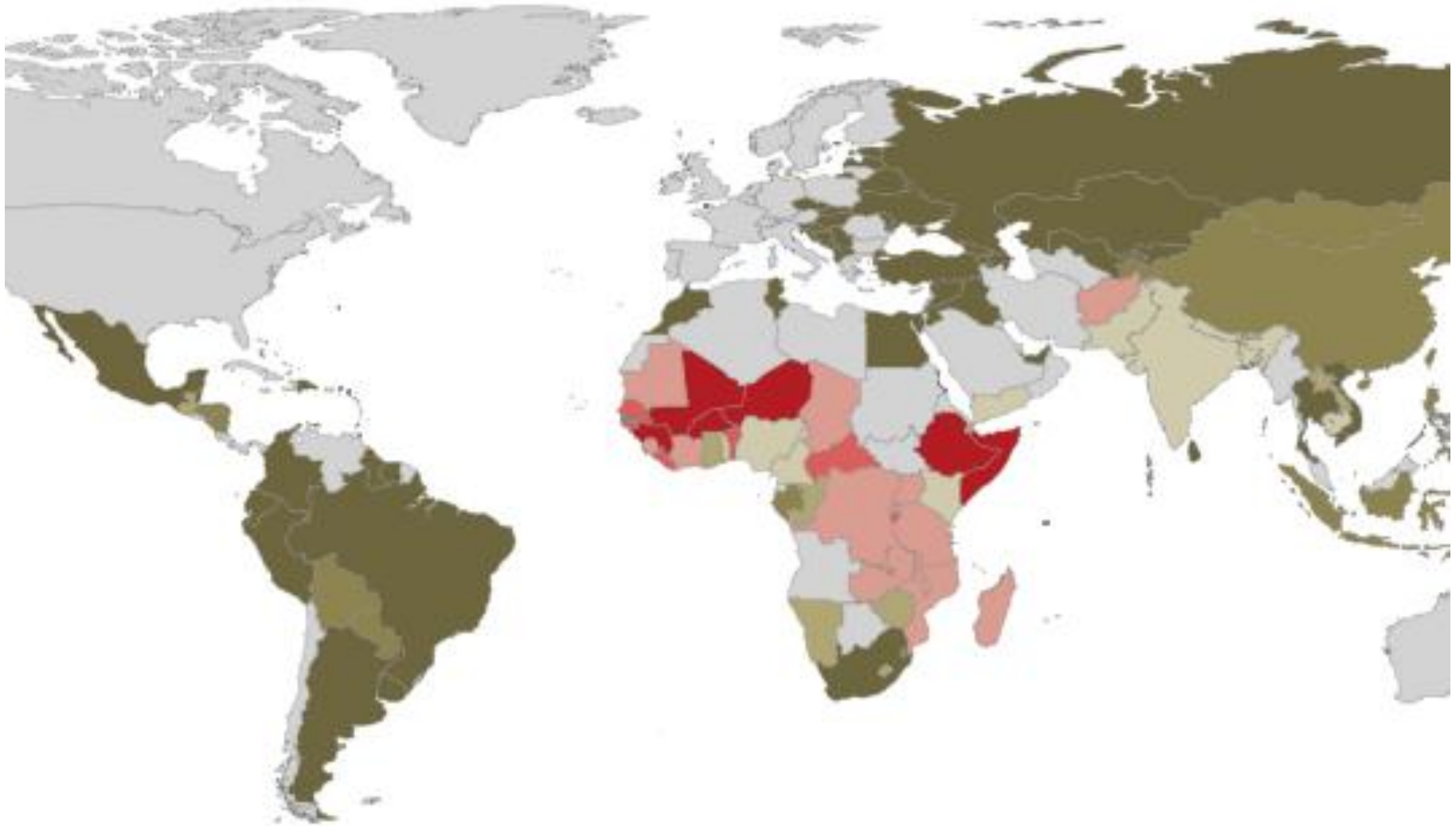
Counting  
Methods  
(NBI)

Axiomatic  
Methods  
(FGT)

AF  
Methodology  
 $M_0$

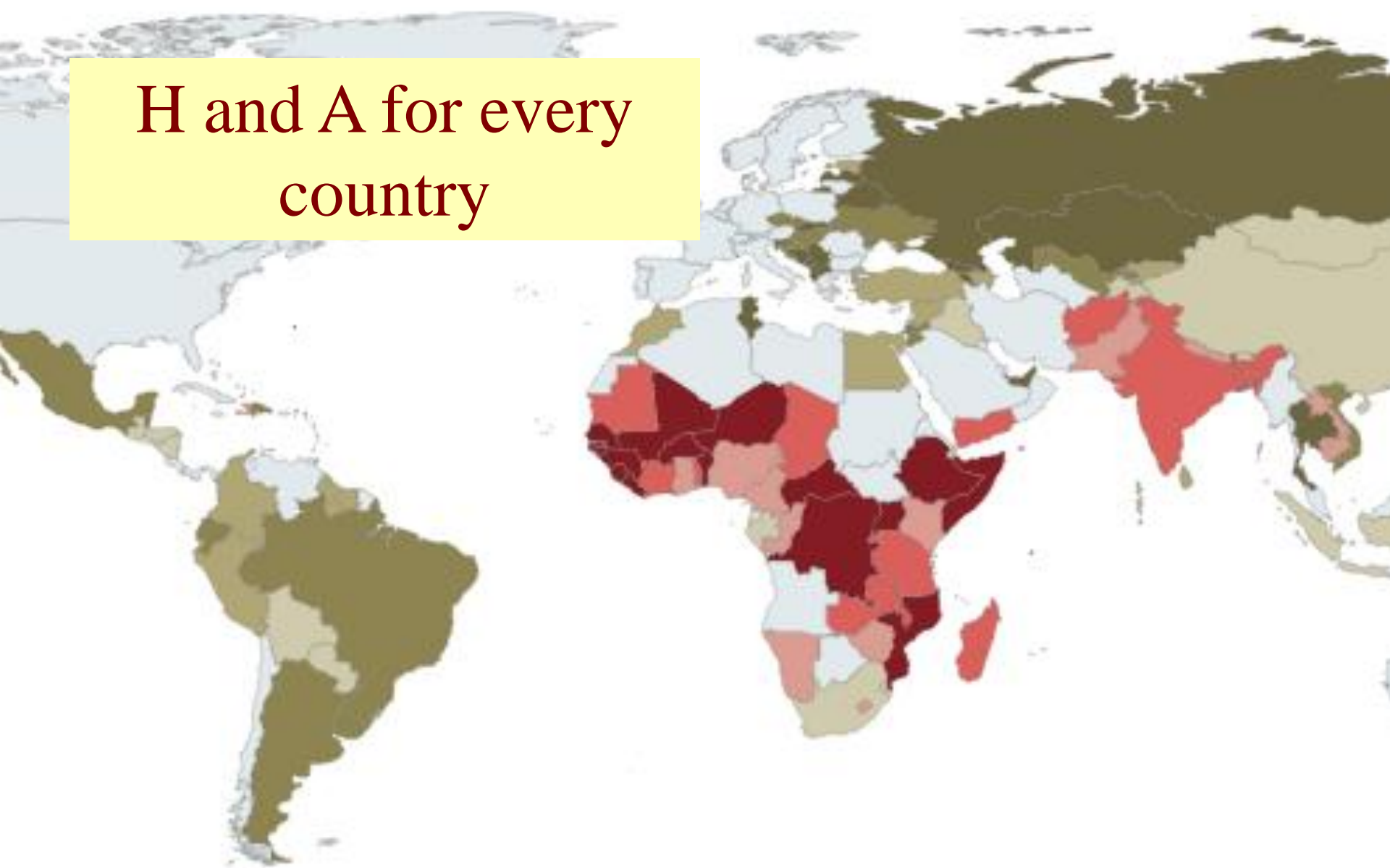
Following Atkinson 2003

# MPI 2014 – 108 Countries



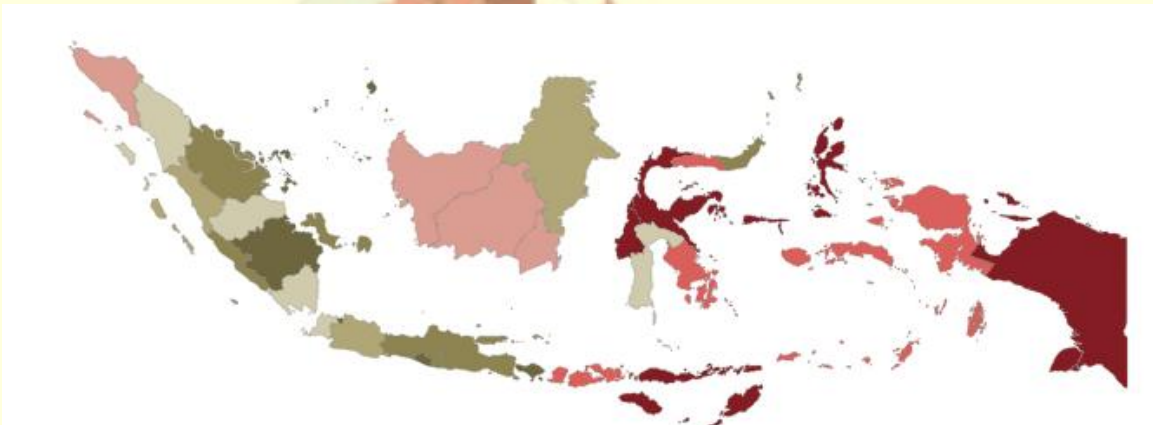
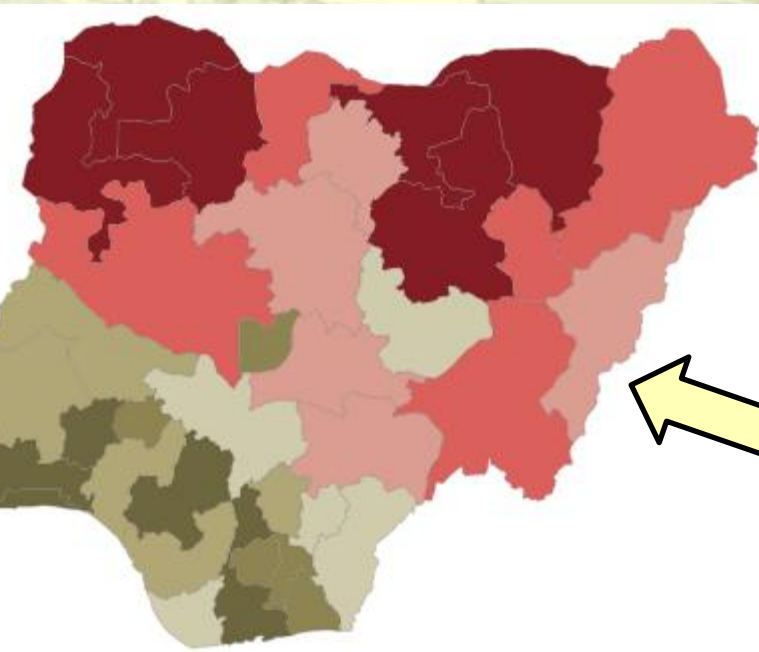


H and A for every  
country



11.03 11.04 - 29.41 29.42 - 49.57 49.58 - 69.43 69.44 - 89.3 Missing Value

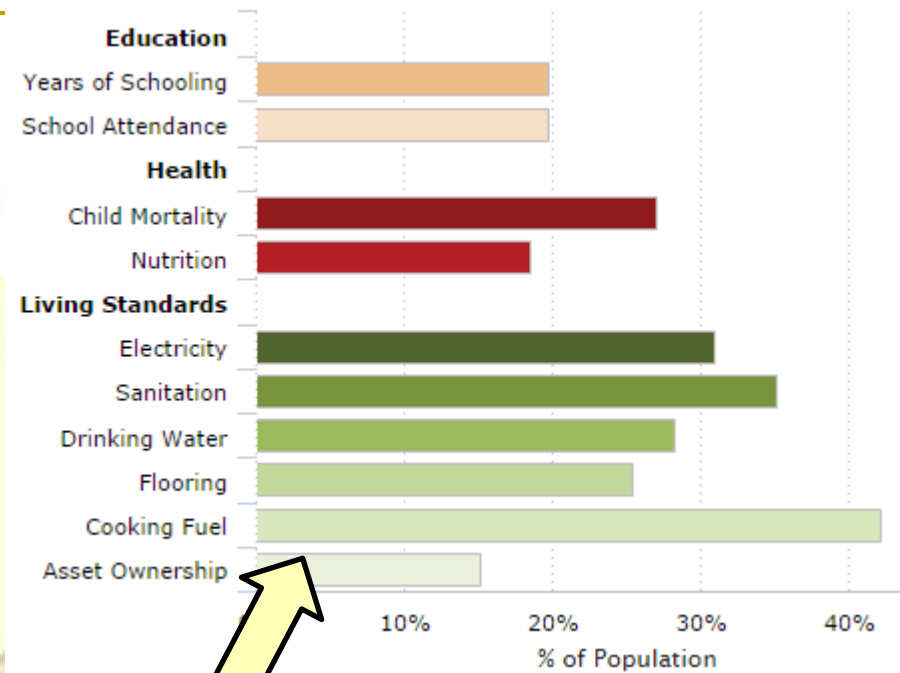
# Disaggregated data by region



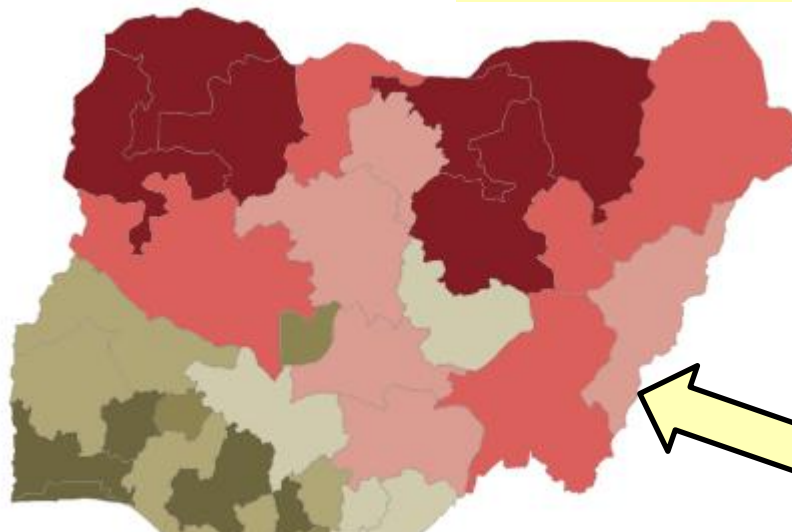
11.03 11.04 - 29.41 29.42 - 49

12.82 - 13.4 13.41 - 14.97 14.98 - 17.73 17.74 - 22.44 22.45 - 27.11 27.12 - 44.6 Missing

# Composition of poverty by dimension

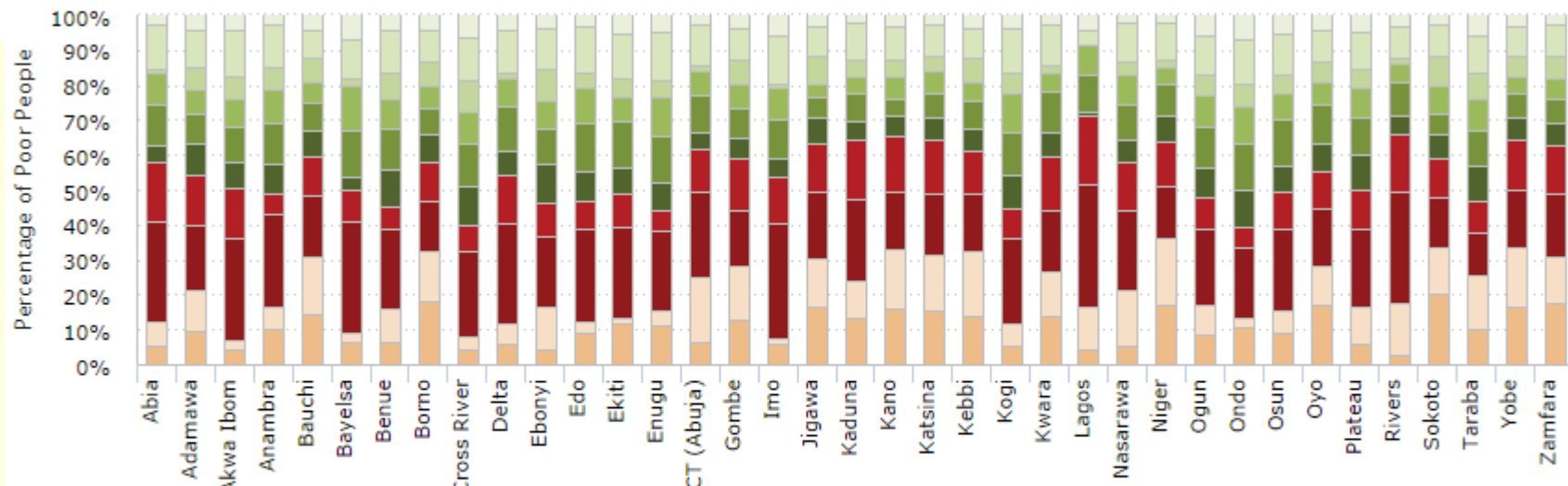


# Composition by region and dimensions

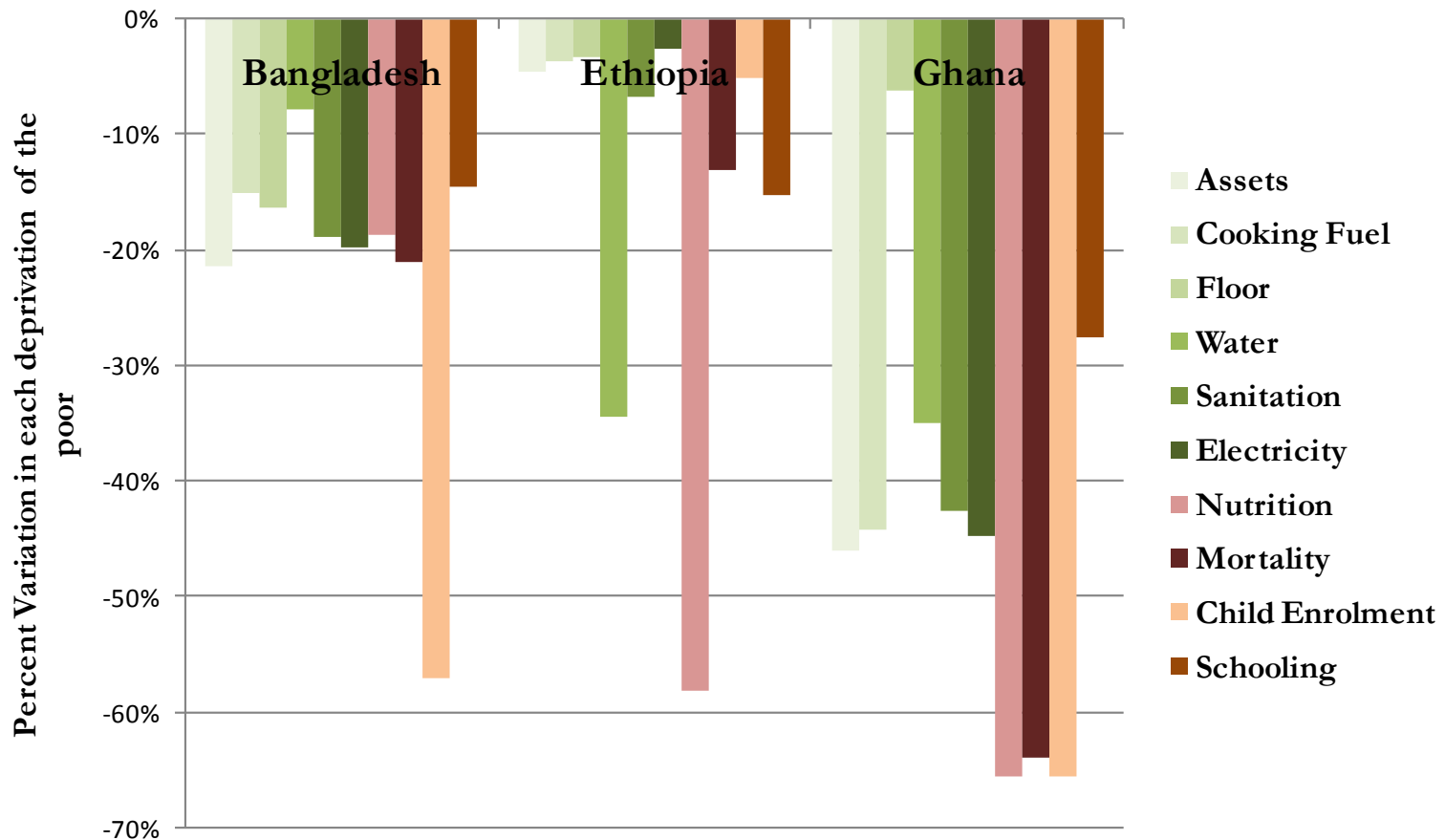


Percentage Contribution of Each Indicator to the MPI at the Sub-national Level

OPHI MPI 2014



**Progress over Time** Bangladesh improved school attendance, Ethiopia nutrition and water, Ghana many at the same time.





The MPI is like a high resolution lens...



The MPI is like a high resolution lens...

You can zoom in



The MPI is like a high resolution lens...

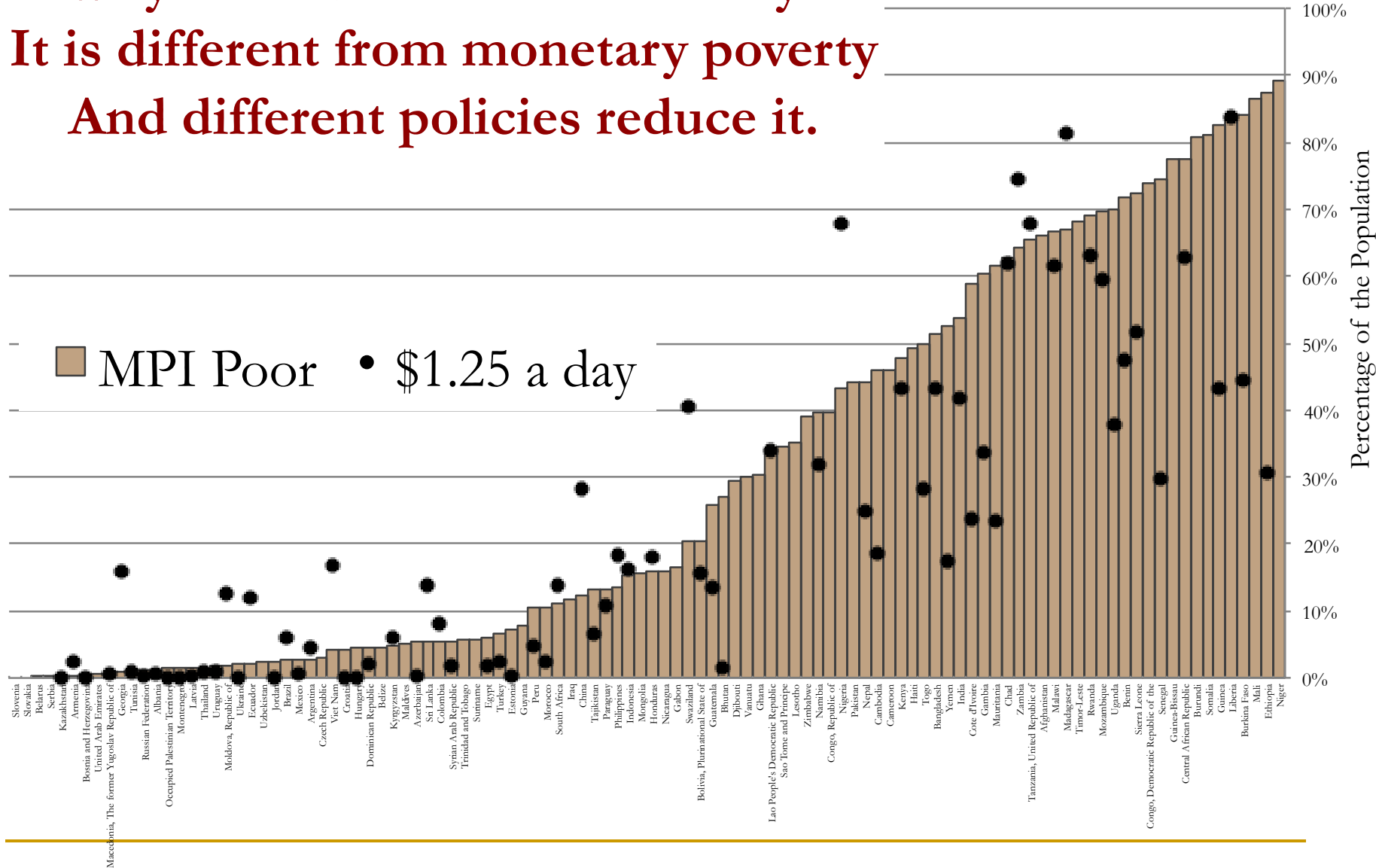
You can zoom in  
and see more





# Why Multidimensional Poverty?

It is different from monetary poverty  
And different policies reduce it.



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# Example 2: National Methodologies

## Motivations

Show **progress** quickly and directly (Monitoring/Evaluation)

Inform **planning** and focus **policy**

**Target** poor people and communities more effectively

Reflect poor people's **own** understandings of poverty

## Cases of National MPIs

**Mexico** December 2009

**Colombia** August 2011

Others in progress

- Slides drawn from government agencies
  - Available on agency websites
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# Example 2.1 - Mexico

Good **Governance** in Bad Times



Consejo Nacional de Evaluación  
de la Política de Desarrollo Social

# Multidimensional Poverty in Mexico Methodology & results

**First released December, 2009**

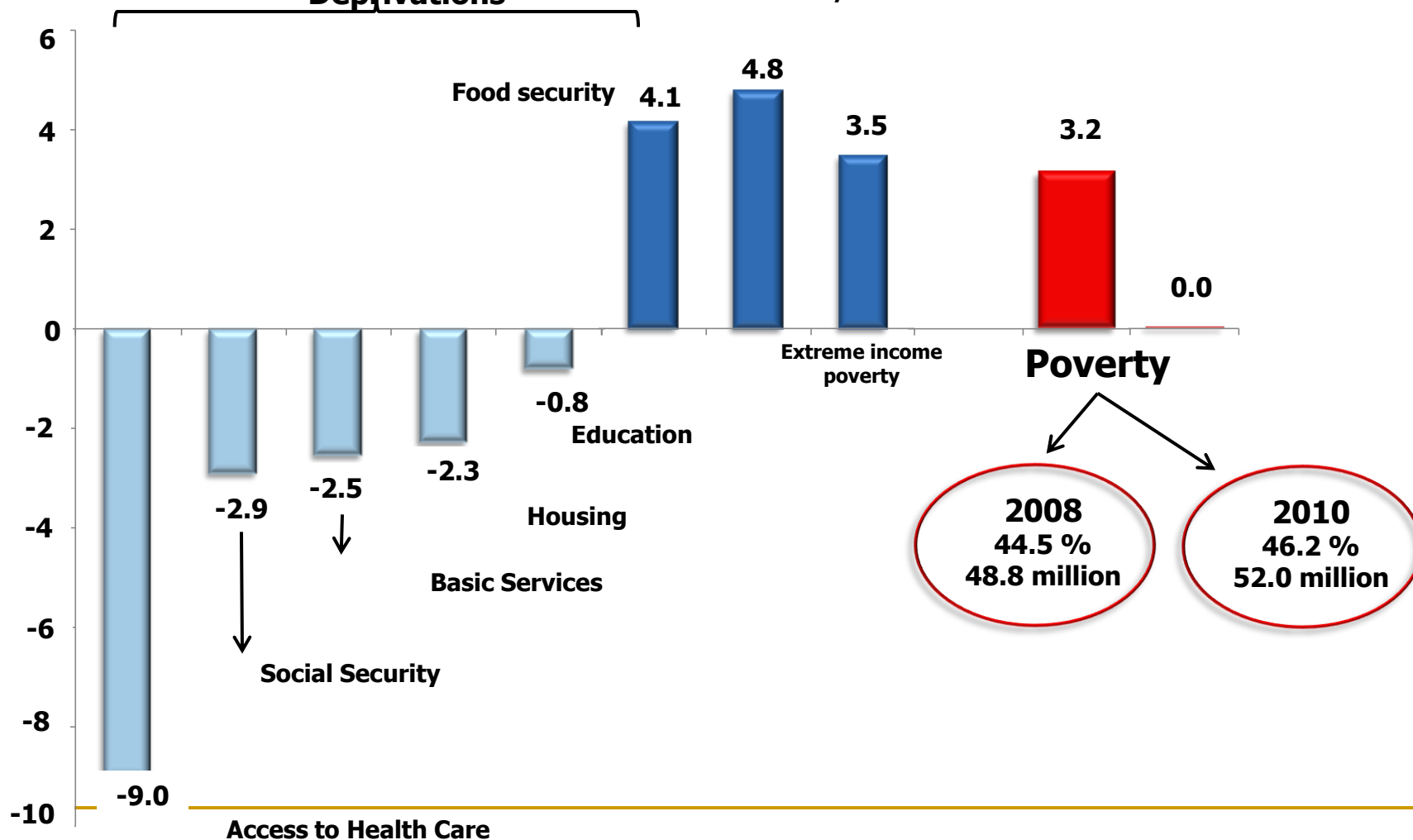
[www.coneval.gob.mx](http://www.coneval.gob.mx)

# Change in the Number of Poor People in Mexico 2008-2010

Millions of people

Social  
Deprivations

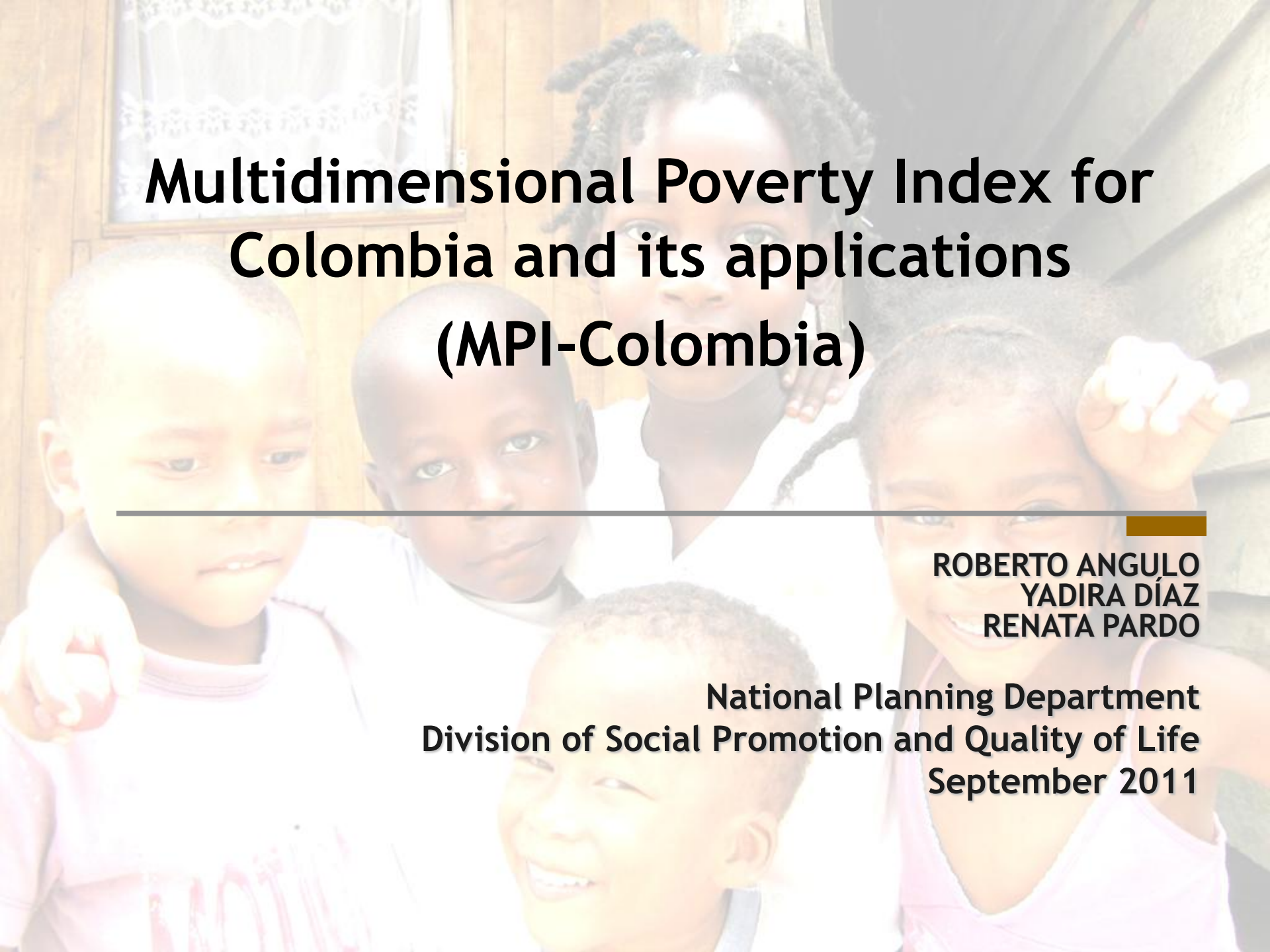
Income Poverty



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# Example 2.2 - Colombia

## **Coordinating** Action



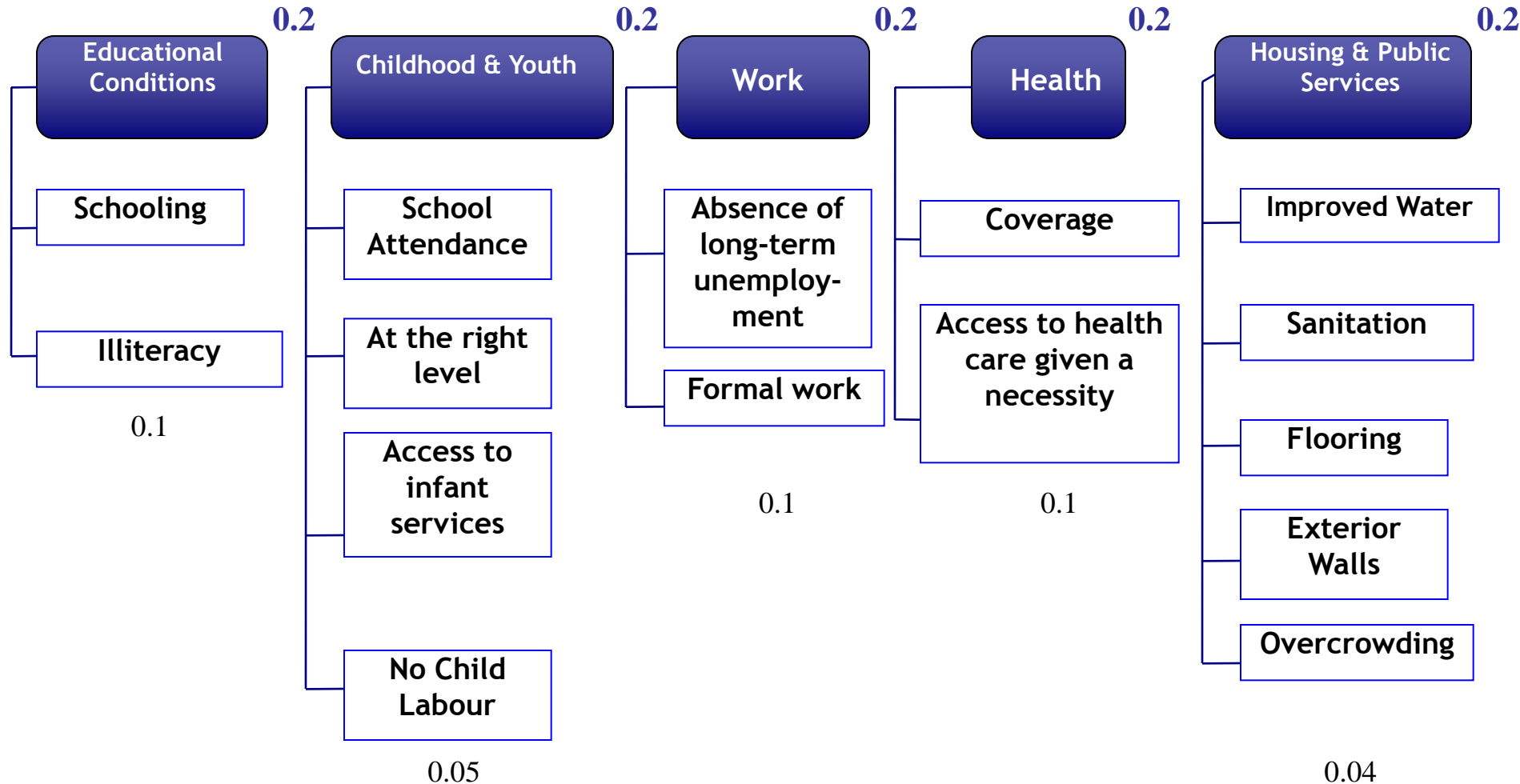
# **Multidimensional Poverty Index for Colombia and its applications (MPI-Colombia)**

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**ROBERTO ANGULO  
YADIRA DÍAZ  
RENATA PARDO**

**National Planning Department  
Division of Social Promotion and Quality of Life  
September 2011**

# Dimensions, Variables and Weights MPI-Colombia





# Poverty committee

## Coordinating and monitoring poverty reduction

### ■ Leaders

- Counselor for the Presidency
- National Planning Department

### ■ Permanent members

- Ministry of Health
- Ministry of Labor
- Ministry of Housing
- Ministry of Agriculture
- Ministry of Education
- Ministry of Finance



**MANDATORY PRESENCE**  
The President of Colombia

# Summary: Two Measurement Technologies

Two forms of technologies for evaluating poverty

- for identification and aggregation

1 **Unidimensional methods** apply when:

Single welfare variable – eg, calories

Variables can be combined into an aggregate variable – eg, expenditure, income

2 **Multidimensional methods** apply when:

Variables cannot be meaningfully aggregated – eg, sanitation conditions and years of education

Desirable to leave variables disaggregated because sub-aggregates are policy relevant – eg food and nonfood consumption

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# Summary

The AF methodology:

Presents **complementary** picture of poverty

Includes other key, non-monetary **dimensions**

**Policy** relevant tool

Dimensions can embody country specific policies and **priorities**

Show **progress** quickly and directly (Monitoring/Evaluation)

Inform planning and **coordinate** action

**Target** poor people and communities more effectively

Reflect poor people's **own understandings** of poverty

**Facilitates** deeper understanding and policy analysis

**HA; Decompositions** by subgroup, **breakdown** by dimension; **changes**

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Thank you

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