The Multidimensional Poverty Revolution

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Introduction

Thank you for invitation!

Much has happened since December 2014

- I am simply a tool maker
- Changes are best reported by the main actors

My role today

- Introduce general methods apologies for repetition
- Why multidimensional and not only income poverty?
- Provide examples of innovations

Traditional Monetary Poverty

Longstanding concept

Dating back to Booth and Rowntree

Foster (1984); Ravallion (2015) *The Economics of Poverty*

Official methods in many **countries**

Complementary **global** methods

World Bank's $1.90 a day

FGT: P_0, P_1, P_2

Colossal effort

Remarkable collection of data points over time and space

M. Cruz, J. Foster, B. Quillin and P. Schellekens (2015)
"Ending Extreme Poverty and Sharing Prosperity: Progress and Policies"
Policy Research Note 101740, World Bank, Washington, DC

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)

Lack of

Basic **social services**

Human and social **rights**

Each dimension having distinct policy solutions

Traditional Monetary Poverty

Alternative question

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

Or should new methods try to incorporate **missing dimensions**?

Examples

Indian income poverty has plummeted

Yet over 40% of children malnourished

Something is missing here!

Other examples: Employment quality, empowerment, physical safety, ability to go about without shame, social connectedness and external capabilities, hope and aspirations

With the right **data**, missing dimensions can be revealed!

Which can lead to policy action

Note: Others will remain – It is a process!

Multidimensional Poverty

Longstanding concept

    Implicit in Booth and Rowntree

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

        Oxford Poverty and Human Development Initiative

        http://www.ophi.org.uk

        Alkire and Santos (2014) *World Development*

Which Measurement Technology?

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

Outline of Talk

Poverty Measurement
- Unidimensional
- Multidimensional

Examples

Conclusions

Poverty Measurement

Traditional poverty framework of Sen (1976)

Two steps

    Identification: "Who is poor?"

        Targeting

    Aggregation "How much poverty?"

        Evaluation and monitoring

Unidimensional Poverty Measurement

Typically uses **poverty line** for identification

Poor if income below the cutoff

Example: Income distribution **x = (7,3,4,8)** poverty line **p = 5**

Who is poor?

Unidimensional Poverty Measurement

Typically uses **poverty line** for identification

Poor if income below the cutoff

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

Who is poor?

Typically uses **poverty measure** for aggregation

Formula aggregates data to poverty level

Examples: Watts, Sen

Example: **FGT** $P_\alpha(x;\pi) = \mu(g_1^\alpha,...,g_n^\alpha) = \mu(g^\alpha)$

Where: g_i^α 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 $P_0(x; p) = \mu(g^0) = 2/4$

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

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

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

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

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

AF Methodology

Alkire and Foster (2011) methodology addresses these problems

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

Dual cutoff identification

Deprivation cutoffs $z_1...z_j$ one per each of j deprivations

Poverty cutoff k across aggregate weighted deprivations

Idea

A person is poor if multiply deprived enough

Let's work through an example

AF Methodology

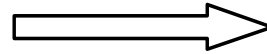Achievement Matrix (assume each dim. equally important)

$$Y = \begin{bmatrix} 13.1 & 14 & 4 & 1 \\ 15.2 & \underline{7} & 5 & \underline{0} \\ \underline{12.5} & \underline{10} & \underline{1} & \underline{0} \\ 20 & \underline{11} & 3 & 1 \end{bmatrix}$$

Dimensions (above)

Persons (right side)

$z = (\ 13 \quad 12 \quad 3 \quad 1\ )$ **Cutoffs**

AF Methodology

Deprivation Matrix   Censored Deprivation Matrix, k=2

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

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   Censored Squared Gap Matrix

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

Aggregation

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

Adjusted FGT M_α is the mean of the respective censored matrix

AF Methodology

Note

Poverty measures with $\alpha > 1$ address **inequality** among poor

However, all measures with $\alpha > 0$ require **cardinal** data

Impractical given typical data quality

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

Adjusted Headcount Ratio M_0

Also called "MPI"

Practical and applicable

Adjusted Headcount Ratio

Adjusted Headcount Ratio $= M_0 = HA = \mu(g^0(k))$

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

Domains   c(k)   c(k)/d

c(k)	c(k)/d
0	
2	2 / 4
4	4 / 4
0	

Persons

H = multidimensional headcount ratio = 1/2

A = average deprivation share among poor = 3/4

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

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

Example 1: - Global MPI

Headline number for communication and monitoring

Coordinated dashboard for policy analysis

Evaluating poverty across **boundaries**

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.

UN discussion includes multidimensional poverty (**SDG 1.2**)

Being considered for SDG 1.2

World Bank's Global Poverty Commission – Atkinson (2016)

Includes recommendation to construct measure using AF technology

Constructing the MPI - Overview
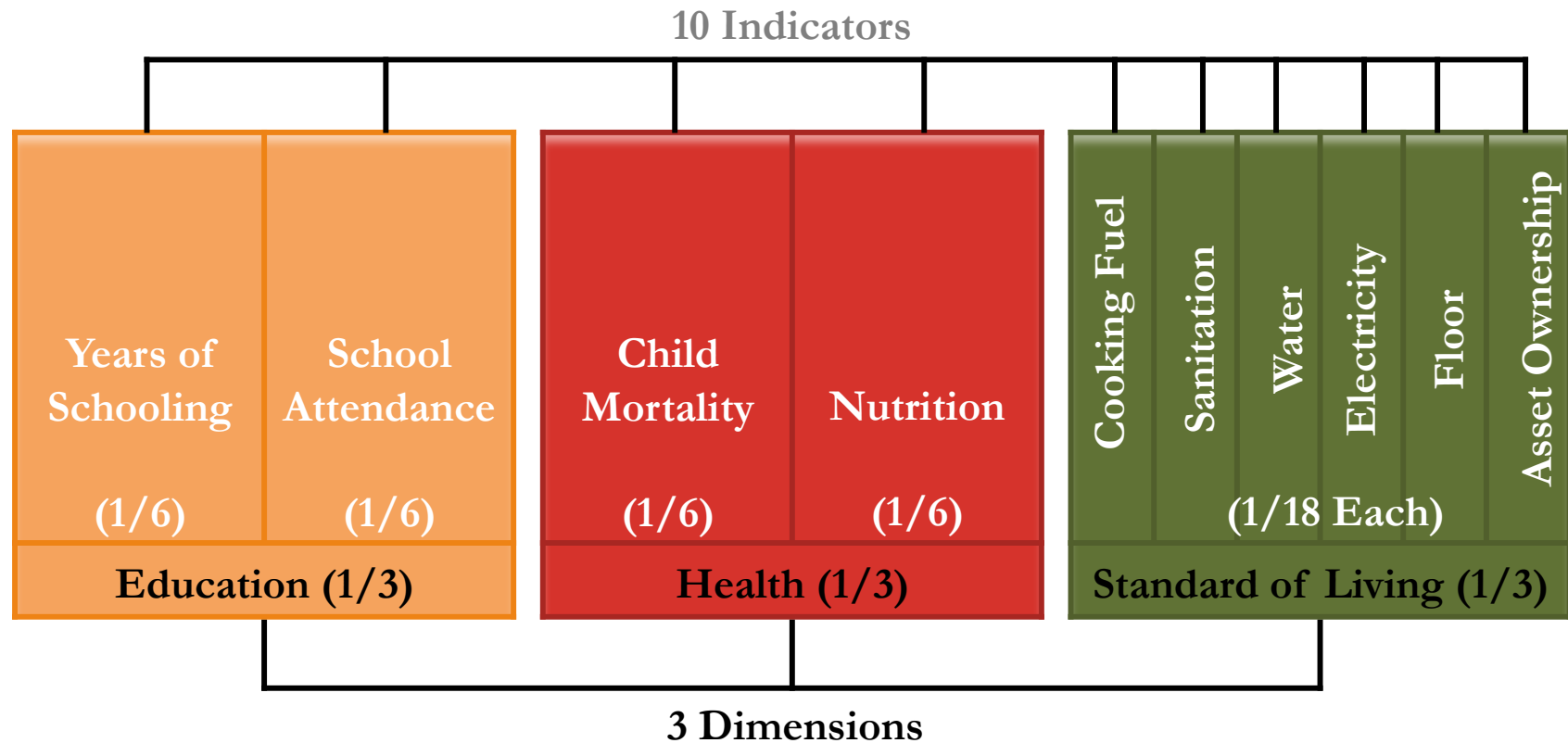
Constructing the MPI

1. Build a deprivation **score** for each person

Ex: Nathalie faces multiple deprivations in health and living standards

10 Indicators

Years of schooling	School Attendance	Nutrition	Child Mortality	Cooking Fuel	Sanitation	Water	Electricity	Floor	Asset Ownership
Education		Health		Standard of Living					
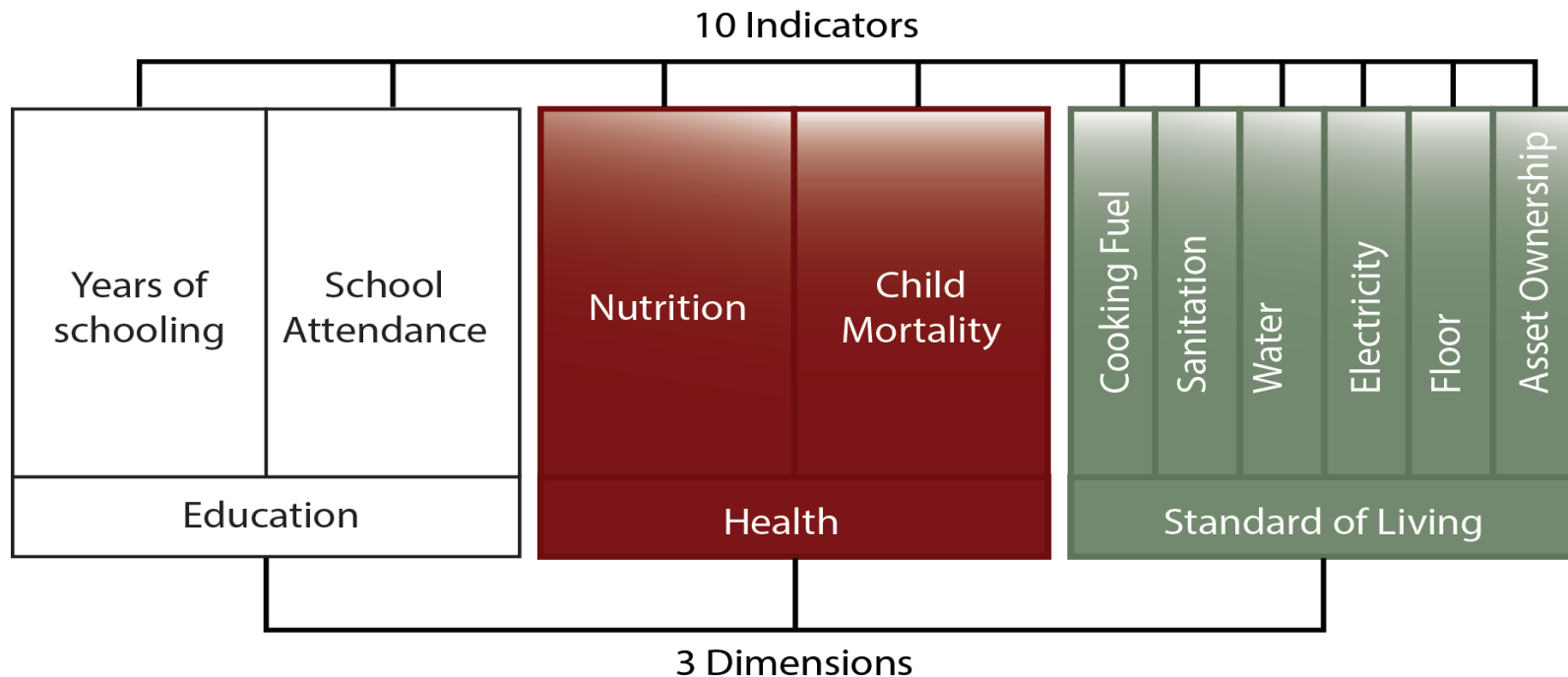
3 Dimensions

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
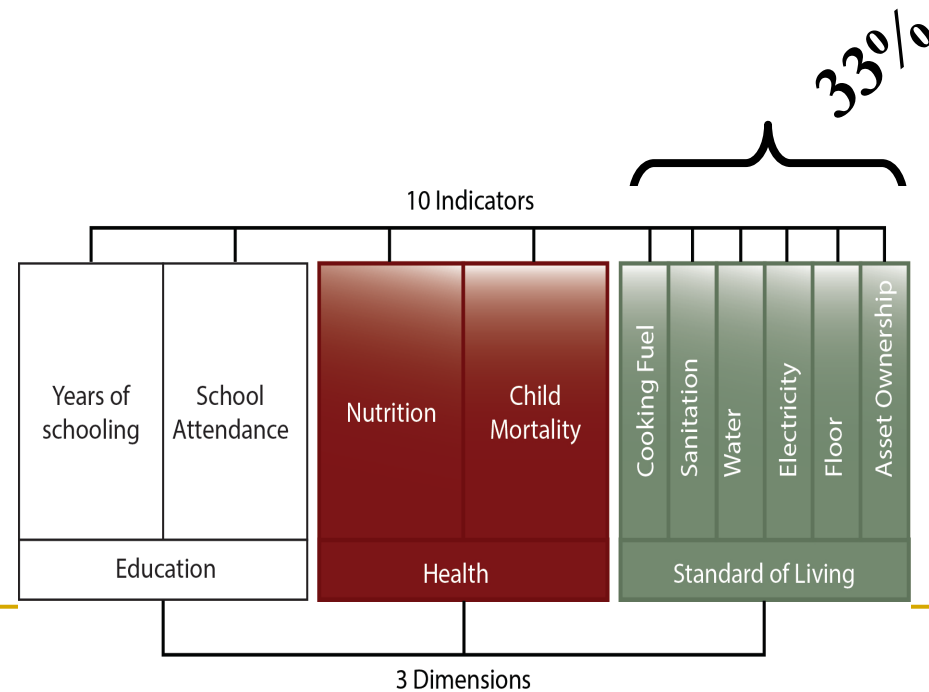
Constructing the MPI

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

**Why Multidimensional Poverty?
It is different from monetary poverty
And different policies reduce it.**

MPI Poor • $1.25 a day
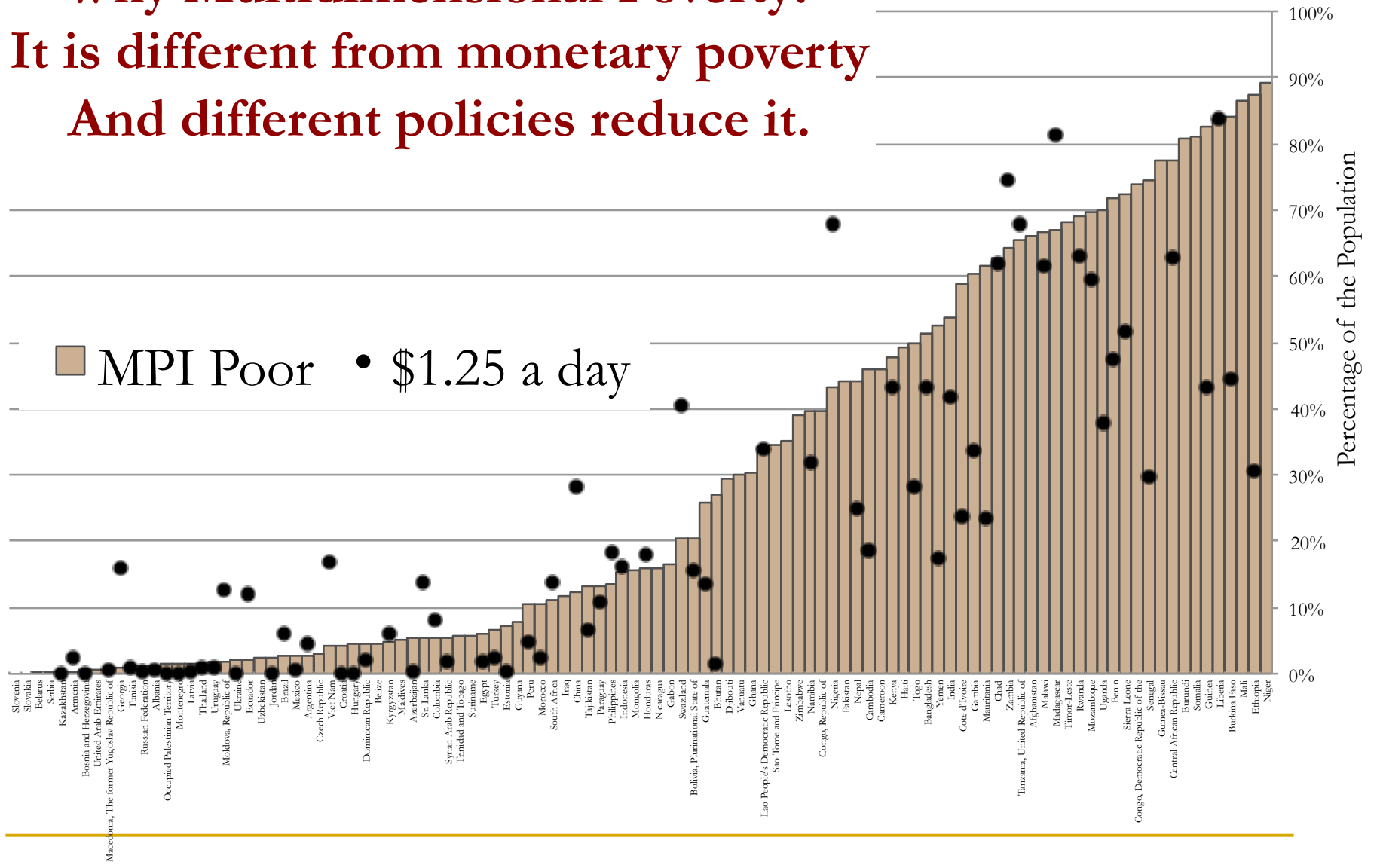
Examples: National Methodologies

Best Practice
- Use **Poverty Committee** to develop measure
- Receive input from **stakeholders**, including **civil society**
- Balance **aspirations** and **feasibility**
  - **Innovate** but strive for clear, policy relevant **indicators**
- Some **arbitrariness** is inevitable in poverty measurement
  - $1.60 a day?
  - Use **principles** to narrow options and calibrate measure
- Be clear about **purpose** of the measure

Examples: 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
- **Chile** December 2014
- Many others

- Slides drawn from government agencies
- Available on agency websites

Example 2 - Mexico

Combining **Economic** and **Social** Dimensions

Good **Governance** in Bad Times
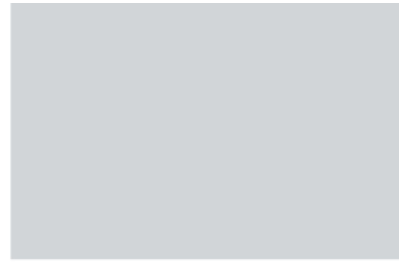
Multidimensional Poverty in Mexico
Methodology & results

First released December, 2009
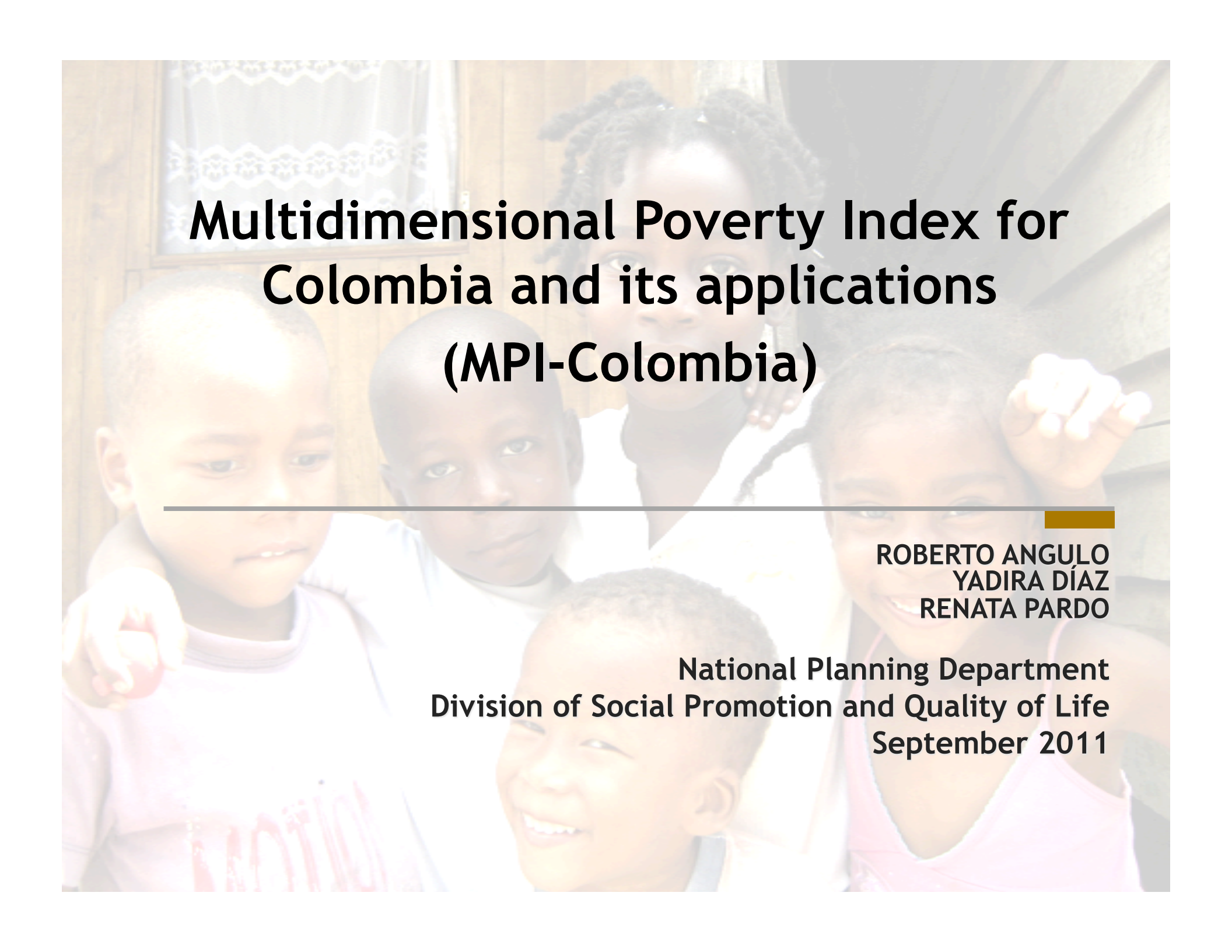
Change in the Number of Poor People in Mexico 2008-2010

Millions of people

Social Deprivations

Income Poverty

Food security 4.1

4.8

3.5

3.2

0.0

-9.0

-2.9

-2.5

-2.3

-0.8 Education

Housing

Basic Services

Social Security

Access to Health Care

Extreme income poverty

Poverty

2008
44.5 %
48.8 million

2010
46.2 %
52.0 million
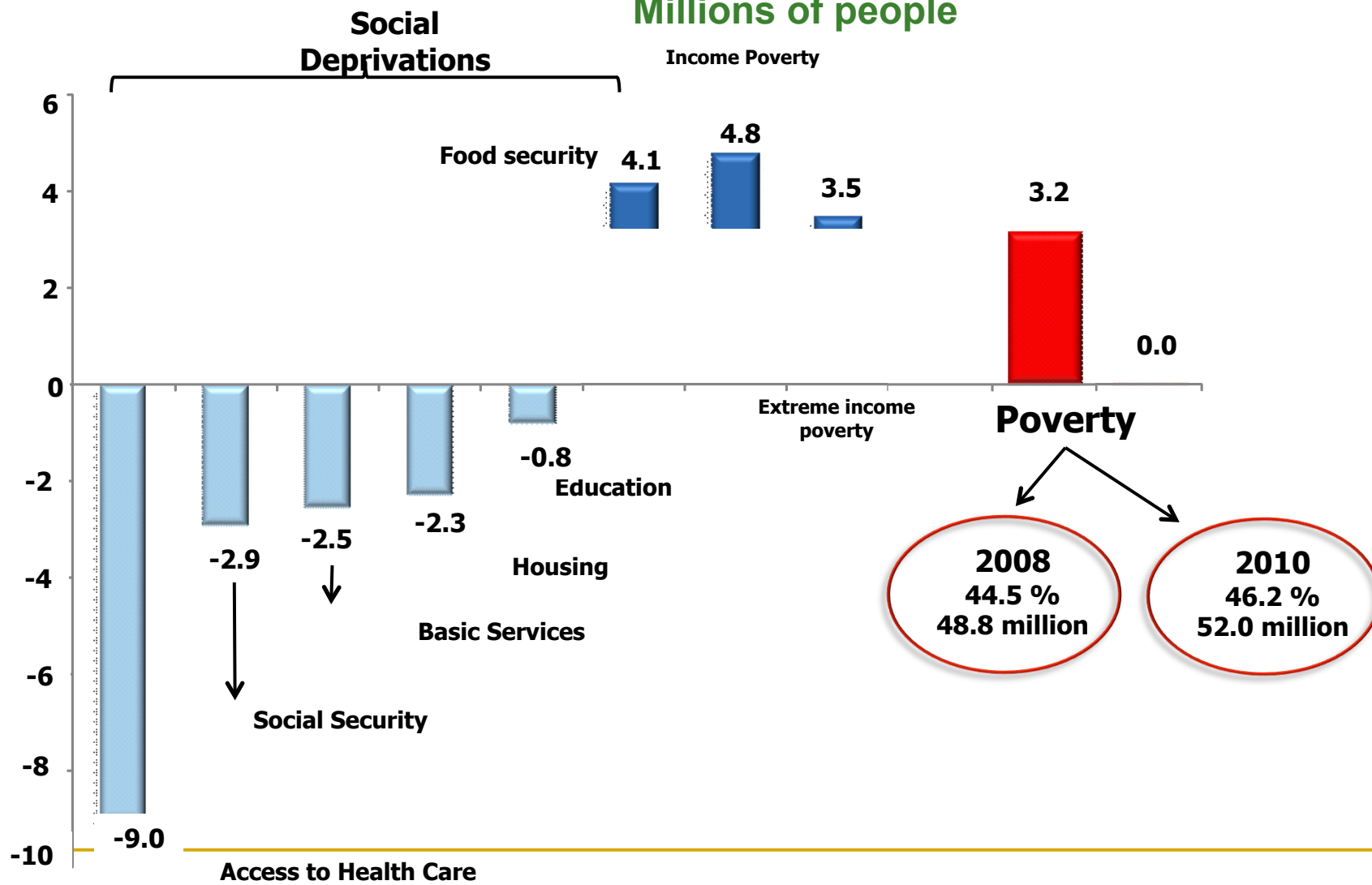
Example 3 - Colombia

Including **Work** and **Housing** Dimensions

Coordinating Development Policy

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

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

0.2

Educational Conditions

- Schooling
- Illiteracy

0.1

0.2

Childhood & Youth

- School Attendance
- At the right level
- Access to infant services
- No Child Labour

0.05

0.2

Work

- Absence of long-term unemploy-ment
- Formal work

0.1

0.2

Health

- Coverage
- Access to health care given a necessity

0.1

0.2

Housing & Public Services

- Improved Water
- Sanitation
- Flooring
- Exterior Walls
- Overcrowding

0.04

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

Example 4: Costa Rica

IPM

Educación 20%	Vivienda y uso de internet 20%	Salud 20%	Trabajo 20%	Protección social 20%
No asiste a la educacción formal 5%	Mal estado del techo y el piso 5%	Sin seguro de salud 5%	Desempleo de larga duración o personas trabajadoras desalentadas 6,67%	Primera infancia sin cuido 5%
Rezago educativo 5%	Mal estado de las paredes exteriores 5%	Sin servicio de agua 5%	Incumplimiento de derechos laborales — Incumplimiento de salario mínimo 3,33% / Incumplimiento de otros derechos laborales 3,33%	Personas adultas mayores sin pensión 5%
Sin logro de bachillerato 5%	Hacinamiento 5%	Sin eliminación de excretas 5%		Personas con discapacidad sin transferencias 5%
Bajo desarrollo de capital humano 5%	Sin uso de Internet 5%	Sin eliminación de basura 5%	Empleo independiente informal 6,67%	Fuera de la fuerza de trabajo por obligaciones Familiares 5%

Umbrales de privación por indicador para el IPM
2015

Dimensión	Indicador	Umbral de privación
		Hogares con...
Educación	No asistencia a la educación formal	Al menos una persona que se encuentre en edades entre los 5 y 17 años y no asista a educación formal. Sí se considerará con privación si una persona de 5 a 17 años asiste a educación abierta.
	Rezago educativo	Al menos una persona que se encuentre entre 7 y 19 años que esté asistiendo a la educación formal y tenga dos años de rezago o más.
	Sin logro de bachillerato	Al menos una persona que se encuentre en edades de 18 a 24 años y que no tenga bachillerato de secundaria académica o técnica ni esté asistiendo a la educación formal.
	Bajo desarrollo de capital humano	Ninguna persona con edades entre los 25 y 35 años con título de bachillerato de secundaria académica o técnica, o alguna certificación de educación no formal edades entre los 36 y 57 años con noveno año o alguna certificación de educación no formal; o edades entre los 58 y 64 años con primaria completa o alguna certificación de educación no formal.
Vivienda	Mal estado del techo o el piso	Que residen en viviendas con techo o piso en mal estado.
	Mal estado de las paredes exteriores	Que residen en viviendas con paredes exteriores en mal estado.
	Hacinamiento	Que residen en viviendas con menos de 30 m^2 de construcción con dos residentes; viviendas con menos de 40 m^2 de construcción en las que residan de 3 a 6 personas; viviendas con menos de 60 m^2 de construcción en las que residan 7 personas o más. Las personas que vivan solas no se consideran hacinadas, independientemente del tamaño de la vivienda.
	Sin uso de internet	Donde ninguna persona de 5 años o más haya utilizado Internet en los últimos tres meses. En el caso de hogares conformados únicamente por personas adultas mayores (de 65 años o más), independientemente de si utilizaron o no Internet en los últimos tres meses, no se considera con la privación.
Salud	Sin seguro de salud	Al menos una persona que no cuente con un seguro de salud.
	Sin servicio de agua	Que residen en viviendas sin tubería de agua dentro de la misma o con agua proveniente de pozo, río, quebrada o naciente, lluvia u otra fuente que no sea acueducto.
	Sin eliminación de excretas	Que residen en viviendas que no tienen servicio sanitario exclusivo para el hogar o con sistemas de eliminación de excretas de "hueco", pozo negro, letrina u otro sistema diferente al alcantarillado o tanque séptico.
	Sin eliminación de basura	Que residen en viviendas donde eliminan la basura botándola en un hueco o enterrándola, quemándola, tirándola a un lote baldío, al río, quebrada o mar u otro. En la zona rural no se considera privación enterrar la basura.

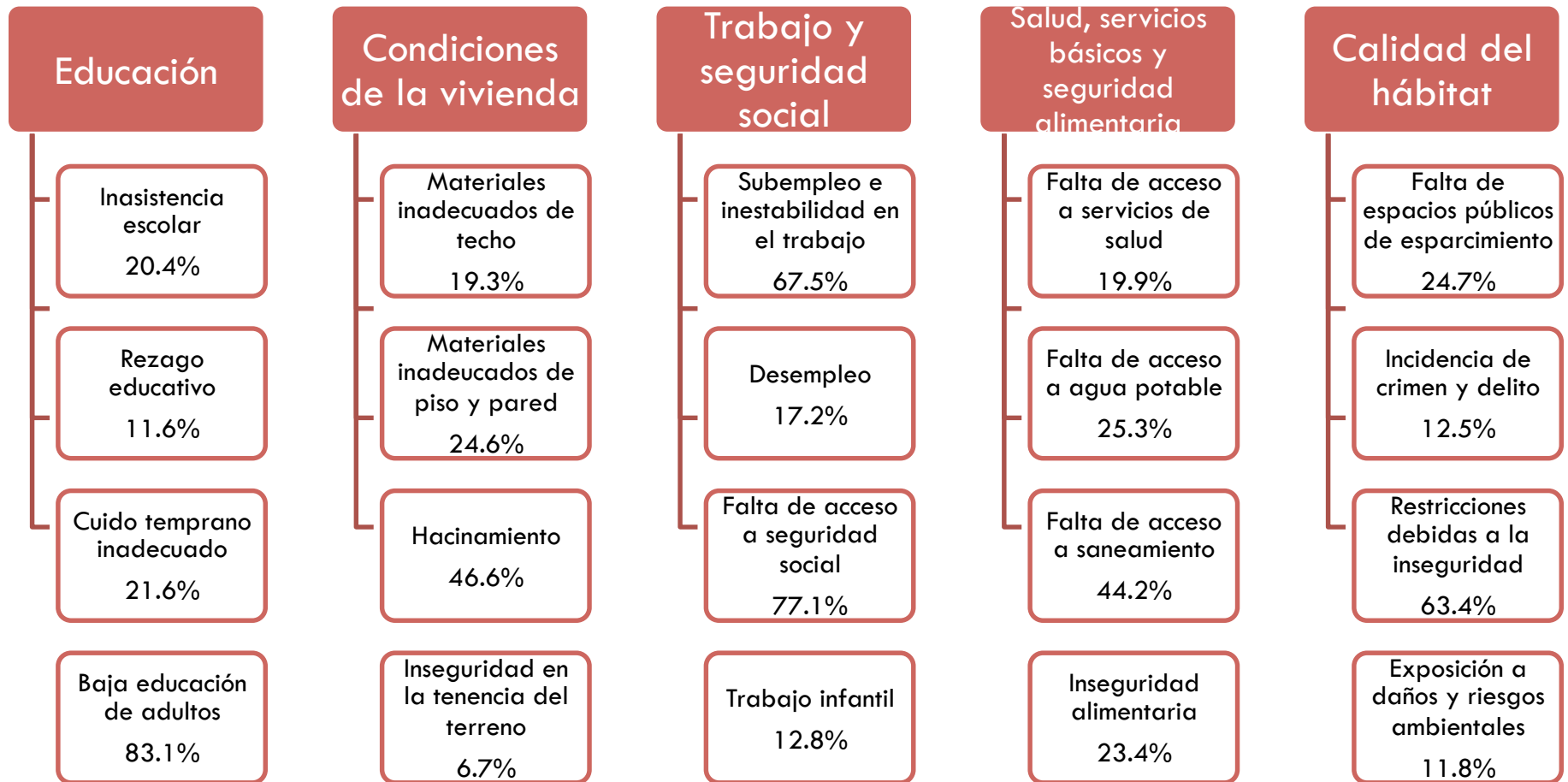| Dimensión	Indicador	Umbral de privación Hogares con...
Trabajo	Desempleo de larga duración o personas desalentadas	Al menos una persona de 15 años o más que ha estado desempleada durante más de 12 meses y buscó trabajo la semana anterior a la entrevista, o personas fuera de la fuerza de trabajo desalentadas.
	Incumplimiento de salario mínimo	Al menos una persona asalariada, en el sector privado, que recibe un salario menor al salario mínimo minimórum por hora laborada.
	Incumplimiento de otros derechos laborales	Al menos una persona asalariada, en el sector privado, a la que se le incumplan dos o más garantías diferentes al salario mínimo.
	Empleo independiente informal	Al menos una persona ocupada, que declare mantener económicamente al hogar y que realice una actividad independiente informal.
Protección social	Primera infancia sin cuido	Al menos una persona de 0 a 4 años que no asista al CEN CINAI, Red de Cuido, al maternal o al prekinder; y donde no haya alguna persona mayor de edad fuera de la fuerza de trabajo.
	Personas adultas mayores sin pensión	Donde ninguna persona adulta mayor reciba pensión.
	Personas con discapacidad sin transferencias	Al menos una persona con alguna discapacidad, que no esté ocupada y que no reciba ningún tipo de transferencia monetaria, ya sea del Estado o pensión alimenticia.
	Fuera de la fuerza de trabajo por obligaciones familiares	Al menos una persona fuera de la fuerza de trabajo debido a obligaciones familiares y donde haya más de dos personas dependientes por cada persona en la fuerza de trabajo.

Innovative Indicators

People with **disabilities** and without **transfers**:

Deprived if at least one of its members – older than 12 – is disabled, has no job and does not receive a transfer.

Use of **Internet**:

Deprived if no household member has used internet in the last three months.

Example 5: El Salvador

Educación	Condiciones de la vivienda	Trabajo y seguridad social	Salud, servicios básicos y seguridad alimentaria	Calidad del hábitat
Inasistencia escolar 20.4%	Materiales inadecuados de techo 19.3%	Subempleo e inestabilidad en el trabajo 67.5%	Falta de acceso a servicios de salud 19.9%	Falta de espacios públicos de esparcimiento 24.7%
Rezago educativo 11.6%	Materiales inadeucados de piso y pared 24.6%	Desempleo 17.2%	Falta de acceso a agua potable 25.3%	Incidencia de crimen y delito 12.5%
Cuido temprano inadecuado 21.6%	Hacinamiento 46.6%	Falta de acceso a seguridad social 77.1%	Falta de acceso a saneamiento 44.2%	Restricciones debidas a la inseguridad 63.4%
Baja educación de adultos 83.1%	Inseguridad en la tenencia del terreno 6.7%	Trabajo infantil 12.8%	Inseguridad alimentaria 23.4%	Exposición a daños y riesgos ambientales 11.8%

Innovative Indicators

Quality of Local Environment

Lack of **public spaces** for leisure activities.

> A household is considered as deprived if at least one of the following spaces is not available in its community: park, sports centre, playground, community centre. Or if any of these spaces is not used because it is too far away from the household, or because there are no activities taking place in these spaces.

Incidence in **crime** and **felony**

> A household is deprived if any of its members have suffered, in the last twelve month, any of the following events: robbery, theft, injury or assault.

Restrictions due to **insecurity**

> A household is deprived if, due to the climate of insecurity in their community, its members cannot do any of the following: nightlife, let the children go out to play, let the house alone, start a business or move freely.

Exposure to **environmental** damage and risks

> A household is deprived if it has suffered from damages due to flooding, landslide, mudslide or running water, in the last twelve months.

Innovations Chile

Network

Local Environment

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**

Thank you