The Global MPI
& its Alkire Foster Method

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MPI adds value to a dashboard such as this one:

A Dashboard: Across 101 countries and 5.2 billion people:

- **53%** of the considered population lack **clean cooking fuel**
- **40.2%** lack adequate **sanitation** by MDG definitions
- **26.5%** live in houses where **floors are dirt**, sand, or natural
- **26.8%** have someone in their household who is **undernourished**
- **21.8%** lack **electricity**
- **16.9%** of people live in houses where **a child has died**
- **25.1%** lack safe **water** by MDG definitions
- **13.6%** live in a household where **a child is not attending school** up to class 8.
- **13.6%** live in a household in which **no member has completed five years of schooling**.

Measurement Observation: Dashboards aggregate vertically

Joint Distribution I

	Income	Education	Shelter	Water
1.	D	ND	ND	ND
2.	ND	D	ND	ND
3.	ND	ND	D	ND
4.	ND	ND	ND	D
	.25	**.25**	**.25**	**.25**

Joint Distribution II

	Income	Education	Shelter	Water
1.	ND	ND	ND	ND
2.	ND	ND	ND	ND
3.	ND	ND	ND	ND
4.	D	D	D	D
	.25	**.25**	**.25**	**.25**

Std Composite

ND: Not Deprived

D: Deprived

Marginal

The Dashboard

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The Dashboard

A Dashboard: Across 101 countries a

- **53%** of the considered population
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- **25.1%** lack safe **water** by MDG def
- **13.6%** live in a household where **a** up to class 8.
- **13.6%** live in a household in which **five years of schooling**.

Totals 13.2 billion deprivations across 5.2 billion people.

Simple question: How many people have more than one deprivation?

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To answer this need to: Aggregate horizontally ('Count')

Joint Distribution I

	Income	Education	Shelter	Water
1	D	ND	ND	ND
1	ND	D	ND	ND
1	ND	ND	D	ND
1	ND	ND	ND	D

Joint Distribution II

	Income	Education	Shelter	Water
0	ND	ND	ND	ND
0	ND	ND	ND	ND
0	ND	ND	ND	ND
4	D	D	D	D

Counting

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A counting method permits us to 'zoom in' on the multiply deprived (MPI weights).

K >=	Poor people
Union 1%	**3.9 billion**
20%	**2.3 billion**
33%	**1.6 billion**
50%	**818 million**
100%	**16.1 million**
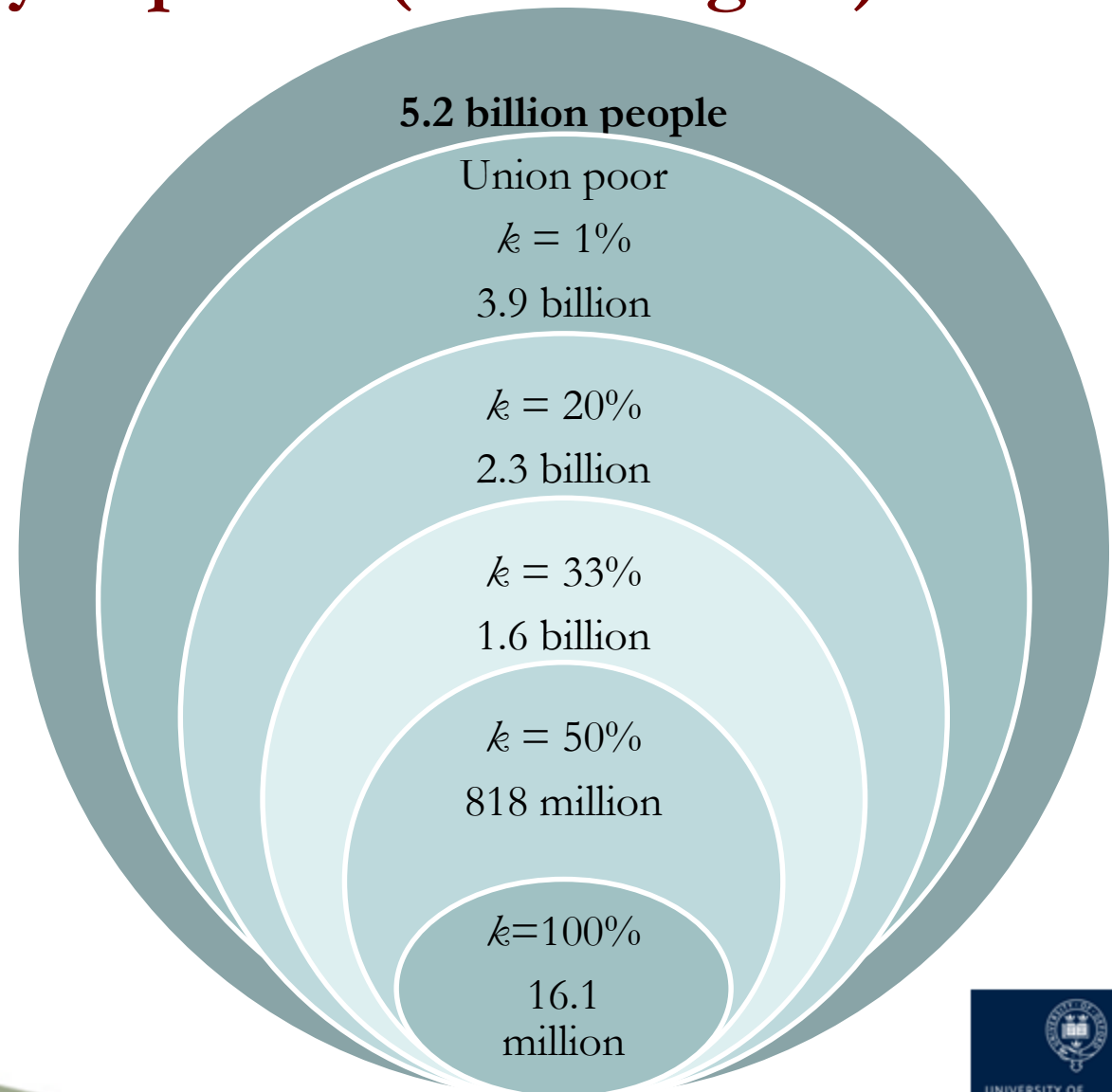
5.2 billion people

Union poor
$k = 1\%$
3.9 billion

$k = 20\%$
2.3 billion

$k = 33\%$
1.6 billion

$k = 50\%$
818 million

$k=100\%$
16.1 million

The Alkire Foster Method (Warm-Up)

and Public Policy

Alkire Foster Methodology

1. Select Dimensions, Indicators and Weights
2. Set Deprivation cutoffs for each indicator
3. Apply to create profiles for each household from the same survey
4. Set a cross-dimensional poverty cutoff to identify who is poor
5. Compute the MPI, multidimensional poverty rate, intensity and profiles of composition; disaggregate by district, agegroup, etc.

.

Alkire, Sabina and James Foster, J. of Public Economics 2011

A F: Intuitive explanation!
(to simplify we assume equal weights in this example)

Matrix of deprivation scores for 4 persons in 4 dimensions

Who is deprived in what?

	Schooling	Food	Water	Housing	
	ND	ND	ND	ND	Bilal
	D	ND	ND	D	Davina
$y =$	D	D	D	D	Chris
	ND	D	ND	ND	Paula

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How poor? How many deprivations?

	Schooling	Food	Water	Housing	
	ND	ND	ND	ND	0
y =	D	ND	ND	D	2
	D	D	D	D	4
	ND	D	ND	ND	1

Who is Poor?

Fix poverty cut-off k, identify as poor if $c_i >= 2$

	Schooling	Food	Water	Housing		
$y =$	ND	ND	ND	ND		0
	D	ND	ND	D		2
	D	D	D	D		4
	ND	D	ND	ND		1

→Multidimensional Poverty Headcount (H)= 2/4 = ½ = 50%

[50% of the population are poor]

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How poor are the poor?

Fix poverty cut-off k, identify as poor if ci >= 2

	Schooling	Food	Water	Housing		
	ND	ND	ND	ND	0	.
	D	ND	ND	D	2	2/4
y =	D	D	D	D	4	4/4
	ND	D	ND	ND	1	.

→ Intensity of deprivation among the poor
A=(2/4+4/4)/2= 6/8=¾ = 75%

→ [on average the poor are deprived in 75% of the dimensions]

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The Multidimensional Poverty Index

	Schooling	Food	Water	Housing		
	ND	ND	ND	ND	0	.
	D	ND	ND	D	2	2/4
$y =$	D	D	D	D	4	4/4
	ND	D	ND	ND	1	.

Headcount Ratio (H) = 2/4

Average Intensity of Poverty (A)= 6/8 = 3 / 4

MPI = H x A

$$= (2/4) \times (3/4) = 6/16$$

Public Policy Intervention

INTERVENTION

	Schooling	Food	Water	Housing		
	ND	ND	ND	ND	0	.
	D	ND	ND	D	2	2/4
y =	↓D	D	D	D	4	4/4
	ND	D	ND	ND	1	.

Headcount Ratio (H) = 2/4

Average Intensity of Poverty (A)= 6 / 8 = 3/4

MPI = H x A

= (2/4)x(3/4) = 6/16

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Public Policy Intervention

INTERVENTION

	Schooling	Food	Water	Housing		
	ND	ND	ND	ND	0	.
	D	ND	ND	D	2	2/4
$y =$	ND	D	D	D	3	3/4
	ND	D	ND	ND	1	.

Headcount Ratio (H) = 2/4

Average Intensity of Poverty (A)= 5 / 8

MPI = H x A

= (2/4)x(5/8) = 5/16

What is new?

Intensity.

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.

- Counting measures do look at coupled deprivations 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.

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MPI: Full Technical methodology published

Statistical methods include:

Standard errors and confidence intervals for all statistics

Statistical inference for all comparisons

Validation for component indicators, alone and jointly

Robustness tests for cutoffs and weights

Axiomatic properties include:

Subgroup decomposability and Subgroup consistency

Dimensional breakdown, Dimensional monotonicity

Ordinality, Symmetry, Scale and replication invariance, Normalization, Poverty and Deprivation Focus, Weak Monotonicity, and Weak Deprivation Re-arrangement
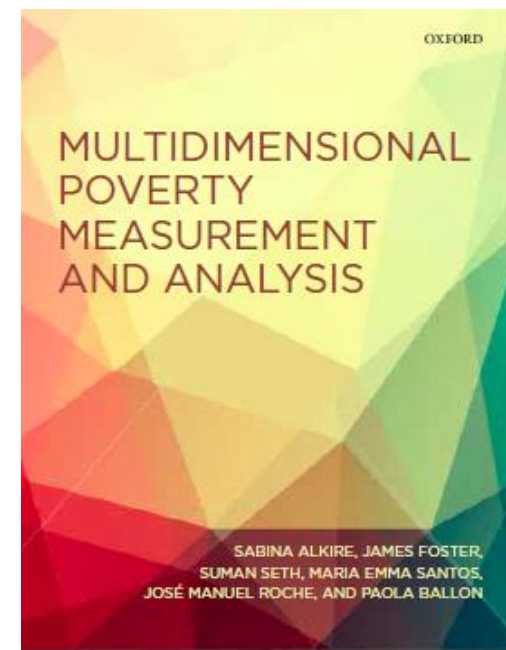
AVAILABLE ONLINE FOR FREE (!)

https://multidimensionalpoverty.org/

Alkire Foster Seth Santos Roche Ballon OUP 2015

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MULTIDIMENSIONAL POVERTY MEASUREMENT AND ANALYSIS

SABINA ALKIRE, JAMES FOSTER, SUMAN SETH, MARIA EMMA SANTOS, JOSÉ MANUEL ROCHE, AND PAOLA BALLON

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Global Multidimensional Poverty Index (Global MPI)

What is the global MPI?

- The global MPI is an internationally comparable index of acute poverty for 100+ developing countries.

- It was launched in 2010 in the *Human Development Report.*

- Since 2010, the global MPI, H and A have been published for 275 datasets covering 120 countries

- Updated at least once per year, to include newly released datasets.

- The global MPI is one prominent implementation of the M0 measure.

The Global MPI
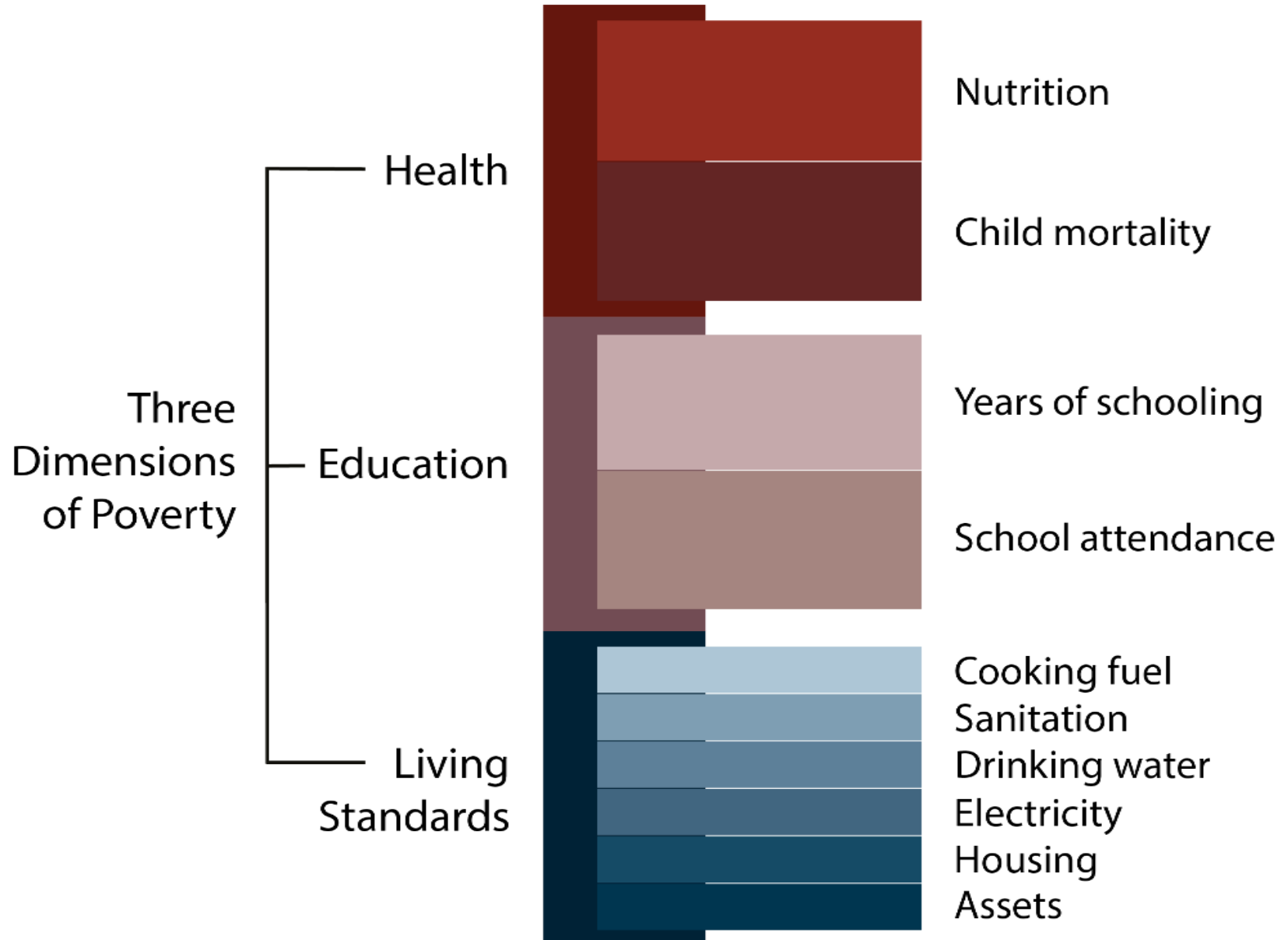
Indicators, Cutoffs & Weights

Indicator		Deprived if...	Weight
Health (1/3)	Nutrition	Any person under 70 years who is measured is **undernourished**.	1/6
	Child mortality	A **child under 18 has died** in the family in the five-year period preceding the survey.	1/6
Education (1/3)	Years of schooling	**No** household member aged 10 years or older has completed **six years of schooling.**	1/6
	School attendance	**Any** school-aged child is **not attending school** up to the age at which he/she would complete class 8.	1/6
Living Standards (1/3)	Cooking fuel	A household cooks using **solid fuel**: dung, agricultural crop, shrubs, wood, charcoal or coal.	1/18
	Sanitation	The household's sanitation facility is **not improved** or it is improved but **shared** with other households.	1/18
	Drinking water	The household's source of drinking water is **not safe** or safe drinking water is at least **a 30-minute walk** from home, roundtrip.	1/18
	Electricity	The household has **no electricity**.	1/18
	Housing	The household has **inadequate housing**: the floor is of natural materials or the roof or wall are of rudimentary materials.	1/18
	Assets	The household does **not own more than one** of these assets: radio, TV, telephone, computer, animal cart, bicycle, motorbike, or refrigerator, and does not own a car or truck.	1/18

Global MPI Indicators and SDGs

Dimension	Indicator	Related to…
Health	Nutrition	SDG 2: Zero Hunger
	Child mortality	SDG 3: Health & Well-being
Education	Years of schooling	SDG 4: Quality Education
	School attendance	
Living Standards	Cooking fuel	SDG 7: Affordable & Clean Energy
	Sanitation	SDG 6: Clean Water & Sanitation
	Drinking water	
	Electricity	SDG 7
	Housing	SDG 11: Sustainable Cities & Communities
	Assets	SDG 1: No Poverty

Global MPI Indicators

- The global MPI indicators use the **same base population**: the total population.

- **Unit of identification:** the household
  - MPI uses any available information on all members of each household.

- **Unit of analysis:** individuals
  - Our estimates are reported in terms of people (not HH).

Identification: Who is poor?

A person who is deprived in <u>1/3 or more</u> of the weighted indicators is MPI poor. Consider 56 year old Tamang, from Nepal
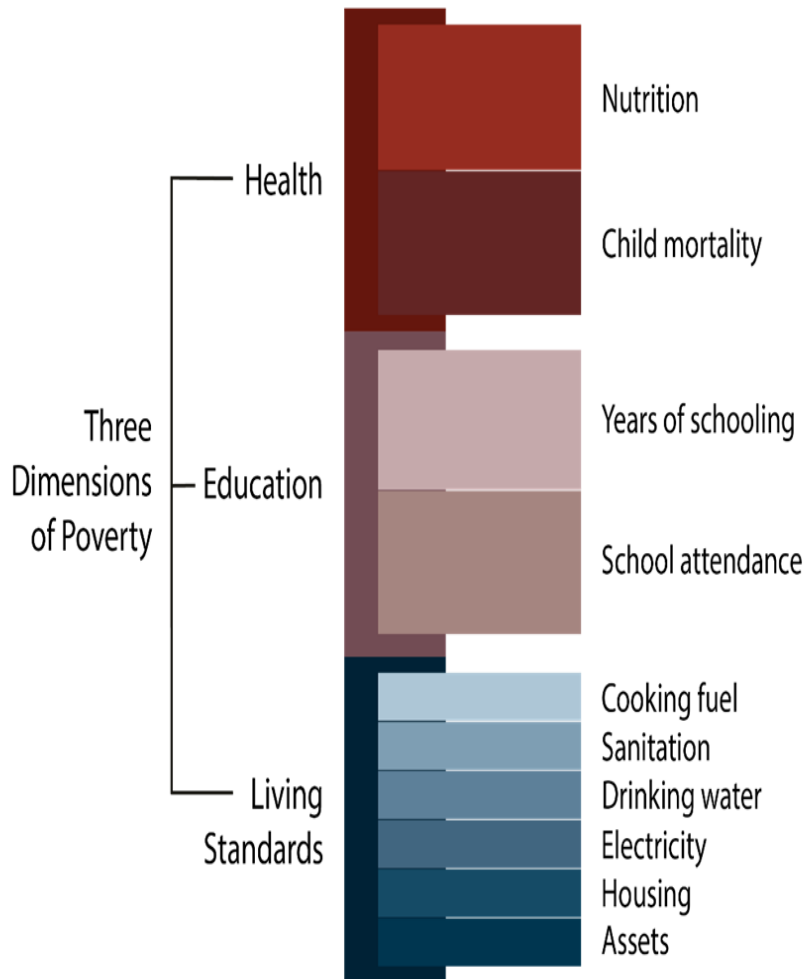
Tamang lives with two granddaughters and her husband, who has a **low BMI**.

Her home is a single room rudimentary hut with a **dirt floor**.

She has **no toilet** and uses her neighbour's **unprotected well** for drinking water.

She has electricity but does **not own** a phone, refrigerator, television or even a radio.

Identification: Is Tamang MPI poor?

The global Multidimensional Poverty Index builds on each person's deprivation profile

10 indicators

| Nutrition | Child mortality | Years of schooling | School attendance | Cooking fuel | Sanitation | Drinking water | Electricity | Housing | Assets |

| Health | Education | Standard of living |

Dimensions of poverty
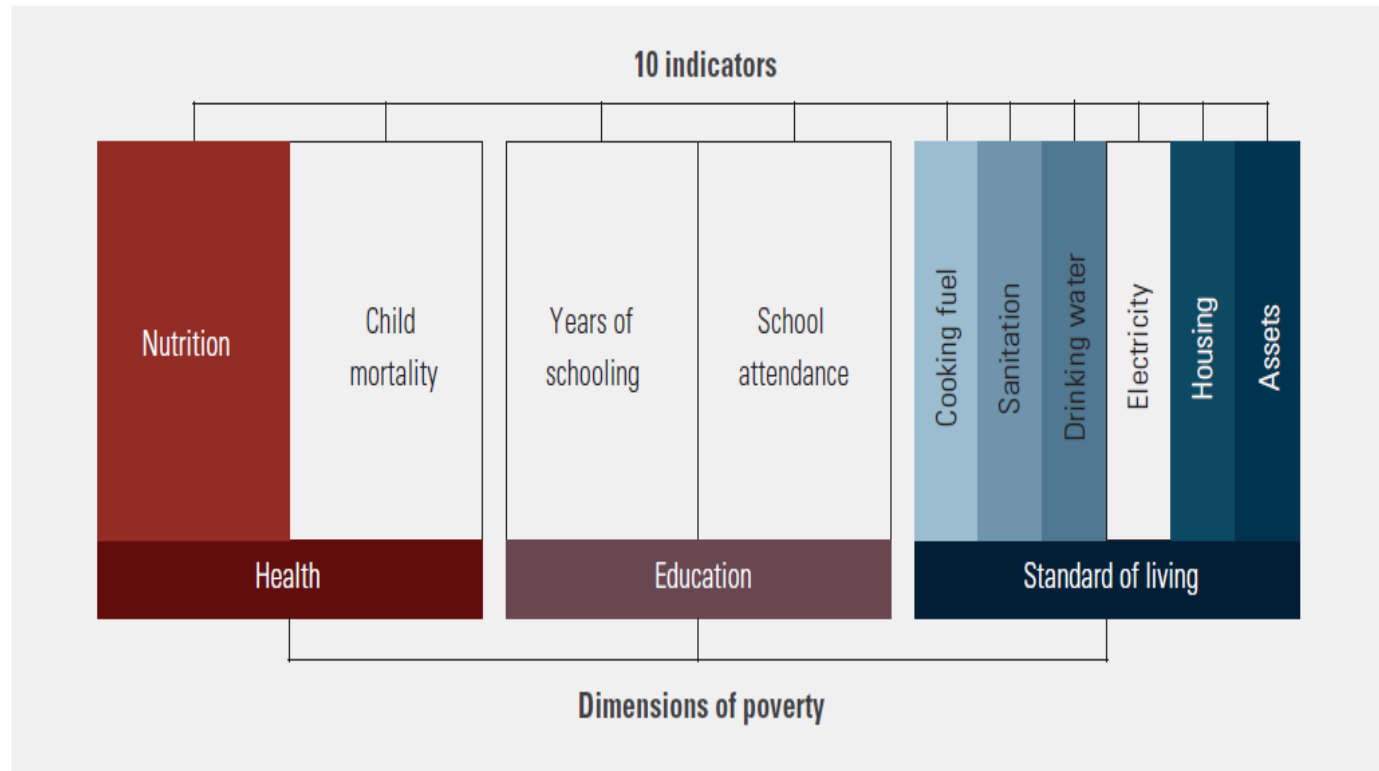
- Tamang is deprived in 44.4% of the weighted global MPI indicators.
- Anyone who is deprived in more than one-third is identified as MPI poor.

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Computing the global MPI

1. Consider the 10 indicators
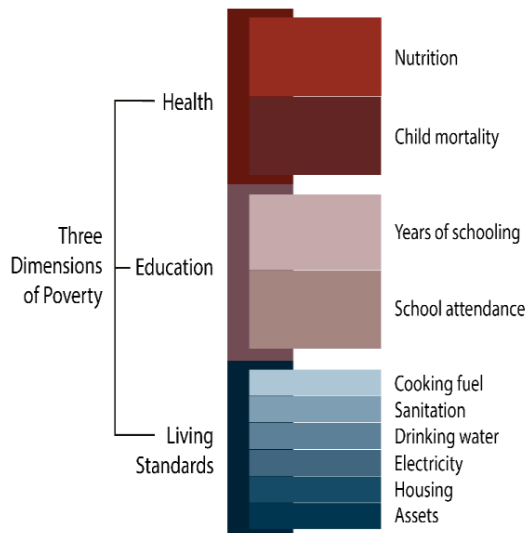
2. Build a Deprivation Profile for each person
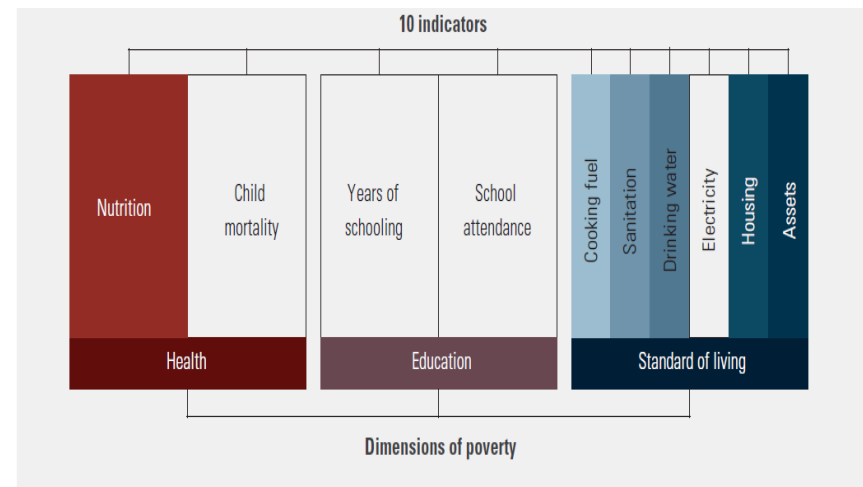
3. Identify Who is Poor

Tamang's Dep Score: 44.4%
Poverty Cut-off: 1/3

4. Compute MPI

$$MPI = H \times A$$

H (Incidence) = Headcount ratio
A (Intensity) = Average deprivation score among poor

Data constraints

- Key **indicators** are not collected
    - In 2019, 7 surveys lack child mortality; 8 lack nutrition
    - Assets indicator may lack subcomponents (radio, animal cart, motocycle…)
- **Missing values** lead to sample size reduction/biases
- Surveys **updated** every 3-5 years, and in different **years**
- Still, data quality has greatly improved: In 2010 we had all 10 indicators for only 60% of countries; in 2019 it is 82%.

*All particular national variations are documented in the methodological notes for the year in which the MPI was released.

Recent global MPI findings

Source of surveys

✓ Demographic & Health Surveys (DHS - 50)

✓ Multiple Indicator Cluster Surveys (MICS - 42)

✓ DHS-MICS (1)

✓ Pan–Arab Project for Family Health (PAPFAM – 3)

✓ 5 national surveys covering Brazil (PNAD), China (CFPS), Ecuador (ECV), Jamaica (JSLC) & Mexico (ENSANUT)

# The Global MPI: High Resolution

The MPI can be broken down in different ways:

1. By Headcount – to show *how many* are poor

Global MPI 2019: Across 101 countries & 5.7 billion people, 23% of people are MPI poor
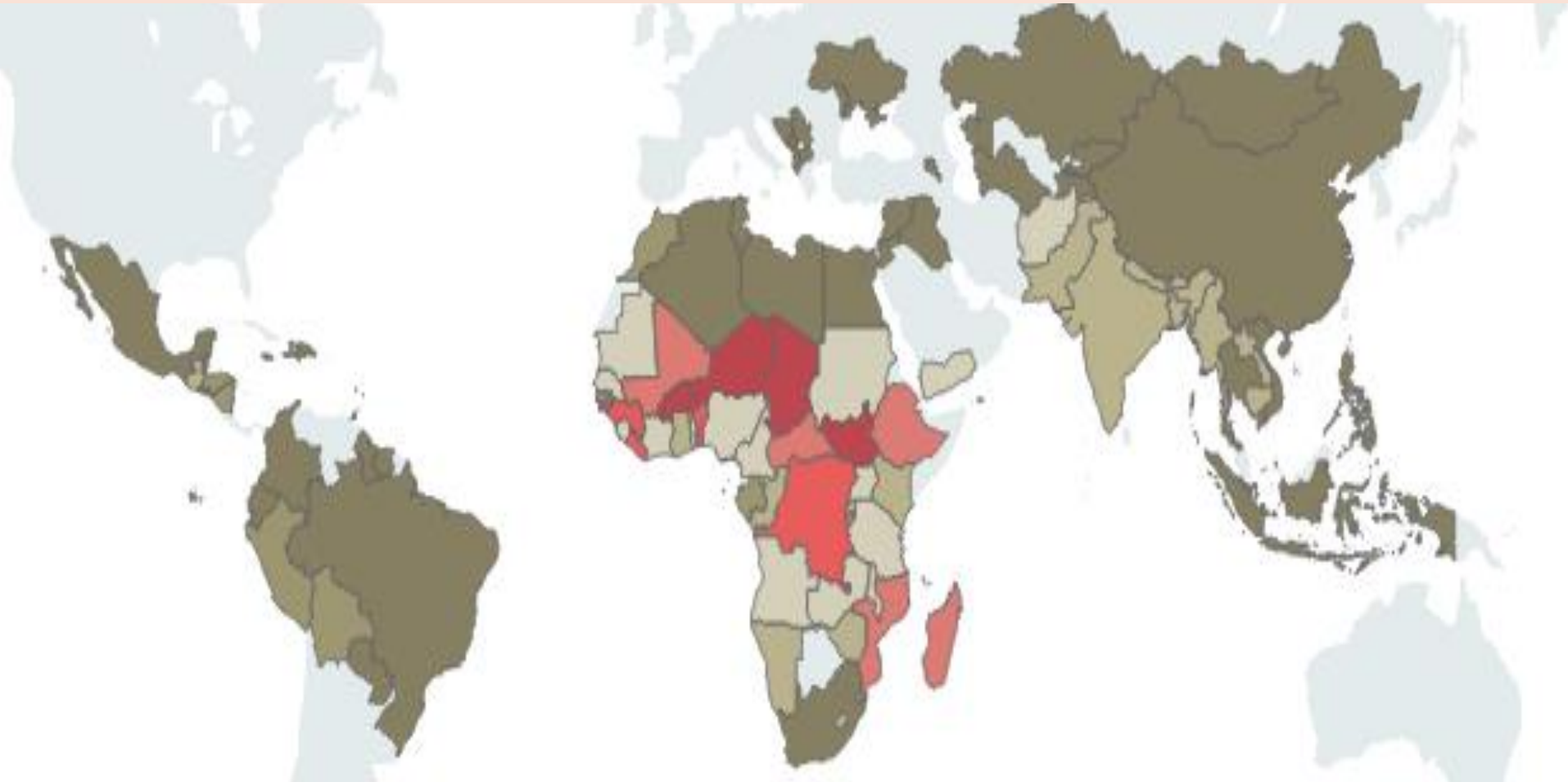
=1.3 billion people (aggregates use 2017 population data)

Population who are poor:
Incidence of multidimensional poverty (H)

The poorest
countries are
Niger and
South Sudan
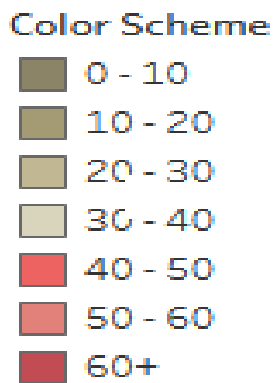
Niger
H=90%

South Sudan
H=92%
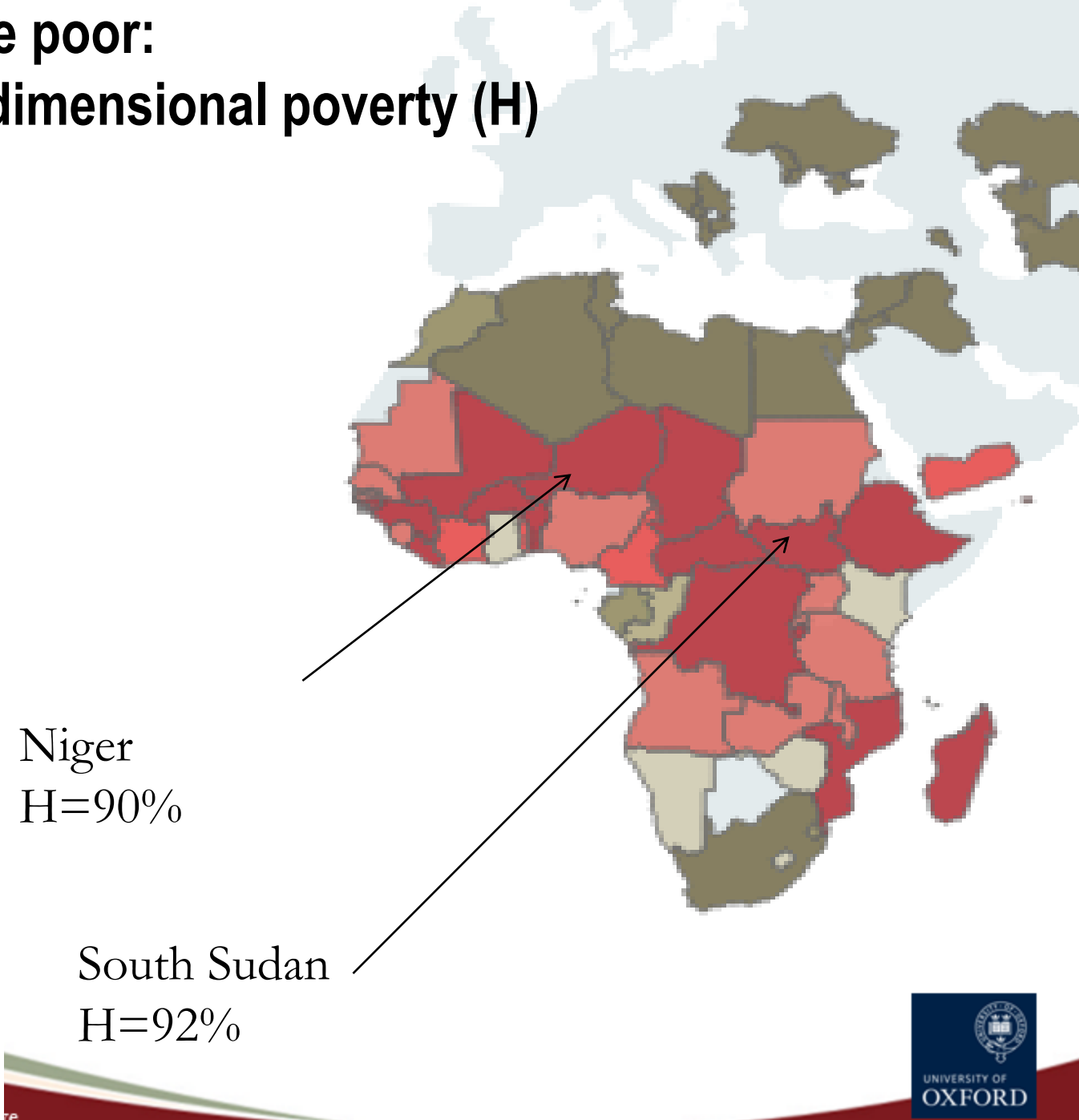
Color Scheme
- 0 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60+

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The Global MPI: High Resolution

The MPI can be broken down in different ways:

1. By Headcount – to show *how many* are poor

2. By Intensity – to show *who* has greatest intensity

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How poor the poor people are?:
Intensity of multidimensional poverty (A)
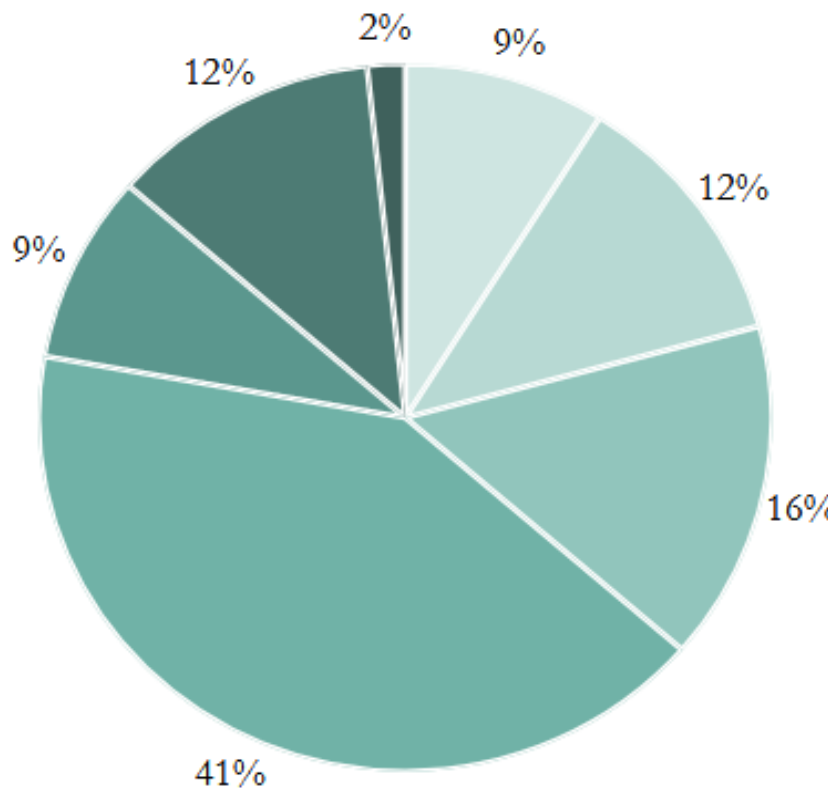
South Sudan
MPI = 0.557
A = 61%
H=92%
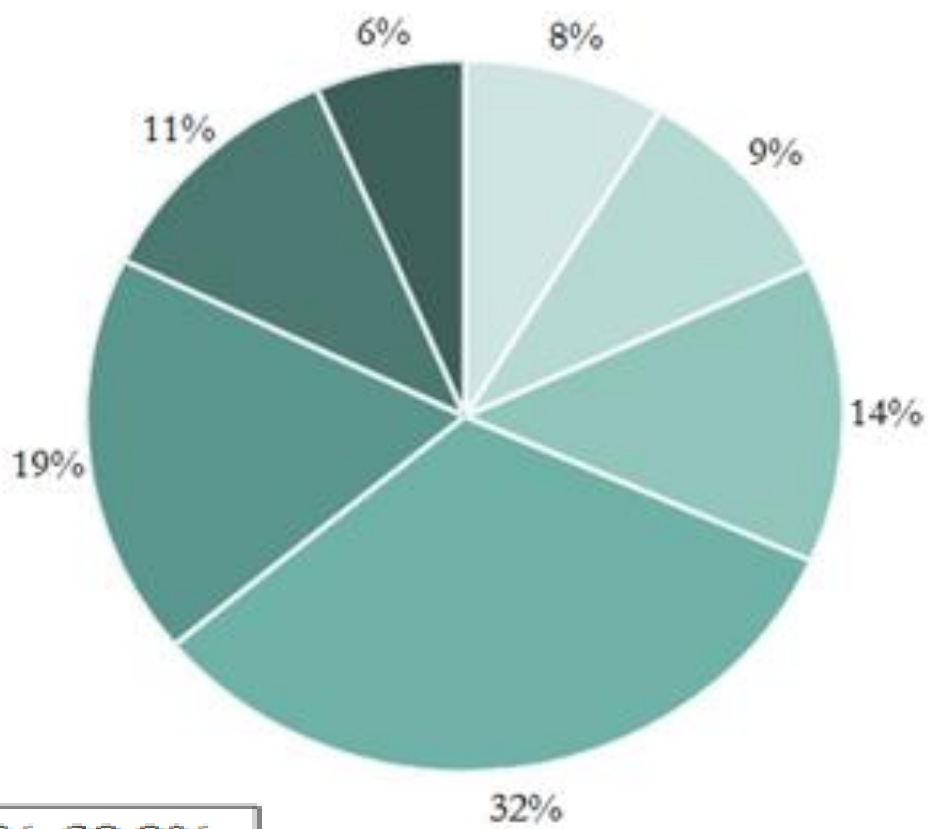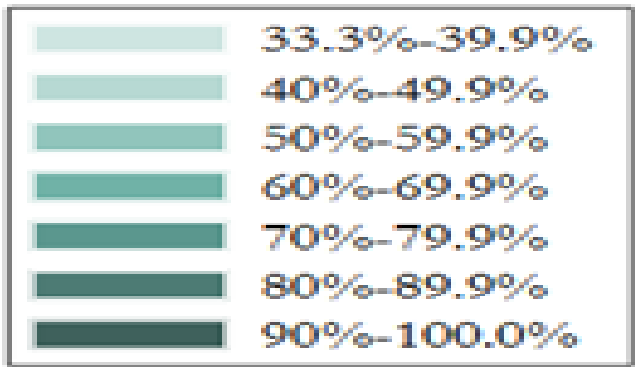
Niger
MPI = 0.605
A = 68%
H=90%

Legend:
- 33.3%–39.9%
- 40%–49.9%
- 50%–59.9%
- 60%–69.9%
- 70%–79.9%
- 80%–89.9%
- 90%–100.0%

South Sudan pie chart values: 9%, 2%, 12%, 9%, 41%, 16%, 12%

Niger pie chart values: 8%, 6%, 9%, 11%, 14%, 19%, 32%

The Global MPI: High Resolution

The MPI can be broken down in different ways:

1. By Headcount – to show *how many* are poor
2. By Intensity – to show *who* has greatest intensity

3. By Disaggregation – to show no one is left behind

Going beyond averages:
Disaggregation - Namibia subnational regions

National MPI 0.171
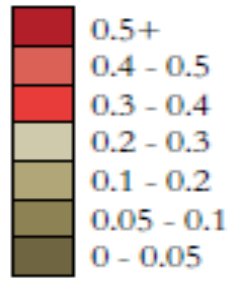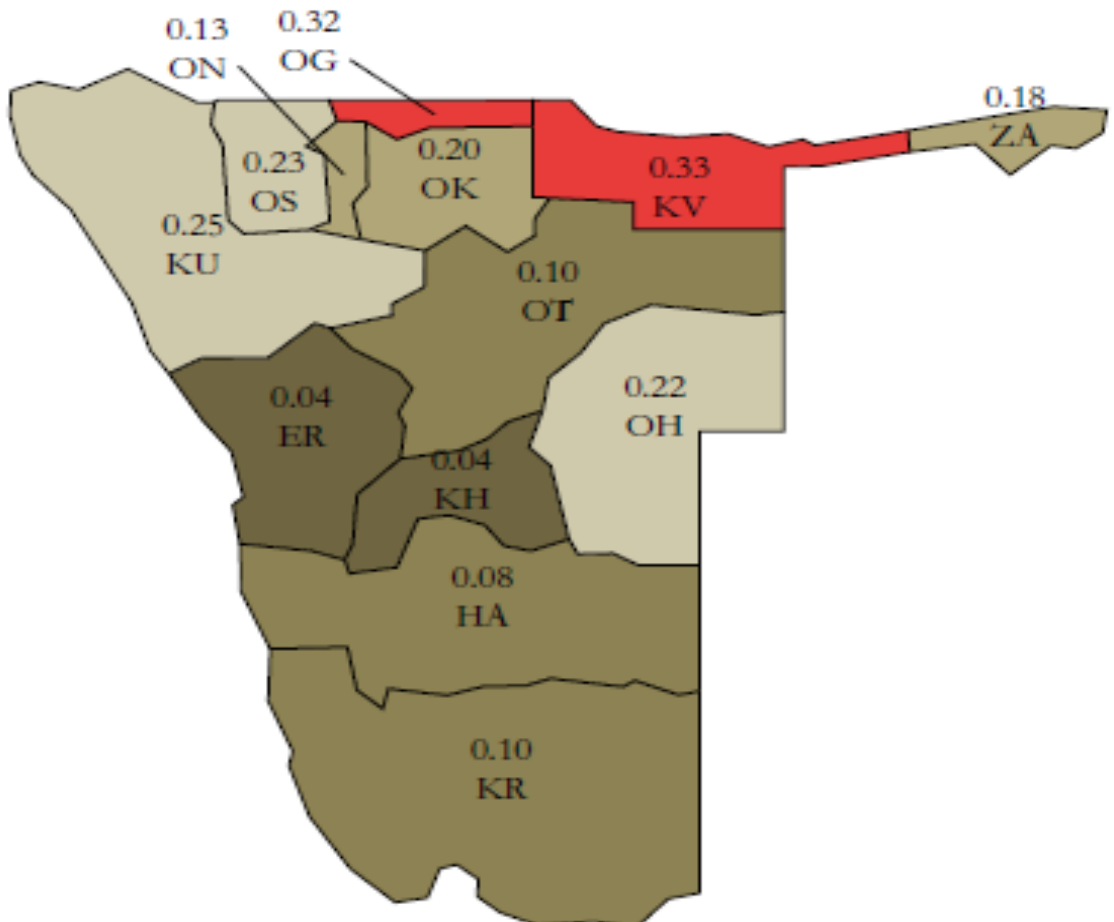
ER: Erongo
HA: Hardap
KH: Khomas
KR: Karas
KU: Kunene
KV: Kavango
OG: Ohangwena
OH: Omaheke
OK: Oshikoto
ON: Oshana
OS: Omusati
OT: Otjozondjupa
ZA: Zambezi

0.13 ON
0.32 OG
0.23 OS
0.20 OK
0.18 ZA
0.25 KU
0.33 KV
0.10 OT
0.04 ER
0.22 OH
0.04 KH
0.08 HA
0.10 KR

0.5+
0.4 – 0.5
0.3 – 0.4
0.2 – 0.3
0.1 – 0.2
0.05 – 0.1
0 – 0.05

Going beyond averages:
Disaggregation - 1,119 subnational regions

Going beyond averages shows great subnational disparities in Uganda

Contribution of deprivation in each indicator to overall multidimensional poverty
Percent values represent incidence of multidimensional poverty

Sub-Saharan Africa
57.5%

Developing regions
23.1%

South Sudan, 2010
91.9%

Uganda, 2016
55.1%

Sub-Saharan Africa

South Asia

Arab States

Latin America and the Caribbean

East Asia and the Pacific

Europe and Central Asia
1.1%

Uganda

Karamoja
96.3%

Kampala
6.0%

South Africa, 2016
6.3%

Nutrition | Child mortality | Years of schooling | School attendance | Cooking fuel | Sanitation | Drinking water | Electricity | Housing | Assets

Low and middle income countries have a wide range of multidimensional poverty

Upper-middle-income countries (94 million multidimensionally poor people)
Intensity (percent)
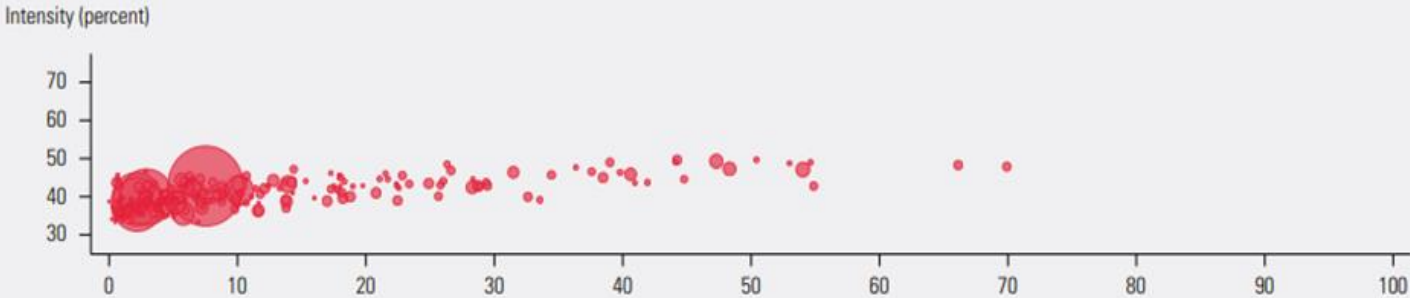
Lower-middle-income countries (792 million multidimensionally poor people)
Intensity (percent)
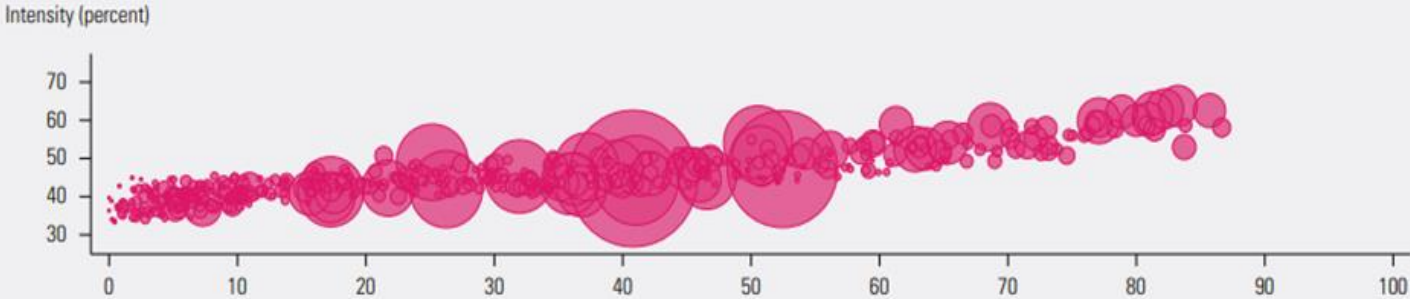
Low-income countries (440 million multidimensionally poor people)
Intensity (percent)

Incidence (percent)
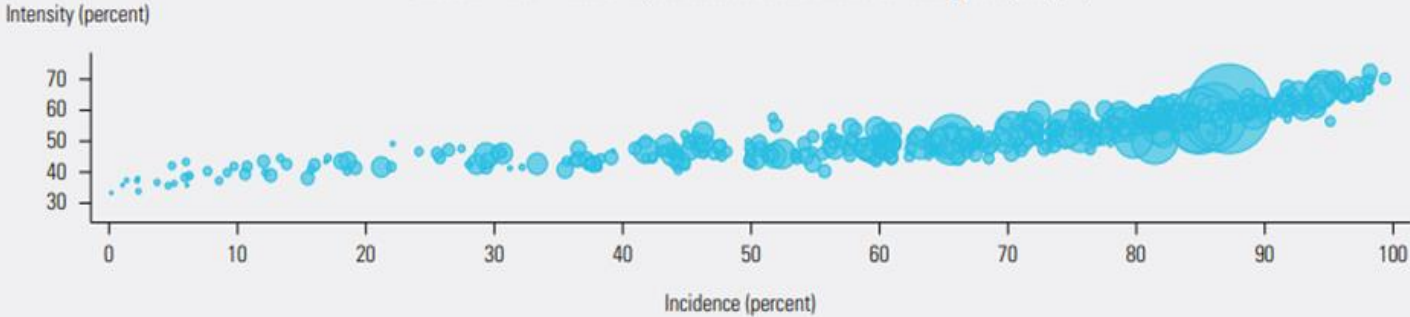
Incidence of MPI across countries and subnational regions:

Upper-middle-income **0-70%**

Lower-middle-income **0-87%**

Low-income **0-99%**

Global
MPI findings: Iraq
(MICS 2018)

Global MPI: Iraq 2018 MICS

Area	MPI	H	A
National	0.033	8.6%	37.9%
Urban	0.025	6.9%	36.7%
Rural	0.050	12.6%	39.3%

Notes: Source: MICS year 2018, own calculations.

Global MPI: Iraq 2018 MICS

Global MPI: Iraq 2018 MICS, Poor and Deprived In …

Figure 6. Censored Headcount Ratios

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Global MPI: Iraq 2018 MICS, Contributions by Indicators to MPI
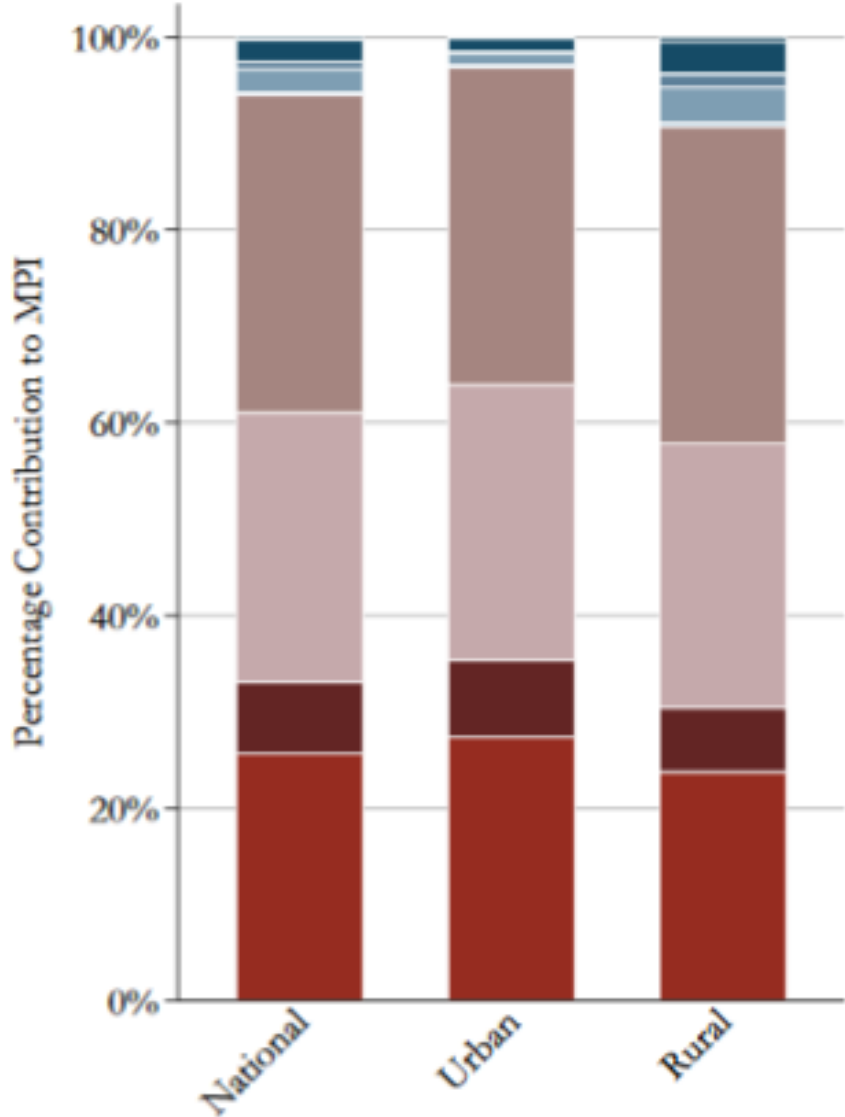
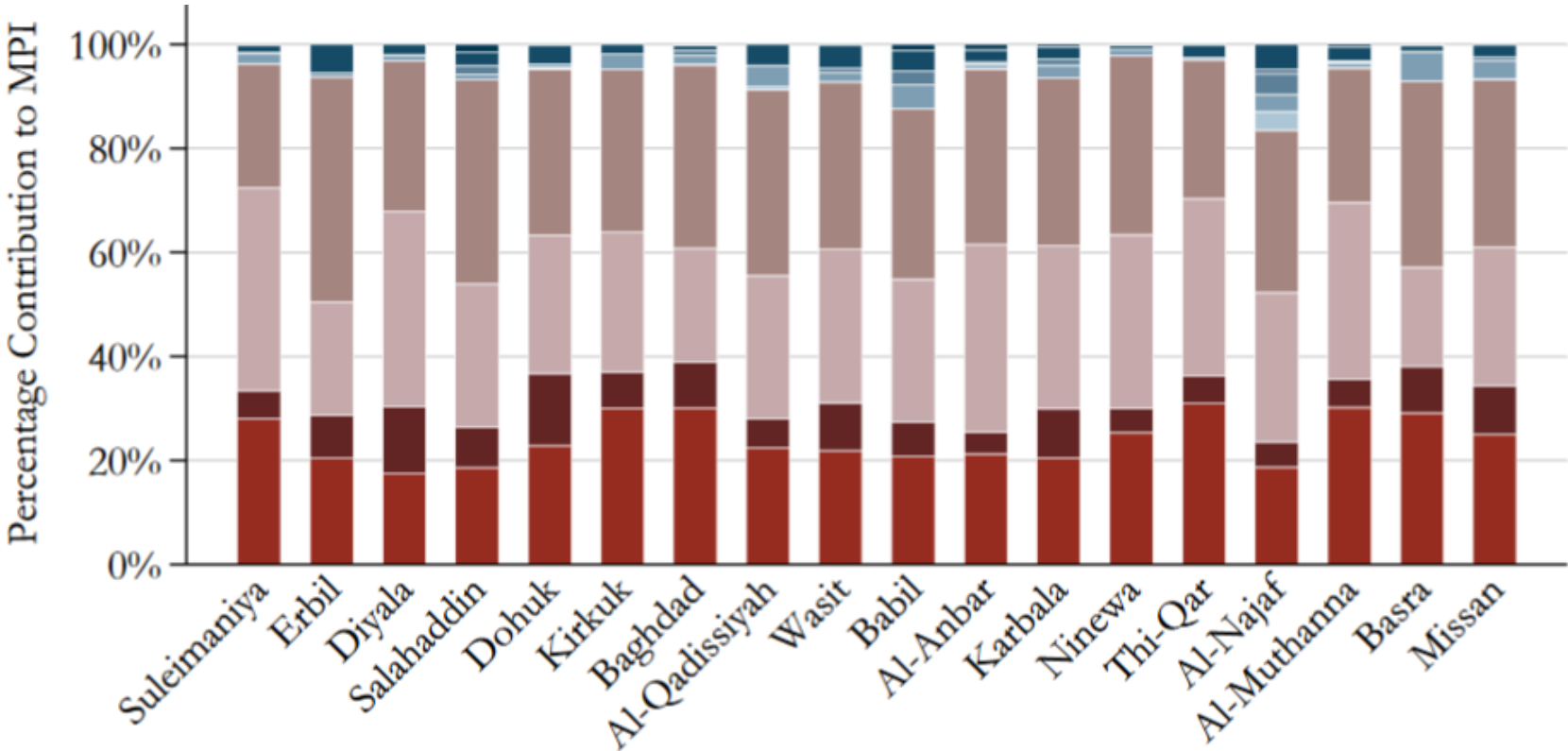# Global MPI: Iraq 2018 MICS, Poverty by Regions

National MPI 0.004

AA: Al-Anbar
AB: Basra
AM: Al-Muthanna
AN: Al-Najaf
AQ: Al-Qadissiyah
AR: Erbil
BA: Baghdad
BB: Babil
DI: Dohuk
DQ: Thi-Qar
DY: Diyala
KA: Karbala
KK: Kirkuk
MA: Missan
NI: Ninewa
SD: Salahaddin
SU: Suleimaniya
WA: Wasit
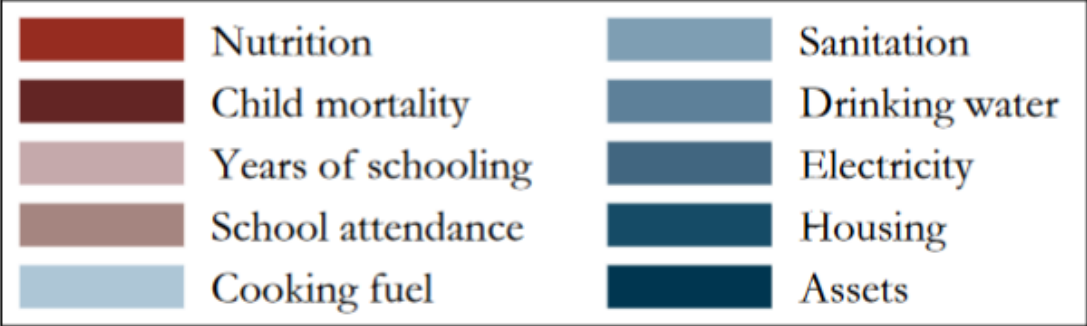
0.5+
0.4 - 0.5
0.3 - 0.4
0.2 - 0.3
0.1 - 0.2
0.05 - 0.1
0 - 0.05

Global MPI: Iraq 2018 MICS, Poverty by Regions

The Global MPI: High Resolution

The MPI can be broken down in different ways:

1. By Headcount – to show *how many* are poor

2. By Intensity – to show *who* has greatest intensity

3. By Disaggregation – to show no one is left behind

4. By Dimension – to show *how* people are poor

   - how groups (regions, urban/rural) vary (in headcount, intensity, and dimensional composition).

Tabita, Kenya   Rabiya, India   Stephanie, Madagascar   Agathe, Madagascar   Daima, Kenya   Ann-Sophia, Kenya   Valérie, Madagascar

# Extended Analysis

Progress over time: Leaving no one behind

- 271 million moved out of multidimensional poverty during the decade.

- India's poorest states progressed fastest

India, 2005/06–2015/16

MPIᴛ value, 2005/06

Annualized absolute change in MPIᴛ value
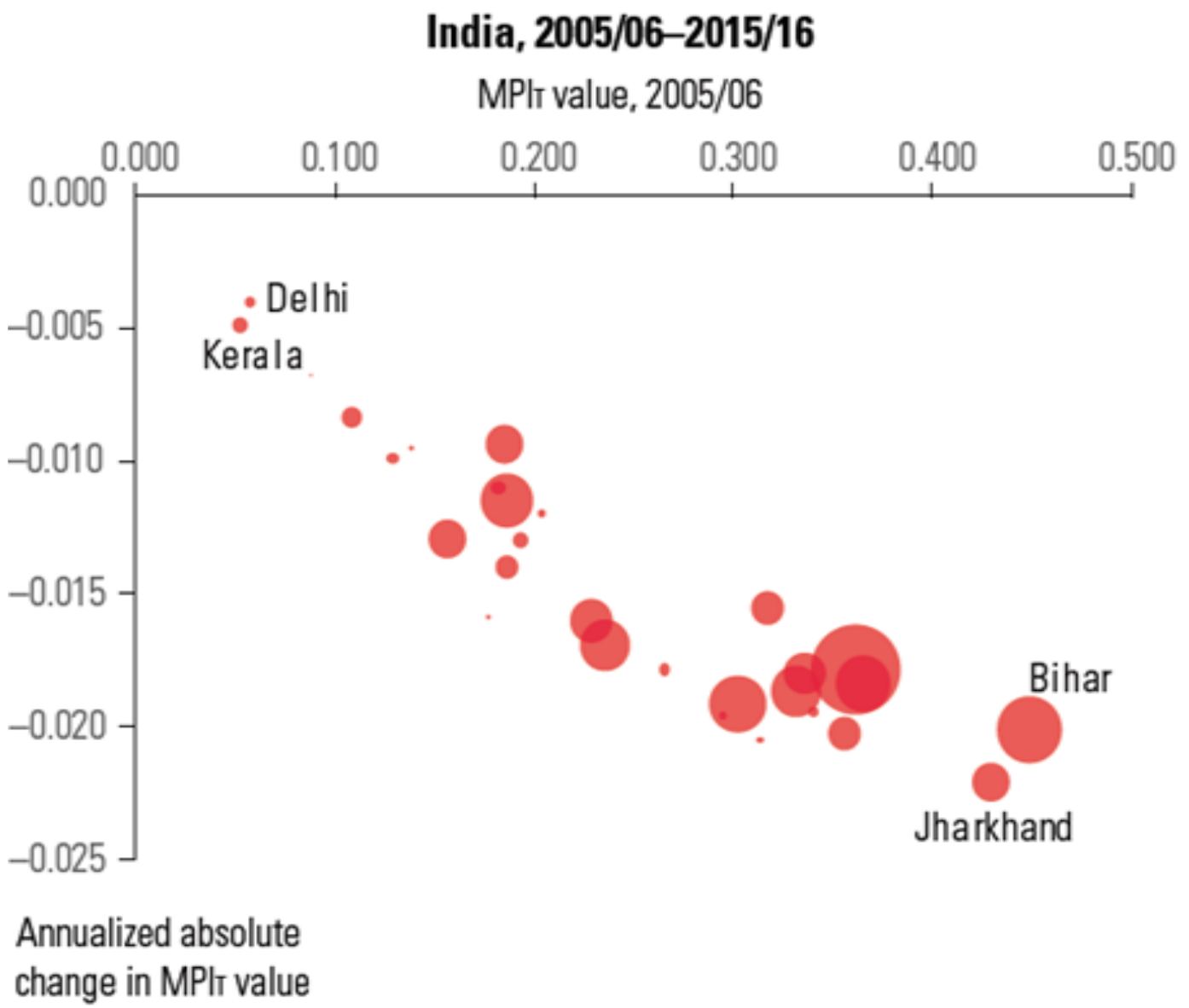
Inside the home: a spotlight on children in South Asia

11% of South Asian girls are MPI poor and out of school. In Afghanistan 44% of girls are.

In South Asia the percentage of school-age children who are multidimensionally poor and out of school varies by country

School-age children who are multidimensionally poor and out of school (percent)
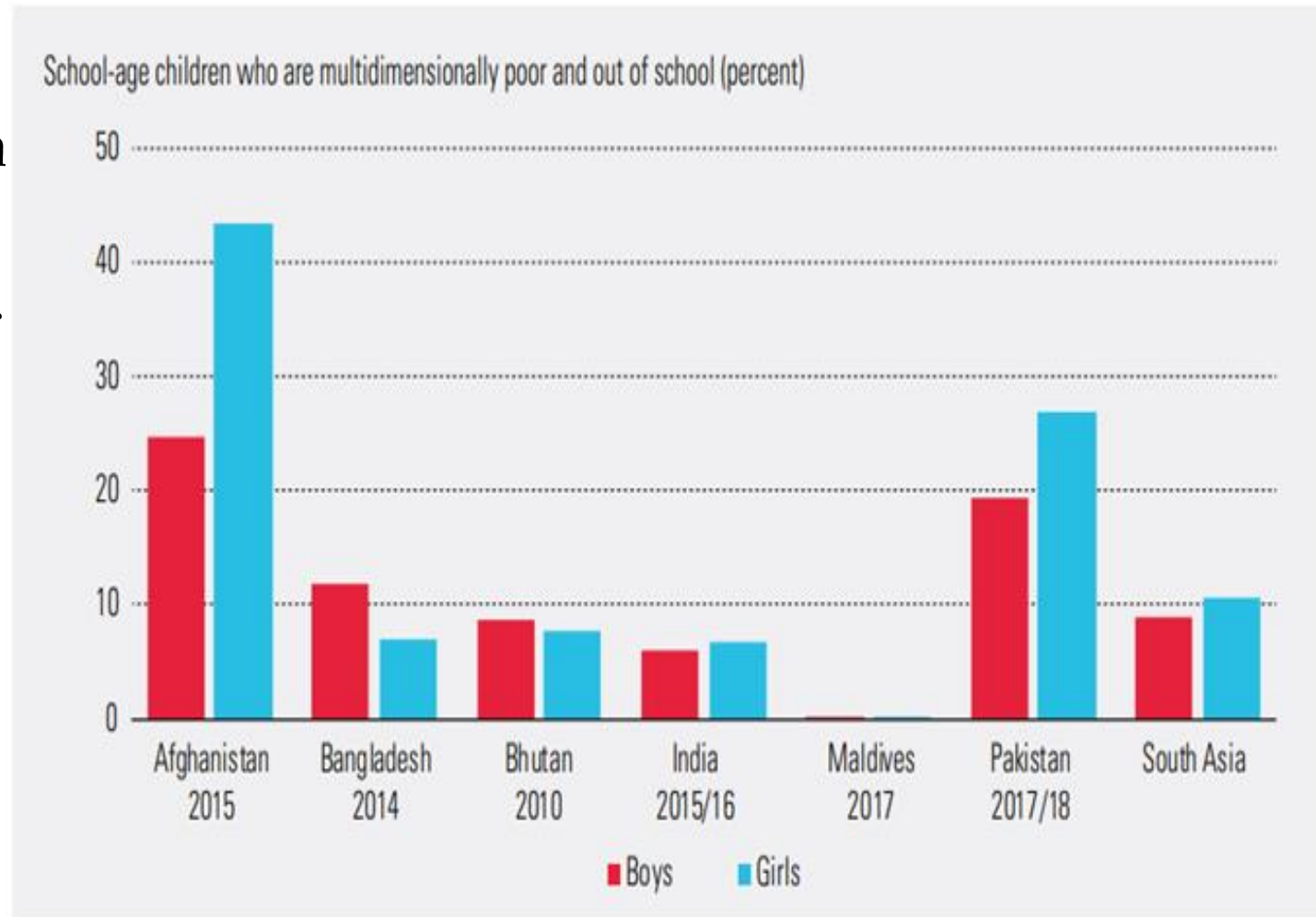

Note: Out-of-school children are school-age children who do not attend school through grade 8.
Source: Alkire, Ul Haq and Alim 2019.

Inequality among the MPI poor

Inequality among multidimensionally poor people tends to increase with Multidimensional Poverty Index value, but there is wide variation across countries

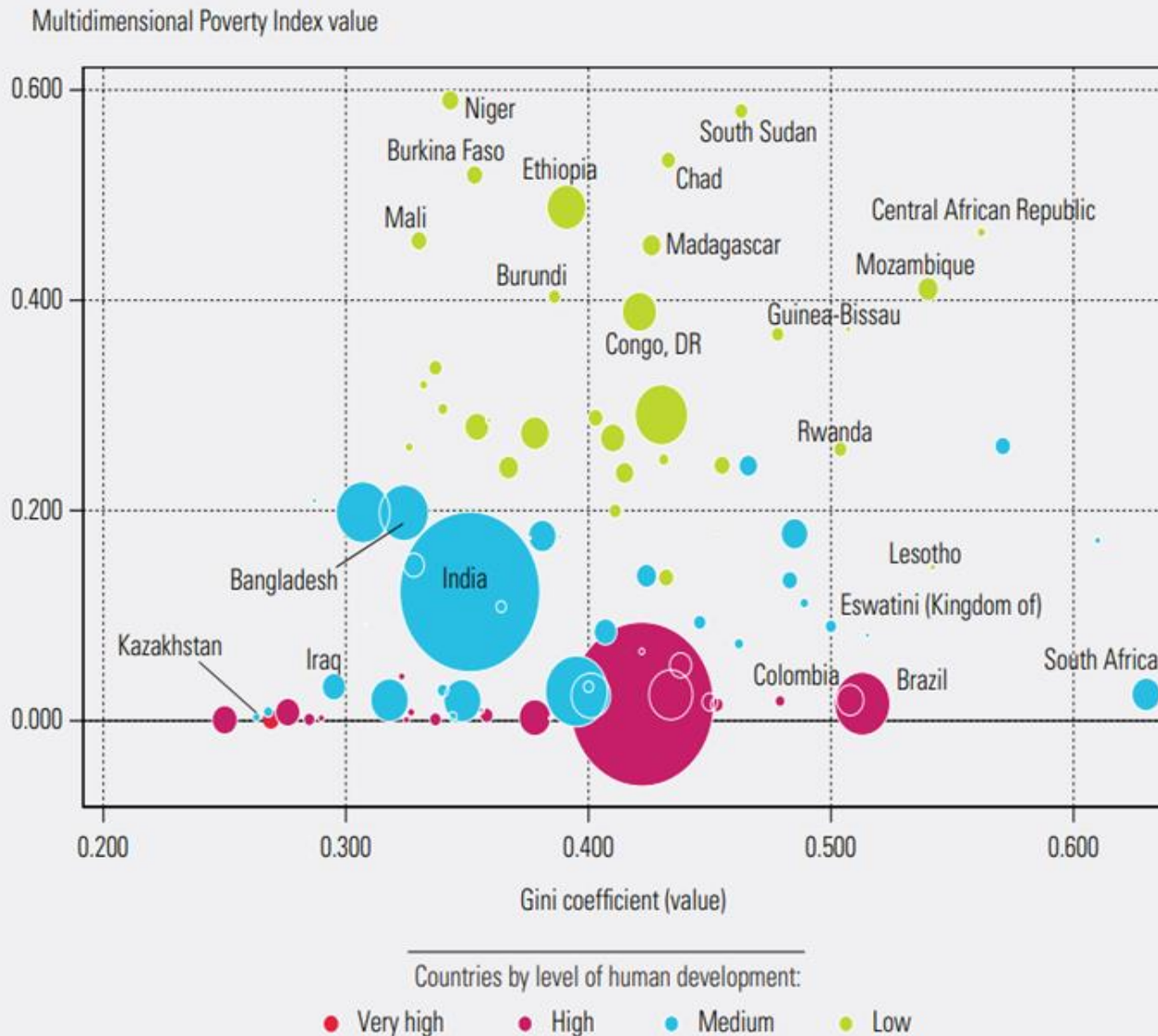Inequality among multidimensionally poor people (variance of deprivation scores)
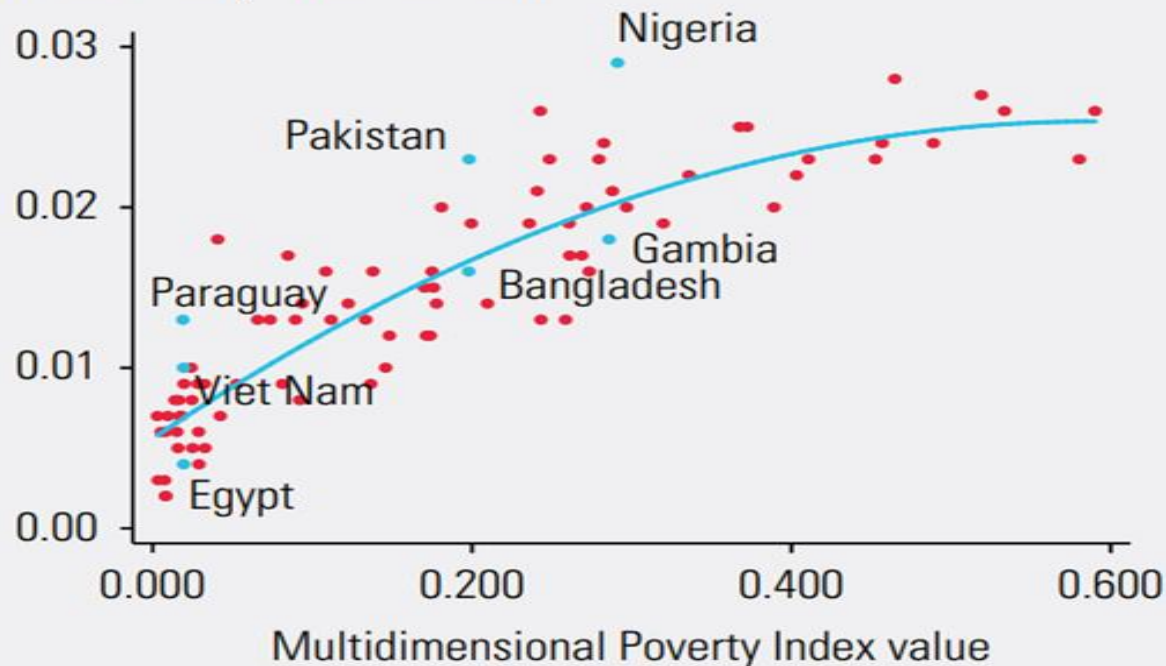
Inequality across deprivation scores of the poor.

Note: Data are from surveys conducted between 2007 and 2018.
Source: Alkire and Santos 2019.

MPI-Gini correlation

There is no correlation between economic inequality and Multidimensional Poverty Index value

There is no clear correlation between economic inequality (Gini) and the MPI.

Note: years may differ.

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