Presenting the Alkire-Foster Method and the Global Multidimensional Poverty Index (MPI)

Corinne Mitchell

9th December

Alkire-Foster Method

What is the Alkire-Foster Method?

- The Alkire-Foster (AF) method is a means of calculating multidimensional measures using a counting-based approach

- It is flexible to different contexts

- It is most often used to compute Multidimensional Poverty Indices (MPIs)

- It can show both the breadth (incidence) and depth (intensity) of poverty

Alkire-Foster Method: Steps

1) Select indicators

2) Set deprivation cut-offs for each indicator

3) Build the deprivation matrix identifying each person as deprived or not in each indicator

4) Select weights for each indicator

5) Build the weighted deprivation matrix

6) Compute the deprivation score for each person (share/number of indicators in which they are deprived)

7) Select a poverty cut-off (k-value)

8) Build the censored deprivation matrix (censor deprivations of non-poor from the weighted deprivation matrix)

9) Compute MPI!

Achievement Matrix (Starting Dataset)

Indicators

Years of Schooling   Assets   Electricity

Persons

$$X = \begin{bmatrix} 4 & 1 & 0 \\ 8 & 4 & 0 \\ 12 & 1 & 1 \\ 3 & 2 & 1 \\ 15 & 1 & 1 \\ 12 & 5 & 1 \end{bmatrix}$$

Deprivation cut-offs $z = \begin{bmatrix} 10 & 3 & 1 \end{bmatrix}$

Build the Deprivation Matrix

Identify values that are strictly less than (<) the deprivation cut-offs

Indicators

$$X = \begin{bmatrix} \textbf{4} & \textbf{1} & \textbf{0} \\ \textbf{8} & 4 & \textbf{0} \\ 12 & \textbf{1} & 1 \\ \textbf{3} & \textbf{2} & 1 \\ 15 & \textbf{1} & 1 \\ 12 & 5 & 1 \end{bmatrix}$$

Persons

Deprivation cut-offs $\quad z = \begin{bmatrix} 10 & 3 & 1 \end{bmatrix}$

*The **red** values are below the cut-offs*

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Build the Deprivation Matrix

Replace values: 1 if deprived, 0 if not deprived

Indicators   Indicators

Persons

$$X = \begin{bmatrix} \mathbf{4} & \mathbf{1} & \mathbf{0} \\ \mathbf{8} & 4 & \mathbf{0} \\ 12 & \mathbf{1} & 1 \\ \mathbf{3} & \mathbf{2} & 1 \\ 15 & \mathbf{1} & 1 \\ 12 & 5 & 1 \end{bmatrix} \qquad g^0 = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

Deprivation cut-offs $z = \begin{bmatrix} 10 & 3 & 1 \end{bmatrix}$

*The **red** values are below the cut-offs*

Build the Weighted Deprivation Matrix

Multiply deprivation matrix by weight vector

Indicators   Indicators

Persons

$$\mathbf{g}^0 = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix} \quad \bar{g}^0 = \begin{bmatrix} 0.33 & 0.33 & 0.33 \\ 0.33 & 0 & 0.33 \\ 0 & 0.33 & 0 \\ 0.33 & 0.33 & 0 \\ 0 & 0.33 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

Weights $\mathbf{w} = \begin{bmatrix} 0.33 & 0.33 & 0.33 \end{bmatrix}$

Compute the Deprivation Score

Sum across each row to get the individual's deprivation score (c-vector)

Indicators

Persons

$$\bar{g}^0 = \begin{bmatrix} 0.33 & 0.33 & 0.33 \\ 0.33 & 0 & 0.33 \\ 0 & 0.33 & 0 \\ 0.33 & 0.33 & 0 \\ 0 & 0.33 & 0 \\ 0 & 0 & 0 \end{bmatrix} \qquad c = \begin{bmatrix} 1 \\ 0.66 \\ 0.33 \\ 0.66 \\ 0.33 \\ 0 \end{bmatrix}$$

Build the Censored Deprivation Matrix

Poverty cut-off (k) = 0.66, so poor if deprivation score is >=0.66

Weighted Deprivation Matrix

$$\bar{g}^0 = \begin{bmatrix} 0.33 & 0.33 & 0.33 \\ 0.33 & 0 & 0.33 \\ 0 & \mathbf{0.33} & 0 \\ 0.33 & 0.33 & 0 \\ 0 & \mathbf{0.33} & 0 \\ 0 & 0 & 0 \end{bmatrix} \qquad c = \begin{bmatrix} 1 \\ 0.66 \\ 0.33 \\ 0.66 \\ 0.33 \\ 0 \end{bmatrix}$$

Censored Deprivation Matrix

$$\bar{g}^0(0.66) = \begin{bmatrix} 0.33 & 0.33 & 0.33 \\ 0.33 & 0 & 0.33 \\ 0 & \mathbf{0} & 0 \\ 0.33 & 0.33 & 0 \\ 0 & \mathbf{0} & 0 \\ 0 & 0 & 0 \end{bmatrix} \qquad c(0.66) = \begin{bmatrix} 1 \\ 0.66 \\ 0 \\ 0.66 \\ 0 \\ 0 \end{bmatrix}$$

Censor data for non-poor

*The **red** values are deprivations among non-poor*

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Compute the MPI – Headcount Ratio

Share of deprivations of the poor

$$\bar{g}^0(0.66)=\begin{bmatrix} 0.33 & 0.33 & 0.33 \\ 0.33 & 0 & 0.33 \\ 0 & 0 & 0 \\ 0.33 & 0.33 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$c(0.66)=\begin{bmatrix} 1 \\ 0.66 \\ 0 \\ 0.66 \\ 0 \\ 0 \end{bmatrix}$$

Headcount Ratio (H) = % of population that is poor

$$H = \frac{3}{6} = 0.50$$

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Compute the MPI - Intensity

Share of deprivations of the poor

$$\bar{g}^0(0.66)= \begin{bmatrix} 0.33 & 0.33 & 0.33 \\ 0.33 & 0 & 0.33 \\ 0 & 0 & 0 \\ 0.33 & 0.33 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$c(0.66)= \begin{bmatrix} 1 \\ 0.66 \\ 0 \\ 0.66 \\ 0 \\ 0 \end{bmatrix}$$

Average Intensity Among the Poor (A) = average % of deprivations experienced by the poor

$$A= \frac{\frac{3}{3}+\frac{2}{3}+\frac{2}{3}}{3} = \frac{7}{9} = 0.78$$

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Compute the MPI - MPI

Share of deprivations of the poor

$$\bar{g}^0(0.66)= \begin{bmatrix} 0.33 & 0.33 & 0.33 \\ 0.33 & 0 & 0.33 \\ 0 & 0 & 0 \\ 0.33 & 0.33 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$c(0.66)= \begin{bmatrix} 1 \\ 0.66 \\ 0 \\ 0.66 \\ 0 \\ 0 \end{bmatrix}$$

Multidimensional Poverty Index
(MPI) = H * A

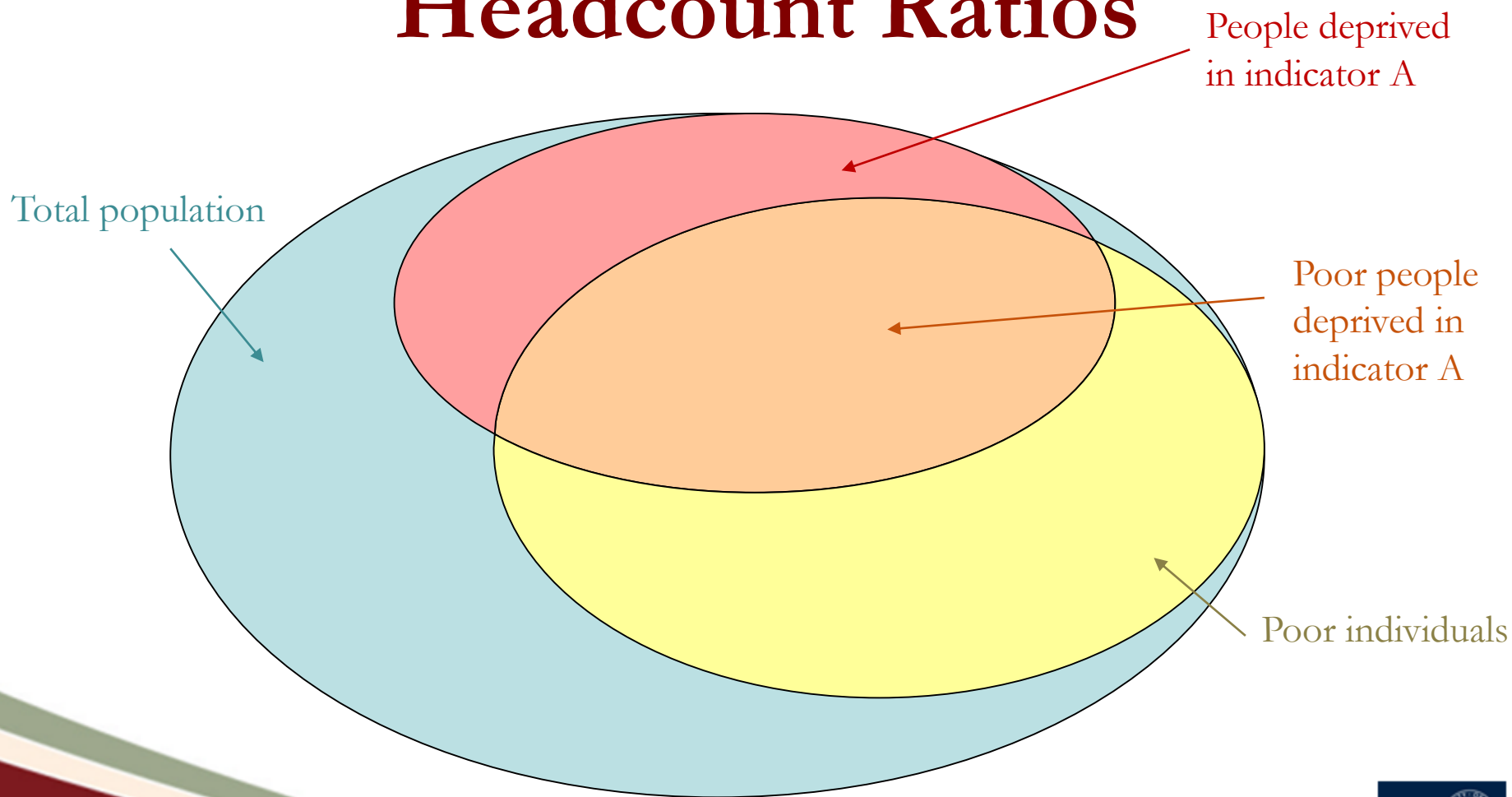$$MPI = \frac{3}{6} \times \frac{7}{9} = \frac{21}{54} = \frac{7}{18} = 0.389$$

Indicator Analysis

The **uncensored headcount** ratio of an indicator

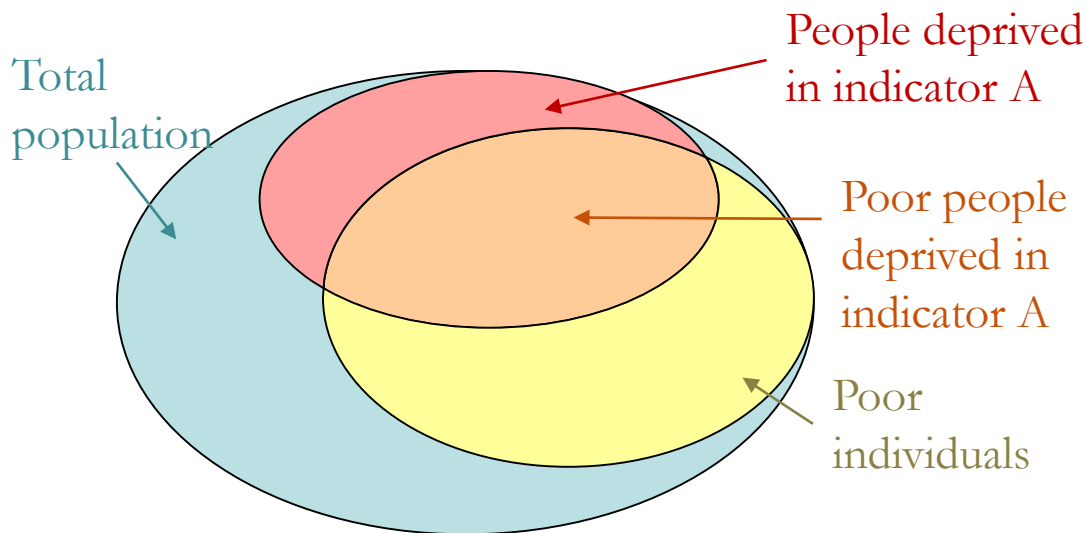   denotes the proportion of the population **deprived in that indicator**.

The **censored headcount** ratio of an indicator

    denotes the proportion of the population that is multidimensionally **poor** and **deprived in that indicator** at the same time.

The **percentage contribution** of an indicator

    denotes the proportion of the overall MPI that is determined by that indicator/ Calculated as:

    (censored headcount ratio of the indicator * indicator weight) / MPI

Uncensored vs Censored Headcount Ratios

People deprived in indicator A

Total population

Poor people deprived in indicator A

Poor individuals

Uncensored vs Censored Headcount Ratios

Total population

People deprived in indicator A

Poor people deprived in indicator A

Poor individuals

Headcount ratio (H) = (poor individuals)/(total population)

Uncensored headcount ratio of indicator A = (people deprived in indicator A)/(total population)

Censored headcount ratio of indicator A = (poor people deprived in indicator A)/(total population)

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Indicator Analysis – Uncensored Headcount Ratios

Deprivation Matrix

Indicators

Years of Schooling   Assets   Electricity

Persons

$$\mathbf{g^0} = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

Uncensored Headcount Ratios = % of persons deprived in each column of deprivation matrix

Uncensored Headcount Ratios   3/6   4/6   2/6

Indicator Analysis – Censored Headcount Ratios

Censored Deprivation Matrix

Indicators

Years of Schooling   Assets   Electricity

Persons

$$\bar{g}^0(0.66)= \begin{bmatrix} 0.33 & 0.33 & 0.33 \\ 0.33 & 0 & 0.33 \\ 0 & 0 & 0 \\ 0.33 & 0.33 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

Censored Headcount Ratios = % of persons deprived in each column of censored deprivation matrix

Censored Headcount Ratios   3/6   **2**/6   2/6

Note: the censored headcount ratio is different from the uncensored headcount ratio for assets (in **red**)

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Indicator Analysis – Percentage Contribution

Percentage contribution of an indicator =
(weight of indicator *censored headcount of indicator) / MPI

% contribution of years of schooling = $(1/3 * 3/6)/0.389 \cong 0.424$

% contribution of assets= $(1/3 * 2/6)/0.389 \cong 0.280$

% contribution of assets= $(1/3 * 2/6)/0.389 \cong 0.280$

Note: all of the % contributions of
every indicator should sum to 1 (100%)

Normative Choices

1) **Purpose** of the measure (targeting, monitoring, comparison to monetary poverty, etc.)

2) **Unit of identification and analysis** (individual, household, etc.)

3) **Dimensions** (if helpful)

4) **Indicators**

5) **Deprivation cut-offs** for each indicator

6) **Weights** for each indicator

7) **Poverty cut-off** (k-value)

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How to Make Normative Choices

- Link to laws, strategies, development plans, SDGs, etc.
- Policy relevance
- Expert input
- Participatory work
- Data constraints
- Robustness analysis

The Global MPI

What is the Global MPI?
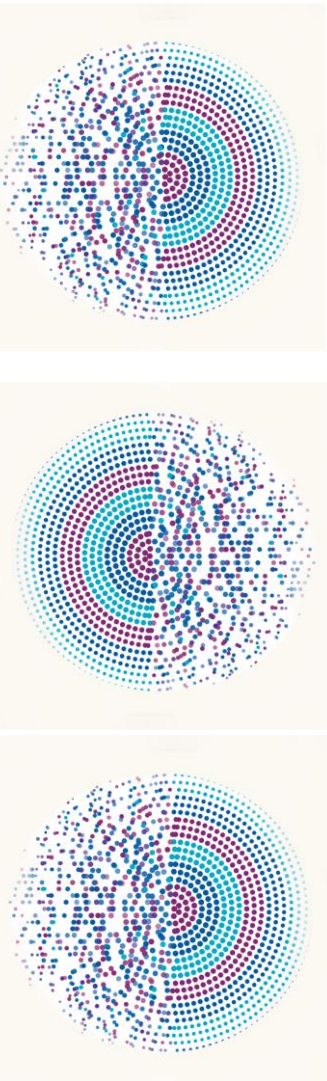
- The Global MPI is an **internationally comparable** measure of **acute** multidimensional poverty covering more than **100 countries**

- Jointly computed by OPHI and UNDP's Human Development Report Office (HDRO) and published annually

- All documentation is freely available online (country briefings, tables, Stata dofiles, interactive databank, methodological notes):
  https://ophi.org.uk/multidimensional-poverty-index/

Global MPI Structure
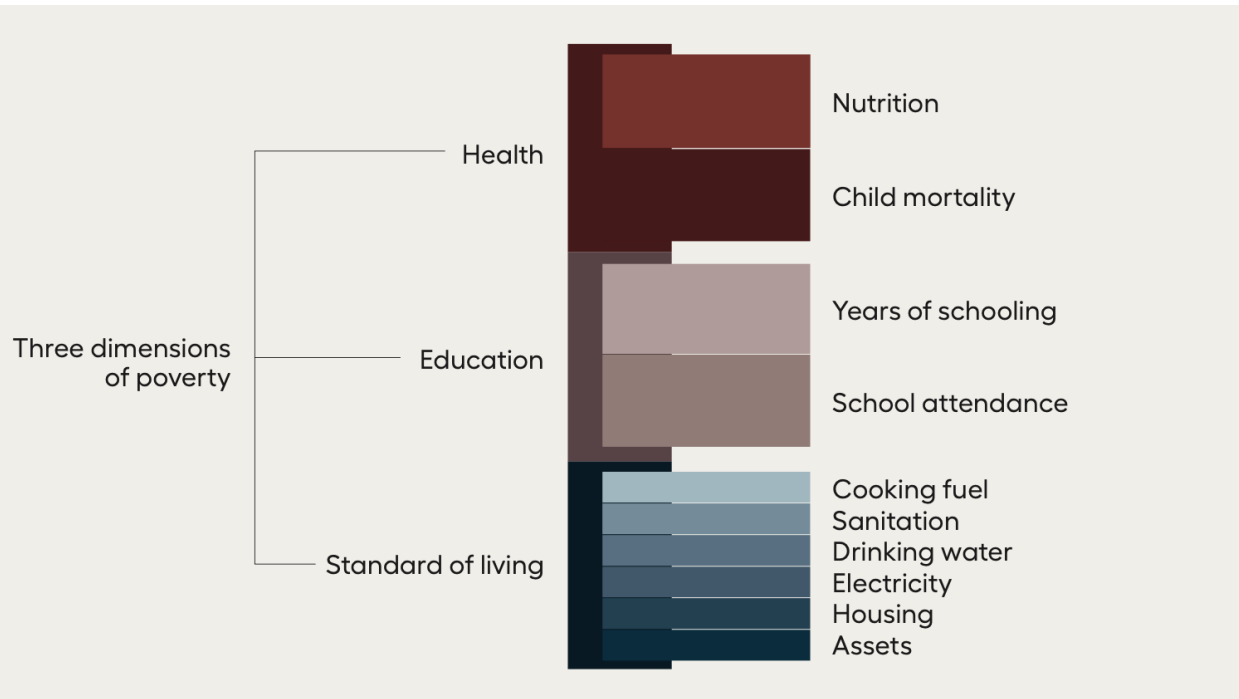
A person is identified as poor if they are deprived in 1/3 or more of these weighted indicators

Of the 5.9 billion people covered by the global MPI, 1.3 billion (21.7%) are MPI poor

- About half (644 million) are **children** under age 18. One in three children is multidimensionally poor compared with one in six adults. About 8.2 percent of multidimensionally poor people (105 million) are age 60 or older.

- Nearly 85 percent live in **Sub-Saharan Africa** (556 million) and **South Asia** (532 million).

- Roughly, 84 percent (1.1 billion) live in **rural** areas.

- More than two-thirds live in **middle-income countries**, where the incidence ranges from 0.1 to 66.8 percent nationally and from 0.0 to 89.5 percent subnationally.

OPHI
Oxford Poverty & Human
Development Initiative

UN
DP

Gendered and intrahousehold lens

- **<u>Two-thirds</u> of multidimensionally poor people—836 million—live in households in which no girl or woman has completed at least six years of schooling.**

- Ranges from 12.8 percent in Europe and Central Asia to 70.5 percent in the Arab States

- One in six multidimensionally poor people (215 million) live in households in which at least one male has completed at least six years of schooling but no female has.

- ● Household has at least one male member but no female member who has completed at least six years of schooling
- ● No household member has completed at least six years of schooling
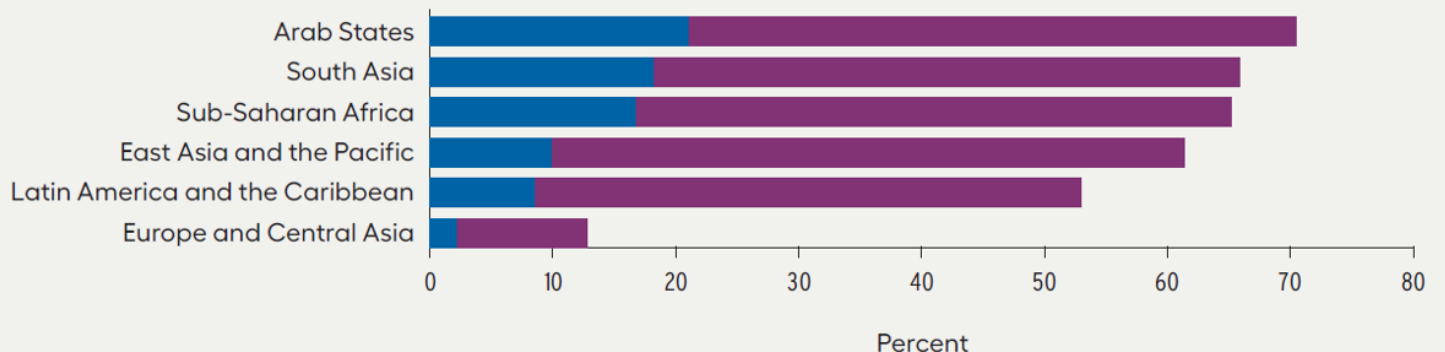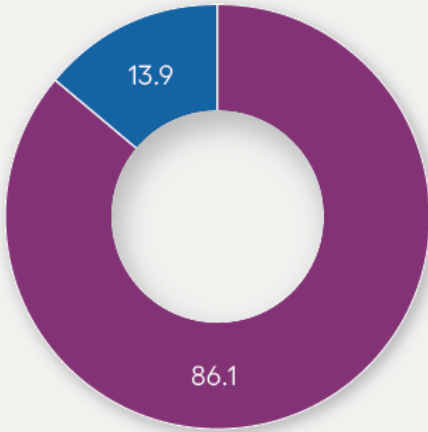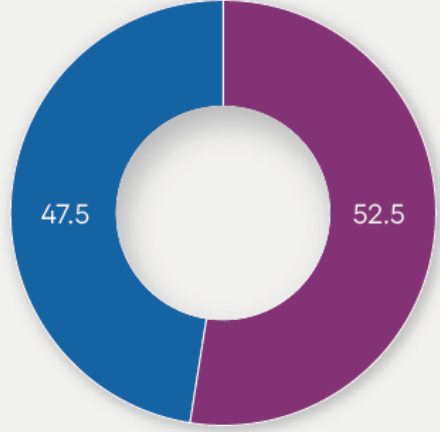
Gender & Intimate Partner Violence
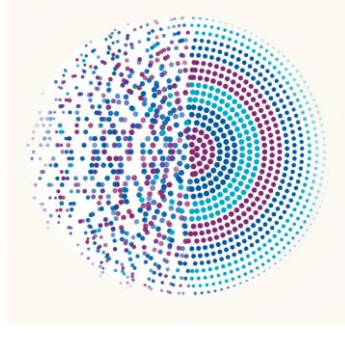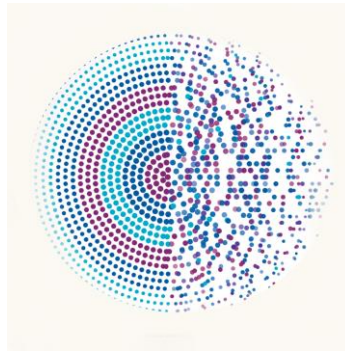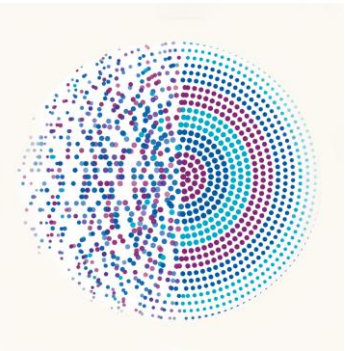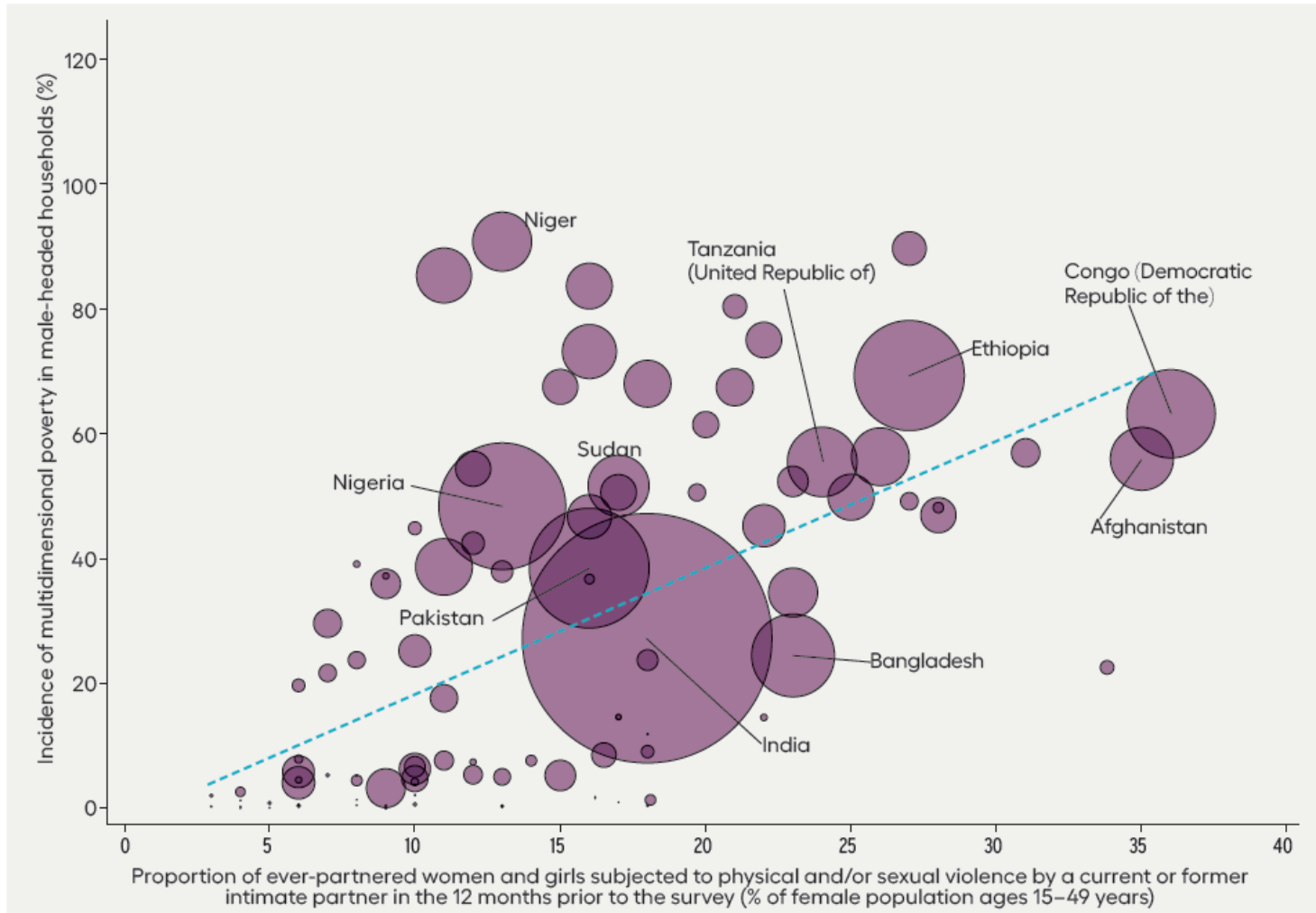
Ethnic minorities in East Asia and the Pacific show higher levels of multidimensional poverty
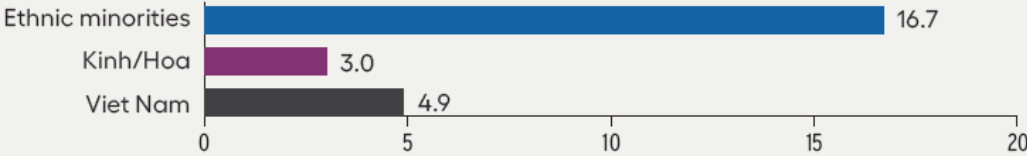

Population share in Viet Nam (%)
- Kinh/Hoa: 86.1
- Ethnic minorities: 13.9

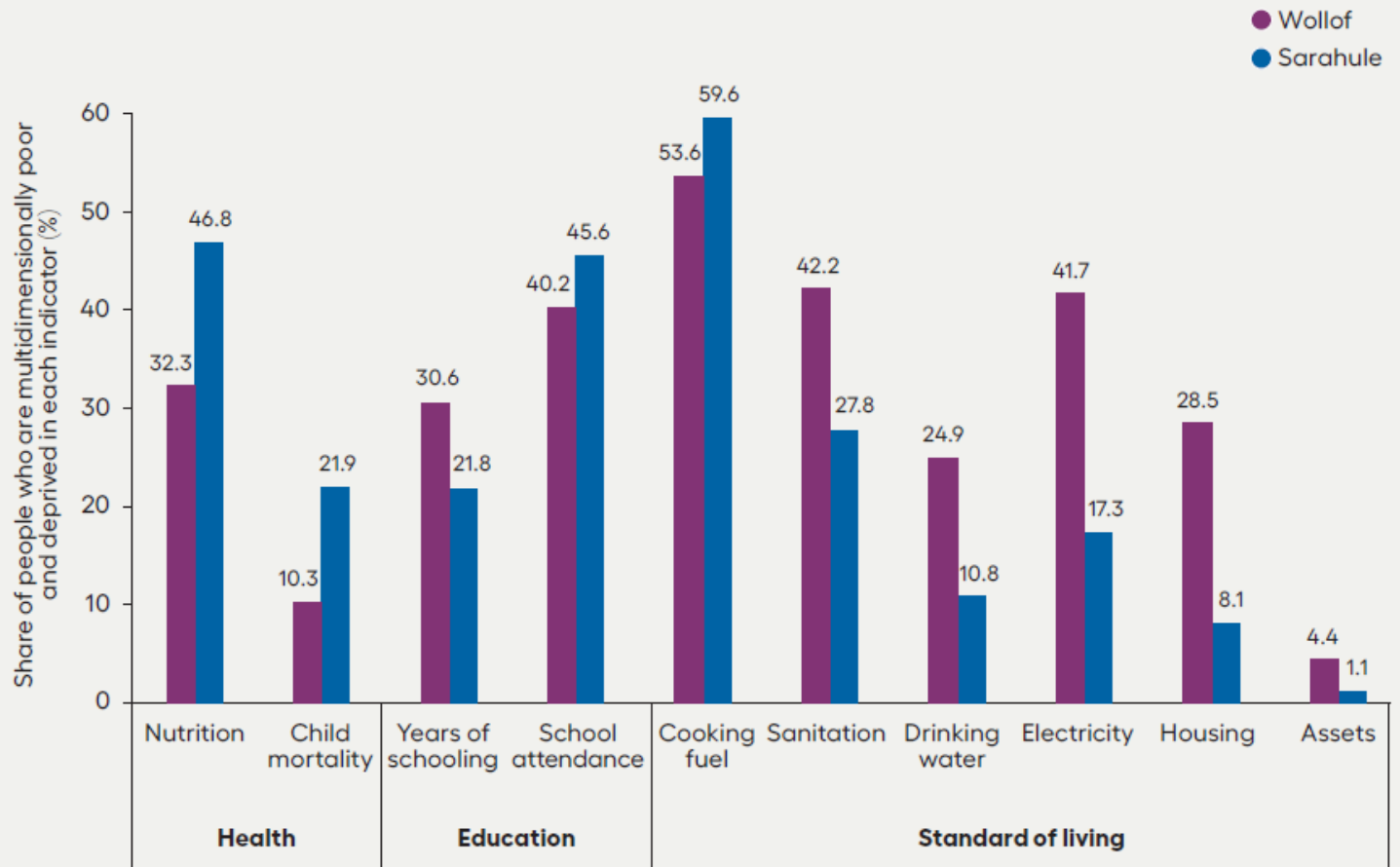Distribution of the multidimensionally poor in Viet Nam (%)
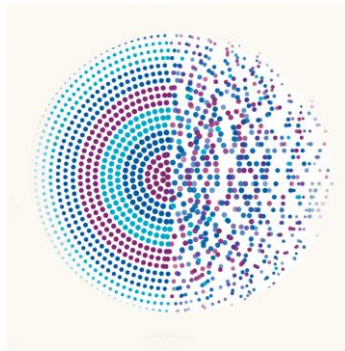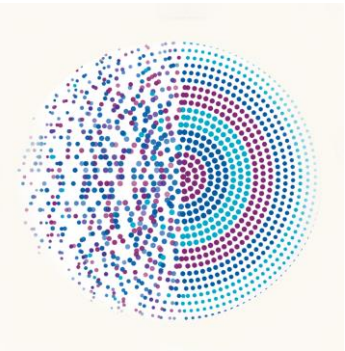- Kinh/Hoa: 52.5
- Ethnic minorities: 47.5

Incidence of multidimensional poverty (%)
- Ethnic minorities: 16.7
- Kinh/Hoa: 3.0
- Viet Nam: 4.9

Ethnic groups with different composition of multidimensional poverty in Gambia: Wollof vs. Sarahule
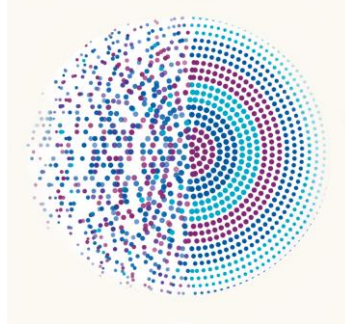
Poverty Reduction Trends

➢ Of the **80 countries** studied, covering roughly 5 billion people, **70 experienced a statistically significant reduction** in absolute terms in MPI value during at least one period.

➢ In some, the **poorest region reduced MPI fastest**: North Central in **Liberia** (2013–2019/2020), Province 2 in **Nepal** (2016–2019), Sylhet in **Bangladesh** (2014–2019) and Tambacounda in **Senegal** (2017–2019).
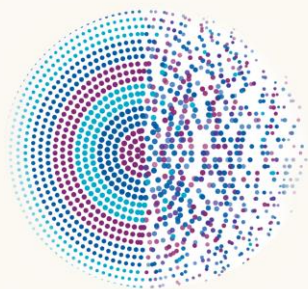
MPI in Arab States

Country	World region	MPI data source		Multidimensional poverty					Number of MPI poor people [b]			Indicators included in the MPI	
		Survey	Year	Multidimensional Poverty Index (MPI = H*A)	Headcount ratio: Population in multidimensional poverty (H)	Intensity of deprivation among the poor (A)	Vulnerable to poverty	In severe poverty	Year of the survey	Population 2018	Population 2019	Total number of indicators included (out of ten)	Indicator (s) missing
				Range 0 to 1	% Population	Average % of weighted deprivations	% Population	% Population	Thousands	Thousands	Thousands		
Jordan	Arab States	DHS	2017-2018	0.002	0.43	35.39	0.69	0.00	43	43	44	10	
Palestine, State of	Arab States	MICS	2019-2020	0.002	0.57	34.97	1.25	0.01	29	28	28	10	
Tunisia	Arab States	MICS	2018	0.003	0.79	36.49	2.39	0.06	92	92	93	10	
Algeria	Arab States	MICS	2018-2019	0.005	1.38	39.17	3.61	0.20	594	583	594	10	
Libya	Arab States	PAPFAM	2014	0.007	2.00	37.13	11.36	0.09	127	133	135	10	
Egypt	Arab States	DHS	2014	0.020	5.24	37.57	6.09	0.58	4,737	5,156	5,259	9	Cooking fuel
Morocco	Arab States	PAPFAM	2017-2018	0.027	6.36	41.98	10.86	1.42	2,291	2,291	2,319	10	
Syria	Arab States	PAPFAM	2009	0.029	7.39	38.94	7.77	1.24	1,568	1,253	1,262	10	
Iraq	Arab States	MICS	2018	0.033	8.64	37.86	5.24	1.31	3,319	3,319	3,395	10	
Yemen	Arab States	DHS	2013	0.245	48.47	50.58	22.29	24.35	12,188	13,812	14,134	10	
Sudan	Arab States	MICS	2014	0.279	52.33	53.40	17.66	30.88	19,873	21,874	22,403	10	

- Among 11 countries covered, MPI ranges from 0.002 (Jordan, Palestine) to 0.279 (Sudan)
- Of the 341 million people covered, 49 million (12.1%) are MPI poor. On average, a poor person is deprived in 40.3% of weighted indicators
- The highest deprivations are in housing, followed by sanitation and nutrition
- 16.2% of the rural population lives in poverty, compared to 5.9% of the urban population

Thank You!

Questions? Comments?