

Povert  e Disuguaglianza multidimensionale:  
un indicatore sintetico applicato a dati della  
Giordania

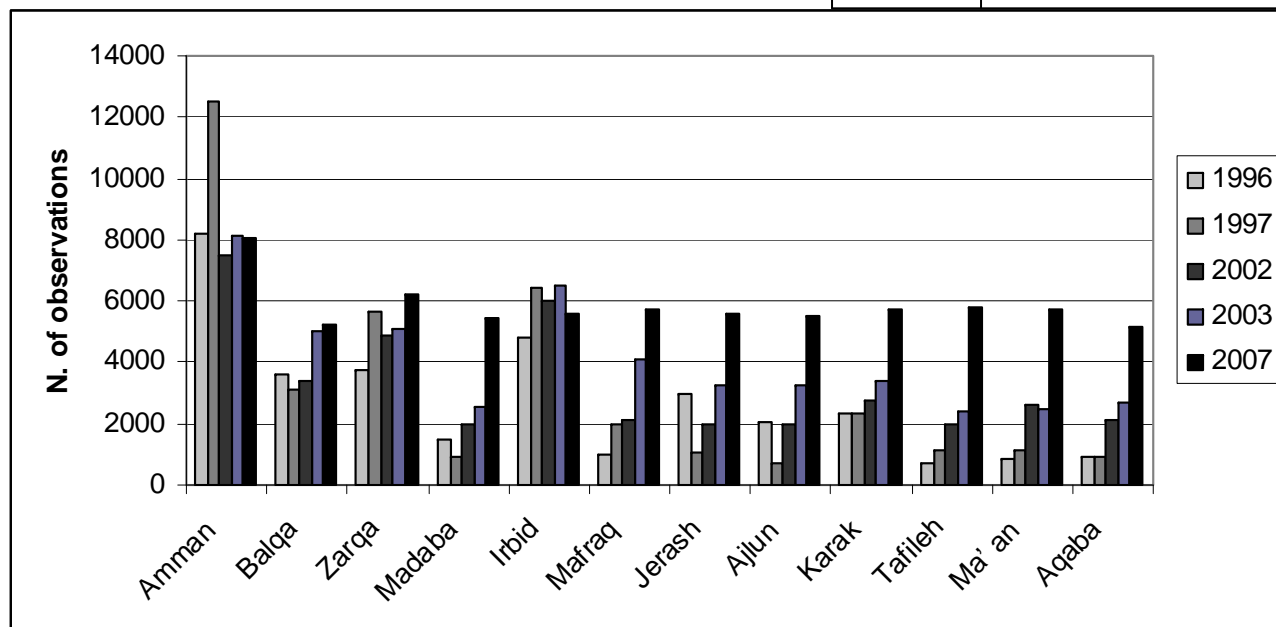
Enrica Chiappero-Martinetti  
Nadia von Jacobi

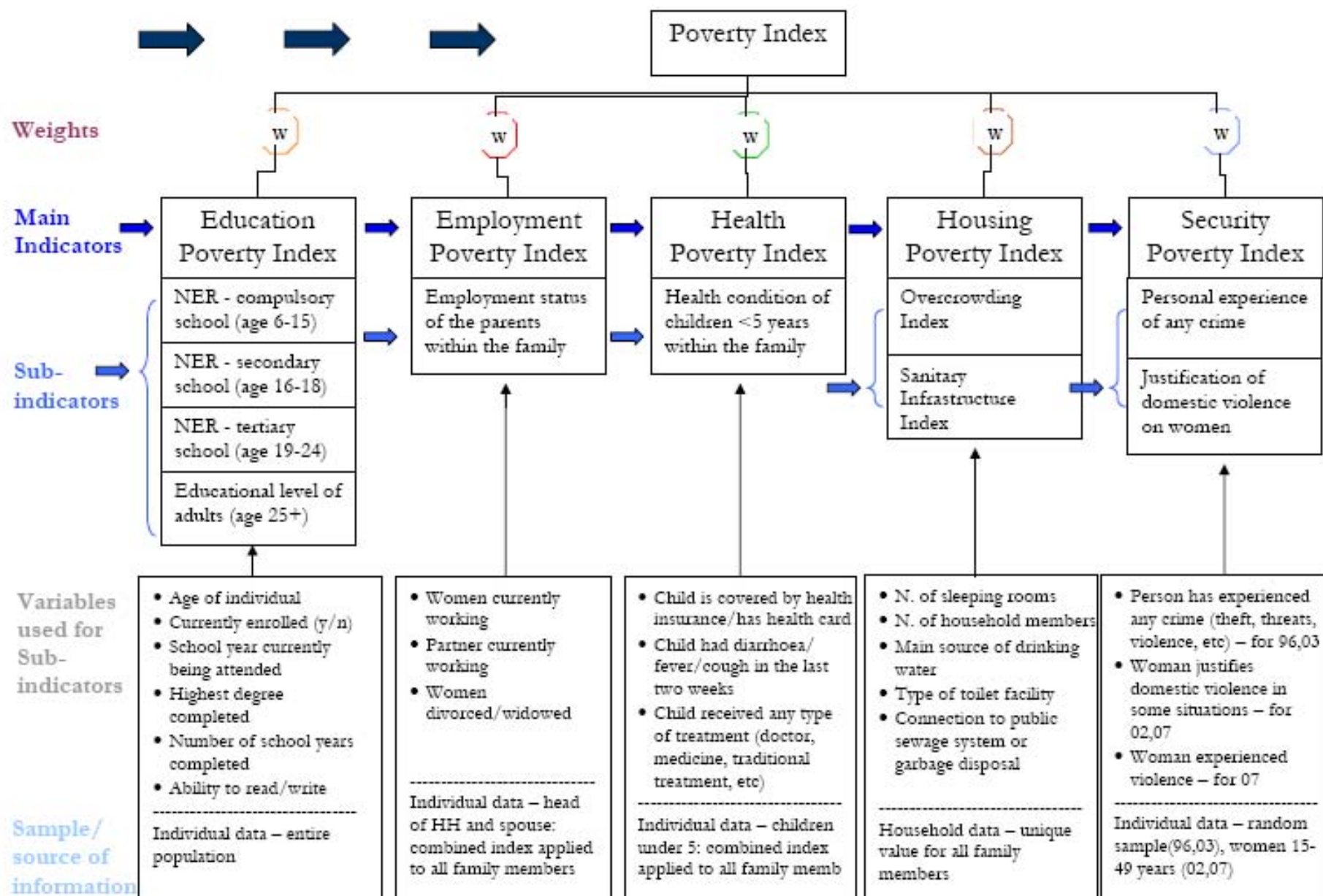
Universit  di Pavia

# The datasets used

- 2 national surveys (1996, 2003)
- 3 DHS (1997, 2002, 2007)

Year	Name of Dataset	N. of HH	N. of Ind
1996	Jordan Living Conditions Survey	5919	40579
1997	Demographic Health Survey	7335	45864
2002	Demographic Health Survey	7545	46755
2003	Multipurpose Household Survey	10176	57761
2007	Demographic Health Survey	14044	82471





# Measuring poverty in education

Age	Indicator/ Abbreviation	Values	Detailed information	Degree of deprivation
6-15	Net enrolment compulsory school EDU1	0	Currently attending school	No deprivation
13-15		0.5	Not enrolled, completed primary	No deprivation, possibly from now on
13-15		1	Not enrolled, incomplete primary	Visible deprivation
16-18	Net enrolment secondary school EDU2	0	Currently attending school	No deprivation
		0.33	Not enrolled, completed basic	No deprivation, possibly from now on
		0.67	Not enrolled, completed primary	Some deprivation
		1	Not enrolled, incomplete primary	Visible deprivation
19-24	Net enrolment tertiary education EDU3	0	Currently attending university	No deprivation
		0.25	Not enrolled, completed secondary	No deprivation, possibly from now on
		0.5	Not enrolled, completed basic	Little deprivation
		0.75	Not enrolled, completed primary	Some deprivation
		1	Not enrolled, incomplete primary	Visible deprivation
25+	Educational attainment of adults EDU4	0	Some tertiary, more than 12 years of schooling	Absolutely deprivation
		0.2	Completed secondary, 12 years of schooling	Almost no deprivation
		0.4	Incomplete secondary, 9/10 years of schooling	Little deprivation
		0.6	Completed primary, 6 years of schooling	Some deprivation
		0.8	Less than primary, <6 years of schooling	Significant deprivation
		1	Illiterate, never attended any school	Visible deprivation

# Measuring poverty in employment

Indicator/ Abbreviation	Values	Detailed information	Degree of deprivation
Presence of employment among parents of the family  EMP1	0	Both parents work	No deprivation
	0.33	Only man works	Little deprivation – reduced woman empowerment
	0.67	Only woman works	Some deprivation – dependence on others
	1	No one works	Visible deprivation – persistent unemployment and dependence on others

# Measuring poverty in health

Indicator/ Abbreviation	Values	Detailed information	Degree of deprivation
Health conditio n of under- five olds  HEA3	0	No disease, insurance coverage	No deprivation
	0.2	No disease, no insurance coverage	No immediate risk but vulnerability
	0.4	Disease, coverage, gets treatment	Some: health risk but reaction
	0.6	Disease, no coverage, gets treatment	Medium: health risk, more difficult reaction
	0.8	Disease, coverage, no treatment	High: health risk no reaction though insured
	1	Disease, no coverage, no treatment	Absolute: health risk, no reaction, not insured

# Measuring poverty in housing

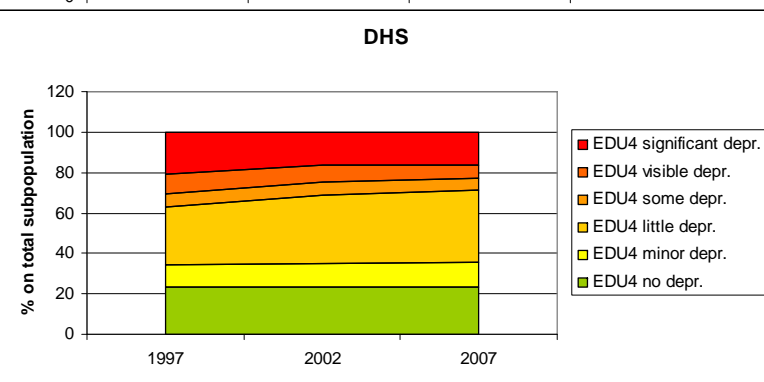
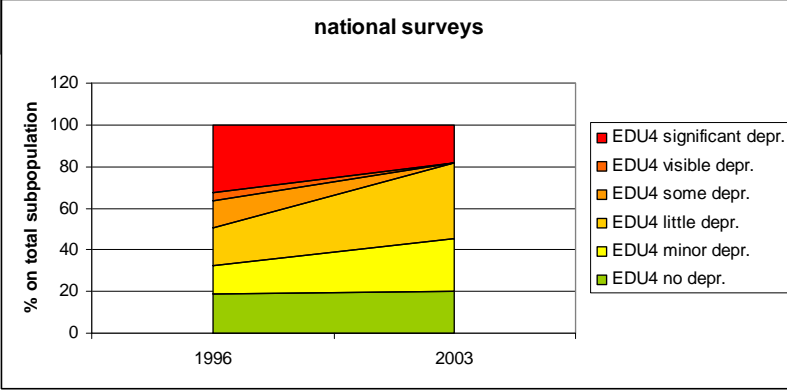
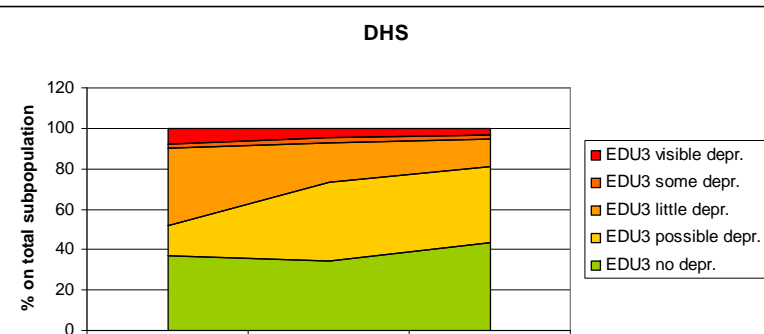
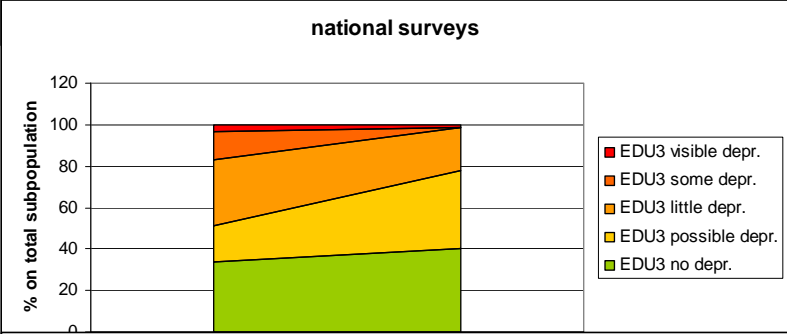
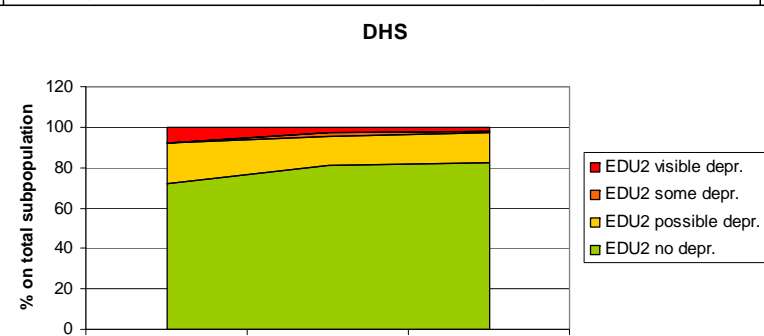
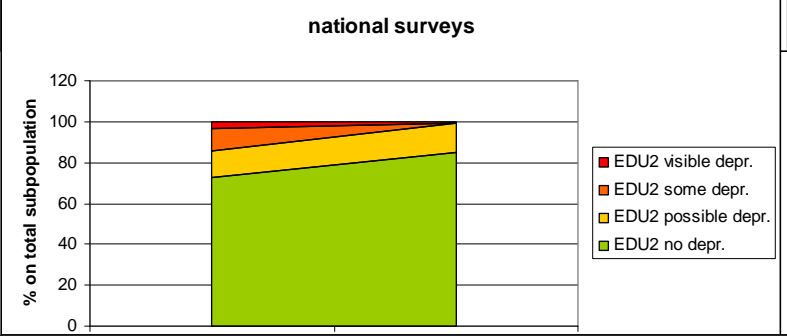
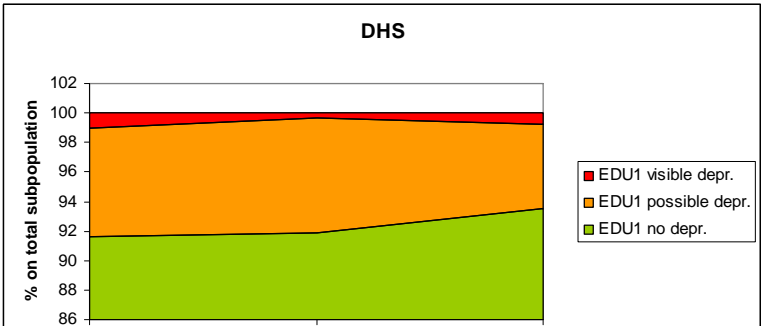
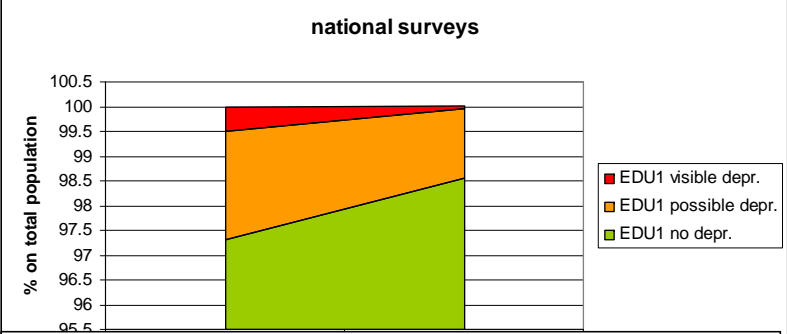
Indicator/ Abbreviation	Values	Detailed information	Degree of deprivation
Overcrowding Index  HOU1	0	No overcrowding	No deprivation
	0.33	Overcrowding below mean	Little deprivation
	0.67	Overcrowding above mean	Medium deprivation
	1	High overcrowding	Visible deprivation
Quality of housing infrastruct ure  HOU5	0	All infrastructures: HH has water, flush toilet and sewage system	No deprivation
	0.33	2 infrastructures: HH has any two of water, flush toilet or sewage	Little deprivation: some hygienic risk
	0.67	1 infrastructure: HH has only 1 out of 3 (water, flush toilet, sewage)	Medium deprivation: higher hygienic risk
	1	No infrastructure: HH has no water, no flush toilet, no sewage	Visible deprivation: extreme hygienic risk

## Measuring poverty in security

Indicator/ Abbreviation	Values	Detailed information	Degree of deprivation
Personal experience of any crime  SEC1	0	None of the family has been victim of theft, threats, violence or injury	No deprivation
	1	Someone of the family has been victim of theft, threats, violence or injury	High deprivation
Justification of domestic violence by women  SEC3	0	Never justifies violence on behalf of the husband	No deprivation
	0.5	Justifies violence on behalf of husband only in one case	Some deprivation: permits to be victim of domestic violence
	1	Justifies violence on behalf of husband in more than one case	High deprivation: is likely to be victim of domestic violence

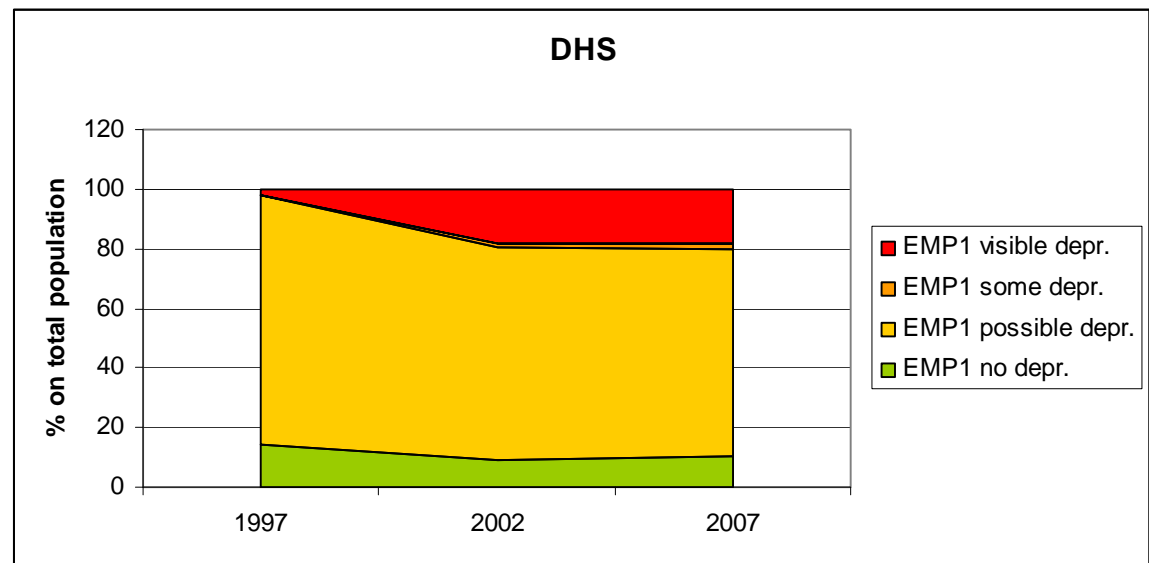
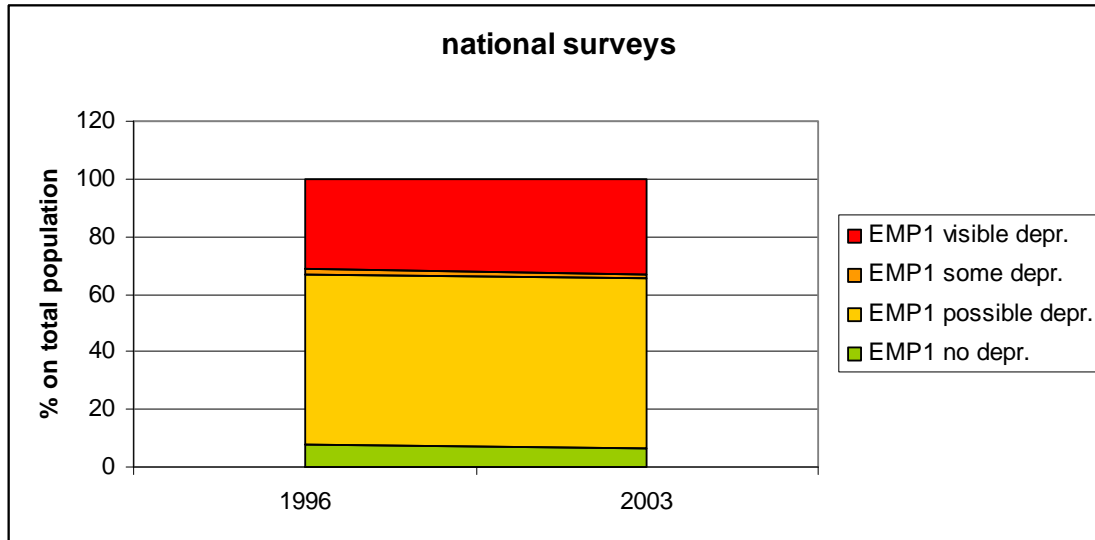


# Results education



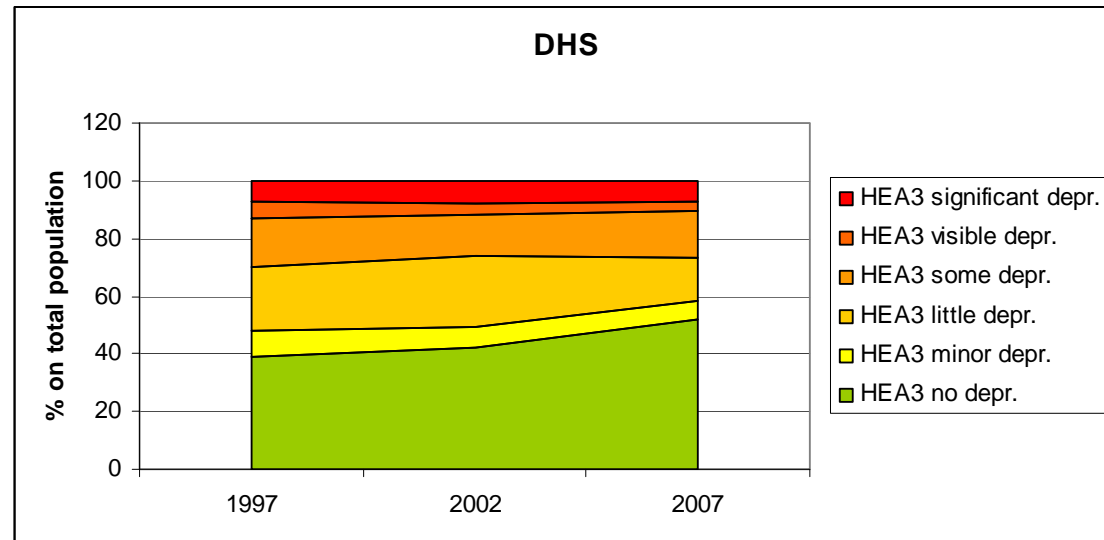
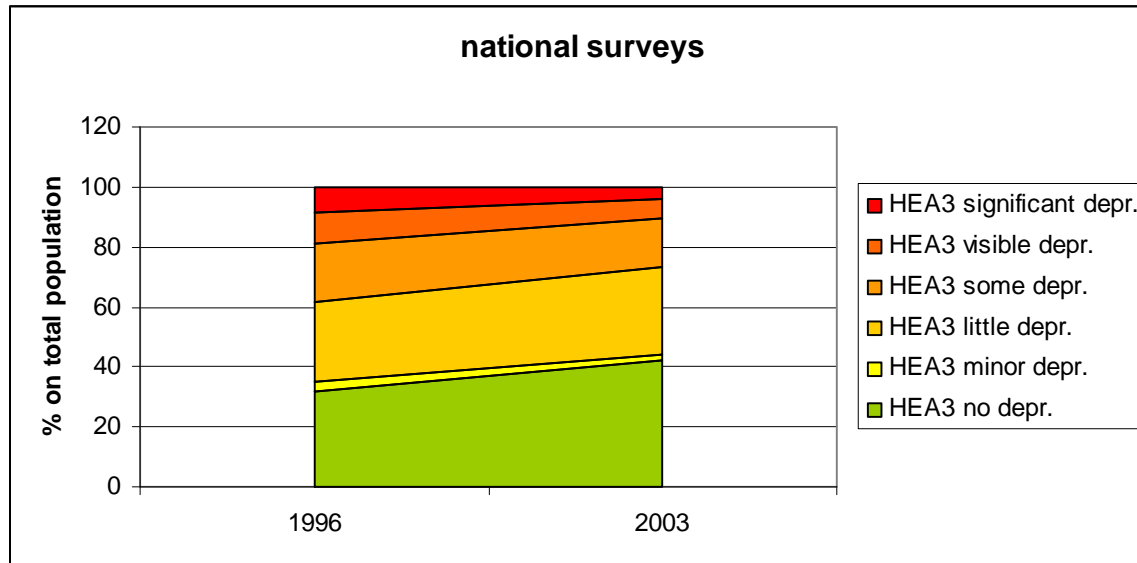
# Results

## employment



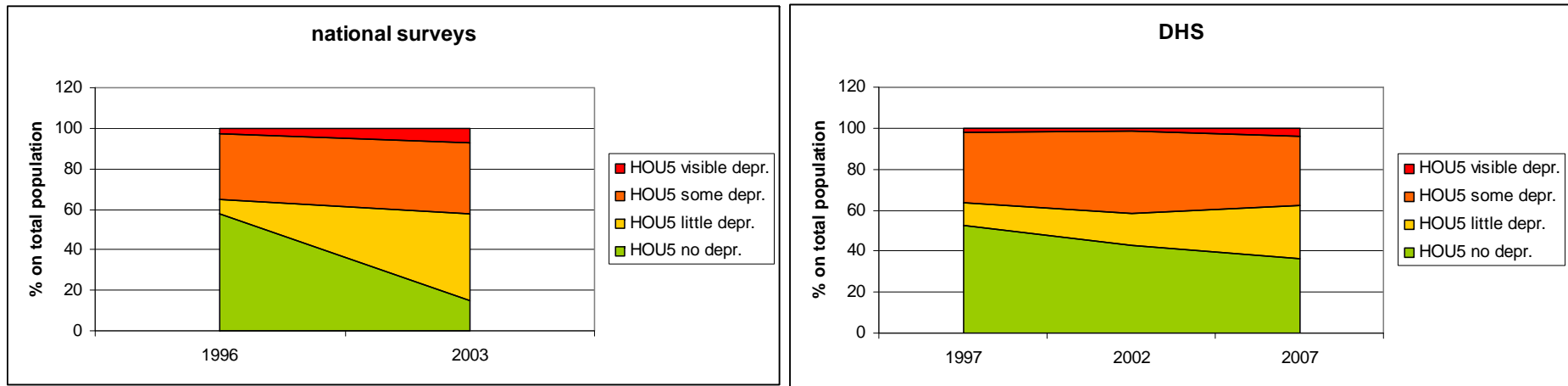
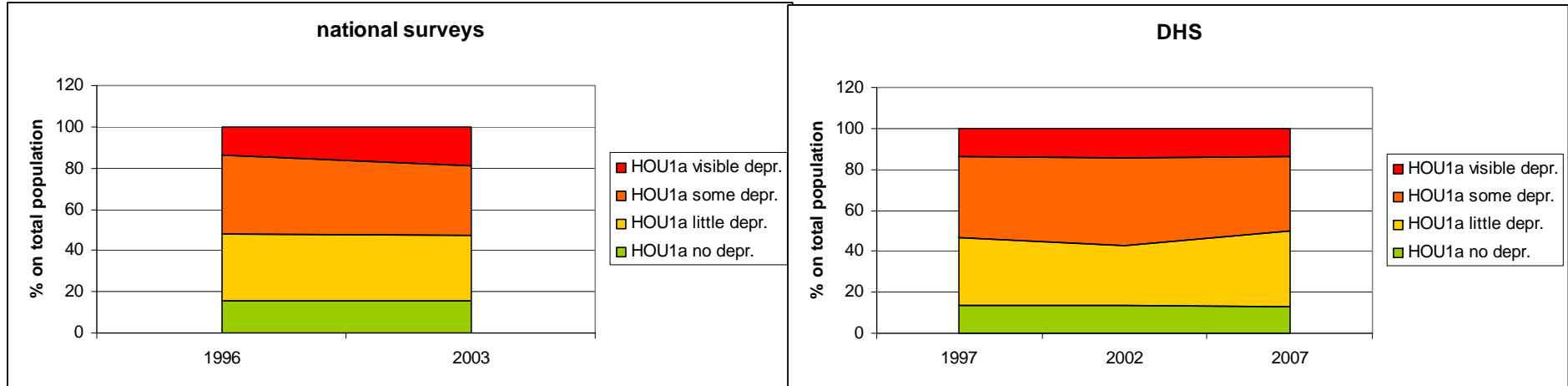
# Results

## health



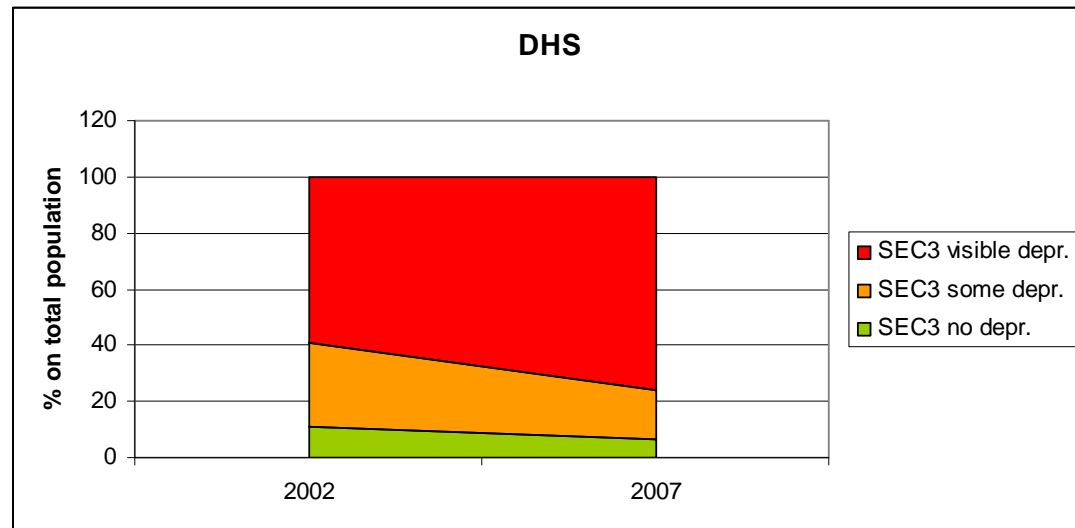
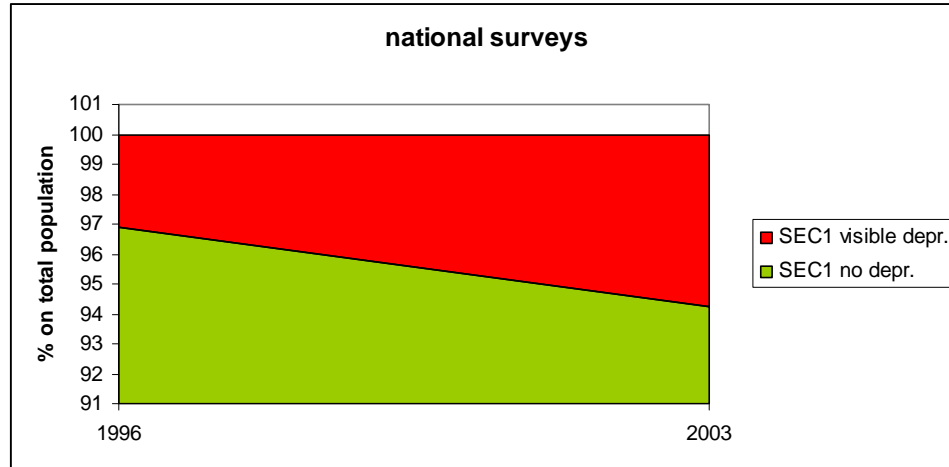
# Results

## housing



# Results

## Personal security



# Unidimensional Poverty Indexes

Foster, Greer e Thorbecke (1984) class of poverty indexes

$$FGT = P\alpha = \frac{1}{n} \sum_{i=1}^q \left( \frac{z - x_i}{z} \right)^\alpha$$

$\alpha$  poverty aversion parameter

- $\alpha = 0 \Rightarrow FGT = H = \text{incidence}$
- $\alpha = 1 \Rightarrow FGT = PGI = \text{intensity}$
- $\alpha = 2 \Rightarrow FGT = SPG = \text{severity}$

# Poverty thresholds

Different poverty thresholds used:

$H_1 = .001$  (are gradually poor all those who do not have a full achievement)

Generally:

$H_2 =$  median value

$H_3 =$  mean value

Exc. HEA where  $H_2 = .2$  “high or extreme risk” and  $H_3 = .4$  “some health risk but reaction”; EMPL:  $H_2 =$ no one or only women works;  $H_3 =$ no one works

## Trends in poverty incidence, intensity and severity '96 - '07, direction and degree of change, by governorate

	H1	H2	H3	PGI	SPG
Education					
Amman	*	+		**	**
Balqa	*	*	*	**	***
Zarqa	*		*	**	***
Madaba	*	*	*	**	***
Irbid	*		*	**	***
Mafraq	*	*	*	**	**
Jerash	*		*	**	***
Ajlun	*	*	*	**	***
Karak	*	*	*	**	***
Tafleh	*	*	*	**	***
Ma'an	*	*	*	**	**
Aqaba	*		*	**	***
Jordan				*	**

\* 5-24% of change

\*\* 25-50% of change

\*\*\* more than 50% of change



poverty increases



poverty decreases



## Trends in poverty incidence, intensity and severity '96 - '07, direction and degree of change, by governorate

Employment					
Amman		***	***	**	**
Balqa		**	**	+	**
Zarqa		***	***	**	**
Madaba	+	**	**	+	**
Irbid		***	***	**	**
Mafraq		+	+		+
Jerash		**	**	+	+
Ajlun		**	**	+	**
Karak		+	+	+	+
Tafleh		+	+	+	+
Ma'an		**	***	+	**
Aqaba		**	**	+	+
Jordan		**	**	*	**

\* 5-24% of change

\*\* 25-50% of change

\*\*\* more than 50% of change



poverty increases



poverty decreases

## Trends in poverty incidence, intensity and severity '96 - '07, direction and degree of change, by governorate

	Health				
Anaman	**	**	=	**	**
Balqa	**	***	=	**	**
Zarqa	***	***	**	***	***
Madaba	**	***	=	**	**
Irbid	*	+	**	+	
Mafrq	+	+	***	+	
Jerash	**	**	=	+	+
Ajlun	*		**		*
Karak	+		=	+	+
Tafleh	+	**	=	**	**
Ma'an	+	**	=	+	+
Aqaba	**	**		**	**
Jordan	**	**	****	**	**

- \* 5-24% of change  poverty increases
- \*\* 25-50% of change  poverty decreases
- \*\*\* more than 50% of change

## Trends in poverty incidence, intensity and severity '96 - '07, direction and degree of change, by governorate

Housing					
Amman		+++			
Balqa		+++		+	+
Zarqa		+++	**	+	++
Madaba		**	**	+	+
Irbid		+	+++	++	+++
Ma'raq		**	**	+	++
Jerash		+	**	+	++
Ajlun		+	**	+	++
Karak	*	+	+++	++	++
Tafleh		**	*	+	+
Ma'an		**			+
Aqaba		+++	**	++	++
Jordan		+++	*	**	**

\* 5-24% of change

\*\* 25-50% of change

\*\*\* more than 50% of change



poverty increases



poverty decreases

## Trends in poverty incidence, intensity and severity '96 - '07, direction and degree of change, by governorate

	Security				
Amman	*	**		+	+
Balqa		+		+	+
Zarqa		+		+	+
Madaba					
Irbid	*	***		**	**
Mafraq		**		+	+
Jerash	*	**		+	**
Ajlun	*	**		+	**
Karak		+		+	+
Tafleh		+		+	+
Ma'an	*	+		+	+
Aqaba	*	+		+	+
Jordan	*	**		+	+

\* 5-24% of change

\*\* 25-50% of change

\*\*\* more than 50% of change



poverty increases



poverty decreases

# Multidimensional indexes

Well-being Index  $I(\cdot)$  as a weighted mean of order  $\beta$  of the transformed achievements (or shortfalls)  $I_j(x_j)$

$$I(x) = \begin{cases} [w_1 I_1(x_1)^\beta + \dots + w_m I_m(x_m)^\beta]^{1/\beta} & \text{for } \beta \neq 0 \\ I_1(x_1)^{w_1} * \dots * I_m(x_m)^{w_m} & \text{for } \beta = 0. \end{cases}$$

$x_j$  achievements (or shortfall),  $m$  dimensions

$w_i$  weights (non negative,  $\Sigma=1$ )

# Multidimensional indexes (2)

Three main decisions:  $I$ ,  $\beta$ ,  $w$

1)  $I_j(.)$  = transformation function

- Identity:  $I_j(x_j) = x_j$
- Rescaling = ratio of the indicator value to the mean or median
- Linear transformation: z-score or HDI-type
- Logarithmic transformation
- Etc.

# Multidimensional indexes (3)

2)  $\beta$ : elasticity of substitution between achiev.  $\sigma = 1/(1 - \beta)$ ;  
smaller  $\beta$  implies smaller substitutability between  
dimensions

$\beta < 1$       wb index is a concave function (preference for more equally  
distributed bundles)

$\beta = 1$       (weighted) arithmetic mean  $\Rightarrow$  perfect substitutability between  
transformed achievements (e.g. HDI)

$\beta = 0$       (weighted) geometric mean  $\Rightarrow$  unit elasticity of substitution

$\beta = - (+) \infty$       min (max) of the transformed achievements (no substitution)

# Multidimensional indexes (4)

Weights (Lugo, Decanq, 2010)

1. Data driven: “let the data speak for themselves”; no explicit value judgement about trade-offs (“how is”)
    - a) frequency-based: e.g. (log) inverse of the frequency of deprivation (less frequent deprivations get a higher weight)
    - b) Statistical weights: multivariate statistical methods (PCA, FA, MIMIC)
- (+) robust against the inclusion of not relevant dimensions
- (-) relatively instable?
- (-) can we derived what is “a good life” from the factual distribution of achievement? What happens in case of endemic deprivation in a plurality of dimensions?



# Multidimensional indexes (5)

2. Normative approaches: only depends on value judgement (“how ought to be”)
  - a) equal or arbitrary weights (e.g HDI)
  - b) expert opinion
  - c ) subjective evaluations
  - (-) paternalism?
  - (-) selection of experts, representativity?
  
3. Hybrid approaches: mixed case, combining the actual distribution of achievements with individual valuation on them

# Our analysis

I = linear transformation (linear membership degrees; m.d. frequency-based)

$$\beta = 1$$

Weights:

- Arbitrary HEA = EDU = SEC = EMP = HOU
- Students: HEA  $0.244$  > EDU  $0.228$  > SEC  $0.188$  > EMPL  $0.182$  > HOUS  $0.159$
- Experts: EMPL  $0.243$  > EDU  $0.240$  > HEA  $0.230$  > HOUS  $0.147$  > SEC  $0.143$

## Ranking of Governorates in terms of multidimensional poverty incidence, different weighting systems

	H2-arithmetic		H2-students		H2-experts	
1	zarqa	<b>0.306</b>	zarqa	<b>0.325</b>	zarqa	<b>0.322</b>
2	balqa	<b>0.327</b>	balqa	<b>0.352</b>	balqa	<b>0.351</b>
3	madaba	<b>0.390</b>	madaba	<b>0.380</b>	madaba	<b>0.396</b>
4	aqaba	<b>0.434</b>	aqaba	<b>0.464</b>	aqaba	<b>0.446</b>
5	amman	<b>0.451</b>	amman	<b>0.470</b>	amman	<b>0.455</b>
6	tafileh	<b>0.485</b>	tafileh	<b>0.489</b>	tafileh	<b>0.472</b>
	<b>Jordan</b>	<b>0.491</b>	<b>Jordan</b>	<b>0.500</b>	<b>Jordan</b>	<b>0.486</b>
7	jerash	<b>0.552</b>	jerash	<b>0.557</b>	<u>ajlun</u>	<b>0.543</b>
8	ajlun	<b>0.555</b>	ajlun	<b>0.566</b>	<u>irbid</u>	<b>0.550</b>
9	irbid	<b>0.570</b>	irbid	<b>0.575</b>	<u>jerash</u>	<b>0.555</b>
10	ma'an	<b>0.593</b>	ma'an	<b>0.587</b>	<u>karak</u>	<b>0.567</b>
11	karak	<b>0.604</b>	karak	<b>0.61</b>	<u>ma'an</u>	<b>0.582</b>
12	mafraq	<b>0.642</b>	mafraq	<b>0.637</b>	mafraq	<b>0.611</b>

## Ranking of Governorates in terms of multidimensional poverty intensity, different weighting systems

	PGI-arithmetic		PGI-students		PGI-experts	
1	zarqa	<b>0.373</b>	zarqa	<b>0.352</b>	zarqa	<b>0.334</b>
2	balqa	<b>0.376</b>	balqa	<b>0.356</b>	balqa	<b>0.338</b>
3	madaba	<b>0.403</b>	madaba	<b>0.377</b>	madaba	<b>0.358</b>
4	amman	<b>0.419</b>	amman	<b>0.403</b>	amman	<b>0.380</b>
5	aqaba	<b>0.422</b>	aqaba	<b>0.405</b>	aqaba	<b>0.384</b>
6	<b>Jordan</b>	<b>0.435</b>	<u>tafileh</u>	<b>0.411</b>	<u>tafileh</u>	<b>0.385</b>
	irbid	<b>0.456</b>	<b>Jordan</b>	<b>0.413</b>	<b>Jordan</b>	<b>0.390</b>
7	ajlun	<b>0.458</b>	<u>jerash</u>	<b>0.430</b>	<u>irbid</u>	<b>0.409</b>
8	tafileh	<b>0.463</b>	<u>ajlun</u>	<b>0.437</b>	<u>jerash</u>	<b>0.409</b>
9	karak	<b>0.466</b>	<u>irbid</u>	<b>0.438</b>	<u>ajlun</u>	<b>0.410</b>
10	ma'an	<b>0.472</b>	<u>karak</u>	<b>0.445</b>	<u>karak</u>	<b>0.417</b>
11	mafraq	<b>0.487</b>	<u>ma'an</u>	<b>0.448</b>	<u>ma'an</u>	<b>0.424</b>
12	jerash	<b>0.543</b>	<u>mafraq</u>	<b>0.464</b>	<u>mafraq</u>	<b>0.440</b>

## Ranking of Governorates in terms of multidimensional poverty severity, different weighting systems

	SPG-arithmetic		SPG-students		SPG-experts	
1	zarqa	<b>0.156</b>	zarqa	<b>0.141</b>	zarqa	<b>0.128</b>
2	balqa	<b>0.159</b>	balqa	<b>0.146</b>	balqa	<b>0.133</b>
3	madaba	<b>0.180</b>	madaba	<b>0.160</b>	madaba	<b>0.147</b>
4	amman	<b>0.195</b>	amman	<b>0.183</b>	amman	<b>0.165</b>
5	aqaba	<b>0.197</b>	aqaba	<b>0.184</b>	<u>tafileh</u>	<b>0.166</b>
6	tafileh	<b>0.205</b>	tafileh	<b>0.186</b>	<u>aqaba</u>	<b>0.168</b>
	<b>Jordan</b>	<b>0.207</b>	<b>Jordan</b>	<b>0.190</b>	<b>Jordan</b>	<b>0.172</b>
7	irbid	<b>0.223</b>	<u>jerash</u>	<b>0.204</b>	irbid	<b>0.185</b>
8	jerash	<b>0.223</b>	<u>irbid</u>	<b>0.209</b>	jerash	<b>0.186</b>
9	ajlun	<b>0.226</b>	ajlun	<b>0.209</b>	ajlun	<b>0.187</b>
10	karak	<b>0.234</b>	karak	<b>0.216</b>	karak	<b>0.193</b>
11	ma'an	<b>0.239</b>	ma'an	<b>0.219</b>	ma'an	<b>0.199</b>
12	mafraq	<b>0.253</b>	mafraq	<b>0.233</b>	mafraq	<b>0.214</b>

# Synthesis

- Strengths

Robust and valuable country-specific poverty analysis

Political relevance due to geographic disaggregation

- Open Issues

Comparison of datasets - which adjustments are still lacking?

Can the combined use of individual and HH-level data be misleading?

Is the direct comparison of two trends helpful?

How can subjective weights be combined with time trend analyses?