

# ICPD Population Development Composite Index (PDCI) Towards People-Centered SDGs

*(Pilot study for Arab States)*

UNFPA- ASRO

# Objectives

- UNFPA Arab States Regional Office (ASRO) initiated a new composite index to quantify the progress of the implementation of ICPD based SDGs within the context of the ICPD Beyond 2014 review and the post 2015 development agenda.

The objectives are to

- Provide a scientific measure and policy tool to advocate for people-centered SDGs
- Show in a quantitative manner the importance of accommodating population agenda as a key enabler for achieving SDGs.

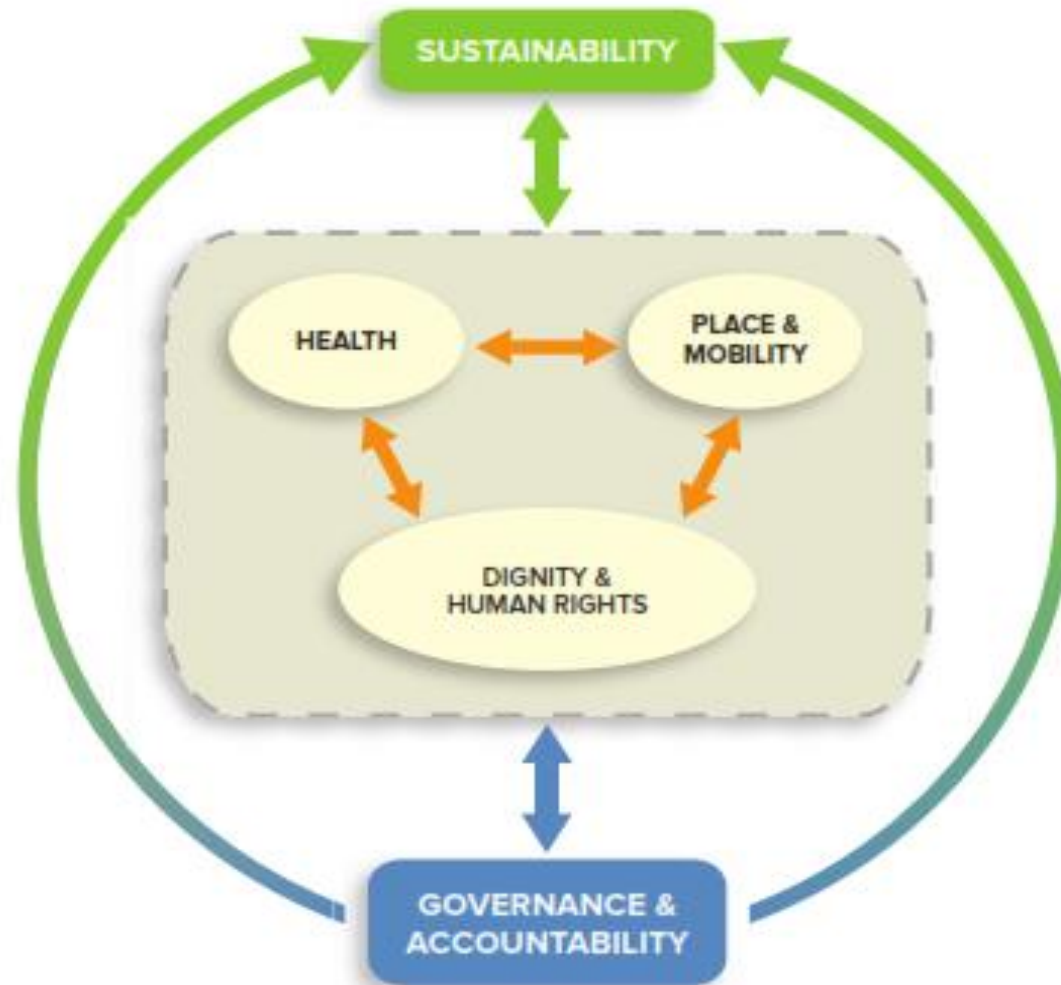
# Steps to construct composite index

1. Identify the conceptual framework
2. Selection of indicators
3. Calculate the index scores
4. Statistical validation

# Conceptual Framework and Indicators selection

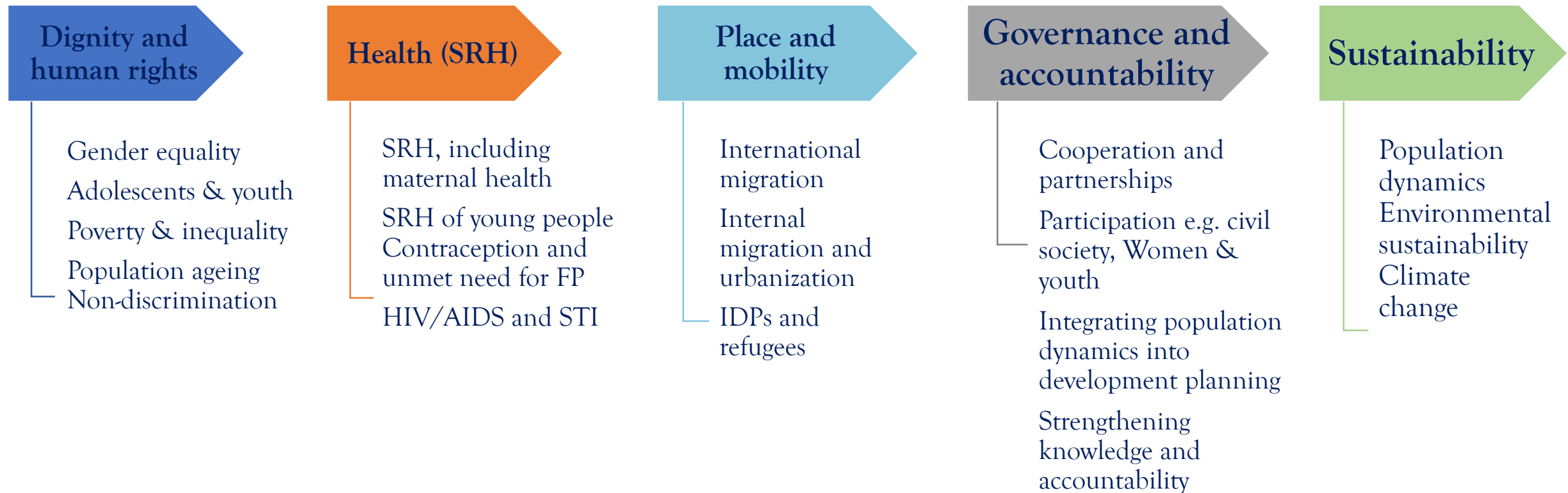
# Conceptual framework

## Thematic Dimensions for ICPD/PoA Beyond-2014



Source: United Nations, 2014. "Framework of Actions for the follow-up to the ICPD-PoA Beyond 2014"

# Component Level Framework



	Dignity	Health (SRH)	Place and Mobility	Governance	Sustainability
Goal 1. End poverty in all its forms everywhere	✓				
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture	✓				
Goal 3. Ensure healthy lives and promote well-being for all at all ages		✓			✓
Goal 4. Ensure inclusive and equitable quality education and promote life-long learning opportunities for all	✓				
Goal 5. Achieve gender equality and empower all women and girls	✓	✓			
Goal 6. Ensure availability and sustainable management of water and sanitation for all					✓
Goal 7. Ensure access to affordable reliable sustainable and modern energy for all					✓
Goal 8. Promote sustained inclusive and sustainable economic growth full and productive employment and decent work for all	✓		✓		
Goal 9. Build resilient infrastructure promote inclusive and sustainable industrialization and foster innovation					✓
Goal 10. Reduce inequality within and among countries	✓		✓		
Goal 11. Make cities and human settlements inclusive safe resilient and sustainable			✓		✓
Goal 13. Take urgent action to combat climate change and its impacts					✓
Goal 16. Promote peaceful & inclusive societies for sustainable development provide access to justice for all & build effective accountable & inclusive institutions at all levels	✓		✓	✓	
Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development				✓	

# Indicator Selection

- Five criteria:
  - 1)Relevance for monitoring
  - 2)Reliable
  - 3)Data quality.
  - 4)Updated regularly.
  - 5)Coverage: Availability for at least 75% of the countries

UNFPA/ASRO Listed 39 priority P&D Indicators from SDG indicators



# Indicators integrated into the conceptual framework



- Initially, **44 indicators** were identified to construct the composite index, 6 were dropped during statistical validation;
- **38 indicators** were assigned across the five dimensions as follows:
  - dignity and human rights (13 indicators),
  - Health/ SRH (7);
  - Place and mobility (5);
  - Governance and Accountability (6); and
  - Sustainability (7).
- Assigning indicators to the five dimensions in accordance to the report of the Secretary-General on the ICPD themes presented in the 47th sessions of the CPD in 2014.

## Indicators

FGM prevalence (%) among girls aged 15-19

Child marriage by age 18 (% of women ages 20-24 who are married before 18)

Women ever experienced domestic physical violence

Gender Parity Index for secondary education

Female to male labor force participation rate (%)

Share of seats in parliament (% held by women)

Youth unemployment rate (ages 15–24)

Share of seats in parliament (% held by members aged under 40)

Vulnerable employment (% of total employment)

Proportion of population living below the national poverty line (%)

Secondary school dropout rate among youth

Freedom of choice

Old-age pension recipients

Youth literacy rate (% of ages 15–24)

Healthy life expectancy at birth

## Dignity and human rights

- Gender equality
- Adolescents & youth
- Poverty & inequality
- Population ageing
- Non-discrimination

## Health (SRH)

- SRH, including maternal health
- SRH of young people
- Contraception and unmet need for FP
- HIV/AIDS and STI

## Indicators

Neonatal Mortality rates

Proportion of births attended by skilled health personnel

Antenatal care coverage- at least four visits

Adolescent birth rate

Providing school-based sexuality education.

Unmet need for family planning

HIV prevalence adult

Maternal mortality ratio

## Indicators

Country adopted measures on integration of immigrants

Refugees and IDPs by country of origin (% of population)

Proportion of urban population living in slums

Estimated direct deaths from major conflicts (per 100 000 population)

Country in a conflict

## Place and mobility

- International migration.
- Internal migration and urbanization
- IDPs and refugees

## Governance and accountability

- Cooperation and partnerships
- Participation e.g. civil society, Women & youth
- Integrating population dynamics into development planning
- Strengthening knowledge and accountability

### Indicators

Birth registration (% under age 5)

Countries that have conducted population and housing census in the last 10 years

Country adopted National Population related issues policies

Proportion of individuals using the Internet

Country adopted and implement constitutional statutory and/or policy guarantees for public access to information

Country has an independent national human rights institution in compliance with the Paris Principles

## Indicators

Renewable energy consumption (% of total final energy consumption)

Homeless people due to natural disaster (average annual per million people)

Household and ambient air pollution (per 100 000 population)

Research and development expenditure (% of GDP)

Adoption and Implementation of national DRR strategies in line with the Sendai Framework

GDP annual growth - Population annual growth

Population using improved sanitation facilities

Access to electricity

Access to clean fuels & technology for cooking

Population using improved drinking-water sources

## Sustainability

- Population dynamics
- Environmental sustainability
- Climate change



*Is there data gap?*

*In which topics?*

# Data Limitations

- Discrimination against disabled persons
- Discrimination against migrants,
- Supporting environment for older persons,
- Harassment and human trafficking,
- Disparities between urban and rural communities,
- Urbanization and internal migration,
- Labor rights protections,
- Engagement of civil society,
- Women empowerment to make their own informed decisions regarding SRH



# Coverage and Data Sources

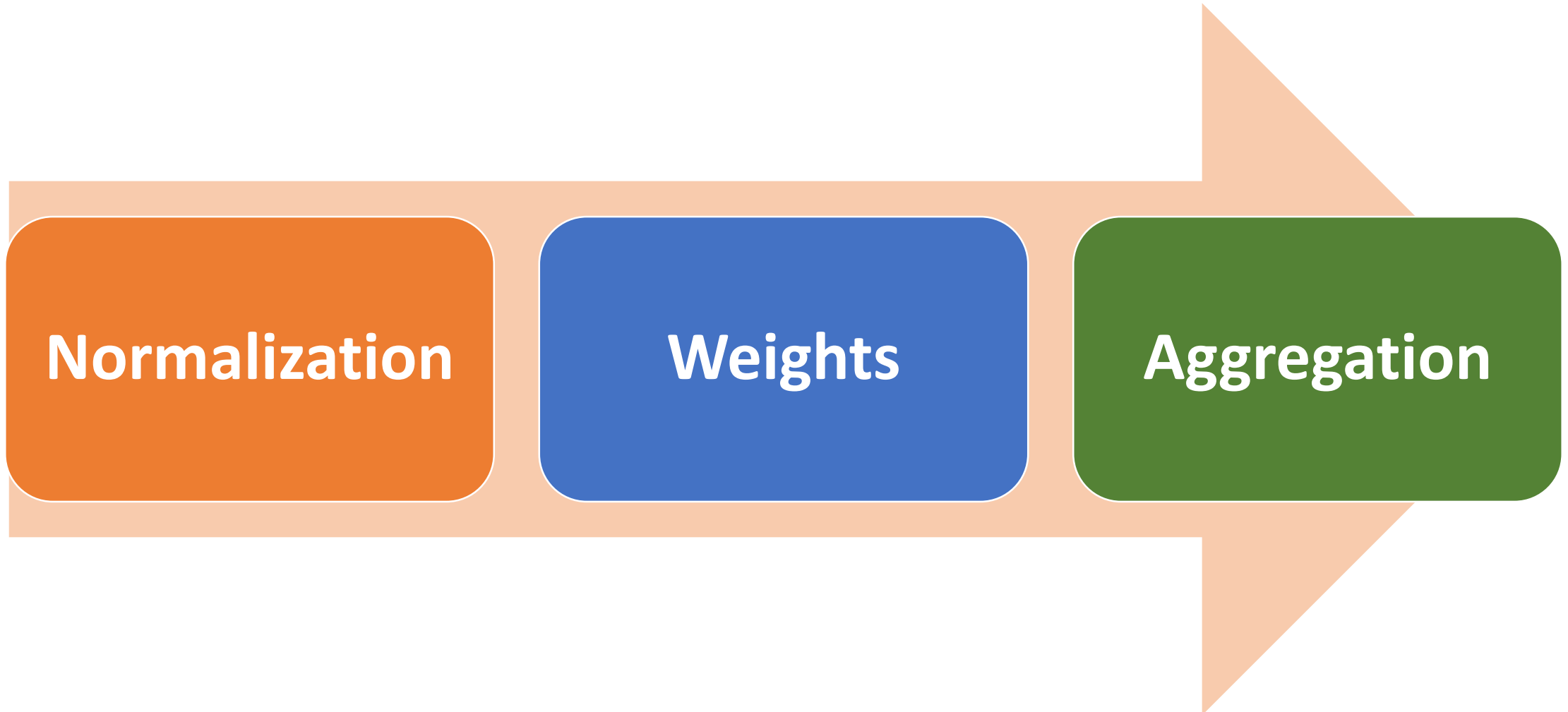
- Coverage: Composite Index is computed for the 22 Arab countries.
- Statistical testing and multi-collinearity diagnostics conducted for 157 countries with completed data out of 195 on the UN databases;
- Procedures established for data imputation for Arab Countries
- Data Sources: National data and UN databases e.g. UN-DESA, UNICEF, ILO, World Bank, WHO,...etc.
- Complementary data, collected through UNFPA COs in the Arab region.

# Missing data imputation

- Cross-country regression model based on data from 157
- Estimation by the average of the countries in similar conditions
- Computation using micro datasets

# Calculation of index scores

# Main three steps for calculate index scores



# Normalization

a) Upper and lower bounds identified

- Effect of extreme values removed by censoring data at the bottom **2.5th percentile** as the minimum value for the normalization. This in line with SDGs Index applied similar approach and with OECD recommendations

b) Variables were transformed linearly to 0 - 100 scale; using the formula :

$$xs = \left( \frac{x - \min(x)}{\max(x) - \min(x)} \right) * 100$$

$\min(x)$  = the bounds for worst performance, and  
 $\max(x)$  = the bounds for best performance.

# Weights

- The literature identifies four main approaches to designing weights:

1. Equal weights  $\checkmark$
2. Mathematical weights  $\checkmark$
3. Expert weights  $\checkmark$
4. Subjective weights

equal weights  
were assigned for  
the indicators  
within each  
dimension

Weights schemes

	equal weights	Mathematical weights (PCA)	Expert weights
Dignity and Human rights	0.20	0.215	0.29
Health	0.20	0.218	0.29
Place and Mobility	0.20	0.186	0.14
Governance	0.20	0.214	0.14
Sustainability	0.20	0.167	0.14
Total	1.00	1.000	1.00

# Aggregation within & across dimensions

Within dimension **arithmetic mean** was utilized across indicators

The following equation was used to calculate sub-indices:

$$Y_j = \frac{\sum_{i=1}^{n_j} w_{ij} x_{s_{ij}}}{\sum_{i=1}^{n_j} w_{ij}}$$

Where  $Y_j$  = sub-index j

$w_{ij}$  = weight assigned to indicator i belonging to dimension j (*equal weights are used*).

$x_{s_{ij}}$  = standardized indicator i within dimension j and

$n_j$  = number of indicators belonging to dimension j.

# Aggregation within & across dimensions

For compiled dimensions, the geometric mean adopted, since dimensions represent diversity of issues.

The following equation was used to calculate sub-indices:

$$PDCI = \sqrt[1/\sum w_j]{\prod_{j=1}^n Y_j^{w_j}}$$

Where *PDCI* = composite index

$Y_j$  = sub-index  $j$

$w_j$  = weight assigned to dimension  $j$  and

$n$  = number of sub-indices.



# Statistical Soundness and Validation

# Reliability test for internal consistency between the indicators



- Cronbach's alpha is used to estimate the reliability, or internal consistency, of a composite score. High Cronbach's alpha, or equivalently a high “reliability”, indicates that the individual indicators measure the latent phenomenon well.
- Accordingly, inter-item consistencies are high ( $> 0.7$ ) for 2 dimensions (Dignity and Human rights and Health), and moderate ( $0.4 < x < 0.7$ ) for the other dimensions

Reliability test (Cronbach's alpha) for each dimension		
Dimension	Number of Items	Scale reliability coefficient
Dignity and Human rights	14	0.85
Health	8	0.78
Place and Mobility	5	0.44
Governance	5	0.40
Sustainability	10	0.58

# Testing the Collinearity /redundancy



## One-way correlation

- Pearson's Correlation Coefficient, a measure of the linear relationship between two quantitative, continuous variables is used.

Cut-off strong correlation 0.7

# Pearson Correlation of Indicators under Dignity Dimension



	FGM prevalence (%) among girls aged 15-19	Child marriage by age 18 (% among women ages 20-24)	Women ever experienced Domestic physical violence	Gender Parity Index for secondary education	Female to male labor force participation rate (%)	Share of seats in parliament (% held by women)	Youth literacy rate (% of ages 15–24)	Youth unemployment rate (ages 15–24)	Share of seats in parliament (% held by members aged under 40)	Vulnerable employment (% of total employment)	Proportion of population living below the national poverty line (%)	Secondary school dropout rate among youth	Freedom of choice	Healthy life expectancy at birth	Old-age pension recipients
FGM prevalence (%) among girls aged 15-19	1														
Child marriage by age 18 (% among women ages 20-24)	.309**	1													
Women ever experienced Domestic physical violence	.159	.304**	1												
Gender Parity Index for secondary education	.327**	.437**	.371**	1											
Female to male labour force participation rate (%)	.025	-.234*	.165*	.151	1										
Share of seats in parliament (% held by women)	.089	-.019	-.059	.174	.222**	1									
Youth literacy rate (% of ages 15–24)	.586**	.635**	.351**	.764**	-.035	.053	1								
Youth unemployment rate (ages 15–24)	-.093	-.320**	-.064	-.185	.296**	.093	-.258**	1							
Share of seats in parliament (% held by members aged under 40)	.024	.136	.251**	.197	.167	.286**	.132	-.011	1						
Vulnerable employment (% of total employment)	.288**	.624**	.289**	.471**	-.228**	.139	.657**	-.275**	.264**	1					
Proportion of population living below the national poverty line (%)	.265**	.595**	.147	.344**	-.252*	-.080	.500**	-.154	.135	.567**	1				
Secondary school dropout rate among youth	.528**	.688**	.316**	.662**	.072	.178*	.848**	-.268**	.355**	.740**	.631**	1			
Freedom of choice	.095	.085	.007	.096	.143	.204*	.185	.241**	.171	.264**	.293**	.253**	1		
Healthy life expectancy at birth	.390**	.581**	.380**	.573**	-.032	.250**	.739**	-.091	.373**	.778**	.656**	.796**	.361**	1	
Old-age pension recipients	.289**	.407**	.345**	.417**	.162*	.228**	.530**	-.168*	.366**	.676**	.391**	.713**	.245**	.643**	1

# Testing the Collinearity /redundancy



## Collinearity

- Collinearity among indicators is tested, to determine which of the correlated indicators would be excluded.
- Regression model was constructed for each dimension, using the dimension score as the outcome (dependent) variable and its components as the explanatory (independent) variables.
- Variance-inflation factor (VIF) was computed to measure the collinearity diagnostics statistics. A VIF value greater than 5.0 was applied as cut-off criterion for suggesting that there is collinearity problem.

# Testing the Collinearity /redundancy



The procedure was applied to each dimension and results suggested excluding the following indicators:

## Dignity

- Youth literacy rate (% of ages 15–24)

- Healthy life expectancy at birth

## Health:

- Maternal mortality ratio

## Sustainability:

- Access to electricity

- Access to clean fuels & technology for cooking

- Population using improved drinking-water sources

**Collinearity assessment among dimensions** showed a VIF ranging from 1.7 to 3.2 suggesting that all dimensions are free from collinearity. Indeed, this statistically supports using the proposed 5 dimensions as components of the PDCI.

# Sensitivity/Robustness tests

- Testing the Sensitivity/Robustness is necessary to explore the extent to which ranking is robust regarding the choice of alternative weighting schemes, the aggregation methods and the upper and lower bound used in the normalization procedure.

## Changing the lower bound “worst” (=0)

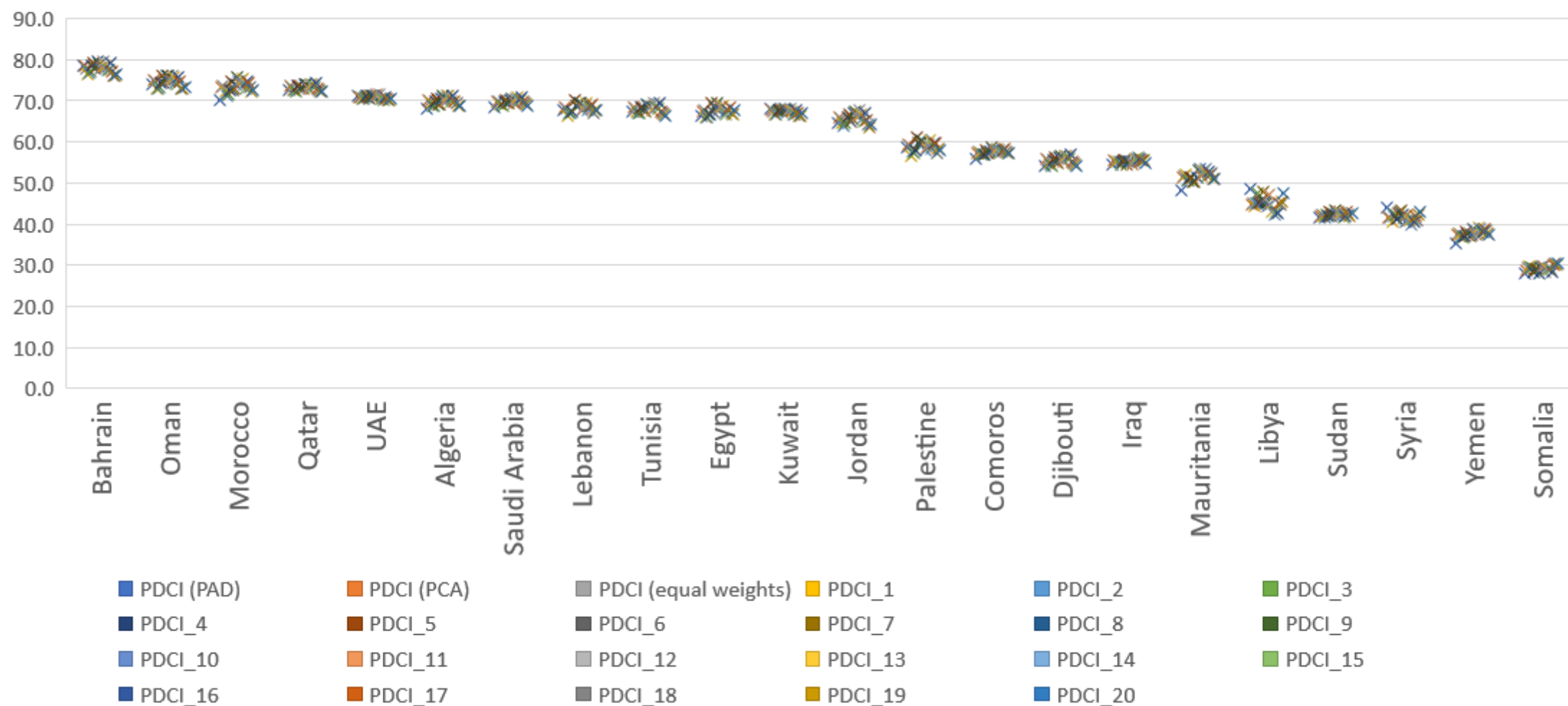
Results indicate that the differences in country ranks ranged between 0 and 2 ranks.

## Changing the aggregation method among dimensions

countries kept the same rank while some varied by one rank and a single country differed by three ranks.

## Using different weighting schemes

The uniform max–min bound approach was used to determine a set of alternative weighting schemes. The assumption used for this purpose is that the weight on any dimension is not lower than  $\alpha \in [0, 1/D)$  and the weight on any dimension not higher than  $\beta \in (1/D, 1]$ . Accordingly,  $\Delta = \{w_1, \dots, w_d \mid \alpha \leq w_d \leq \beta \ \forall d \text{ and } \sum_{d=1}^D w_d = 1\}$ , and let  $\beta = 0.25$  and  $\alpha = 0.15$  so a set of 20 alternative weighting schemes are obtained.





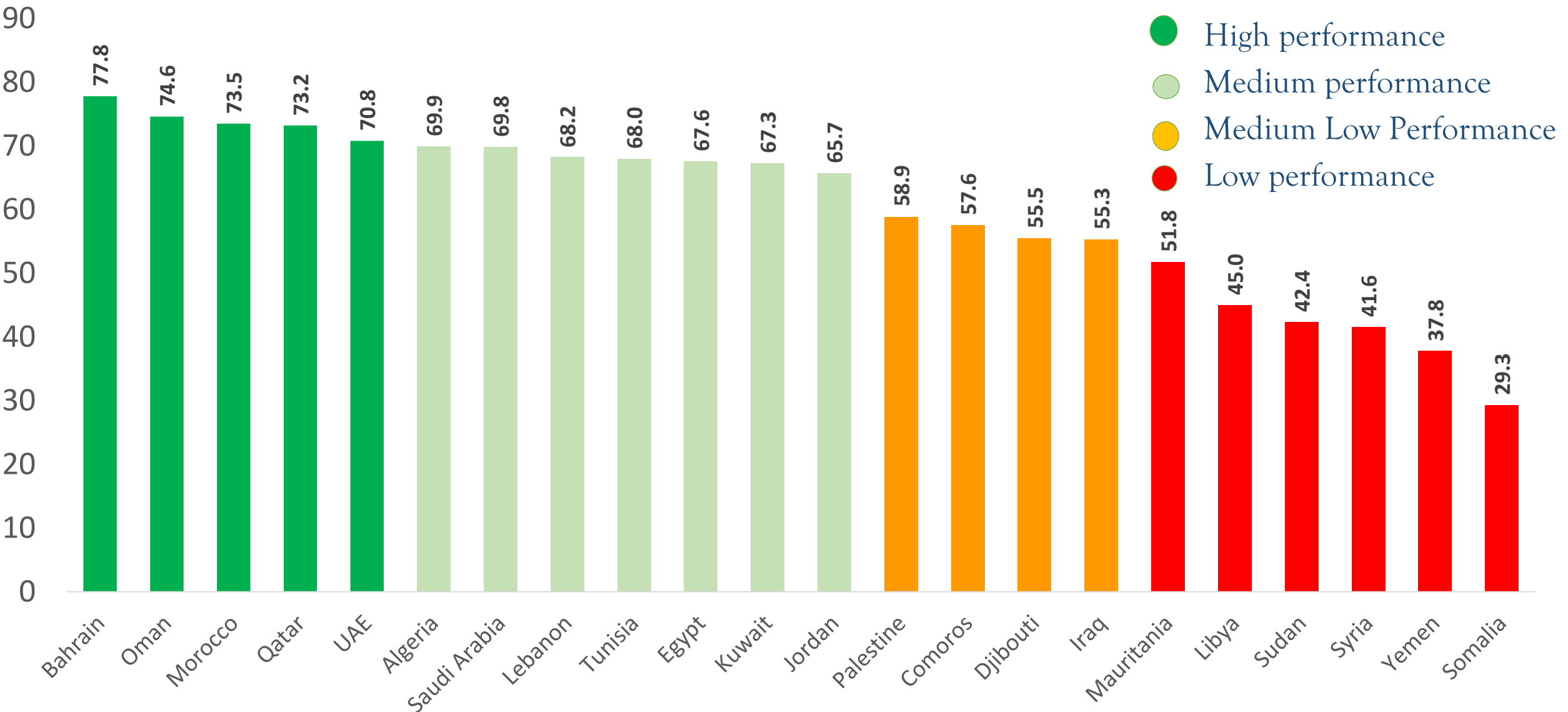
# Main Findings

# Scores by Dimension by Country

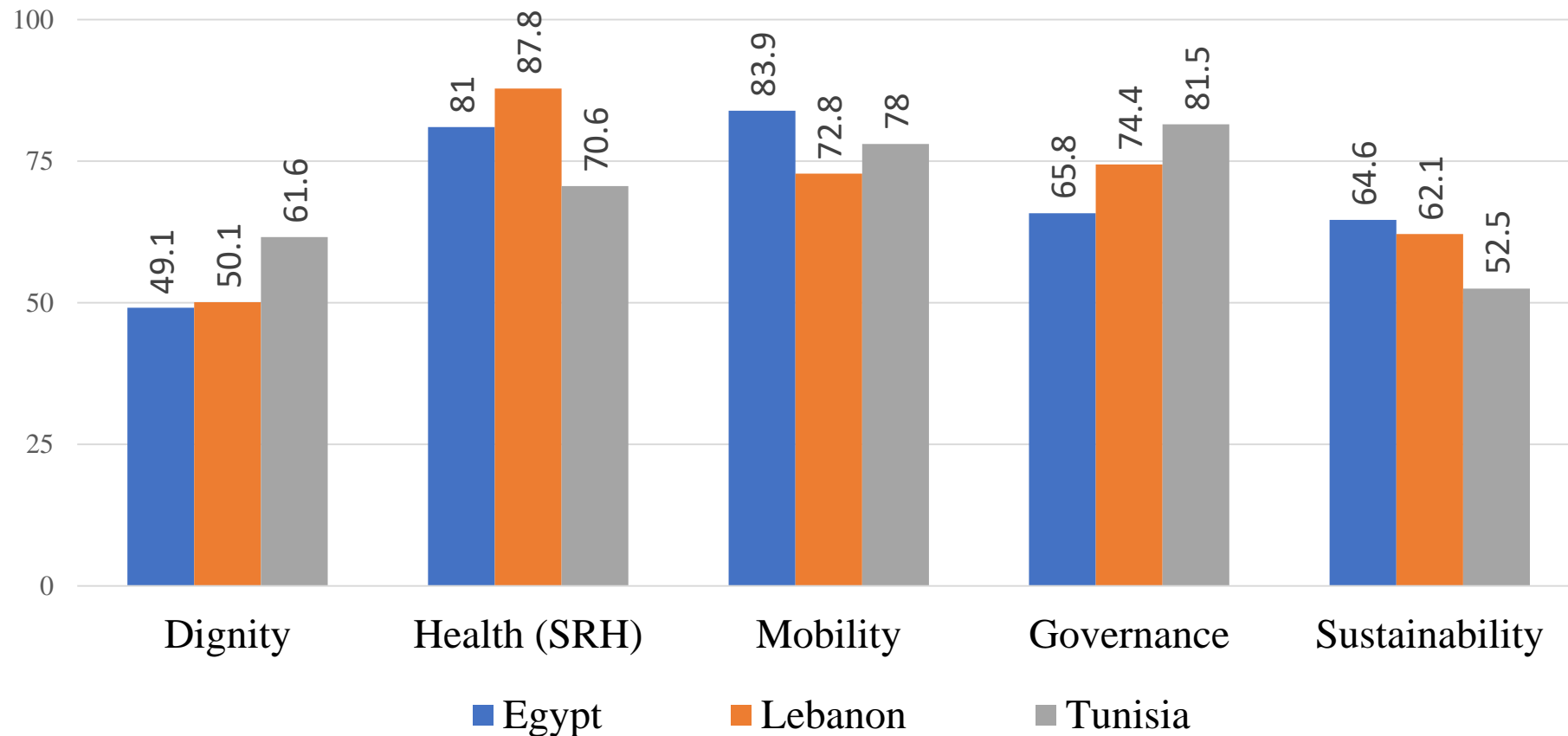


Country	Dignity	SRH	Mobility	Governance	Sustainability
Algeria	59.3	68.6	83.7	82.9	59.3
Bahrain	68.4	93.7	92.7	83.0	58.0
Comoros	47.9	55.8	64.8	63.1	58.2
Djibouti	46.1	57.1	64.3	71.5	43.5
Egypt	49.1	81.0	83.9	65.8	64.6
Iraq	51.6	52.7	51.3	67.1	55.3
Jordan	52.2	74.3	90.5	71.8	48.5
Kuwait	64.2	75.5	75.3	65.3	58.1
Lebanon	50.1	87.8	72.8	74.4	62.1
Libya	52.8	65.8	50.2	19.3	55.0
Mauritania	43.2	37.8	68.1	69.0	48.8
Morocco	52.8	73.2	97.1	86.9	66.0
Oman	58.8	89.1	91.7	80.5	59.7
Palestine	39.6	85.5	61.2	66.9	51.0
Qatar	66.5	75.8	79.6	84.7	62.0
Saudi Arabia	61.0	70.8	76.0	81.2	62.1
Somalia	27.6	22.2	28.8	23.8	51.4
Sudan	35.5	43.7	51.8	38.4	44.2
Syria	40.0	64.9	35.6	27.9	48.6
Tunisia	61.6	70.6	78.0	81.5	52.5
UAE	70.3	74.2	79.6	67.4	63.8
Yemen	26.9	31.7	42.9	50.1	42.1

# The Population Development Composite Index (PDCI)

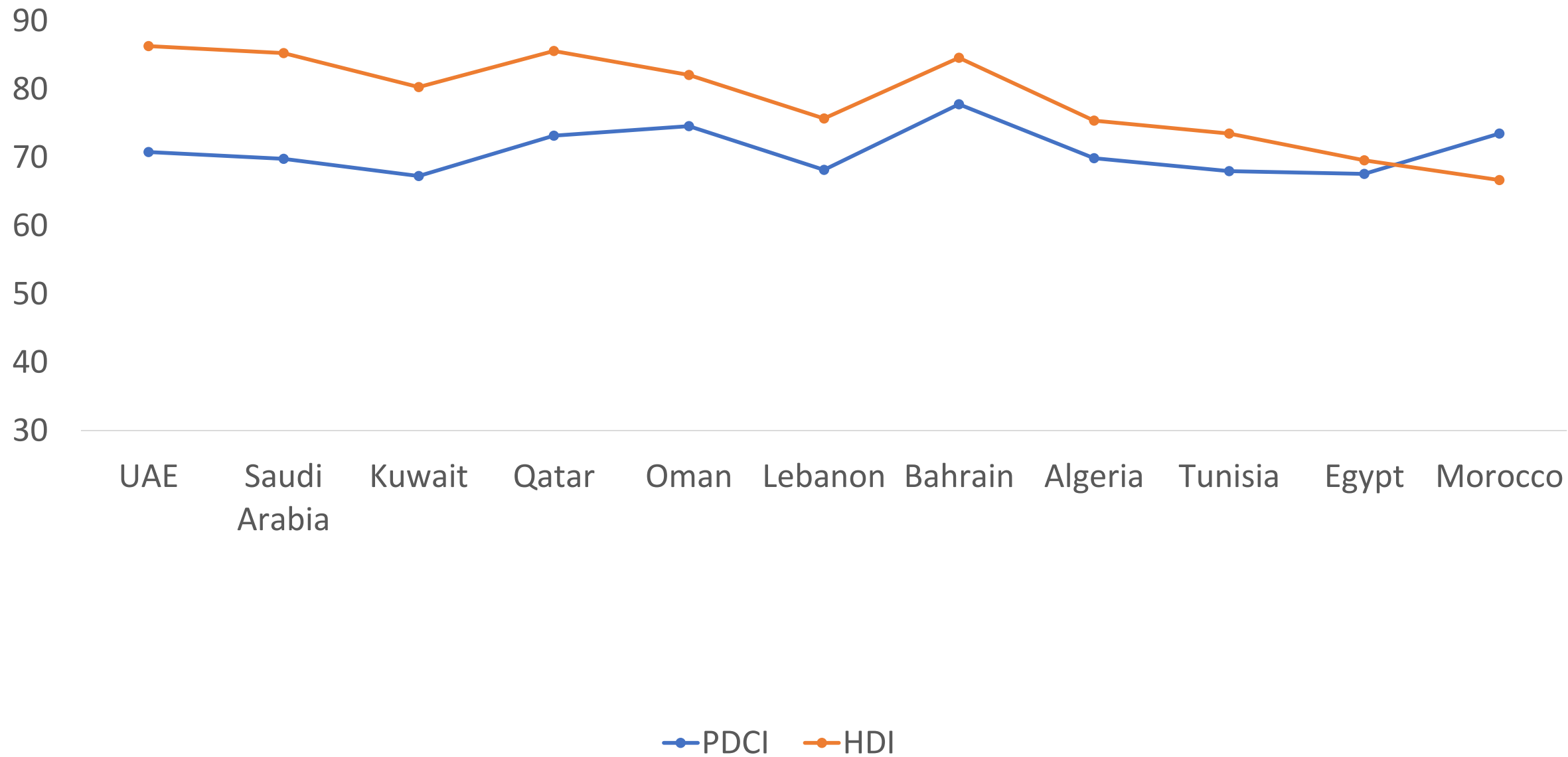


# Different paths lead to similar results: Tunisia, Lebanon & Egypt

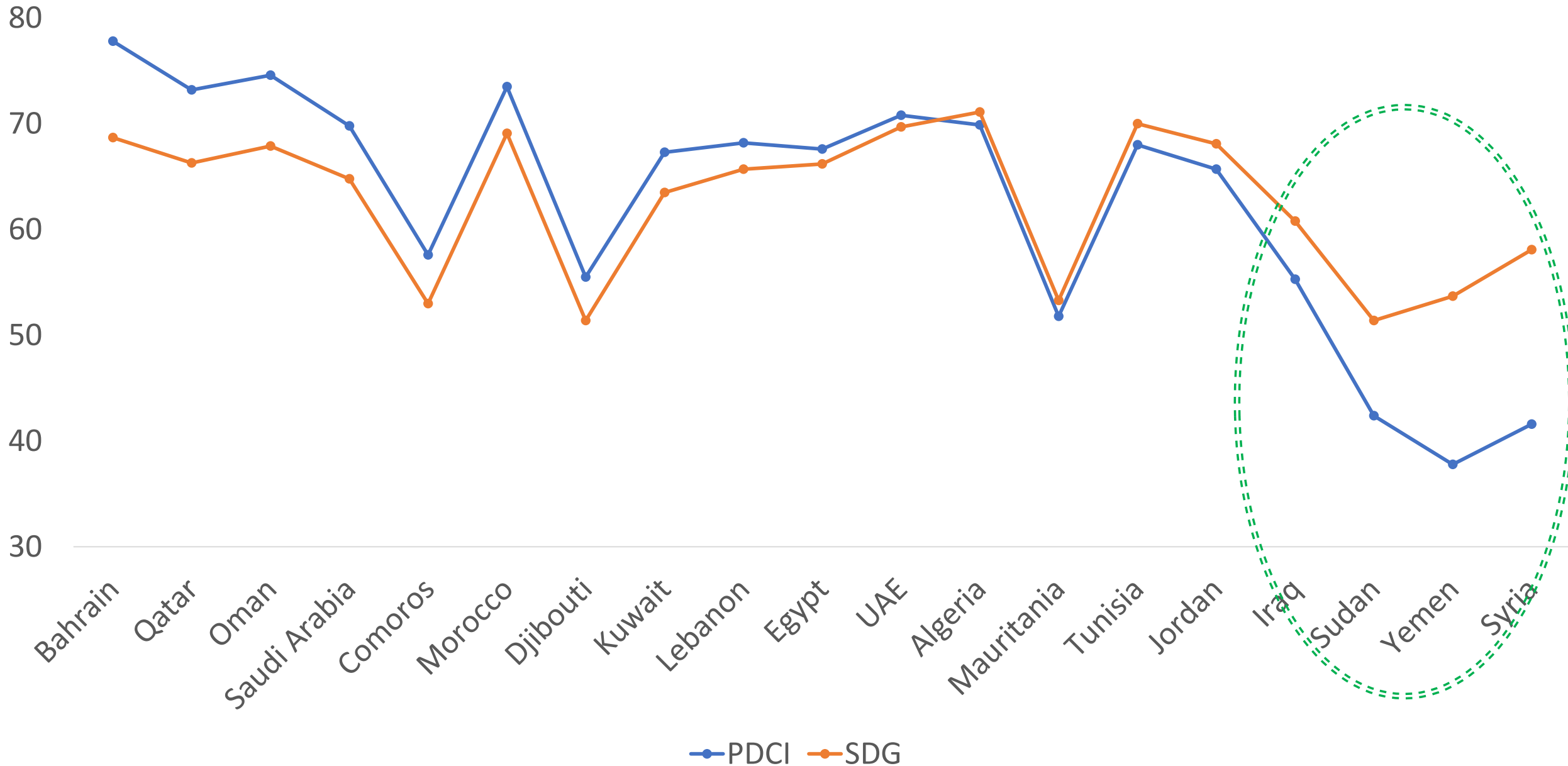


# PDCI and Other Indices

## PDCI vs HDI selected Countries



## PDCI vs SDGs index



# Recommendations



- PDCI is an informative and policy tool people-centered SDG
- NSS to routinely collect and disseminate data needed for PDCI



Thank You