


01X-Human Development Index Supplementary Slides

Off-Grid Electrical Systems in Developing Countries



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Discussion

What are the characteristics of a “good life”?

How do you quantify “human development”?

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Human Development Index (HDI)

- HDI was developed by the United Nations as a way of numerically evaluating the well-being of a country
- Considers three equally-weighted dimensions
 - Standard of Living (Income)
 - Knowledge (Education)
 - Long and Healthy Life (Life Expectancy)
- 1.0 is the maximum reasonable HDI score
 - HDI is not theoretically limited to 1.0

HDI: Indicators

1. Knowledge
 - Mean years of schooling
 - Expected years of schooling
2. Standard of Living
 - Per capita Gross National Income (GNI in \$PPP/person)
3. Long and Healthy Life
 - Life expectancy at birth

Equally weighted

Expected years of schooling: Number of years of schooling that a child of school entrance age can expect to receive if prevailing patterns of age-specific enrolment rates persist throughout the child's life.

Calculating HDI

- LEI (Life Expectancy Index): $LEI = \frac{LE - 20}{85 - 20}$
 - LE: life expectancy at birth
- EI (Education Index): $EI = \frac{1}{2} \frac{MYS}{15} + \frac{1}{2} \frac{EYS}{18}$
 - MYS: mean years of school
 - EYS: expected years of school
- II (Income Index): $II = \frac{\ln(GNI) - \ln(100)}{\ln(75000) - \ln(100)}$
 - GNI: per capita GNI in PPP\$

Note: HDI was calculated differently prior to 2009, and will be adjusted in the future.

Equal weighting

Geometric mean

$$HDI = \sqrt[3]{LEI \times EI \times II}$$

Calculating HDI

Constants in the equations (other than the $\frac{1}{2}$ in the EI) represent the estimated maximum or minimum value for the indicator

- Used in normalization, making it highly unlikely for a score to exceed 1.0

$$LEI = \frac{LE - 20}{85 - 20}$$

Maximum life expectancy

Minimum life expectancy

Calculating HDI

- Income Index is logarithmic—increasing GNI has diminishing returns on the II score

$$II = \frac{\ln(\text{GNI}) - \ln(100)}{\ln(75000) - \ln(100)}$$

- Justification: increasing GNI from \$300 to \$400 is more significant than increasing from \$50,000 to \$50,100

Exercise

A GNI of \$300 results in an II of 0.166; a GNI of \$400 results in an II of 0.209.

Compute and compare the II for GNI of \$50,000 and \$50,100.

Exercise

A GNI of \$300 results in an II of 0.166; a GNI of \$400 results in an II of 0.209.

Compute and compare the II for GNI of \$50,000 and \$50,100.

$$II = \frac{\ln(50000) - \ln(100)}{\ln(75000) - \ln(100)} = 0.9388$$

$$II = \frac{\ln(50100) - \ln(100)}{\ln(75000) - \ln(100)} = 0.9391$$

II is capped at 1.0 if GNI is greater than \$75,000?

Example

Ethiopia's 2014 HDI indicators are: life expectancy at birth (64.1), expected years of school (8.5), mean years of schooling (2.4), GNI (PPP\$1428). What is the HDI?

Example

- Start by computing the Life Expectancy Index score:

$$LEI = \frac{LE - 20}{85 - 20} = \frac{64.1 - 20}{85 - 20} = 0.6785$$

- Now the Income Index score:

$$II = \frac{\ln(GNI) - \ln(100)}{\ln(75000) - \ln(100)} = \frac{\ln(1428) - \ln(100)}{\ln(75000) - \ln(100)} = 0.4016$$

Example

- Start by computing the Education Index score:

$$EI = \frac{1}{2} \frac{MYS}{15} + \frac{1}{2} \frac{EYS}{18} = \frac{1}{2} \frac{2.4}{15} + \frac{1}{2} \frac{8.5}{18} = 0.3161$$

- Now compute the geometric mean:

$$HDI = \sqrt[3]{LEI \times EI \times II} = \sqrt[3]{0.6785 \times 0.3161 \times 0.4016} = 0.4416$$

Ethiopia ranks 174 out of 188 in the world

Exercise

Canada's 2014 HDI indicators are: life expectancy at birth (82.0), expected years of school (15.9), mean years of schooling (13.0), GNI (PPP\$42155). What is the HDI?

<http://www.hdr.undp.org/en/composite/HDI>

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Exercise

Canada's 2014 HDI indicators are: life expectancy at birth (82.0), expected years of school (15.9), mean years of schooling (13.0), GNI (PPP\$42155). What is the HDI?

LEI: 0.938

II: 0.913

EI: 0.875

HDI: 0.9134

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Other Indices

- Inequality adjusted HDI: adjusts the three HDI scores by the distribution of the indicators across the population (if no inequality, than it is the same as the HDI)
- Gender HDI: measures the gender gap by comparing female HDI to male HDI in a country
- See also:
 - Multidimensional Poverty Index
 - Sustainable Economic Development Assessment

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