
TECHNICAL NOTES

Construction of Human Development Index (HDI)

Introduction

The latest UNDP Report-2010 on HDI continues to adopt the same basic three indicators of education, health and standard of living/income for the calculation of HDI. Simultaneously, an effort was also made to arrive at Gender Inequality Index. To compute HDI, 10 indicators were used covering the area of living standard, education and health.

HDI presents information on the human development in three dimensions while GII provides information gender differentials in achievements.

Indicators for HDI

The indicators that may be used for deriving HDI at the block level are as follows:

Indicators for measuring HDI

Dimensions	Indicators
Living standards	Percentage of HHs having access to Cooking fuel
	Percentage of HHs having access to Toilet
	Percentage of habitations having access to Drinking Water
	Percentage of HHs having access to Electricity
	Percentage of HHs having access to Pucca house
Health	Infant Mortality rate
	Maternal Mortality Ratio
	Under 5 Mortality Rate
Education	Literacy Rate
	Gross Enrolment Rate (Primary And Gross enrollment in secondary) Schools

There are three indicators for measuring health, three for education and five for standard of living. All these indicators reflect human development.

Method of Estimating HDI

For the estimation of the HDI, the following steps may be followed:

1. All computations would be done at two stages. The first computation would help in understanding the relative positions of different blocks within the district. The second set of computation would relate to the position of a block with reference to other blocks

As a first step, a minimum and maximum value has to be set for each of the above 11 indicators to transform them into indices lying between zero and one. For this purpose, the observed minimum and maximum figures for each of the indicators will be taken. Since the Geometric Mean has to be calculated, in the case of a positive indicator, the minimum value would be taken as 10 per cent less than the observed minimum value in the block similarly, in the case of a negative indicator, the maximum value would be taken as 10 per cent more than the observed maximum value.

2. The index value (in the case of a positive indicator) can be calculated using the formula –

$$\text{Index Value} = (\text{Actual Value} - \text{Min. Value}) / (\text{Max. Value} - \text{Min. Value})$$

Eg.: calculations will be based on highest values being assigned highest ranking

3. The index value (in the case of a negative indicator) can be calculated by using the formula –

$$\text{Index Value} = (\text{Max. Value} - \text{Actual Value}) / (\text{Max. Value} - \text{Min. Value})$$

.For Computing sectoral indices (health, education and standard of living) geometric mean is to be used and the method of calculation is as below. Thus there will be three indices one for Standard of living, another for health and the last for education.

Sectoral Index = If I_1, I_2, \dots, I_n are the n indices for a particular sector, then the Geometric mean for the sector = $(I_1 \times I_2 \times \dots \times I_n)^{(1/n)}$.

4. To compute HDI, aggregate the three sectoral indices using geometric mean with the following formula.

HDI = $(SI_l \times SI_h \times SI_e)^{(1/3)}$; where SI_l is the sectoral index for living standard, SI_h is the sectoral index for health and SI_e is the sectoral index for education.

Construction of Gender Inequality Index (GII)

Introduction

GII measures the loss in potential of human development due to inequality between female and male achievements. As it reflects an inequality situation, a value of zero represents no inequality and a value of one represents highest level of inequality in the society. The UNDP report of 2010 has brought out the GII index for all the countries.

Indicators considered for measuring GII

Dimensions	Indicators
Health	Maternal Mortality Rate (MMR)
	Share of Institutional deliveries (ID)
	Ante-natal coverage
Empowerment	Share of female and male elected representatives in Urban and Rural Local Bodies (PR _F and PR _M)
	Share of female and male literacy (LIT _F , LIT _M)
	Share of Female and Male Children (0-6) years
Labour market	Share of female and male Work Participation Rate (WPR _F , WPR _M)
	Share of female and male workers in the non agricultural sector (NAG _F , NAG _M)
	Female and male Agricultural wage rate (WAGE _F , WAGE _M)

Method

1. Aggregating across dimensions within each gender group using geometric mean.

For females

$$G_F = \sqrt[3]{\left[\left(\frac{1}{MMR}\right) \times ID \times ANE\right]^{1/3} * [PR_F \times CHLD_F \times LIT_F]^{1/3} * [WPR_F \times NAG_F \times WAGE_F]^{1/3}}$$

For Males

$$G_M = \sqrt[3]{1 * [PR_M \times CHLD_M \times LIT_M]^{1/3} * [WPR_M \times NAG_M \times WAGE_M]^{1/3}}$$

2. Aggregating across gender group using a Harmonic mean.

$$HARM(G_F, G_M) = \left[\frac{(G_F)^{-1} + (G_M)^{-1}}{2} \right]^{-1}$$

3. Calculate the geometric mean of the Arithmetic means of the each indicator

$$G_{\overline{F}, \overline{M}} = \sqrt[3]{\overline{health} \cdot \overline{empowerment} \cdot \overline{LFPR}}$$

$$\text{Where } \overline{health} = \left[\frac{\left[\left(\frac{1}{MMR} \times ID \times ANE \right)^{1/3} + 1 \right]}{2} \right]$$

$$\overline{empowerment} = \frac{[PR_F \times CHLD_F \times LIT_F]^{1/3} + [PR_M \times CHLD_M \times LIT_M]^{1/3}}{2}$$

$$\overline{LFPR} = \frac{[WPR_F \times NAG_F \times WAGE_F]^{1/3} + [WPR_M \times NAG_M \times WAGE_M]^{1/3}}{2}$$

4. Calculating the GII by comparing the equally distributed gender index to the reference standard. The GII value ranges from zero (no gender inequality across dimensions) to one (total inequality across dimensions)

$$GII = 1 - \frac{HARM(G_F, G_M)}{G_{\overline{F}, \overline{M}}}$$

Construction of Child Development Index (CDI)

Introduction

Child Development Index (CDI) is an index combining performance measures specific to children - education, health and nutrition - to produce a score on a scale of 0 to 100. A zero score would be the best. The higher the score, the worse children are faring.

The Child Development Index (CDI) was developed by the campaign in UK, "Save the Children" in 2008 through the contributions of Terry McKinley, Director of the Centre for Development Policy and Research at the School of Oriental and African Studies (SOAS), University of London, with support from Katerina Kyrili.

The indicators which make up the index are chosen because they are easily available, commonly understood, and clearly indicative of child well-being. At the international level, the three indicators used for measuring child development index are.

Indicators for Child Development

In the preparation of District Human Development reports , the following indicators would be used to measure the CDI:

Dimension	Indicator
Health	U5MR
	Child Sex Ratio(0-6)
Nutrition	Percentage of Malnourished Children
	Enrollment in Primary and Secondary
Education	Children never enrolled in schools
	Transition rate from Primary to Upper Primary and Upper Primary to Secondary

Computation of Child Development Index

- The indicators have been broadly categorised under the 3 parameters that influence the HDI.
- All the above indicators are negative and positive in nature.

The index value (in the case of a positive indicator) can be calculated using the formula –

$$\text{Index Value} = (\text{Actual Value} - \text{Min. Value}) / (\text{Max.Value} - \text{Min.Value})$$

Eg.: calculations will be based on highest values being assigned highest ranking

The index value (in the case of a negative indicator) can be calculated by using the formula –

$$\text{Index Value} = (\text{Max. Value} - \text{Actual Value}) / (\text{Max.Value} - \text{Min.Value})$$

- The index values for each of the indicators would range between 0 and 1 - 0 indicating the lowest ranking for the blocks and 1 indicating highest ranking of the block
- The Child Development Index would be the average of the index values of the three indicators – with highest value indicating better child development.
- The composite index is the average of the consolidated index values of all sectors and this is to be used to assign the ranks for the blocks within the district.

Multidimensional Poverty Index

Indicators

Dimension	Indicator
Health	IMR
	Higher order Birth
	Malnourished Children
Education	Drop out in primary and secondary
Living Standards	Access to cooking fuel
	Access to toilet facilities
	Access to drinking water
	Access to Electricity
	Pucca house

Computation of Multidimensional Poverty Index

- The indicators have been broadly categorised under the 3 parameters that influence the HDI.
- All the above indicators are negative and positive in nature.
- The index value (in the case of a positive indicator) can be calculated using the formula –
$$\text{Index Value} = (\text{Actual Value} - \text{Min. Value}) / (\text{Max. Value} - \text{Min. Value})$$

Eg.: calculations will be based on highest values being assigned highest ranking
- The index value (in the case of a negative indicator) can be calculated by using the formula –
$$\text{Index Value} = (\text{Max. Value} - \text{Actual Value}) / (\text{Max. Value} - \text{Min. Value})$$
- The index values for each of the indicators would range between 0 and 1 - 0 indicating the lowest ranking for the blocks and 1 indicating highest ranking of the block
- The composite index is the average of the consolidated index values of all sectors and this is to be used to assign the ranks for the blocks within the district.