Technical Note on Methodology of Human Development Indices

Human Development Index (HDI)

HDI is a summary measure of human development. It measures the average achievements in three basic dimensions of human development:

I. A long and a healthy life as measured by the life expectancy at birth.

II. Knowledge, as measured by the adult literacy rates (with two- thirds weight) and the combined primary, secondary and tertiary gross enrollment ratio (with one- third weight)

III. A decent standard of living measured by GDP per capita (PPP $).

To arrive at HDI, dimension indices are created. These are calculated as:

$$\text{Dimension Index} = \frac{\text{Actual Value- Minimum Value}}{\text{Maximum Value- Minimum Value}}$$

Therefore, performance in each indicator is expressed as a value between 0 and 1. Finally each dimension is combined using simple average to arrive at HDI.

This Report uses the same three dimensions as those in the UNDP Human Development Reports as well as a similar methodology for the calculation of the HDI. However, some of the variables used in this report, and some other methodological details are different because of practical considerations related to availability of district level data and suitability in the light of state specific considerations.

1. Education Index: We have made a departure from the standard UNDP's methodology to compute the Education Index. Instead of adult literacy, we have used literacy rate of 7 years and above. We have also refrained from using school enrollment rate for want of reliable data at district level for all the years, for which HDI was computed. In the light of these considerations, we have thought it appropriate to rely on the literacy rate (7 +years) figures available from 1991 and 2001 Census to compute the Education Index. For 2005, projected literacy rate figures have been used. As usual, to calculate the dimension index, minimum and maximum values of the literacy rate are 0 and 100 percent respectively.

2. Health Index: UNDP makes use of life expectancy at birth (LEB) as the indicator to compute the Health Index. For U.P. districts; the estimates for

LEB were available only for 1991(through a special study commissioned for the First UPHDR) and 1981. We have, therefore, used Infant Mortality rate. The IMR for the years 2001 and 2005 are the derived rates based on the RCH Surveys. For IMR, the Lower and Upper limits are 10 and 200, based on the current and past-observed IMR in India and U.P,

3. Income Index: In the HDI income serves as a surrogate for all the dimensions of human development not reflected in Health and Education Index. The UNDP takes as minimum and maximum values of real GDP per capita (PPP$) at $100 and $40,000. The income Index is calculated using an adjusted district per capita income in PPP$. The district per capita income in PPP$ equivalent is derived from the district per capita income at constant prices in rupees, multiplying with the ratio of per capita GDP in PPP$ in India and per capita GDP in rupees in India for the relevant years. After estimating the district per capita income in PPP$, the Income Index is computed using the log values of income as:

$$\text{Income Index} = \frac{\text{Log (per capita Income PPP\$)- log(100)}}{\text{log (40,000)- log (100)}}$$

The income index is adjusted using the above formula because achieving respectable level of human development does not require unlimited income

4. Calculation of the HDI: The three dimension indices have been used to compute the HDI. It is the simple average of three dimension indices as:

HDI = 1/3*[income index + health index + education index]

Gender- Related Development Index (GDI)

5. While the HDI measures average achievement, the GDI adjusts the average achievement to reflect the inequalities between men and women in the same dimensions as that of HDI. The calculation of GDI involves three steps. First, female and male indices in each dimension are calculated according to the dimension index formula explained before. Second, the female and male indices in each dimension are combined in a way that penalizes differences in achievement between men and women. This index is called Equality Distributed Index. This is calculated according to the following formula:

$$\text{Equally Distributed Index} = \frac{1}{\text{Female Pop. Share/ Female Index + Male Pop. Share/ Male Index}}$$

It gives the harmonic mean of female and male Indices.

Third, the GDI is calculated by combining the three equally distributed indices in an unweighted average.

6. Method to calculate Education and Health indices remains the same as in HDI calculations. Income index is arrived at in a different way in GDI. The steps are as follows:

Computing Equally distributed Income Index

First per capita income for women and men are calculated from the female share and male share of earned income. The Female share of income is computed using the formula given below:

$$\text{Female share of Earned Income} = \frac{\text{ratio of female to male wage* share of female workers}}{\text{ratio of female to male wage* (share of female workers+ share of male workers)}}$$

The estimated female share of female earned income has been used to compute the district per capita income of women and district per capita income of men. These per capita incomes have been adjusted for equivalent to PPP$ using the same procedure as in HDI.The income dimension index for female and male has been computed using the formula given before. These indices have been used to compute the equally distributed income index

7. Having thus computed the equally distributed indices for health, education and income, the GDI is computed as the simple average of the three equally distributed indices as:

GDI=1/3*(equally distributed index of income +equally distributed index of health+equally distributed index of education)

Deprivation Index

8. The deprivation index measures the deprivation in four basic necessities of well being such as quality of housing, a access to drinking water, good sanitation and electricity for lighting. The following indicators have been used to compute the deprivation index

(i)   Deprivation in Quality of Housing (d1): this is measured through percentage of households not residing in a permanent house.

(ii)   Deprivation in Access to Water (d2): The deprivation in access to water is measured through percentage of households whose source drinking water is away from the house.

(iii)   Deprivation in Good Sanitation (d3): Deprivation in good sanitation is measured through percentage of households who do not have the facility of latrine.

(iv)   Deprivation in Electricity for Lighting (d4): Deprivation in electricity lighting is measured through percentage of households who do not have the source of lighting as electricity.

The above indicators for all districts of U.P. have been taken from census 1991 and census 2001.

9. The formula for calculating the Deprivation Index is similar to that of Human Poverty Index used by the UNDP. The formula is as follows:

Deprivation Index=$[1/4(d1^3+d2^3+d3^3+d4^3)]^{1/3}$