

TECHNICAL NOTES

THE HUMAN DEVELOPMENT INDEX (HDI) in this report is computed based on three indicators: longevity, knowledge, and standard of living. These are measured respectively by life expectancy at birth; functional literacy and the combined elementary and high school enrollment ratio, also called the basic education enrollment ratio; and real income per capita.

Maximum and minimum values

Computing the index begins by setting minimum and maximum levels for each of the indicators:

Indicator	Maximum	Minimum
life expectancy	85 years	25 years
functional literacy	100 percent	0 percent
basic education enrollment ratio	100 percent	0 percent
income per capita I	highest income per capita in a given year	lowest income per capita in a given year
income per capita II	\$40,000 purchasing-power parity	\$100 purchasing-power parity

An index for each indicator is then arrived at in the following manner:

$$\text{Index} = \frac{\text{actual x value} - \text{minimum x value}}{\text{maximum x value} - \text{minimum x value}}$$

If, for example, the life expectancy for Albay is 67.65, then the life expectancy index for Albay is computed as:

$$\text{Life Expectancy Index (Albay)} = \frac{67.65 - 25}{85 - 25} = \frac{42.65}{60} = 0.711.$$

Similarly, for Albay's functional literacy rate of 82.3 and enrollment ratio of 84.3, the following indices are obtained:

$$\text{Functional Literacy Index (Albay)} = \frac{82.3 - 0}{100 - 0} = 0.823$$

$$\text{Enrollment Index (Albay)} = \frac{84.3 - 0}{100 - 0} = 0.843.$$

These two indices are averaged to obtain the Education Index, i.e.,

$$\text{Education Index} = (1/2)(\text{Functional literacy index} + \text{Enrollment index})$$

Hence in this specific example:

$$\text{Education index (Albay)} = (1/2)(0.843 + 0.823) = 0.830$$

Two income indices

The treatment of income is more involved. The first income indicator is used in the intra-country comparison of provinces and computed for 1994 and 1997, yielding the computation of HDI-I. The second income variable was used to generate HDI-II, comparing provinces with other countries using the method followed in the global *Human development report* of 1999. Two different indices of income are thus generated.

Income Index I

To arrive at Income Index I is simple. Suppose a province's real per capita income for a certain year is y , and the maximum and minimum income levels for that year are Y_{\max} and Y_{\min} , respectively. Then the income index is given by:

$$\text{Income Index I} = \frac{y - Y_{\min}}{Y_{\max} - Y_{\min}}$$

giving a number between zero and one. A province obtains a higher index, the closer its income is to the highest income for that year, relative to what other provinces have achieved. In practice, the NCR income is always the maximum, although the minimum may change. In 1997 the maximum and minimum incomes per capita were P48,930 (NCR) and P8,181 (Sulu), respectively. It is obvious from the formula that Sulu's index would be zero and NCR's would be one. For the 1994 computations the maximum and minimum levels of income used were P37,070 (NCR) and P6,533 (Romblon). One problem cited with this practice has been that the scale changes annually as the maximum and minimum incomes change. It is therefore possible that a province's income index may fall even if its income has not actually declined, simply because it has fallen relative to the highest income province. In other words, this index is sensitive to changes in a province's ranking within the country.

Again following the case of Albay, which had an income per capita of P13,379 in real terms in 1997:

$$\text{Income Index I} = \frac{13379 - 8181}{48930 - 8181} = 0.128$$

Income Index II

To allow comparison between a province's income and that of other countries, its income must first be converted into purchasing-power parity terms, that is conceptually valued according to a common set of commodities that it may purchase, regardless of where the income is earned.

To obtain the PPP\$ equivalent of a province's per capita income in 1997, it is first converted to US currency using the average 1997 peso-dollar exchange rate of P30. This is then converted into PPP\$ by multiplying it with 3.06, the implicit ratio of one PPP\$ to one current US\$ in the 1999 *Human Development Report*. The result is the province's 1997 per capita income in purchasing-power parity terms.

The income index-II proper is based on a scale defined by a minimum income of PPP\$100 and a maximum of PPP\$40,000. First, the gap between a province's PPP\$ income and the minimum income of PPP\$100 is computed as the difference between their logarithms. This difference is then taken as a proportion of the gap between the maximum income of PPP\$40,000 and the minimum income of PPP\$100, again taken as the difference between their logarithms, or 2.6062. In general, if y is a province's per capita income, the index is computed as

$$\text{Income Index II} = \frac{\log y - \log 100}{\log 40000 - \log 100}$$

Hence, for instance, take Albay's per capita income in 1997 of P18,758 in current pesos. This is equivalent to \$625 (=18,758 / 30), or PPP\$ 1,912 (= 625 x 3.06). Hence one computes:

$$\text{Income Index II (Albay)} = \frac{\log (1912) - \log 100}{\log 40000 - \log 100} = \frac{1.281}{2.606} = 0.492$$

Computing the HDI

The HDI in all cases is simply an average of three indices: the Life Expectancy Index, the Education Index, and the relevant Income Index, i.e.,

$$\text{HDI} = (1/3)(\text{Life Expectancy Index} + \text{Education Index} + \text{Income Index})$$

To compute HDI-I, one uses Income Index-I:

$$\text{HDI-I} = (1/3)(\text{Life Expectancy Index} + \text{Education Index} + \text{Income Index-I})$$

Analogously, one uses Income Index II to obtain the HDI-II used for international comparisons:

$$\text{HDI-II} = (1/3)(\text{Life Expectancy Index} + \text{Education Index} + \text{Income Index-II})$$

These formulas yield the following HDI levels for the specific case of Albay, which are given in the statistical annexes.

$$\text{HDI-I(Albay)} = (1/3)(0.711 + 0.830 + 0.128) = 0.556$$

$$\text{HDI-II(Albay)} = (1/3)(0.711 + 0.830 + 0.492) = 0.677$$