

## THE HUMAN DEVELOPMENT INDEX AS AN ANALYTICAL TOOL IN DEVELOPMENT GEOGRAPHY

SHELAGH B. WADDINGTON AND JAMES A. WALSH

*Department of Geography, St. Patrick's College, Maynooth*

**Abstract.** This paper considers possible definitions of the concept of development, advocating one which includes aspects of human advancement in addition to the more traditional economic variables. The method of calculation of one multi-dimensional index (the Human Development Index) is described and a short report on the findings is then given. A method of using this index in the classroom is then outlined.

### Introduction

✓ Indicators of development in common usage, such as per capita Gross National Product [GNP] or per capita Gross Domestic Product [GDP], focus exclusively on economic aspects of development, equating high GNP with overall high standards of living and low GNP with low levels of human development. A simple analysis would reveal that while there is a fairly strong positive relationship between GNP and indicators of development, such as Life Expectancy or educational attainment, there are many exceptions. For example in 1992 China had a GNP of \$370 and a life expectancy of 70.5 years, while Pakistan had a GNP of \$400 but a life expectancy of only 58.3 years. It is, thus, reasonable to suggest that while there is good reason to assume that economic growth is necessary for human development, improvements in human development do not take place automatically. Governments and other leaders must make decisions on how to manage their economies in such a way as to allow the maximum benefit to be gained by all of the people if the overall well-being of the country is to be improved. This raises questions over the use of strictly economic indices of development by funding bodies such as the World Bank. A number of alternative multi-dimensional indices have, therefore, been suggested as providing a more accurate reflection of the true levels of development. The Human Development Index [HDI], which has been in use since 1990, represents one such attempt to combine other measures of achievement with economic ones. This index is calculated each year and forms the basis of the Human Development Report, produced annually by the United Nations Development Programme (U.N.D.P., 1990 -1995). This paper provides an introduction to the index and to a broader concept of human development. One way in which the HDI could be used to assist students to broaden their understanding of the concept of development is also suggested.

## What is Human Development?

In the Human Development Report (U.N.D.P., 1994) the purpose of development was defined as being "to create an environment in which all people can expand their capabilities, and opportunities can be enlarged for both present and future generations". It follows from this that all humans must be regarded as intrinsically valuable, not just because they are producers of wealth or because they are the "correct" race or gender or happen to be born in one area of the world. Development must, therefore, include opportunities for everyone to maximise their potential, not just in economic terms, but also in social and cultural fields. It is, therefore, necessary to provide access for all to food, education, health care, etc. and to ensure that all have basic human rights, such as security and political freedom. If the high levels of development enjoyed by the 'Developed' countries are to be extended to the rest of the world, it will be necessary to address the problem of sustainability. At current rates of resource consumption (particularly non-renewable energy sources) it is unlikely that standards can be maintained even in the 'North' on a long-term basis. In the rest of the world the build-up of problems, such as debt and environmental degradation, in the present may render future development even more difficult than it is today. Economic improvements for the poor would enable them to make choices which would avoid further damage to their environment. Without this improvement the choice may be between personal survival and conservation. One way to redistribute some economic advantage would be for a proper pricing system to be developed for the ecosphere. This would ensure that the 'North' could not afford to use nature resources at the current rate and may lead to sustainable patterns of consumption. This may also encourage countries to focus on other aspects of development, particularly the development of human capital. Education and new or improved usage of resources can compensate for lower incomes and resource availability, enabling a widening of the group which enjoys a high level of development without increasing the damage to the Earth and threatening the future. Additional information about definitions of development is available in a number of publications, for example Regan (1991) and Farmar (1988). These references also provide additional material for work with students on development issues.

## The Human Development Index

The Human Development Index [HDI] was introduced in 1990 to provide a measure of human development which would allow comparisons between countries and over time in the same country. It is currently calculated by the combination of three separate indicators of development. These are:

- (i) Longevity - this is based on life expectancy figures (i.e. the number of years a new born infant might be expected to live if prevailing patterns of mortality at the time of its birth were to remain the same throughout its life).

- (ii) Knowledge - this is based on two measures. Two thirds of the figure is based on the rate of adult literacy, i.e. the percentage of the population aged 15 years or more who can, with understanding, both read and write a short statement on their every day life. The remainder of the measure is related to the mean number of years of schooling which citizens receive.
- (iii) Standard of Living - this is measured in terms of per capita Gross Domestic Product [GDP], calculated in \$U.S. and adjusted to reflect local living costs or purchasing power parity [p.p.p.]. The minimum per capita GDP was assessed in 1994 as being \$200 (p.p.p.) and the maximum as \$40,000 (p.p.p.). However it was considered that above a certain minimum level an increase in GDP had a decreasing effect on improvements in human development, e.g. an increase of \$300 would have a much greater effect on a standards if the original GDP was \$600 than if it was \$20,000. Therefore, the effect of income is increasingly discounted above the mean income for the world. In 1994 this mean income was \$5,120 and the highest adjusted per capita GDP was \$5,385.

Other measures have been suggested for inclusion but either data were not readily available, e.g. measures of environmental quality, or there would be overlap between these measures and the three selected, e.g. infant mortality would overlap with life expectancy. It was also considered likely that the addition of more variables would not materially improve the reliability of the index and would make its interpretation more difficult.

## Calculating the HDI

In order to combine variables which are measured on different scales it is necessary to convert them to a common scale. This is done for the HDI by expressing each value in relation to the maximum and minimum value of the appropriate variable, as illustrated below:

### Longevity

Minimum life expectancy [LE]	=	25.0 years.		
Maximum LE	=	85.0 years.		
e.g. LE for Pakistan	=	58.3 years.		
LE Index [LEI] for Pakistan	=	$\frac{58.3 - 25.0}{85.0 - 25.0}$	=	$\frac{33.3}{60.0} = 0.555$

### Educational Attainment Index [EAI]

Minimum literacy	=	0.0%	This is expressed as 0
Maximum literacy	=	100.0%	This is expressed as 1
Literacy for Pakistan	=	36.4%	
Lit Index [LI] for Pakistan	=	0.364	

$$\begin{aligned}
 \text{Maximum years of schooling} &= 15.0 \text{ years} \\
 \text{Mean years for Pakistan} &= 1.9 \text{ years} \\
 \text{Sch Index [SI] for Pakistan} &= \frac{1.9}{15.0} = 0.127 \\
 \text{EAI for Pakistan} &= \frac{2(LI) + (SI)}{3} = \frac{2(0.364) + 0.127}{3} \\
 &= \frac{0.855}{3} = 0.285
 \end{aligned}$$

#### Standard of Living Index [SLI]

$$\begin{aligned}
 \text{Minimum GDP (p.p.p)} &= \$200 \\
 \text{Maximum GDP (p.p.p)} &= \$40,000 \\
 \text{Maximum adjusted GDP (p.p.p)} &= \$5,385 \\
 \text{Threshold value (Global mean income)} &= \$5,120 \\
 \text{GDP for Pakistan (p.p.p.)} &= \$1,970 \\
 \text{SLI for Pakistan} &= \frac{1,970 - 200}{5,385 - 200} = \frac{1,770}{5,185} = 0.341
 \end{aligned}$$

To illustrate the effects of adjustment for countries whose income is above the threshold value, the comparable calculation for Greece would be:

$$\begin{aligned}
 \text{GDP for Greece (p.p.p.)} &= \$7,680 \\
 \text{Adjusted GDP (p.p.p.)} &= 5,120 + 2(7,680 - 5,120)^{0.5} \\
 &= 5,120 + 101 = 5,221 \\
 \text{SLI for Greece} &= \frac{5,221 - 200}{5,385 - 200} = \frac{5,021}{5,185} = 0.968
 \end{aligned}$$

#### The HDI Index [HDI]

$$\begin{aligned}
 \text{HDI} &= \frac{\text{LEI} + \text{EAI} + \text{SLI}}{3} \\
 \text{HDI for Pakistan} &= \frac{0.555 + 0.285 + 0.341}{3} = \frac{1.181}{3} \\
 &= 0.393
 \end{aligned}$$

When the index was originally calculated the maxima and minima used were based on figures available for the current year. This meant that a country could make improvements to its level of development, but its world ranking could remain the same or even fall if the countries above it in the table also improved. This meant that comparisons over time were very difficult and so calculations are now based on fixed norms selected in 1994. It is, therefore, necessary to view comparisons between years before 1994 with some caution, but future results should be much easier to interpret.

## The Main Findings of the HDI for 1994

The 1994 Human Development Report (UNDP, 1994) revealed that there were fewer countries than in previous years in the low development group (with an index value up to 0.5) and that indices of the most developed group (index 0.8 or over) were also lower than in previous years. These results were at least partly due to changes in the way in which the index was calculated, but it was considered certain that all countries had made progress since the 1960's. Improvement had not, however, been equally rapid in all regions of the world. While many countries in Latin America and East Asia have moved from low to medium or even high development categories, most countries in sub-Saharan Africa and south Asia are still in the low development group. The distribution of the countries with the highest and lowest HDI's in 1994 is shown on the world map, Fig.1.

The results generally confirmed the positive relationship between the HDI and GNP, but also provided graphic illustrations of contrasting policies influencing the results. Some countries had a much higher HDI than would be predicted from their GNP, indicating that judicious use had been made of available income to improve the life chances of the majority of their citizens, e.g. China, Colombia and Guyana. In contrast, other countries, such as Guinea, Gabon and Saudi Arabia had a much lower HDI than their GNP value would suggest, showing that they have considerable potential for further improvement to the development of their people. Some countries also showed considerable variation in rankings for one of the three variables involved in the HDI in comparison with their overall ranking. For example, the Republic of Korea has the 4th highest HDI of the Developing countries group, but has only the 18th highest life expectancy ranking.

The report also noted that while some countries reported that GNP had decreased from previous years none showed a decrease in HDI, suggesting that human capital is much more sustainable than economic capital once it is built up.

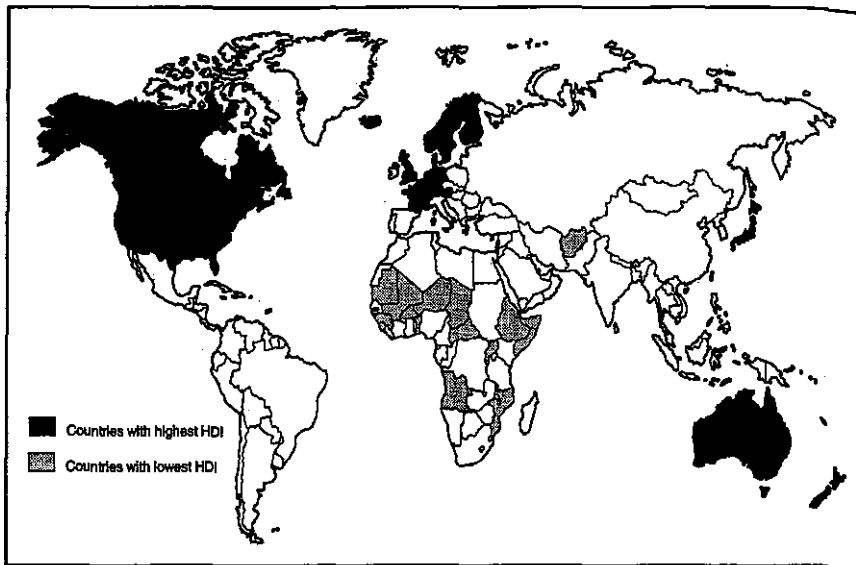
### Variations within the Overall HDI

The report also provides details of how the general HDI for a country can conceal considerable variations in the level of development of different sub-groups within the population.

#### (a) Gender

Most countries could provide information about education and about life expectancy by gender, but only limited information from the industrial sector about income. This meant that the findings could not be regarded as absolutely conclusive. In all 43 countries for which data were available the HDI for women was lower than that for men, despite women having a higher life expectancy. The amount of difference did, however, vary quite widely from Sweden (where the HDI for women was 94.8 percent that for men) to Egypt,

Figure 1. Countries with the Highest and the Lowest Human Development Index



where the female HDI was only 59 percent that of the male one. In industrial countries there was considerable variation in employment and wages, while in developing countries this variation also encompassed education, health care and nutrition. The 1995 Human Development Report focuses particularly on this aspect of development and provides much greater detail than the 1994 report.

(b) Income Distribution

It was assumed that if income was more evenly distributed in a country, it was likely that the benefits of development would also be more evenly shared. To obtain a measure of this the income for the wealthiest 20 percent of the population and for poorest 20 percent of the population was obtained for 55 countries and the ratio between these two calculated. The HDI was then multiplied by this ratio and the rankings of the countries compared with their overall ones. No country revealed a perfectly even distribution of income, and considerable variation was observed between countries, for example Brazil had a ratio of 1:32, while Botswana had one of 1:47. It would, of course, be possible to calculate the same type of ratio for the other measures, but variation is greatest in income.

(c) Regional Variations

For countries where such information was available, the HDI was calculated for individual regions or states. As with other disaggregations, some countries showed considerably greater variation than others, e.g. In Nigeria, Bendel had an HDI of 0.666, while its least developed state had an index of only 0.156 (lower than the HDI for any country). The report drew attention to the link between regional disparities and potential for social, economic and political unrest, and suggested that the HDI ratings should be used to guide future development policies. An interesting finding was that regional variations existed even in China, with its most developed Province (Shanghai) having an HDI of 0.865 and its least developed (Tibet) one of only 0.404. In contrast, in Poland the least developed region has an HDI which is about 80 percent that for the most developed region.

(d) Ethnic Variations

For many countries data were not available by racial or ethnic grouping, either because it was not collected in this way or there was little variation within the country. Some countries did, however, display considerable disparities, for example in Canada the "aboriginals" (the Indians, Inuit and Metis) had both a lower life expectancy (5.6 years) and and real income (two thirds that of the rest of the population). In Malaysia the disparity between Chinese and Malay groups had been reduced by positive action by the government following racial riots in 1969. This action meant that the HDI of the Malays increased at nearly one and a half times the rate of the Chinese group.

Uses of the HDI

The main section of the 1994 report concluded by making suggestions about how the HDI could be used in planning and assessing global development. On a national level the findings should stimulate debate about development policy. The index emphasises the point that even the poorest countries can improve some aspect of their development despite scarcity of finance. For example, if countries focus resources more on the least developed groups or areas improvements can be made without a great deal of additional input. It is also suggested that the HDI could become a useful tool for analysis of development and for the evaluation of development programmes. While it may help to identify more accurately the extent of disparities, the nature of policy responses would need to take account of a wider set of considerations than just the index.

Conclusion

The HDI and the Human Development Reports provide a basis for considering human development. This short article has merely sketched a broad outline of the information available in the Annual Human Development Reports issued by the

United Nations. The text of each of the reports and the large number of tables, covering such aspects of development as urbanisation, energy consumption, communications and food security provide detailed information for school-based study of a large number of aspects of development.

## **UNDERSTANDING MEASURES OF DEVELOPMENT:**

### **An exercise based on the HDI [Teachers' Notes]**

#### **Aims**

- 1 Students will gain a better understanding of some aspects of the meaning of "development".
- 2 Students will understand that levels of human development are influenced by factors other than availability of money.
- 3 Students will develop an understanding of one measure of human development, the HDI.

#### **Target Groups**

The exercise could be used as part of a module on development education in Transition year (possibly as an introduction), or in Leaving Certificate Geography. It would be relevant to several areas of the LC syllabus, including (ii) Social Geography (a) (2) Economies; (b) The colonial heritage; (iii) Economic Geography (a) Problems of hunger and illiteracy in countries of the Third world; (b) Types of industries (1) Primary industries; (4) Trade.

#### **Introduction - Exploring development**

- a Students provide either individual or group answers to broad questions such as:
  - 1 Name some developed countries.
  - 2 Name some developing countries.
  - 3 What are the differences between developed and developing countries?
- b Present answers to the whole class and summarise in some way, e.g. by teacher noting them on the board. [Hopefully, the answers will include variations in some aspects of wealth, education and health - if not, prompts should be given].

Introduce idea of examining various measures of development, to assess the level of development of a country. Stress that while money is important, it is agreed that development could also involve other aspects of life. Explain that the exercise will not only examine the relationships between money available and individual aspects of development, but also use a measure which combines some of these



together - the Human Development Index. The information on the data sheet [Fig.2] can be used to outline this index, or more detail can be given based on this article.

### The Exercise

- a Divide the class into groups of four students and distribute the worksheet [see Fig 2]. Each student should draw one of the graphs listed. It is probably advisable for the teacher to demonstrate how this should be done by locating the first country on the list on one of the graphs. Depending on the ability and experience of the class, it may even be sensible to draw the axes for the graphs and then provide copies of these with the table of information. It should be explained that GDP has not been defined as this will be explained later.
- b When the graphs have been completed ask students to use the graphs A, B and C to answer the following questions . [It might be advisable to collect Graph D to ensure that they actually use the correct graphs. It would probably be best to suggest that one member of the group keeps a brief written record of the agreed answers.]
  - 1 What general relationships can you identify between the variables on each of the graphs which have been drawn?
  - 2 What exceptions can you identify to these general relationships, i.e. cases where two countries have approximately the same value on one scale and very different scores on the other, or countries with a low value on one scale and a high value on the other?
  - 3 What explanations can you think of for these exceptions?
- c When the groups have completed their discussions answers should be presented to the whole class and the main findings made clear to all of the members. It would probably be helpful to have correct versions of the graphs available on acetates to show on the OHP to illustrate some findings.

### Main Points from Exercise

- 1 Greater GNP correlates with higher HDI, longer life expectancy and higher literacy levels and lower GNP correlates with lower HDI, shorter life expectancy and lower literacy levels.
- 2 Choices made by governments influence levels of achievement. Some countries give high priority to provision of basic social services (doctors, hospitals, schools) and, therefore, have higher scores on HDI and on life expectancy or literacy scales, while others spend more on defence or debt repayments. Compare China with India, Libya with Greece.

**Fig 2: Student Data Sheet**

**UNDERSTANDING MEASURES OF DEVELOPMENT**

The table below shows a number of indices of income and development for a selection of countries. The information was collected in 1991 and 1992.

**Gross National Product [GNP]** is the standard measure of the income generating capacity of an economy, including foreign earnings, e.g. from investment, tourism and aid, but excluding outflows of money, e.g. repatriated profits and debt repayments. It is frequently used as an indicator of the level of development of countries. Per capita GNP is the average amount of income per person in the economy. It is measured in \$US.

**Human Development Index [HDI]** combines indicators of national income, life expectancy and educational attainment to give a composite measure of human progress. It does not measure absolute levels of development, but ranks countries in relation to each other.

**Life expectancy [LE]** is the number of years a new born infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

**Literacy rate [Lit]** is the percentage of persons aged 15 and over who can, with understanding, both read and write a short statement on their everyday life.

**Student A:** Draw a graph to show the position of each country in the table according to its score on HDI and on GNP.

**Student B:** Draw a graph to show the position of each country in the table according to its score on Lit and on GNP.

**Student C:** Draw a graph to show the position of each country in the table according to its score on LE and on GNP.

**Student D:** Draw a graph to show the position of each country in the table according to its score on HDI and GDP.

Country	LE (years)	Lit (%)	GNP (\$) 1991	HDI	GDP (ppp) (\$)
Brazil	65.8	82.1	2920	0.756	5240
Canada	77.2	99.0	20510	0.932	19320
China	70.5	80.0	370	0.644	2946
Egypt	60.9	50.0	610	0.551	3600
Gambia	44.4	30.0	360	0.215	763
Greece	77.3	93.8	6420	0.874	7680
Guinea	43.9	26.9	500	0.191	500
India	59.7	49.8	330	0.382	1150
Ireland	75.0	99.0	11150	0.892	11430
Libya	62.4	66.5	5310*	0.703	7000
Malawi	44.6	45.0	510	0.260	800
Mexico	69.9	88.6	3080	0.804	7170
Nepal	52.7	27.0	180	0.289	1130
Pakistan	58.3	36.4	400	0.393	1970
Poland	71.5	99.0	1790	0.815	4500
Saudi Arabia	68.7	64.1	7900	0.742	10850
Sweden	77.7	99.0	17490	0.928	17490
Switzerland	77.8	99.0	33710	0.931	21780
U.S.A.	75.6	99.0	22340	0.925	22130
Zimbabwe	56.1	68.6	670	0.474	2160

\* = most recently available figure

- 3 A certain basic level of per capita GNP is required to give a high level of basic services, after which increases in GNP have little further impact on HDI (or literacy or life expectancy). Compare Greece, Ireland and Sweden. If students do not identify the reasons for this spontaneously, point out that nowhere can have more than 100 percent adult literacy or extend their citizens lives indefinitely.

### **Highlighting the problem with GNP as a measure of economic development**

- d Ask students to consider why GNP is unsatisfactory as a measure of available spending power. It may be necessary to remind them of the definition supplied and even prompt them with questions about lifestyles in different countries (reminders about subsistence agriculture) and varying costs of living (e.g. how much did a bag of chips cost on holiday abroad?)
- e Ask students to suggest a better method of comparing income levels. Use their answers to introduce GDP.

### **Main Points to Develop**

- 1 In some countries (especially less developed ones) many goods and services are not exchanged for cash and, therefore, the level of GNP in these countries may be understated, e.g. India. These exchanges are also important in socialist countries, e.g. basic to Chinese commune.
- 2 GNP is calculated by changing local currencies into \$U.S., but relative purchasing power is not considered (i.e. a Mars Bar costs 50 cents equivalent in one place and \$2 in another). Introduce the idea of producing an internationally comparable scale and explain that Real GDP (ppp), which uses an internationally comparable scale of **purchasing power parities**, i.e. converts not to \$U.S. but to international \$ is such a method.
- f Ask groups to compare graph D (HDI vs Real GDP (ppp)) with Graph A (HDI vs GNP).

### **Main Points to Develop**

- 1 Real GDP is actually used in the HDI calculations.
- 2 Closer correlation between HDI and GDP than HDI with GNP.
- 3 No measures of development (or anything else) provide all the information which might be desirable in an ideal world, but some are more useful for developing full understanding than others. This could be developed further to consider the HDI itself and possibly students could be asked to suggest alternatives or amendments to the index.

## Conclusion

The general points from the lesson can be summarised orally or a written task may be set, e.g. providing HDI and separate rating of the variables for two countries and asking students to decide what aspects of development should be given priority in the future. This could include as little or as much detail as you considered necessary.

## References

- Regan, C. (1991) 'Development: What it's all about' in 75:25 *Ireland in a Still Unequal World*, Development Education Commission, Congood, Dublin, 5-18.
- Farmer, A. (ed) (1988) 'Section 1: Thinking about development' in *The Developing World*, D.E.S.C., Dublin, 1-87.
- United Nations Development Programme (1990 to 1995) *Human Development Report*, Oxford University Press, Oxford. N.B. Particular reference is made in this article to the Human Development Report for 1994.