

the largest share of the government budget. Yet in spite of some impressive quantitative advances in school enrollments, literacy levels remain strikingly low compared with the developed nations. For example, among the least developed countries, literacy rates average only 45% of the population. Currently, it is estimated that 325 million children have dropped out of primary and secondary school, and of the estimated 854 million illiterate adults, well over 60% are women.<sup>11</sup> The education of children who do attend school regularly is often irrelevant to the development needs of the nation in which they live. We examine the role of education in detail in Chapter 9.

Summarizing our discussion so far, we can list the following common characteristics of the low living levels of developing countries:

1. Low relative levels and, in many countries, slow growth rates of national income
2. Low levels and, in many countries, stagnating rates of real income per capita growth
3. Highly skewed patterns of income distribution, with the top 20% of the population receiving 5 to 10 times as much income as the bottom 40%
4. Consequently, great masses of developing country populations suffering from absolute poverty, with up to 1.3 billion people living on subsistence incomes of less than \$370 per year at purchasing power parity
5. Large segments of the populations suffering from ill health, malnutrition, and debilitating diseases, with infant mortality rates running as high as 10 times those in developed nations
6. In education, low levels of literacy, significant school dropout rates, and inadequate and often irrelevant educational curricula and facilities

Most important is the interaction of all six characteristics, which tends to reinforce and perpetuate the pervasive problems of "poverty, ignorance, and disease" that restrict the lives of so many people in the developing world.

### **A Holistic Measure of Living Levels: The Human Development Index**

The latest and most ambitious attempt to analyze the comparative status of socioeconomic development such as we have just reviewed in both developing and developed nations systematically and comprehensively has been undertaken by the United Nations Development Program (UNDP) in its annual series of *Human Development Reports*. The centerpiece of these reports, which were initiated in 1990, is the construction and refinement of the Human Development Index (HDI). Because of its great importance, we examine the HDI in detail. The HDI attempts to rank all countries on a scale of 0 (lowest human development) to 1 (highest human development) based on three goals or end products of development: *longevity* as measured by life expectancy at birth, *knowledge* as measured by a weighted average

of adult literacy (two-thirds) and mean years of schooling (one-third), and *standard of living* as measured by real per capita income adjusted for the differing purchasing power parity (PPP) of each country's currency to reflect cost of living and for the assumption of diminishing marginal utility of income. Using these three measures of development and applying a formula to data for 175 countries, the HDI ranks all countries into three groups: low human development (0.0 to 0.499), medium human development (0.50 to 0.799), and high human development (0.80 to 1.0).

Calculation of the HDI has undergone a number of changes since its inception. Perhaps most importantly, the index has been simplified so that today the HDI is calculated in a relatively straightforward manner. In particular, in the past a relatively complicated formula was used to convert PPP income into "adjusted" income (meaning income adjusted for diminishing marginal utility). Today, we find adjusted income by simply taking the natural log of current income. Then, to find the income index, subtract the natural log of 100 from the natural log of current income, because it is believed that the lowest that per capita income could possibly have been over the past generation in any country is \$100 PPP. The difference gives the amount by which the country has exceeded this "lower goalpost." To put this achievement in perspective, consider it in relation to the maximum that a country could reasonably aspire to over the coming generation. The UNDP takes this at \$40,000 PPP. So we then divide by the difference between the log of \$40,000 and the log of \$100 to find the country's relative income achievement. This gives each country an index number that ranges between 0 and 1. For example, for the case of Armenia, whose 1999 PPP income per capita was \$2,215, the income index is given by<sup>12</sup>:

$$\text{income index} = \frac{[\log(2,215) - \log(100)]}{[\log(40,000) - \log(100)]} = 0.517 \quad (2.1)$$

With a value of the income index about midway through the maximum and minimum points (that is, 0.517 is close to 0.5), for the case of Armenia, it is easy to see the effect of diminishing marginal utility at work. An income of \$2,215, which is less than 6% of the maximum goalpost of \$40,000, is already enough to reach more than halfway to the maximum value that the index can take. Note that one (small) country, Luxembourg, has already exceeded the \$40,000 PPP income target; for this case, the UNDP assigns Luxembourg the maximum value of \$40,000 PPP income, and so the country gets the maximum income index of 1.

To find the life expectancy (health proxy) index, the UNDP starts with a country's current life expectancy at birth, then subtracts 25 years. The latter is the lower goalpost, the lowest that life expectancy could have been in any country over the last generation. Then, the UNDP divides the result by 85 years minus 25 years, or 60 years, which represents the range of life expectancies expected over the previous and next generations. That is, it is anticipated that 85 years is a maximum reasonable life expectancy for a country to try to achieve over the coming generation. For example, for the case of Armenia, whose population life expectancy in 1999 was 72.7 years, the life expectancy index is given by:

$$\text{life expectancy index} = \frac{[72.7 - 25]}{[85 - 25]} = 0.795 \quad (2.2)$$

Notice that no diminishing marginal utility of years of life are assumed; the same holds for the education index. The education index is made up of two parts, with two-thirds weight on literacy and one-third weight on school enrollment. Because gross school enrollments can exceed 100% (because of older students going back to school), this index is also capped at 100%. For the case of Armenia, adult literacy is estimated at 98.3%, so the adult literacy index is given by:

$$\text{adult literacy index} = \frac{[98.3 - 0]}{[100 - 0]} = 0.983 \quad (2.3)$$

For the gross enrollment index, Armenia estimates that 79.9% of its primary, secondary, and tertiary age population are enrolled in school, so the country receives a value of:

$$\text{gross enrollment index} = \frac{[79.9 - 0]}{[100 - 0]} = 0.799 \quad (2.4)$$

Then, to get the overall education index, the adult literacy index is multiplied by two-thirds, while the gross enrollment index is multiplied by one-third. This choice reflects the view that literacy is the fundamental characteristic of an educated person. In the case of Armenia, this gives us:

$$\begin{aligned} \text{education index} &= \frac{2}{3} (\text{adult literacy index}) + \frac{1}{3} (\text{gross enrollment index}) \\ &= \frac{2}{3} (0.983) + \frac{1}{3} (0.799) = 0.922 \end{aligned} \quad (2.5)$$

In the final index, each of the three components receives equal, or one-third, weight. Thus, the HDI is found as:

$$\text{HDI} = \frac{1}{3} (\text{income index}) + \frac{1}{3} (\text{life expectancy index}) + \frac{1}{3} (\text{education index}) \quad (2.6)$$

For the case of Armenia, the HDI is then calculated as:

$$\text{HDI} = \frac{1}{3} (0.517) + \frac{1}{3} (0.795) + \frac{1}{3} (0.922) = 0.745 \quad (2.7)$$

One major advantage of the HDI is that it does reveal that a country can do much better than might be expected at a low level of income, and that substantial income gains can still accomplish relatively little in human development.

Further, the HDI points up clearly that disparities in income are greater than disparities in other indicators of development, at least health and education measures. Moreover, the HDI reminds us that by *development*, we clearly mean broad human development, not just higher income. Many countries, such as some of the higher-income oil producers, have been said to have experienced "growth without development." Health and education are not just inputs into a production function (as in their role as components of human capital) but are fundamental development goals in their own right (see Chapter 9). We cannot easily argue that a nation of high-income individuals who are not well educated, and suffer from significant health problems that lead to them living a much shorter life span than others around the globe, has necessarily achieved a higher level of development than a low-income country with high life expectancy and literacy. A better indicator of development disparities and rankings might be found by including health and education variables in a weighted welfare measure rather than by simply looking at income levels; and the HDI offers one very useful way to get at this.

There are other criticisms and possible drawbacks of the HDI. One is that gross enrollment in many cases overstates the amount of schooling, because in many countries a student is counted as enrolled in primary school if he or she begins school, without considering whether he or she drops out at some stage. Equal (one-third) weight is given to each of the three components, which clearly has some value judgement behind it, but it is difficult to determine what this is. Note that because the variables are measured in very different types of units, it is difficult even to say precisely what equal weights mean. Finally, there is no attention to the role of quality. For example, there is a big difference between an extra year of life as a healthy, well-functioning individual and an extra year with a sharply limited range of capabilities (such as being confined to bed). Moreover, the quality of schooling counts, not just the number of years of enrollment. Finally, it should be noted that while one could imagine better proxies for health and education, measures for these variables were chosen partly on the criterion that sufficient data must be available to include as many countries as possible.

Table 2.9 shows the 1999 Human Development Index for a sample of 22 developed and developing nations ranked from low to high human development (column 3) along with their respective real GDP per capita (column 4) and a measure of the differential between the GDP per capita rank and the HDI rank (column 5). A positive number shows by how much a country's relative ranking rises when HDI is used instead of GDP per capita, and a negative number shows the opposite. Clearly, this is one of the critical issues for the HDI. If country rankings did not vary much when the HDI is used instead of GDP per capita, the latter would (as some economists claim) serve as a reliable proxy for socioeconomic development, and there would be no need to worry about such things as health and education indicators.

We see from Table 2.9 that the country with the lowest HDI (0.258) in 1999 was Sierra Leone and the one with the highest (0.939) was Norway. What is more interesting for our purposes is that even though countries with high HDIs tend to have higher per capita incomes, within and across the three subgroups we find some

TABLE 2.9 Human Development

Country
<b>Low human development</b>
Sierra Leone
Ethiopia
Malawi
Guinea
Angola
Tanzania
Bangladesh
<b>Medium human development</b>
India
Nicaragua
China
South Africa
Peru
Oman
Turkey
Malaysia
Thailand
<b>High human development</b>
Kuwait
Costa Rica
United Kingdom
United States
Canada
Norway

Source: United Nations Development Programme (2001), annex tab. 1. Reprinted with permission. \*A positive figure indicates that the HDI rank is higher than the GDP per capita rank.

countries whose HDI is almost twice that of Sierra Leone's HDI is almost twice that of Sierra Leone's per capita income is roughly twice that of Sierra Leone's even though Sierra Leone's HDI is in the medium HDI group.

TABLE 2.9 Human Development Index for Twenty-Two Selected Countries, 1999

Country	Relative Ranking (lowest to highest)	Human Development Index (HDI)	Real 1995 GDP Per Capita (PPP\$)	GDP Rank minus HDI Rank <sup>a</sup>
<b>Low human development</b>				
Sierra Leone	162	0.258	448	0
Ethiopia	157	0.321	628	0
Malawi	151	0.397	586	+8
Guinea	150	0.397	1,934	-32
Angola	146	0.422	3,179	-44
Tanzania	140	0.436	501	+21
Bangladesh	132	0.470	1,483	-4
<b>Medium human development</b>				
India	115	0.571	2,248	0
Nicaragua	106	0.634	2,279	+7
China	87	0.718	3,617	+7
South Africa	94	0.702	8,908	-49
Peru	73	0.743	4,622	+8
Oman	71	0.747	13,356	-33
Turkey	82	0.735	6,380	-21
Malaysia	56	0.774	8,209	-4
Thailand	66	0.757	6,132	-3
<b>High human development</b>				
Kuwait	43	0.818	17,289	-14
Costa Rica	41	0.821	8,860	+6
United Kingdom	14	0.923	22,093	+5
United States	6	0.934	31,872	-4
Canada	3	0.936	26,251	+3
Norway	1	0.939	28,433	+2

Source: United Nations Development Program, *Human Development Report, 2001* (New York: Oxford University Press, 2001), annex tab. 1. Reprinted with permission.

<sup>a</sup>A positive figure indicates that the HDI rank is better than the real GDP per capita (PPP\$) rank; a negative indicates the opposite.

countries whose HDI is considerably higher than others even though the latter have substantially higher per capita incomes. Thus, for example, we see that Tanzania's HDI is almost twice that of Sierra Leone even though Sierra Leone's real GDP per capita is roughly the same as Tanzania's. Similarly, Malawi's HDI is very close to Angola's even though the latter's GDP is more than five times the former's. In the medium HDI group, China's GDP is 60% lower than South Africa's even though its

HDI is higher. Peru versus Oman and Costa Rica versus Kuwait also pose interesting contrasts.

To emphasize the point that countries at similar levels of GNP per capita can have significantly different human development indicators, depending on how that income is used, let us look briefly at Table 2.10. We see, for example, that Vietnam and Guinea have about the same income level (Guinea's is actually somewhat higher), but Vietnam's HDI is 72% higher than Guinea's. Similar results are shown for Sri Lanka and Morocco, Indonesia and Angola, and Kenya and the Central African Republic.

One of the major innovations of the HDI over the past few years has occurred through the disaggregation of a country's overall HDI into separate components to distinguish between men and women, different social classes reflecting skewed income distributions, and different regions and ethnic groups. The results show, not surprisingly, that men generally fare far better than women for almost every socioeconomic indicator. For example, in the 43 countries for which gender-based income data were available in a recent year, women's income averaged less than 40% of men's in 14 countries (mostly developing countries, although the figure was

35% in Japan and 33% in developed nations like Sweden.

When the aggregate HDI is broken down into its component parts, in a recent year, we have seen that the HDI has changed significantly in many countries. For example, the HDI of China and Sri Lanka has increased significantly. In more egalitarian distributions of income, we find, for example, that the HDI of Brazil (medium), the HDI of India (low), and the HDI of Brazil (Paulo) have an HDI of 0.666, while the HDI of the best-ranked Guinea is 0.397.

The United Nations Development Program's contribution to improving human development in developing countries are successful in many different groups and regions. In addition to economic data, the HDI also includes indicators of human development performance, such as life expectancy, economic and social progress, and so on.

Although there are many factors that can greatly increase our understanding of human development and which are the major components of the HDI, the HDI reflects income distribution and is not able to identify most of the significant groups within a country.

### Low Levels of Progress

In addition to low levels of income, developing countries are often characterized by low levels of human development. The concept of a "poor" country is a combination of factors, such as the way in which societal resources are used, technical engineering capabilities, broader conceptual skills, and access to education. Throughout the developing world, these are extremely low and are often explained by a number of factors.

**Table 2.10** Human Development Index Variations for Similar Incomes, 1999

Country	GNP Per Capita (U.S. \$ PPP)	HDI	HDI Rank	Life Expectancy (years)	Adult Literacy (%)
<b>GNP per capita around PPP \$1,000</b>					
Kenya	1,022	.514	123	51.3	81.5
Uganda	1,167	.435	141	43.2	66.1
Central African Republic	1,166	.372	154	44.3	45.4
Burkina Faso	965	.320	159	46.1	23.0
<b>GNP per capita around PPP \$2,000</b>					
Armenia	2,215	.745	72	72.7	98.3
Vietnam	1,860	.682	101	67.8	93.1
Pakistan	1,834	.498	127	59.6	45.0
Guinea	1,934	.397	150	47.1	35.0
<b>GNP per capita around PPP \$3,000</b>					
Sri Lanka	3,279	.735	81	71.9	91.4
Indonesia	2,857	.677	102	65.8	86.3
Morocco	3,419	.596	112	67.2	48.0
Angola	3,179	.422	146	45.0	42.0

Source: Derived from United Nations Development Program, *Human Development Report 2001* (New York: Oxford University Press, 1999), tab. 1, pp. 141-144. Reprinted with permission.

35% in Japan and 33% in Ireland) and above 60% in only 11, all of which were developed nations like Sweden and Norway.

When the aggregate HDI for various countries was adjusted for income distribution, in a recent year, the relative rankings of many developing nations also changed significantly. For example, Brazil and Botswana have highly unequal distributions so that their rankings slip by seven and eight places, respectively, while China and Sri Lanka see their HDI rankings rise by a similar factor due to their more egalitarian distributions. When HDIs were then adjusted for race, region, and ethnicity, we find, for example, that even though South Africa's overall HDI is 0.650 (medium), the HDI for whites is 0.876 (high), while for blacks it is 0.462 (low); even though Brazil's HDI is 0.756, its wealthy southern regions (Rio de Janeiro and São Paulo) have an HDI of 0.838, while its poor northeast regions have an HDI of 0.549; and even though Nigeria has an HDI of 0.348, its richest state, Bendel, has an HDI of 0.666, while the poorest, Borneo, has a value of only 0.156 (lower even than lowest-ranked Guinea).

The United Nations Human Development Index has thus made a major contribution to improving our understanding of what constitutes development, which countries are succeeding (as reflected by rises in their HDI over time), and how different groups and regions within countries are faring. By combining social and economic data, the HDI allows nations to take a broader measure of their development performance, both relatively and absolutely, and thus to focus their economic and social policies more directly on those areas in need of improvement.

Although there are somewhat valid criticisms, the fact remains that the HDI, when used *in conjunction* with traditional economic measures of development, greatly increases our understanding of which countries are really experiencing development and which are not. More important, by examining each of the three major components of the HDI-adjusted real per capita income, life expectancy, and literacy and schooling measures and by disaggregating a country's overall HDI to reflect income distribution, gender, regional, and ethnic differentials, we are now able to identify not only whether a country is developing but also whether various significant groups within that country are participating in that development.

### Low Levels of Productivity

In addition to low levels of living and deprivations in human development, developing countries are characterized by relatively low levels of **labor productivity**. The concept of a **production function** systematically relating outputs to different combinations of factor inputs for a given technology is often used to describe the way in which societies go about providing for their material needs. But the technical engineering concept of a production function must be supplemented by a broader conceptualization that includes among its other inputs managerial competence, access to information, worker motivation, and institutional flexibility. Throughout the developing world, levels of labor productivity (output per worker) are extremely low compared with those in developed countries. This can be explained by a number of basic economic concepts.