The 2010 Human Development Index (HDI):
Construction and Analysis

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Comments, suggestions, and other inputs are warmly welcome at:
ophi@qeh.ox.ac.uk

Purpose: To measure the level of achievements in three basic aspects of human development in a given country

Components: Health, Knowledge and Living Standards

Data required:

- Life expectancy at birth: United Nations Department of Economic and Social Affairs Population Division
- Gross National Income (GNI) per capita: the World Bank’s World Development Indicators database.
- Inequality in the underlying distributions of mean years of schooling and income: Luxembourg Income Study; EU Statistics on Income and Living Conditions; United Nations Children’s Fund Multiple Indicator Cluster Surveys; Measure DHS; the UN University’s World Income Inequality Database; and, the World Bank’s International Income Distribution Database.

1 This draft was prepared by OPHI for UNDP, and use with the joint 2011 Oxford Human Development Training Course Participants. It will be revised considerably drawing on their responses, insights and suggestions. This document was compiled with information from different Human Development Reports and other publications by UNDP. Diego Zavaleta and Melissa Friedman collated source materials for this draft, with support from Sebastian Silva Leander, Sabina Alkire, Maria Emma Santos, and others at HDRO including Amie Gaye and Tim Scott. Graphics are in progress for the next draft, and comments are warmly welcomed!
HDI: Outline

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ii. Indicators and upper and lower bounds - Three dimensions
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i. Overview

The Human Development Index (HDI) is a summary composite index that measures a country’s average achievements in three basic aspects of human development: health, knowledge, and income. The HDI sets a minimum and a maximum for each dimension, called goalposts, and then shows where each country stands in relation to these goalposts, expressed as a value between 0 and 1.

**BOX 1: How can the HDI be interpreted?**

The HDI was created to emphasize that people should be the ultimate criteria for assessing the development of a country, not economic growth alone. The HDI can also be used to question national policy choices, asking how two countries with the same level of income per person can end up with such different human development outcomes. For example, the Bahamas and New Zealand have similar levels of income per person, but life expectancy and expected years of schooling differ greatly between the two countries, resulting in New Zealand having a much higher HDI value than the Bahamas. These striking contrasts can directly stimulate debate about government policy priorities.

The HDI was introduced as an alternative to conventional measures of national development, such as level of income and the rate of economic growth. The centrality of the HDI in the global HDR does not imply, however, that it represents the best measure of human development: the index does not capture many aspects of life that people value and have reason to value, such as economic, social and political freedom, and protection against violence, insecurity and discrimination. Unfortunately, there are important data constraints to incorporate many of these dimensions. Yet is an important step forward. This gap has been highlighted in subsequent investigations of well-being. Regional and National HDRs have created innovative measures of human development in a wide variety of ways, and a sizeable academic literature has emerged around the HDI and related topics.

**BOX 2: Innovations in measurement: the Human Development Index in action**

Several National Human Development Reports (HDRs) have assessed broader aspects of well-being at the national level by extending and adapting the standard Human Development Index (HDI):

- A Bosnia and Herzegovina report examined social exclusion as a multidimensional concept in the shift from socialism and in the wake of conflict. It measured political participation in elections and civil society, access to services, and extreme and long-term exclusion and found that half the population suffers social exclusion, which disproportionately affects rural residents, the poor, the elderly, young people and children with special needs.
• A Colombia report demonstrated the effects of armed conflict on people’s lives, using data on homicide, displacement, war degradation (crimes committed under conflict circumstances), governability and violence. Drawing on social dialogues with communities across the country, it analysed the underlying causes of conflict and identified enhancing freedoms and addressing inequalities as solutions. It pointed to a range of policies beyond military action to complement high-level peace negotiations.

• A Costa Rica report explored the relationship between citizen insecurity and human development. It introduced new tools to measure citizen insecurity at the district level, including security (especially violence and theft), perceptions of insecurity and individual liberties. It discounted the conventional HDI values and redrew the map of Costa Rica based on broader notions of well-being.

Improvements are regularly made to the indicators and functional specifications of the HDI. The reforms reinforce its value and centrality as an approach to thinking about development. The HDR 2010 introduced several important changes to the HDI. These changes will be highlighted after introducing the current indicators and specifications of the index.

**BOX 3: The HDI and poverty measures**

The HDI measures achievements in a society: how well a society is doing in terms of health, education and living standards when compared to a desirable goal. Poverty measures, on the contrary, establish the levels of deprivations that people suffer in particular aspects of life (such as income) in a given society. Information on poverty is vital to understand key impediments to achieve human development. This is why in 1997 the Human Development Report introduced an accompanying poverty measurement, the Human Poverty Index. This index has now been replaced by the Multidimensional Poverty Index as new data and techniques allow now for better attempts to measure this phenomenon (see Chapter X).

**ii. Indicators and Upper and Lower Bounds**

The HDI could be thought of as having several components:

• Indicators (data)

• Boundaries (used to normalise the indicators to lie between 0 and 1)
• Aggregation Formula (functional form used to aggregate across the indicators to one ‘index’).

This section sets out the indicators used to create the 2010 HDI, as well as the upper and lower bounds used to normalize the HDI, and their justification.

Since 1990 the HDI has consisted of the following dimensions: a) a long and healthy life, b) knowledge, and c) a decent standard of living. In bringing together income with health and education, the HDI draws attention to the fact that some low-income countries do better on human development than some high-income countries. It is useful to compare a country’s GDP per capita with its HDI ranking.

<table>
<thead>
<tr>
<th>BOX 4: Highlighting uneven development: comparing relative levels of HDI and per capita income</th>
</tr>
</thead>
<tbody>
<tr>
<td>National wealth has the potential to expand people’s choices. However, it may not. The manner in which countries spend their wealth, not the wealth itself, is decisive. Moreover, an excessive obsession with the creation of material wealth can obscure the ultimate objective of enriching human lives.</td>
</tr>
<tr>
<td>In many instances, countries with higher average incomes have higher average life expectancies, lower rates of infant and child mortality and higher literacy rates, and consequently a higher human development index (HDI). But these associations are far from perfect. In inter-country comparisons, income variations tend to explain not much more than half the variation in life expectancy, or in infant and child mortality. And they explain an even smaller part of the differences in adult literacy rates.</td>
</tr>
<tr>
<td>Although there is a definite correlation between material wealth and human well-being, it breaks down in far too many societies. Many countries have high GNP per capita, but low human development indicators and vice versa, while some countries at similar levels of GNP per capita have vastly different levels of human development.</td>
</tr>
<tr>
<td>Given the imperfect nature of wealth as gauge of human development, the HDI offers a powerful alternative to GNP for measuring the relative socio-economic progress at national and sub-national levels. Comparing HDI and per capita income ranks of countries, regions or ethnic groups within countries highlights the relationship between their material wealth on the one hand and their human development on the other. A negative gap implies the potential of redirecting resources to Human Development.</td>
</tr>
</tbody>
</table>

**Long and healthy life**

The life expectancy at birth component of the HDI is calculated using a minimum value of 20 years and maximum value of 83.2 years. These are the observed maximum value of the indicators from the countries in the time series, 1980–2010. Thus, the longevity component for a country where life expectancy birth is 55 years would be 0.554.
Knowledge

The education component of the HDI is now measured by mean of years of schooling for adults aged 25 years and expected years of schooling for children of school going age. Mean years of schooling is estimated based on duration of schooling at each level of education. Expected years of schooling estimates are based on enrolment by age at all levels of education and population of official school age for each level of education. The indicators are normalized using a minimum value of zero and maximum values are set to the actual observed maximum values of the indicators from the countries in the time series, that is, 1980–2010. The education index is the geometric of two indices.

Wealth

For the wealth component, the goalpost for minimum income is $163 (PPP) and the maximum is $108,211 (PPP), both observed minimum observed during the same time series. The decent standard of living component is measured by GNI per capita (PPP US$) instead of GDP per capita (PPP US$). The HDI uses the logarithm of income, to reflect the diminishing importance of income with increasing GNI.

The scores for the three HDI dimension indices are then aggregated into a composite index using geometric mean.

The new HDI assigns equal weight to all three dimension indices as has occurred since 1990. The two education sub-indices are also weighted equally. This is different from the previous HDI, which weighted them differently. The choice of weights is based on the normative judgement that all three dimensions are equally important. The new HDI has more equal ranges of variation of dimension indices than the previous one, implying that the effective weighting is more equal than it was before.

BOX 5: What is the “hybrid HDI”?  
The hybrid HDI is a different version of the HDI that applies the same aggregation formula as the new HDI, but to a set of indicators used in the previous HDI – life expectancy, adult literacy, gross enrolment ratio and GDP per capita. It is used in the 2010 Report for analysis of historical HDI trends since 1970 because there is much more data available from past decades for those indicators. The hybrid HDI uses annual data from 1970 to 2010 for 135 countries.

Changes in the Indicators and Boundaries

Over the past 20 years the HDI has received its share of criticism. Some take issue with its construction and composition. Others suggest that it be expanded to include more dimensions, ranging from gender equity to biodiversity. Many concerns are valid. But the objective is not to build an unassailable indicator of well-being—it is to redirect attention towards human-centred development and to promote debate over how we advance the progress of societies. The more we discuss what should or should not be included in the HDI—whether it makes sense to lump distinct categories together, how much importance to accord to each category, how to obtain
more and better data—the more the debate moves away from the single-minded focus on growth that pervaded thinking about development.

The indicators of the HDI have been importantly modified in the 2010 report in order to improve it. As in past Human Development Reports, the HDI remains a composite index that measures progress in the three basic dimensions of health, knowledge and income. Under the previous HDI formula, health was measured by life expectancy at birth; education or “knowledge” by a combination of the adult literacy rate and school enrolment rates (for primary through university years); and income or standard of living by GDP per capita adjusted for purchasing-power parity (PPP US$).

**Health** is still measured by life expectancy at birth. But the 2010 HDI measures achievement in **knowledge** by combining the expected years of schooling for a school-age child in a country today with the mean years of prior schooling for adults aged 25 and older. The **income** measurement, meanwhile, has changed from purchasing-power-adjusted per capita Gross Domestic Product (GDP) to purchasing-power-adjusted per capita Gross National Income (GNI); GNI includes remittances and foreign assistance income, for example, providing a more accurate economic picture of many developing countries.

The indicators were changed for several reasons. For example, adult literacy used in the old HDI (which is simply a binary variable – literate or illiterate, with no gradations) is an insufficient measure for getting a complete picture of knowledge achievements. By including average years of schooling and expected years of schooling, one can better capture the level of education and recent changes.

Gross Domestic Product (GDP) is the monetary value of goods and services produced in a country irrespective of how much is retained in the country. Gross National Income (GNI) expresses the income accrued to residents of a country, including international flows such as remittances and aid, and excluding income generated in the country but repatriated abroad. Thus, GNI is a more accurate measure of a country’s economic welfare. As shown in the Report, large differences could exist between the income of a country’s residents, measured by GNI or GDP.

### DATA SOURCE

**Primary data sources for the Human Development Index**

**Life expectancy at birth**
The life expectancy at birth estimates are from World Population Prospects 1950–2050: The 2008 Revision (UNDESA 2009d), the official source of UN population estimates and projections.

**Expected years of schooling**
The Report uses data on expected years of schooling from the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics. The estimates are based on enrolment by age at all levels of education and population of official school age for...
all levels of education by age. Cross-country comparison of expected years of schooling should be made with caution because the length of the school year and the quality of education are not the same in every country and because the indicator does not directly take into account the effects of repetition (some countries have automatic promotion while others do not). The coverage of different types of continuing education and training also varies across countries. Thus, where possible, the indicator should be interpreted in the context of complementary indicators, such as repetition rates, as well as indicators of quality.

Mean years of schooling
In the absence of mean years of schooling data from the UNESCO Institute for Statistics, the Report uses estimates from Barro and Lee (2010). They are presented in six categories: no formal education, incomplete primary, complete primary, first cycle of secondary, second cycle of secondary, and tertiary. Barro and Lee use country-specific information about duration of schooling at each level to calculate the estimates.

Gross national income per capita
Data on gross national income (GNI) per capita are from the World Bank’s (2010g) World Development Indicators database. To better compare standards of living across countries, data must be converted into purchasing power parity (PPP) terms to eliminate differences in national price levels. The GNI estimates are based on price data from the latest round of the International Comparison Program (ICP), which was conducted in 2005 and covered 146 countries and areas. For more than 20 countries not included in the ICP surveys, the World Bank derives estimates through econometric regressions, and we rely on those here where available.

Inequality in the underlying distributions of mean years of schooling and income are estimated from the most recent national household surveys available from international databases:

Luxembourg Income Study; EU Statistics on Income and Living Conditions; United Nations Children’s Fund Multiple Indicator Cluster Surveys; Measure DHS; the UN University’s World Income Inequality Database; and, the World Bank’s International Income Distribution Database. Inequality in the distribution of life expectancy is estimated from life tables produced by the United Nations Population Division.

The calculations of the HDI and the goalposts have also been modified. Previously, the HDI had a form of the arithmetic mean of dimension indices obtained from the corresponding indicators by normalization using the fixed minima and maxima. The normalisation refers to the transformation of indicators expressed in different units to the unit-less quantities taking values between 0 and 1. This year’s HDI has a form of geometric mean of dimension indices obtained.
from the indicators by normalization based on minima and maxima observed over the period for which the HDI has been computed and reported. Thus, the previous ‘cap’ on the income component has been replaced in the 2010 HDI by an ‘observed maximum’ per capita income level. Adopting the geometric mean produces lower index values, with the largest changes occurring in countries with uneven development across dimensions. The geometric mean has only a moderate impact on HDI rankings.

The ‘cap’ on the income component of the HDI was lifted for several reasons. Income is instrumental to human development, but the contribution diminishes as incomes rise. GDP in the previous HDI was capped at $40,000 and was logarithmically transformed. The original HDI placed this cap on income to reflect the view that beyond some upper set amount, additional income does not expand human development opportunities. A further consideration was that while literacy rates and school enrolment and life expectancy have ‘natural’ caps (100 percent, mortality limits, and so on forth), the highest incomes would continue rising, skewing the upper ranks of the HDI to increasingly income-driven values and rankings over time.

**BOX 6: Why is the geometric mean better suited for the HDI than the arithmetic mean?**

Unlike the old HDI, the new HDI based on the geometric mean takes into account differences in achievement across dimensions. Poor performance in any dimension is now directly reflected in the new HDI, which captures how well a country’s performance is across the three dimensions. There is no longer perfect substitutability across the dimensions. That is to say, a low achievement in one dimension is not anymore linearly compensated for by high achievement in another dimension. The geometric mean reduces the level of substitutability between dimensions and at the same time ensures that a 1 percent decline in say life expectancy at birth has the same impact on the HDI as a 1 percent decline in education or income. Thus, as a basis for comparisons of achievements, this method is also more respectful of the intrinsic differences across the dimensions than a simple average.

There are other reasons why the cap on income is lifted. First, countries were increasingly bunched at the cap. This meant that we could not distinguish among an increasing number of countries at the top of the distribution. In 2007, the GDP of 13 countries exceeded the cap. Thus, the discriminatory power of capped income has been weakened, especially for discrimination between the very high developed countries. Second, it was not originally intended to be binding in the sense of totally disregarding additional income beyond a particular level. For example, the income cap of PPP$ 40,000 was not binding on countries when it was introduced in the mid-1990s but rather was an upper bound used to normalize the income dimension index. Third, the use of geometric mean intensifies the diminishing returns of the logarithmic transformation of GNI compared to the arithmetic mean. Fourth, and very importantly, the use of real maximum values instead of caps allows the resulting indices to vary in similar ranges so that their implicit weights are more similar than had been the case under the previous method.

The new HDI uses the natural logarithm instead of the previously used logarithm with the base of 10. This minor change has no effect on the value of the income index and is motivated by the fact that most of the economic literature uses the natural logarithm of income. The caps in each dimension are lifted so one can say that they are equal to the observed maxima over the period (1980-2010) for which HDI trends are presented.

ophi@qeh.ox.ac.uk
The methodology for calculating the dimension sub-indices has also changed. This year, the dimension indicators are transformed using the maximum levels for all sub-components observed over the period for which HDI trends are presented (from 1980). The minimum levels for the dimension indicators are set as follows:

- Life expectancy at 20 years. The rationale behind changing the minimum value for life expectancy at birth from 25 years to 20 is based on historical evidence which indicates 20 years as the minimum. If a society or a subgroup of society has a life expectancy below the typical age of reproduction, that society would die out. Lower values have occurred during some crises, such as the Rwandan genocide, but these were exceptional cases that were not sustainable.
- Both education variables at 0 (since societies can subsist without formal education).
- GNI per capita at PPP $163, which is the observed minimum (the lowest value attained by any country in recent history - Zimbabwe in 2008 - and corresponds to less than 45 cents a day, just over a third of the World Bank’s $1.25 a day poverty line).

The choice of minimum values is motivated by the principle of natural zeros below which there is no possibility for human development. As noted already, this way of normalizing has the effect of making the component sub-indices of these dimensions vary along the similar range.

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**BOX 7: International comparisons and country level measures**

Yes, the HDI indicators can be adapted for country specific relevant ones provided they meet other aspects of statistical quality. It can also be disaggregated at sub-national level to compare levels and disparities among different subpopulations within a country, provided that appropriate data at the level of disaggregation are available; or can be estimated using sound statistical methodology. The highlighting of internal disparities using HDI methodology has prompted constructive policy debates in many countries.

**BOX 8: Why is it important to express per capita GNI in Purchasing Power Parity (PPP) US$?**

The HDI attempts to make an assessment of 169 diverse countries and areas, with very different price levels. To compare economic statistics across countries, the data must first be converted into a common currency. Unlike market exchange rates, PPP (Purchasing Power Parity) rates of exchange allow this conversion to take account of price differences between countries. In that way GNI per capita (PPP US$) better reflects people’s living standards. In theory, 1 PPP dollar (or international dollar) has the same purchasing power in the domestic economy of a country as US$1 has in the United States economy. The new PPP values have been used since 2008. The latest International Comparison Survey ICP, from which the PPPs are calculated, was...
iii. Aggregation and Measurement

Calculating the Human Development Index
The Human Development Index (HDI) is a summary measure of human development. It measures the average achievements in a country in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living.

In 2010, the aggregation formula used to create the HDI changed, as it has at various times in the past also. The dimension indices are normalized in the same way as before, only using different indicators and boundary values. What has changed is the aggregation formula, and as mentioned previously, the education sub-indices. The 2010 HDI is the geometric mean of normalized indices measuring achievements in each dimension.

The first step is to create subindices for each dimension. Minimum and maximum values (goalposts) need to be set in order to transform the indicators into indices between 0 and 1. The maximum values are set to the actual observed maximum values of the indicators from the countries in the time series, that is, 1980–2010. Because the geometric mean is used for aggregation, the maximum value does not affect the relative comparison (in percentage terms) between any two countries or periods of time. The minimum values will affect comparisons, so values that can be appropriately conceived of as subsistence values or “natural” zeros are used. Progress is thus measured against minimum levels that a society needs to survive over time.

The minimum values are set at 20 years for life expectancy, at 0 years for both education variables, and at $163 for per capita gross national income (GNI).

The life expectancy minimum is based on long-run historical evidence from Maddison (2010) and Riley (2005).1 Societies can subsist without formal education, justifying the education minimum. A basic level of income is necessary to ensure survival: $163 is the lowest value attained by any country in recorded history (in Zimbabwe in 2008) and corresponds to less than 45 cents a day, just over a third of the World Bank’s $1.25 a day poverty line.
Minimum and Maximum values for the Human Development Indicators in 2010

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Observed maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life expectancy</td>
<td>83.2 (Japan, 2010)</td>
<td>20.0</td>
</tr>
<tr>
<td>Mean years of schooling</td>
<td>13.2 (United States, 2000)</td>
<td>0</td>
</tr>
<tr>
<td>Expected years of schooling</td>
<td>20.6 (Australia, 2002)</td>
<td>0</td>
</tr>
<tr>
<td>Combined education index</td>
<td>0.951 (New Zealand, 2010)</td>
<td>0</td>
</tr>
<tr>
<td>Per capita income (PPP $)</td>
<td>108,211 (United Arab Emirates, 1980)</td>
<td>163 (Zimbabwe, 2008)</td>
</tr>
</tbody>
</table>

Having defined the minimum and maximum values, the sub-indices are calculated as follows:

**Equation 1**

\[
\text{Dimension index} = \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}.
\]

For education, equation 1 is applied to each of the two subcomponents, then a geometric mean of the resulting indices is created and finally, equation 1 is reapplied to the geometric mean of the indices, using 0 as the minimum and the highest geometric mean of the resulting indices for the time period under consideration as the maximum. This is equivalent to applying equation 1 directly to the geometric mean of the two subcomponents.

Because each dimension index is a proxy for capabilities in the corresponding dimension, the transformation function from income to capabilities is likely to be concave (Anand and Sen 2000c). Thus, for income the natural logarithm of the actual minimum and maximum values is used. This has the effect of lowering the contribution of very high incomes to human development.

**Aggregating the subindices to produce the Human Development Index**

The HDI is the geometric mean of the three dimension indices. To take the geometric mean of three numbers, you first take the cube root of each dimension index. The cube root is the number which, if raised to the exponent of 3, or if multiplied by itself twice, will yield the number you have started with. For example, the cube root of 8 is 2, because \(2 \times 2 \times 2 = 8\). Second, you simply multiply the three cube roots of the three HDI dimension indices together. This product is the HDI. The aggregation formulae for the HDI is shown in equation 2.

**Equation 2**

\[
(\frac{1}{3} \cdot I_{\text{Life}} + \frac{1}{3} \cdot I_{\text{Education}} + \frac{1}{3} \cdot I_{\text{Income}}).
\]

Equation 2 embodies imperfect substitutability across all HDI dimensions. It thus addresses one of the most serious criticisms of the linear aggregation formula (in which all dimensions were added and the sum divided by three). This formulae allowed for perfect substitution across
dimensions. Some substitutability is inherent in the definition of any index that increases with the values of its components.

**Example: China**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life expectancy at birth (years)</td>
<td>73.5</td>
</tr>
<tr>
<td>Mean years of schooling (years)</td>
<td>7.5</td>
</tr>
<tr>
<td>Expected years of schooling (years)</td>
<td>11.4</td>
</tr>
<tr>
<td>GNI per capita (PPP US$)</td>
<td>7,263</td>
</tr>
</tbody>
</table>

*Note: Values are rounded.*

Life expectancy index = \( \frac{73.5 - 20}{83.2 - 20} = 0.847 \)

Mean years of schooling index = \( \frac{7.5 - 0}{13.2 - 0} = 0.568 \)

Expected years of schooling index = \( \frac{11.4 - 0}{20.6 - 0} = 0.553 \)

Education index = \( \frac{\sqrt{0.568 \cdot 0.553} - 0}{0.951 - 0} = 0.589 \)

Income index = \( \frac{\ln(7,263) - \ln(163)}{\ln(108,211) - \ln(163)} = 0.584 \)

Human Development Index = \( \sqrt[3]{0.847 \cdot 0.589 \cdot 0.584} = 0.663 \)

**iv. Analysis**

Despite its simplicity, the HDI provides grounds for varied and powerful statistical analysis. Some of the potential uses are:

**Disaggregation**

A country's overall index can conceal the fact that different groups within the country have very different levels of human development. Disaggregated HDIs are arrived at by using the data for the HDI components pertaining to each of the separate groups; treating each group as if it was a separate country. Such groups may be defined relative to income, geographical or administrative regions, urban/rural residence, gender and ethnicity. Using disaggregated HDIs at the national and sub-national levels helps highlight the significant disparities and gaps: among regions,
between the sexes, between urban and rural areas and among ethnic groups. The analysis made possible by the use of the disaggregated HDIs should help guide policy and action to address gaps and inequalities.

Disaggregated HDIs have been used extensively for analysis since their inception, including: Brazil, Colombia, Egypt, Gabon, Germany, India, Kazakhstan, Malaysia, Mexico, Nigeria, Papua New Guinea, Poland, South Africa, Trinidad and Tobago, Turkey, Ukraine and USA. Recent National Human Development Reports in China and Kenya found wide provincial and urban/rural disparities while a similar study in Guatemala has shown that those disparities apply to ethnic groups as well.

Potential messages:

- The richest 20% of the population in Bolivia had an HDI rank 97 positions higher than the poorest 20%.
- In South Africa, the top quintile ranks 101 positions above the lowest.
- The top quintile in the United States has an HDI value that exceeds all other countries for which the statistic was computed, while the poorest quintile ranks 49 positions lower.

Country-specific HDIs

To reflect country-specific priorities and problems and to be more sensitive to a country's level of development, the HDI appearing in the global HDRs can be tailored so that additional components are included in the calculation. HDI adjustments should utilize the methods of weighting and normalization as the original HDI, making use of maximum and minimum values to create an index for the added component. In addition, indicator-specific weights can be tailored such that they reflect national policy priorities.

Additional adjustments to the HDI could involve expanding the breadth of existing component indices. For example, the life expectancy category could be adjusted to reflect under-five or maternal mortality rates; the income component could be adjusted to reflect unemployment, incidence of income poverty or the Gini-corrected mean national income; and finally the educational component can be adjusted to include the number of students enrolled in particularly important fields of study, such as the mathematics and sciences.

It is difficult to use the HDI to monitor changes in human development in the short-term because two of its components, namely life expectancy and adult literacy change slowly. To address this limitation, components that are more sensitive to short-term changes could be added to the national HDI. For example, the rate of employment, the percent of population with access to health services, or the daily caloric intake as a percentage of recommended intake could be used in place of the traditional indicators of the HDI.

Thus, the usefulness and versatility of the HDI as an analytical tool for HD at the national and sub-national levels would be enhanced if countries choose components that reflect their priorities and problems and are sensitive to their development levels, rather than rigidly using the three components presented in the HDI of the global HDRs.
Trends

Powerful insights are achieved through the use of a systematic review of patterns and trends in human development. The 2010 Human Development Report analysis of overall patterns, for example, sheds light in aspects such as overall tendencies, convergences between countries, strong local variability, longer lives and better health and on the relationship between economic growth and human development.

Needless to say, trends analysis requires comparable data throughout time so some adjustments may need to be undertaken. For the HDR 2010, for example, the analysis of historical trends uses a different version of the HDI, the hybrid HDI. This applies the same aggregation formula as the new HDI to the set of indicators and sources used in previous Reports (since 1995) in order to allow more extensive analysis over time. An equivalent exercise should need to be performed for NHDIs.

For the 2010 HDR, the analysis is based on a new dataset of human development trends since 1970, covering 135 countries that account for 92 percent of the world’s population.

Some examples of key results in different aspects:

Overall trends

Measured in terms of the HDI, progress around the world has been impressive. The world average HDI rose to 0.68 in 2010 from 0.57 in 1990, continuing the upward trend from 1970, when it stood at 0.48. This increase reflects aggregate expansions of about a fourth in the health and education indicators and a doubling of income per capita. The aggregate global measures are strongly influenced by the most populous countries—China and India. Even so, global figures unweighted by population (and thus reflecting average country performance) show similar progress.

Advances in the HDI have occurred across all regions and almost all countries. The fastest progress has been in East Asia and the Pacific, followed by South Asia, then the Arab States. All but 3 of the 135 countries have a higher level of human development today than in 1970—the exceptions are the Democratic Republic of the Congo, Zambia and Zimbabwe.

The 10 most successful countries in furthering the human development of their people come from different regions and initial levels or economic development. The top 10 movers include several countries in East and South Asia and the Arab States (both from North Africa and the oil-rich Gulf region). Oman—a country that benefited from oil discoveries at the beginning of the period—tops the list, followed by China, Nepal and Indonesia. These results offer some interesting insights and unexpected contrasts. A country’s progress in human development can be measured in various ways, and which countries are classed as top movers depends on the standard used to judge change. This Report uses the deviation from fit—the country’s deviation from its expected improvement given its initial HDI and the improvement of countries at a similar starting point—as the measure of country progress over time. The method selects the countries whose improvement is farthest above or below what would be expected given their initial level of development. Since the method used to evaluate progress compares countries with similar initial HDI levels, some countries experiencing rapid progress from low starting points—such as Nepal and Lao PDR—are on the list.
Strikingly, this list contains several countries not typically described as success stories. This is because several countries make it into the top 10 list thanks to their high achievements in health and education, in some cases even with unexceptional growth performance. Also remarkable is the general lack of overlap between top performers in growth and those in health and education. Only Indonesia and South Korea are in the top 10 for both income and non-income dimensions. Of the remaining eight countries, five enter the list through higher levels of health and education; only one (China) enters solely through its growth performance. The new HDI functional form recognizes balanced development, so that two countries with moderately high progress on both income and non-income dimensions (Lao PDR and Morocco) make it into the top movers. Although no countries from Sub-Saharan Africa are in the top 10, Ethiopia comes in at 11, and several African countries are in the top 25. Perhaps most notable is the absence of any Latin American country—the top mover there, Guatemala, comes in 22nd. Even so, the top performers are diverse not only in regional origin but in how they achieve success.

Convergence—big time

The HDI can help assess whether poor countries are closing the gap with rich countries. This question is generally answered by looking at some measure of difference in a specific indicator between poor and rich countries or by assessing whether less developed countries are advancing more rapidly than more developed ones. Many researchers have investigated this question using GDP as a measure of development. They have generally concluded that the gap is widening.

But the HDI tells a more optimistic story. Overall, poor countries are catching up with rich countries in the HDI: the HDI gap between developing and developed countries narrowed by about a fifth between 1990 and 2010 (and by about a fourth since 1970). For example, the HDI more than doubled for Mali (from 0.17 to 0.37), Nepal (from 0.22 to 0.50) and Oman (from 0.36 to 0.79). Good news indeed, this occurred despite the large divergence in incomes.

In contrast, incomes show increased divergence. Statistical tests confirm that upper bounds on these variables do not generate the convergence. But even if the bounds contribute to the convergence, the substantive result—that health and education outcomes are becoming more alike in poor and rich countries—still holds. Consider life expectancy. Someone born in The Gambia in 1970 could expect to live to age 41—some 33 years fewer than someone born in Norway. By 2010 life expectancy in The Gambia had increased by 16 years (to 57) but in Norway by only 7 years. Thus, while the gap in life expectancy between Norway and The Gambia is still huge (24 years), it has shrunk by more than a fourth.

On average then, living in a developing country today is more similar—at least for these basic health and education indicators—to living in a developed country than was the case 40 or even 20 years ago. However, this is not true for all developing countries.

In several countries—mainly in Southern Africa and the former Soviet Union—life expectancy has declined. A handful of countries—including, perhaps most strikingly, China—have also seen drops in gross enrolment. Moreover, in several more cases of some absolute improvements—such as for Armenia and Trinidad and Tobago—these have not been sufficient to narrow the
gap with developed countries. In general, however, most developing countries have enjoyed rapid and significant progress in health and education.

Local variability

Not all countries have seen rapid progress, and the variation is striking. Over the past four decades a fourth of developing countries saw their HDI increase less than 20 percent, while another fourth experienced a more than 65 percent increase. Since 1990, 10 countries have seen no overall improvement in the HDI. The recent global financial crisis and the East Asian financial crisis of 1997–1998 remind us that progress is not linear, even for countries that perform well. Economic crises can throw countries off track. So can shocks that affect health and education directly, such as epidemics and natural disasters.

To some extent, these differences in rates of progress reflect different starting points—convergence means that less developed countries tend, on average, to improve more rapidly than more developed ones. However, half the variation in HDI progress is unexplained by initial HDI level, and countries with similar starting points experience remarkably different evolutions over time. This evidence suggests that country factors such as institutions, geography and policies—and even pure luck (good and bad)—are important in determining outcomes.

Take Morocco and Côte d’Ivoire. Measured by the variables that go into the HDI, they had similar levels of development in 1970 and so might be expected to have followed similar development paths. However, their human development trajectories diverged widely. Over the 40 years to 2010, life expectancy rose 20 years in Morocco but just 11 years in Côte d’Ivoire. Today, 61 percent of Moroccan children are enrolled in schools, far more than the 38 percent in Côte d’Ivoire, and Morocco’s per capita income is 2.7 times Côte d’Ivoire’s. There is a story behind these differences. Political instability and a protracted civil war held back Côte d’Ivoire, and active social policies appear to have made a big difference in Morocco. Understanding the causes of these variations is of major policy relevance, and we explore them in detail in the next chapter. By design, the HDI gives only a summary assessment of progress so it is vital to look at what happened in each of the relevant dimension.

Longer lives, better health

Many countries have achieved large gains in life expectancy. A baby born today in almost any country can expect to live longer than at any time in history. Life expectancy has risen most in the Arab States, by more than 18 years since 1970 (just more than a third). Even in Sub-Saharan Africa, life expectancy is more than eight years longer than in 1970. And increases in longevity were more than twice as rapid in the bottom quarter of countries in the 1970 HDI distribution than in the top quarter. In several developing countries—including Chile and Malaysia—mortality rates are about 60 percent what they were 30 years ago.
The puzzle of economic growth and human development

The 2010 Report identified how achievements in income growth are related to progress in other HDI dimensions: average income growth has been high but it has been variable across countries, while progress has been more consistent for health and education. Many developing countries have attained levels of health and education similar to those in developed countries, but crossing the divide that separates income-poor from income-rich countries is much harder. Therefore, countries became top performers on the HDI through two broad routes: fast income growth or exceptional progress in health and education.

These findings suggest that over the past 40 years the forces driving improvements in health and education are different from those driving improvements in income. Had these processes had the same drivers, the processes would have broadly coincided. But the Report show that they did not. We now explore in more detail the growth–human development link.

Economic growth and human development do not always coincide

There is a positive association—though with substantial variation—suggesting that growth and improvements in human development are positively associated. This is not a surprise as income is part of the HDI; thus, by construction, a third of the changes in the HDI come from economic growth, guaranteeing a positive association. A more useful exercise is to compare income growth with changes in the non-income dimensions of human development. This can be done by using an index similar to the HDI but calculated with only the health and education indicators of the HDI to compare its changes with economic growth. The correlation is remarkably weak and statistically insignificant.

Other interesting examples come from countries whose economies have contracted over the past 40 years. If economic growth was indispensable for progress in health and education, countries with falling GDP would not be progressing in health and education. But this is not the case: Iran, Togo and Venezuela experienced income declines, yet their life expectancy has risen an average of 14 years and their gross school enrolment an average of 31 percentage points since 1970.

This result is about the lack of relationship between changes in income (growth) and changes in the nonincome dimensions of human development. It thus does not negate a basic fact, which is that levels of income and levels of health and education are positively and significantly correlated.

Explaining the puzzle

A puzzle remains. While there is little correlation between income growth and changes in health and education, there is a strong correlation between national levels of income and there is surprisingly little correlation between income growth and changes in health and education over time national levels of health and education. This is also true at the individual and household levels. How do we reconcile this with the finding of no correlation between changes over time?
First, **correlation does not imply causation in a specific direction.** Even if there is a causal relation, the direction is unknown: higher incomes could improve quality of life, or improvements in health and education could make societies more productive.

Second, the **absence of a correlation in changes casts doubt on whether a snapshot of the world at a given moment accurately reflects the relationship between the variables.** We can shed some light on the puzzle by observing that over time, the relationship between the income and nonincome dimensions of human development has shifted up. So while people in richer countries are healthier and more educated on average, people in countries at all levels of income have experienced progress through improving health and education levels. In addition to moving up, these relationships have flattened, meaning that poorer countries have enjoyed faster improvements in health and education than have richer countries.

**One explanation of the puzzle could be that there are long and variable lags in translating greater wealth into better health and education outcomes.** This would account for the weak correlation, as not enough time may have elapsed for the changes in income to lead to improvements in other dimensions of human development. However, this explanation is much less tenable over longer periods: the lack of correlation holds for a large sample of 135 countries over 40 years, a long enough time, surely, for income growth to translate into health and education improvements at the national level and for income deteriorations to be reflected in worsening health and education outcomes.

**Another explanation is that the processes through which people became healthier and more educated in countries that are rich today differ from those in developing countries today.**

The hypothesis of a changing development process suggests that the correlation in levels is a snapshot that reflects a past when countries that became rich were the only ones able to pay for costly advances in health and education. But technological improvements and changes in societal structures, discussed below, make it easier today even for poorer countries to realize substantial gains. The findings of studies testing explanations for the changes in health and income over the past 40 years suggest that countries with low and medium levels of human development could attain higher levels of health through inexpensive interventions. But as countries attain higher levels of development, improvements rely on costlier technologies, and income starts to matter again. Thus the results are compatible with the hypotheses of changing development opportunities and processes.

**What the 2010 HDR results mean**

These results do not mean that growth is unimportant. Income is a summary indicator capturing access to resources important for developing capabilities and expanding people’s freedoms—and should remain an important policy goal. Income increases people’s command over the resources necessary to gain access to food, shelter, clothing and broader options in life. Such resources also make it possible to advance people’s life plans without being unduly constrained by material necessities—such as working in meaningful and intrinsically rewarding activities or spending more time with loved ones. Income growth can indicate that opportunities for decent work are expanding—though this is not always the case.
Nor do our results negate the importance of higher income for increasing poor people’s access to health and education services, a result documented extensively in the microeconomic literature. The strong correlation between socioeconomic status and health within a society often reflects the relative advantage of wealthier people in gaining access to health services. High or rising inequalities can occur alongside a rise in aggregate income, as China’s recent experience shows.

However, the evidence does cast doubt on whether economy-wide income growth is instrumental in furthering health and education at low and medium levels of human development. And as we explore below, high rates of growth can coincide with environmental degradation and worsening income distribution, which are grave concerns.

The results of new analysis confirm a central contention of the Human Development Reports (HDRs) from the outset: that human development is different from economic growth and that great achievements are possible even without fast growth. The first HDR pointed to countries such as Costa Rica, Cuba and Sri Lanka, which had attained much higher human development than other countries at the same income levels. These achievements were possible because growth had become decoupled from the processes determining progress in other dimensions of human development.

These results also respond to one of the criticisms often levelled at the HDI. From the outset some economists have regarded the nonincome components as redundant, because the snapshot of development that the HDI reveals is not systematically different from that emerging from comparing income levels. But the HDI gives a very different picture from GDP when we look at changes over time—and in the end these are precisely the changes that development policy tries to influence.

The implications for development policy could be far-reaching. Much development policy-making assumes that economic growth is indispensable to achievements in health and education. Our results suggest that this is not the case. This does not mean that countries can forget about growth—we have underlined that growth generates important possibilities. Rather, the results imply that countries do not have to solve the difficult problem of generating growth in order to tackle many problems on the health and education fronts. This is good news. More fundamentally, because development processes and the possibilities facing poor countries today are so different from those that once faced the now-developed countries, development is not so much about copying the experiences of developed countries as about finding new paths to progress in today’s world.