Methodological Notes for
A Century Apart: New Measures of Well-Being for U.S. Racial and Ethnic Groups

The American Human Development Index is calculated using a simple methodology that is replicated for each state and population group. First, a subindex for each of the three components of the overall index is calculated. These three components are health, education, and income. Performance in each dimension is expressed as a value between 0 and 10 by applying the following general formula:

$$\text{Dimension Index} = \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}} \times 10$$

Goalposts for Calculating the American HD Index

For each of the three indices, goalposts are determined based on the range of the indicator observed on all possible groupings and also taking into account possible increases and decreases in years to come.

Indicator	Maximum value	Minimum value
Life expectancy at birth (years)	90	66
Educational attainment score	2.0	0.5
Combined gross enrollment ratio (%)	100	70
Median earnings (2008 dollars)*	60,659.23	14,337.64

*Earnings goalposts were originally set at $55,000 and $13,000 in 2005 dollars. These have been adjusted for inflation so that the goalposts remain at a constant level of purchasing power over time.

The American Human Development Index is obtained by taking the simple average of the health, education, and income indices. Since all three components range from 0 to 10, the Index itself also varies from 0 to 10, with 10 representing the highest level of human development.

Health Index

The Health Index is calculated as follows:

$$\text{Health Index}_i = \frac{LE_i - LE_{\text{MIN}}}{LE_{\text{MAX}} - LE_{\text{MIN}}} \times 10$$

where LE_i is the life expectancy at birth for unit i and LE_{MIN} and LE_{MAX} are the goalposts.

Life expectancy at birth was calculated using data from two principal sources. Mortality data for 2006, the most recent year available, were obtained by arrangement with the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention, part of the federal Department of Health and Human Services. Bridged-race population estimates for the July 1, 2006 population (using Vintage 2007 data) were obtained from the CDC WONDER Database.

Life expectancy was calculated utilizing abridged life tables based on methods developed by Chiang (1984), an internationally used methodology. Calculating life expectancy for Asian Americans, Latinos, and Native Americans and Alaska Natives at the state-level involved a further step since mortality data routinely undercount mortalities among members of these groups, especially in parts of the country in which they constitute a very small proportion of the overall population. For Asian Americans and Latinos, a ratio correction has been applied in states in which these groups constitute a proportion of the state population which is less than half of their share of the total national population. The cut-off values were as follows:

Grouping	% of Total Population	Cut-Off Point Below Which Correction was Used
Asian Americans	4.53% (13,667,962)	2.27%
Latinos	15.06% (45,427,437)	7.53%

Based on 2007 American Community Survey three-year population data, the correction was applied to mortality data for the following groups in the following states. As with state-level disaggregation in the other indicators, life expectancy estimates for groups which number fewer than 50,000 total population in any given state were not calculated due to the statistical instability of working with such small populations.

Asian Americans	Latinos
Florida	Alabama
Indiana	Arkansas
Kansas	Delaware
Louisiana	Indiana
Missouri	Iowa
North Carolina	Kentucky
Ohio	Louisiana
Oklahoma	Maryland
South Carolina	Michigan
Tennessee	Minnesota
Utah	Mississippi
Wisconsin	Missouri
	North Carolina
	Ohio
	Oklahoma
	Pennsylvania
	South Carolina
	Tennessee
	Virginia
	Wisconsin

Due to widespread miscoding of race on death certificates among Native Americans and Alaskan Natives, mortality counts have been adjusted using age group-specific correction factors based on current research about the prevalence of this phenomenon across the country and in specific states. Life expectancy estimates for this group are based on these adjusted mortality counts. Due to the small population size of Native Americans and Alaskan Natives in many states and data inconsistencies in others, state-level analysis of this group is restricted to 12 states. However, national life expectancy data for Native Americans and Alaskan Natives are based on adjusted mortality and population data for this group throughout the

country. See Arias et al. (2008) and Indian Health Service (1996) for further details on correcting for errors in racial classification.

Education Index

The Education Index is comprised of two sub-indices: an Attainment Index and an Enrollment Index. The **Attainment Index** measures the overall level of educational attainment achieved by the adult population. It takes into account the percentage of the population age twenty-five years and older who have earned at least a high school diploma or equivalent, at least a bachelor's degree, or an advanced degree (master's, professional, doctoral, etc). Each category represents the percentage of the adult population who have achieved at least that level of attainment, meaning that the percentage of the population twenty-five and over with a graduate degree necessarily includes those with a bachelor's degree and those with a high school diploma or its equivalent. To calculate the Attainment Index, first an Attainment Sum is determined by adding the percentage of the population twenty-five and older with at least a highschool diploma or equivalent, the percentage with at least a bachelor's degree, and the percentage with an advanced degree. Those who have earned an associate's degree or those who have completed some college without earning a degree are counted in the "at least highschool" category.

The **Attainment Index** is calculated as follows:

$$\text{Educational Attainment Index}_i = \frac{EAS_i - EAS_{\text{MIN}}}{EAS_{\text{MAX}} - EAS_{\text{MIN}}} \times 10$$

where EAS_i is the Education Attainment Sum for unit i and EAS_{MIN} and EAS_{MAX} are the goalposts.

The **Enrollment Index** is based on a gross enrollment calculation that takes into account the total number of students enrolled in school (of any age at any level) divided by the total school-aged population of 3 to 24 year-olds (inclusive). Therefore:

$$\text{Gross Enrollment Ratio}_i = \frac{ENR_i}{P3to24_i}$$

where ENR_i is the population of any age enrolled in school at any level and $P3TO24_i$ is the population between the ages of 3 and 24. The Enrollment Index is then calculated:

$$\text{Enrollment Index}_i = \frac{GER_i - GER_{\text{MIN}}}{GER_{\text{MAX}} - GER_{\text{MIN}}} \times 10$$

where GER_i is the Education Enrollment Ratio for unit i and GER_{MIN} and GER_{MAX} are the goalposts. If and when the Gross Enrollment Ratios exceed 100 percent, as can happen especially when large numbers of older students in a given geography or group are enrolled in school, the Gross Enrollment Ratio is capped at 100 percent for the purposes of calculating the Enrollment Index.

Finally, these two components are combined into the Education Index. In order to reflect the relative ease of enrolling students in school compared to getting students through a meaningful course of education (signified by the attainment of degrees), a two-thirds weight is applied to the Attainment Index and a one-third weight to the Enrollment Index to calculate the final Education Index as follows:

$$\text{Education Index}_i = \frac{2}{3} EAI_i + \frac{1}{3} EI_i$$

where EAI_i is Educational Attainment Index, and EI_i is Enrollment Index.

Educational attainment data for the U.S. were obtained from the American Community Survey (ACS) using attainment by education level and population from form B15002 (Sex by Educational Attainment for Population 25 Years and Over), B15002B, B15002C, B15002D, B15002H, and B15002I (same, for Black or

African American Alone, Native American and Alaska Native Alone, Asian Alone, White Non-Hispanic, and Hispanic).

Enrollment data for the U.S. as a whole, the states, and U.S. states by race or by gender (but not by race and gender) were obtained from ACS tables B14001 (School Enrollment by Level of School for the Population 3 Years and Over), B14001B, B14001C, B14001D, B14001H, and B14001I (same, for Black or African American alone, Native American and Alaska Native Alone, Asian Alone, White Non-Hispanic Alone, and Hispanic). Three-year estimates spanning 2005 to 2007 were used for state-level racial and ethnic groups to help reduce sampling error. One-year estimates for 2007 were used for national-level racial and ethnic groups.

groups to help reduce sampling error. One-year estimates for 2007 were used for national-level racial and ethnic groups.

Inflation adjustments: Comparing earnings from different years requires an adjustment to account for the depreciation of the purchasing power of any dollar amount due to inflation. The Consumer Price Index of the Bureau of Labor Statistics was used to convert dollars of one year to dollars of another year.

Income Index

The Income Index is calculated as follows:

$$\text{Income Index}_i = \frac{\log(y_i) - \log(y_{\text{MIN}})}{\log(y_{\text{MAX}}) - \log(y_{\text{MIN}})} \times 10$$

where y_i is the Median Earnings for unit i and y_{MIN} and y_{MAX} are the goalposts.

Median personal earnings data for the U.S. were obtained from American Community Survey tables B20017 (Median Earnings by Sex by Work Experience for the Population 16+ Years with Earnings), B20017B, B20017C, B20017D, B20017H and B20017I (same table for Black and African American Alone, Native American and Alaska Native Alone, Asian Alone, White Non-Hispanic Alone, and Hispanic). Median personal earnings reflect the median of the sum of wages, salaries and net income from self-employment before deductions for taxes and social contributions for the population aged 16 and over with earnings. Three-year estimates spanning 2005 to 2007 were used for state-level racial and ethnic

Difference between the American HD Index and the Standard HD Index

The standard Human Development Index was developed at the United Nations Development Programme (UNDP) and is published annually in the *Human Development Report*. This composite index was created to measure human development in all countries of the world, ranging from very-low-income countries in sub-Saharan Africa to high-income countries in Europe, North America, and elsewhere. Thus, some of the indicators used and the goalposts chosen are not well suited to measuring human development in an advanced industrialized economy like the United States since these goalposts have to accommodate a very wide range of conditions.

The American Human Development Index is a modified version of UNDP's index created by the American Human Development Project. It follows the same principles of the standard Human Development Index, and measures the same three basic dimensions of human development—health, knowledge, and standard of living—but it has been adapted in order to better reflect the U.S. context.

The table below lists the indicators used in the American HD Index and the standard HD Index:

Dimension	Indicator	
	AMERICAN HD Index	**STANDARD HD Index**
Health	Life expectancy at birth	Life expectancy at birth
Knowledge	Educational attainment Gross enrollment ratio	Adult literacy rate Gross enrollment ratio
Standard of living	Median earnings	GDP per capita

In the health dimension, the same indicator is used (life expectancy at birth), but the goalposts are changed. The standard HD Index uses goalposts of 25 years (minimum) and 85 years (maximum), to accommodate the enormous gap in life expectancy found in countries around the world. For the American HD Index, the goalposts were set at 66 years and 90 years, a range that accommodates the variations across all groupings considered in *The Measure of America*. Since life span in the United States is nowhere near the lower limit of 25 years set in the standard HD Index, using the standard HD Index goalposts would cluster all Health Index values around the maximum value, providing very little differentiation among states, congressional districts, and so on.

In the knowledge dimension, adult literacy rate was replaced with an educational attainment index. Adult literacy is a relevant indicator in a global context, where low-income countries still have very high illiteracy levels, but is largely irrelevant for developed nations, where most of the adult population has basic reading and writing skills and the labor market demands increasingly sophisticated skills. Functional literacy (the ability to read, write, and speak in English, and compute and solve problems at levels of proficiency necessary to function on the job and in society, achieve one's goals, and develop one's knowledge and potential) would be a good indicator, but it suffers from severe data availability problems. Thus, the educational attainment index was used. It captures the overall educational level of the population, and is a good indicator of how well any given population is prepared to satisfy an increasingly demanding labor market.

The other knowledge indicator, school enrollment, which is the combined gross enrollment ratio, is the same in both the American HD Index and the standard HD Index with a slight modification. The enrollment ratio in the American HD Index includes nursery school and pre-kindergarten, and the age group used

in the denominator of the enrollment ratio has been adjusted to accommodate this (the range begins with age three). The goalposts were also changed, from 0 to 100 percent in the standard HD Index to 70 to 100 percent in the American HD Index, in order to reflect the ranges observed in all American HD Index groupings.

In the standard of living dimension, gross domestic product (GDP) per capita was replaced by median earnings. For relatively closed economies, such as those of countries, GDP per capita is a good indicator of the income appropriated by the local population. However, in smaller geographical areas within a country, such as states and congressional districts, economies are much more open and substantial portions of the income generated within the community are used to remunerate production factors owned by persons who do not reside in that community (e.g., profits from a large manufacturing plant located in the community). They therefore do not adequately represent the income available to local residents.

As a result of these modifications, the American HD Index and the standard HD Index are not comparable. In order to prevent any comparison attempts, the American HD Index varies from 0 to 10 whereas the standard HD Index varies from 0 to 1.

Sources

Arias, Elizabeth, William Schauman, Karl Eschbach, Paul Sorlie, and Eric Backlund. "The Validity of Race and Hispanic Origin Reporting on Death Certificates in the United States." Vital and Health Statistics Series 2, No. 18, October 2008. http://www.cdc.gov/nchs/data/series/sr_02/sr02_148.pdf (accessed August 8, 2009).

Chiang, C. L. The Life Table and Its Applications. Malabar, FL: Krieger, 1984.

Indian Health Service. "Adjusting for Miscoding of Indian Race on State Death Certificates." Washington D.C.: Indian Health Service, 1996.

Meara, Ellen R., Seth Richards and David M. Cutler. "The Gap Gets Bigger: Changes in Mortality and Life Expectancy, by Education, 1981-2000." Health Affairs, vol. 27, no. 2 (2008), pp. 350-360.

National Center for Health Statistics. Bridged-Race Population Estimates, United States. July 1st Resident Population by State, Age, Sex, Bridged-race, and Hispanic Origin, 2006. Accessed through CDC WONDER Online Database, Vintage 2007.

National Center for Health Statistics. Multiple Cause of Death Files for 2006 with All Counties Coded by NCHS Identified, 2009 (received by agreement with NCHS).

Toson, Barbara and Alan Baker. "Life Expectancy at Birth: Methodological Options for Small Populations." National Statistics Methodological Series No. 33. London: Office for National Statistics, 2003.

U.S. Census Bureau. A Compass for Understanding and Using American Community Survey Data. 2008. Available at www.census.gov/acs/www/Downloads/ACSGeneralHandbook.pdf (accessed March 11, 2010).

U.S. Census Bureau. American Community Survey. 2007 Estimates. 2009. On American FactFinder Online Database, 1- and 3-year estimates.

Thank You