Measuring America: Ten Years and Counting

Methodological Note

The American Human Development Index

The American Human Development (HD) Index measures the distribution of well-being and opportunity in three basic dimensions: health, access to knowledge, and living standards. All data used to calculate the American HD Index come from official U.S. government sources. In the Index:

• **A long and healthy life** is measured using life expectancy at birth. This indicator is calculated by Measure of America using abridged life tables based on the Chiang methodology.[1] The mortality data come from the Centers for Disease Control and Prevention, National Center for Health Statistics and the population estimates come from the U.S. Census Bureau Population Estimates Program 2016 data.

• **Access to knowledge** is measured using two indicators: net school enrollment for the population age 3 to 24 and degree attainment for the population 25 years and older (based on the proportion of the adult population that has earned a high school diploma, a bachelor's degree, and a graduate or professional degree). Both indicators are from the American Community Survey (ACS) of the U.S. Census Bureau 2016.

• **A decent standard of living** is measured using the median personal earnings of all workers with earnings ages 16 and older from the ACS 2016.

Calculating the American HD Index

Before the HD Index is calculated, a sub-index needs to be created for each of these three dimensions. To calculate these indices, minimum and maximum values (goalposts) are chosen for each underlying indicator. The 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. These are then adjusted in order to achieve a balance in the final index. **All three dimensions of the American HD Index are weighted equally.** Performance in each dimension is expressed as a value between 0 and 10 by applying the following general formula:

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

Goalposts for Calculating the American HD Index

The goalposts for the four principle indicators that make up the American Human Development Index are shown in the table below. In order to make the HD Index comparable over time, the health and education indicator goalposts do not change from year to year. The earnings goalposts are adjusted for inflation (please see the below for more details). Because earnings

data and the goalposts are presented in dollars of the same year, these goalposts reflect a constant amount of purchasing power regardless of the year, making income index results comparable over time.

	Maximum Value	Minimum Value
Life expectancy at birth (years)	90 years	66 years
Educational attainment score	2	0.5
Combined net enrollment ratio (%)	95%	60%
Median personal earnings (2016 dollars)*	$67,730	$16,009

* Earnings goalposts were originally set at $55,000 and $13,000 in 2005 dollars converted to 2016 currency.

The American HD Index is calculated by taking the simple average of the health, education, and income indices. Since all three components range from 0 to 10, the HD Index itself also varies from 0 to 10, with 10 representing the highest level of human development. The example at right shows how the HD Index value for the United States is calculated.

EXAMPLE: Calculating the HD Index for the United States

HEALTH Index

Life expectancy at birth for the United States in 2016 was 79.4.
The Health Index is given by:

$$\text{Health Index} = \frac{79.4 - 66}{90 - 66} \times 10 = 5.57$$

EDUCATION Index

In 2016, 87.4 percent of U.S. adults 25 years and older had at least a high school diploma, 31.3 percent had at least a bachelor's degree, and 12.0 percent had a graduate or professional degree. Therefore the Educational Attainment Score is 0.874 + 0.313 + 0.12 = 1.307.
The Educational Attainment Index is then:

$$\text{Educational Attainment Index} = \frac{1.307 - 0.5}{2.0 - 0.5} \times 10 = 5.38$$

School enrollment (net gross enrollment ratio) was 77.4 percent. So the Enrollment Index is:

$$\text{Enrollment Index} = \frac{77.4 - 60}{95 - 60} \times 10 = 4.97$$

The Educational Attainment Index and the Enrollment Index are then combined to obtain the Education Index. The Education Index gives a 2/3 weight to the Educational Attainment Index and a 1/3 weight to the Enrollment Index to reflect the relative ease of enrolling students in school as compared with the relative difficulty of completing a meaningful course of education (signified by the attainment of degrees):

Education Index = 2/3 (5.38) + 1/3 (4.97) = 5.24

INCOME Index

Median personal earnings in 2016 were $32,023. The Income Index is then:

$$\text{Income Index} = \frac{\log(32{,}023) - \log(16{,}009)}{\log(67{,}730) - \log(16{,}009)} \times 10 = 4.81$$

HUMAN DEVELOPMENT Index

Once these indices have been calculated, the HD Index is obtained by taking the average of the three indices:

$$\text{HD Index} = \frac{5.57 + 5.24 + 4.81}{3} = 5.21$$

Health Index

The Health Index measures relative achievement in life expectancy at birth. Life expectancy at birth is calculated using data from two principal sources. Mortality data were obtained by arrangement with the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention, and the National Association for Public Health Statistics and Information Systems Vital Statistics Cooperative Program. Bridged-race population estimates were obtained from the CDC WONDER Database.

Life expectancy is calculated based on a widely used method developed by C. L. Chiang. This method involves the construction of abridged life tables that use population and mortality counts by age group as inputs. The Health Index is obtained by scaling the life expectancy at birth values using the maximum and minimum goalposts and is calculated as follows:

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

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

Education Index

The Education Index is based on two sub-indices: an Educational Attainment Index and an Enrollment Index. The Educational Attainment Index measures the overall level of educational attainment achieved by the adult population. It takes into account the percentage of the population age 25 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 25 and over with a master's degree necessarily includes those with a bachelor's degree and a high school diploma or its equivalent. To calculate the Educational Attainment Index, first an Attainment Sum is determined by adding the percentage of the population 25 and older with at

least a high school 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 degree or those who have completed some college without earning a degree are counted in the "at least high school" category. The Educational Attainment Index is calculated as follows:

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

where $EASi$ is the Educational Attainment Score for unit i and EAS_{MIN} and EAS_{MAX} are the goalposts.

The **Enrollment Index** is based on a net enrollment calculation that takes into account the totalnumber 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,

$$\text{Net Enrollment Ratio}_i = \frac{ENR_i}{P3TO24_i}$$

where ENR_i is the population ages 3 to 24 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:

$$\text{Enrollment Index}_i = \frac{NER_i - NER_{MIN}}{NER_{MAX} - NER_{MIN}} \times 10$$

where NER_i is the Educational Attainment Score for unit i and NER_{MIN} and NER_{MAX} are the goalposts.

Finally, these two components are combined into the Education Index. In order to reflect the relative ease of enrolling students in school compared to the completion of 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:

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

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

Income Index

The Income Index is calculated as follows:

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

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

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 age 16 and older with earnings.
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 (CPI) as calculated by the Bureau of Labor Statistics (BLS) was used to convert dollars of different years to 2016 dollars for the purposes of this report. Following the recommendation of the U.S. Census Bureau[2], the CPI research series using current methods (CPIU-RS) was used to construct adjustment factors for converting dollars of one year to another.

Racial and Ethnic Groups Used in this Project

The racial and ethnic groups used in this report are based on definitions established by the White House Office of Management and Budget (OMB) and used by the Census Bureau and other government entities[3]. Since 1997 the OMB has recognized five racial groups and two ethnic categories. The racial groups include Native Americans, Asian Americans, African Americans, Native Hawaiians and Other Pacific Islanders, and whites. The ethnic categories are Latino and not Latino. People of Latino ethnicity may be of any race. In this report, members of each of these racial groups include only non-Latino members of these groups.
When the total population of any group in any area was less than 50,000 people, the American HD Index was not calculated for that group due to the statistical instability of survey-based estimates for small populations. This is one of the reasons why some data points are blank in the tables.

Cautions on Comparability

Note that HD Index values presented in this report for all years and levels of geography have been calculated using the updated methodology and are fully comparable with each other.
All data used to calculate the American Human Development Index, with the exception of life expectancy at birth, come from the American Community Survey (ACS), an annual survey conducted by the U.S. Census Bureau. As the ACS surveys a subset of the overall population, estimates of population characteristics calculated from ACS data are subject to some degree of sampling and non-sampling error. Comparisons between similar values on any indicator, especially for small populations, should be made with caution since these differences may not always be statistically significant.

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1 See Chiang; Toson and Baker for more information.
2 Office of Management and Budget, "Update of Statistical Area Definitions and Guidance on Their Uses."
3 U.S. Census Bureau, *A Compass for Understanding and Using American Community Survey Data: What General Data Users Need to Know*.