SOCIAL PROGRESS INDEX 2015

METHODOLOGICAL REPORT

BY **SCOTT STERN,** AMY WARES AND SARAH ORZELL

SOCIAL PROGRESS IMPERATIVE

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SOCIAL PROGRESS INDEX 2015 METHODOLOGICAL REPORT

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The Social Progress Index Methodology 2015

Scott Stern, Amy Wares and Sarah Orzell

1.1 / INTRODUCTION

Measuring multiple dimensions of social progress is indispensable to understanding its components, benchmarking success, and catalyzing improvement. The Social Progress Index provides a holistic, objective, transparent, outcome-based measure of a country's wellbeing that is independent of economic indicators. The Social Progress Index can be used to compare countries on different facets of social progress, allowing the identification of specific areas of strength or weakness at the country level. It also allows countries to benchmark themselves against peer countries both at the level of individual indicators as well as in terms of more aggregate measures of social progress.

This paper describes the methodology used to calculate the Social Progress Index. Section 2 describes the conceptual architecture of the index and the distinction between input and outcome indices. We introduce the logic behind the underlying components of the Index. Section 3 describes the data used for the construction of the Index. Section 4 provides detail on the calculations undertaken to compute each element. Section 5 discusses the methodology behind assessing countries' relative strengths and weaknesses. Section 6 looks at the differences between the 2014 Index and the 2015 methodology and provides comparability between the two iterations. Section 7 concludes this chapter and provides information on future directions.

1.2 / SOCIAL PROGRESS PRINCIPLES

To create an index measuring social progress, one must first develop a conceptual framework that defines social progress as well as its key elements. Then it is necessary to design and implement a rigorous methodology for measurement at the country level. We define 'social progress' as the capacity of a society to meet the basic human needs of its citizens, establish the building blocks that allow citizens and communities to enhance and sustain the quality of their lives, and create the conditions for all individuals to reach their full potential. This definition of the concept of 'social progress' is used throughout this report.

The Social Progress Index framework aims to capture the level of social development within a given society. It is composed of three overall dimensions: Basic Human Needs, Foundations of Wellbeing, and Opportunity. Each of these dimensions is further broken down into four underlying components (see Figure 1 on page 8). Together, this framework aims to capture an interrelated set of factors that represent the primary elements that combine to produce a given level of social progress. The Social Progress Index methodology allows measurement of each component and each dimension, and yields an overall score and ranking.

The Social Progress Index is explicitly focused on non-economic aspects of national performance. Unlike most other national measurement efforts, we treat social progress as distinct, though affected by, traditional economic measures such as GDP per capita. Other hybrid indices such as the Human Development Index or OECD Better Life Index combine economic and social indicators, confounding

the two. Our objective is to utilize a clear yet rigorous methodology that isolates the non-economic dimensions of social performance.

Our approach builds on a long line of work constructing country indices to measure and assess various facets of economic and social performance. However, the Social Progress Index embodies a number of core methodological choices:

- A focus on non-economic dimensions of national performance;
- A measurement approach based on outcome indicators, rather than input measures;
- A holistic framework consisting of three broad dimensions of social progress, each of which is the sum of four equally weighted components; and,
- Calculation of each component as the weighted sum of a series of measures, with the weights determined through principal component factor analysis (FA).

1.2.1 / "BEYOND GDP" MEASUREMENT

These choices and the implementation of the Social Progress Index build on a two-year process guided by a group of academic and policy experts. The Social Progress Index framework builds upon and synthesizes a large body of research emphasizing the importance of moving "beyond GDP." As emphasized by Fleurbaey and Blanchet (2013), "beyond GDP" measurements tend to draw from one of four methodological approaches: composite indices, monetary equivalents, direct measures of subjective well-being, and Amartya Sen's capabilities approach. While each of these approaches has particular advantages and disadvantages (and some prior approaches combine these approaches)[1], each of these prior approaches either amends the measurement of GDP itself, includes components additional to GDP, or develops alternative measures (such as subjective well-being measures) that reflect both economic and social progress[2].

The Social Progress Index, in contrast, has been guided since the outset by the objective of developing a practical and usable measure of social progress that is independent of GDP itself. In other words, the Social Progress Index is based on the hypothesis that it is only by constructing a separate social progress measure that can stand alongside GDP that policymakers, societal stakeholders, and researchers can begin to develop and implement a systematic and structured approach to inclusive development. Our approach draws on prior research and methods in key ways, including the wide range of academic sources on the challenges and importance of measuring "beyond GDP" as well as more specific insights on how to consider social progress in a comprehensive way, including insights from economics,

[1] To be clear, many individual indices combine approaches or data limitations reduce the consistency of a particular methodology: for example, though Sen's capabilities perspective offers a compelling focus on the realization of objective dimensions of the human experience, the most well-known measure connected to that approach (the justly influential Human Development Index) is a simple composite index that captures only two concrete dimensions beyond GDP (longevity and education).

[2] A complete literature review is beyond the scope of this short note. For an insightful framework and contemporary discussion of both the challenges and progress in moving "beyond GDP," see Fleurbaey and Blanchet (2013).

sociology, political science, and history, among other fields (key references are included at the end). As well, we benefited from an interactive process of engagement with academic experts, policymakers, and practitioners from around the world. We differentiate ourselves from earlier efforts not simply by the novelty of our framework, but by our overarching choice to develop a systematic and distinctly non-economic measure of social progress.

1.2.2 / OUTCOME INDICES VERSUS INPUT INDICES

Overall, there are two broad categories of conceptually coherent methodologies for index construction: input indices and outcome indices. Both can help countries to benchmark their progress, but in very different ways. Input indices measure a country's policy choices or investments believed or known to lead to an important outcome. In competitiveness, for example, an input index might measure investments in human capital or basic research. Outcome indices directly measure the outcomes of investments. For competitiveness, this might include productivity per working-age citizen.

Whether to utilize an input index or an outcome index depends on the specific problem to be addressed and the data available. On the one hand, a well-constructed, input-driven index can provide direct guidance to policy-makers about specific policy choices and investments. Creating an input index, however, requires a degree of consensus about how inputs lead to outcomes, as well as a process to calibrate the relative importance of different input factors against outcome measures. For example, Delgado, et al (2012) focuses on the input factors shaping the degree of national competitiveness, which is measured as the PPP-adjusted GDP per working age population.

In contrast, when there are multiple output measures, lack of consensus on all the inputs that matter, and/or data related to inputs are highly incomplete, an outcome-oriented index may be more appropriate (Fleurbaey and Blanchet, 2013). As powerfully articulated by Sen in his development of the capability approach, a constructive way to move "beyond GDP" is to measure how well a particular society helps individuals realize particular capabilities and activities. Following this logic, the Social Progress Index has been designed as an outcome index. Given that there are many distinct aspects of social progress that are measurable in different ways, the Social Progress Index has been designed to aggregate and synthesize multiple outcome measures in a conceptually consistent and transparent way that will also be salient to benchmarking progress for decision-makers. Over time, the Social Progress Imperative research program will explore the role of input measures and policies in determining a country's performance.

1.2.3 / METHODOLOGY OVERVIEW

With a focus on non-economic outcome indicators, we develop a synthetic framework for considering social progress in a systematic and comprehensive way. Specifically, the Social Progress Index methodology is built on three architectural elements: dimensions, components, and indicators. Dimensions represent the broad conceptual categories which define social progress. The Index is calculated as the equally-weighted average of a country's score on each dimension. Within each dimension are components:

four unique but related concepts together comprising each dimension. A country's dimension score is calculated as the equally-weighted average of its components in that dimension. Each component is composed of indicators which measure as many valid aspects of the component as possible. These indicators are aggregated using a weighted average, where the weights are determined by FA.

1.2.4 / THREE DIMENSIONS OF THE SOCIAL PROGRESS INDEX

As mentioned earlier, the Social Progress Index framework synthesizes a large body of research emphasizing the importance of moving "beyond GDP," and which identifies the social and environmental elements of the performance of countries.

Based on this wide body of research, discussed in greater detail in Chapter 2 of the 2014 Methodology Report, we synthesized three distinct though related questions that, taken together, offer insight into the level of social progress:

1 / Does a country provide for its people's most essential needs?

2 / Are the building blocks in place for individuals and communities to enhance and sustain wellbeing?

3 / Is there opportunity for all individuals to reach their full potential?

Any assessment of social progress must begin with whether that society is able and willing to provide for its citizens' basic human needs, including adequate nourishment and basic medical care, sanitation, basic shelter, and personal safety. This is challenging in developing countries, and often incomplete even in advanced countries. While basic needs have been the predominant focus of research in development economics, a second dimension of social progress captures whether a society offers building blocks for citizens to improve their lives. Are citizens able to gain a basic education, obtain information, access communications, benefit from a modern healthcare system, and accomplish these objectives in a way that is environmentally sustainable?

Finally, any discussion of social progress must include not simply whether citizens are able to improve their own lives but whether they have the freedom and opportunity to make their own choices. Personal rights, personal freedom and choice, an environment of tolerance and inclusion, and access to advanced education all contribute to the level of opportunity within a given society.

The Social Progress Index framework in Figure 1 reflects these three distinct but interrelated dimensions. Therefore, as an empirical matter, we do not judge any one of the dimensions to have an a priori higher weighting than any other; as such, the Index is a simple average of the three social progress dimensions. We considered other avenues to weighting such as using the coefficients of a regression of life satisfaction scores against the three dimension scores. Though the results are intriguing (and an avenue we intend to explore in ongoing work), we did not believe there was a sufficiently robust relationship of how each of the social progress dimensions mattered in a relative way. We therefore adopt a simple average of the dimensions in order to highlight the critical role of each in social progress.

Figure 1 / Social Progress Index Component-level Framework

1.2.5 / COMPONENTS OF EACH DIMENSION

For each of the three dimensions of social progress, there are four components. Components, like dimensions, are categories of outcomes rather than specific outcomes. Every component within a dimension is designed to highlight a separate aspect of the overall set of outcomes which make up a dimension, building on both the academic and policy literature. For example, the Opportunity dimension includes the components Personal Rights, Personal Freedom and Choice, Tolerance and Inclusion, and Access to Advanced Education. Each of these components describes a related but distinct aspect of what it means for a society to provide opportunity. The Personal Rights and Access to Advanced Education components describe different aspects of the extent to which individuals are able to pursue their own objectives to the best of their ability. Both Personal Freedom and Choice and Tolerance and Inclusion describe different aspects of the extent of limits on individuals. Together these components offer a conceptually coherent way of capturing how societies can empower (or limit) an individual's autonomy, freedom, and ability to progress.

The selection of the dimensions and the elaboration of the components within each dimension occurred through an iterative process involving review of the literature and input from the Social Progress Imperative Advisory Board. The components represent what we believe to be the most complete set of broad outcome elements available given our current understanding from diverse literatures.

We have consulted extensively with experts across disciplines on the 12-component structure of the Social Progress Index to ensure that this captures the principal aspects of human wellbeing, incorporating but not confined to, challenges such as those affected by extreme poverty.

As in weighting across dimensions, the Social Progress Index architecture equally weights components for constructing a dimension-level score because there is no clear theoretical or empirical reason to weight any of the components more highly than any other. For this reason, each dimension score is composed of the simple average of the four components.

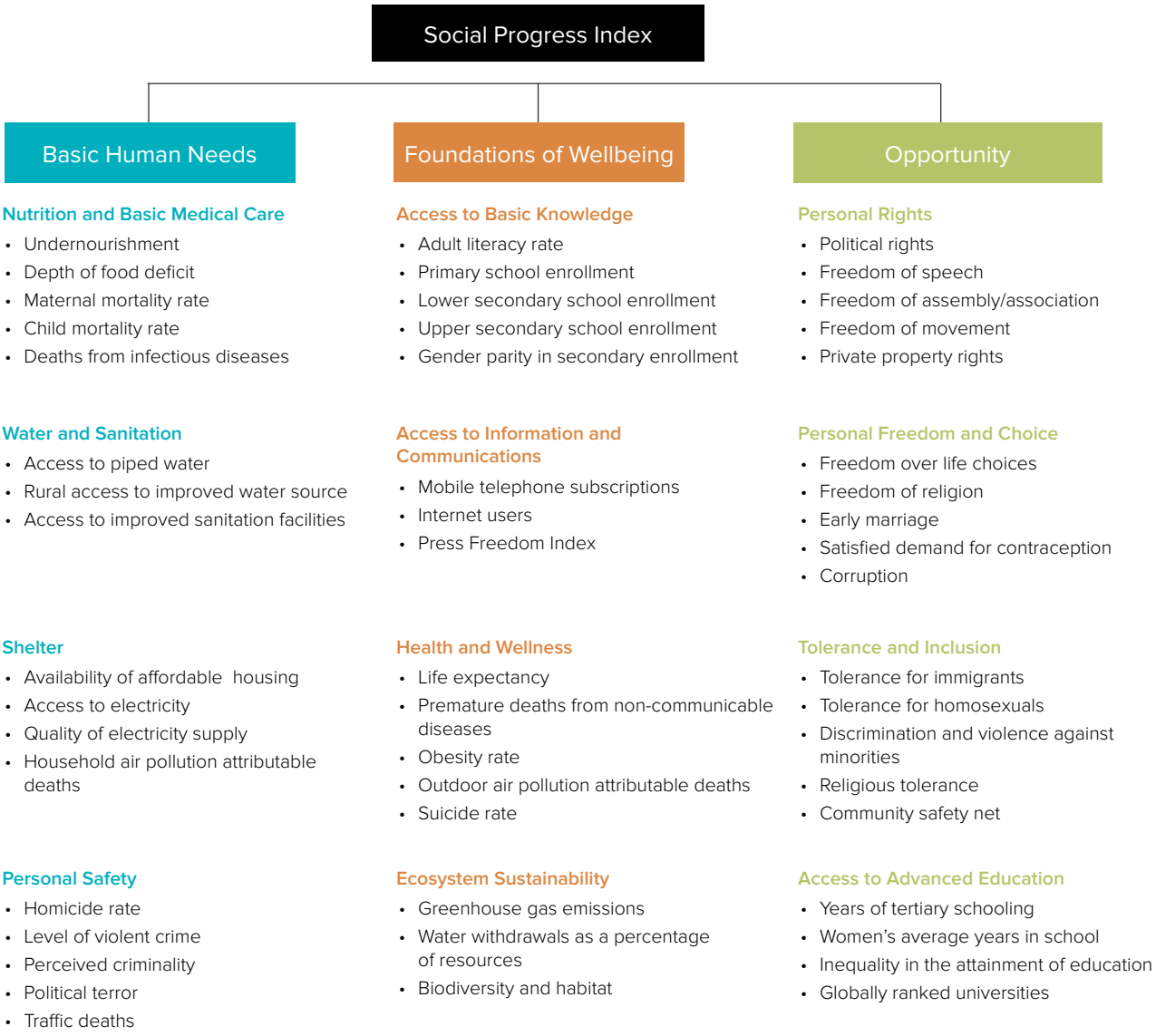
1.2.6 / MEASURING INDIVIDUAL COMPONENTS

Once the dimensions and components are determined, the Social Progress Index model identifies multiple independent outcome measures related to each component. Each measure had to meet three criteria: internal validity, public availability, and geographic coverage. Each indicator was evaluated to ensure that the procedures used to produce the measure were sound and that it captured what it purported to measure (hence internally valid). Each measure also must be available for most, if not all, of the countries in our sample. We only included indicators that were measured well, with consistent methodology, by the same organization, and across all (or essentially all) of the countries in our sample. To meet our goals of transparency and independent replication, the data for each indicator is available to the public on our website. Figure 2 lists each of the outcome measures by component.

As can be seen in Figure 2, there is some conceptual overlap among the measures that are included to capture various aspects of the same component. For instance, in the Nutrition and Basic Medical Care component, two separate overlapping measures are included: “Undernourishment” and “Depth of food deficit.” To account for the overlap between these elements, the score for each component is calculated using a standard technique, principal component factor analysis. In researching the best construction for the Social Progress Index we pursued both an equal weighting of indicators within each component and the use of factor analysis to calculate weights for each indicator. Through this process we found that factor analysis weighted many indicators very near to equally within components, signaling a good selection of indicators to measure the concept of the component (see Appendix 2 for 2015 weights). However, there are some components that are more challenging to measure due to lack of data or the inherent divergent nature of data across countries. This finding solidified our decision to use FA weighting, as we believe it is important to compensate for differences in available data and divergent indicators within components and across the Index by allowing FA to weight indicators appropriately to reach the best composite measure of each component. Ecosystem Sustainability, however, is constrained by limited available data and factor analysis-derived weighting is skewed. As a result, we chose to weight the indicators of this component equally.

We discuss the measures in more detail in Section 3. From a methodological perspective, it is useful to note here that two common measures of the validity of factor analysis—the Kaiser-Meyer-Olkin and Cronbach scores—are within ranges considered acceptable in the statistical literature (Manly, 2004).

Figure 2 / The Individual Indicators Within the Social Progress Index Framework



1.3 / DATA

1.3.1 / INDICATOR SELECTION AND SOURCES

The Social Progress Index is an aggregate measure derived from numerous indicators drawn from many different organizations, ranging from very large institutions like the United Nations, to non-governmental organizations such as Transparency International. The sources are summarized in Appendix 1. In some cases, there are tradeoffs between the quality and precision of a social indicator and its broad coverage of countries and continents. The architecture of the Index affects the screening criteria for data sources. For factor analysis based on principal components to be valid, each of the indicators used to calculate the factor must be relatively free of measurement error (Dunteman, 1989). Thus, it should precisely measure what it was intended to measure and do so consistently across countries. Our choice of factor analysis as the basis for aggregating at the component level was affected by the quality and quantity of data available on social progress.

Similar to the state of affairs in the mid-20th century for measuring economic variables, social scientists have only just begun to build the complicated infrastructure required to successfully mount the large-scale surveys and measurements required to provide effective measurements of social issues across countries. Not surprisingly, the UN and its various entities have taken the lead, and we include UN data ranging from the percent of a population with access to piped water drawn from the Joint Monitoring Programme for Water Supply and Sanitation, to the percentage of children receiving a primary education from the UN Educational, Scientific, and Cultural Organization Institute for Statistics. For other metrics, we rely on specialist organizations such as the Institute for Economics and Peace which supplies personal safety data. One of our objectives is to stimulate improvement in data sources over time.

In an effort to measure solely outcomes, not inputs, we have focused on results that matter to the lives of real people, not whether certain things are legally permissible or how much money the government spends. In some cases, this requires survey data. For example, five indicators are used from the Gallup World Poll in the 2015 Social Progress Index to measure peoples' perceptions of living conditions in their country. For instance, same-sex sexual activity is legal in Tajikistan, but according to the Gallup survey, only 1 percent of the population replied yes to a question on whether Tajikistan is a good place for homosexuals. Due to divergences like this, we concluded that survey data, as a representation of peoples' lived experiences, is the better outcome measure.

For some indicators, such as Corruption, there were alternative data sources that provided similar indicators. We evaluated alternatives based on internal validity, geographic coverage, and theoretical attractiveness (what methodology was used to gather data). Geographic coverage was often a key limitation. We sought indicators that were measured by the same organization for all of the countries in our initial sample. This meant that many high-quality indicators were excluded from consideration because they only covered a subset of countries (e.g., just Latin America or just OECD countries). The step-by-step process for selecting indicators is outlined in Figure 3 below.

Figure 3 / Indicator Selection Data Tree

There are additional indicators we hope to use in the future, but which are not yet measured broadly or in a standard way. For instance, in the Access to Basic Knowledge component one could imagine a number of interesting indicators like the Program for International Student Assessment (PISA) scores to measure educational attainment rather than enrollment. While there is PISA data for a number of countries, the scores do not cover a broad enough country sample for inclusion.

The Social Progress Index includes all the valid and available indicators that were conceptually linked to the components. We relied upon factor analysis to draw out the common signal among the set of selected indicators in each area. Figure 1 provides a mapping of the connection between components and dimensions.

Most indicator data in raw form had score ranges from 0–100 or from 1–5. Such indicators are constructed to have clear upper and lower bounds. Other indicators, like Greenhouse gas emissions (in the Ecosystem Sustainability component of the Foundations of Wellbeing dimension), are variables which have no *ex ante* upper bound. In order to prevent outliers from skewing the weights of indicators we have converted them to ordinal variables (see Table 1 for more information). Additionally, the indicators which measure gross school enrollment have been capped at 100 percent to prevent countries from being rewarded for students repeating grades. Similar capping has been applied to Mobile telephone subscriptions (see full list in Table 2). Both of these transformations are applied after any missing variables have been estimated; the estimation process is described in the next section.

Table 1 / Indicators Transformed to Ordinal Variables

VARIABLES	MIN	MAX
Household air pollution attributable deaths	1	6
Greenhouse gas emissions	0	4
Globally ranked universities	0	5

Table 2 / Capped Indicators

VARIABLES	MIN	MAX
Lower secondary school enrollment	0	100
Upper secondary school enrollment	0	100
Gender parity in secondary enrollment	0	1
Adult literacy rate	0	99
Mobile telephone subscriptions	0	100

Prior to implementing factor analysis, we evaluate the "fit between" the individual indicators within a component, first by calculating Cronbach's alpha for the indicators in each component. Cronbach's alpha provides a measure of internal consistency across indicators. An applied practitioner's rule of thumb is that the alpha value should be above 0.7 for any valid grouping of variables (Bland and Altman, 1997). Table 3 shows alpha values well above 0.7 for all but two of our components (Health and Wellness and Ecosystem Sustainability). While Cronbach's alpha is a good screen for conceptual fit, it does not provide a direct measure of the goodness of fit of a factor analysis (Manly, 2004).

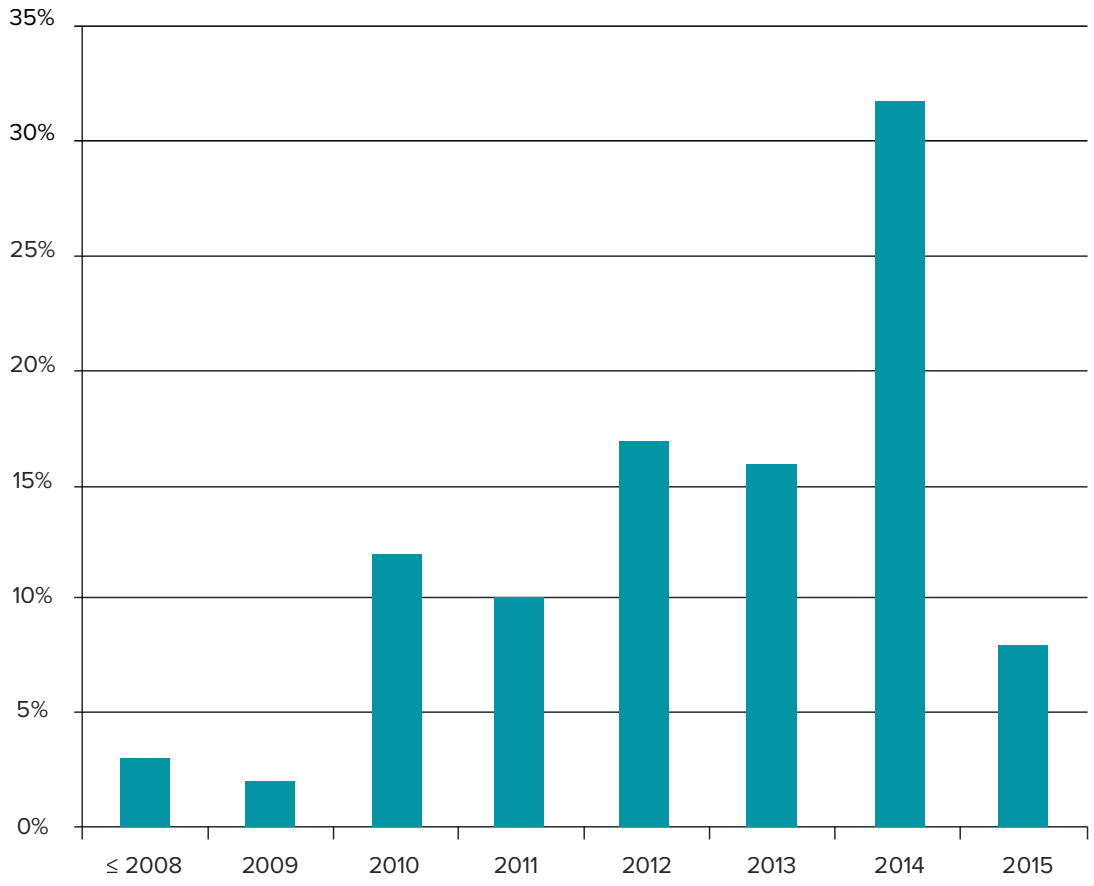
Table 3 / Cronbach's Alpha for Each Component

		CRONBACH'S ALPHA
Basic Human Needs	Nutrition and Basic Medical Care	0.95
	Water and Sanitation	0.93
	Shelter	0.77
	Personal Safety	0.87
Foundations of Wellbeing	Access to Basic Knowledge	0.93
	Access to Information and Communications	0.71
	Health and Wellness	0.45
	Ecosystem Sustainability	0.27
Opportunity	Personal Rights	0.86
	Personal Freedom and Choice	0.75
	Tolerance and Inclusion	0.79
	Access to Advanced Education	0.88

1.3.2 / CHARACTERISTICS OF COUNTRY DATA

The use of data in the Social Progress Index is limited to 2005–2015 data for any given indicator and country. This is done to create the most current index possible while not excluding indicators or countries that update on a less frequent basis. The average year of data in the 2015 Social Progress Index is 2013. A small number of data points are from 2008 or earlier. The majority of these are from the obesity indicator, where all data is from 2008. Figure 4 shows the percentage of data points from each year across all countries with sufficient data to calculate at least nine complete components.

Figure 4 / Percentage of Data Points Published In Each Year



1.3.3 / REGIONAL DIFFERENCES

The nature of a global index is to measure how countries as a whole perform on a certain set of indicators. This is important and useful for comparing countries to one another and assessing both progress and under-performance in order to find best practices and target areas which need improvement. Many policies and investments that affect social progress are also set nationally. However, while the Social Progress Index gives a view into how a country performs on average, aggregate data can obscure substantial regional and state differences in performance. These sub-national patterns matter when a country is considering policies, especially in geographically large nations. For example, in 2014 the Índice de Progresso Social na Amazônia (IPS Amazônia) was released assessing social progress levels in the Brazilian Amazon across 772 municipalities.[3] This level of analysis found large disparities and varying priorities highlighted among the municipalities. While the Social Progress Index is a great starting point for targeting successes and challenges, continued research and indexing at the sub-national level will add greater clarity. We have several initiatives underway at city and region levels which will be represented in future reports.

3 More information is provided at http://www.ipsamazonia.org.br/

1.3.4 / ESTIMATES FOR MISSING VALUES

We have carefully selected our country set for 2015 to have the most coverage possible across all indicators, without jeopardizing the statistical quality of the Index. Our final country set excludes nations with more than one missing value in more than three components. In rare cases, a country will not have a value for a given indicator due to lack of coverage by the source, incomplete reporting by the country to international organizations, or only data older than 2005. In these instances, values are estimated using a regression process applied at the component level. In exceptional situations, qualitative and cohort group estimates are applied. Constraining the regression to within component indicators allows for the preservation of the signal that the indicator provides to the component factor analysis calculation. For example, if a country is missing a value for the measurement of Satisfied demand for contraception, the four other Personal Freedom and Choice indicators are used as independent variables to predict a value by regressing them on Satisfied demand for contraception using the sample country set. The estimation of missing values is necessary prior to undertaking FA, which requires a complete dataset for the results to be sound.

Lastly, we transformed some indicators so that in each case a greater value means better social progress. For example, a higher score on the Discrimination and violence against minorities indicator, is transformed so that a greater value means better social progress. For clarity and ease of interpretation, we transformed all measures so that a higher score on the indicator corresponds to a higher overall Social Progress Index score.

1.4 / CALCULATING THE SOCIAL PROGRESS INDEX

1.4.1 / INDICATOR WEIGHTS AND AGGREGATION

Factor analysis uses the shared covariance across all of the indicators within each component to calculate a set of weights that makes it possible to create one aggregate value out of many different indicators (Manly, 2004). This aggregate value is called a factor. If indicators within a component are chosen well, this factor will extract a score which can be used as a valid synthetic measure of the component across countries. Factor analysis provides a set of weights for the underlying variables within each component to account for these variables themselves sometimes being correlated with each other.

The Health and Wellness component has indicators with signals that diverge into two separate groupings of correlated values. In this case, FA is used to weight the indicators within similar signal groups and these two sub-components are then equally weighted to sum to the component value.

After performing FA in each component, we assessed goodness of fit using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The results of this analysis are provided in Table 4. In general, KMO scores should be above 0.5. In our data, the mean KMO score is above 0.5 for all but two components. Hence, the grouping of indicators chosen for the components of the Social Progress Index seem to

provide a good measure of the underlying construct, especially for exploratory rather than confirmatory FA. The two exceptions are the Health and Wellness and the Ecosystem Sustainability components. A KMO of 0.43 is not surprising as the indicators for Ecosystem Sustainability are highly disparate due to the wide ranging scope of the component. Also, because the statistical measures for Ecosystem Sustainability are relatively new and not highly institutionalized, compared to other components, it is expected that some noise in the data causes the KMO to be reduced. This result, combined with the low alpha for the component and skewed weights when FA was applied called for a reconsideration of the weighting of the component and equal weighting of the indicators was applied.

As mentioned above, the Health and Wellness component has indicators trending in two different directions: one captures health issues more prevalent in developing nations and the other health issues more prominent in developed nations; the combination produces a lower mean KMO.

Table 4 / Mean Kaiser-Meyer-Olkin Measure of Sampling Adequacy for Each Component

DIMENSION	COMPONENT	MEAN KMO
Basic Human Needs	Nutrition and Basic Medical Care	0.75
	Water and Sanitation	0.75
	Shelter	0.70
	Personal Safety	0.82
Foundations of Wellbeing	Access to Basic Knowledge	0.83
	Access to Information and Communications	0.63
	Health and Wellness	0.50
	Ecosystem Sustainability	0.43[4]
Opportunity	Personal Rights	0.82
	Personal Freedom and Choice	0.72
	Tolerance and Inclusion	0.75
	Access to Advanced Education	0.74

The individual component values are calculated by summing the weighted scores to reach the component

Formula 1

$$Component_c = \sum_i (w_i * indicator_i)$$

where the weights (w in the equation) are determined through FA. See Appendix 2 for a full list of weights and the corresponding values on a 0 to 1 scale for ease of interpretation.

[4] The KMO value for Ecosystem Sustainability assumes the use of FA for weighting the component. We report this number for comparison to the other components in the Index, however, we apply equal weighting of indicators in this component for the calculation of the Index.

1.4.2 / COMPONENT SCORES

The final step in calculating each component is to provide transparency and comparability across the different components. Our goal is to transform the values so that each component score can be easily interpreted, both relative to other components and across different countries. To do so, we calculated scores using an estimated best- and worst-case scenario dataset in addition to the individual country data. The best- and worst-case scores are defined at the indicator level according to the definition of each data point. For indicators that do not have a clear best or worst bound or where the probability of reaching a bound is extremely unlikely, such as child mortality where the theoretical worst case would be that every child dies before the age of five, we use a bound based on the worst recorded performance since 2004 across all years and countries available in the indicator data set as available from the source, not just from our sample of countries. Best and worst-case data series are included with the sample country set when FA is applied. See Appendix 3 for the specific values used for each indicator's bounds.

This process allows for countries to be scored on a 0 to 100 scale with 100 being the estimated best case and 0 signifying the estimated worst case at the component level. The following formula is used to calculate a component score for each country:

Formula 2

$$\frac{(X_j - \text{Worst Case})}{(\text{Best Case} - \text{Worst Case})}$$

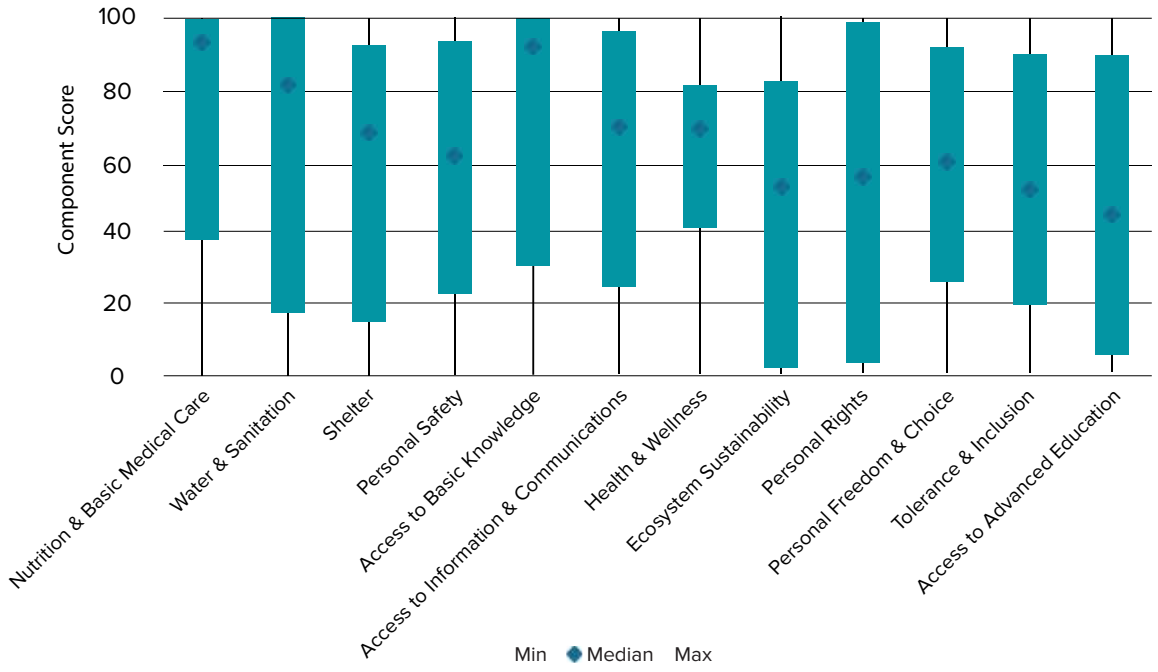
where X_j is the raw component value for each country. The summary statistics after this final transformation of the data are provided in Table 5.

Table 5 / Summary Statistics for Each Component by Dimension Across All Countries In the Social Progress Index 2015

	VARIABLES	MEAN	STANDARD DEVIATION	MIN	MAX
Basic Human Needs	Nutrition and Basic Medical Care	86.42	15.35	37.07	99.58
	Water and Sanitation	72.03	26.84	16.35	100.00
	Shelter	62.78	20.57	13.93	92.25
	Personal Safety	61.54	17.97	21.91	93.57
Foundations of Wellbeing	Access to Basic Knowledge	84.02	17.23	29.76	99.97
	Access to Information and Communications	66.93	16.96	23.67	96.11
	Health and Wellness	67.33	8.42	40.59	81.08
	Ecosystem Sustainability	51.34	13.30	0.96	82.21
Opportunity	Personal Rights	53.37	25.82	2.32	98.84
	Personal Freedom and Choice	60.58	15.09	25.08	91.54
	Tolerance and Inclusion	52.37	15.27	18.66	89.54
	Access to Advanced Education	40.57	21.66	4.55	89.47

There are differences across the components in terms of their overall score variation, which are displayed in Figure 5. For example, some components have a high overall range (such as Water and Sanitation), because some countries score perfectly with no need for improvement, while others struggle to meet these infrastructure needs. Other components, such as Health and Wellness, have a much smaller range, due in part to the great strides the world has made in health since 2004. Even for this component, however, there is much room for improvement.

Figure 5 / Distribution of Component Scores



1.4.3 / Dimension Scores

Table 6 provides summary statistics for each dimension, where each dimension score is the average of the four components that make up that dimension (see formula below). Countries that do not have scores in all four components of a given dimension will not have a dimension score.

Formula 3

$$Dimension_d = \frac{1}{4} \sum_c Component_c$$

Table 6 / Summary Statistics for Each Dimension

	MEAN	STANDARD DEVIATION	MIN	MAX
Basic Human Needs	70.82	18.19	26.81	96.03
Foundations of Wellbeing	67.68	10.07	44.02	88.46
Opportunity	52.03	16.72	21.12	86.58

1.4.4 / INDEX SCORES

The overall Social Progress Index is calculated as the simple average of the three dimensions. As such, the overall Index is calculated as:

Formula 4

$$SPI = \frac{1}{3} \sum_d Dimension_d$$

In the 2015 Social Progress Index, scores range from 31.42 to 88.36. It is expected that the range of scores decreases when averaging scores first into dimensions and then into an index. Countries that do not have scores in all three dimensions are not included in the overall Index scores and ranks.

1.5 / ASSESSING COUNTRIES' RELATIVE STRENGTHS AND WEAKNESSES

The component, dimension, and overall Social Progress Index scores are scaled from 0 to 100 with 100 as the score that a country would achieve were it to have the highest possible score on every indicator, and 0 as the score were it to have the lowest possible score on every indicator. Best and worst are determined as described above. With this scale, it is possible to evaluate a country's performance relative to the best and worst possible score.

In some cases, it is also helpful to compare a country's performance to other countries at a similar level of economic development. For example, a lower-income country may have a low score on a certain component, but could greatly exceed typical scores for countries with similar per capita incomes. Conversely, a high-income country may have a high absolute score on a component, but still fall short of what is typical for comparably wealthy countries. For this reason, we have developed a methodology to present a country's strengths and weaknesses on a relative rather than absolute basis, comparing a country's performance to that of its economic peers. Within the group of peer countries, yellow signifies that a country's performance is typical for countries at its level of economic development, green signifies that the country performs substantially better than its peer group, and red signifies that the country performs substantially worse than its peer group.

Standard groupings of countries, such as the classifications done by the World Bank, are not appropriate for our purposes for two reasons. First, the groupings are too large, representing excessively wide ranges of social performance and therefore few relative strengths and weaknesses. Second, using these groups, countries at the top or bottom of a group may appear to have a misleadingly large number of strengths or weaknesses simply because the group the country is being compared to is at a much lower or higher level of economic development. We therefore define the group of a country's economic peers as the 15 countries closest in GDP PPP per capita. Each country's GDP per capita is compared to every other country for which there is full Index data and the 15 countries with the smallest difference on an absolute value basis are selected for the comparator group. In order to reduce the influence of year-to-year fluctuations in GDP data, a four-year average is used (2010-2013). Comparator groups are defined for all countries, regardless of whether they have complete SPI data or sufficient data for only some components and dimensions, but to maintain stability in comparisons, only countries with full data across all aspects of the Index are included in comparator groups for other countries. No strengths and weaknesses calculations are made for the four countries missing GDP data: Argentina, Cuba, Myanmar, and Syria. After significant testing, we found that groupings larger than 15 resulted in a wider range of typical scores and therefore too few relative strengths and weaknesses. Smaller groupings become too sensitive to outliers.

Once the group of comparator countries is established, the country's performance is compared to the median performance of countries in the group. The median is used rather than the mean, to minimize the influence of outliers. If the country's score is greater than (or less than) the average absolute deviation from the median of the comparator group, it is considered a strength (or weakness). Scores that are within one average absolute deviation are within the range of expected scores and are considered neither strengths nor weaknesses. A floor is established so the thresholds are no less than those for poorer countries and the minimum distance from median to strength or median to weakness is 1 point.

1.6 / YEAR-TO-YEAR RESULTS COMPARISON

In the 2015 Index we have made improvements to the way some components are measured through changes to select indicators, as described below. To facilitate comparability between the 2014 Social Progress Index and the 2015 Social Progress Index, we calculated two index variations in addition to the headline 2015 Index. The first version allows the countries included in the 2014 Index to see how their country has progressed by using the 2014 methodology with data updated to 2015 values. The second version shows country progress by using 2014 data with the improved 2015 framework. The addition of these index variations gives us a two-point time series for both versions of the index. Only the 2015 methodology will be carried forward after this year.

Changes by Component

The underlying framework of 12 components across the three dimensions of the Social Progress Index remains unchanged from 2014. A few modifications were made at the indicator level, mainly to remove discontinued indicators.

Nutrition and Basic Medical Care: The Stillbirth rate indicator, published once by the World Health Organization in 2009, was removed because it is unlikely that it will be updated.

Water and Sanitation: Rural vs. urban access to improved water source was designed to measure inequality in access to water. Although few, there were cases of countries with relatively high access to water scoring low on this indicator and countries with low access (but little inequality) scoring high. Therefore, this indicator has been replaced by Rural access to improved water.

Access to Basic Knowledge: Due to lack of confidence in the significant digits in literacy data used for developed countries, we have capped adult literacy at 99%.

Access to Information and Communications: Due to a change in how Press Freedom Index results are reported, the scale of the indicator has been converted from 1-7 to 0-100.

Ecosystem Sustainability: A change to the indicator used for Greenhouse gas emissions was considered; however after careful evaluation of the options, we decided to continue calculating it as emissions per $1000 of GDP. We considered changing the indicator to be a measure of the consumption of greenhouse gases calculated by Peters, et al.[5] While this measure provides important insight into the production, trade, and consumption of high-emissions goods, the limited country coverage and uncertainty around the measure being calculated on regular basis led us to keep our current measure. We will continue to research additional measures for this component as more data becomes available.

Personal Freedom and Choice: The Modern slavery, human trafficking, and child marriage indicator used data from the Global Slavery Index. Due to changes in how that Index is constructed, it has been replaced by a stand-alone indicator of early marriage.

[5] Glen P. Peters, Jan C. Minx, Christopher L. Weber, and Ottmar Edenhofer. *Growth in emission transfers via international trade from 1990 to 2008*. PNAS 2011 108 (21) 8903-8908; published ahead of print April 25, 2011

Tolerance and Inclusion: The question that served as the basis for the Women treated with respect indicator is no longer being asked in the Gallup World Poll. As no suitable alternative was identified, this indicator has been removed.

Access to Advanced Education: The Globally ranked universities indicator was modified from a count of universities in the top 400 to a count of all universities listed on any of the three main global rankings (grouped into tiers on a 0-5 scale).

Additionally, there are several indicators that are unchanged conceptually, but are not directly comparable to previous years due to improvements in how they are measured or a switch to more up-to-date sources. Indicators affected are:

- ***Nutrition and Basic Medical Care:*** Undernourishment; Depth of food deficit; Maternal mortality rate and Child mortality rate (retroactive revisions to historical data for both indicators); and Deaths from infectious diseases
- ***Water and Sanitation:*** Access to piped water and Access to improved sanitation facilities (retroactive revisions to historical data for both indicators)
- ***Access to Basic Knowledge:*** Adult literacy rate
- ***Health and Wellness:*** Premature deaths from non-communicable disease deaths between the ages of 30 and 70 and Outdoor air pollution attributable deaths
- ***Personal Freedom and Choice:*** Satisfied demand for contraception
- ***Access to Advanced Education:*** Inequality in the attainment of education

1.7 / CONCLUSION

The Social Progress Index provides a benchmark by which countries can compare themselves to others, and can identify specific areas of current strength or weakness. Additionally, scoring on a 0–100 scale gives countries a realistic benchmark rather than an abstract measure. This scale allows us to track absolute, not just relative, performance of countries over time on each component, dimension, and the overall model.

The Social Progress Index 2015 results, found in the main report, are a starting point for many different avenues of research into the ways a country is successful or not and whether conclusions can be drawn about the overall effect of social progress on economic growth and life satisfaction. Furthermore, while disaggregated scores provide insight into the behavior of the different components that contribute to a country's performance, we believe disaggregation within a country (e.g. regional or state) also provides important insight and actionable information to those seeking to increase social progress, and over the last year have begun to test our process and methodology at the region and city level.

Appendix 1 / Data Sources

	COMPONENT	INDICATOR NAME	PRIMARY SOURCE
Basic Human Needs	Nutrition and Basic Medical Care	Undernourishment	Food and Agriculture Organization of the U.N.
		Depth of food deficit	Food and Agriculture Organization of the U.N.
		Maternal mortality rate	World Health Organization
		Child mortality rate	UN Inter-agency Group for Child Mortality Estimation
		Deaths from infectious diseases	World Health Organization
	Water and Sanitation	Access to piped water	World Health Organization/UNICEF Joint Monitoring Programme for Water Supply and Sanitation
		Rural access to improved water source	World Health Organization/UNICEF Joint Monitoring Programme for Water Supply and Sanitation
		Access to improved sanitation facilities	World Health Organization/UNICEF Joint Monitoring Programme for Water Supply and Sanitation
	Shelter	Availability of affordable of housing	Gallup World Poll
		Access to electricity	Sustainable Energy for All
		Quality of electricity	World Economic Forum Global Competitiveness Report
		Household air pollution attributable deaths	Institute for Health Metrics and Evaluation
	Personal Safety	Homicide rate	Institute for Economics and Peace
		Level of violent crime	Institute for Economics and Peace
		Perceived criminality	Institute for Economics and Peace
		Political terror	Institute for Economics and Peace
		Traffic deaths	World Health Organization
Foundations of Wellbeing	Access to Basic Knowledge	Adult literacy rate	UN Educational, Scientific, and Cultural Organization
		Primary school enrollment	UN Educational, Scientific, and Cultural Organization
		Lower secondary school enrollment	UN Educational, Scientific, and Cultural Organization
		Upper secondary school enrollment	UN Educational, Scientific, and Cultural Organization
		Gender parity in secondary enrollment	UN Educational, Scientific, and Cultural Organization
	Access to Information and Communications	Mobile telephone subscriptions	International Telecommunications Union
		Internet users	International Telecommunications Union
		Press Freedom Index	Reporters Without Borders
	Health and Wellness	Life expectancy	World Bank
		Premature deaths from non-communicable diseases	World Health Organization
		Obesity	World Health Organization
		Outdoor air pollution attributable deaths	Institute for Health Metrics and Evaluation
		Suicide rate	Institute for Health Metrics and Evaluation
	Ecosystem Sustainability	Greenhouse gas emissions	World Resources Institute
		Water withdrawals as a percentage of resources	World Resources Institute
		Biodiversity and habitat	Environmental Performance Index using data from the World Database on Protected Areas maintained by the United Nations Environment Programme World Conservation Monitoring Centre
Opportunity	Personal Rights	Political rights	Freedom House
		Freedom of speech	Cingranelli-Richards (CIRI) Human Rights Dataset
		Freedom of assembly/association	Cingranelli-Richards (CIRI) Human Rights Dataset
		Freedom of movement	Cingranelli-Richards (CIRI) Human Rights Dataset
		Private property rights	Heritage Foundation
	Personal Freedom and Choice	Freedom over life choices	Gallup World Poll
		Freedom of religion	Pew Research Center – Government Restrictions Index
		Early marriage	OECD Gender, Institutions and Development Database
		Satisfied demand for contraception	United Nations Population Division
		Corruption	Transparency International
	Tolerance and Inclusion	Tolerance for immigrants	Gallup World Poll
		Tolerance for homosexuals	Gallup World Poll
		Discrimination and violence against minorities	Fund for Peace – Fragile States Index
		Religious tolerance	Pew Research Center
		Community safety net	Gallup World Poll
	Access to Advanced Education	Years of tertiary schooling	Barro-Lee Educational Attainment Dataset
		Women's average years in school	Institute for Health Metrics and Evaluation
		Inequality in the attainment of education	United Nations Development Programme
		Globally ranked universities	Times Higher Education, QS World University Rankings, and Academic Ranking of World Universities

Appendix 2 / Factor Analysis Weights

	COMPONENT	INDICATOR NAME	WEIGHT	SCALED WEIGHT (0-1)
Basic Human Needs	Nutrition and Basic Medical Care	Undernourishment	0.21	0.19
		Depth of food deficit	0.21	0.19
		Maternal mortality rate	0.23	0.21
		Child mortality rate	0.23	0.20
		Deaths from infectious diseases	0.23	0.20
	Water and Sanitation	Access to piped water	0.36	0.34
		Rural access to improved water source	0.35	0.33
		Access to improved sanitation facilities	0.36	0.34
	Shelter	Availability of affordable of housing	0.15	0.12
		Access to electricity	0.36	0.29
		Quality of electricity	0.36	0.30
		Household air pollution attributable deaths	0.35	0.29
	Personal Safety	Homicide rate	0.25	0.20
		Level of violent crime	0.27	0.22
		Perceived criminality	0.25	0.20
		Political terror scale	0.24	0.19
		Traffic deaths	0.23	0.18
Foundations of Wellbeing	Access to Basic Knowledge	Adult literacy rate	0.24	0.21
		Primary school enrollment	0.20	0.18
		Lower secondary school enrollment	0.24	0.21
		Upper secondary school enrollment	0.23	0.20
		Gender parity in secondary enrollment	0.22	0.19
	Access to Information and Communications	Mobile telephone subscriptions	0.43	0.34
		Internet users	0.45	0.36
		Press Freedom Index	0.37	0.30
	Health and Wellness	Life expectancy	0.56	0.25
		Premature deaths from non-communicable diseases	0.56	0.25
		Obesity	0.44	0.30
		Outdoor air pollution attributable deaths	0.60	0.41
		Suicide rate	0.44	0.30
	Ecosystem Sustainability	Greenhouse gas emissions	n/a	0.33
		Water withdrawals as a percentage of resources	n/a	0.33
		Biodiversity and habitat	n/a	0.33
Opportunity	Personal Rights	Political rights	0.28	0.22
		Freedom of speech	0.23	0.19
		Freedom of assembly/association	0.25	0.20
		Freedom of movement	0.25	0.20
		Private property rights	0.23	0.18
	Personal Freedom and Choice	Freedom over life choices	0.29	0.22
		Freedom of religion	0.13	0.09
		Early marriage	0.29	0.21
		Satisfied demand for contraception	0.31	0.23
		Corruption	0.33	0.25
	Tolerance and Inclusion	Tolerance for immigrants	0.26	0.19
		Tolerance for homosexuals	0.29	0.22
		Discrimination and violence against minorities	0.31	0.23
		Religious tolerance	0.22	0.17
		Community safety net	0.27	0.20
	Access to Advanced Education	Years of tertiary schooling	0.30	0.26
		Women's average years in school	0.31	0.27
		Inequality in the attainment of education	0.30	0.26
		Globally ranked universities	0.25	0.21

Appendix 3 / Best and Worst-case Indicator Values

INDICATOR NAME	BEST CASE	WORST CASE
Undernourishment	5	58
Depth of food deficit	8	592
Maternal mortality rate	0	1600
Child mortality rate	0	205
Deaths from infectious diseases	0	1327
Access to piped water	100	0
Rural access to improved water source	100	9
Access to improved sanitation facilities	100	7
Availability of affordable of housing	1	0
Access to electricity	100	0
Quality of electricity	7	1
Household air pollution attributable deaths	6	1
Homicide rate	1	5
Level of violent crime	1	5
Perceived criminality	1	5
Political terror scale	1	5
Traffic deaths	0	68
Adult literacy rate	99	15
Primary school enrollment	100	30
Lower secondary school enrollment	100	9
Upper secondary school enrollment	100	0
Gender parity in secondary enrollment	1	0
Mobile telephone subscriptions	100	0
Internet users	100	0
Press Freedom Index	0	100
Life expectancy	85	41
Premature deaths from non-communicable diseases	0	41
Obesity	0	71
Outdoor air pollution attributable deaths	0	126
Suicide rate	0	33
Greenhouse gas emissions	4	0
Water withdrawals as a percentage of resources	0	5
Biodiversity and habitat	100	0
Political rights	1	7
Freedom of speech	2	0
Freedom of assembly/association	2	0
Freedom of movement	4	0
Private property rights	100	0
Freedom over life choices	1	0
Freedom of religion	4	1
Early marriage	0	1
Satisfied demand for contraception	100	0
Corruption	100	0
Tolerance for immigrants	1	0
Tolerance for homosexuals	1	0
Discrimination and violence against minorities	1	10
Religious tolerance	4	1
Community safety net	1	0
Years of tertiary schooling	2	0
Women's average years in school	16	0
Inequality in the attainment of education	0	0.5
Globally ranked universities	5	0

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