

2022 SOCIAL PROGRESS INDEX



METHODOLOGY REPORT

By Scott Stern, Jaromír Harmacek, Petra Krylova & Mohamed Httich

STRATEGIC PARTNER

Deloitte.

SUPPORTING SPONSOR

 **Breckinridge**
CAPITAL ADVISORS

**SOCIAL
PROGRESS
IMPERATIVE**

Acknowledgements

Constructing the Social Progress Index® is a significant research effort which involves months of desk research, data collection, cleaning, transformations, and calculations. This would not be possible without the leadership of Michael Green and Luke Greeves, alongside the Board of Directors, and support from all our colleagues. We would like to thank Balaaj Mustafa for his research assistance support, Sophie Sutherland, and the entire communications team for their editorial support and ensuring a very smooth communications and design process.

Suggested Citation

Index

Social Progress Imperative: 2022 Social Progress Index®. Social Progress Imperative. Washington, DC. Available at: www.socialprogress.org

Data

Harmacek, J., Krylova, P., Htitch, M.: 2022 Social Progress Index Data. Social Progress Imperative. Washington, DC.

Methodology

Stern, S., Harmacek, J., Krylova, P. & Htitch, M.: 2022 Social Progress Index Methodology Summary. Social Progress Imperative. Washington, DC. Available at: www.socialprogress.org/global/methodology

For methodological queries regarding the index, please contact Jaromir Harmacek (jharmacek@socialprogress.org). For any other queries, please contact Sophie Sutherland (ssutherland@socialprogress.org) or visit our website www.socialprogress.org.



2022 Social Progress Index® Methodology Report

- Introduction** 3
- Social Progress Principles** 3
- Dimensions of Social Progress** 5
- Components of Social Progress** 6
- Indicator Selection** 6
- Indicator Transformations** 9
 - A. Capped Indicators* 9
 - B. Log-transformed Indicators* 10
 - C. Calculation of parity* 10
 - D. Limiting volatility of survey indicators* 10
- Determining the Country Sample** 10
- Index Calculation** 11
 - A. Missing Values* 11
 - B. Standardization* 13
 - C. Component Scores* 13
 - D. Dimension Scores* 14
 - E. Index Scores* 14
 - F. World Score Calculation* 15
- Assessing Countries’ Relative Strengths and Weaknesses** 15
- Structural Integrity of the Social Progress Index** 16
- Year-to-Year Results Comparison** 17
- Limitations** 19
- Conclusion** 20
- Appendix A: Indicator Definitions and Sources** 21
- Appendix B: Indicator Boundaries** 29
- Appendix C: PCA-Derived Indicator Weights** 31
- Appendix E: Bibliography and Further Reading** 34



Introduction

The Social Progress Index® is a well-established measure, published since 2013, that is meant to catalyze improvement and drive action by presenting social outcome data in a useful and reliable way. Composed of multiple dimensions, the Social Progress Index can be used to benchmark success and provide a holistic, transparent, outcome-based measure of a country's wellbeing that is independent of economic indicators. Policymakers, businesses, and countries' citizens alike can use it to compare their country against others on different facets of social progress, allowing the identification of specific areas of strength or weakness.

The 2022 Social Progress Index ranks 169 countries on social progress. We combine 60 social and environmental outcome indicators to calculate an overall score for these countries, based on tiered levels of scoring that include measures in health, safety, education, technology, rights, and more. We also consider the data of 27 additional countries, calculating component and dimension scores when enough data are available. In all, the Social Progress Index measures at least some aspects of social progress across more than 99.97% of the world's population.

This report describes the methodology used to calculate the Social Progress Index. We start by describing the principles that establish the conceptual architecture of the index and provide an overview of the index framework. We then detail the steps taken to select data and calculate the index. Finally, we discuss the methodology behind assessing countries' strengths and weaknesses, relative to their economic prosperity. We conclude the report with limitations of year-to-year comparisons and information on future directions.

Social Progress Principles

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, established in consultation with a group of academic and policy experts, drives the framework of the Social Progress Index. It alludes to three broad elements of social progress, which we refer to as dimensions: Basic Human Needs, Foundations of Wellbeing, and Opportunity. Under each dimension are four components whose underlying concepts relate and are guided by questions we seek to answer with available data (see Figure 1.) Each component is further defined by a set of outcome indicators that respond to the conceptual questions posed.

Figure 1 / Social Progress Index® Component-Level Framework



Together, these interrelated elements combine to produce a given level of social progress. The Social Progress Index methodology allows measurement of each component and each dimension, yielding an overall score and ranking.

Our approach builds on a long line of work constructing country indexes to measure and assess various facets of economic and social performance. However, the Social Progress Index is distinct in its 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
- Calculation of each component as the weighted sum of a series of measures, with the weights determined through principal component analysis

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 associated with more traditional economic measures such as GDP per capita. In contrast, other indices such as the Human Development Index or OECD Better Life Index combine economic and social indicators. Our objective is to utilize a clear yet rigorous methodology that isolates the non-economic dimensions of social performance.

The Social Progress Index aims to be as outcome-based as possible. Both input and outcome-based indexes can help countries benchmark their progress, but in very different ways. Input indexes measure a country's policy choices or investments believed (or known) to lead to an important outcome, while outcome indexes directly measure the outcomes of these decisions or investments. Input indexes also require 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. In the field of social progress, this would mean a clear consensus and understanding of which inputs lead to better social outcomes—a field of research that is still growing and to which the Social Progress Index continues to contribute.

When there are multiple output measures or a lack of consensus on all the inputs that matter, or when data related to inputs are highly incomplete, an outcome-oriented index may be more appropriate (Fleurbaey and Blanchet, 2013). Following this logic, we designed the Social Progress Index as an outcome index. 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 useful for decision-makers benchmarking progress. The Social Progress Imperative continues to explore the role of input measures and policies in determining a country's performance.

Dimensions of Social Progress

At the topmost level of the framework, we synthesize 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?

Each of these questions describes a dimension of social progress, respectively: Basic Human Needs, Foundations of Wellbeing and Opportunity. The first dimension, Basic Human Needs, assesses a population's capacity to survive with adequate nourishment and basic medical care, clean water, sanitation, adequate shelter, and personal safety. These needs are still not met in many developing countries and are often incomplete in some more prosperous countries.

Basic needs have been the predominant focus of research in development economics, but the second dimension of social progress, Foundations of Wellbeing, deserves equal attention. It highlights the extent to which a country's residents can gain a basic education, obtain information and communicate freely, benefit from a modern healthcare system, and live in a healthy environment conducive to a long life. Nearly all countries struggle with at least one of these aspects.

Finally, any discussion of social progress must also include whether a country's population have the freedom and opportunity to make their own choices and pursue higher education. Personal rights, personal freedom and choice, inclusiveness, and access to advanced education all contribute to the level of opportunity within a given society. This dimension of the Social Progress Index is perhaps the most controversial and most difficult to measure. Nonetheless, it is important to highlight that societies, high-income or low-income, developed or developing, still struggle to meet the moral imperative to guarantee the equality of opportunity for all citizens.

The multi-dimensional construction of the Social Progress Index should not be interpreted as a step-by-step movement toward progress from one dimension to the next. Rather, the three dimensions are interrelated and, in fact, statistically correlated. While we distinguish between these three aspects of social progress, many issues they encompass interact with one another to drive more meaningful change.

Components of Social Progress

Under each dimension are four components. Components, like dimensions, are categories of outcomes, rather than specific outcomes themselves. Each component highlights a separate aspect of the overall set of outcomes that make up a dimension, building on both academic and policy literature. For example, the Opportunity dimension includes the components Personal Rights, Personal Freedom and Choice, Inclusiveness, and Access to Advanced Education. Each of these components describes a related, but distinct aspect of what it means for a society to guarantee opportunity among its population. The Personal Rights and Access to Advanced Education components describe the extent to which individuals can pursue their own objectives to the best of their ability. Personal Freedom and Choice and Inclusiveness, on the other hand, describe the extent of limits on individuals. Together, the four components offer a conceptually coherent way of capturing how societies can empower (or limit) an individual's autonomy, freedom, and ability to progress.

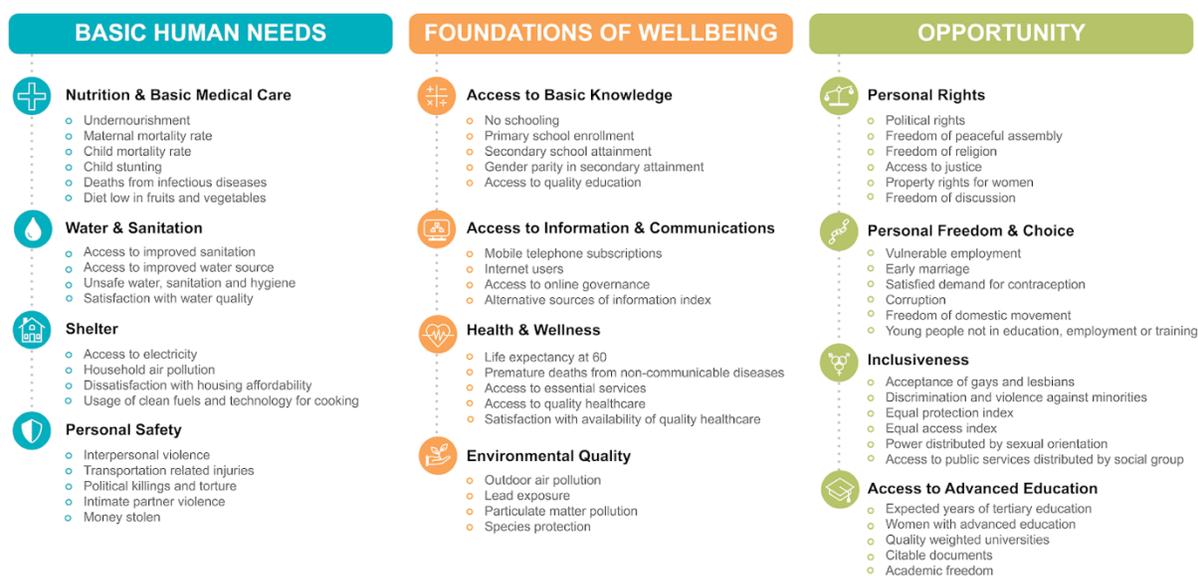
The twelve components represent what we believe to be the most complete set of outcome categories given our current understanding of social progress from diverse literature and given the current availability of data. The Social Progress Imperative Advisory Board provided input into selecting the dimensions and the elaboration of the components within each dimension, along with an iterative review of relevant literature.

The framework was established in 2013, and we continue to ensure its relevance each year of publication. We consult extensively with experts across disciplines on the twelve-component structure of the Social Progress Index on an ongoing basis, ensuring it continues to capture the principal aspects of human wellbeing and that the issues measured are comprehensive and apply to all societies, regardless of their country's level of economic development, political stature, or geography.

Indicator Selection

At the most granular level of the Social Progress Index framework, we identify multiple independent outcome measures – indicators – related to each component. Each set of indicators, grouped by component, defines and measures the same aspect of social progress. Depending on data availability and ongoing research into social outcomes, indicators may change with each edition of the Social Progress Index. However, the concepts captured by each set of indicators (i.e., components) remains the same. The 2022 Social Progress Index includes 60 indicators, with 4-6 indicators per component (see Figure 2.)

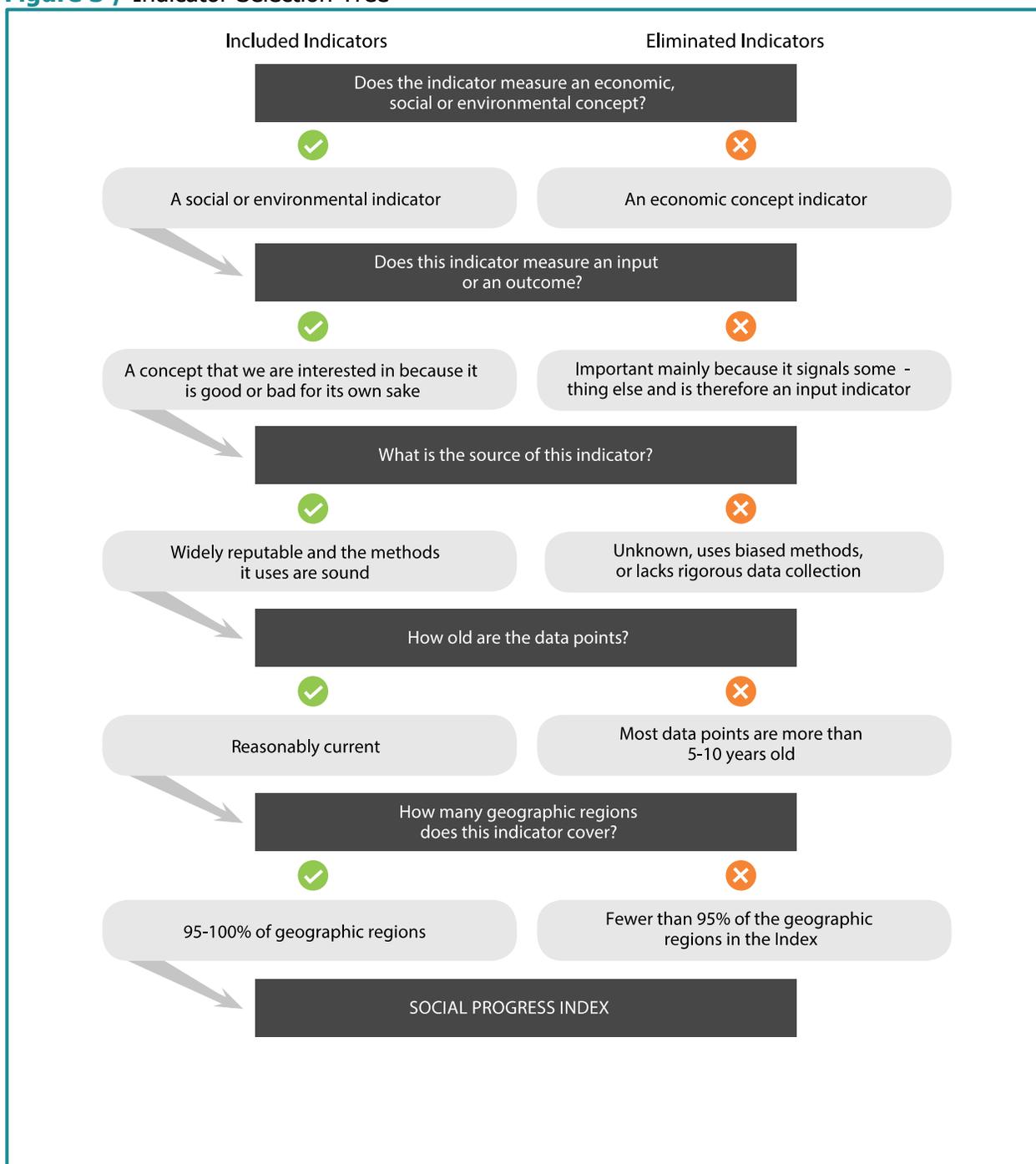
Figure 2 / Social Progress Index Indicator-Level Framework



We only include indicators that are measured well, with consistent methodology, by the same organization and across all (or essentially all) countries in our sample. We evaluate each indicator to ensure that the procedures used to produce the measure are sound and that it captures what it purports to capture. Data for each indicator must come from the same source to ensure consistency in measurement across countries.

Data sources range from large international institutions like the United Nations to non-governmental organizations such as Freedom House. We also include data collected via global surveys, such as Gallup’s World Poll (sources are summarized in Appendix 1.) For each indicator, we evaluate the data sources available and consider tradeoffs between the quality and precision of a social indicator and the comprehensiveness of its country coverage. Figure 3 below depicts our decision tree for indicator selection. Geographic coverage tends to exclude many high-quality indicators from consideration because they only cover a subset of countries, such as OECD countries, or a particular region, such as the European Union.

Figure 3 / Indicator Selection Tree



Additionally, we factor into our decision the age of the indicators, only considering the most recent available data. Across the 169 ranked countries we have a total of 9,885 data points to calculate the Social Progress Index for 2022.¹ Most of the data are reflective of 2021 (46.78%) and 2019 (37.72%). The least recent data point is from 2013 (Acceptance of gays and lesbians for the West Bank and Gaza).

¹ The rest to the total of 10,140 observations (60 variables for 169 ranked countries) for the current year (2022), i.e. 255 observations, were imputed using regression techniques.

A final important criterion for indicator data is that they are publicly available. We strive for transparency both in terms of the data we use to inform the Social Progress Index, as well as our calculation methodology. All the raw indicator data we use to calculate the Social Progress Index are published and downloadable on our website at www.socialprogress.org.

Indicator Transformations

When comparing country-level data, we encounter issues that require us to transform the data for certain indicators. In most cases, we transform data to meet clear upper or lower boundaries set by the indicator definition. In others, we address extreme values that may skew results if left untreated. Our main two techniques are to either cap an indicator, setting a clear upper or lower boundary cut-off value, or to log an indicator. We also transform gender parity in secondary attainment to better reflect the parity between boys and girls in a more gender-neutral fashion. Lastly, we calculate a floating average for selected survey indicators to limit annual volatility.

A. Capped Indicators

We impose a top and bottom boundary on a number of indicators, listed below in Figure 4. Child mortality rate, Infectious diseases, Undernourishment, Unsafe water, sanitation and hygiene, Transportation related injuries and Premature deaths from non-communicable diseases are capped at 99th percentile (defined for 2006-2022) to limit the influence of a few significant outliers. We set a floor at 0.03 for gender parity in secondary enrollment to allow for measurement error based on the recommendations of UNESCO², and we impose an upper boundary on the same indicator at the observed maximum to treat regression imputations with higher values. The mobile telephone subscriptions indicator is capped at 100 subscriptions to reflect the boundary set by its unit of measurement (number of subscriptions per 100 people). The political rights indicator is set to a floor of zero in line with the indicator's definition. Similarly, discrimination against minorities is set to a floor of one. Lastly, we cap years of tertiary schooling at five years to avoid the influence of a few near-outliers on component-level performance.

Figure 4 / Capped Indicators

Indicators	Cap
Child mortality rate	155.63
Infectious diseases	61253.96
Undernourishment	49.4
Unsafe water, sanitation, and hygiene	10850.66
Transportation related injuries	3219.5
Premature deaths from non-communicable diseases	1101.36
Gender parity in secondary enrollment	0.83
Gender parity in secondary enrollment	0.03
Mobile telephone subscriptions	100
Discrimination against minorities	1
Political rights	0
Years of tertiary schooling	5

² UNESCO Institute for Statistics. "Global Education Digest 2010." 2010, p. 17.
http://www.ungei.org/resources/files/GED_2010_EN.pdf

B. Log-transformed Indicators

Four indicators, Interpersonal violence within Personal Safety, Lead exposure within Environmental Quality, Citable documents, and Quality weighted universities within Access to Advanced Education, contain extreme values in relation to the rest of the indicator data distribution. Based on external research, we determined that these extreme values are not erroneous and should be preserved as a distinguishing characteristic of the countries they describe. As such, we transform these indicators using natural log.³ Logging allows us to retain the unique differences between countries in performance while creating a more sensible distribution that is less extreme.

C. Calculation of parity

We transform gender parity in secondary attainment in Access to Basic Knowledge to reflect the absolute distance from 1, where 1 represents an equal number of girls and boys enrolled. While in most countries, more boys are enrolled in secondary education than girls, there are a select number of countries in which the opposite is true. We therefore use the absolute distance from 1 to acknowledge the lack of parity for both boys and girls across countries.

D. Limiting volatility of survey indicators

We transform several indicators to limit the annual volatilities of the measures. This method was applied on all indicators from the Gallup World Poll. Indicator values are calculated as floating 3-year average.

Determining the Country Sample

The 2022 Social Progress Index ranks 169 countries⁴ on social progress. We have selected these countries by collecting all data available across all indicators and determining for which countries we can impute data, and for which countries we will have incomplete information to calculate a Social Progress Index score. Generally, a country cannot have more than one missing indicator per component to be included in the final Social Progress Index score rankings. In some cases, we make exceptions to this rule, particularly it pertains to Access to Basic Knowledge and Access to Advanced Education, where data are notoriously lacking. These exceptions are discussed in the next section.

Alongside the 169 ranked countries, we also include in our country sample 5 'partial' countries. These countries have enough data to calculate between nine to eleven of the twelve components, but not enough data to calculate an overall Social Progress Index score. As with ranked countries,

³ Prior to transformation, we add an alpha of 1 to interpersonal violence and lead exposure. We also add alpha of 0.1 to quality weighted universities, and 0.0001 to citable documents. This ensures we can log all values within the indicator, including zeros, while maintaining nearly the same relative differences between countries.

⁴ We refer to [World Population Review](#) regarding country recognition, while also taking into account the above mentioned data availability.

within those nine to eleven components for which enough data are available there cannot be more than one indicator missing per component.

Finally, we exclude from our original calculation sample countries with limited data, but we use the weights generated from PCA (described below) to calculate scores for these countries when possible. These countries do not have enough data to calculate at least 9 components, but 22 of them have enough data to calculate at least one component score. We include these countries in imputations prior calculation and during calculation (see below). Raw indicator data and scores for these 22 countries are included in the published dataset on our website.

In this year's edition, the 169 ranked countries include a full index score, ranks and relative performance for the West Bank and Gaza. In order to do so, we implement an approach different to other countries, since some indicator sources provide data for the West Bank and Gaza, while several others provide data separately for the West Bank and for Gaza. In these cases, we calculate a population weighted average to obtain one data point for the whole entity, which is then used in the overall index calculation.

Index Calculation

There are five core steps for calculating the Social Progress Index. We first address missing values, then invert and standardize indicators so that they are comparable in scale. We then use Principal Component Analysis (PCA) to aggregate indicators into a component score. Finally, we calculate dimension and overall Social Progress Index scores by averaging components and dimensions, respectively. Each of these steps is described in more detail below.

A. Missing Values

We ensure that all indicators included in the Social Progress Index are missing as few observations as possible to avoid jeopardizing the statistical quality of the index. Missing values can stem from lack of coverage by the data source, incomplete reporting by the country to international organizations, or outdated data whose publication date is older than 2008. In cases where an indicator is missing a country data point, we assess our imputation methodology both before and during index calculation. Imputations used prior to calculation are included and marked in the published dataset on our website; imputations generated during calculation are not.

Imputations prior to calculation:

We impute missing data prior to calculation under two scenarios: when a country lacks some, not all, indicator data within the examined time period; and when there are gaps in the years of data for indicators. These pre-calculation imputations are imperative to be able to include key countries in Social Progress Index rankings. We mark and publish these values in our dataset available for download, as they rely either on historical data from the same source or supplemental research.

In the first case, we carry back a future value for values used to calculate the Social Progress Indexes for the years 2011-2021 in order to maintain a consistent sample. Similarly we carry forward a historical value in those cases where historical data is available. In most cases we only carry forward or back a value for the maximum of 5 consecutive years. In cases where more data points are missing, we rely on imputations during calculations (see below).

Under the second scenario of pre-calculation imputations, we impute gaps between years by applying linear interpolation. We do so to ensure smooth year-to-year estimates based on current and historical data and by assuming linear change. In cases where there were data in the examined years, but not for all years aligned with 2011 through 2022 Social Progress Indexes, we rely on data older than 2010 (if available) to create linear estimations for the years in between. This is a necessary step in order to ensure that our calculations of social progress over time do not exaggerate annual improvement or decline merely due to gaps in the data points themselves.

Imputations during calculation:

After constructing the dataset with pre-calculation imputations as noted above, we assess the number of indicators each country is missing within a component. Using regression imputation, we generally impute data only for those countries for which there is no more than one missing data point per component in each of the twelve components (considered 'ranked countries') and for countries that have no more than one missing indicator data point in nine to eleven components (considered 'partial countries'). We use our country sample data of ranked and partial countries (including both current and historical Social Progress Index years, i.e. 2011-2022) to regress each indicator on the other indicators within a component. By constraining the regression to within-component indicators, we can preserve the signal that the indicator provides to PCA.

In the past, we have strictly adhered to only one missing indicator per component and continue to stress the importance of this aspect of our methodology. However, we allowed for an exception to this rule particularly within the Access to Basic Knowledge component where data availability poses a significant limitation. Therefore, for two indicators within this component we applied a pre-imputation regression methodology: we used indicators not directly included in the index which had a more complete global coverage and were highly correlated with the indicators we needed to predict. We used the Institute for Health Metrics and Evaluation indicators *education in years per capita* (total, males, females) and UNDP indicator *mean years of schooling* (total) to predict total, males', and females' secondary attainment for approximately 20 countries with missing data. The latter two variables were then used to calculate the educational parity indicator. The two pre-imputed indicators (secondary attainment and gender parity in secondary attainment) were then used again in the standard regression imputations described above.

We review each imputation to ensure accuracy. In some cases, we combine the regression trend with observed data. For example, when the last observed value for a country is in 2012, we have ten missing values that we impute by regression predictions. If the predicted data do not match the observed values, we take the regression trend from the predictions and apply it on the observed data. If there are no observed values for a country, we apply standard regression imputations as described above. In cases where these imputations do not match expectations or qualitative research, we use regional cohort estimates or carry values consistently across time to minimize bias. For example, for many Middle Eastern countries where Gallup does not ask its survey question on gays and lesbians due to cultural sensitivities, we consider assessments of countries set by the Human Dignity Trust based on LGBT criminalization laws.⁵ If a country is not assessed by the survey and criminalization includes the death penalty, we assign the country zero value for the indicator.

⁵ Map of countries that criminalize LGBT people can be found here:
<https://www.humandignitytrust.org/lgbt-the-law/map-of-criminalisation/>

The estimation of missing values is necessary prior to undertaking PCA, which requires a complete dataset for the results to be sound. We do not impute values for countries that do not meet the criteria of ranked or partial countries noted above; these countries are excluded from the main calculation process by which PCA weights are determined.

B. Standardization

We convert indicators to the same scale in a three-step process. First, we set best- and worst-case scenarii to provide concrete boundaries on both ends of the scale that are based on theoretical or historical values. We then invert indicators when increasing values reflect lower social progress. Finally, we standardize the indicators into z-scores prior to applying PCA.

While the best- and worst-case scenarii are defined at the indicator level, we strive to follow the same method for similar metrics. For indicators with pre-defined boundaries (all indicators from Varieties of Democracy, summary exposure values etc.) we use these to establish the upper and lower scenarii. We use natural boundaries for indicators that have a natural best-case scenario – such as maternal mortality, mobile phone subscriptions, primary school enrollment etc. For indicators that do not have a clear worst case or where the probability of reaching an upper boundary is extremely unlikely (e.g., child mortality, for which the theoretical worst case would be that every child dies before the age of five), we use a boundary based on the worst recorded performance five years prior to the first year of measurement (i.e., five years prior to the 2011 Social Progress Index). Best- and worst-case data values are included with the country dataset when PCA is applied. See Appendix B for the specific values used for each indicator’s bounds.

Once we establish a full dataset with indicator values for 2011 through 2022 and the best- and worst-case scenarii, we invert indicators for which a higher value denotes lower social progress. There are 23 inverted indicators in the 2022 Social Progress Index. These include: Undernourishment, Maternal mortality rate, Child mortality rate, Child stunting, Diet low in fruits and vegetables, Infectious diseases, Unsafe water, sanitation and hygiene, Household air pollution, Dissatisfaction with housing affordability, Interpersonal violence, Money stolen, Transportation related injuries, Intimate partner violence, Population with no schooling, Gender parity in secondary attainment, Premature deaths from non-communicable diseases, Outdoor air pollution, Lead exposure, PM 2.5, Vulnerable employment, Early marriage, Young people not in education, employment or training, and Discrimination and violence against minorities.

As a final step prior to applying PCA, we standardize the indicators into z-scores. Doing so produces scores with a mean of 0 and standard deviation of 1, ensuring the comparability of the indicators across the dataset in measurement.

C. Component Scores

To calculate component scores, we aggregate the set of indicators within each component into a factor using PCA and all twelve years of data.⁶ PCA combines indicators in a way that captures the maximum amount of variance in the data while reducing redundancy between indicators. It essentially assigns each indicator a weight, a method we select over equal weighting to ensure

⁶ Each statistical program has several ways to calculate PCA, leading to slight differences in estimations depending on both the command and program used. We use the following command in Stata: *factor [standardized indicator names], factor(1) pcf*

that indicators are meaningfully contributing to a component score, while accounting for similarities between them.

Within many of the twelve components, PCA generates similar weights for the indicators we include because we ensure a fair level of correlation between them (e.g., not too high or low a correlation) prior to finalizing our framework. However, for those cases in which indicators are less correlated with other indicators within their component, we consider PCA a good statistical approach for determining these indicators' contribution to the component scores while remaining objective.

The formula below reflects indicator aggregation into a principal component, where c=Social Progress Index component and i=indicator.

Formula 1
$$\text{Component value}_c = \sum_i (w_i * \text{indicator}_i)$$

Our choice of PCA as the basis for aggregation at the component level was also influenced by the quality and quantity of data available on social progress. For PCA to be valid, each indicator 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 design principles and the data we use fulfill this requirement.

To convert each principal component into a component score on a scale of 0 to 100, we use a simple min-max formula, where X=component value and j=country.

Formula 2
$$\text{Component score}_c = \frac{(X_j - \text{Worst Case})}{(\text{Best Case} - \text{Worst Case})} * 100$$

As noted in the prior section, only countries that are ranked or qualify as 'partial' are included in the country sample that determines PCA-generated weights. For countries that do not have enough data to calculate at least nine components, we use the weights generated by the original country sample to calculate component scores when possible. If a country outside the ranked and partial country sample has enough data to calculate all four components within a dimension, we proceed to calculate dimension scores as well.

D. Dimension Scores

Each dimension is the arithmetic average of the four components that make up that dimension. Countries that do not have scores in all four components of a given dimension do not have a dimension score. The formula for calculating a dimension score is below, where d=dimension and c=component.

Formula 3
$$\text{Dimension}_d = \frac{1}{4} \sum_c \text{Component score}_c$$

E. Index Scores

The overall Social Progress Index score is calculated as the arithmetic average of the three dimensions. Countries that do not have scores in all three dimensions do not have a Social

Progress Index score. The formula for calculating a Social Progress Index score is below, where d =dimension.

Formula 4
$$\text{Social Progress Index score} = \frac{1}{3} \sum_d \text{Dimension}_d$$

We provide the mean, standard deviation, minimum, and maximum values of the calculated component, dimension, and Social Progress Index scores in Appendix D. In establishing country rankings for overall performance, we divide country scores into six tiers based on hierarchical clustering.

F. World Score Calculation

In order to provide the most accurate assessment of world performance on social progress, we account for countries' populations as well as the statistical interaction between indicators. Therefore, to calculate the world Social Progress Index score, we first aggregate indicators into population-weighted values using data of all ranked and partial countries. We then apply the PCA weights generated by the original ranked and partial country sample to derive component scores and proceed as noted above to calculate dimension and the overall Social Progress Index scores. It is important to note that this method is different than calculating population-weighted scores, and in essence treats the world as a country.

Tiers

In previous editions of the index, hierarchical cluster analysis was used to calculate the tiers (for each year separately). For the 2022 Social Progress Index we applied a slightly different approach where we define deciles in the Social Progress Index scores across the 12 years. We then assign deciles into tiers as per the following: Tier 1: first decile, Tier 2: second and third decile, Tier 3: fourth and fifth decile, Tier 4: sixth and seventh decile, Tier 5: eighth and ninth decile, Tier 6: tenth decile. This method ensures comparability of tiers across years.

Assessing Countries' Relative Strengths and Weaknesses

The component, dimension, and overall Social Progress Index scores are scaled from 0 to 100 to provide an intuitive scale for the interpretation of absolute performance, benchmarking a country against the best and worst-possible scenarios in terms of social progress performance. However, it is also useful to consider relative performance, comparing the level of social progress among countries of similar levels 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 GDP 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 basis, comparing a country's performance to that of its economic peers. Results of this analysis are the basis of our country scorecards, which can be found on our website.

We define the group of a country's economic peers as the 15 countries closest in GDP PPP per capita. Standard groupings of countries, such as the World Bank's country income classifications, are not appropriate for relative comparison of countries 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.

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. We have found that groupings larger than 15 resulted in a wider range of typical scores and showed too few relative strengths and weakness, while smaller groupings become too sensitive to outliers. Additionally, to reduce the influence of year-to-year fluctuations in GDP data, we use a four-year average (2018-2021).

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.

We define comparator groups for all countries, regardless of whether they have complete Social Progress Index data or sufficient data for only some indicators, components, and dimensions. However, to maintain stability in comparisons, only countries with full data across all components of the index are included in comparator groups for other countries. Among ranked and partial countries, we do not calculate strengths and weaknesses for Cuba, Eritrea, North Korea, South Sudan, Syria, Taiwan, Venezuela, and Yemen due to missing GDP data.

Structural Integrity of the Social Progress Index

Throughout the indicator assessment and calculation process, we conduct statistical tests to ensure the structural integrity of the Social Progress Index. Our goal is that no single indicator majorly affects a country's component, dimension, or overall score, and that the indicators within each component are statistically related and compatible. To achieve this, we look at correlations between indicators and between indicators and aggregated scores, Cronbach's alpha, and the Kaiser-Meyer-Olkin measure of sampling adequacy.

In understanding the correlations between indicators, we strive for indicators within components to show correlations of between $r=0.25$ to $r=0.92$ (absolute values). Indicators with correlations below 0.25 generally show little conceptual and statistical relation to other indicators. Likewise, if two indicators are too highly correlated (i.e., $r>0.92$), we find that the indicators overlap too much in concept and become statistically redundant, which would place too much weight on the concepts they are capturing within the component; we generally remove one of these indicators as well. In the 2022 SPI framework, correlation coefficients range from 0.17 to 0.88. However, all correlations are statistically significant at the 1% level.

To evaluate the fit between indicators within each component, we calculate Cronbach's alpha after we transform the indicators and impute missing values. 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). As shown in Figure 5, all twelve components meet the 0.7.

Figure 5 / Cronbach’s Alpha for Each Component

		Cronbach’s Alpha
Basic Human Needs	Nutrition and Basic Medical Care	0.94
	Water and Sanitation	0.90
	Shelter	0.83
	Personal Safety	0.76
Foundations of Wellbeing	Access to Basic Knowledge	0.90
	Access to Information and Communications	0.75
	Health and Wellness	0.90
	Environmental Quality	0.76
Opportunity	Personal Rights	0.94
	Personal Freedom and Choice	0.82
	Inclusiveness	0.89
	Access to Advanced Education	0.86

Cronbach’s alpha is a good preliminary screen for conceptual fit; however, it does not provide a direct measure of the goodness of fit of a factor analysis (Manly, 2004.) Rather, we assess goodness of fit using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. Generally, KMO scores should be above 0.5. In our data, the mean KMO score is above 0.5 for all components, suggesting that the grouping of indicators chosen for the components of the Social Progress Index provides a good measure of the underlying construct.

Figure 6 / KMO for Each Component

		Mean KMO
Basic Human Needs	Nutrition and Basic Medical Care	0.89
	Water and Sanitation	0.83
	Shelter	0.74
	Personal Safety	0.72
Foundations of Wellbeing	Access to Basic Knowledge	0.84
	Access to Information and Communications	0.69
	Health and Wellness	0.78
	Environmental Quality	0.74
Opportunity	Personal Rights	0.90
	Personal Freedom and Choice	0.77
	Inclusiveness	0.83
	Access to Advanced Education	0.82

Year-to-Year Results Comparison

Each year we conduct a comprehensive review of all indicators included in the Social Progress Index framework to check data updates (which frequently include retroactive revisions) and whether new indicators have been published that are well-suited to describing social progress concepts. Many data sources that we use revise their data collection or estimation methods, which

impacts not just newly published data but also previously published data. The Social Progress Index undergoes the same process for the sake of comparability. Using the 2022 Social Progress Index framework and methodology, we provide comparable historical data for eleven additional years of the Social Progress Index, from 2011 to 2021. Results for the years 2011 to 2021 are therefore different from results that we have previously published.

It is important to note that while we establish a twelve-year time-series of social progress from 2011 to 2022, not all indicator data are updated on an annual basis. Therefore, change over time is best interpreted over the entire span of these eleven years rather than focusing on annual change.

The underlying framework (components and dimensions) of the Social Progress Index has remained the same as in 2021. However, we added several new indicators and removed a few due to their discontinuation or the lack of updated data. We also changed the sources and the measurement of a handful of indicators. Additionally, of the 60 indicators, majority were retroactively revised by the data sources. We list indicator changes by component below.

For several indicators we have changed the metric of measurement from deaths to Disability-adjusted life years (DALYs). DALYs represent the sum of years lost due to premature death (YLLs) and years lived with disability (YLDs). DALYs are also defined as years of healthy life lost. It is a universal metric that allows researchers and policymakers to compare very different populations and health conditions across time. One DALY equals one lost year of healthy life. DALYs allow us to estimate the total number of years lost due to specific causes and risk factors at the country, regional, and global levels. This change was applied on the following indicators:

- Infectious diseases
- Unsafe water, sanitation and hygiene
- Household air pollution
- Interpersonal violence
- Transportation related injuries
- Outdoor air pollution
- Lead exposure

Nutrition and Basic Medical Care: The composition of the component remained mostly unchanged, with one new indicator on measuring Diet low in fruits and vegetables from the Institute of Health Metrics and Evaluation. The measurement of Infectious diseases indicator now uses the metric of Disability-adjusted life years instead of deaths.

Water and Sanitation: The composition of the component remained mostly unchanged with one new indicator on measuring the Satisfaction with water quality from the Gallup World Poll. The measurement of Unsafe water, sanitation, and hygiene indicator now uses the metric of Disability-adjusted life years instead of deaths.

Shelter: The composition of the component remained unchanged. The measurement of Household air pollution indicator now uses the metric of Disability-adjusted life years instead of deaths.

Personal Safety: The composition of the component changed with two new indicators on Intimate partner violence from the Institute of Health Metrics and Evaluation and Money stolen

from the Gallup World Poll. The measurement of Interpersonal violence and Transportation related injuries indicators now uses the metric of Disability-adjusted life years instead of deaths.

Access to Basic Knowledge: The composition of the component remained unchanged. The indicator on No schooling now refers to the whole population, while in previous editions it was only relating to women.

Access to Information and Communications:

The composition of the component changed with one new indicator on Alternative sources of information from the Varieties of Democracy while the Media censorship indicator was removed to eliminate duplicities.

Health and Wellness: The composition of the component remained mostly unchanged with one new indicator on measuring the Satisfaction with availability of quality healthcare from the Gallup World Poll.

Environmental Quality: The composition of the component remained unchanged. The measurement of Lead exposure and Outdoor air pollution indicators now uses the metric of Disability-adjusted life years instead of deaths.

Personal Rights: The composition of the component changed with two new indicators on Freedom of peaceful assembly and Freedom of discussion from the Varieties of Democracy while the Freedom of expression indicator was removed to eliminate duplicities.

Personal Freedom and Choice: The composition of the component remained mostly unchanged with one new indicator on measuring the Freedom of domestic movement from the Varieties of Democracy.

Inclusiveness: The composition of the component changed with four new indicators – Equal protection index, Equal access index, Power distributed by sexual orientation and Access to public services distributed by social group from the Varieties of Democracy. Three indicators – Equality of political power by gender, Equality of political power by socioeconomic position and Equality of political power by social group – were removed to eliminate duplicities.

Access to Advanced Education: The composition of the component remained unchanged.

Limitations

The Social Progress Index measures how countries at the national level perform on a certain set of indicators that meet the standards and concepts represented by the Social Progress Index framework. It is an important tool that is used to compare countries and assess both absolute and relative levels of performance on social progress to find best practices and to target areas which need improvement or from which other countries can learn. While the Social Progress Index framework captures the multi-dimensional concepts underlying social progress, we are limited in how we measure these concepts by the data available from public sources. Country performance is dependent upon the data published by other sources, and we defer to these sources to respond to country inquiries about the different aspects of social progress (a full list of sources is included in Appendix A).

We also recognize that the indicators in many of the topics we measure are not perfect. We strive to ensure each indicator meets our standards of quality; however, some issues are much more complex than the numbers we use to communicate them. For example, equality of political power by gender (in Inclusiveness) must consider laws that are in place that require female representation in government, as well as account for places where women might not necessarily have the voice they are supposedly provided under these laws. We view these indicators as a starting point for measurement and conversation, and we continue to refine the index each year to accommodate more recent data with greater geographic coverage that cover important aspects of social progress still not captured by the current indicators available, including violence against women, national environmental degradation, freshwater withdrawals, and more.

Furthermore, the Social Progress Index provides a view into how a country performs on average, which helps inform the many policies and investments that affect social progress at the national level. However, it is only a starting point: aggregate data can obscure substantial regional and state differences in performance that are equally important to a country's policy considerations, especially in geographically large regions. For this reason, we have established several initiatives across Latin America, Europe, South Asia, and North America to explore social progress at a disaggregated regional level. We apply the same Social Progress Index framework to more localized geographic regions, contextualizing indicators and concepts with the input of local stakeholders. These initiatives help further drive action from the broader issues highlighted in the global Social Progress Index.

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 2022 Social Progress Index results 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. 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. We continue to test our process and methodology at the regional and city level, replicating the steps outlined in this report to produce meaningful results in different areas of the world.

Appendix A: Indicator Definitions and Sources

All data used to calculate the 2022 Social Progress Index and relevant analyses are the most recent available as of July 1, 2022.

Component	Indicator name	Definition	Source	Link
BASIC HUMAN NEEDS				
Nutrition and Basic Medical Care	Infectious diseases	Age-standardized Disability-Adjusted Life Years (DALYs) rate caused by HIV/AIDS, tuberculosis, diarrhea, intestinal infections, respiratory infections, otitis media, meningitis, encephalitis, diphtheria, whooping cough, tetanus, measles, varicella, herpes zoster, malaria, Chagas disease, leishmaniasis, typanosomiasis, schistosomiasis, cysticercosis, cystic echinococcosis, lymphatic filariasis, onchocerciasis, trachoma, dengue, yellow fever, rabies, intestinal nematode infections, food-borne trematodiasis, leprosy, ebola, zika virus, guinea worm disease, sexually transmitted diseases (excluding HIV), hepatitis, and other infectious diseases per 100,000 people.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool
	Child mortality rate	Probability of dying between birth and exactly 5 years of age, expressed per 1,000 live births.	UN Inter-agency Group for Child Mortality Estimation	http://www.childmortality.org
	Child stunting	Risk-weighted prevalence of stunting in children under 5 as measured by the summary exposure value (SEV) for child stunting.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool
	Maternal mortality rate	Maternal deaths per 100,000 livebirths in women aged 10-54 years.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/gbd-2017-health-related-sdgs-1990-2030
	Undernourishment	The prevalence of undernourishment expresses the probability that a randomly selected individual from the population consumes an amount of calories that is insufficient to cover her/his energy requirement for an active and healthy life. The indicator is computed by comparing a probability distribution of habitual daily dietary energy consumption with a threshold level called the minimum dietary energy requirement. Both are based on the notion of an average individual in the reference population.	Food and Agriculture Organization of the United Nations	http://www.fao.org/economic/ess/ess-fs/ess-fadata/en/
Diet low in fruits and vegetables	Risk-weighted, age-standardized prevalence of nutrition low in fruits and vegetables as measured by the summary exposure value (SEV).	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool	

Component	Indicator name	Definition	Source	Link
Water and Sanitation	Access to improved sanitation	Proportion of population with access to improved toilet types as defined by the Joint Monitoring Program (JMP).	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/global-burden-disease-study-2019-gbd-2019-covariates-1980-2019
	Access to improved water source	Proportion of population with access to improved water sources as defined by the Joint Monitoring Program (JMP).	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/global-burden-disease-study-2019-gbd-2019-covariates-1980-2019
	Unsafe water, sanitation and hygiene	Age-standardized Disability-Adjusted Life Years (DALYs) rate attributable to unsafe water, sanitation and hygiene per 100,000 people.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool
Shelter	Satisfaction with water quality	The proportion of respondents answering 'satisfied' to the question, "In the city or area where you live, are you satisfied or dissatisfied with the quality of water?"	Gallup World Poll	https://ga.gallup.com/
	Household air pollution	Age-standardized Disability-Adjusted Life Years (DALYs) rate caused by household air pollution from solid fuels per 100,000 people. Household air pollution includes exposure to particulate matter less than 2.5 microns in diameter (PM2.5) due to the use of solid fuels for cooking, including coal, charcoal, wood, agricultural residue, and animal dung.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool
	Dissatisfaction with housing affordability	The proportion of respondents answering 'dissatisfied' to the question, "In the city or area where you live, are you satisfied or dissatisfied with the availability of good, affordable housing?"	Gallup World Poll	https://ga.gallup.com/
	Access to electricity	The percentage of the population with access to electricity.	SE4ALL Global Tracking Framework (World Bank, International Energy Agency, and the Energy Sector Management Assistance Program)	https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS
	Usage of clean fuels and technology for cooking	The proportion of population primarily using clean cooking fuels and technologies for cooking.	World Health Organization	https://apps.who.int/gho/data/node.main.SDGFUELS712?lang=en
Personal Safety	Interpersonal violence	Age-standardized Disability-Adjusted Life Years (DALYs) per 100,000 people from interpersonal violence. Interpersonal violence is defined as death or disability from intentional use of physical force or	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool

Component	Indicator name	Definition	Source	Link
		power, threatened or actual, from another person or group not including military or police forces.		
	Transportation related injuries	Age-standardized Disability-Adjusted Life Years (DALYs) per 100,000 people due to injuries related to transportation. These injuries include road injuries (death or disability due to unintentional interaction with an automobile, motorcycle, pedal cycle, or other vehicles) as well as other transport injuries.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool
	Political killings and torture	Physical violence index is based on indicators that reflect violence committed by government agents and that are not directly referring to elections.	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
	Intimate partner violence	Age-standardized prevalence of ever-partnered women aged 15 years and older who experienced physical or sexual violence by a current or former intimate partner in the last 12 months (%).	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/gbd-2017-health-related-sdgs-1990-2030
	Money stolen	The proportion of respondents answering 'yes' to the question, "Within the last 12 months, have you had money or property stolen from you or another household member?"	Gallup World Poll	https://ga.gallup.com/

FOUNDATIONS OF WELLBEING

Access to Basic Knowledge	Population with no schooling	Proportion of population (age-standardized) with no schooling.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/global-burden-disease-study-2019-gbd-2019-covariates-1980-2019
	Equal access to quality education	Country experts' aggregated evaluation of the question, "To what extent is high quality basic education guaranteed to all, sufficient to enable them to exercise their basic rights as adult citizens?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
	Primary school enrollment	Total number of students of official primary school age who are enrolled in any level of education, expressed as a percentage of the total population of official primary school age. Statistic is termed 'total net primary enrollment rate.'	UN Educational, Scientific, and Cultural Organization Institute for Statistics	http://data.uis.unesco.org/
	Secondary school attainment	Population with at least some secondary education (% ages 25 and older)	United Nations Development Programme (UNDP) Human Development Data	http://hdr.undp.org/en/data
	Gender parity in secondary attainment	The absolute deviation from parity (=1) in secondary education attainment of women and men.	United Nations Development Programme (UNDP) Human Development Data	http://hdr.undp.org/en/data

Component	Indicator name	Definition	Source	Link
Access to Information and Communications	Access to online governance	The availability of e-participation tools on national government portal for of the following uses: e-information – provision of information on the Internet; e-consultation – organizing public consultations online; and e-decision-making – involving citizens directly in decision processes. E-participation is defined as the process of engaging citizens through ICTs in policy, decision-making, and service design and delivery in order to make it participatory, inclusive, and deliberative.	UN Department of Economic and Social Affairs E-Government Survey	https://publicadministration.un.org/e-govkb/en-us/Data-Center
	Internet users	The estimated number of Internet users out of the total population, using the Internet from any device (including mobile phones) in the last 12 months.	International Telecommunications Union	http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx
	Mobile telephone subscriptions	Subscriptions to a public mobile telephone service using cellular technology, including the number of pre-paid SIM cards active during the past three months, expressed as the number of mobile telephone subscriptions per 100 inhabitants.	International Telecommunications Union	http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx
	Alternative sources of information index	Country experts' aggregated evaluation of the questions: To what extent is the media (a) un-biased in their coverage or lack of coverage of the opposition, (b) allowed to be critical of the regime, and (c) representative of a wide array of political perspectives?	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
Health and Wellness	Life expectancy at 60	The average number of years that a person of 60 to 64 years of age could expect to live, if he or she were to pass through life exposed to the sex- and age-specific death rates prevailing at the time of his or her 60 years, for a specific year, in a given country, territory, or geographic area.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool
	Premature deaths from non-communicable diseases	Mortality rate due to cardiovascular diseases, cancers, diabetes, and chronic respiratory diseases among populations aged 30–70 years.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/ihme-data/gbd-2017-health-related-sdgs-1990-2030
	Equal access to quality healthcare	Country experts' aggregated evaluation of the question, "To what extent is high quality basic healthcare guaranteed to all, sufficient to enable them to exercise their basic political rights as adult citizens?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html

Component	Indicator name	Definition	Source	Link
	Access to essential health services	The universal health coverage (UHC) measures the coverage of 9 tracer interventions and risk-standardized death rates from 32 causes amenable to personal healthcare, including vaccine-preventable diseases (e.g., diphtheria, tetanus, measles), respiratory infections, cancer (breast, cervical, uterine, testicular), heart diseases, diabetes, kidney disease), and the adverse effects of medical treatment.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/global-burden-disease-study-2019-gbd-2019-covariates-1980-2019
Environmental Quality	Outdoor air pollution	Age-standardized Disability-Adjusted Life Years (DALYs) per 100,000 people resulting from ambient particulate matter pollution, including emissions from industrial activity, households, cars and trucks.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool
	Lead exposure	Age-standardized Disability-Adjusted Life Years (DALYs) per 100,000 people attributable to lead exposure. Lead exposure is defined as acute exposure, measured by micrograms of lead per decilitre of blood, and chronic exposure, measured by micrograms of lead per gram of bone.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/gbd-results-tool
	Particulate matter pollution	Population-weighted mean levels of annual exposure to suspended particles smaller than 2.5 microns in aerodynamic diameter (PM2.5), which are capable of penetrating deep into the respiratory tract and causing severe health damage.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/global-burden-disease-study-2019-gbd-2019-covariates-1980-2019
	Species protection	An index of how well a country's terrestrial protected areas overlap with the ranges of its vertebrate, invertebrate, and plant species. The Species Protection Index is calculated using remote sensing data, global biodiversity informatics, and integrative models to map suitable habitat for over 30,000 terrestrial species at high resolutions. A score of 100 indicates full coverage of all species' ranges by a country's protected areas, and a score of 0 indicates no overlap.	Environmental Performance Index Map of Life	https://epi.yale.edu/ https://mol.org/indicators/

OPPORTUNITY

Personal Rights	Access to justice	Country experts' aggregated evaluation of the question, "Do citizens enjoy secure and effective access to justice?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
	Freedom of religion	Country experts' aggregated evaluation of the question, "Is there freedom of religion?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
	Political rights	An evaluation of three subcategories of political rights: electoral process, political pluralism and participation,	Freedom House	https://freedomhouse.org/report-types/freedom-world

Component	Indicator name	Definition	Source	Link
		and functioning of government on a scale from 0 (no political rights) to 40 (full political rights). Some countries and territories score below zero on the questions used to compose the indicator.		
	Property rights for women	Country experts' aggregated evaluation of the question, "Do women enjoy the right to private property?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
	Freedom of peaceful assembly	Country experts' aggregated evaluation of the question, "To what extent do state authorities respect and protect the right of peaceful assembly?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
	Freedom of discussion	Country experts' aggregated evaluation of the question, "Are citizens able to openly discuss political issues in private homes and in public spaces?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
Personal Freedom and Choice	Satisfied demand for contraception	The percentage of total demand for family planning among married or in-union women aged 15 to 49 that is satisfied with modern methods.	United Nations Population Division	http://www.un.org/en/development/desa/population/theme/family-planning/cp_model.shtml
	Perception of corruption	The perceived level of public sector corruption based on expert opinion, measured on a scale from 0 (highly corrupt) to 100 (very clean).	Transparency International	www.transparency.org/cpi
	Early marriage	The percentage of women aged 15-19 years who are married or in-union.	United Nations Population Division	https://www.un.org/en/development/desa/population/theme/marriage-unions/marriage_estimates.asp https://ilostat.ilo.org/data/
	Young people not in education, employment or training	The proportion of youth who are not in employment and not in education or training. Youth are defined as persons between the ages of 15 and 24 years. The series is part of the ILO modelled estimates.	International Labor Organization	
	Vulnerable employment	Contributing family workers and own-account workers as a percentage of total employment.	International Labor Organization/World Bank	https://data.worldbank.org/indicator/SL.EMP.VULN.ZS
Inclusiveness	Freedom of domestic movement	Country experts' aggregated evaluation of the question, "Do citizens enjoy freedom of movement and residence?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
	Equal protection index	Country experts' aggregated evaluation of the question, "How equal is the protection of rights and freedoms across social groups by the state?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
	Equal access index	Country experts' aggregated evaluation of the question, "How equal is access to power?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
	Power distributed by sexual orientation	Country experts' aggregated evaluation of the question, "To what extent is political power distributed according to sexual orientation?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html

Component	Indicator name	Definition	Source	Link
Access to Advanced Education	Access to public services distributed by social group	Country experts' aggregated evaluation of the question, "Are basic public services, such as order and security, primary education, clean water, and healthcare, distributed equally across social groups?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
	Discrimination and violence against minorities	Group Grievance indicator: discrimination, powerlessness, ethnic violence, communal violence, sectarian violence, and religious violence.	Fund for Peace Fragile States Index	https://fragilestatesindex.org/
	Acceptance of gays and lesbians	The proportion of respondents answering yes to the question, "Is the city or area where you live a good place or not a good place to live for gay or lesbian people?"	Gallup World Poll	https://ga.gallup.com/
	Citable documents	Citable documents - articles, reviews and conference papers - per 1,000 population.	Scimago Journal & Country Rank	https://www.scimagojr.com/countryrank.php
	Academic freedom	Country experts' aggregated evaluation of the question, "To what extent is academic freedom respected?"	Varieties of Democracy (V-Dem), Dataset Version 12	https://v-dem.net/vdemds.html
	Women with advanced education	Proportion of females (age-standardized) with 12–18 years of education.	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/global-burden-disease-study-2019-gbd-2019-covariates-1980-2019
	Expected years of tertiary schooling	Number of years a person of tertiary school entrance age can expect to spend within tertiary education. For a child of a certain age a, the school life expectancy is calculated as the sum of the age specific enrollment rates for the levels of education specified. The part of the enrolment that is not distributed by age is divided by the school-age population for the level of education they are enrolled in, and multiplied by the duration of that level of education. The result is then added to the sum of the age-specific enrolment rates. The indicator seeks to show the overall level of development of an educational system in terms of the average number of years of schooling that the education system offers to the eligible population, including those who never enter school.	UN Educational, Scientific, and Cultural Organization Institute for Statistics	http://data.uis.unesco.org/
	Quality weighted universities	The number of universities in a country weighted by the quality of universities, measured by university rankings on any of the three most widely used international assessments. Universities in the top 400 on any list are given double weight. Not ranked universities are given 5% weight of the top ranked universities.	Times Higher Education World University Rankings, QS World University Rankings, and Academic Ranking of World Universities; Varieties of Democracy	https://www.timeshighereducation.com/world-university-rankings/2022 https://www.topuniversities.com/university-rankings/world-university-rankings/2023 https://www.shanghai-ranking.com/rankings/arwu/2020 https://v-dem.net/vdemds.html

Component	Indicator name	Definition	Source	Link
			(V-Dem), Dataset Version 12; SPI calculations	
	GDP per capita, PPP (constant 2017 international \$)	GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2017 international dollars.	World Bank	http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD

Appendix B: Indicator Boundaries

Indicator	Best case	Worst case
Child mortality rate (deaths/1,000 live births)	0	155.6328
Undernourishment (% of pop.)	2.5	49.4
Child stunting (0=low risk; 100=high risk)	0	100
Maternal mortality rate (deaths/100,000 live births)	0	746.19
Diet low in fruits and vegetables (0=low risk; 100=high risk)	0	100
Infectious diseases (DALYs/100,000)	0	61253.96
Unsafe water, sanitation and hygiene (DALYs/100,000)	0	10850.66
Access to improved water source (proportion of pop.)	1	0.263106
Satisfaction with water quality (proportion of pop.)	1	0.2475
Access to improved sanitation (proportion of pop.)	1	0.091353
Household air pollution (DALYs/100,000)	0	13107.33
Usage of clean fuels and technology for cooking (% of pop.)	100	0
Access to electricity (% of pop.)	100	0.643132
Dissatisfaction with housing affordability (proportion of pop.)	0	0.82
Intimate partner violence (% of women aged 15+)	0	51.15
Transportation related injuries (DALYs/100,000)	0	3219.5
Interpersonal violence (DALYs/100,000)	0	5827.237
Money stolen (proportion of pop.)	0	0.505
Political killings and torture (0=low freedom; 1=high freedom)	1	0
Population with no schooling (proportion of pop.)	0	0.876141
Primary school enrollment (% of children)	100	35.30679
Equal access to quality education (0=unequal; 4=equal)	4	0
Secondary school attainment (% of pop. aged 25+)	100	3.2
Gender parity in secondary attainment (distance from parity)	0.03	0.838095
Access to online governance (0=low; 1=high)	1	0
Internet users (% of pop.)	100	0
Alternative sources of information index (0=low; 1=high)	1	0
Mobile telephone subscriptions (subscriptions/100 people)	100	0
Access to essential health services (0=none; 100=full coverage)	100	0
Life expectancy at 60 (years)	28.36	11.40923
Premature deaths from non-communicable diseases (deaths/100,000)	0	1101.368
Satisfaction with availability of quality healthcare (proportion of pop.)	1	0.135834
Equal access to quality healthcare (0=unequal; 4=equal)	4	0
Particulate matter pollution (mean annual exposure, µg/m3)	0	98.22298
Outdoor air pollution (DALYs/100,000)	0	4837.824
Species protection (0=low; 100=high)	100	0
Lead exposure (DALYs/100,000)	0	2474.773
Access to justice (0=nonexistent; 1=observed)	1	0
Freedom of peaceful assembly (0=no freedom; 4=full freedom)	4	0
Freedom of discussion (0=low; 1=high)	1	0
Freedom of religion (0=no freedom; 4=full freedom)	4	0

Property rights for women (0=no rights; 5=full rights)	5	0
Political rights (0 and lower=no rights; 40=full rights)	40	0
Vulnerable employment (% of total employment)	0	94.4
Young people not in education, employment or training (% of youth)	0	53.76
Early marriage (% of married women aged 15-19)	0	62.99182
Freedom of domestic movement (0=low; 1=high)	1	0
Satisfied demand for contraception (% satisfied demand)	100	4.3
Perception of corruption (0=high corruption; 100=low corruption)	100	0
Equal protection index (0=low; 1=high)	1	0
Acceptance of gays and lesbians (proportion of pop.)	1	0
Equal access index (0=low; 1=high)	1	0
Power distributed by sexual orientation (0=extremely unequal; 3=equal)	3	0
Access to public services distributed by social group (0=extremely unequal; 4=equal)	4	0
Discrimination and violence against minorities (0=low; 10=high)	1	10
Citable documents (documents/1,000 people)	6.503036	0
Women with advanced education (proportion of females)	1	0.006506
Expected years of tertiary schooling (years)	5	0.0112
Quality weighted universities (points)	1043.4	0
Academic freedom (0=low; 1=high)	1	0

Appendix C: PCA-Derived Indicator Weights

Indicator	Unscaled	Scaled
Child stunting (0=low risk; 100=high risk)	0.19	0.17
Infectious diseases (DALYs/100,000)	0.19	0.17
Maternal mortality rate (deaths/100,000 live births)	0.20	0.18
Child mortality rate (deaths/1,000 live births)	0.20	0.18
Undernourishment (% of pop.)	0.18	0.16
Diet low in fruits and vegetables (0=low risk; 100=high risk)	0.17	0.15
Unsafe water, sanitation and hygiene (DALYs/100,000)	0.29	0.26
Access to improved sanitation (proportion of pop.)	0.30	0.26
Access to improved water source (proportion of pop.)	0.29	0.26
Satisfaction with water quality (proportion of pop.)	0.25	0.22
Household air pollution (DALYs/100,000)	0.33	0.29
Access to electricity (% of pop.)	0.34	0.30
Usage of clean fuels and technology for cooking (% of pop.)	0.33	0.29
Dissatisfaction with housing affordability (proportion of pop.)	0.13	0.11
Transportation related injuries (DALYs/100,000)	0.29	0.21
Interpersonal violence (DALYs/100,000)	0.23	0.17
Political killings and torture (0=low freedom; 1=high freedom)	0.25	0.18
Intimate partner violence (% of women aged 15+)	0.33	0.24
Money stolen (proportion of pop.)	0.28	0.20
Equal access to quality education (0=unequal; 4=equal)	0.21	0.18
Population with no schooling (proportion of pop.)	0.25	0.22
Secondary school attainment (% of pop. aged 25+)	0.25	0.21
Primary school enrollment (% of children)	0.21	0.18
Gender parity in secondary attainment (distance from parity)	0.24	0.21
Alternative sources of information index (0=low; 1=high)	0.16	0.13
Mobile telephone subscriptions (subscriptions/100 people)	0.34	0.28
Internet users (% of pop.)	0.38	0.31
Access to online governance (0=low; 1=high)	0.36	0.29
Equal access to quality healthcare (0=unequal; 4=equal)	0.23	0.20
Life expectancy at 60 (years)	0.25	0.21
Premature deaths from non-communicable diseases (deaths/100,000)	0.23	0.20
Access to essential health services (0=none; 100=full coverage)	0.26	0.22
Satisfaction with availability of quality healthcare (proportion of pop.)	0.21	0.18
Lead exposure (DALYs/100,000)	0.34	0.26
Particulate matter pollution (mean annual exposure, µg/m3)	0.35	0.27
Outdoor air pollution (DALYs/100,000)	0.35	0.27
Species protection (0=low; 100=high)	0.25	0.19
Freedom of religion (0=no freedom; 4=full freedom)	0.17	0.15

Property rights for women (0=no rights; 5=full rights)	0.18	0.16
Freedom of peaceful assembly (0=no freedom; 4=full freedom)	0.20	0.17
Access to justice (0=nonexistent; 1=observed)	0.19	0.17
Freedom of discussion (0=low; 1=high)	0.20	0.18
Political rights (0 and lower=no rights; 40=full rights)	0.20	0.18
Early marriage (% of married women aged 15-19)	0.24	0.17
Satisfied demand for contraception (% satisfied demand)	0.23	0.17
Young people not in education, employment or training (% of youth)	0.18	0.13
Vulnerable employment (% of total employment)	0.26	0.19
Perception of corruption (0=high corruption; 100=low corruption)	0.27	0.20
Freedom of domestic movement (0=low; 1=high)	0.18	0.13
Equal protection index (0=low; 1=high)	0.21	0.17
Equal access index (0=low; 1=high)	0.22	0.18
Power distributed by sexual orientation (0=extremely unequal; 3=equal)	0.22	0.18
Access to public services distributed by social group (0=extremely unequal; 4=equal)	0.20	0.16
Acceptance of gays and lesbians (proportion of pop.)	0.20	0.16
Discrimination and violence against minorities (0=low; 10=high)	0.18	0.15
Academic freedom (0=low; 1=high)	0.15	0.13
Women with advanced education (proportion of females)	0.27	0.23
Expected years of tertiary schooling (years)	0.27	0.23
Citable documents (documents/1,000 people)	0.27	0.23
Quality weighted universities (points)	0.23	0.19

Appendix D: Descriptive Statistics for 2022 Social Progress Index, Component, and Dimension Scores

The following descriptive statistics are based on the sample of 174 countries for which we can calculate at least 9 components for the 2022 Social Progress Index.

	Mean	Standard Deviation	Minimum	Maximum
Social Progress Index	63.95	15.53	27.50	90.85
Basic Human Needs	72.38	16.33	25.40	93.35
Foundations of Wellbeing	61.88	15.76	25.56	91.26
Opportunity	57.44	17.36	17.52	90.42
Nutrition and Basic Medical Care	80.00	15.14	30.44	97.91
Water and Sanitation	75.82	19.90	14.32	99.26
Shelter	72.73	21.98	14.96	97.05
Personal Safety	61.33	11.88	29.05	83.54
Access to Basic Knowledge	73.63	20.32	15.62	99.53
Access to Information and Communications	59.41	22.52	0.31	98.87
Health and Wellness	56.60	17.15	16.83	90.84
Environmental Quality	57.85	12.59	17.36	85.14
Personal Rights	70.18	22.74	2.98	98.57
Personal Freedom and Choice	62.95	14.93	25.27	91.97
Inclusiveness	48.66	20.03	4.38	92.29
Access to Advanced Education	48.10	19.18	10.46	88.41

Appendix E: Bibliography and Further Reading

Bland, J. M., and D. G. Altman. "Cronbach's Alpha." *BMJ (Clinical Research Ed.)* 314, no. 7080 (1997): 572.

Dunteman, George H. *Principal Components Analysis*. SAGE, 1989.

Fleurbaey, M. and D. Blanchet. *Beyond GDP: Measuring Welfare and Assessing Sustainability*, Oxford University Press, 2013.

Manly, Bryan F. J. *Multivariate Statistical Methods: A Primer*. CRC Press, 1994.

For further reading on social progress, development, and composite indices, we recommend:

Bishop, Matthew, and Michael Green. *The Road from Ruin: How to Revive Capitalism and Put America Back on Top*. New York: Crown Business, 2011.

Delgado, Mercedes, Christian Ketels, Michael E. Porter, and Scott Stern. *The Determinants of National Competitiveness*. Working Paper. National Bureau of Economic Research, July 2012. <http://www.nber.org/papers/w18249>.

Fehder, Daniel, Michael E. Porter, and Scott Stern. "The Empirics of Social Progress: The Interplay between Subjective Well-Being and Societal Performance." *AEA Papers and Proceedings*, 108 (2018): 477-482.

Furman, Jeffrey L., Michael E. Porter, and Scott Stern. "The Determinants of National Innovative Capacity." *Research Policy* 31, no. 6 (2002): 899–933.

Gehl, Katherine M., and Michael E. Porter. "Why Competition in the Politics Industry is Failing America." Harvard Business School, 2017.

<https://www.hbs.edu/competitiveness/Documents/why-competition-in-the-politics-industry-is-failing-america.pdf>

Joint Research Centre-European Commission. Handbook on constructing composite indicators: methodology and user guide. OECD Publishing, 2008.

Kuznets, Simon. "Economic Growth and Income Inequality." *The American Economic Review* 45, no. 1 (1955): 1-28.

Porter, Michael E. *Competitive Advantage of Nations: Creating and Sustaining Superior Performance*. Simon and Schuster, 2011.

Porter, Michael E. *Competition in Global Industries*. Harvard Business Press, 1986.

Sen, Amartya Kumar. *Commodities and Capabilities*. North-Holland Publ., 1985.

Sen, Amartya Kumar. *Development as Freedom*. Oxford University Press, 1999.

Stevenson, Betsey, and Justin Wolfers. *Economic growth and subjective well-being: Reassessing the Easterlin paradox*. No. w14282. National Bureau of Economic Research, 2008.

Stiglitz, Joseph, Amartya Sen, and Jean-Paul Fitoussi. "The measurement of economic performance and social progress revisited." *Reflections and overview. Commission on the Measurement of Economic Performance and Social Progress, Paris* (2009).

World Population Review. "Countries not in the United Nations 2022" 2022. Available at: <https://worldpopulationreview.com/country-rankings/countries-not-in-the-un>