

International SERF Index

Historical Trends: Technical Note

Version 2012.1

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International SERF Index Historical Trends: Technical Note Version 2012.1

This document details the specific methods used to construct the Social and Economic Rights Fulfillment (SERF) Index Historical Trends data series. It does not elaborate on the fundamentals of the Index itself. Readers unfamiliar with the fundamentals of the SERF Index and its methodology are encouraged to read the “Overview International SERF Index Methodology Version 2011.1” document which presents the SERF Index methodology in detail before reading this one.

Here we provide an overview of how the International SERF Index Historical Trends data series is constructed, a brief explanation of the methods used for selecting and projecting historical GDP per capita figures, notes on filling in missing data for specific indicators, and annexes detailing indicator sources and definitions as well as frontier equations, peak values, and maximum and minimum values for each indicator used in the constructing the International SERF Index Historical Trends data series.

Basic Overview

The International SERF Index Historical Trends Series takes the basic International SERF Index methodology and applies it to internationally comparable data spanning four decades. The resulting Historical International SERF Index and Historical Component Right Indices are comparable over time. Since data on many of the indicators used to construct the SERF Index are only collected infrequently, we have chosen to present Index values for “waves” spanning a decade so as to ensure that the data used in constructing the index for each decade is unique. That is, indicator values used to construct the index for a given decade are different from those used to construct the index for any other decade. The year range for each wave is as follows:

Table I: Year Range for each Wave of the SERF Historical Series

Wave	Year Range
Wave I	1971 – 1980
Wave II	1981 – 1990
Wave III	1991 – 2000
Wave IV	2001 – 2010

In the event a country has multiple observations on a given indicator for a given wave, the year of the observation on a given indicator for a given wave used to construct the SERF Index for that wave is the value closest to the mid-point of each decade (1975, 1985, 1995, 2005) available. In addition to enabling comparisons within a country over time, the International SERF Historical Trends data series is comparable across countries. That is, the scores on the International SERF Index and Component Right indices historical for any country in any wave are comparable to the scores for any other country in any other wave. So, for example, if a country has data on the gross primary school completion rate for 1970, 1974, 1977, and 1979, the 1974 data is used to construct the Right to Education Index and then the SERF Index for Wave I.

In order to apply the SERF Index methodology across four decades and achieve the best-possible coverage across countries a slightly different mix of indicators was required than that used in the construction of our primary International SERF Index series. Therefore, scores from the SERF Index Historical Trends series are not comparable to scores from the primary International SERF Index series. As is the case for our primary SERF Index series, separate core country and high income OECD country indices are constructed. However, in the case of the SERF Index Historical Trend series for high income OECD countries, two variants are constructed. Version A includes data for all four decades, but excludes information on education quality (since comparable data on education quality is not available for all four decades); while Version B includes information on education quality, but only covers the final two waves. Table 2 below compares the indicators used in the construction of the SERF Index Historical Trends series with those used in the construction of our primary International SERF Index series.

Table 2: Comparison of Indicators used in the Primary and Historical SERF Index Series

(indicators that differ between the two appear in italics)

Right	Primary International SERF Index Series		SERF Index Historical Series	
	<i>Core Countries</i>	<i>High Income OECD</i>	<i>Core Countries</i>	<i>High Income OECD</i>
Food	% children (under) not stunted	% babies not low birth weight	% children (under) not stunted	% babies not low birth weight
Education	Primary completion rate	Average math & science PISA score	Primary completion rate	Average math & science PISA score (Variant B ONLY)
	<i>Combined gross enrollment rate</i>	<i>Combined gross enrollment rate</i>	<i>Gross secondary enrollment rate</i>	<i>Gross secondary enrollment rate</i>
Health	Contraceptive use rate		Contraceptive use rate	
	Child (under 5) survival rate	Child (under 5) survival rate	Child (under 5) survival rate	Child (under 5) survival rate
	<i>Age 65 survival rate</i>	<i>Age 65 survival rate</i>	<i>Life expectancy at birth</i>	<i>Life expectancy at birth</i>
Housing	<i>% rural population with access to improved water source</i>		<i>% total population with access to improved water source</i>	
	% total population with access to improved sanitation access		% total population with access to improved sanitation access	
Work	% with incomes > \$2 (2005 PPP\$) per day	% with income > 50% median income	% with incomes > \$2 (2005 PPP\$) per day	% with income > 50% median income
		% unemployed not long-term unemployed		% unemployed not long-term unemployed

GDP per capita

GDP per capita, in constant 2005 PPP dollars, is the proxy for state resource availability in our SERF Index Historical Trends series just as it is in our Primary SERF Index series. The preferred source for these data was the World Bank's *World Development Indicators* database, which presents relatively complete coverage on this indicator for most countries across the years spanning 1980 to 2009. However, filling in gaps in the GDP per capita data and projecting

figures for before 1980 required some additional steps. The basic approach used to fill in gaps in the GDP per capita data was:

- If data existed for any year's GDP per capita in 2005 PPP\$, we used that as a base from which to extrapolate GDP per capita estimates based on the GDP per capita growth rate from either the *World Development Indicators* (preferred source) or from the United Nations Statistics Division.
- The general formula for extrapolating forward was: $GDP_{percap_{t+1}} = (GDP_{percap_t}) \times (GDP_{percapGrowthRate_{t+1}})$. The general formula for extrapolating backwards was: $GDP_{percap_t} = GDP_{percap_{t+1}} / GDP_{percapGrowthRate_{t+1}}$.
- In the absence of GDP per capita growth rates, an estimated GDP per capita growth rate was derived using overall GDP growth rates and population growth rates. The general formula for computing the GDP per capita growth rate was: $GDP\ per\ capita\ Growth\ Rate_t = GDP\ growth\ rate_t - population\ growth\ rate_t$.

In the case of Cuba, no data on per capita GDP (2005PPP\$) were available so a 2005 estimate for the country, based on an estimate from Version 6.2 of the Penn World Tables was used as a starting point. GDP per capita growth rates for 1995 through 2004 from the World Bank were used to extrapolate GDP per capita estimates for those years. GDP and population growth rates from the United Nations Statistics Division were used to calculate a GDP per capita growth rate for the years 2005 through 2008 to permit the extrapolation of GDP per capita figures for those years.

Other Data Notes, by Indicator

Absolute Poverty – In some cases, the share of the population living on less than \$2 per day (2005 PPP\$) was only available from PovCalNet for urban and rural areas. In these cases, data on the urban v. rural population break-down were extracted from World Bank's *Health Nutrition Population* data set the weighted average of the two poverty headcount ratios was used to estimate a national rate. This was an issue in the following cases: China (1985, 1987, 1990, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2002) and Indonesia (1987, 1990, 1993, 1996, 1999, 2002). For Equatorial Guinea, the only income poverty figure available was of 80% of the population living on less than USD \$2 per day in 2003, taken from a United Nations Development Group Common Country Assessment of Equatorial Guinea completed in 2006. The figure used for Cuba was an estimate based on a comparison of analysis of data from the Gallup World Poll by Gasparini and Gluzmann (2009) after adjusting for the average difference they found between their estimates and estimates using national household survey data as well

as the results of a regression analysis in which we regressed the percentage of the population not poor at the \$2 per day level over the most recent extreme poverty headcount figure (at USD\$ 1.25 per day) and the log of GDP per capita in 2005 PPP\$¹. After weighing considerations inherent in all these sources, we settled on an estimate of 10% of the total population living on less than USD \$2 per day in 2003 for Cuba.

Relative Poverty – The *Luxembourg Income Study Key Figures* was the primary source for this indicator for High-Income OECD countries; France had data from two different surveys given for 1984, one labeled “tax” and the other “budget”. We opted to keep the “tax” survey results as the relative poverty figure based on the “budget” survey was quite a bit higher than surveys for France from any other year. We also explored the option of using data from *OECD StatExtracts* (“poverty rate after taxes and transfers” in Social and Welfare Stats) to fill in gaps in the data but these data were not sufficiently comparable with the existing Luxembourg Income Study figures.

Absolute Poverty and Gross Secondary Enrollment Frontier Equations: Functional forms for these indicators returned negative frontier values for some very low income countries, mainly in Sub-Saharan Africa. Negative values were replaced with 0.0. Conceptually, if these countries had any positive achievement on these indicators (anyone living above the \$2 per day threshold or any students enrolled in school), they therefore earned an achievement score of 100% on that indicators. Table 4 below notes the countries and waves in which this situation arose for these two indicators:

Secondary Sources

In some cases secondary sources of data were used in order to fill gaps in the data obtained from the primary source for that indicator. When considering secondary sources, we compared data from both primary and secondary sources for overlapping years to ensure comparability. Please see Annex A for a complete list of all sources, primary as well as secondary, for indicators used in the SERF Historical series.

¹ This OLS model was based on data for all countries in the World Bank's *World Development Indicators* database with data from 1990 to 2007. The R² for the overall model was .949.

Table 4: Achievement Possibilities Frontier Value Re-Set to 0.0 After the Functional Form Returned a Negative Value

County	Not Absolutely Poor	Gross Secondary Enrollment
Bangladesh	Wave II	
Burundi	Wave III, IV	Wave IV
C.A.R.	Wave III, IV	
Congo, Dem Rep	Wave IV	Wave III, IV
Ethiopia	Wave II, III, IV	
Liberia	Wave IV	Wave IV
Malawi	Wave III, IV	
Mali	Wave II, III	
Mozambique	Wave III, IV	Wave II
Nepal	Wave II	
Niger	Wave III, IV	
Rwanda	Wave III	
Sierra Leone	Wave II, IV	
Timor-Leste	Wave IV	
Uganda	Wave II, III	

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Annex A. Indicator Definitions and Sources, Primary and Secondary

Aspect	Indicator	Primary Source	Other Sources	Definition
Resources				
Both	GDP per capita (2005 PPP\$)	World Bank, International Comparison Program database. Extracted from World Bank (via WB-WDI)	Projected GDP per capita figures based using GDP growth and population growth rates from WB-WDI and UN Stats (see Table 1 above)	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 2005 international dollars.
Right to Food				
Core	% children not stunted	World Health Organization, Global Database on Child Growth and Malnutrition (via WB-WDI)	WHO-GHO	Prevalence of child malnutrition is the percentage of children under age 5 whose height for age (stunting) is more than two standard deviations below the median for the international reference population ages 0-59 months. For children up to two years old height is measured by recumbent length. For older children height is measured by stature while standing. The data are based on the WHO's new child growth standards released in 2006.
High Income OECD	% babies not low birth weight	UNICEF, State of the World's Children, Childinfo, and Demographic and Health Surveys by Macro International (via WB-WDI)	SourceOECD for OECD countries	Low birth weight babies are newborns weighing less than 2,500 grams, with the measurement taken within the first hours of life, before significant postnatal weight loss has occurred.

Aspect	Indicator	Primary Source	Other Sources	Definition
Right to Health				
Core	Contraceptive use rate	Household surveys, including Demographic and Health Surveys by Macro International and Multiple Indicator Cluster Surveys by UNICEF. (via WB-WDI)		Contraceptive prevalence rate is the percentage of women who are practicing, or whose sexual partners are practicing, any form of contraception. It is usually measured for married women ages 15-49 only.
Core	Child survival	Level & Trends in Child Mortality. Report 2010. Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA, UNPD). (via WB-WDI)		Under-five mortality rate is the probability per 1,000 that a newborn baby will die before reaching age five, if subject to current age-specific mortality rates.
Both	Life expectancy at birth	Derived from male and female life expectancy at birth. Male and female life expectancy source: (1) United Nations Population Division. 2009. World Population Prospects: The 2008 Revision. New York, United Nations, Department of Economic and Social Affairs (advanced Excel tables), (2) Census reports and other statistical publications from national statistical offices, (3) Eurostat: Demographic Statistics, (4) Secretariat of the Pacific Community: Statistics and Demography Programme, and (5) U.S. Census Bureau: International Database. (via WB-WDI)	Coverage is excellent; checked UN Data but didn't find any additional	Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

Aspect	Indicator	Primary Source	Other Sources	Definition
Right to Education				
Core	Primary completion rate	United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics (via WB-WDI)	UNESCO UIS historical series	Primary completion rate is the percentage of students completing the last year of primary school. It is calculated by taking the total number of students in the last grade of primary school, minus the number of repeaters in that grade, divided by the total number of children of official graduation age. [Capped at 100% for our purposes.]
Both	Gross Secondary Enrollment	United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics.	UNESCO UIS historical series	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.
High Income OECD	Average PISA maths and science	OECD PISA (via WB Ed Stats)		Average of country mean quality of learning outcome scores on mathematics and science subject tests.
Right to Housing				
Core	Improved water access (% with access)	World Health Organization and United Nations Children's Fund, Joint Measurement Programme (via WB-WDI)	UNEP (via Pacific Institute)	Access to an improved water source refers to the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, and rainwater collection. Unimproved sources include vendors, tanker trucks, and unprotected wells and springs. Reasonable access is defined as the availability of at least 20 liters a person a day from a source within one kilometer of the dwelling.
Core	Improved sanitation access (% with access)	World Health Organization and United Nations Children's Fund, Joint Measurement Programme (via WB-WDI)	UNEP (via Pacific Institute)	Access to improved sanitation facilities refers to the percentage of the population with at least adequate access to excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta. Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection. To be effective, facilities must be correctly constructed and properly maintained.

Aspect	Indicator	Primary Source	Other Sources	Definition
Right to Work				
Core	Not absolutely poor (> \$2 per day)	World Bank, Development Research Group (via WB-WDI)	PovCalNet, including some estimates made using rural/urban population % from WB-HNP	Population below \$2 a day is the percentage of the population living on less than \$2.00 a day at 2005 international prices. As a result of revisions in PPP exchange rates, poverty rates for individual countries cannot be compared with poverty rates reported in earlier editions.
High Income OECD	Not relatively poor	LIS Key Figures		Percentage of population with less than 50% of the median income.
High Income OECD	Not long-term unemployed	International Labour Organization, Key Indicators of the Labour Market database (via WB-WDI)		Long-term unemployment refers to the number of people with continuous periods of unemployment extending for a year or longer, expressed as a percentage of the total unemployed.

Annex B. Frontier Equations, Peak Values, and Maximum / Minimum Values

Aspect	Indicator	Frontier Equation	Peak Value, Xp	Income level of Xp	Minimum Values
Right to Food					
Core	% children not stunted	%NS = $-2.158 + 11.175(\ln \text{ GDP per capita})$	98%	\$7806	23.3 % (Bangladesh, 1991)
High Income OECD	% babies not low birth weight	%NLW = 95.8 (value achieved by 4th best performing High Income OECD Country since 1990: Sweden in 2004)	95.8	\$16,000	40% (Lao PDR, 1991, 1994)
Right to Health					
Core	Contraceptive use rate	%CU = $82.753 - 8507.686/\text{GDP per capita}$	82.753%	Asymptotic	0%
Core	Child survival	%U5S = $100.895 - 7334.1/(\text{GDP per capita})$; constrained to 99.74 for GDP per capita >\$6350	99.74%	\$6,350	62.61 (Mali, 1970)
Both	Life expectancy at birth	LE = $1.895 + 13.051 (\ln \text{GDP per capita}) - .51045(\ln \text{ GDP per capita}_s^2)$	Asymptotic	N/A	23 years

Aspect	Indicator	Frontier Equation	Peak Value, Xp	Income level of Xp	Minimum Values
Right to Education					
Core	Primary completion rate	%PC = -7.2382+.16414(GDPpercap) - .0000599159(GDPpercap_SQ); 100% for GDPper cap >\$1076	100%	\$1,076	0%
Both	Gross Secondary Enrollment	%G SE = -322.563 + 54.860 Ln(GDP per capita)	100%	\$2,214	0%
High Income OECD	Average PISA maths and science	PISA=332.345 + .017203(GDPpercap) - .000000323068(GDPpercap_squared); 555 for GDP per cap > \$22,190	555	\$22,190	310 (Peru 2000)
Right to Housing					
Core	Improved water access (% with access)	%GW= -151.879 + 56.139(LnGDP per capita) - 3.098886(LnGDP percapita_squared); 100% for per capita GDP>\$3580	100%	\$3,580	0%
Core	Improved sanitation access (% with access)	%GS= 9.04405[(GDPpercapita) ⁻²⁸⁹⁹⁹⁷]; 100% for per capita GDP>\$3970	100%	\$3,970	0%
Right to Work					
	Not absolutely poor (> \$2 per day)	%NP = -1869.552 + 471.876 (LN_GDPpercap) - 28.289 (LN_GDPpercap_squared); 98% for per capita GDP>=\$3824; 0 if per capita GDP<= \$730	98%	\$3,824	0%
	Not relatively poor	NRP = 95.8 (Finland 1995; highest value achieved by 4th best performing High Income OECD country since 1990).	95.8%	\$16,000	72% (Peru 2004)
	Not long-term unemployed	ULTU= 94.7 (Norway 2000; highest value achieved by 4th best performing High Income OECD country since 1990)	94.7%	\$16,000	26 (Slovak Republic, 2006)