

*Global Social Indicators *1: HDI, IHDI, PHDI

https://www.cps.fgv.br/cps/bd/curso/Global-Social/2BES_CURTO_UN_IHDI_technical_notes_2.pdf

Human Development Index (HDI)

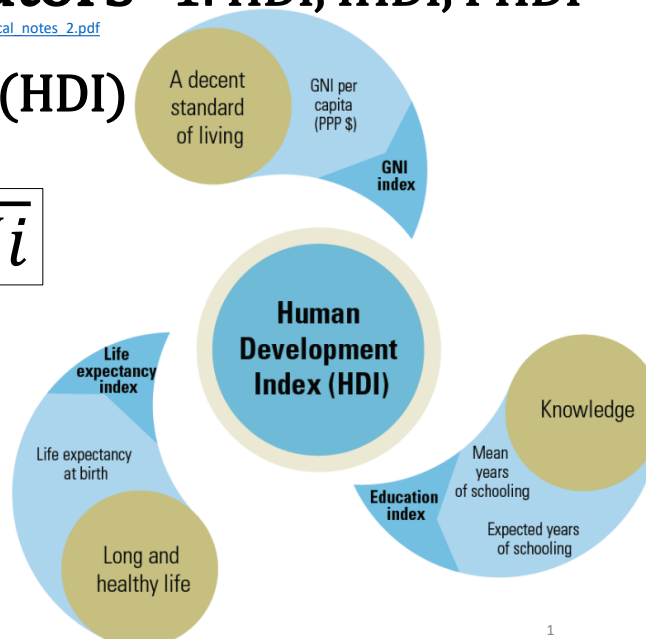
$$HDI = \sqrt[3]{Ih \times Ie \times Ii}$$

Where:

Ih = health index;

Ie = education index;

Ii = income index



Source: Training Material for Producing National Human Development Reports, UNDP Human Development Report Office (2015); Image: <http://hdr.undp.org/en/humandev>

Dimensions Index Calculation

Dimension	Indicator	Minimum	Maximum
Health	Life expectancy (years)	20	85
Education	Expected years of schooling	0	18
	Mean years of schooling	0	15
Standard of living	Gross national income per capita (PPP 2011 \$)	100	75,000

<- based on Deaton and Kahneman

Equation 1: HDI dimension index calculation

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

Equation 1.1: HDI index calculation for income

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

➤ For **Health**, Equation 1 is applied using the actual life expectancy value

➤ For **Education**, Equation 1 is applied for both sub-dimensions and then the arithmetic mean of the two is taken.

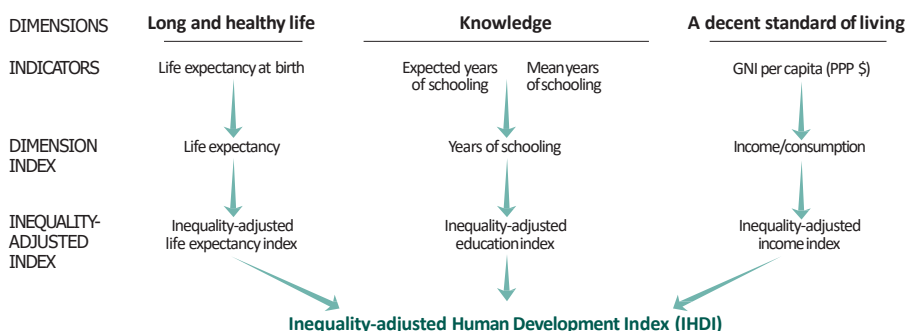
➤ For **Income**, Equation 1 is modified to incorporate the natural logarithm (ln). The log transformation has the effect of lowering the contribution of very high incomes to HDI

Source: Training Material for Producing National Human Development Reports, UNDP Human Development Report Office

Global Social Indexes:

Inequality Adjusted Human Development Index (IHDI)

Inequality-adjusted Human Development Index (IHDI)



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Inequality-adjusted HDI (IHDI)

- IHDI is based on Atkinson (1970 for $\epsilon=1$ compares geometric and arithmetic means), with inequality (A) defined as:

$$Ax = 1 - \frac{\sqrt[n]{X_1 \dots X_n}}{\bar{X}}$$

- Inequality-adjusted dimensions indices are calculated multiplying the HDI dimensions indices by their corresponding inequality measure:

$$Ix^* = (1 - Ax) Ix$$

- IDHI is the geometric mean of the three inequality-adjusted dimensions indices:

$$IHDI = \sqrt[3]{Ih^* * Ie^* * Ii^*}$$

$$IHDI = \frac{[(1 - A_{Health}) \cdot (1 - A_{Education}) \cdot (1 - A_{Income})]^{1/3} \cdot HDI}{\text{Loss}}$$

Source: Training Material for Producing National Human Development Reports, UNDP Human Development Report Office (2015)

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Human Development Index Adjusted by Inequality (2018)

Rank HDI 2018	Country	Human Development Index (HDI)	Inequality-Adjusted HDI	
		Value	Value	Difference from HDI rank
1	Norway	0.954	0.889	0
2	Switzerland	0.946	0.882	-1
3	Ireland	0.942	0.865	-6
4	Germany	0.939	0.861	-7
5	Hong Kong	0.939	0.815	-17
6	Australia	0.938	0.862	-4
6	Iceland	0.938	0.885	+4
8	Sweden	0.937	0.874	+2
9	Singapore	0.935	0.810	-14
10...	Netherlands	0.933	0.870	+2
79	Brazil	0.761	0.574	-23 (largest difference)
...188	Central African Republic	0.381	0.222 (Last)	-1
189	Niger	0.377 (Last)	2.272	3

Source: Human Development Report 2019, UNDP

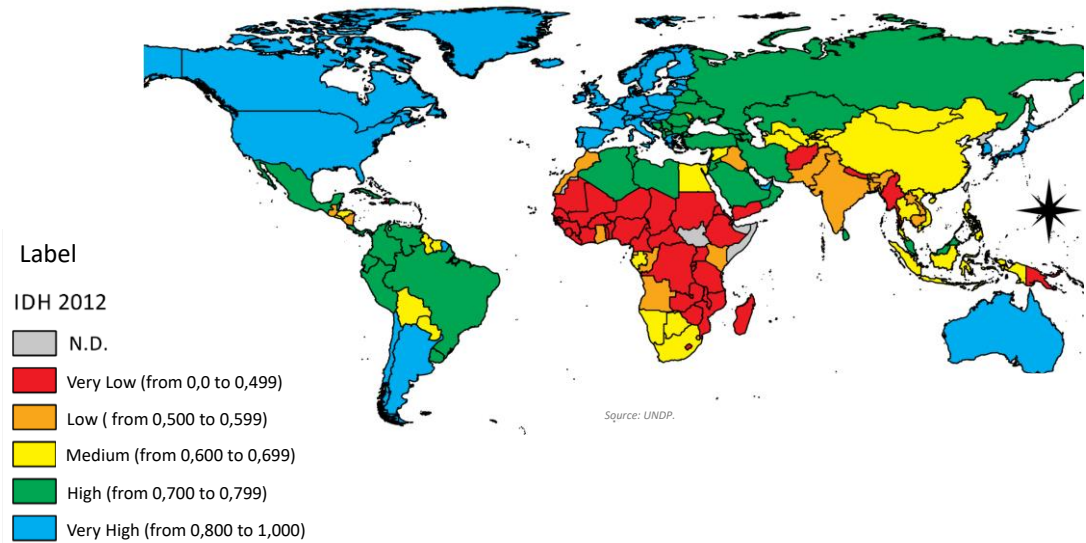
Human Development Index Adjusted by Inequality (2018)

Rank HDI 2018	LAC Country	Human Development Index (HDI)	Inequality-Adjusted HDI	
		Value	Value	Difference from HDI rank
42	Chile	0.847	0.696	-14
48	Argentina	0.830	0.714	-4
57	Uruguay	0.808	0.703	0
76	Mexico	0.767	0.595	-17
79	Brazil	0.761	0.574	-23 (largest difference)
79	Colombia	0.761	0.585	-16
82	Peru	0.759	0.612	-5
85	Ecuador	0.758	0.607	-4
96	Venezuela	0.726	0.600	1

Source: Human Development Report 2019, UNDP

Rank HDI 2018	Country	Inequality-Adjusted Life Expectancy Index		Inequality-Adjusted Education Index		Inequality-Adjusted Income Index	
		Value	Difference from HDI rank	Value	Difference from HDI rank	Value	Difference from HDI rank
79	Brazil	0.763	-4	0.525	-30	0.473	-32

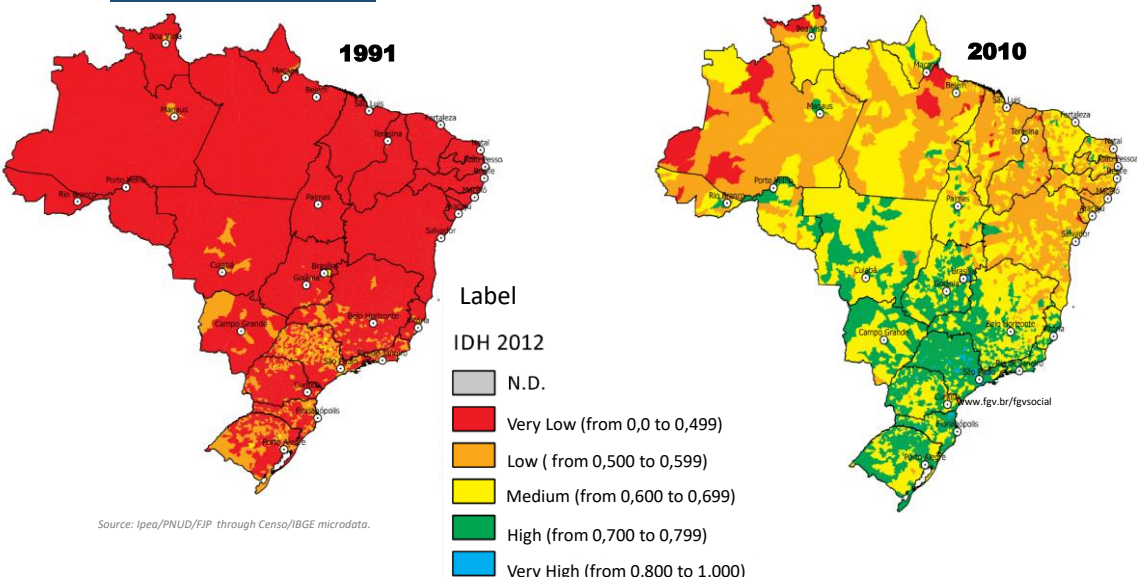
HUMAN DEVELOPMENT INDEX (HDI) – Education, Health & Income



In 1991, 85,8% of the municipalities had a **very low HDI**. In 2010 only 0,6%.

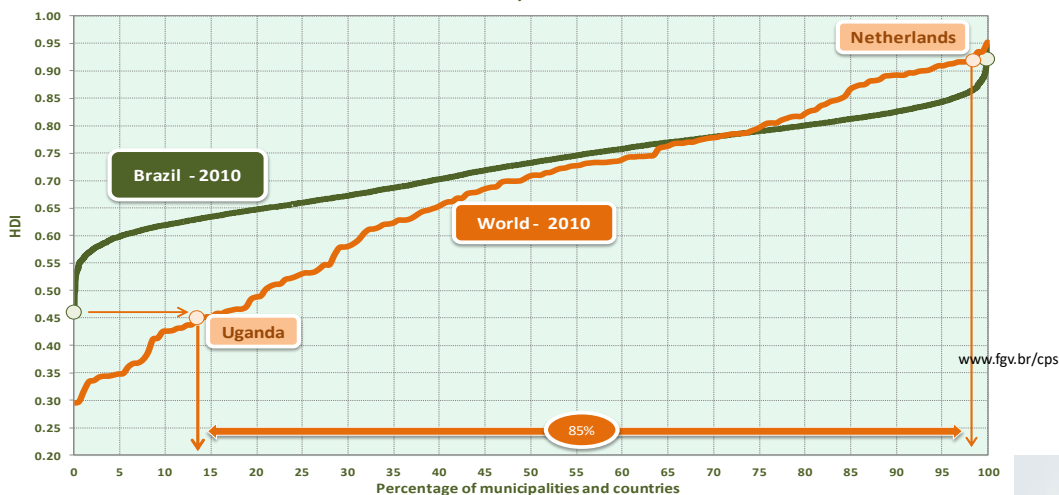
HDI 1991-2010

HUMAN DEVELOPMENT INDEX (HDI) – Education, Health & Income



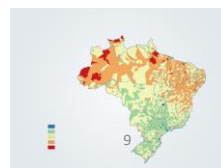
Usage of National data with a Global Vision

Distribution of Brazilian municipalities and countries of the World according to HDI, 2010



Source: SAE/PR, based on Demographic Census 2000 and 2010 and HDI as calculated by the UNDP, Human Development Report

In 2010, it there is 0,6% with very low HDI. But there is still a whole world inside Brasil →.

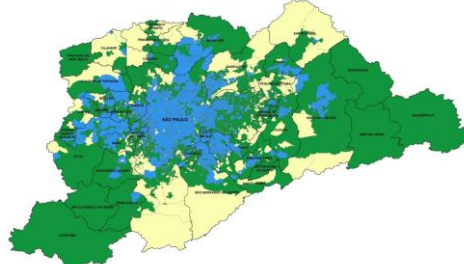
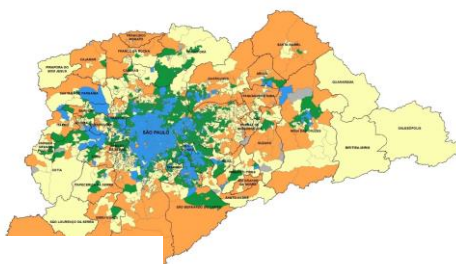


HUMAN DEVELOPMENT INDEX By Neighborhoods

FGV SOCIAL

Great São Paulo 2000

Great São Paulo 2010



Label

IDH 2012

N.D.

Very Low (from 0,0 to 0,499)

Low (from 0,500 to 0,599)

Medium (from 0,600 to 0,699)

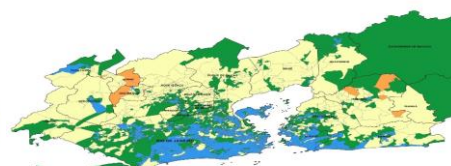
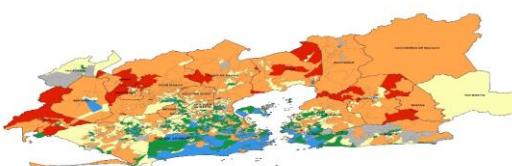
High (from 0,700 to 0,799)

Very High (from 0,800 to 1,000)

Great Rio 2000



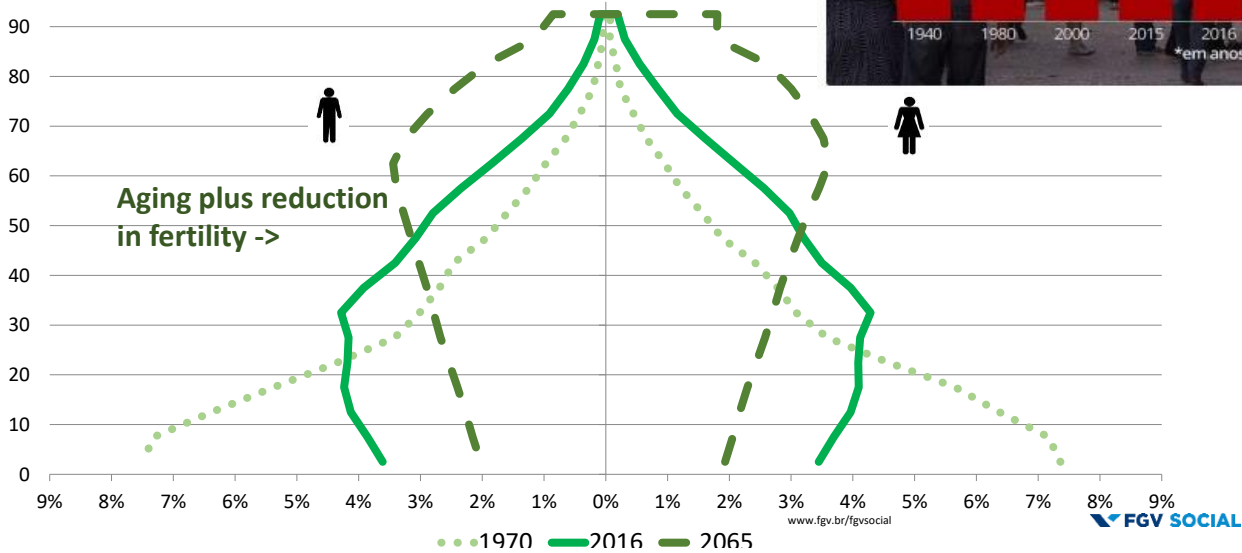
Great Rio 2010



Source: Ipea/PNUD/FIP through Censo/IBGE microdata.

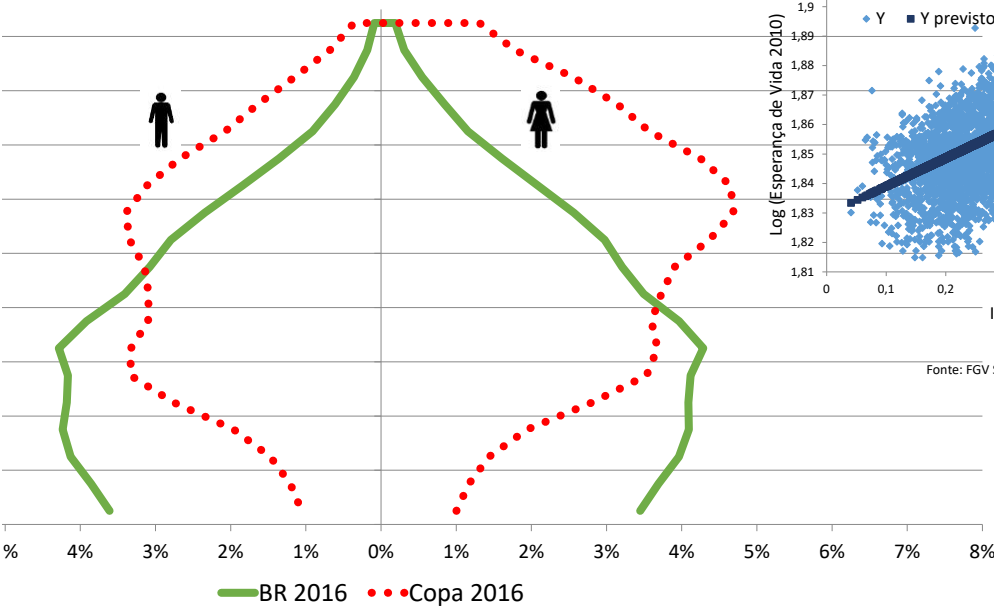
HDI based Social Progress

DIRECTIONS: DEMOGRAPHIC EVOLUTION – BRAZIL

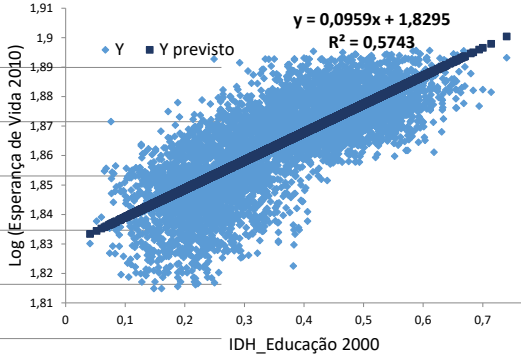


Population by age and sex (2016)

Brazil and Copacabana



LIFE EXPECTATION X LAGGED EDUCATION HDI (Indirect Effect)

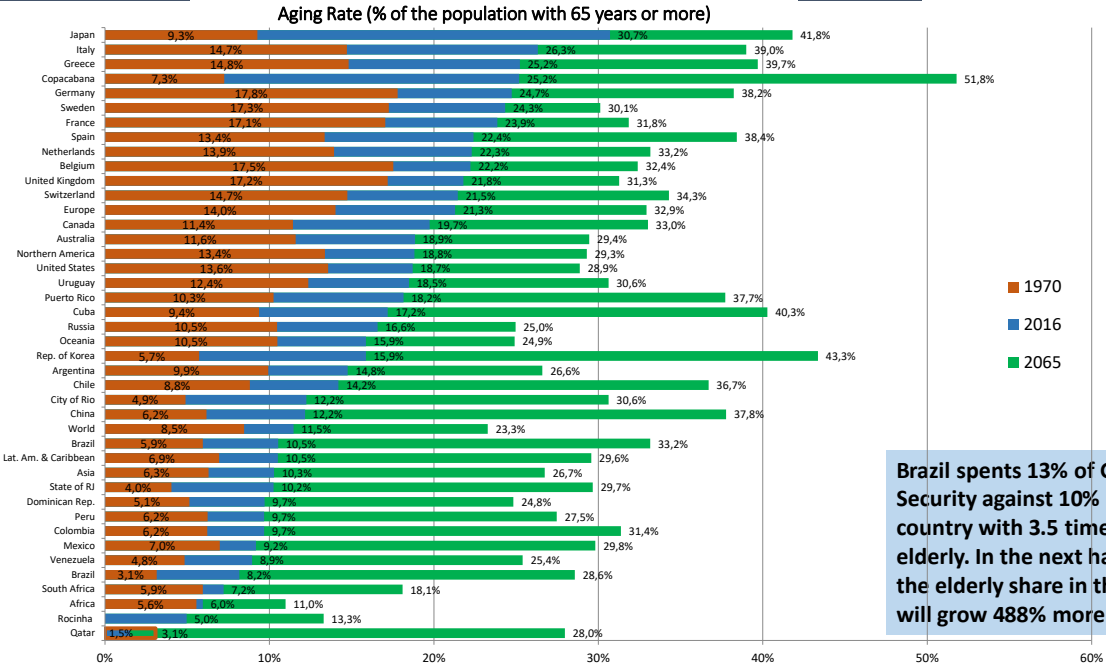


Fonte: FGV Social a partir dos dados do IPEA/PNUD/FJP

www.fgv.br/fgvsocial

DEMOGRAPHIC TRANSITION ACROSS COUNTRIES & PLACES

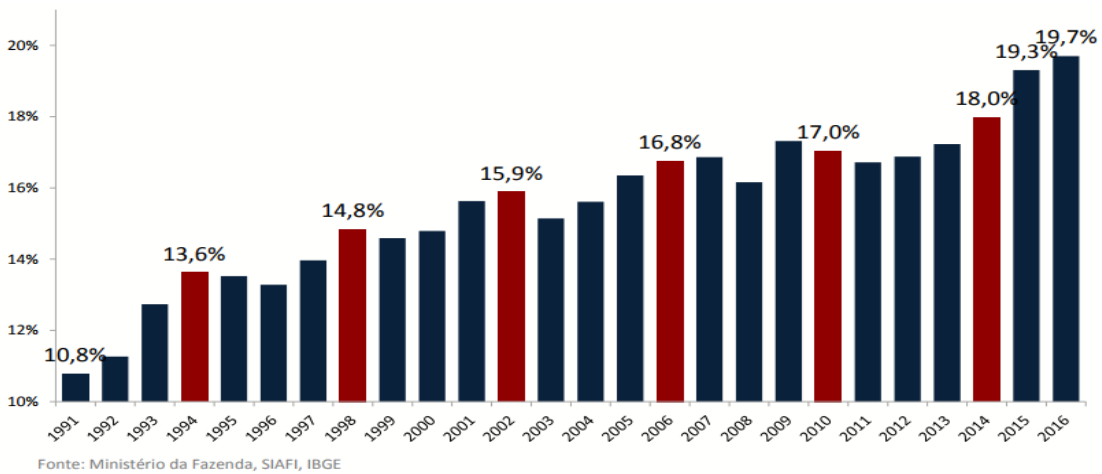
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THE FISCAL CHALLENGE

Evolution of the Central Government Primary Expenditures (% GDP)

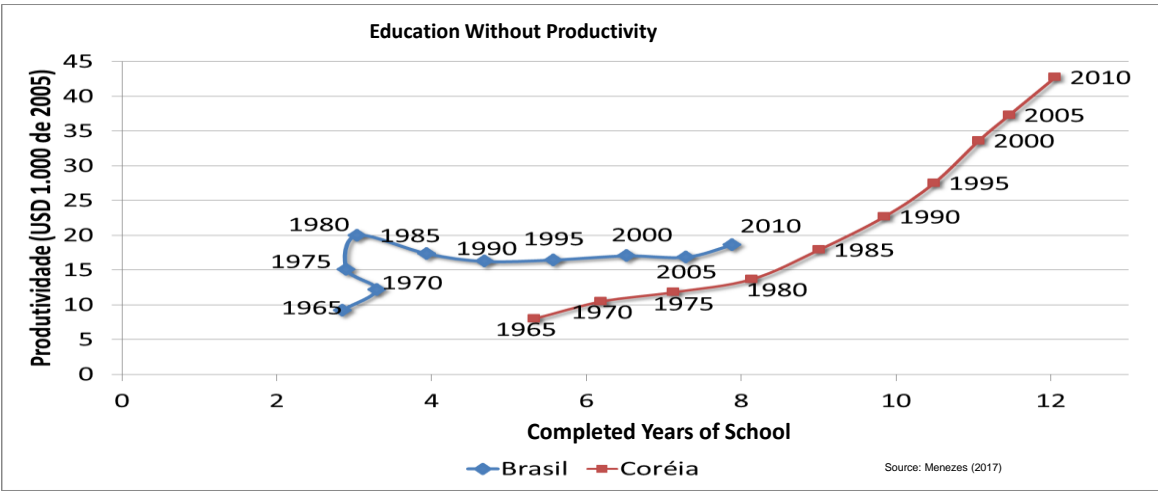
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THE PUBLIC EXPENDITURE CEILING WAS FIXED IN 2016 & SOCIAL SECURITY REFORM IN 2019

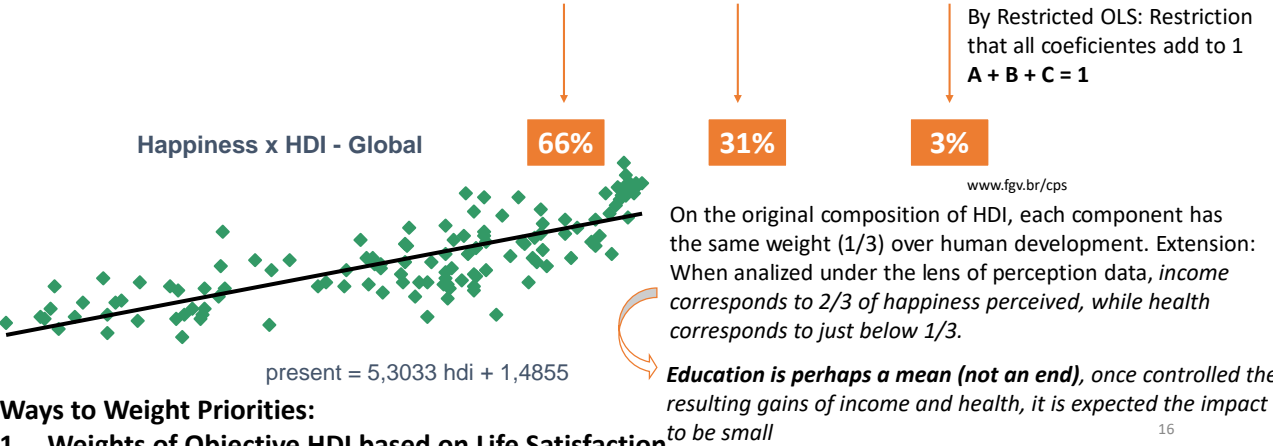
**EDUCATION ALSO IMPACTED LITTLE BRAZILIAN PRODUCTIVITY:
MAIN LONG RUN CHALLENGE with Fiscal adjustment**

FGV SOCIAL



Brazil had a vertical jump in productivity with no gain in schooling (economic miracle 60s &70s)
Or na horizontal jump in schooling after redemocratization with no gain in labor productivity)
There was also Income boost Without Productivity in the end of these series: economic (in)sustainability

Weights of HDI Components on Life Satisfaction
Happiness = a.Income + b.Health + c.Education



- Ways to Weight Priorities:**
- 1. Weights of Objective HDI based on Life Satisfaction
 - 2. Importance Attributed to Different Topics (Policies)
 - 3. Perceptions on Quality (PHDI)

The 6 Priorities of the 16 SDGs related Public Policies of Young People *vis-à-vis* not Young Brazilians – My World

Position	Priority (choice of 6 main priorities))	Young (%)	Not Young (%)
1	Quality education	85,20	80,50
2	Improvement of health services	82,70	86,60
3	Access to quality food	70,10	76,10
4	Honest and active government	63,50	65,70
5	Protection against crime and violence	49,00	52,30
6	Better job opportunities	46,90	43,90
7	Improvement in transport and roads	40,90	37,90
8	Support to people who can't work	35,10	38,00
9	Access to potable water and sewerage	27,40	28,60
10	Protection to forests, rivers and oceans	20,10	19,20
11	Access to energy in your home	19,90	19,10
12	Elimination of prejudice and discrimination	19,50	15,90
13	Equality between men and women	11,70	12,50
14	Political freedom	10,50	8,20
15	Access to telephone and internet	10,00	8,30
16	Fight climate changes	7,30	7,10

3 top are HDI related

www.ifgv.br/cps

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Introducing (backwards) the Perceived Human Development Index (PHDI) (or Subjective HDI)

Do PHDI Weights Change Across the Life Cycle?

HDI education and health components are identified with certain phases of the life-cycle: childhood and elderly, (per capita) income is valid for everyone but work is more associated with nonelderly adults.

At a microdata level interactions between age and respective PHDI components are not statistically significant.

For example, elderly and health issues; or having children at home and education issues; Or, work and 15 to 64 years old->

Weights don't change across the life cycle!

Present Life Satisfaction in Latin America & the PHDI

Do you feel you personally stand at the present time			
Present Life Satisfaction Estimates			
Parameter		Estimate	Standard Error
has children	yes	0.1396	0.0356
has children	zno	0.0000	0.0000
AGE	65 & More	0.3298	0.0854
AGE	z15 A 64	0.0000	0.0000
income_dep_inn		0.5276	0.0181
income_out		-0.2670	0.0201
work_inn		-0.0461	0.0173
work_out		-0.1025	0.0202
health_inn		-0.3371	0.0194
health_inn_permanent		-0.0001	0.0193
health_out		-0.1024	0.0192
education_Out		-0.0045	0.0281
education_Out* has children	yes	0.0334	0.0336
education_Out* has children	zno	0.0000	0.0000
health_inn*AGE	65 & More	-0.0764	0.0598
health_inn*AGE	z15 A 64	0.0000	0.0000
work_inn*AGE	65 & More	0.1327	0.0877
work_inn*AGE	z15 A 64	0.0000	0.0000
Scale		1.0000	0.0000

OBS: Personality traits may lead to spurious correlations between subjective indicators

Principal component analysis is a methodology that is useful when you have data on a number of variables with some redundancy. This means that some of the variables are correlated with one another, possibly because they are measuring the same dimension. It is likely that, the questionnaire are not really measuring different constructs; more likely, they may be measuring a single construct.

It consists in a variable reduction procedure, into a smaller number of artificial variables - called principal components - that will account for most of the variance in the observed variables what is done collapsing some redundant variables into single new variables.

Technically, a principal component can be defined as a linear combination of optimally-weighted observed variables. In performing a principal component analysis, it is possible to calculate a score for each subject on a given principal component. Each subject actually measured would have scores on each one of the new components, and the subject's actual scores on the original questionnaire items would be optimally weighted and then summed to compute their scores on a given component.

In reality, the number of components extracted in a principal component analysis is equal to the number of observed variables being analyzed. However, in most analyses, only the first few no redundant components account for meaningful amounts of variance, so only these first few components are retained, interpreted, and used in subsequent analyses. The remaining components would therefore not be retained and further analyzed.

The first component extracted in a principal component analysis accounts for a maximal amount of total variance in the observed variables. Under typical conditions, this means that the first component will be correlated with at least some of the observed variables, and may be correlated with many. The second component extracted will have two important characteristics. First, this component will account for a maximal amount of variance in the data set that was not accounted for by the first component. Again under typical conditions, this means that the second component will be correlated with some of the observed variables that did not display strong correlations with the first component. The second characteristic of the second component is that it will be uncorrelated with the first component. Literally, a computation of the correlation between components 1 and 2 would give zero. That is the general rule: the remaining components that are extracted in the analysis display the same two characteristics: each component accounts for a maximal amount of variance in the observed variables that was not accounted for by the preceding components, and is uncorrelated with all of the preceding components. The observed variables are standardized in the course of the analysis, that is, each variable is transformed so that it has a mean of zero and a variance of one.



https://www.cps.fgv.br/cps/bd/curso/Global-Social/6Handbook_of_Happiness_Research_in_Latin1.pdf

PHDI: Find principal components and further standardize them using HDI (0, 1) scale

The Four Qualities of Life

	Outer Quality	Inner Quality
Life Chances	Livability of environment	Life-ability of person
Life Results	Utility of life	Satisfaction with life

Source: Veehoven (2000) It turns out to be (a posteriori) a good conceptual framework self-selected by the data. In a second step we splited and isolated the questions by HDI components.

Specific HDI components showing a close relation with respective PHDI components*.

	INCOME DEP INN***	INCOME OUT	WORK INN	WORK OUT	HEALTH INN	HEALTH OUT	EDUCATION OUT
CTE + HDI COMPONENTS + SOCIO-DEMOGRAPHICS**	-0,9051	2,1301	1,1801	1,3348	1,9013	2,7852	-0,6411
	0,0559	0,0651	0,0565	0,0602	0,0920	0,0891	0,0493

Obs: * Labor and income ** regressions include dummies for presence of children, for elderly, gender, position in the household and hdi components. Standard errors small numbers below estimates. *** Expressed in terms of deprivation (negative sign) which is the expected partial correlation with income.

Work – Principal Components

Splitting - Principal Components American Countries 2007

	Rotated Factor Pattern	Factor1	Factor2
		Work_Inner	Work_Outer
Inner components-> contain + information	Are you satisfied with your job or the work you do	96 *	5
	In your work do you have an opportunity to do what you do best every day?	96 *	3
	Can people in this country get ahead by working hard or not?	-4	61 *
	Thinking about the job situation in the city or area where you live today would you say that it is now a good time or a bad time to find a job?	13	69 *
	Are you satisfied or dissatisfied with efforts to increase the number and quality of jobs?	2	72 *

Printed values are multiplied by 100 and rounded to the nearest integer. Values greater than 0.4 are flagged by an '*'.
Source: Gallup World Poll microdata.

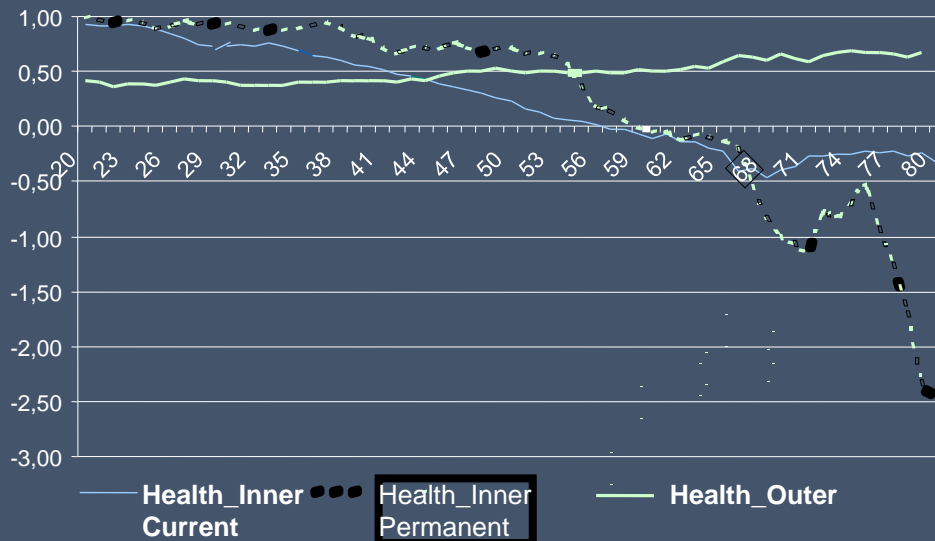
Health – Principal Components American Countries 2007

	Factor1 Health Inner Current	Factor2 Health_Inner Permanent	Factor3 Health_Outer
	Inner comes first		
MOBILITY (have no problems walking around)	34	72 *	-3
SELF CARE (have no problems with self-care)	7	82 *	0
USUAL ACTIVITIES (have no problems with performing my us - work study housework family or leisure activities)	36	74 *	-1
PAIN/DISCOMFORT(have no pain or discomfort)	69 *	29	1
ANXIETY/DEPRESSION(not anxious or depressed)	58 *	8	6
how good or bad your own health is TODAY	73 *	14	8
Are you satisfied with your personal health	71 *	8	6
In your city or area where you live are you satisfied or dissatisfied with the availability of quality health care	5	3	75 *
Are healthcare services in this country accessible to any person who needs them regardless of their economic situation or not	3	1	66 *
Not have health problems that prevent you from doing any of the things people your age normally can do	58 *	25	-3
If you had to go to a hospital because of an accident or illness who would take care of the cost of your assistance? Public or Private	5	-6	33
Do you have confidence in each of the following or not? How about health care or medical systems?	-1	4	76 *

Printed values are multiplied by 100 and rounded to the nearest integer. Values greater than 0.4 are flagged by an '*'. Source: Gallup World Poll microdata

The Life Cycle Pattern of the Perceived Health Components
Latin American Countries Standardized Principal Components
and Years of Age

Centered Moving Average of 5 Years



Source: Microdata from the World Gallup Survey 2007

Transform
components->
into Standard
HDI Scale

Principal Components – Standartized: The PHDI ingredients

	Country	Sample	%	income_dep_i				health_inn_			education_out
				nn	income_out	work_inn	work_out	health_inn	permanent	health_out	
Worldwide Level:	argentina	1000	4.68	0.80	0.67	0.56	0.41	0.51	0.75	0.63	0.25
	belize	502	2.35	0.80	0.34	0.60	0.38	0.78	0.38	0.53	0.66
	bolivia	1000	4.68	0.36	0.78	0.65	0.65	0.12	0.78	0.41	0.58
	brazil	1038	4.86	0.79	0.70	0.76	0.25	0.65	0.53	0.25	0.27
Singapore was 1st	canada	1010	4.73	1.00	1.00	1.00	0.97				
	chile	7272	34.03	0.77	0.58	0.46	0.54	0.66	0.60	0.50	0.52
	colombia	1000	4.68	0.47		0.33	0.37	0.66	0.78	0.45	0.30
	costa rica	1002	4.69	0.73	0.76	0.51	0.72	0.95	0.50	0.94	0.99
Haiti Last	dominican rep	1000	4.68	0.20	0.40	0.27	0.34	0.77	0.73		0.67
	ecuador	1061	4.97	0.36	0.67	0.60	0.35	0.39	0.95	0.20	0.23
	el salvador	1001	4.69	0.16	0.26	0.00	0.10	0.66	0.73	0.41	0.50
	guatemala	1000	4.68	0.83	0.46	0.32	0.47	1.00	0.55	0.29	0.36
	guyana	501	2.34	0.76	0.27	0.54	0.24	0.62	0.63	0.80	0.69
	honduras	1000	4.68	0.06	0.57	0.10		0.77	0.35	0.42	0.59
	mexico	999	4.68	0.57	0.75	0.51	0.52	0.65	0.00	0.47	0.00
	nicaragua	1000	4.68	0.00	0.45	0.29	0.50	0.22	0.63	0.59	0.70
	panama	1000	4.68	0.55	0.56	0.40	0.47	0.93	0.70	0.57	0.80
	paraguay	1000	4.68	0.66	0.00	0.62	0.00	0.61	1.00	0.00	0.00
	peru	1000	4.68	0.13	0.34	0.16	0.30	0.00	0.85	0.12	0.14
	uruguay	1004	4.70	0.66	0.69	0.40	0.33	0.53	0.83	1.00	0.68
	venezuela	1000	4.68			0.79	1.00				1.00
	Max			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	Min			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00