Global Burden of Disease (GBD) Study

Why is it important for Brazil?

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Cuernavaca - November 2016

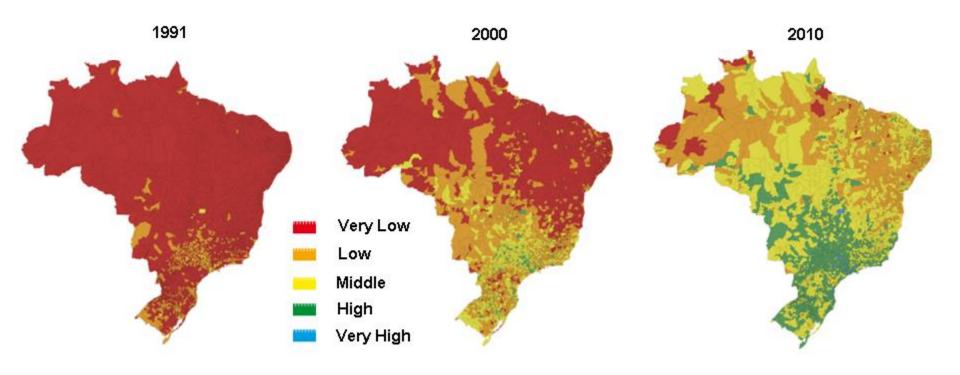
Brazil has been changing its socioeconomic profile quickly

Health services coverage has improved during the last 10 years

Health Data has improved

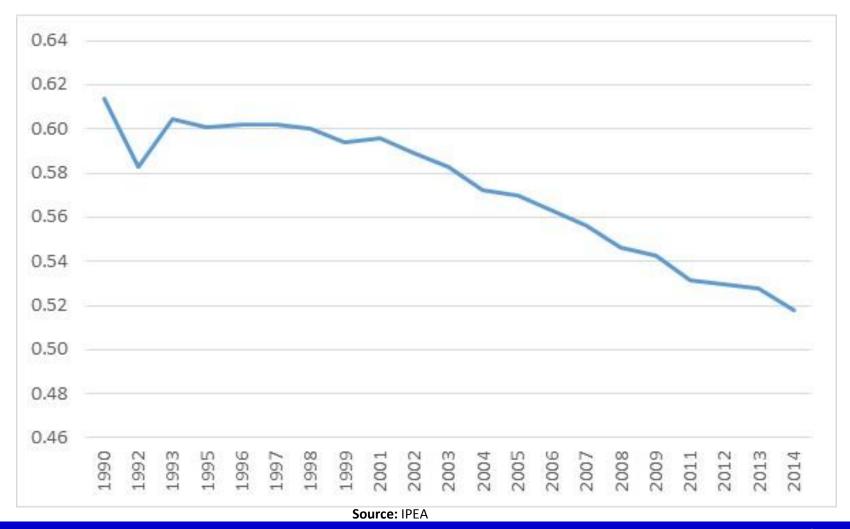
Human Development Index

Figure: Human Development Index of Brazilian Municipalities, 1991-2010.



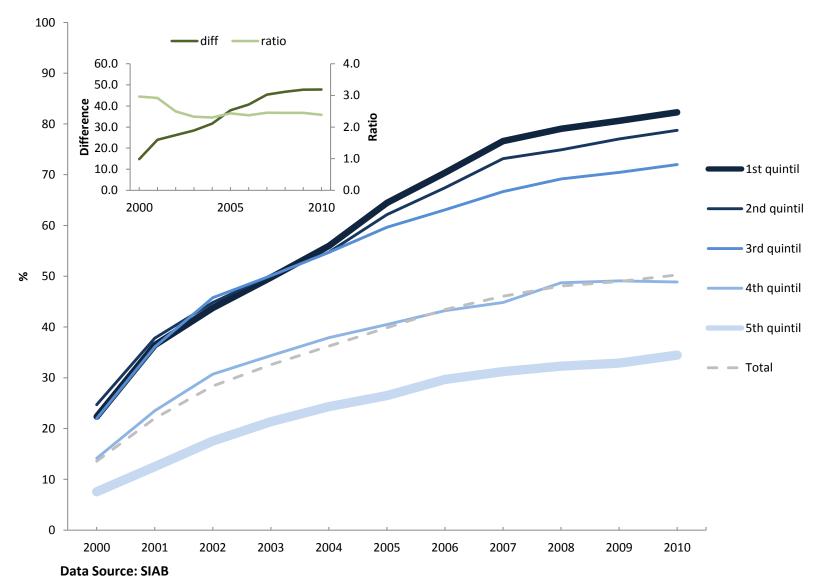
Income Inequality

Trend in income inequality measured by Gini index in Brazil, 1990-2014



Family Health Program Coverage

Trends in municipal Family Health Program coverage according to quintiles of municipal HDI.



Note: The small graph refers absolute difference and rate ratio between the richer and the poorer quintiles.

The GBD 2015 Project in Brazil: a partnership among the Ministry of Health (MoH) and academics

- Close collaboration between the Brazil GBD team (MoH and universities) with IHME on the GBD2015 analysis to have better estimates for Brazil and Brazilian states:
 - Brasil data sent to IHME by the MoH;
 - New population estimates for states by age and sex in 1970-2000 (UFMG and UFRN team)
 - IHME estimates of all cause mortality (mortality envelope-to correct undercount of deaths) and causes of death were discussed with Brazilian researchers in several meetings.
- MoH financed a Brazilian network with two main objectives:
 - producing results to integrate health indicators what is segmented and vertical
 - create knowledge and expertise among academics to contribute in expanding human resources capacity for GBD analysis and create critical resources for informed policy making.

The GBD 2015 Project in Brazil: Organization of the Brazil GBD network

- May2014: agreement proposal between the MoH and IHME
- October2014: Workshop in Brasília (IHME, UK and Mexico researchers, Brazilian researchers)
- November2014: GBD Brasil Project approved in UFMG
- April2015: Workshop in Belo Horizonte (Cedeplar/UFMF) with Prof. Haidong Wang/IHME
- June2015: Funding from the MoH to UFMG
- July-Aug2015: Launching of the GBD Brasil Network and workshops in several cities with Prof Mohsen Naghavi/IHME
- Sep2015May2016: Evaluation of IHME estimates (all cause mortality and causes of death), and workshops to disseminate the GBD study
- June-Aug2016: Workshops and meetings in several cities; training courses in Belo Horizonte (UFMG)
- Sept2016: Workshop to define Brazil GBD articles with Prof Mohsen Naghavi/IHME and collaborators

The GBD 2015 study in Brazil

 First comparison of health loss among Brazilian States using standardized GBD metrics to compare health situation with other countries;

- Data errors and miscoding are corrected, such as undercount of deaths (incompleteness) and underlying cause of deaths registered as garbage codes in the information system.
- By now 78 collaborators from Universities

Mortality according GBD groups Brazil 2000 - 2015

GBD groups	Adjusted rate by age				
	2000	2015	variación %		
GBD mortality	983,0	786,2	-20,0		
Group I - Infecciosas, maternas, neonatal e desnutrição	133,3	93,9	-29,6		
Group II - Non-communicable diseases	754,2	611,2	-19,0		
Group III - Causa Externa	95,5	81,1	-15,0		

The contribution of the GBD study to track health conditions in Brasil: Premature deaths

- Years of life lost (YLLs) is one of the most important metric used in the GBD study.
- Data in Figure (arrow diagram) indicate that the epidemiologic transition took place in Brazil during the last 25 years. Diarrheal diseases, from Group 1 of communicable, maternal, newborn, and nutritional conditions, was the leading cause of premature deaths in 1990, and dropped to the 13th place in 2005 and 36th in 2015.
- Cardiovascular diseases and injuries are leading causes in 2005 and 2015. But the maintenance of the top five COD from 2005 to 2015 is an indicator of important challenges to the health system, although the age-standardized YLL rates have declined during the period.

Figure-Leading 20 causes of YLLs with median percent change and age-standardized median percent change, all ages, both sexes. Brazil, 1990, 2005, and 2015.

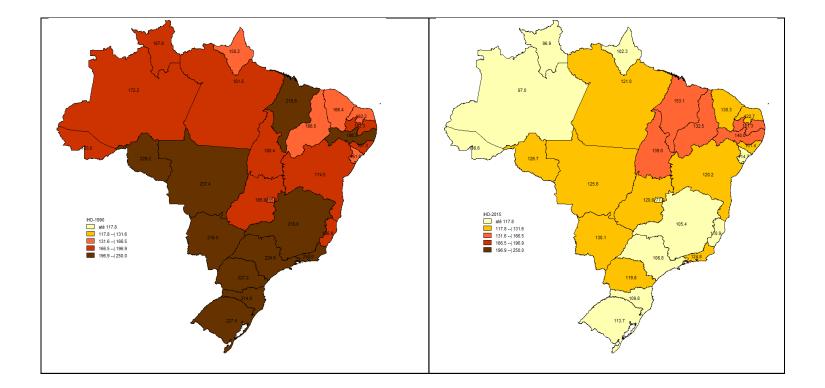
Leading causes 1990	Leading causes 2005	Median % change 1990-2005	Age-standardized median % change		Leading causes 2015	Median % change 2005-2015	Age-stadardized median % change	
1 Diarrheal diseases	1 Interpersonal violence	44% (17 to 54%)	9% (-11 to 16%)		1 Ischemic heart disease	20% (14 to 25%)	-15% (-19 to -11%)	
2 Neonatal preterm birth	2 Ischemic heart disease	9% (5 to 13%)	-36% (-38 to -34%)		2 Interpersonal violence	-1% (-7 to 6%)	-7% (-13 to -1%)	
3 Lower respiratory infect	3 Road injuries	-6% (-10 to 9%)	-27% (-30 to -15%)		3 Cerebrovascular disease	10% (5 to 16%)	-21% (-24 to -17%)	
4 Ischemic heart disease	4 Cerebrovascular disease	-3% (-7 to 7%)	-40% (-42 to -34%)		4 Road injuries	1% (-5 to 7%)	-9% (-14 to -3%)	
5 Road injuries	5 Lower respiratory infect	-46% (-51 to -43%)	-46% (-51 to -43%)	l	5 Lower respiratory infect	-10% (-20 to -3%)	-21% (-28 to -15%)	
6 Cerebrovascular disease	6 Neonatal preterm birth	-56% (-59 to -50%)	-53% (-57 to -47%)	k	6 Diabetes	36% (29 to 43%)	-3% (-8 to 2%)	
7 Interpersonal violence	7 Congenital anomalies	-2% (-45 to 20%)	2% (-43 to 25%)		7 COPD	14% (9 to 20%)	-20% (-24 to -16%)	
8 Neonatal encephalopathy	8 COPD	30% (25 to 36%)	-22% (-25 to -18%)	1	8 Congenital anomalies	-18% (-34 to -7%)	-9% (-28 to 3%)	
9 Congenital anomalies	9 Diabetes	48% (42 to 54%)	-6% (-10 to -2%)	$Y \rightarrow$	9 HIV/AIDS	30% (18 to 41%)	12% (1 to 21%)	
10 Protein-energy malnutrition	10 Neonatal encephalopathy	-34% (-40 to -28%)	-30% (-36 to -23%)		10 Neonatal preterm birth	-47% (-53 to -40%)	-40% (-47 to -33%)	
11 Neonatal sepsis	11 HIV/AIDS	138% (110 to 177%)	76% (55 to 108%)	K	11 Chronic kidney disease	27% (20 to 35%)	-5% (-10 to 1%)	
12 COPD	12 Neonatal sepsis	-20% (-28 to -12%)	-15% (-23 to -6%)		12 Lung cancer	29% (22 to 36%)	-8% (-13 to -3%)	
13 Drowning	13 Diarrheal diseases	-84% (-85 to -82%)	-83% (-84 to -81%)	X	13 Self-harm	8% (1 to 16%)	-4% (-11 to 3%)	
14 Meningitis	14 Chronic kidney disease	33% (27 to 42%)	-8% (-12 to -4%)	KX.	14 Cirrhosis alcohol	13% (5 to 21%)	-12% (-18 to -5%)	
15 Diabetes	15 Self-harm	20% (14 to 36%)	-13% (-18 to -2%)	HV X	15 Alzheimer disease	49% (43 to 55%)	-7% (-10 to -3%)	
16 Self-harm	16 Other neonatal	59% (20 to 81%)	70% (28 to 93%)	XX /	16 Neonatal encephalopathy	-36% (-44 to -27%)	-28% (-37 to -18%)	
17 Chronic kidney disease	17 Lung cancer	61% (54 to 67%)	-2% (-6 to 2%)	XXV/	17 Breast cancer	29% (18 to 41%)	-3% (-11 to 5%)	
18 Cirrhosis alcohol	18 Cirrhosis alcohol	37% (30 to 44%)	-11% (-15 to -6%)	$Y \setminus X$	18 Stomach cancer	17% (11 to 24%)	-16% (-20 to -10%)	
19 Cardiomyopathy	19 Drowning	-24% (-29 to -20%)	-34% (-37 to -30%)	X XX	19 Colorectal cancer	33% (26 to 41%)	-3% (-9 to 2%)	
20 Other neonatal	20 Cardiomyopathy	25% (17 to 32%)	-11% (-16 to -6%)		20 Cardiomyopathy	5% (-3 to 16%)	-18% (-24 to -9%)	
21 Lung cancer	21 Stomach cancer			X	21 Neonatal sepsis			
22 Stomach cancer	22 Breast cancer			1 1	24 Other neonatal			
24 HIV/AIDS	23 Alzheimer disease			//	25 Drowning	Legend:		
31 Breast cancer	24 Protein-energy malnutrition				36 Diarrheal diseases	Communicable, mate		
37 Alzheimer disease	26 Colorectal cancer			/	-40 Protein-energy malnutrition	neonatal and nutritio	nal	
39 Colorectal cancer 33 Meningitis					-44 Meningitis	Non-communicable Injuries		

Source: Cause of death GBD Brazil Network and IHME team-Article to be submmited to publication

The contribution of the GBD study to track health conditions in Brasil

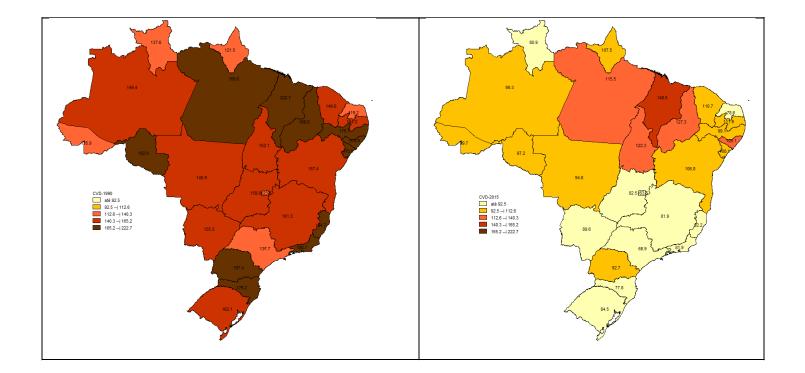
- Demographic shifts: new challenges for health system;
- NCDs were responsible for 76% of all deaths in Brazil in 2015;
- Ischemic heart disease and cerebrovascular disease are the first and second leading causes of death;
- Although mortality rates decreased over the period 1990 and 2015, there are important differences in risks among states;
- The results of the GBD 2015 study demonstrate higher risks in the less developed states of the Northeast region after correction of information bias (undercount of deaths and misclassification).

Figure-Age-standardized rates (per 100,000) for Ischemic heart disease, both sexes, in Brazilian states, 1990 and 2015.



Source: Cause of death Brazil Collaborators-Article to be submmited

Figure -Age-standardized rates (per 100,000) for Cerebrovascular disease, both sexes, in Brazilian states, 1990 and 2015.



Source: Cause of death Brazil Collaborators-Article to be submmited

The contribution of the GBD study to track health conditions in Brasil: DALY

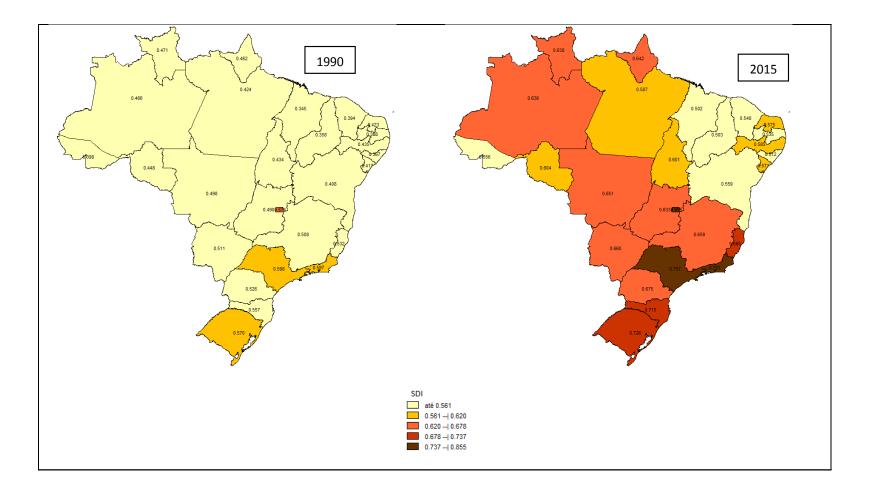
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# The GBD 2015 study in Brazil: burden of disease associated with levels of national development

- Important development of the GBD2015 study: the Sociodemographic index (SDI)- constructed for each country/subnational region based on the geometric mean of three indicators:
  - income per capita (lag dependent income per capita),
  - average years of schooling among populations aged 15 or older,
  - total fertility rate .
- Countries and subnational areas were classified according to SDIs quintiles
- Expected death rates by age-sex-cause calculated on SDI level.
  Source: GBD 2015 Mortality and Causes of Death Collaborat

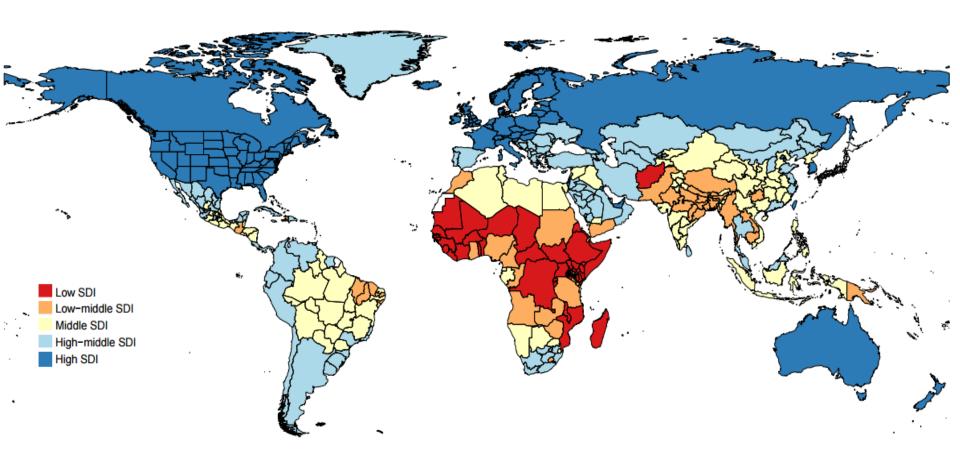
Source: GBD 2015 Mortality and Causes of Death Collaborators. Global,...Lancet 2106; 388:1459-544)

#### Socio-Demographic Index (SDI) based on the GBD 2015 study in Brazilian states in 1990 and 2015



Source: Cause of death Brazil Collaborators-Article to be submmited

#### Quintiles of Socio-demographic index (SDI) by GBD geographies, 2015



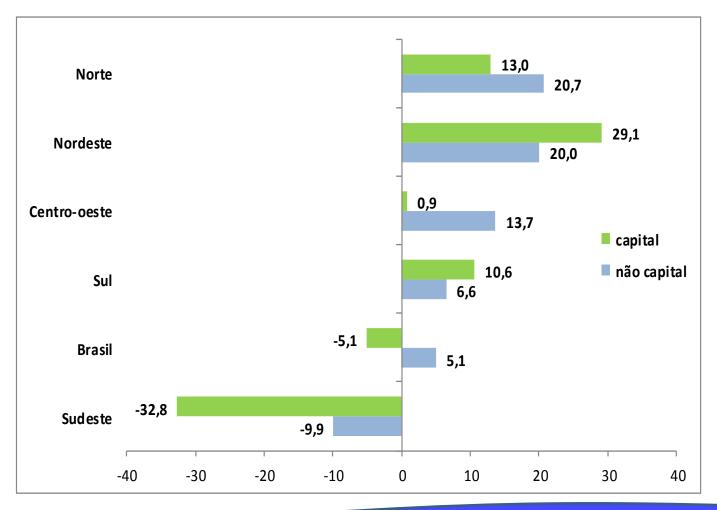
Source: GBD 2015 Mortality and Causes of Death Collaborators. Global,...Lancet 2106; 388:1459-544)

# Leading 10 causes of years of life lost (YLLs) with the ratio of observed YLLs to YLLs expected on the basis of Socio-Demographic Index in 2015.

	1	2	3	4	5	6	7	8	9	10
Argentina	IHD	LRI	Stroke	Road Inj	Congenital	Lung C	COPD	Self Harm	NN Preterm	СКD
	[0.86]	[1.66]	[0.58]	[0.82]	[1.11]	[0.87]	[1.49]	[0.83]	[1.32]	[1.41]
Chile	IHD	Stroke	Self Harm	Road Inj	Stomach C	LRI	Congenital	Lung C	CKD	COPD
	[0.55]	[0.65]	[0.78]	[0.85]	[1.03]	[0.71]	[1.12]	[0.53]	[1.31]	[0.95]
Uruguay	IHD	Stroke	Lung C	COPD	Self Harm	LRI	Road Inj	Colorect C	Congenital	Breast C
	[0.56]	[0.65]	[1.24]	[1.27]	[1.21]	[0.83]	[0.75]	[1.24]	[0.88]	[1.39]
Mexico	IHD	CKD	Diabetes	Violence	Road Inj	Congenital	LRI	Stroke	NN Preterm	Cirr Alc
	[0.62]	[3.23]	[2.7]	[3.2]	[0.78]	[1.09]	[0.67]	[0.41]	[0.69]	[3.0]
Brazil	IHD	Violence	Stroke	Road Inj	LRI	Diabetes	COPD	Congenital	HIV	NN Preterm
	[0.69]	[4.86]	[0.73]	[0.99]	[0.72]	[1.03]	[0.95]	[0.7]	[0.32]	[0.52]
Paraguay	IHD	Road Inj	Stroke	Congenital	NN Preterm	Violence	LRI	Diabetes	CKD	NN Enceph
	[0.67]	[0.93]	[0.8]	[0.82]	[0.6]	[1.94]	[0.57]	[1.34]	[1.22]	[0.58]

Source: GBD 2015 Mortality and Causes of Death Collaborators. Global,...Lancet 2106; 388:1459-544)

Homicídios cambio de la tasa/100 mil habitantes Capital e no capital, por grandes regiones, Brasil, 2000 y 2014 (excluído impacto del crecimiento poblacional)



Fonte: SIM/SVS/MS

# Working with the GBD approach in Brazil: advances and challenges

- 1. Internal consistency of the GBD estimates and comparability are fundamental for analyzing the state of health in states, measuring disparities between states, and making comparisons with other countries.
- 2. Results of the GBD global are based on an enormous effort to correct information bias, such as undercount of deaths and misclassification due to garbage codes in cause of death analysis.
- 3. Data sources and results are available on the internet (raw data and estimates available in the Viztool), and detailed methods in Appendix.
- 4. Methods and data are improving from each sequential GBD, but GBD estimates are not directly comparable with those from older GBD studies.
- 5. A big challenge: the GBD study uses highly complex demographic and statistical methods, so it is difficult to have independent local replication of all results.
- 6. GBD results may support policy makers and other stakeholders to identify important gaps, measure successes and set new priorities. For example, the MoH is launching a project to investigate all GC (ill-defined R codes and others)

# What is coming

- It is ready for submission all causes death paper by state
- A special publication with GBD results will be publish in Portuguese on Brazilian Journal of Epidemiology – in Portuguese
- More engagement of MoH technical programs
- Increase number of collaborators
- Estimates of Zica virus and Chikungunya

# **GBD Brasil 2015**

Thank you!

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