



Global Burden of Disease 2013 overview and future directions

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Global Burden of Disease

- 1) A **systematic, scientific** effort to quantify the **comparative** magnitude of **health loss** from all major diseases, injuries, and risk factors by age, sex, and population and over time.
- 2) 188 countries from 1990 to present. Sub-national assessments for some countries (e.g. **China, Mexico, UK, US, Brazil, Japan, India, Saudi Arabia**)
- 3) 306 diseases and injuries, 2,337 sequelae, 79 risk factors or clusters of risk factors.
- 4) Updated annually; release planned for May each year.
- 5) Findings published in major medical and science journals (*The Lancet, JAMA, New England Journal of Medicine, Science, Nature, PLOS Medicine*), policy reports, and online data visualizations.

GBD: standardized solution to global health measurement challenges

Challenges:

1. Inconsistent coding and case definitions
2. No data
3. Conflicting data
4. Sampling and non-sampling measurement error
5. Excluded groups

GBD solutions:

1. Quality review of all sources and corrections for garbage coding
2. Cross-walking different case definitions, diagnostic technologies, recall periods, etc., using statistical methods
3. Statistical methods to deal with missing data, inconsistent data, excluded groups and measurement error

GBD: a global study with a global collaborative network of investigators



1,414 collaborators from 115 countries

Multiple metrics for health

1. **Traditional metrics:** Disease and injury prevalence and incidence, death numbers and rates.
2. **Years of life lost** due to premature mortality (YLLs) – count the number of years lost at each age compared to a reference life expectancy of 86 at birth.
3. **Years lived with disability** (YLDs) for a cause in an age-sex group equals the prevalence of the condition times the disability weight for that condition.
4. **Disability-adjusted life years (DALYs)** are the sum of YLLs and YLDs and are an overall metric of the burden of disease.
5. **Healthy life expectancy (HALE)** is a positive summary measure counting the expected years of life in full health.

Some GBD 2013 publications

Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013



Global Burden of Disease Study 2013 Collaborators*

Summary Background with disability Disease Str 188 countri

Methods Es with some i additions to reviews, use severity spli cause and in

Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013



GBD 2013 Risk Factors Collaborators*

Global, regional, and national age–sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013



GBD 2013 Mortality and Causes

Summary Background Up-to-date essential for the formati 2013 (GBD 2013) we esti whether there is epidem

Methods We estimated ag accuracy applied to an u death as in the GBD 2010 an updated verbal autopsy Turkey, and Russia. We strategies across the 240 sufficient information. 1 prevalence studies. For p approach. We computed 1 all pairs of countries (Cin

Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990–2013: quantifying the epidemiological transition



GBD 2013 DALYs and HALE Collaborators*

Summary Background The Global Burden of Disease Study 2013 (GBD 2013) aims to bring together all available epidemiological data using a coherent measurement framework, standardised estimation methods, and transparent data sources to enable comparisons of health loss over time and across causes, age–sex groups, and countries. The GBD can be used to generate summary measures such as disability-adjusted life-years (DALYs) and healthy life expectancy (HALE) that make possible comparative assessments of broad epidemiological patterns across countries and time. These summary measures can also be used to quantify the component of variation in epidemiology that is related to sociodemographic development.

Methods We used the published GBD 2013 data for age-specific mortality, years of life lost due to premature mortality (YLLs), and years lived with disability (YLDs) to calculate DALYs and HALE for 1990, 1995, 2000, 2005, 2010, and 2013 for 188 countries. We calculated HALE using the Sullivan method; 95% uncertainty intervals (UIs) represent uncertainty in age-specific death rates and YLDs per person for each country, age, sex, and year. We estimated DALYs for 306 causes for each country as the sum of YLLs and YLDs; 95% UIs represent uncertainty in YLL and YLD rates. We quantified patterns of the epidemiological transition with a composite indicator of sociodemographic status, which we constructed from income per person, average years of schooling after age 15 years, and the total fertility rate and mean age of the population. We applied hierarchical regression to DALY rates by cause across countries to decompose variance related to the sociodemographic status variable, country, and time.

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* Collaborators listed at the end of the Article
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www.gbd.org

Clinical Review & Education

Special Communication

The Global Burden of Cancer 2013

Global Burden of Disease Cancer Collaboration

IMPORTANCE Cancer is among the leading causes of death in individual countries and regions and is a global health burden.

OBJECTIVE To estimate mortality, incidence, years lived with disability (YLLs), and disability-adjusted life-years (DALYs) from 1990 to 2013.

EVIDENCE REVIEW The general methodology of the GBD study was used. Cancer registries were the source for cancer mortality incidence (MI) rates. Sources for cause of death data, verbal autopsy studies, and other sources

Global Burden of Cardiovascular Disease

Estimates of Global and Regional Premature Cardiovascular Mortality in 2025

Gregory A. Roth, MD, MPH, Grant Nguyen, BA, Mohammad H. Forouzanfar, MD, PhD, Ali H. Mokdad, PhD, Mohsen Naghavi, MD, PhD, Christopher J.L. Murray, MD, DPHI

Background—United Nations member states have agreed to reduce premature cardiovascular disease (CVD) mortality 25% by 2025. We produced estimates to show how selected risk factors contribute to CVD mortality in 2025. We disaggregated CVD mortality by sex, age, and region. We used the Global Burden of Disease (GBD) 2013 risk factor data to estimate CVD mortality in 2025, adjusting for joint effects of risk factors. We used the GBD 2013 risk factor data to estimate CVD mortality in 2025, adjusting for joint effects of risk factors. We used the GBD 2013 risk factor data to estimate CVD mortality in 2025, adjusting for joint effects of risk factors. We used the GBD 2013 risk factor data to estimate CVD mortality in 2025, adjusting for joint effects of risk factors.

Measuring the Global Burden of Disease

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Global Burden of Skin Disease as Reflected in Cochrane Database of Systematic Reviews

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Supplemental content at jamaonline.org

IMPORTANCE Research prioritization should be guided by impact of disease. **OBJECTIVE** To determine whether systematic reviews and protocols in the Cochrane Database of Systematic Reviews (CDSR) reflect disease burden, measured by disability-adjusted life years (DALYs) from the Global Burden of Disease (GBD) 2010 project. **DESIGN, SETTING, AND PARTICIPANTS** Two investigators independently assessed 15 skin conditions in the CDSR for systematic review and protocol representation from November 1, 2011, to December 31, 2013. The 15 skin diseases were matched to their respective DALYs from GBD 2010. An official publication report of all reviews and protocols published by the Cochrane Skin Group (CSG) was also obtained to ensure that no titles were missed. There were no study participants other than the researchers, who worked with databases evaluating CDSR and GBD 2010 skin condition disability data.

MAIN RESULTS AND MEASUREMENTS Relationship of CDSR topic coverage (systematic reviews and protocols) with percentage of total 2010 DALYs, 2010 DALY rank, and DALY percentage change from 1990 to 2010 for 15 skin conditions.

RESULTS All 15 skin conditions were represented by at least 1 systematic review in CDSR. 69% of systematic reviews and 67% of protocols by the CSG covered the 15 skin conditions. Comparing the number of reviews/protocols and disability, melanoma, non-melanoma skin cancer, viral skin diseases, and fungal skin diseases were well matched. Decubitus ulcer, psoriasis, and herpes demonstrated overrepresentation/overcoverage when matched with corresponding DALYs. In comparison, acne vulgaris, bacterial skin diseases, cutaneous pruritus, scabies, cellulitis, and skin abscess were underrepresented in CDSR when matched with corresponding DALYs.

CONCLUSIONS AND RELEVANCE Degree of representation in CDSR is partly correlated with DALY metrics. The number of published reviews/protocols was well matched with disability metrics for 5 of the 15 studied skin diseases, while 3 skin diseases were overrepresented, and 7 were underrepresented. Our results provide high-quality and transparent data to inform future prioritization decisions.

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On-line catalog with metadata on 50,000+ GBD sources

The screenshot shows the GHDx website interface. At the top, there is a navigation bar with 'IHME | GHDx | GBD Compare' on the left, a search box, and a 'Login' button on the right. Below this is the GHDx logo and the text 'Global Health Data Exchange Discover the World's Health Data'. A dark navigation bar contains links for 'Home', 'Country Profiles', 'Series and Systems', 'Organizations', 'Keywords', 'IHME Data', 'About the GHDx', and 'Help'. The main content area features a 'Global Health Data Exchange' heading, a welcome message, and a list of links: 'GBD 2013 data downloads', 'GBD 2013 MDG data downloads', and 'All IHME data'. Below this is a paragraph about the Open Data Commons Attribution License. Two purple boxes are present: 'Search Data' with a search input and 'Country Profile' with a dropdown menu showing 'Afghanistan'. To the right, a 'Recent' section lists several surveys: 'Palestine Nutrition Survey 2002', 'World Taxation and Price Guide 1994', 'Brazil Medical Sanitary Assistance Survey 2009', 'Kuwait World Health Survey 2008-2010', 'Sri Lanka Demographic and Health Survey 2000', and 'Australia National Children's Nutrition and Physical Activity Survey 2007'. A 'Resources' section at the bottom right lists 'Contact Us', 'Data Sites We Love', and 'IHME Data Visualizations'. The footer contains the University of Washington logo and contact information for the Institute for Health Metrics and Evaluation.

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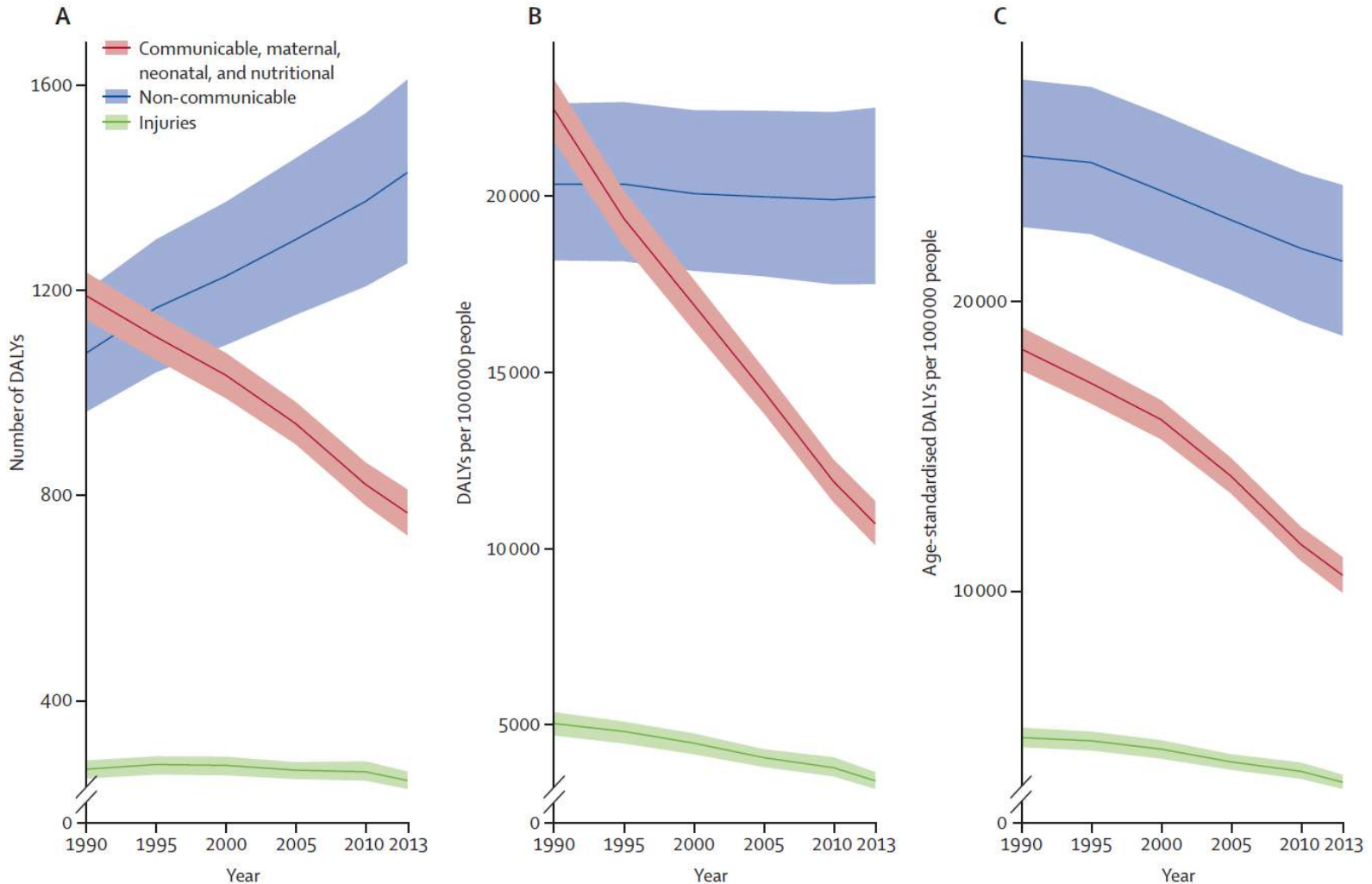
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More Ways to Explore the GHDx

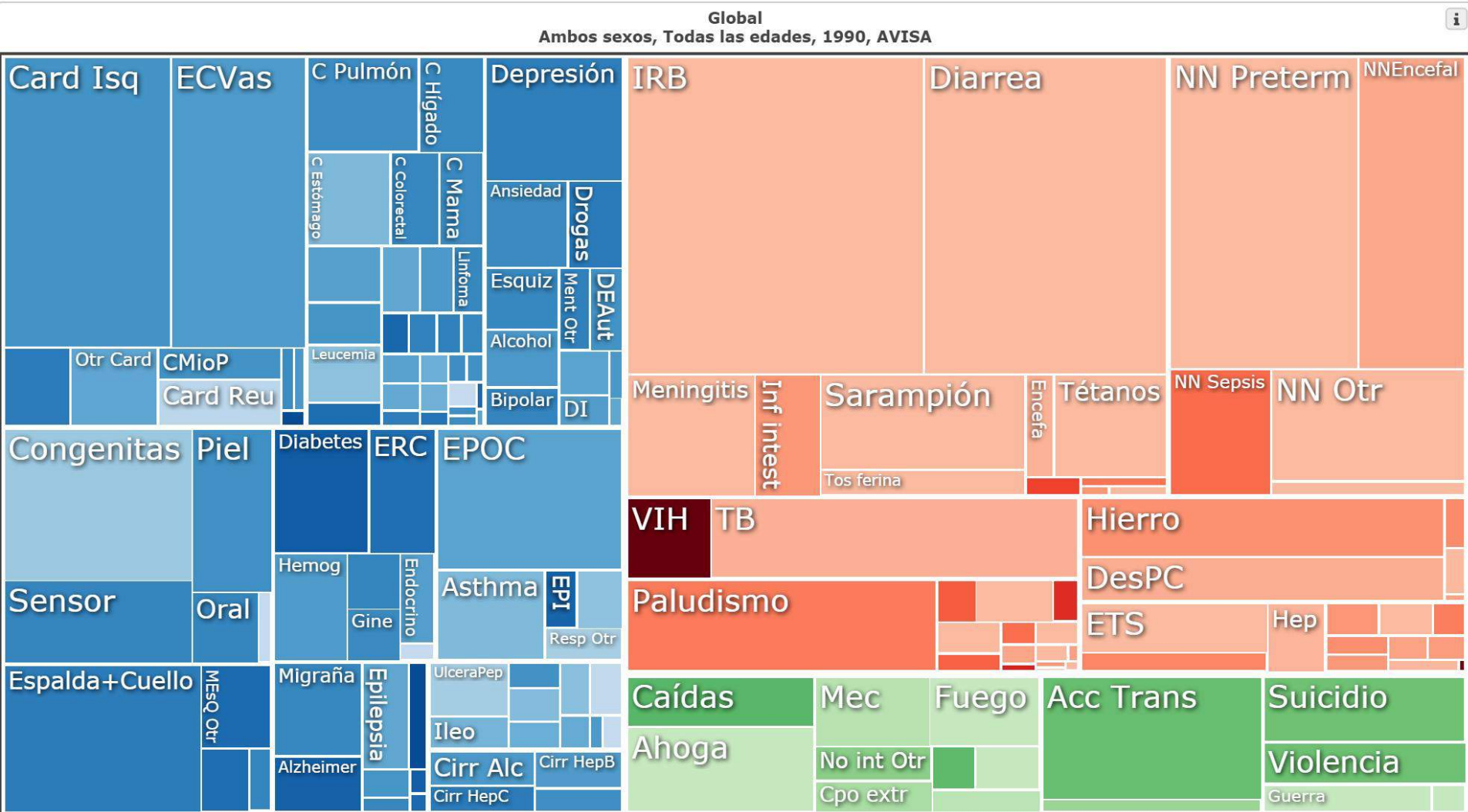
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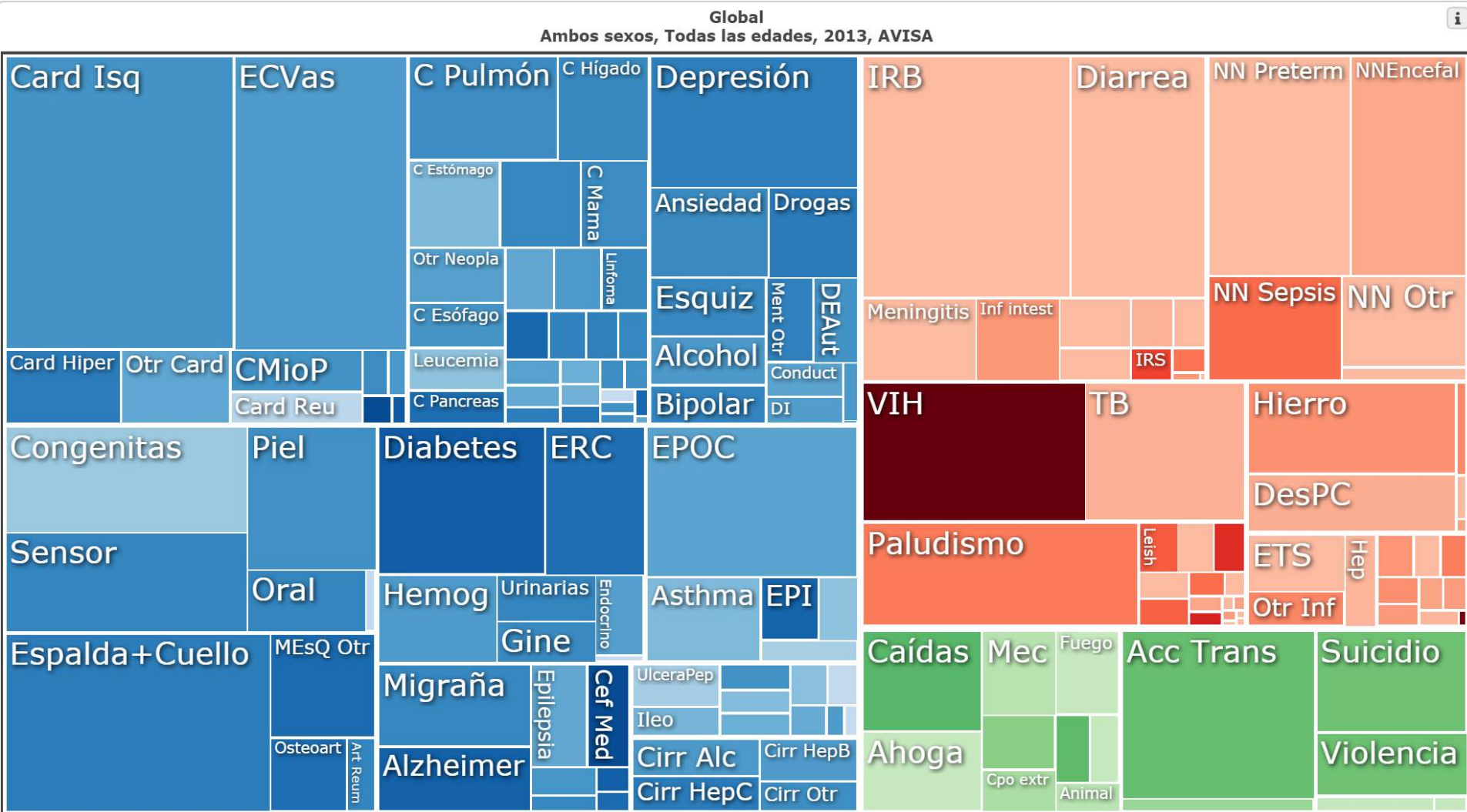
Total DALYs, crude DALY rates, and age-standardised DALY rates from 1990 to 2013



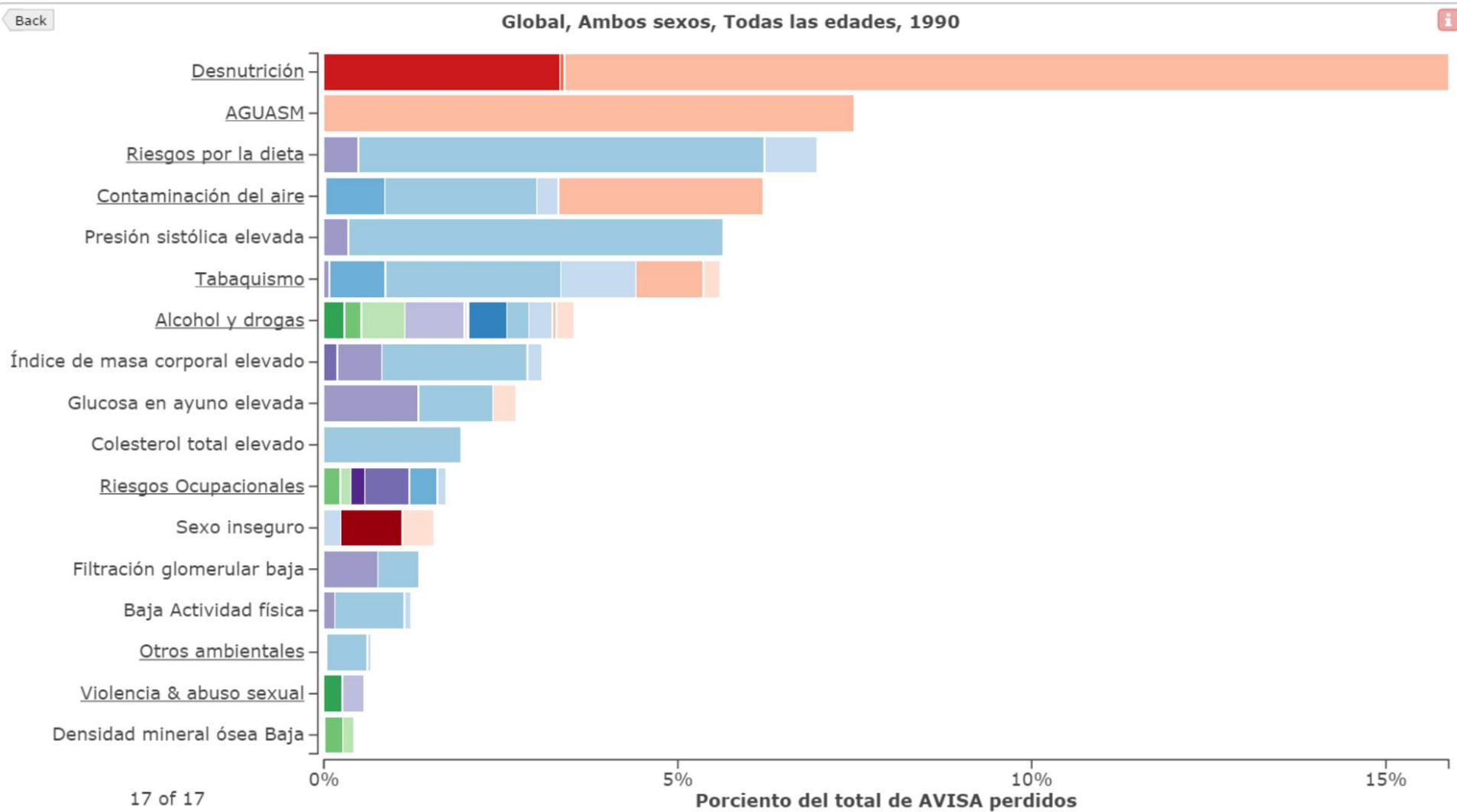
Global DALYs by cause 1990



Global DALYs by cause 2013



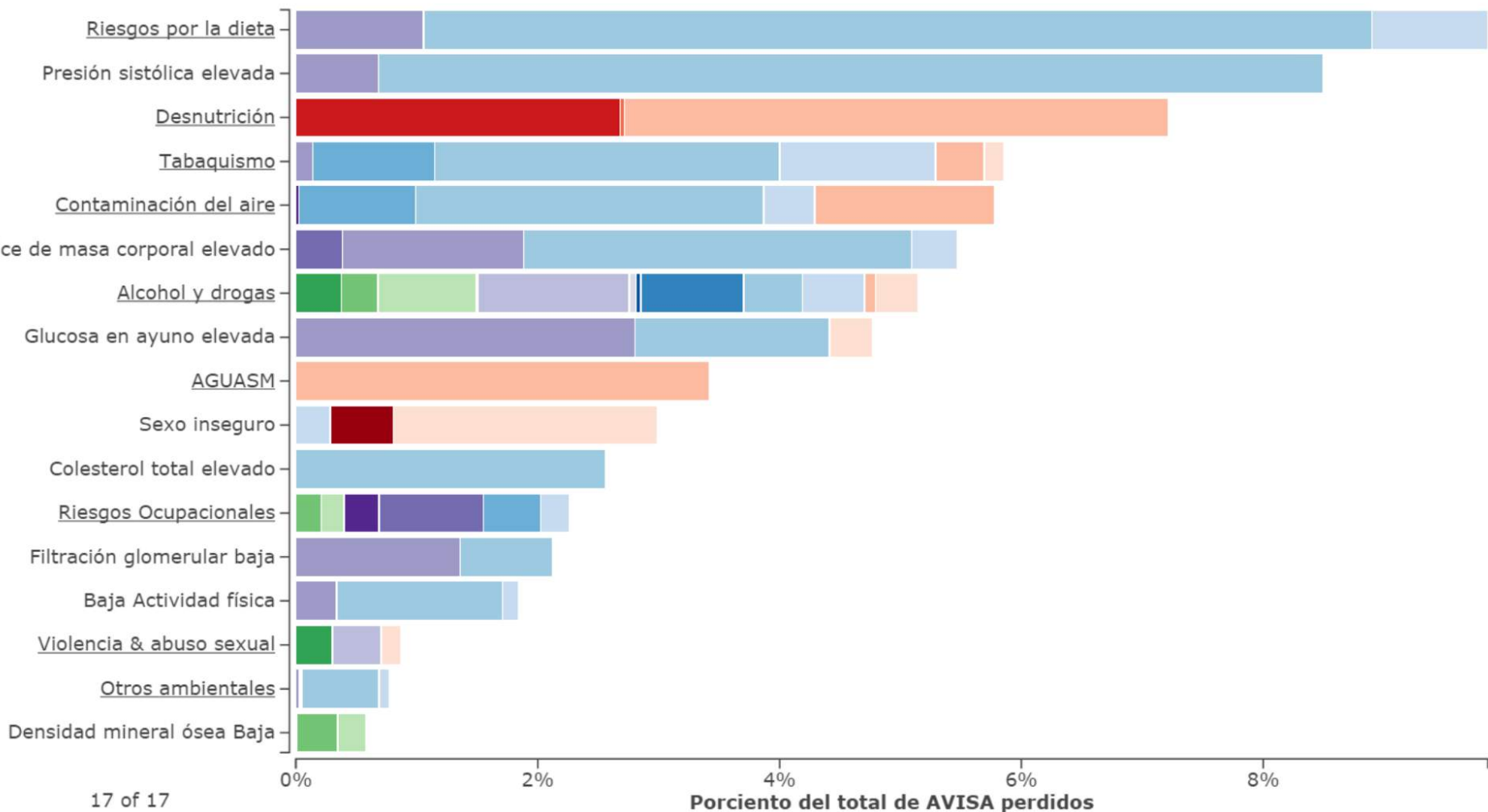
Leading global risks 1990



Leading global risks 2013

Back

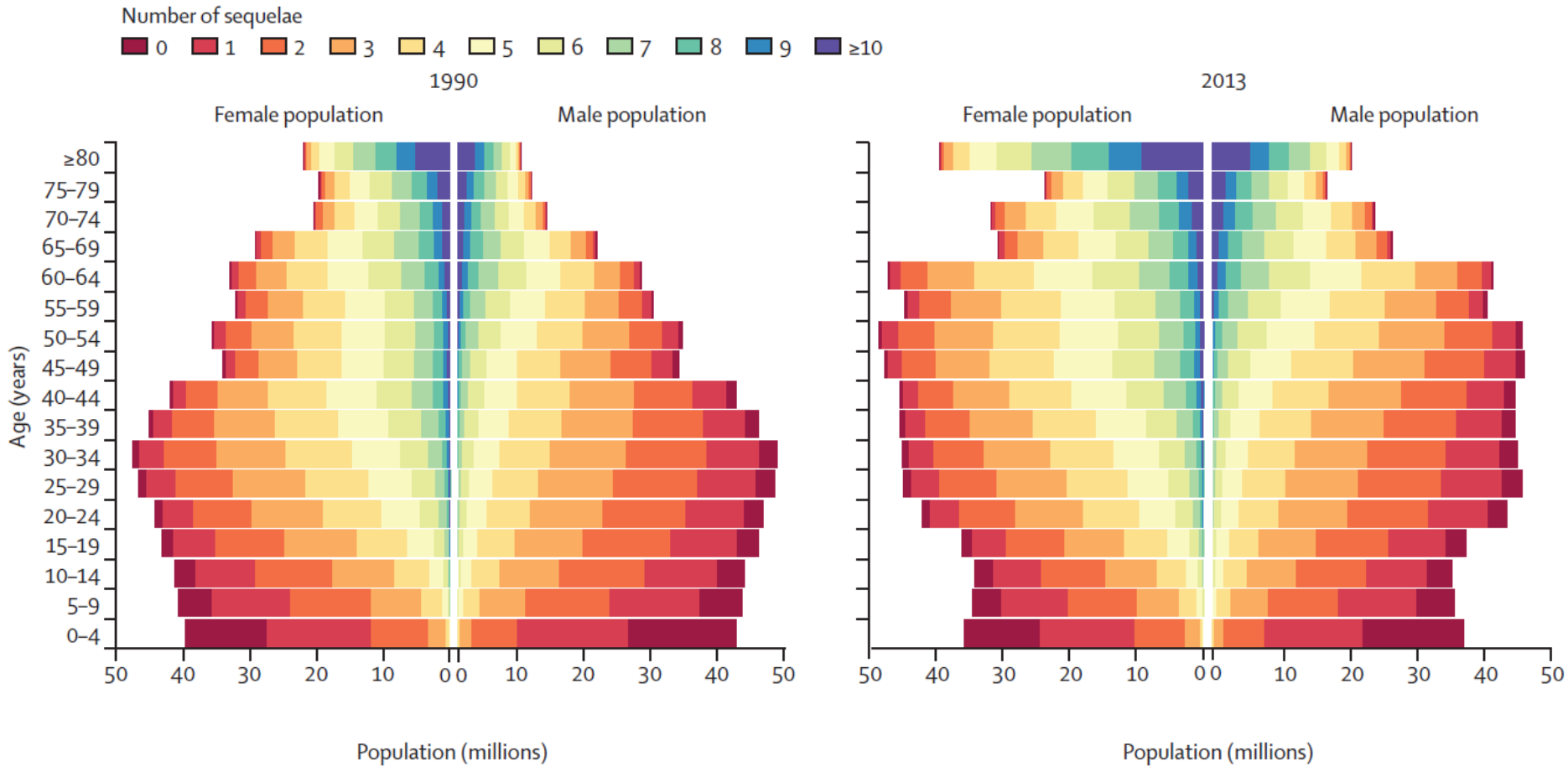
Global, Ambos sexos, Todas las edades, 2013



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Por ciento del total de AVISA perdidos

Co-morbidity population pyramids for high-income countries



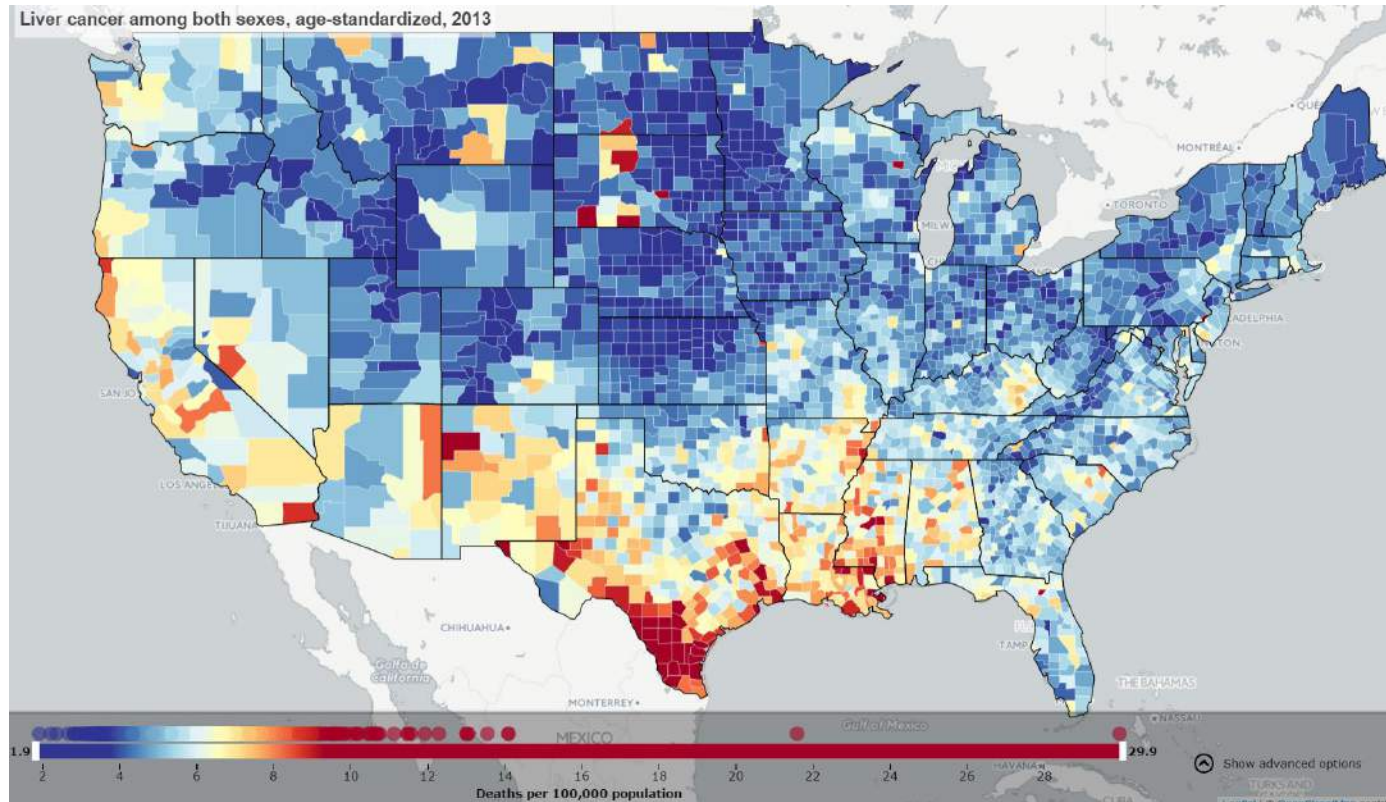
Data viz

www.healthdata.org

GBD new directions: fine spatial resolution

- 1) To guide priority setting, program targeting and evaluation of local programs pushing estimation to finer grained levels using small area statistical methods.

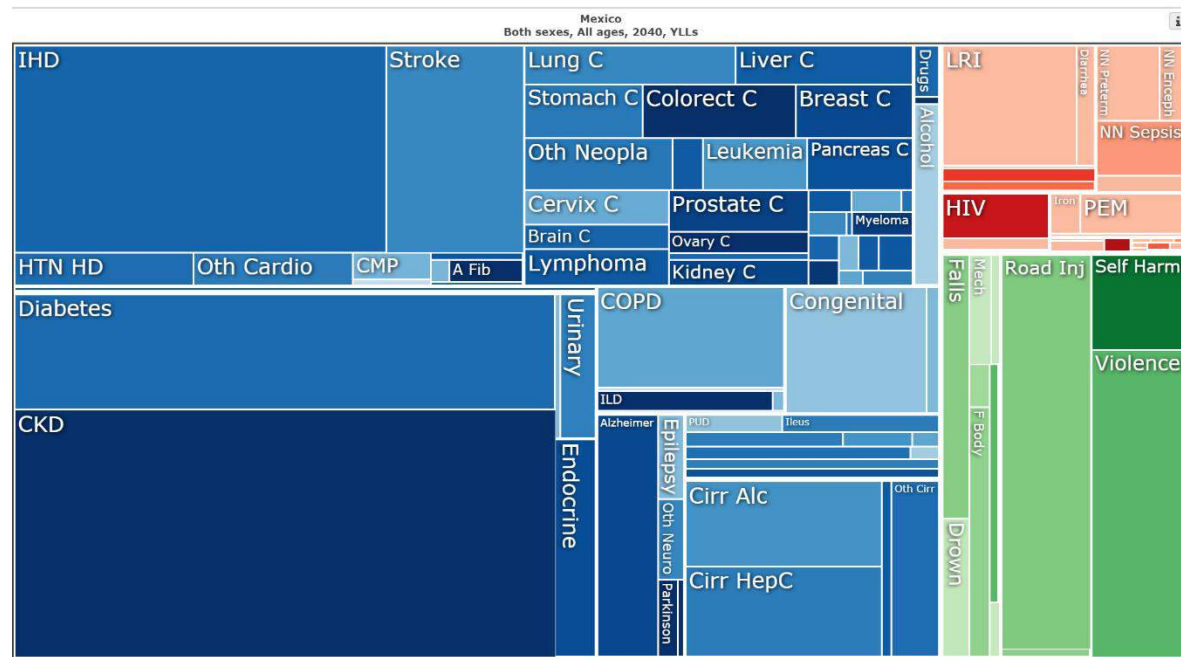
Age-standardized liver cancer death rate for US counties 2013, both sexes combined



GBD new directions: future health scenarios 2015-2040

- 1) What will happen to the burden of disease in each country in the next generation if past trends and relationships continue? And what will be the evolution of health expenditure?
- 2) Alternative scenarios where policy change can influence the evolution of key drivers of health

Mexico YLLs in 2040 in the past trends and relationships scenario

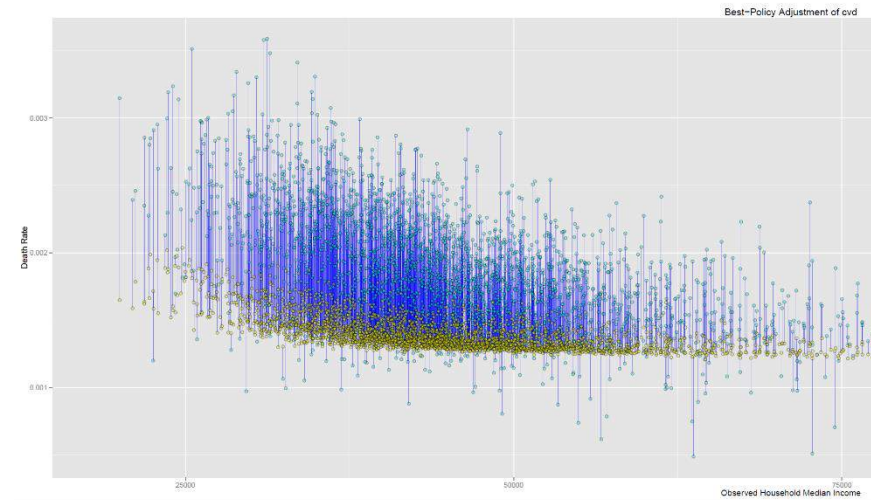


GBD new directions: social, cultural and economic, absence of intervention risk factors

- 1) To date, the comparative risk assessment component of GBD quantifies a set of key behavioural, environmental, occupational and metabolic risk factors based on criteria of convincing or probably causal evidence.
- 2) In coming years, we plan to expand the set of risk factors quantified in two key directions: upstream to social, cultural and economic risks and to characterize the absence of proven interventions as risks.
- 3) Implication is that the evidence criteria used for including social, economic and cultural risks will need to be modified based on the type of evidence that is available.

GBD new directions: achievable reductions in burden at different levels of socio-demographic status

- 1) Use the national and sub-national GBD results to answer the question: what reductions in burden for each disease are achievable given the observed variation across populations at the same level of income, education and fertility?
- 2) Achievable burden can help focus attention on where the greatest potential for improvement in a state or country is possible. It is a formalized form of benchmarking.



Achievable reductions in CVD in US counties at different levels of income – blue lines connect observed to possible