Global Burden of Disease 2013 overview and future directions

Christopher J.L. Murray
December 8, 2015
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.

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 in 188 countries

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


GBD 2013 Mortality and Causes

Summary

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

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 across 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 components of variation in epidemiology that are related to sociodemographic development.

Methods

We used the published GBD 2013 data for age-sex specific mortality, years of life lost due to premature mortality (YLL), and years lived with disability (YLD) to calculate DALYs and HALE for 1990, 1995, 2000, 2005, 2010, and 2015 for 188 countries. We calculated HALE using the Sullivan method. We summarised 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 components of variation in epidemiology that are related to sociodemographic development.

Institute for Health Metrics and Evaluation

University of Washington

Global Burden of Cardiovascular Disease

Estimates of Global and Regional Premature Cardiovascular Mortality in 2025

Guglielmo C. Malan, MD, PhD, Neeraj Khurana, MD, PhD, Gordon W. Murray, MD, PhD

Background The National Heart, Lung, and Blood Institute’s Global Burden of Disease 2010 Collaborators estimated that cardiovascular disease (CVD) is the leading cause of premature mortality in the world. The risk factors for CVD are well established and have been documented for many years. However, CVD burden is expected to increase in the future due to population aging and rising prevalence of chronic conditions, which will translate into a growing number of deaths due to CVD. This rise will be more pronounced in low-income and middle-income countries (LMICs) where the burden of CVD is likely to be highest.

Methods We used a model-based approach to estimate age-specific mortality due to CVD in 2025 in 220 countries and territories globally. We estimated age-specific mortality rates for CVD in 2025 by country and sex using a population-level regression model that incorporated all available data on age-specific mortality due to CVD during 1990–2010.

Results Our model-based estimates suggest that the global CVD mortality rate will increase by 38% in 2025 compared to 2010. The rate of increase will be highest in LMICs, where the CVD mortality rate is likely to triple by 2025.

Conclusions Our findings underscore the need for targeted interventions to prevent and treat CVD in LMICs and high-income countries alike to reduce the burden of CVD in the future.

Institute for Health Metrics and Evaluation

University of Washington

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

Marieke W. de Vries, MD, PhD, Ondrej M. Bankova, MD, PhD

Background The Cochrane Database of Systematic Reviews (CDSR) is a key resource for evidence-based medicine, providing systematic reviews and meta-analyses that inform clinical practice. The CDSR is a critical tool for healthcare professionals, policy makers, and researchers to make informed decisions.

Methods We conducted a systematic search of the CDSR for systematic reviews and meta-analyses related to skin disease. We identified 156 relevant systematic reviews and meta-analyses that were published in the CDSR from 2010 to 2019.

Results Our systematic review identified 156 systematic reviews and meta-analyses related to skin disease. The most common topics covered were dermatology, cosmetic surgery, and skin cancer. The majority of systematic reviews and meta-analyses were from high-income countries, with only a small number from low-income and middle-income countries.

Conclusions Our findings highlight the importance of evidence-based medicine in the field of skin disease. Further research is needed to address the needs of low-income and middle-income countries and to increase the number of systematic reviews and meta-analyses from these regions.

Institute for Health Metrics and Evaluation

University of Washington
On-line catalog with metadata on 50,000+ GBD sources
Benchmarking using the GBD: United Kingdom and England analyses

1) UK benchmarking analyses 2013.
3) Future iterations of the England analysis planned for local health authorities.
China collaboration

• Policy dialogue with 200 participants hosted by China Medical Board, Peking Union Medical College, China CDC, and IHME in Beijing in April 2013 led to commitment to monitor sub-national burden.

• China Centers for Disease Control, China Maternal and Child Surveillance System, China Cancer Registration System collaborating with IHME on producing provincial and county burden of disease analyses.
Total DALYs, crude DALY rates, and age-standardised DALY rates from 1990 to 2013
Global DALYs by cause 1990

Global DALYs by cause 1990

Card Isq  | ECVas  | C Pulmón  | C Hígado  | C Mama  | Depresión  | IRB  | Diarrea  | NN Preterm  | NN Encefal
Card Reu  | CMioP  | C Estómago | C Colorectal | Uterina  | Ansiedad  | Drogas  | Ment Otr  | NN Sepsis  | NN Otr
Otr Card  | Leucemia | Leucemia  | Leucemia  | Leucemia | Leucemia  | Leucemia  | Leucemia  | Leucemia  | Leucemia
Congenitas | Piel  | Diabetes  | ERC  | EPOC  | VIH  | TB  | Paludismo  | Hierro  | DesPC  | ETS
Sensor  | Oral  | Hemog  | Gine  | Endocrino  | Asthma  | EPI  | Resp Otr  | Hep  | Violencia  | Guerra
Espalda+Cuello | MerQc  | Migranes  | Epilepsia  | Alzheimer  | UceraPep  | Ileo  | Ciro Alc  | Cirr HepB  | Violencia  | Guerra
Ahoga  | Mec  | Fuego  | Acc Trans  | Suicidio  | No int Otr  | Cpo extr  | Cirr HepC  | Cirr HepC  | Violencia  | Guerra

IHME | UNIVERSITY of WASHINGTON
Global DALYs by cause 2013
Leading global risks 1990
Leading global risks 2013

Global, Ambos sexos, Todas las edades, 2013

- Riesgos por la dieta
- Presión sistólica elevada
- Desnutrición
- Tabaquismo
- Contaminación del aire
- Índice de masa corporal elevado
- Alcohol y drogas
- Glucosa en ayuno elevada
- AGUASM
- Sexo inseguro
- Colesterol total elevado
- Riesgos Ocupacionales
- Filtración glomerular baja
- Baja Actividad física
- Violencia & abuso sexual
- Otros ambientales
- Densidad mineral ósea Baja

Porcentaje del total de AVISA perdidos

17 of 17
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
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.