



Global Burden of Disease:

- what is new?
- what is it and how does it work?
- example of use



GBD: What does it do?

GBD provides a consistent and comparative description of burden of diseases, injuries and risks, allowing us to answer these questions:

- 1) What are the main causes of health loss in an area today?
- 2) What causes are getting worse and which are improving?
- 3) Compared to a set of relevant areas, what causes have rates that are substantially higher (or lower)?
- 4) What are the major risks associated with causes of burden?



GBD2016: What's new?

- 1) Sub-national releases for GBD now include local authority estimates – released 24th October
- 2) Current data here:
<https://gbd2016.healthdata.org/gbd-compare>
<https://gbd2016.healthdata.org/gbd-results-tool>
- 3) Will update to GBD2017 for local authorities soon
- 4) Future work will include forecasts of causes and scenarios of risk factor changes. Paper published in November for UK, but later publications will include smaller granularity



Variety of methods used to provide point estimates by year, area, age and sex for:

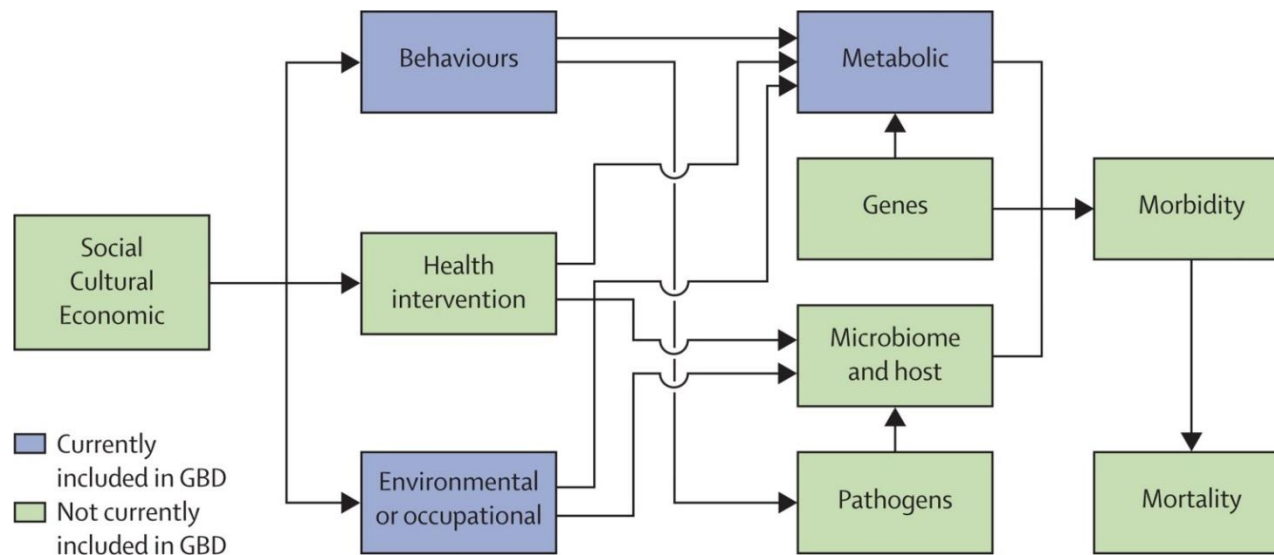
- All-cause mortality
- Deaths by cause
- Years of life lost
- Years lived with disability
- Disability-adjusted life years

Main results presented as **disability-adjusted life years (DALYs)**, a time-based measure that combines years of life lost due to **premature mortality (YLLs)** and **years lived with a disability (YLDs)**. These metrics were specifically developed to assess the burden of disease.



Comparative risk assessment in GBD

- Key metric that quantifies the amount of a risk attributed to each cause
- 3 main domains, behavioural, metabolic, environmental
- 4 levels of risk, progressively detailed





GBD 2017: Other key metrics

Life expectancy: Number of years a person at a given age is expected to live. For GBD, the life expectancy for an age group (e.g., 50-54 years), is determined from the first year in the age range

Healthy life expectancy (HALE): Number of years a person at a given age can expect to live in good health, taking into account mortality and disability.



Disease incidence: Number of new cases during a given period in a specified population. Also rate at which new events occur

Disease prevalence: Number of cases of a given disease in a specified population at a specific point in time

Summary Exposure Value (SEV): Risk-weighted prevalence of an exposure, where 0 = no risk in a population and 100 = entire population is at highest level of risk



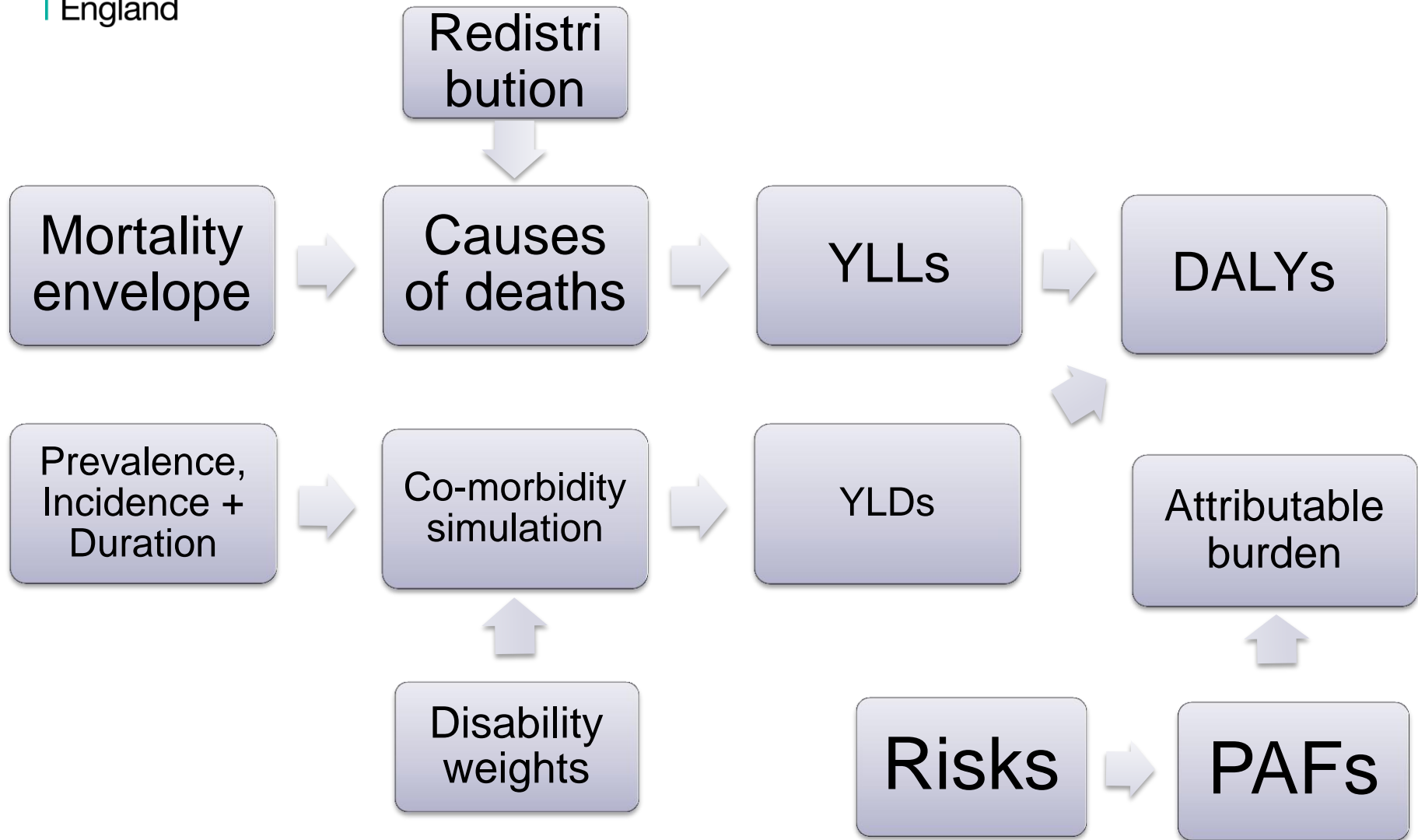
GBD 2017: Cause and risk levels

GBD produces outputs for 360 diseases and injuries, 85 risk factors - uses a hierarchical cause and risk structure, with views available for broad groups and for more detailed causes and risks

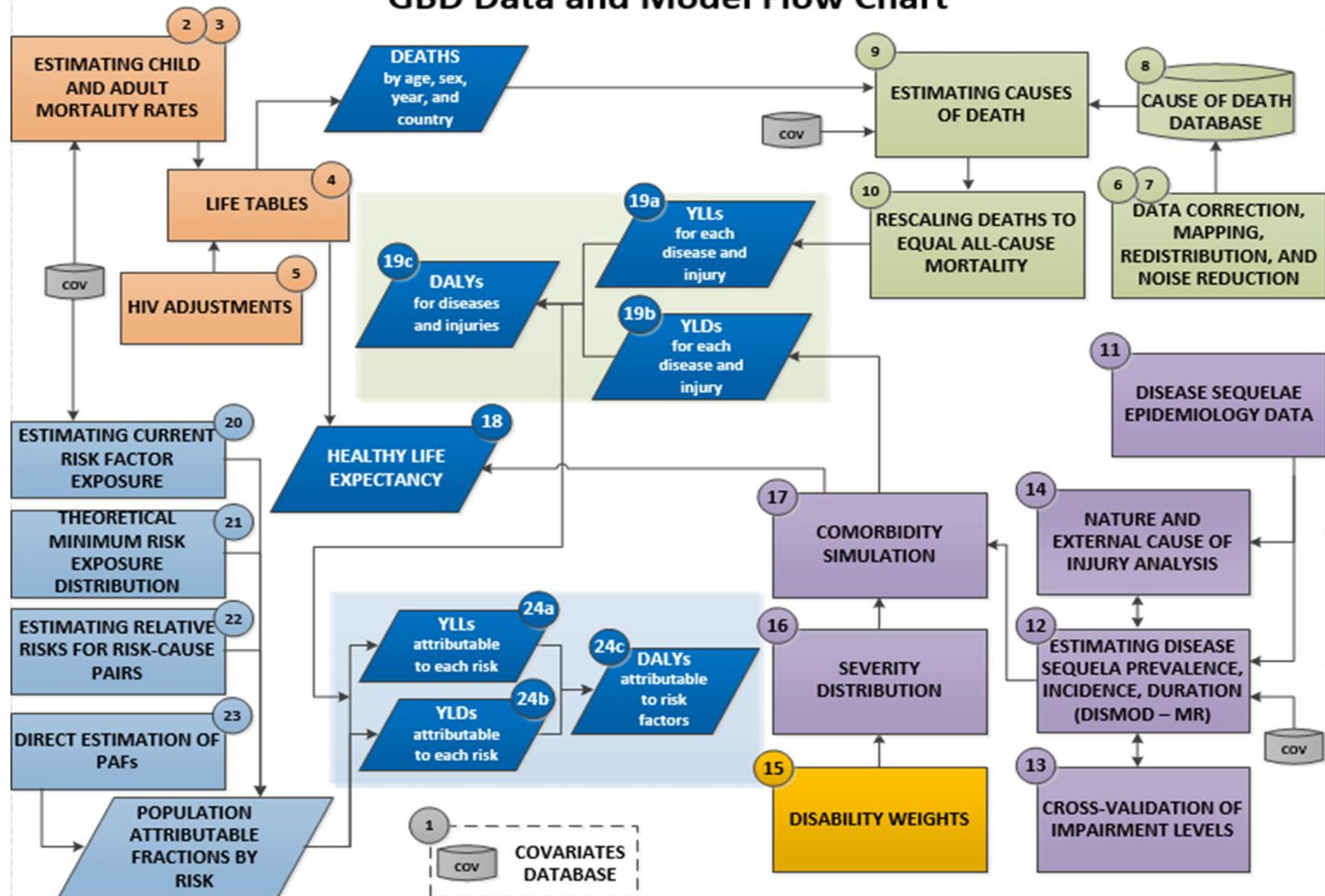
- For causes, the hierarchy roughly translates to levels within WHO's International Classification of Diseases (ICD)
- Risk factors are split into metabolic, environmental and behavioural – with each level below containing more specific risk factors



Simplified GBD model flow



GBD Data and Model Flow Chart





Key assumptions and principles underpinning outputs are outlined in GBD protocol.

- Estimates are for mutually exclusive and collectively exhaustive causes, and for all time periods and locations, facilitating **comprehensive comparisons**
- **GBD is an iterative production.** All estimates (in all time periods and locations) are replaced periodically in light of new data and methods
- GBD estimates **all quantities of interest.** An uncertain estimate is believed to be preferable to no estimate even when data are sparse or not available
- All estimates are created through the use of **appropriate statistical methods** and use multiple sources of data where required
- All estimates are **generated with uncertainty** limits



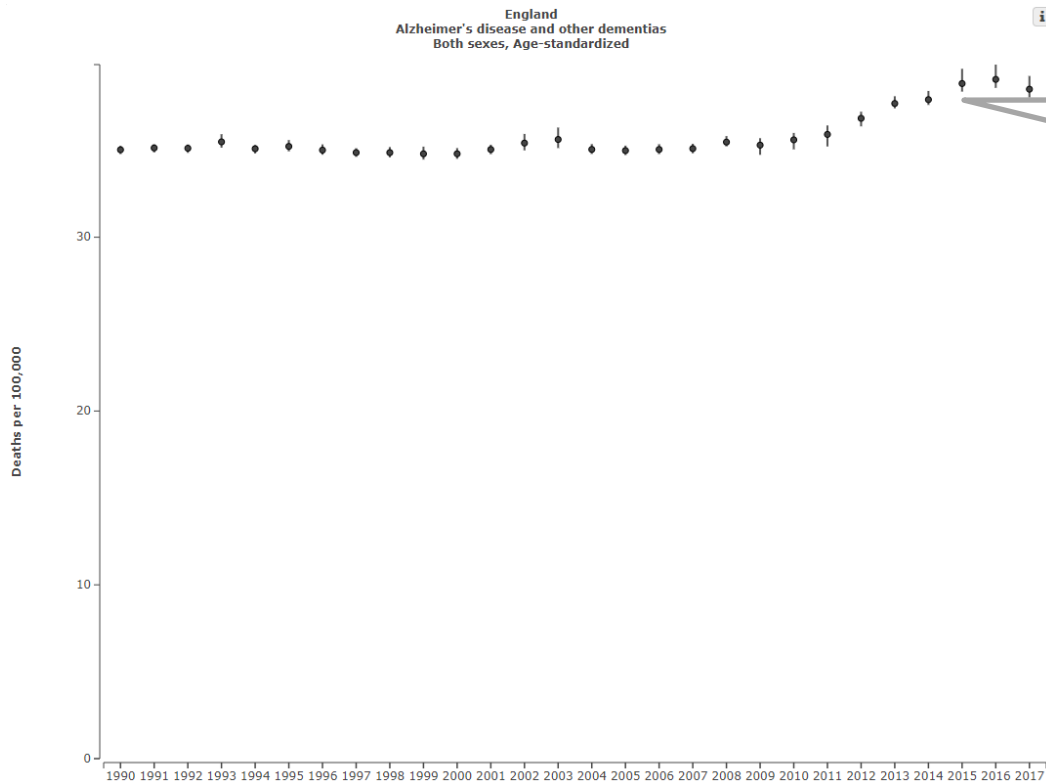
GBD: Understanding the estimates

- All GBD2016 and 2017 data are considered 'estimates', as they are statistically modelled using multiple data sources, including local data within England.
- Many causes in GBD2017 will have different definitions to causes used UK and English statistics.
- Mortality cause estimates in GBD2017 use reported ONS mortality vital statistics as a local data source.
- Non-fatal estimates (YLDs, incidence and prevalence) may not always represent complete within-country variation, due to limited local data sources. Prevalence and incidence estimates should be compared to local data if available.
- *GBD estimates may not always reflect recorded data, even where local data has been used by GBD and definitions are the same, due to modelling principles that GBD apply.*



Exploring differences with local sources

Trend in Alzheimer's and other dementia in England – age standardised mortality rates



Note the small increase in the disease since 1990. In the last 10 years there has been a relatively small amount of age adjusted mortality increase in England

This trend conflicts with ONS vital statistics used by PHE, which shows a large increasing age-standardised trend



Exploring differences with local sources

Why the difference with dementia?

Dementia mortality in vital registration systems has increased more than 5-fold since 1980s in many countries and over 4-fold since 1990 in England.

In contrast prevalence of disease has seen a modest decline in UK (and the US).

GBD uses hypothesis that certifying and coding practices have influenced recording.



1. Visualisation: GBD Compare <https://vizhub.healthdata.org/gbd-compare/>
2. GBD Results tool <http://ghdx.healthdata.org/gbd-results-tool>
3. GBD London Profile <http://www.healthdata.org/united-kingdom-england-greater-london>
4. Global Health Data Exchange <http://ghdx.healthdata.org/>
5. Other visualisations <http://www.healthdata.org/results/data-visualizations>
6. Capstone papers and research hub <https://www.thelancet.com/gbd>
7. GBD protocol <http://www.healthdata.org/gbd/about/protocol>