

Appendix 1 Supplemental method

Overview

Global Burden of Disease (GBD) performs systematic reviews, and diligent searches, and also uses data shared by country collaborators and the WHO to get data used in the models. Data collection is an iterative and progressive process to determine new sources. The detailed information for each cause of disease burden can be accessed in a searchable online tool. GBD 2021 estimated the disability-adjusted life years (DALYs), incidence, and prevalence, and healthy life expectancy (HALE) for 371 diseases and injuries. The estimates were generated by age (25 age group from birth to 95 years and above), sex (females, males, and both), year (1990–2021), and location (204 countries and territories grouped into 21 regions and seven super-regions). In addition, the estimates were reported by the Socio-demographic Index [1]. This paper follows the GBD protocol. The estimates are reported in terms of DALYs, YLLs, and YLDs.

Geographical location

GBD 2021 generated estimates for 204 countries and territories grouped into 21 regions and seven super-regions. GBD regions, as well as super-regions, consist of nations and territories that are spatially proximate, exhibit epidemiological similarities, and experience comparable patterns of mortality causes. This paper is focused on the China and the Asia-Pacific region.

Disease and injury

The GBD 2021 causes and injuries list is described in a four-level hierarchy that includes both fatal and non-fatal causes, each level within a category is unique and no item can belong to more than one level. In this study, the CDs were identified using incidence, prevalence, mortality, disability-adjusted life years (DALY) data from the GBD 2021. The GBD 2021 uses DALYs to measure the population's disease burden which integrate fatal and non-fatal disease burden. The estimates produced in the GBD 2021 were presented with 95% uncertainty intervals (UIs). The burden for each CD was estimated by age (0–6 days and 7–27 days), sex (for females, males, and both), year (from 1990–2021), and location (China and the Asia-Pacific region). The age-standardized were computed according to the GBD population age standard. We

presented estimates as age-standardized and all-age results to allow comparison of estimates of different age structures within the population and percentage changes between 1990 and 2021.

Data sources

In the GBD 2021, the estimation of DALYs was based on the information from 100983 data sources. Multiple data types were included to capture the large body of information such as vital registration and verbal autopsy, census, survey, surveillance, cancer registry, open-source databases, police records, and minimally invasive tissue sampling. Data were standardized by applying a set of data processing corrections to allow comparison by cause, age, sex, location, and time. The vital registration and verbal autopsy were assessed for completeness. Sources with less than 50 percent completeness were excluded. The details about GBD 2021 data sources and processing have been described in the previous studies [1,2].

Appendix 2

Core formula of BIC

$$\text{BIC} = -2 \cdot \ln(L) + k \cdot \ln(n) \quad [1]$$

Where L represents the maximum likelihood function value of the model, k represents the number of model parameters, and n represents the sample size.

Core formula of Monte Carlo

$$\ln(y_t) = \beta_0 + \beta_1 t + \sum_{i=1}^m \beta_{i+1} \max(t - k_i, 0) + \varepsilon_t \quad [2]$$

Where y_t represents the age-standardized rate in year t , $k_1, \dots, k_m$ represents the determined joinpoints, β represents the regression coefficient, and ε_t represents the random error term. The model outputs Annual Percentage Change (APC) and Average Annual Percentage Change (AAPC) to quantify the trend change amplitude.

Core formula of APC analysis

$$\text{Log}(\mu_{\{a,p\}}) = \mu + \alpha a + \pi p + \gamma c \quad [3]$$

Where $\mu_{\{a,p\}}$ represents the expected disease burden rate of age group a in period p , μ represents the overall mean, α represents the age effect, π represents the period

effect, and γ_c represents the cohort effect.

References

41. GBD 2021 Diseases and Injuries Collaborators. Global incidence, prevalence, years lived with disability (YLDs), disability-adjusted life-years (DALYs), and healthy life expectancy (HALE) for 371 diseases and injuries in 204 countries and territories and 811 subnational locations, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet* 2024;403:2133-61.
42. GBD 2021 Causes of Death Collaborators. Global burden of 288 causes of death and life expectancy decomposition in 204 countries and territories and 811 subnational locations, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021. *Lancet* 2024;403:2100-32.

