EDITORIAL COMMENT

The global burden of disease: An information resource for policy-making and evaluation of health interventions☆

A carga global de doença: fonte de informação para a definição de políticas e avaliação de intervenções em saúde

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The global burden of disease (GBD) is a complementary measure to traditional health statistics such as mortality rates and hospital productivity that do not reflect the impact of non-fatal outcomes of disease or injury over a patient's lifetime. The first assessment of health-related quality of life was in 1970 with the development of the health status index, but the term quality-adjusted life years (QALYs) was first used in 1976 to denote a health status measure that combined duration and quality of life.[1] Designed to overcome certain limitations of QALYs, disability-adjusted life years (DALYs) entered the health lexicon as a measure of the impact of a disease over time, which combines years lost due to disease (YLDs) and years of life lost (YLLs) due to premature death. The latter is calculated on the basis of potential longevity as defined in a standard table of mean life expectancy, adjusted to take account of changing life expectancy rather than the previously used cut-off of 70 years, or 75 years in some countries. YLDs correspond to the number of years lived with disability, the burden of disability being weighted according to disease severity on a scale of 0 (healthy) to 1 (death). The DALY measure is recommended by the World Health Organization (WHO) and by the World Bank, and was applied in the first Global Burden of Disease study in 1990 and in the World Bank Development Report in 1993, which had considerable impact on health policies by revealing the hidden burden in certain neglected health areas.[2]

The purpose of the GBD project is to provide comprehensive health data on diagnoses and trends that are comparable between countries and thereby to aid in policy decisions at global (WHO and United Nations [UN]), regional and national levels. One of its specific aims was to develop a measure that can be used to assess the cost-effectiveness of interventions, in terms of the cost per unit of disease burden averted.[3] However, the central concept of the GBD study is health loss, not loss of income or productivity. The financial costs of illness and their relationship to outcomes (health gains) have not as yet been assessed by the GBD studies, but since health systems are evaluated in terms of access, quality and financial protection,[4] they are likely to be included in burden of disease measures in the future.

The 2010 GBD study[5] used the same approach as the 1990 study but had a wider scope, a large consortium of collaborators, improved methodology and updated data on diseases, risk factors, regions and countries. The project, variously described as ''a superhuman effort'', ''a way of life, rather than another massive research project'', ''mission impossible'', a test of fire and a Herculean task, and which few initially believed would succeed, was coordinated by the

Institute for Health Metrics and Evaluation (IHME) at the University of Washington, Seattle, USA, and involved nearly 500 researchers from more than 300 institutions in 50 countries.[6] This technical and organizational challenge, based on a measure, the DALY, that encompasses a widely-shared notion of health and using a descriptive epidemiology that enables causes to be deduced for the differences and trends observed, has in fact succeeded in achieving the objective of international comparability. Data from GBD 2010 went a long way to increasing knowledge of global, regional and national health profiles and were a valuable aid for a comprehensive and innovative rethinking of the overall health of populations. With advances in methodology leading to more robust measures and the continuing partnership between The Lancet and the IHME for publication of GBD 2013 and GBD 2015, these updated estimates of disease burden worldwide (all-cause mortality,[7] DALYs,[8] YLDs[9] and risk factors[10]) constitute an important health information resource. They are not only an essential tool for quantifying global progress in health, but also enable performance to be measured, lacunae to be identified and new priorities to be defined in each country, as well as helping government policy-makers, non-governmental organizations, the medical community and other stakeholders to improve public health.

While research on burden of disease in Portugal is limited, various studies have contributed to the evidence base and enriched the debate on ways to improve health, particularly in the case of hypercholesterolemia[11] and atrial fibrillation,[12] as well as the burden of disease, both overall[13] and attributable to risk factors[14] in the Northern region, which have revealed new needs and health problems and influenced regional and local health planning.

The article by Henriques et al. published in this issue of the *Journal*[15] confirms that YLLs due to non-fatal ischemic heart disease (IHD) – myocardial infarction, angina and heart failure – contribute much more than YLDs to the global burden of IHD in Portugal, as expressed in DALYs. The proportion of DALYs due to YLDs (11.7%), for both sexes, was similar to the estimate for Western Europe (11.0%) in 2010 and was almost twice the 1990 figure (6.6%), while globally (21 world regions), YLDs due to nonfatal IHD accounted for 6% in men and 8% in women, with inequalities between different countries and regions.[16] The authors used an established methodology in international studies in this area applied to data from five of the seven Portuguese NUTS II regions. Some limitations of the study indicate the need to strengthen health information systems, such as those related to mortality and the calculation of YLLs, due to the fact that the cause of death in a significant percentage of cases was reported as symptoms, signs, abnormal findings or ill-defined conditions (8.7% in 2013), which would hinder comparisons if they were excluded from the analysis, or would depend on the validity of the approach used for reclassification of such 'garbage codes'. Using YLDs as an indicator may underestimate hospitalizations for acute coronary syndromes, because these are included in the hospital morbidity statistics of the national health service but not of those of all Portuguese hospitals. Furthermore, the use of data from studies conducted in another country (Spain) to estimate the prevalence of stable angina and heart failure points up the lack of recent data for Portugal. Given advances in computational analysis, the solution in the future may well be 'big data', the use of

computer technology to analyze large data sets in a combination of volume, velocity and variety in a way that will bring significant benefits.

Worldwide, from 1990 to 2013, life expectancy at birth increased by 6.2 years (95% confidence interval [CI] 5.6-6.6) and healthy life expectancy at birth rose by 5.4 years (95% CI 4.9-5.8). This trend was consistent in 21 world regions in 2013, but around an eighth of life expectancy was associated with disability. In Portugal, time lived with disability in 1990 corresponded to 12.5% and 14.0% of mean life expectancy for men and women, respectively, while in 2013 this was 12.9% and 14.7% (approximately an eighth and a seventh, respectively, of life expectancy).[17] Overall health is improving in all countries, but the proportion of disability in the total burden of disease is increasing due to a slower decline in disability than in mortality rates. For example, in 2015, cardiovascular disease (CVD) was the leader in terms of global DALYs for non-communicable diseases (NCDs) (23.5%) and the percentage change from 2005 to 2015, for all age-groups, was 0.1, 11.0, 17.7 and 28.0, respectively, for cerebrovascular disease, IHD, hypertensive heart disease and atrial fibrillation.[8] CVD was responsible for only 7% of YLDs in NCDs, and the percentage change from 2005 to 2015 was 20.7, 28.0 and 30.2, respectively, for cerebrovascular disease, atrial fibrillation and IHD. These findings reflect aging populations, an epidemiological transition to a predominance of NCDs, and improved socioeconomic conditions, resulting in populations living longer with disabilities.[9] Despite these advances, health systems are facing new challenges in meeting needs, applying resources and adapting infrastructure to deal with populations who live longer but with disabilities.

One final observation on the importance of the IHME in quantifying health loss around the world. The GBD project is now a consortium of over 1900 collaborators in 125 countries, who identify the leading health issues in 195 countries and territories, covering more than 300 diseases, injuries and risk factors. It produces the most reliable health statistics currently available, at both national and global level, revealing inequalities and identifying future challenges that will need to be addressed in order to transform the health and well-being of populations. These include how to increase access to quality data for the calculation of DALYs, for both mortality (certification of cause of death) and morbidity, the invisible component of the burden of disease that is difficult to estimate for many diseases and vulnerable to bias and uncertainty,[18] as well as how to improve comparative risk assessment (by constructing disease models to estimate the burden of disease attributable to risk factors).[10,19] Another challenge will be to strengthen research into the links between different development aims, in order to measure the effect of factors that have the greatest impact on health and to act according to this knowledge. The GBD study adds to the evidence and whenever its data are updated, it can serve as an audit of global health and of achievement of goals in the future, as expressed in the health-related targets approved by world leaders in the 2030 Agenda for Sustainable Development at the UN in 2015.[20] As pointed out by Dr Margaret Chan, the Director-General of the WHO, ''Data on its own won't prevent disease or save lives, but it shows where governments need to act to strengthen their health systems and protect people from the potentially devastating effects of health care costs.''

Conflicts of interest

The author has no conflicts of interest to declare.

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