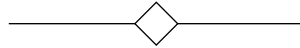


## BOOK REVIEW



# The burden of disease and injury in Australia

COLIN MATHERS, THEO VOS AND CHRIS STEVENSON

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*Reviewed by Don Hindle, Visiting Professor, School of Health Services Management, University of New South Wales*

Large quantities of data are available about health and health care in Australia. We have excellent information on causes of death, episodes of ill health (especially those that result in contact with the health care system), and the quantities and costs of episodes of health care categorised by presenting condition, type of health intervention and care setting. However, there is no agreed way of equating death and non-fatal consequences of disease and injury. This means there are no entirely valid and easily interpreted statistics to indicate (say) whether we have more health *in total* than before, whether health is evenly distributed, which factors contribute most to loss of health, or where we would best be advised to allocate our scarce health care resources.

These are important gaps in our knowledge. There is an increasing pressure on resources, and rationing decisions need to be better informed if cost-effectiveness and equity are to be maximised. The authors of this book point to several areas of health care where the balance may be inappropriate at present. For example, there has long been a view that non-fatal conditions (such as mental health problems and musculoskeletal disorders) are given too little emphasis.

In recent years, there has been a worldwide growth of interest in producing a single measure of the health of a population. Much of the impetus came from international agencies including the World Bank and the World Health Organisation which faced fundamental difficulties of strategic planning in the absence of any convenient way of assessing relative needs for care. They supported the development, testing and application of a new high-level measure of population health within the framework of the Global Burden of Disease (GBD) study: the disability-adjusted life year, or DALY.

The current draft update of the International Classification of Impairments, Disabilities and Handicaps proposes a change to the use of the term disability to more comprehensively cover impairments, functional limitations and handicap (participation

restrictions). For this and other reasons, the study team decided to use this broad definition of disability to refer to departures from good or ideal health in any of the important domains including mobility, self-care, participation in usual activities, pain and discomfort, anxiety and depression, and cognitive impairment. The authors illustrate the idea by pointing out that ‘...disability may be short-term or long-term: a day with a common cold is a day with disability’.

This book reports application of an adaptation of the GBD methodology to the Australian population as it was in 1996. Australian enhancements included analysis of a wider range of disease and injury categories, a more detailed age breakdown of the burden of disease, and adjustments to take account of co-morbidities between mental disorders and between physical disorders at older ages.

The result is a report which provides the first consistent estimates of mortality, disability, impairment, illness and injury according to the common metric. It estimates the contributions of 176 diseases and injuries, and of 10 risk factors, and analyses the burden of disease across important sub-populations.

The study was directed by the Australian Institute of Health and Welfare and funded in part by the Commonwealth Department of Health and Aged Care. It was linked to a State-level analysis by the Victorian Department of Human Services (Department of Human Services 1999).

## **Technical aspects of measurement**

The authors note there are five main design issues with respect to the determination of DALY values. Each is discussed clearly (and comprehensively for the most part). First, there is the determination of life expectancy: how long people may be assumed to live with or without disability. The GBD used a standard life table with a life expectancy at birth of 82.5 years for females and 80.0 years for males. This study has used Australian cohort life expectancies for 1996.

The second issue concerns discounting. Of particular importance, it is necessary to decide whether a year of healthy life gained now is worth more to society than a year of healthy life gained at some time in the future.

The GBD applied a 3% time discount rate to years of life lost (YLL) in the future to estimate the net present value, and the Australian study followed suit. The authors note that this discount rate means a year of healthy life gained in 20 years’ time is worth 45% less than one gained now. A male infant death results in 30 YLL with discounting at 3%, compared with 81 years without discounting. However, because there are arguments for and against discounting health outcomes, the report also provides summary information on undiscounted DALYs.

The third, and in most respects the most difficult, issue concerns the valuation of death relative to various states of disability. The outcomes of this stage are a set of health state weights that allow the combination of information on mortality and non-fatal health

outcomes. Many health care professionals will be familiar with the underlying concept through experience with data on quality-adjusted life years, wellbeing scales, health state preferences and utilities.

It is much more difficult to define non-fatal health states than to define death. Non-fatal outcomes of disease vary in terms of their impact on an individual, and the impact on the individual is affected by personal characteristics and by the physical and social environment. Non-fatal outcomes of disease involve multiple domains, and there is no simple way of weighting and then aggregating various aspects of an individual's health such as mobility, pain and loneliness.

All common methods employ group judgements to some degree, for the purpose of defining relative values. The GBD relied mainly on internationally representative groups of health experts. The Netherlands has also carried out a project to measure weights for 53 diseases of public health importance using methods consistent with the GBD. The Australian team decided to use Dutch weights where available, if only because the Dutch population more closely approximates the Australian than the world population. However, the GBD weights were used where there were no Dutch data. The study team notes that Dutch and GBD weights were highly correlated, thus suggesting a high degree of robustness in the valuation process. However, the team believes it would be desirable to carry out weighting exercises in Australia in due course.

By definition, disability weights range from 0 (good or ideal health that is preferred to all other states) to 1 (health states equivalent to being dead). The book contains a neat explanation of their interpretation. Since the weight for blindness is 0.43, a year of blindness is judged to be preferable to a year with paraplegia (weight 0.57), and a year with paraplegia to be preferable to a year with unremitting unipolar major depression (weight 0.76).

The team notes that the weights:

*...do not represent the lived experience of any disability or health state, or imply any societal value of the person in a disability or health state. Rather they reflect societal preferences for a health state in relation to the societal 'ideal' of good health. Thus a weight for paraplegia of 0.57 does not mean that a person in this health state is 'half dead', that they experience their life as halfway between life and death, or that society values them as a person less than anyone else.*

It is also noted that society would prefer to avoid a health state with a high weight than one with a low weight, if each could be avoided for the same cost and there were insufficient resources to do both. However, the use of DALY measures '...does not imply that society will necessarily choose the maximisation of health gain as the main or only goal for the health system'.

The fourth issue is whether lost years of healthy life are of equal value regardless of age, and the fifth concerns the broader matter of equity. The GBD study used the same values for all countries but placed a higher value on a year of life at young adult ages than in old age or infancy. The Australian study used the same values for all people.

In particular, it used the same life expectancy standard for all population subgroups, regardless of their current life expectancy, and used the same disability weight for everyone living a year in a specified health state. It also gave equal value to a year of healthy life lost at any age.

## Results

The first set of results concerns the burden of premature mortality in terms of years of life lost (YLL). The study estimated that premature mortality was responsible for 1.35 million YLL in 1996. Males lost 26% more years of life than females.

For both males and females, the mortality burden was dominated by cardiovascular disease, cancers and injury (72% of the total). Ischaemic heart disease is by far the largest cause of YLL in both males and females. It is followed by stroke and breast cancer in females and by lung cancer and suicide in males. Heroin overdose deaths are in the top 20 causes of YLL for males, resulting in almost as many YLL as HIV/AIDS or leukemia.

Cardiovascular diseases account for over 50% of the YLL in both males and females over 74 years of age. Cancers are a more important cause than cardiovascular disease for all ages below 75. Injuries are the main cause of lost years of life in young adults and children aged 5–14 years, and neonatal conditions are the main cause in children aged under 5 years. Because YLL give greater weight to deaths at younger ages, causes such as breast cancer, suicide and road traffic accidents rank more highly in terms of mortality burden than in terms of numbers of deaths.

Trends are reported. Inter alia, the age-adjusted mortality burden in Australia has declined by 27% in the 15 years between 1981 and 1996. There have been substantial declines in the mortality burden of cardiovascular diseases, road traffic accidents, low birth weight and stomach cancer for both males and females.

The burden of smoking-related diseases has decreased in males but increased substantially in females. The largest increases in mortality burden have occurred for HIV/AIDS, suicide and prostate cancer in males; for senile dementias and heroin dependence and abuse in both sexes; and for lung cancer and COPD in women.

The second set of results concerns years of healthy life lost due to disability (YLD). The estimation process involved consideration of a comprehensive set of 176 disease and injury categories with 1260 disease stages, severity levels and sequelae.

For the most part, the analytical steps for each disease involved estimating the amount of time lived in each of the stages and severity levels, and with sequelae. The average duration was then multiplied by the number of incident cases and the relevant disability weight, and discounted at 3% to obtain YLD.

Only prevalence data were available for many conditions. A software program was therefore used to model incidence and duration from estimates of prevalence, remission, case fatality and background mortality. Many different sources of information were used to calculate YLD. Where there were no suitable data, use was made of expert judgment.

The pattern of the non-fatal disease burden differs in many ways from that shown by traditional mortality statistics. Mental disorders are the leading cause of YLL due to disability (YLD), accounting for nearly 30% of the total. Nervous system disorders, which are dominated by senile dementias and hearing loss, are responsible for 16%.

Depression is the leading cause of non-fatal disease burden in Australia, accounting for 8% of the total YLD in 1996. Hearing loss is the second, and alcohol dependence and harmful use is the third leading contributor to non-fatal burden for males. Dementia and osteoarthritis are the second and third leading contributors for females.

In contrast to the mortality burden, the overall disability burden is almost identical for males and females. The non-fatal burdens of nervous system disorders, mental disorders and musculoskeletal disorders are all higher for females than for males. The male burden is higher for cardiovascular disease, diabetes, chronic respiratory diseases and cancers.

The third set of results concerns the total disease burden measured in DALYs – the combined burden of mortality (YLL) and non-fatal health outcomes (YLD). The total burden in Australia in 1996 is estimated to be 2.5 million DALYs, or 137 DALYs lost per 1000 population.

The male burden (total DALYs) is 13% higher than the female burden. Non-fatal outcomes (YLD) are responsible for 43% of the male burden and 49% of the female burden.

For children under 15, asthma is the leading cause of disease burden for Australian children (18% of the total). This is followed by low birth weight and attention-deficit hyperactivity disorder.

For people aged 15 to 24, alcohol dependence and harmful use, and road traffic accidents are the leading causes of disease burden (9% of the total DALYs). These are followed by depression, bipolar affective disorder (manic depression), and suicide and self-inflicted injuries. In total, mental disorders account for 55% of the total disease and injury burden for young adults.

For adults between 25 and 64, the leading cause of disease burden is ischaemic heart disease (8.5% of the total). Depression is the second leading cause, at 6.3%. These are followed by chronic obstructive pulmonary disease (4.0%), suicide and self-inflicted injuries (4.0%), and diabetes mellitus (3.9%). All cancers combined account for 20% of the total disease burden in adults aged 25–64 years.

For people aged 65 and over, the leading causes are ischaemic heart disease and stroke (32% of the total). These are followed by senile dementias, lung cancer and chronic obstructive pulmonary disease. Hearing loss and benign prostate enlargement are among the top 10 causes of disease burden for older men. Vision loss and osteoarthritis are among the top 10 causes for older women.

I found the analysis of differences by socioeconomic class to be particularly interesting. The basis for categorisation was unavoidably crude: each statistical local area of usual residence was assigned to a quintile of socioeconomic disadvantage according to the

value of the socioeconomic indexes for areas (Australian Bureau of Statistics 1998). The authors note that ‘...inequalities in burden would be even greater for disadvantaged groups defined in terms of individual circumstances rather than small area average disadvantage’. Even so, the crude underestimates are large enough to encourage action.

With respect to premature mortality (YLL), the most disadvantaged quintile of the Australian population lost 35% more years of life than the least disadvantaged quintile in 1996. For Australians aged less than 65, the differential burden between the lowest and highest quintile is even greater, with a 60% excess burden in the most disadvantaged quintile. Males carry the larger share of the burden: there is a 3.6 year difference in life expectancy at birth for males between the bottom and top quintiles, and a 1.9 year gap for females. The gaps widened between 1986 and 1996 for males aged 15–24. However, deaths from drug overdose increased faster in the top quintile than the bottom in the same period.

For disability burden (YLD), only selected mental disorders were analysed in detail. Again, the most disadvantaged carry an unfair share. The YLD burden in the bottom quintile is 45% higher for males and 41% higher for females than for those in the top quintile (least disadvantaged).

For the overall disease burden, DALYs per capita in the most disadvantaged quintile are 37% higher for males and 27% higher for females than in the top quintile. The authors note that if all Australians had the same disease burden as those in the most advantaged quintile there would be a reduction of 17% in the total disease burden. They point out that this would be a greater gain than that which would apply if risk factors such as tobacco smoking, hypertension or physical inactivity were to be addressed.

There is a thorough analysis of the contributions to the burden by various risk factors. The authors note that there may be significant errors as a consequence of the complexity of interaction between factors.

Tobacco smoking contributes the most to the burden of disease (12% of the total in males and 7% in females). Physical inactivity is responsible for about 7%, alcohol consumption for 5%, high blood pressure for 5%, obesity for 4%, and inadequate fruit and vegetable intake for 3%. There are some important interactions. For example, a part of the burden caused by alcohol consumption is counterbalanced by its influence on cardiovascular disease.

Illicit drugs are responsible for 2.2% of total male burden and 1.3% of total female burden. Unsafe sex accounts for 1% of the total burden (of which 58% is associated with HIV/AIDS).

I found a few minor errors in the report. The structure could have been improved to increase readability, partly through reducing the level of repetition. I would also have liked to see an interpretative section – perhaps a mix of experts commenting on the implications for redesign of the health care system.

There are some unavoidable weaknesses. One is the source data, but the authors do an excellent job of advising caution where appropriate. It is unfortunate that the data

apparently could not support a separate analysis of Aboriginal and other populations. The authors recommend that a special study be conducted in this regard.

Another weakness derives from the fact that there are two key parts to the puzzle: knowing where the penalties lie, and the extent to which they are manageable at a reasonable cost. The authors point out that there are major gaps in our knowledge about the cost-effectiveness of many types of interventions. This is one reason why it would have been useful to include expert commentary on the implications. However, the commentary will emerge in due course in the technical literature – including the *Australian Health Review*.

My main concern is whether there is the political will to act. This report clarifies many aspects of the health of Australians and improves our knowledge to a significant extent in some cases. Nevertheless, the most important problems are recognisable from previous data, with all their weaknesses: the dreadful inequalities in health between the indigenous population and other Australians, the overemphasis on life-threatening relative to other diseases, and so on. All recent governments have done too little, perhaps because they are intuitively applying much higher discount rates to cost than to health outcomes.

The authors are modest in their claims about relevance and recommend that the usefulness of burden of disease data be fully evaluated. If one believes that health politicians can do no more than respond to governments' commitment to avoid present cost, then the doubts are justified. However, I would like to believe a world is coming where all kinds of resource allocators at all levels ask for information on DALYs per dollar from any care provider as a condition of funding. This is a feasible and desirable goal if the cultural aversion to explicit rationing is well managed. If we are to move more rapidly to a healthier state of health care, convincing people of the feasibility is crucial. Mathers, Vos and Stevenson's book is hugely important in this regard.

In total, the book is a major achievement: skilled analysis and elegant writing on a topic of great importance. The Australian Institute of Health and Welfare, the Commonwealth Department of Health and Aged Care and other involved parties are to be congratulated.

In addition to the full report, there is a much shorter version. Both are available on the Institute's web site at <<http://www.aihw.gov.au>> or may be ordered from Government Information Shops in each capital city or from AusInfo mail order sales (free call 13 24 47).

## References

Australian Bureau of Statistics 1998, *1996 Census of Population and Housing: Socioeconomic Indexes for Areas*, Australian Bureau of Statistics, Canberra (catalogue no 2039.0).

Department of Human Services 1999, *The Victorian Burden of Disease Study (Mortality and Morbidity)*, Department of Human Services, Melbourne.