The burden of disease and injury in Australia

Colin D. Mathers,[1] E. Theo Vos,[2] Christopher E. Stevenson,[3] & Stephen J. Begg[4]

Abstract An overview of the results of the Australian Burden of Disease (ABD) study is presented. The ABD study was the first to use methodology developed for the Global Burden of Disease study to measure the burden of disease and injury in a developed country. In 1996, mental disorders were the main causes of disability burden, responsible for nearly 30% of total years of life lost to disability (YLD), with depression accounting for 8% of the total YLD. Ischaemic heart disease and stroke were the main contributors to the disease burden disability-adjusted life years (DALYs), together causing nearly 18% of the total disease burden. Risk factors such as smoking, alcohol consumption, physical inactivity, hypertension, high blood cholesterol, obesity and inadequate fruit and vegetable consumption were responsible for much of the overall disease burden in Australia. The lessons learnt from the ABD study are discussed, together with methodological issues that require further attention.

Keywords Cost of illness; Life expectancy; Mental disorders/epidemiology; Cardiovascular diseases/epidemiology; Chronic disease/epidemiology; Risk factors; Epidemiologic studies; Australia (*source: MeSH*).

Mots clés Coût maladie; Espérance vie; Troubles mentaux/épidémiologie; Cardio-vasculaires, Maladies/épidémiologie; Maladie chronique/épidémiologie; Facteur risque; Etude analytique (Epidémiologie); Australie (*source: INSERM*).

Palabras clave Costo de la enfermedad; Esperanza de vida; Trastornos mentales/epidemiología; Enfermedades cardiovasculares/epidemiología; Enfermedad crónica/epidemiología; Factores de riesgo; Estudios epidemiológicos; Australia (*fuente: BIREME*).

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Voir page 1083 le résumé en français. En la página 1083 figura un resumen en español.

Introduction

We present an overview of the Australian Burden of Disease (ABD) study. The ABD was the first study to measure the national burden of disease in a developed country using the disability-adjusted life year (DALY), a new summary measure of population health developed for the Global Burden of Disease (GBD) study (*1*). The burden of disease methodology provides a way to link information at the population level on disease causes and occurrence to information on both short-term and long-term health outcomes, including impairments, functional and activity limitations (disability), and death. It has been used to assess the global burden of disease and injury for the World Bank (*2*), to set global priorities for health research (*3*) and to assess global health trends (*4*).

A DALY is equivalent to the loss of one year of "healthy" life and it allows the burden of disease in a population to be measured as the gap between current health and an ideal situation where everyone lives to old age, free of disease and disability. As such, it is an indication of the "unfinished" health agenda and identifies areas where health gains can be made. The Australian burden of disease study was undertaken to assist national and state planning and priority setting for public health, health services and health and medical research.

A previous paper (*5*) has described the methods used by the ABD study for calculation of the burden of mental disorders and compared the results with those of the GBD study. The full results of the ABD study have been published by the Australian Institute of Health and Welfare (AIHW) and are also available on the AIHW web site (*6, 7*). The Victoria Department of Human Services also carried out an analysis of the disease burden in this state (*8, 9*). The Victoria and AIHW project teams collaborated closely and shared methods and analyses. In this paper, we describe some key findings of the Australian burden of disease study, as well as lessons learned from using the DALY to measure disease burden.

Methods

The disability-adjusted life year

The DALY is a health gap measure that extends the idea of potential years of life lost due to premature

[1] Principal Research Fellow, Health Division, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601, Australia. Correspondence should be addressed to this author.

[2] Senior Epidemiologist, Public Health Division, Department of Human Services, Victoria, Australia.

[3] Statistician, Health Division, Australian Institute of Health and Welfare, Canberra, Australia.

[4] Epidemiologist, Public Health Division, Department of Human Services, Victoria, Australia.

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death, to include equivalent years of "healthy" life lost to poor health or disability (*10*). Information on both mortality and non-fatal health outcomes are thus combined into a single measure of population health. To calculate DALYs for a disease or injury cause in a population, the years of life lost due to premature mortality (YLL) from the cause are added to the number of years lost due to disability (YLD) from incident cases of the disease or injury: DALY = YLL + YLD.

The ABD study departs from the GBD methodology in a number of key areas.

Firstly, YLL were calculated using Australian projected cohort life expectancies. The latter take into account projected trends in mortality rates to estimate the average life expectancies likely to be achieved by people currently alive. The gender difference at birth is around 4.2 years compared to 2.5 years for the standard life expectancies used by the GBD.

Secondly, age-weights were not used, but 3% time discounting was applied. The US Panel on Cost-Effectiveness in Health and Medicine recommended that a 3% real discount rate be used in health economic analyses, to adjust both costs and health outcomes (*11*). Because there are arguments for and against discounting health outcomes, undiscounted DALYs were also calculated in the ABD study.

Thirdly, in addition to disability weights developed for the GBD study, the ABD used weights developed by Dutch researchers (*12*) for many conditions because of their greater detail and their focus on the most common disabilities found in low-mortality countries such as Australia.

Fourthly, DALYs were adjusted for the effects of comorbidity between conditions, in contrast to the GBD study.

Fifth and lastly, a wider range of disease and injury categories, and more detailed age categories, were included, compared to the GBD study. The ABD study estimated DALYs for a comprehensive set of 176 disease and injury categories involving analysis of 1260 disease stages, severity levels and sequelae.

Disability weights

The disability weights used in DALY calculations represent societal preferences for different health states. Panels of health experts from around the world derived weights for the GBD study using person trade-off (PTO) methods for 22 indicator conditions followed by a deliberative process that allowed panel members to alter their initial valuations after hearing arguments from other members (*1*). As no comparable study has yet been undertaken to determine local weights for the range of health states most relevant to Australia, the ABD used actual or derived weights from the GBD and from the Dutch study (*12*).

The Dutch study used deliberative PTO methods generally consistent with the GBD study to derive weights for 53 diseases of public health importance, including weights for 175 disease stages, sequelae and severity levels. However, the Dutch study differed from the GBD study in the choice of indicator conditions and in the use of a standardized descriptor of health states (the EQ-5D+, a variant of the EuroQol 5D classification that includes a sixth dimension for cognitive functioning). While the Dutch study covered a more restricted range of conditions than the GBD study, it differentiated more finely between condition stages and severities, thus allowing more detailed disease models to be used in estimating YLD than was possible with the GBD weights. Moreover, the conditions for which Dutch weights were available are those of most relevance in the Australian context. The exception is the injury category, where the GBD study had a more comprehensive set of weights for the short-term and long-term sequelae of 32 types of injury.

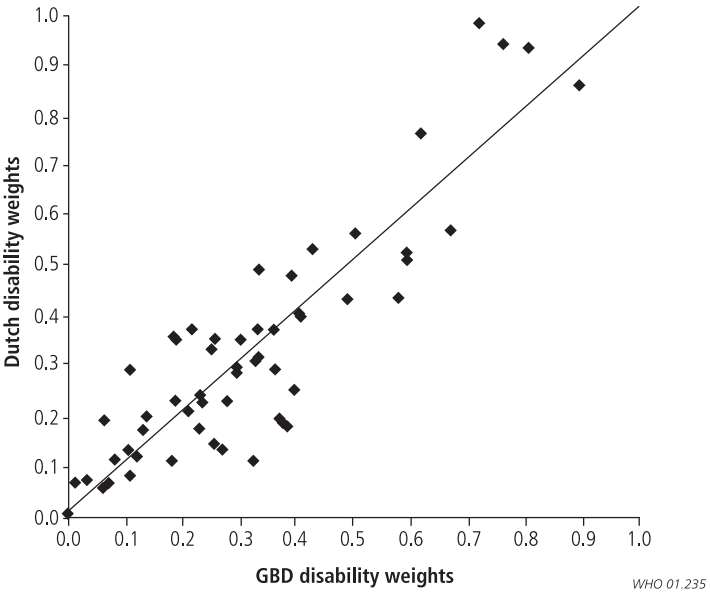
Because the Dutch weights enabled Australian severity distributions to be built in to DALY estimates, they were used in the ABD study wherever possible. Otherwise, weights from the GBD study were used. The two sets of weights were not directly comparable for most conditions in the ABD study, because of differences in the definitions of the health states valued. However, there was a high correlation between the two sets of weights for 54 conditions in the ABD study that were common to both sets (Fig. 1). This indicated that the two sets of weights valued the same conditions similarly and that it was valid to use them concurrently in the ABD study.

A multiplicative regression model (*6*) was also fitted to the Dutch weights in terms of the six dimensions of the EQ-5D+ descriptions for the corresponding health states. Thirty-three disability weights were derived for disease stages, severity levels or sequelae, using the regression model together with EQ-5D+ descriptions of the health states associated with the disease categories. These included some disease categories with no equivalents in either the Dutch or the GBD weights. They also included some short-duration health states that had been "annualized" for the PTO valuation (e.g. two weeks of influenza in a year of otherwise good health). For the most part, disability weights for the actual period of ill-health derived from annualized health states were inconsistent with the other disability weights. For these short-duration conditions, new weights were derived using their EQ-5D+ descriptions and the multiplicative regression model.

Adjustments for comorbidity

It is not uncommon for two or more disease conditions to occur simultaneously, either dependently or independently of each other. In the GBD study and Dutch studies, however, disability weights were estimated for disease conditions independently and no attempt was made to estimate weights for comorbid (or coexisting) conditions. It makes little sense to add independently determined

Fig. 1. **Comparison of global burden of disease (GBD) and Dutch weights for 54 comparable disease and injury categories**



weights for coexisting conditions as this can lead to a combined weight of more than one (i.e. more disabling than death), particularly with two heavily-weighted conditions. Furthermore, for people with severe conditions such as Alzheimer's disease or cancer, it is unlikely that an additional weight for mild conditions (eg. 0.02 for mild vision loss) is meaningful.

In the ABD study, weights were adjusted to take account of comorbidities for the following disease and injury categories: common coexisting non-fatal conditions of older age (eg. hearing loss, osteoarthritis, heart conditions, diabetes); some mental health disorders (although comorbidity between mental and physical disorders was not factored into the analyses); and congenital malformations and injuries. For prevalent low-severity conditions at older ages, a multiplicative model was used to estimate weights for pairwise combinations of comorbid conditions and the change in total weight attributed back to the weight for the milder of the conditions (*6*). The prevalences of pairwise comorbid combinations of disease were estimated assuming the conditions were independent, and that the probability of comorbidity was given by the product of the prevalences of each condition. The overall burden for each condition was then adjusted to account for the reduction in disability weight among people with comorbidity.

Methods for dealing with comorbidities between mental disorders have been previously described (*5*). Similar methods were used to deal with comorbidities resulting from multiple types of injury from a single external cause (*6*). For infants with multiple malformations, the disability was attributed to the most severe malformation.

Years lost due to disability

To calculate YLD for a given condition in the Australian population, we estimated the number of new cases (incidence) of the condition occurring in the time period of interest. For each new case, the number of years of healthy life lost was obtained by multiplying the average duration of the condition (to remission or death) by a severity weight that quantified the equivalent loss of healthy years of life due to living with the health condition. A disease or injury may have various levels of symptom severity (e.g. asthma, depression, dementia), various stages (e.g. cancers) and multiple disabling effects or sequelae. Diabetes, for example, can result in retinopathy, neuropathy, foot problems, amputation or renal failure. To estimate YLD for each disease, the ABD study estimated the amount of time lived in each of the disease stages, severity levels and with various sequelae.

Consistent and meaningful YLD estimates depend on clearly defining disease conditions in terms of case or episode, and severity level or disease stage. It is then necessary to ensure that the disability weight and the population incidence or prevalence data relate to the same case definition. The most difficult step in estimating YLD for most diseases is matching existing population data to the disease stage or severity categories for which weights are available, and getting this wrong can result in substantial errors in YLD estimates. The inclusion of the EQ-5D+ health state descriptions for the Dutch disability weights helped to define and estimate severity distributions from Australian population health data.

YLD estimates were made for a comprehensive set of 176 disease and injury categories involving analysis of 1260 disease stages, severity levels and sequelae. For some conditions, the numbers of incident cases were available directly from disease registers or epidemiological studies, but for most conditions only prevalence data were available. In these cases, a software program, DISMOD©, was used to model disease incidence and duration from estimates of prevalence, remission, case fatality and background mortality (*13*).

Although many different sources of information were used to calculate YLD, sometimes data were not available and expert judgement was relied on. For most disease and injury groups, Australian experts were consulted during the development and revision of YLD estimates. Complete worksheets for each disease group were given to selected experts for comment, and the assumptions, models and estimates were revised as necessary. The worksheets will be made available via the Internet and compact disc in the interest of transparency.

Conduct of the studies

Both Australian burden of disease projects commenced in early 1998 and ran for approximately 18 months. Two project teams of approximately 3 people worked together closely and shared methods

and analyses. The ABD study required approximately 6 person-years of staff time, together with a non-salary budget for computer and office support and for publishing reports.

Results

Years of life lost to mortality

In 1996, premature mortality in Australia was responsible for 1.35 million years of life lost (discounted at 3%), with males losing 26% more years than females. This figure rose to 43% if gender differences were removed (by calculating male YLL using the female cohort life expectancies). The single largest cause of YLL for both males and females was ischaemic heart disease, followed by stroke and breast cancer in females, and by lung cancer and suicide in males. Heroin overdose deaths were in the top 20 causes of YLL for males, resulting in almost as many YLL as from HIV/AIDS or leukaemia.

Years of life lost to disability

Mental disorder was the leading cause of YLD in 1996, accounting for nearly 30% of the non-fatal burden of disease in Australia. Nervous system and sense disorders accounted for 16% of the disability burden, mainly resulting from dementia and hearing loss. Although the overall disability burden was almost identical for males and females, in contrast to the mortality burden, there were gender differences for different disorders: YLD for nervous system disorders, mental disorders and musculoskeletal disorders were all higher in females, whereas cardiovascular disease, diabetes, chronic respiratory diseases and cancers accounted for more YLD in males.

Australian YLD estimates for mental disorders were based on methods that departed significantly from those used in the GBD study (*5*). Fig. 2 compares the overall non-fatal burden of anxiety disorders, affective disorders and substance abuse disorders for Australia and the established market economies (EME) in the GBD study. The burden of schizophrenia is lower in Australia than the EME because the estimate was based on lower incidence estimates. The estimated burden of anxiety disorders is substantially larger in Australia, because seven disorders were included in the ABD study, compared to only three in the GBD study.

The top 10 causes of YLD for Australians in 1996 are shown in Table 1. Depression was the leading cause of non-fatal disease burden for both males and females, accounting for 8% of total YLD. Hearing loss and alcohol dependence were the second and third contributors for males; dementia and osteoarthritis for females. Detailed information on YLD by sex and age for all disease and injury categories is given in the full report (*6*).

Total disease burden

The 1996 burden of disease and injury in Australia is shown in Fig. 3. The total burden of disease and injury was estimated to be 2.5 million DALYs (137 DALYs lost per 1000 population), with males accounting for 13% more of the burden than females. Non-fatal outcomes (YLD) accounted for 43% of the male burden and 49% of the female burden.

Fig. 2. **Burden of mental disorders (undiscounted DALYs) in Australia, 1996 and in established market economies (EME), 1990**

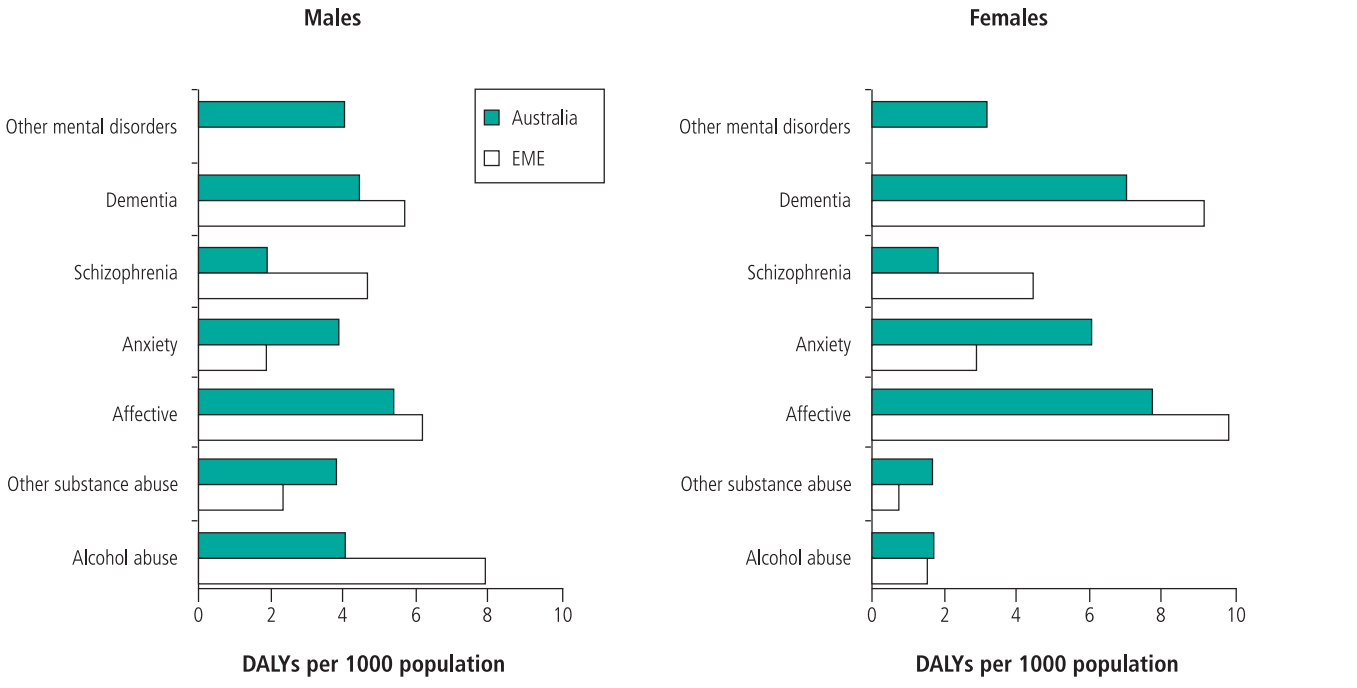


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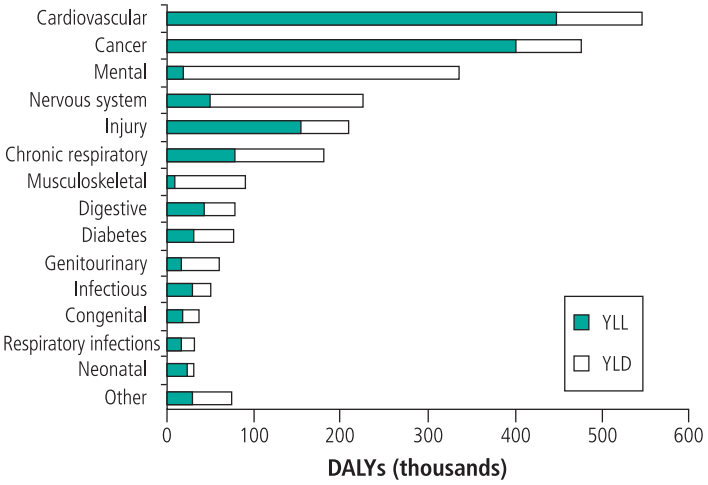
Table 1. **Top 10 causes of disability burden in Australia in 1996, by sex, as percentages of total years of life lost to disability (YLD)**

Males	% of total YLD	Females	% of total YLD
Depression	6.2	Depression	9.8
Adult-onset hearing loss	5.7	Dementia	6.8
Alcohol dependence/abuse	4.9	Osteoarthritis	5.7
Dementia	4.4	Asthma	5.3
Asthma	4.3	Generalized anxiety disorder	3.5
COPD[a]	4.2	Diabetes mellitus[b]	3.5
Diabetes mellitus[b]	4.1	Vision disorders	2.9
Stroke	3.9	Stroke	2.7
Osteoarthritis	3.9	Adult-onset hearing loss	2.6
Ischaemic heart disease	3.9	COPD[a]	2.5

[a] Chronic obstructive pulmonary disease (chronic bronchitis and emphysema).

[b] Includes Type 1 and Type 2 diabetes.

Fig. 3. **Burden of disease (years of life lost to premature mortality (YLL), years of life lost due to disability (YLD) and total disability-adjusted life years (DALYs)) for major disease groups in Australia, 1996**



Inclusion of non-fatal health outcomes creates a substantially different picture to that provided by traditional mortality statistics: mental disorders are now the third leading cause of overall burden (14% of total) after cardiovascular diseases (20%) and cancers (19%). The burden of nervous system disorders, and chronic respiratory conditions is each similar in magnitude to that of injuries (Fig. 3).

In 1996, the 15 leading causes of disease burden in Australia accounted for more than 50% of the total disease burden, with ischaemic heart disease and stroke alone causing nearly 18% of the burden (Table 2). Chronic obstructive pulmonary disease and lung cancer (also smoking-related diseases) were the third and fifth leading causes of disease burden, together accounting for another 7.3% of the total burden. Depression was the fourth leading cause of disease burden in Australia, accounting for nearly 4% of the total burden. Among these top 15 causes were four non-fatal or low fatality diseases: depression, asthma, osteoarthritis and hearing loss (Table 2). The results of the ABD study indicated that traditional approaches for measuring the burden of disease, which take into account only the contribution from deaths and not disability, seriously underestimate the burden of mental illnesses (e.g. depression and alcohol dependence) and non-fatal diseases (e.g. osteoarthritis and hearing loss).

Affective disorders (depression and bipolar disorder), substance use disorders and anxiety disorders dominated the burden of mental disorders in Australia. Substance use disorder was the leading category for males, accounting for 33% of their mental ill-health DALYs. Alcohol abuse accounted for 59% of the DALYs for substance use disorder, followed by heroin use (30%). The major cause of mental disorder for women was affective disorders, accounting for 39% of women's mental ill-health DALYs. This was almost entirely depression (87%). However, including the attributable burden of suicide and ischaemic heart disease increased the total burden of depression to 5% (from 3%) of total DALYs; and if comorbidity adjustments with other mental disorders are ignored, the burden of depression increased to 8% of the total burden.

Including the attributable burden of cardiovascular disease due to diabetes also increased the burden of diabetes to 5% (from 3%) of total DALYs, making diabetes and depression the equal third leading contributors to the disease burden in Australia. Asthma was responsible for 4.8% of YLD (non-fatal burden) and 2.6% of DALYs (total burden) in Australia. This reflected the high prevalence of asthma in Australia compared to most other developed countries, with most of the asthma burden incident in childhood. As a result, asthma was the leading cause of disease burden for Australian children aged 0–14 years, accounting for over 18% of their total disease burden. Low birth weight and attention-deficit hyperactivity disorder were the second and third leading causes, respectively.

Alcohol dependence and harmful use, and road traffic accidents were the leading causes of disease burden for young Australians aged 15–24 years, each accounting for over 9% of their total disease burden. These were followed by depression, bipolar disorder (manic depression) and suicide, and self-inflicted injuries, which together accounted for 22% of the total disease burden for this age group. Heroin dependence and harmful use was the fifth leading cause of burden for 15–24-year-olds, accounting for 6% of the total disease burden for this age group. In total, mental disorders account for 55% of the total disease and injury burden for young adults (6%).

Although most deaths occurred at age 65 years and over, the burden of disease at ages 25–64 years was almost as large in absolute terms as that at ages 65 years and over. Ischaemic heart disease was the leading cause of disease burden in adults aged 25–64 years, accounting for 8.5% of total DALYs, followed by depression (6.3%). These were followed

by chronic obstructive pulmonary disease (4.0%), suicide and self-inflicted injuries (4.0%), and diabetes mellitus (3.9%). All cancers combined accounted for 20% of the total disease burden in adults aged 25–64 years.

Among older Australians (aged 65 years and over), ischaemic heart disease and stroke were the leading causes of disease burden, together accounting for 32% of the total disease burden, followed by dementia (7.2%), lung cancer (5.0%) and chronic obstructive pulmonary disease (4.9%). Hearing loss and benign prostate enlargement were among the top 10 causes of disease burden for older men, while vision loss and osteoarthritis were among the top 10 causes for older women.

The disease burden attributable to risk factors

The ABD study also estimated the burden of disease and injury in Australia attributable to the major risk factors (Table 3) to evaluate the scope for future health gains by reducing population exposure to these hazards. The prevalence of a risk factor in a population, and the relative risk of dying or falling ill for those exposed, determined the attributable fraction for each disease or injury caused by exposure to the risk. Attributable fractions were calculated for risk factors with multiple levels of exposure using the methods outlined by English et al. (*14*). These attributable fractions are interpreted as the proportions of current disease burden attributable to current and past exposure to the risk factors concerned. For some conditions, direct estimates for attributable fractions were directly available from surveillance systems or epidemiological studies.

Tobacco smoking was the single risk factor responsible for the greatest disease burden (around 12% of the total burden in Australian males and 7% in females). Physical inactivity and hypertension each caused 5–8% of the total disease burden, or about as much as the burden from stroke, the second largest cause of ill-health. Obesity caused an estimated 4% of the total burden, followed by high blood cholesterol and inadequate intake of fruits and vegetables (each contributing 2–3% of the total burden). Inadequate intake of fruits and vegetables was defined as an average consumption of fewer than five servings of fruit or vegetables per day. Inadequate intake of fruits and vegetables caused an estimated 11% of the total cancer burden in Australia.

The net harm associated with alcohol consumption was approximately 2% of the total burden, as the amount of ill-health associated with harmful drinking was offset by the benefits of alcohol in preventing cardiovascular disease. The protective effect of alcohol was only relevant after age 45 years, whereas its harmful effects were apparent at all ages. Illicit drugs were responsible for 2.2% of the total male disease burden, with just over half of the burden due to premature mortality and the remainder due to YLD from drug dependence or harmful use. This is a similar level of harm as that caused by alcohol in males. Illicit drugs accounted for 1.3% of the total female disease burden.

Table 2. **The 15 leading causes of disease burden in Australia, 1996**

Cause	% of total disease burden
Ischaemic heart disease	12.4
Stroke	5.4
Chronic obstructive pulmonary disease[a]	3.7
Depression	3.7
Lung cancer	3.6
Dementia	3.5
Diabetes mellitus	3.0
Colorectal cancer	2.7
Asthma	2.6
Osteoarthritis	2.2
Suicide and self-inflicted injuries	2.2
Road traffic accidents	2.2
Breast cancer	2.2
Hearing loss	1.9
Alcohol dependence and harmful use	1.8

[a] Chronic bronchitis and emphysema.

Table 3. **The burden of disease attributable to the major risk factors in Australia, 1996**

Risk factor	Attributable burden (% of total DALYs)		
	Males	Females	Total
Tobacco	12.1	6.8	9.7
Physical inactivity	6.0	7.5	6.7
High blood pressure	5.1	5.8	5.4
Alcohol harm	6.6	3.1	4.9
Alcohol benefit	–2.4	–3.2	–2.8
Obesity	4.3	4.3	4.3
Lack of fruit and vegetables	3.0	2.4	2.7
High blood cholesterol	3.2	1.9	2.6
Illicit drugs	2.2	1.3	1.8
Occupation	2.4	1.0	1.7
Unsafe sex	1.1	0.7	0.9

Unsafe sex was responsible for around 1% of the total disease burden, with HIV/AIDs accounting for 58% of the total disease burden attributable to unsafe sex, followed by cervix cancer (23%) and sexually transmitted diseases other than HIV/AIDS (8%). Occupational exposure to toxic chemicals and injury risks were responsible for an estimated 2005 deaths in Australia in 1996, or 1.6% of all deaths. Because many of these deaths occurred at younger ages, the mortality burden was a somewhat higher proportion (2.0%) of the total mortality burden. The attributable burden of occupational exposure was 1.7% of the total burden of disease and injury in 1996. Cancers were responsible for 41% of this attributable burden, followed by injuries (33%) and other chronic diseases (25%).

As far as possible, the estimates were based on studies that examined each risk factor independently of other risk factors, but it is likely that the complexity

of the interaction between risk factors was not fully captured and the results should be interpreted cautiously. Despite these reservations, the 10 major risk factors shown in Table 3 are responsible for significant ill-health, comparable to that caused by the top 10 diseases, suggesting that substantial health gains can be expected from effective public health interventions.

Discussion

The extensive epidemiological modelling carried out in the ABD study for over 1200 disease and sequelae categories resulted in the identification of many gaps and deficiencies in Australian population health data, even though the quality and availability of such data are high in Australia compared to many other countries. Incidence or prevalence data were relatively complete for some diseases, such as cancer and certain infectious diseases, but were unavailable or limited for others. Similarly, information on the distribution of disease severity was inadequate or lacking for many important conditions, including asthma, angina, heart failure, stroke, peripheral arterial disease, osteoarthritis and dementia. Population-based case fatality rates also were not available for many conditions, but improvements in linking records and retaining identifiers in population surveys should allow case fatality data to be collected at relatively low cost in the near future. Similarly, information was generally not available on the average progression times through severity levels for vision and hearing loss, nor on the average time for development of complications from diseases such as diabetes.

For a number of important diseases, such as arthritis, asthma and respiratory conditions, there were inconsistencies between self-reported health data from population surveys and best estimates from epidemiological studies. The major limitations of self-reported health data related to underreporting of undiagnosed conditions (e.g. mental health problems, diabetes); overreporting of other conditions (e.g. joint pain incorrectly labelled as osteoarthritis, or occasional wheezing as asthma); and lack of information about the severity of a condition (which led to an overestimation of disease prevalence, due to the inclusion of minor conditions or symptoms).

Although the ABD study attempted to harmonize impairment, disability and epidemiological data for some conditions (intellectual disability, cerebral palsy, stroke), only limited information relating disability to underlying causes of disease and injury was available. There is thus a need to determine the causes of disability, using population epidemiological studies with consistent and well-defined criteria for identifying diseases, injuries and risk factors.

In the course of undertaking this study, it also became apparent that there are a number of methodological issues which require further thinking and development in order to improve the validity and applicability of the DALY metric. Efforts are already under way internationally in some of these areas. We briefly summarize the major areas where methods need to be improved.

Comorbidities. The ABD study has made the first attempt to take comorbidities into account in estimating the total burden of disease. There are a number of issues which need to be addressed, including how to model the effect of comorbidities on combined disability weights, how to deal with comorbidities that arise from common causes, and how to manage the potentially large number of comorbidity combinations.

Discounting. This makes YLD analysis very complex for diseases with long-term sequelae as we then need to get precise estimates of progression times. Also, discounting is not currently carried out entirely consistently, for instance, YLL are not discounted back to the point of disease incidence. This would require complex and uncertain modelling for many conditions at present.

Numerical valuation of health states. A substantial programme of research and development is required to deal with issues relating to the description and valuation of health states. For reasons of comparability across countries, it would be preferable to use internationally standardized disability weights. This has to be balanced against the need to use disability weights in national studies that reflect the preferences of the relevant populations. Further work is needed to examine the comparability of weights across cultures and between socioeconomic groups. Current methods for determining disability weights for low severity conditions are imprecise. This, potentially, has a large effect on burden estimates and the ranking of highly prevalent low severity conditions such as hearing loss.

Population disability data. The ABD study took some steps towards developing consistency between DALY estimates and population data for impairments and functional limitations. The development of standard validated summary health state measures for inclusion in population surveys and for use in longitudinal epidemiological studies will be an important step in harmonizing burden of disease analyses and population-level data on disability.

Data requirements for burden of disease analyses. The ABD study was the first national burden of disease study in a developed country to make full use of the extensive population health data available. In developing countries, however, many of these data sources will not be available and the highest priority for burden of disease studies will usually be to obtain the best possible analysis of causes of death at the population level. Nevertheless, many developing countries have a reasonable range of epidemiological studies and health surveys, and the disease models developed for the ABD study should help researchers in developing countries make the best use of available data.

Conclusions

Burden of disease analyses provide a unique perspective on health, one that integrates fatal and

non-fatal outcomes, yet which also allows the two classes of outcomes to be examined separately. This study is a first step towards exploring the usefulness of burden of disease methods for Australia. In response to the demand by health planners for health status information at the level of small administrative areas, burden of disease estimates have been developed for 78 Local Government Areas in Victoria. These small area estimates were calculated from five years of mortality data and synthetic estimates of the disability component of DALYs that were based on socioeconomic and rural/urban differentials at the state level.

Cost-effectiveness analyses have been initiated that build on the disease models and results of the ABD study. A pilot study has also been completed on the cost-effectiveness of a number of national cancer control options (*15*) and similar analyses have been initiated to evaluate interventions for coronary heart disease and mental disorders.

The results reported here provide a valuable insight into the scope for further health gain in Australia. This information will assist in taking up the future challenges posed by an ageing population, by changes in disease and risk factor patterns and by the increasing costs of health services. Linking burden of disease analyses to cost-effectiveness studies of interventions for major health problems will allow these interventions to be judged both in terms of cost-effectiveness, and their relative impacts in reducing the burden of disease and ill-health at the population level. ■

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Conflicts of interest: none declared.

Résumé

Poids de la maladie et des traumatismes en Australie

Le présent article donne un aperçu des résultats de l'étude australienne sur la charge de morbidité (étude ABD). Cette étude était la première à appliquer la méthodologie élaborée pour l'étude sur la charge mondiale de morbidité à la mesure du poids de la maladie et des traumatismes dans un pays développé. En 1996, les troubles mentaux étaient les principales causes de la charge d'incapacité avec près de 30 % du nombre total d'années de vie vécues avec une incapacité (YLD). La dépression était à l'origine de 8 % du total des YLD. Les cardiopathies ischémiques et les accidents vasculaires cérébraux étaient les principaux responsables de la charge de morbidité (années de vie ajustées sur l'incapacité – DALY), contribuant à eux deux pour près de 18 % à la charge totale de morbidité. Les facteurs de risque tels que le tabagisme, la consommation d'alcool, la sédentarité, l'hypertension, l'hypercholestérolémie, l'obésité et la consommation insuffisante de fruits et de légumes étaient responsables d'une grande partie de la charge globale de morbidité en Australie. Les leçons de l'étude ABD sont passées en revue ainsi que les questions de méthodologie qui doivent être approfondies.

Resumen

Carga de enfermedades y traumatismos en Australia

Se presenta un resumen de los resultados del estudio de la carga de morbilidad en Australia (estudio ABD). Fue éste el primer estudio que utilizó metodología puesta a punto en el estudio de la carga mundial de morbilidad para medir la carga de morbilidad y de traumatismos en un país desarrollado. En 1996, los trastornos mentales constituían la causa principal de la carga de morbilidad, siendo responsables de cerca del 30% de los años perdidos por discapacidad (APD); el 8% del total de APD se debía a la depresión. La cardiopatía isquémica y los accidentes vasculares cerebrales eran los contribuyentes principales a la carga de morbilidad (años de vida ajustados en función de la discapacidad, AVAD), y juntos representaban cerca del 18% de la carga de morbilidad total. Gran parte de la carga de morbilidad global de Australia se debía a factores de riesgo tales como el tabaquismo, el consumo de alcohol, la falta de actividad física, la hipertensión, la hipercolesterolemia, la obesidad y el consumo insuficiente de fruta y verdura. Se examinan las lecciones derivadas del estudio ABD, así como cuestiones metodológicas que merecen más atención.

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