



The Burden of Disease and Injury in Australia

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Key findings

This information circular provides a summary of the key findings of the report.

- Premature mortality is responsible for 57% of the total burden of disease in Australian males and 51% in females. Males lost 26% more years of life than females.
- Mental disorders are the third leading cause of disease burden, in terms of major disease groups (14% of the total), after cardiovascular diseases (20%) and cancer (19%), as assessed by disability adjusted life years (DALY).
- The leading specific causes of total disease burden were ischaemic heart disease and stroke, together causing nearly 18% of the burden. Chronic obstructive pulmonary disease and lung cancer (both smoking-related diseases) were the third and fifth leading causes of disease burden, accounting for another 7.3% of the total burden.
- Depression and dementia are responsible for 3.7% and 3.5% of the disease burden, the fourth and sixth leading specific causes respectively.
- Diabetes was the seventh leading cause of total disease burden. If the burden of cardiovascular diseases attributable to diabetes is included with diabetes, its total attributable burden rose to 4.9%, making it the equal third specific cause of disease burden with depression.
- The total disease burden that can be attributed to socioeconomic disadvantage was at least 17%.
- Risk factors such as smoking, alcohol consumption, physical inactivity, hypertension, high blood cholesterol, obesity and inadequate fruit and vegetable consumption were responsible for a large proportion of the overall burden of disease in Australia.

Introduction

The Australian Institute of Health and Welfare recently published *The Burden of Disease and Injury in Australia*, the first comprehensive assessment of the health status of the Australian population.^{1,2} Measurement of the health status of the population is based upon incident cases of fatal and non-fatal health states in Australia in 1996. The burden of disease was determined for 176 exhaustive and mutually exclusive diseases and injuries, involving 1260 disease stages, severity levels and sequelae. Analysis has also been undertaken by 10 risk factors and socioeconomic disadvantage. The non-fatal outcomes included impairments, functional limitations (disability) and restrictions in participation in usual roles (handicap).

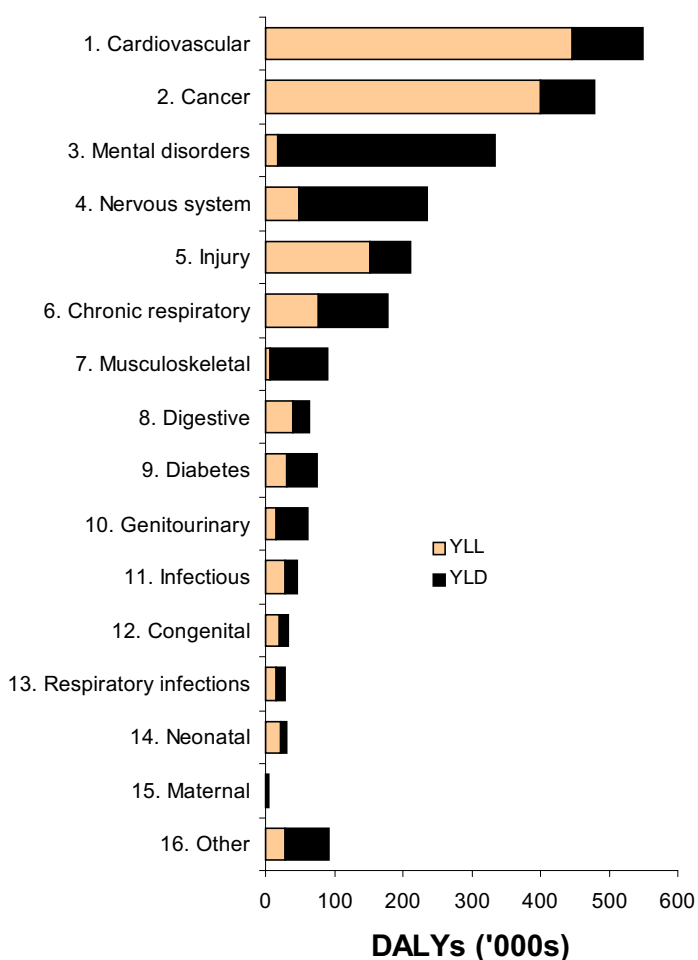
The Australian Burden of Disease study addresses the need for a detailed assessment of the magnitude and impact of health problems in the population, including non-fatal health states. Good evidence and sound estimates of the size of health problems, are necessary to inform health planning and priority setting.

Burden of disease and injury in Australia, 1996

The study used the population health summary measure of DALYs (See methodology section), which combines the impacts of fatal and non-fatal health outcomes from incident cases of disease and injury, into a single measure.

Inclusion of non-fatal health outcomes in summary measures of health status provides a substantially different picture to that provided by traditional mortality statistics, hospital admissions or clinical consultations. The relative contribution of death and disability to total DALYs varies greatly between conditions (Figure 1).

Figure 1: Burden of disease (YLL, YLD and DALYs) for major disease groups, Australia, 1996.



Mental disorders are the third leading cause of overall burden (14% of the total), after cardiovascular diseases (20%) and cancers (19%). Mental disorders were the leading cause of disability burden, responsible for nearly 30% of years of life lost due to disability (YLD). The relative contribution of years of life lost (YLL) and disability (expressed as YLD) varied markedly between mental disorders and both cardiovascular disease and cancer.

The DALY's for central nervous system, chronic respiratory conditions and injury were similar, however, the distribution of YLL and YLD within the DALY varied between these three disease groups.

The 15 leading causes of the burden of disease in Australia for all persons, males and females are shown in Table 1. Together, these 15 causes account for more than 50% of the total disease burden in Australia. Amongst these are four non-fatal or low-fatality diseases: depression, asthma, osteoarthritis and hearing loss.

Depression was the leading cause of disability burden, causing 8% of YLD. Hearing loss and alcohol dependence and harmful use, were the second and third leading contributors to disability burden for males respectively. Dementia and osteoarthritis were the second and third leading contributors for females.

The burden of mental disorders such as depression and alcohol dependence, and of non-fatal diseases such as osteoarthritis and hearing loss, were primarily due to disability burden and have been seriously underestimated by traditional approaches to health status reporting based on mortality.

Table 1: The 15 leading causes of burden of disease and injury in Australia, 1996.

	Persons	DALY (%)	
		Male	Female
1. Ischaemic heart disease	12.4	13.6	11.1
2. Stroke	5.4	4.8	6.1
3. Chronic obstructive pulmonary disease ^(a)	3.7	4.2	3.2
4. Depression	3.7	2.7	4.8
5. Lung cancer	3.6	4.5	2.6
6. Dementia	3.5	2.5	4.7
7. Diabetes mellitus	3.0	3.0	3.0
8. Colorectal cancer	2.7	2.7	2.7
9. Asthma	2.6	2.1	3.1
10. Osteoarthritis	2.2	1.7	2.9
11. Suicide and self-inflicted injuries	2.2	3.3	1.0
12. Road traffic accidents	2.2	3.0	1.3
13. Breast cancer	2.2	-	4.6
14. Adult onset hearing loss	1.9	2.5	1.3
15. Alcohol dependence and harmful use	1.8	2.4	1.2

(a) Chronic bronchitis and emphysema.

The relative rank of burden for some diseases may be modified if alternative coding rules are applied:

- If the burden of suicide and self-inflicted injury attributable to depression is included with the disability burden of depression, the total burden of depression rose to 4.9%, making it the third leading cause of burden of disease in Australia, after ischaemic heart disease and stroke.
- If the burden of cardiovascular diseases attributable to diabetes is included with diabetes, its total attributable burden rose to 4.9%, making it equal with depression as the third leading cause of disease burden.

- If the burden of diseases and injuries caused by alcohol use is included with its direct burden in terms of mental health, the attributable burden of alcohol use rose to 2.2%.

Age specific burden of disease

The DALY/1000 population varied approximately 10 fold between children aged 0-14 years and adults aged 65 years or more (Table 2). More than 80% of total DALYs were attributed to adults aged 25 years or more.

Table 2: Major causes of disease burden, by age, Australia 1996.

Disease group	Percent DALY/age group			
	0-14y	15-24y	25-64y	65+y
Cardiovascular	1.1	1.2	14.9	36.7
Cancer	2.3	2.0	21.1	23.9
Mental Disorders	15.9	55.1	17.0	0.9
Injury	11.1	22.4	11.5	2.1
Nervous system	4.3	2.7	5.9	15.0
Chronic respiratory	20.2	3.3	5.9	6.5
Congenital & neonatal	27.1	0.5	0.3	0.1
All other diseases	18.0	12.9	23.5	14.9
DALY/1000 pop	55.6	83.3	109.8	498.9
% TOTAL DALY	8.5	8.5	40.3	42.7

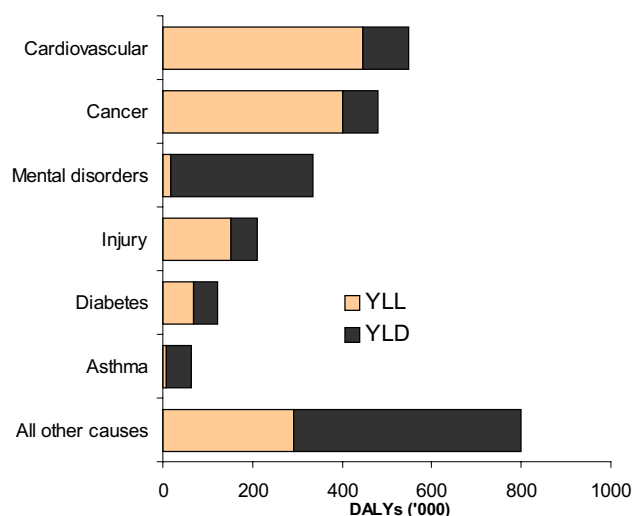
The proportion of DALYs attributable to disease groups varied markedly between age groups:

- Asthma accounts for 18% of the disease burden in children aged 0-14 years and was the largest cause of burden in this age group;
- Mental disorders account for 55% of the disease burden for 15-24 year olds;
- Ischaemic heart disease and depression account for 8.5% and 6.3% of total DALYs for adults 25-64 years;
- Ischaemic heart disease and stroke together account for 32% of the DALYs of adults older than 64 years.

National Health Priority Areas

The six National Health Priority Areas (Figure 2) accounted for 70% of the total burden of disease and injury in Australia, and accounted for 81% of the YLL and 57% of the YLD. The burden of cardiovascular diseases attributable to diabetes has been included with the diabetes burden in Figure 2.

Figure 2: Contribution of NHPAs to total burden of disease and injury in Australia, 1996.



Burden attributable to socioeconomic inequality

The SEIFA index of relative socioeconomic disadvantage is an area-of-residence based measure of socioeconomic disadvantage.³ The Australian population can be classified into quintiles of socioeconomic disadvantage according to the index value for their usual area-of-residence. The first quintile of socioeconomic disadvantage corresponds to the group with the least socioeconomic disadvantage and the fifth quintile with the most socioeconomic disadvantage

The Burden of Disease study showed a marked increasing gradient in the total burden of disease with increased socioeconomic disadvantage, as defined by SEIFA index of socioeconomic disadvantage. The total disease burden per 1000 population in the most disadvantaged quintile is 37% higher for males and 27% higher for females than the burden for males and females in the least disadvantaged quintile (Table 3). The ratio of burden of disease between least and most disadvantaged quintiles was consistently greater for males than females, for YLL, YLD and DALY.

Table 3: Ratio of burden of disease between most and least socioeconomically disadvantaged quintiles, Australia, 1996.^a

	Persons	Males	Females
Yll ratio	1.35 (1.32-1.37)	1.41 (1.38-1.45)	1.26 (1.22-1.29)
YLD ratio	1.30 (1.09-1.44)	1.32 (1.13-1.46)	1.29 (1.05-1.53)
DALY ratio	1.32 (1.22-1.39)	1.37 (1.28-1.43)	1.27 (1.14-1.41)
% Excess burden ^b	17.1 (13.7-19.4)	18.7 (15.1-21.5)	15.4 (9.3-19.6)

a Using age-standardised YLL, YLD and DALYs per 1000 population, (95% confidence interval).

b Per cent of DALYs avoided if all quintiles had the same DALY rate as the least disadvantaged quintile

At least 17% of the total disease burden in Australia would be avoided if the disease and injury incidence and mortality for all Australians were equivalent to that of the least disadvantaged quintile of the population.

As SEIFA is an area-of-residence index, an ecological bias may be present in this analysis due to variation of socioeconomic status within an area of residence.

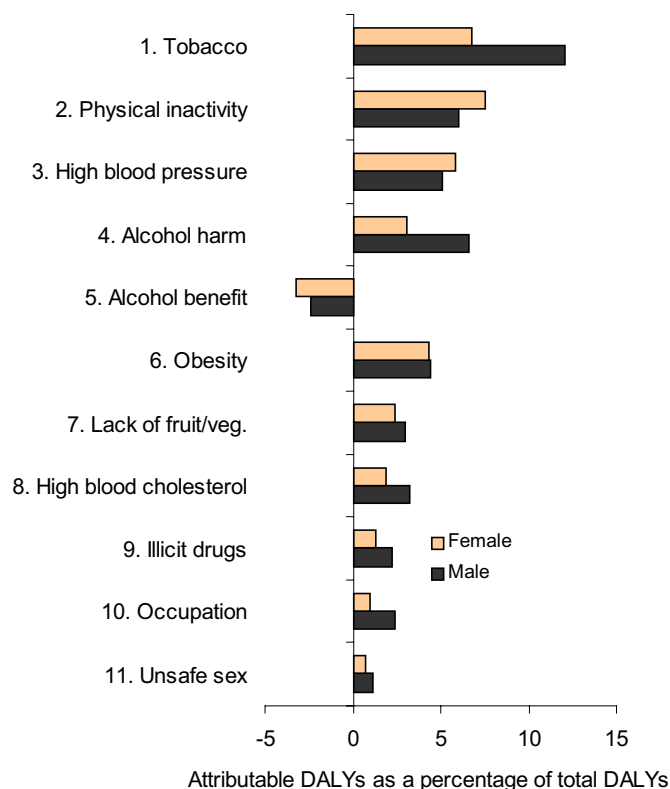
Burden attributable to risk factors

Risk factors such as tobacco smoking, physical inactivity, obesity, high blood pressure and high cholesterol are responsible for a sizeable proportion of the total burden of disease in Australia (Figure 3), as determined using attributable fraction methodology.

To the extent possible, these burden estimates are independent of other risk factors. However, it is likely that the complexity of the interaction between risk factors has not been captured fully. Therefore, caution is warranted in the interpretation of these results and the attributable burdens for different risk factors should not be added together to estimate the combined burden of all the risk factors.

Despite these reservations, the conclusion remains that each of these risk factors was responsible for large amounts of disease burden, ranking in size with the top ten diseases. This suggests that large health gains can be expected from effective public health interventions.

Figure 3: Proportion of total burden attributed to selected risk factors, by sex, Australia, 1996.



Points to note are:

- The burden of disease and injury averted by alcohol consumption was substantially lower than that caused by alcohol consumption for men. For women, the harm and benefit were almost equally balanced. The protective effect of alcohol consumption is only relevant after age 45, whereas the harmful effects of alcohol are apparent at all ages;
- The overall burden of disease associated with diet is difficult to assess from available evidence.

Methodology

Using the Disability-Adjusted Life Year (DALY) as a summary measure of population health, this report provides estimates of the contribution of fatal and non-fatal health outcomes to the total burden of disease and injury.

The DALY methodology provides a means to link information on disease causes and occurrence to information on both short-term and long-term health

outcomes. DALYs for a disease or health condition are the sum of the years of life lost due to premature death in the population (YLL) and the years lived in a state of ill-health or years of life lost due to disability (YLD). Similar methodology was used for the Global Burden of Disease Study (GBD).⁴

YLD are essentially calculated as the multiplication of the number of incidence cases in the reference period, the disability weight and the average duration of disability.

**One DALY is
one lost year of
'healthy' life**

All summary measures of population health involve social value choices. The DALY methodology involves five specific social value choices, which are fundamental to the methodology (Table 4).

Table 4: Social values choices built into the DALY and the choice made for 'The Burden of Disease and Injury in Australia'

Social value choice	Australian study choice*
What should be the expected length of life?	1996 Australian cohort life expectancy
Should life expectancy be equal for all people, independent of gender or race?	Male life expectancy=81.5 years; female life expectancy=85.7 years (No difference between races)
Is a year of healthy life gained of the same value now and in the future?	3% discount rate applied**
Method of deriving disability weights for comparison of life with disability vs life in perfect health	Primarily Dutch & GBD weights applied; developed using person-trade off method for 6 health domains; indicative of societal preference for health state
Is the value of lost years of healthy life the same at all ages?	Equal for all Australian population

*Detailed justification of value choices in AHIW report.

**Sensitivity analysis indicated little impact of the application of a 3% discount rate for years of healthy life in the future on the rank order of diseases according to DALYs. Differences were observed in the absolute number DALYs attributed to some diseases, specifically long term conditions, particularly those conditions with a high incidence in childhood and to conditions with high levels of mortality at younger ages.

Data sources

YLL was determined from mortality registers, as Australia has almost complete registration of deaths and relatively good information on causes of death. Disease registers, epidemiological studies and expert opinion were used to either ascertain or model disease incidence and the average duration of disability.

No comprehensive Australian measurements of disability weights have yet been undertaken. Dutch weights were used where possible as these relate to conditions of most relevance to the health of the Australian population and differentiate between different stages and severity levels, allowing Australian information on severity to be taken into account in estimating YLD.

The Australian study adjusts YLD estimates for comorbidities between mental disorders and between physical disorders at older ages.

Limitations of estimates and method

While every attempt has been made to identify the best available information in relation to each disease and injury category, and to consult as widely as possible, the estimates should be seen as provisional and developmental.

The most difficult step in measuring YLD for most diseases is matching existing population data to the disease stage or severity categories for which weights are available. Substantial error can occur if the incidence/duration data do not accurately reflect the disease state stipulated in the disability weight estimation.

The burden of disease methodology assesses the health of the study population at the reference point in time. Caution must be applied in the application of this methodology as a primary decision making tool for resource allocation because: the methodology, applied to incident cases as in the Australian study, will not measure the success of existing prevention programs such as successful immunisation programs or HIV/Aids programs; it is difficult to assess the impact of discarding programs using this methodology.

Conclusion

The Burden of Disease and Injury in Australia study has provided a detailed assessment of the magnitude and impact of health problems in the Australian population. This information is one of four basic types of information required for evidence based evaluation of policies to improve health and reduce inequalities, and the prioritising and resourcing of these policies.¹

Burden of disease analyses may be linked to studies of the cost-effectiveness of interventions for major health problems, allowing these interventions to be judged in terms of both cost-effectiveness and their relative impacts in reducing the burden of disease and ill-health.

The Health Information Centre, Queensland Health is currently reviewing the utility of a Queensland Burden of Disease and Injury study, based on the methodologies described in the Australian study.

The entire AIHW report is available, at the AIHW's website: www.aihw.gov.au.

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