



3.1 Burden of disease and injury in Australia

Introduction

While the health of the population is monitored using separate measures of morbidity and mortality (as described elsewhere in this publication), it is important for health policy-making and service planning to be able to combine information on both of these measures. This enables health policymakers and service planners to be able to recognise and assess the varying impact of morbidity and mortality for different diseases, injuries and risk factors.

The Australian Burden of Disease Study (ABDS) recently undertaken by the AIHW provides information on the burden of disease for the whole population, as well as for the Aboriginal and Torres Strait Islander population (Box 3.1.1). The study builds on the AIHW's previous burden of disease studies and disease monitoring work and provides Australian-specific burden of disease estimates for 200 diseases and injuries, grouped into 17 disease groups, and for 29 risk factors, for 2003 and 2011.

This feature article highlights the key results of the ABDS for the Australian population as a whole. (The Indigenous component was still being finalised at time of preparation of this feature article.) It also provides a comparison of burden between Australia and other Organisation for Economic Co-operation and Development (OECD) countries, using international burden of disease data.

Health loss across the life course

Overall, in 2011 there were 201 years of healthy life lost due to dying or living with disease or injury for every 1,000 people in Australia. This is equivalent to 4.5 million DALY in total.

As expected, the overall disease burden increased with age, except for over 85 where it was much lower due to the smaller population (Figure 3.1.1).

Males experienced more burden than females, but the age distribution of burden is very similar for males and females.

Children (aged under 15 years) and adolescents and young adults (15–24 years) experienced a similar number of DALY in 2011, although the sources of this burden are quite different. In children, the burden is evenly shared between fatal burden (due to dying prematurely) and non-fatal burden (due to ill health), whereas in adolescents and young adults, ill health accounts for more burden than dying prematurely.

The total burden increased with increasing age, and was highest in those aged 65–84. The increased burden between the ages of 25 and 84 was mostly due to the increased burden of dying prematurely, as the burden from ill health was similar across these age groups.

While the total burden for very old Australians (those aged 85 and over) is quite low, the rate of burden (that is, the number of DALY per 1,000 population) in this age group is the highest.



Box 3.1.1: What is burden of disease and why is it useful?

Burden of disease analysis quantifies the gap between a population's actual health and an ideal level of health in a given year—that is, every individual living in full health to the theoretical maximum life span—for all diseases at the same time. It does this by measuring both the burden of living with ill health as well as the burden of dying prematurely. It also quantifies the contribution of various risk factors to this burden. Because the same methods are used for all diseases, it means that the health impacts of different diseases and injuries can be validly compared, which is valuable for informing health policy and service planning.

Non-fatal burden is expressed as years lived with disability (YLD). YLD measures the proportion of healthy life lost due to living with a disease in a given year. Total YLD are influenced by the number of people with each disease, how long they spend living with its effects and how severe those effects are.

Fatal burden, which is expressed as years of life lost (YLL), measures the years lost between the age at which a person dies and the number of years they could have potentially gone on to live, based on the current best life expectancy across the world. Total YLL are influenced by both the number of deaths and the ages at which the deaths occur. (Note that YLL is different to 'premature mortality', described in 'Chapter 3.2 Premature mortality', which specifies an age cut-off in order to identify early deaths.)

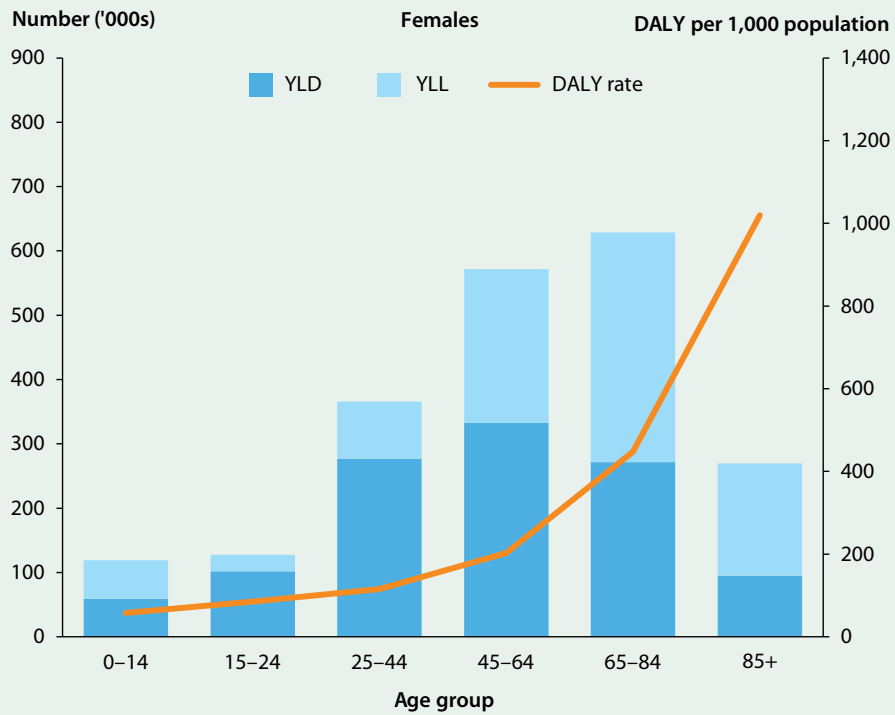
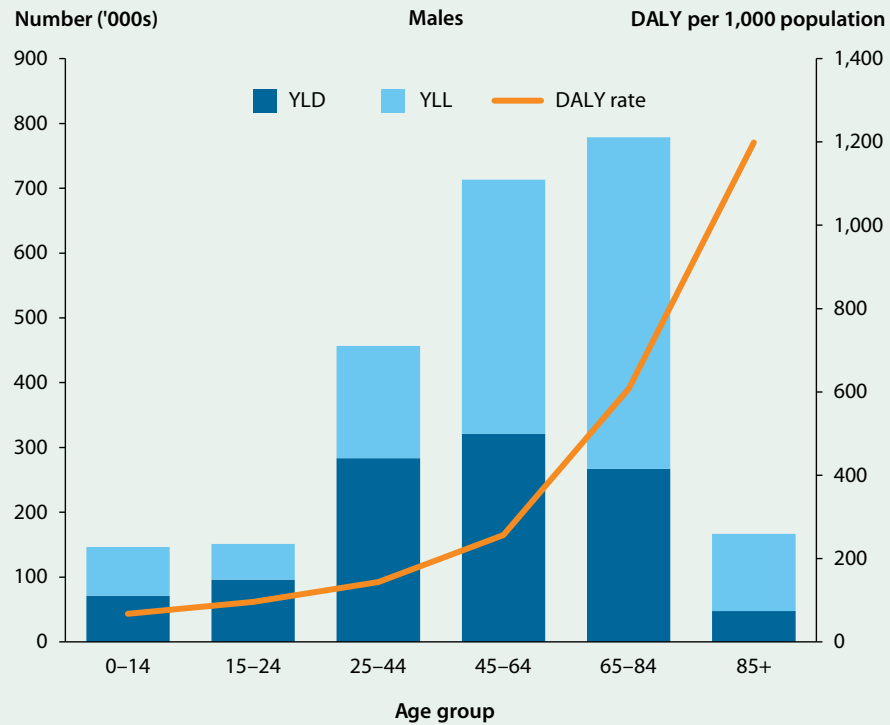
Non-fatal and fatal burden are added together to produce a single summary measure called disability-adjusted life years (DALY). One DALY is one year of 'healthy life' lost due to illness and/or death—the more DALY associated with a disease or injury, the greater the burden. DALY are estimated for every occurrence of every disease and then added together for the whole population, to indicate the total disease burden.

The attributable burden is the amount of burden that could be avoided if the risk factor were removed. There are 29 separate risk factors analysed in the ABDS 2011. These were selected because they are modifiable and there is strong evidence that they are linked to diseases that occur in Australia. While it is an extensive list, it does not cover all potential risk factors.

Details on the methods used to calculate burden of disease are contained in the report [Australian Burden of Disease Study: impact and causes of illness and death in Australia 2011](#).



Figure 3.1.1: Composition of total burden and DALY rate, by age and sex, 2011



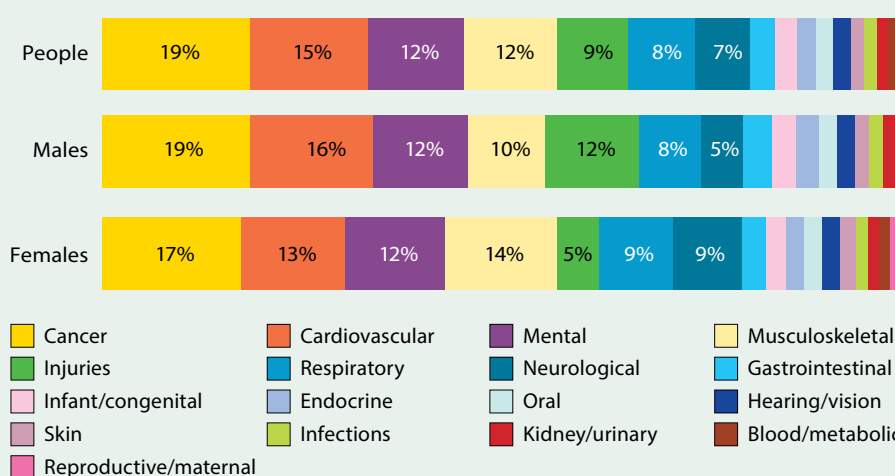
Source: Australian Burden of Disease Study 2011; Table S3.1.1.



Chronic diseases and injuries dominate

At the disease group level, cancer, cardiovascular disease, mental and substance use disorders, musculoskeletal disorders, and injuries contributed the most burden in Australia in 2011. Together, they accounted for around two-thirds of the disease burden (69% of males and 62% of females) (Figure 3.1.2). The patterns of disease group contribution for males and females were largely similar, although there were a few exceptions; for example, injuries accounted for a higher proportion of burden in males than females.

Figure 3.1.2: Burden of disease, by disease group and sex, 2011



Source: Australian Burden of Disease Study 2011; Table S3.1.2.

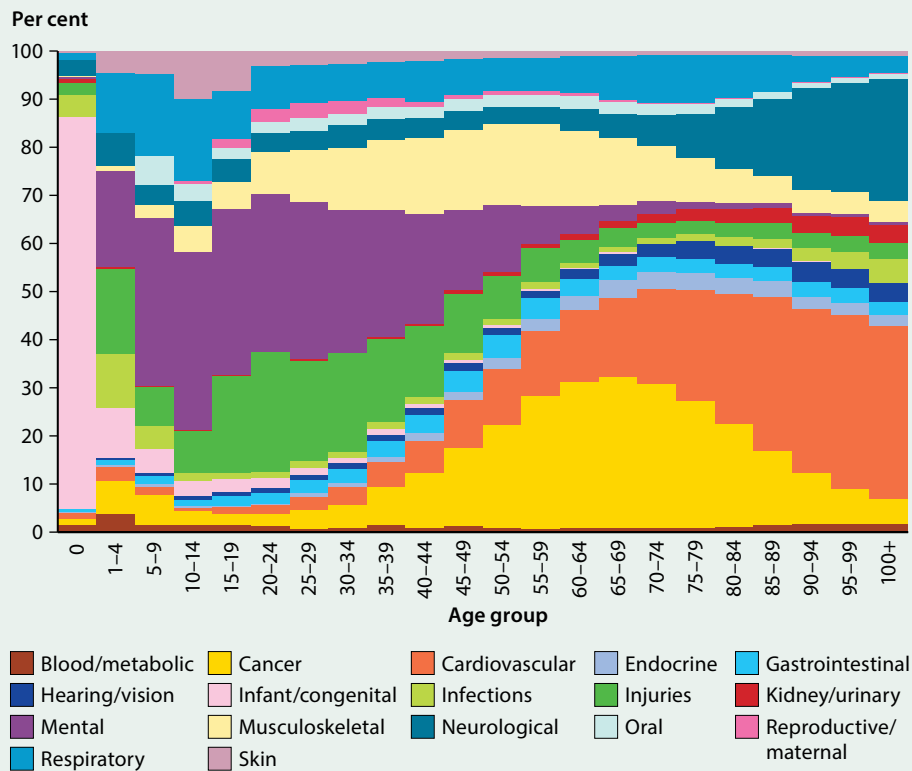
Among the five highest-burden disease groups, the total burden from cancer, cardiovascular disease and injuries was mainly due to people dying early, while the burden from mental and substance use disorders and musculoskeletal disorders was mainly due to people living with the various conditions. The small contribution of fatal burden in these two groups highlights the importance of including non-fatal health outcomes when measuring population health.

The share of burden between males and females also varied by disease group. Males experienced almost three-quarters (72%) of the burden from injury and a greater share of the burden from cardiovascular (59%), endocrine and infant and congenital diseases (57% each), and from cancer (56%). Females experienced a greater share of the burden from blood and metabolic disorders (59%), neurological conditions (58%) and musculoskeletal conditions (55%).

Across the life course, there is a change in the disease groups that cause the majority of burden. Infant and congenital conditions were the main causes of burden in infancy (Figure 3.1.3), while mental and substance use disorders were the main causes in late childhood, adolescence and adulthood to age 49. Cancer caused the most burden for those aged 50–79, while cardiovascular disease was the major cause of burden in older Australians. Other major causes of burden included respiratory conditions in children, adolescents and young adults; injuries in ages 15–44; musculoskeletal conditions in ages 25–74 and neurological conditions in older Australians.



Figure 3.1.3: Burden of disease, by disease group and age, 2011



Source: Australian Burden of Disease Study 2011; Table S3.1.3.

Specific diseases causing the most burden

The diseases and injuries causing the most burden were generally similar for males and females, although there are some differences in specific age groups (Figure 3.1.4).

Infant and congenital conditions (specifically pre-term birth complications, birth trauma and asphyxia, sudden infant death syndrome, cardiovascular defects and other disorders of infancy) make up a large proportion of burden in children under 5 years.

Asthma was the main cause of burden in boys aged 5–14, followed by anxiety disorders, whereas in girls this order was reversed. Suicide and self-inflicted injuries were the main causes of health loss for males (15–44 years) but for females it continued to be anxiety disorders.

For men aged 45 and over, coronary heart disease was the leading cause of burden, followed by lung cancer for those aged 45–74, chronic obstructive pulmonary disease (COPD) for those aged 75–84 and dementia for those aged 85 and over. Other musculoskeletal disorders was the leading cause of burden in women aged 45–64, while coronary heart disease was the leading cause of burden in women aged 65–84. Dementia was the leading cause of burden in women aged 85 and over.

Stroke, COPD and diabetes were also responsible for a large proportion of burden in older Australians.



Figure 3.1.4: Leading causes of total burden, by age and sex, 2011

		Age group							
		Under 5	5-14	15-24	25-44	45-64	65-74	75-84	85+
Males	1	Pre-term/lbw complications	Asthma	Suicide/self-inflicted injuries	Suicide/self-inflicted injuries	Coronary heart disease	Coronary heart disease	Coronary heart disease	Coronary heart disease
	2	Birth trauma/asphyxia	Anxiety disorders	Alcohol use disorders	Back pain and problems	Lung cancer	Lung cancer	COPD	Dementia
	3	Other disorders of infancy	Autism spectrum disorders	RTI/motor vehicle occupant	Alcohol use disorders	Other musculoskeletal	COPD	COPD	Dementia
	4	SIDS	Conduct disorder	Depressive disorders	Poisoning	Back pain and problems	Diabetes	Stroke	Stroke
	5	Other congenital conditions	Depressive disorders	Asthma	Depressive disorders	Suicide/self-inflicted injuries	Bowel cancer	Lung cancer	Prostate cancer
Females	1	Birth trauma/asphyxia	Anxiety disorders	Anxiety disorders	Anxiety disorders	Other musculoskeletal	Coronary heart disease	Coronary heart disease	Dementia
	2	Pre-term/lbw complications	Asthma	Depressive disorders	Depressive disorders	Breast cancer	Lung cancer	Dementia	Coronary heart disease
	3	Other disorders of infancy	Depressive disorders	Asthma	Back pain and problems	Back pain and problems	COPD	COPD	Stroke
	4	SIDS	Dental caries	Suicide/self-inflicted injuries	Other musculoskeletal	Anxiety disorders	Other musculoskeletal	Stroke	COPD
	5	Cardiovascular defects	Upper respiratory conditions	Bipolar affective disorder	Asthma	Lung cancer	Breast cancer	Lung cancer	Lung cancer	Diabetes

Source: Australian Burden of Disease Study 2011; Table S3.1.4.



Changes since 2003

There was a 6.9% increase in the number of DALY between 2003 and 2011, from 4.2 million to 4.5 million. However, after taking the impact of the increasing age of the population into account (by using age-standardised rates), overall burden decreased from 211 to 190 DALY per 1,000 people—a decrease of 10%. Most of this improvement came from decreases in the rate of fatal burden (15%), by preventing or delaying deaths from particular diseases or injuries. There was also a smaller (3.8%) improvement in the non-fatal burden. This suggests that, overall, the impact from gains in life expectancy for the population is not outweighed by more ill health.

Comparison of age-specific rates indicates that there was little change in overall burden between 2003 and 2011 for those aged 1–50. However, the burden was lower in 2011 for infants and those aged 55–89, but higher for those aged 95 or more. The increase in the number of DALY experienced by those aged 55–89 is due to the increased population in this group relative to 2003 (Figure 3.1.5).

Figure 3.1.5: Number and rates of total burden, by age, 2003 and 2011

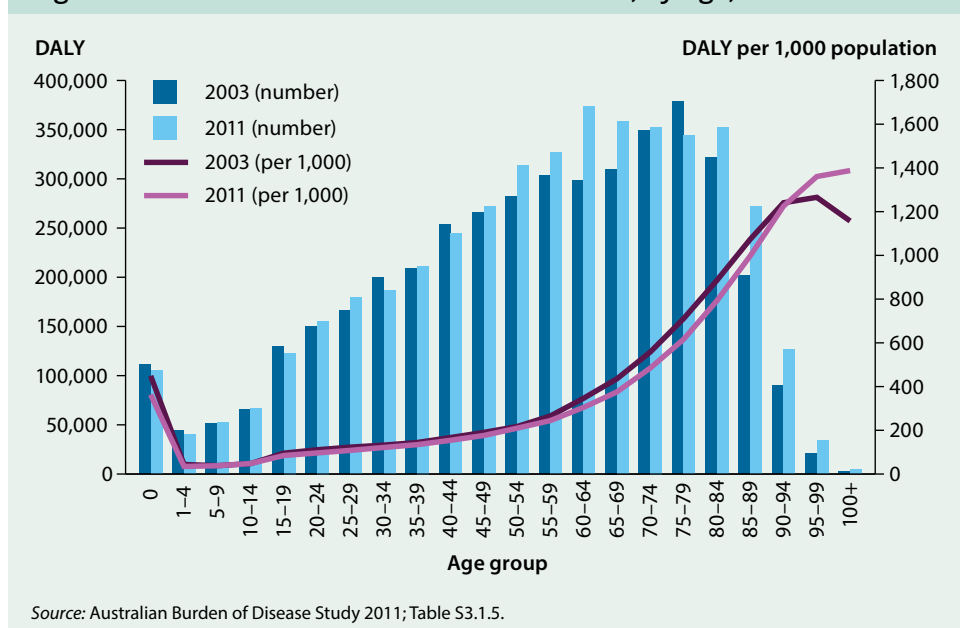


Figure 3.1.6 compares the actual estimates for 2003 and 2011 for each disease group with those that would have been expected based on population increase and ageing since 2003.

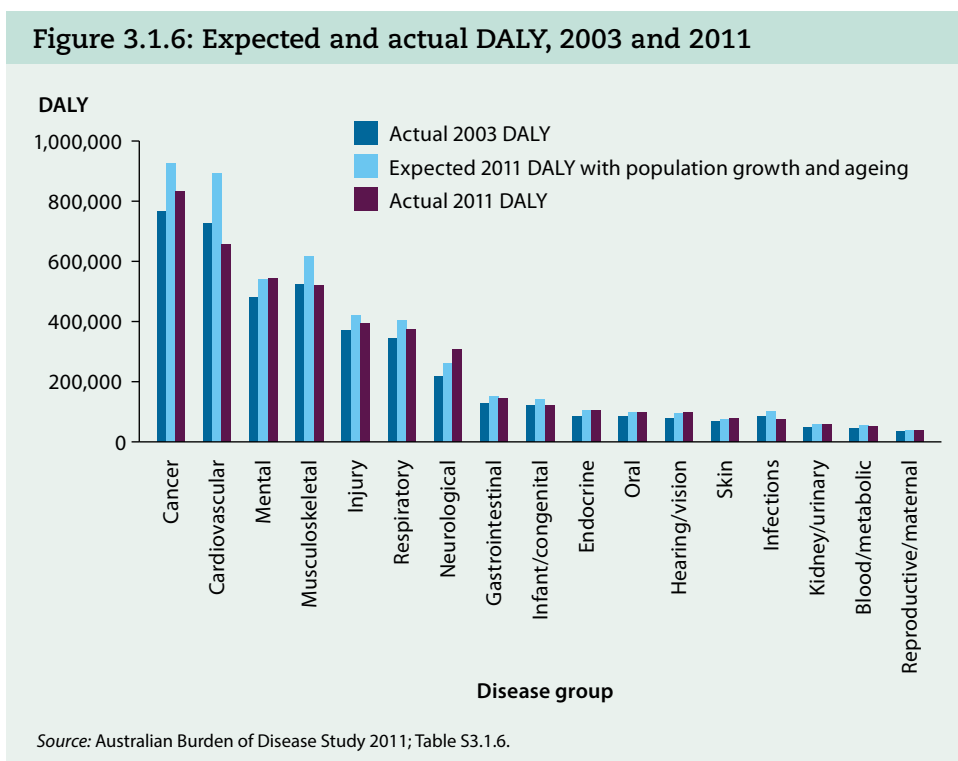
Generally, the actual 2011 DALY for most disease groups was lower than would have been expected. This indicates an improvement in the underlying disease burden of these groups.

Cardiovascular disease and infections were lower in 2011 than in 2003. While the overall burden of cancer and injuries was higher in 2011 than 2003, these increases were lower than expected based on population changes.

Conversely, actual 2011 DALY were substantially higher for neurological conditions than would be expected based on population changes. Kidney and urinary diseases, skin disorders, hearing and vision disorders, and endocrine disorders were also slightly higher than expected.



Figure 3.1.6: Expected and actual DALY, 2003 and 2011



Source: Australian Burden of Disease Study 2011; Table S3.1.6.

A large proportion of the burden is preventable






A large proportion (31%) of the burden experienced by the population could be prevented by reducing the exposure to modifiable risk factors.

The five risk factors included in the ABDS that caused the most burden were tobacco use, high body mass, high alcohol use, physical inactivity and high blood pressure (see 'Chapter 4 Determinants of health'). Table 3.1.1 also shows the proportion of burden (DALY) in each disease group attributable to that risk factor. For example, 22% of all cancer DALY is due to tobacco use, 4.5% is due to high body mass, 3.3% is due to alcohol use, and 6.4% is due to physical inactivity. (Note that it is not possible to add these proportions together to find the total amount of cancer DALY due to these risk factors, because the same burden may be attributed to more than one risk factor.)

While there are known *associations* between these risk factors and many diseases and conditions, burden was only attributed to a risk factor where there is sufficient evidence that the risk factor *causes* the disease and its contribution can be measured.



Table .1.1: Proportion of total burden, and burden of selected disease groups, attributable to the five risk factors causing the most burden, 2011

Disease group	 Tobacco use (%)	 High body mass (%)	 High alcohol use (%)	 Physical inactivity (%)	 High blood pressure (%)
	Proportion of total burden				
All disease groups	9.0	5.5	5.1	5.0	4.9
	Proportion of disease group burden				
Cancer	22.0	4.5	3.3	6.4	..
Cardiovascular	12.0	21.1	4.8	21.2	31.7
Mental	..	..	12.2	..	..
Injury	..	..	20.6	..	..
Respiratory	36.2	..	..	..	..
Endocrine	3.5	49.4	2.0	29.7	..
Kidney/urinary	..	27.5	..	..	21.5

.. Indicates that there was no burden from this disease group that could be attributed to the risk factor in this study.

Source: Australian Burden of Disease Study 2011.

Overall, alcohol was the leading contributor to burden for those aged 0–44; tobacco for those aged 45–84; and high blood pressure for those over 85. From 0–84, males experienced a higher amount of burden due to the three top-ranking risk factors. After the age of 85, females experienced a higher amount of burden due to the top three risk factors.

The risk factors able to be measured in 2003 contributed to 28% of the total burden (DALY) in 2003. These same risk factors contributed to 27% of the total burden in 2011. This small decrease in the proportion of burden attributable to these common risk factors between 2003 and 2011 may reflect success in reducing either the exposure to these risk factors or the burden from the diseases and injuries linked to them.

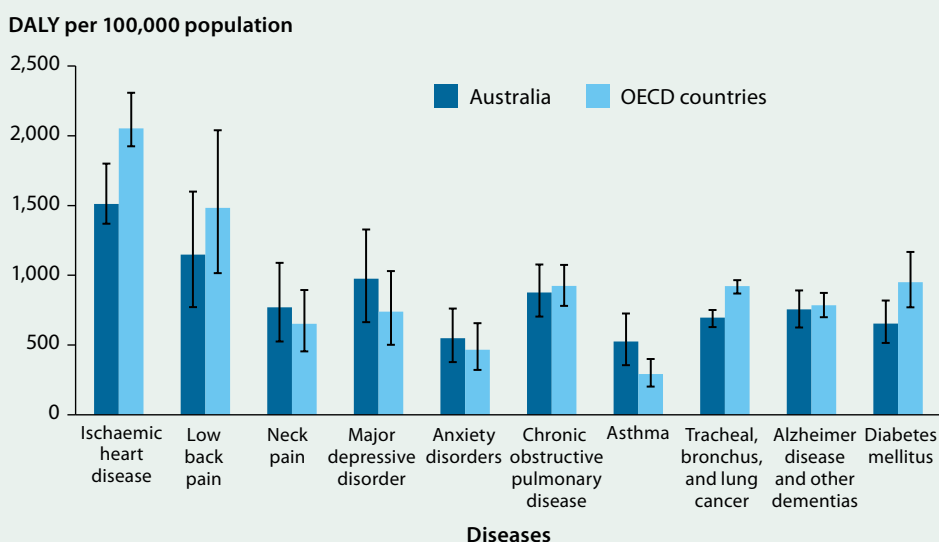
How do we compare with other similar countries?

International comparisons are important and can provide a useful perspective on global disease burden. However, comparing the health of populations between countries is complex, with many factors being important. Comparisons of disease burden must be made using estimates that are internally consistent and produced using common methods. While the ABDS 2011 has sought to maintain the same broad methodological approach as used for recent global studies, there are sufficient differences that results from the ABDS 2011 cannot be compared with results from other burden of disease studies. Instead, the Global Burden of Disease (GBD) 2013 is used here to compare the burden of disease in Australia with other countries or regions.



When comparing the top 20 diseases contributing to DALY in Australia, using GBD 2013 results, most rates of burden for Australia were similar to the average rates for OECD countries (GBD 2013 Collaborators 2015). However, the rates of burden for ischaemic heart disease and lung cancer were significantly lower in Australia compared with the average rates of burden for OECD countries (Figure 3.1.7).

Figure 3.1.7: Total burden of selected high burden diseases in Australia compared with OECD countries, 2013



Source: AIHW analysis of GBD 2013; Table S3.1.7.

What is missing from the picture?

ABDS 2011 is based on the best current knowledge, methods and available data, as suited to the Australian context. Nevertheless, there are some limitations which further development work may reduce.

The ABDS 2011 burden of disease estimates are currently limited to 2003 and 2011. Frequent and up-to-date burden of disease estimates would provide better insight into the areas in which improvements are taking place, and which diseases, injuries or risk factors require greater attention from policymakers and service planners.

For the non-fatal component, ABDS 2011 was able to use detailed Australian data for many diseases and injuries. However, where some data gaps remain, reliance on overseas data or old Australian data remains. For some diseases, such as coronary heart disease and epilepsy, results were partly based on state-level linked hospital and deaths data from Western Australia, so may be limited as to their applicability to Australia as a whole. Reliability of estimates would be significantly improved if national linked data could be used.

The ABDS 2011 did not estimate the burden where diseases are also risk factors for other diseases (for example, diabetes is a risk factor for coronary heart disease). Projects are currently under way to estimate the burden due to diseases such as diabetes.



The scope of the ABDS 2011 report was limited to the total population (including by state and territory, remoteness area and socioeconomic group) and to Indigenous Australians; however, there are a range of other deeper analyses that can be undertaken using the available data. This includes looking more closely at: particular diseases and disease groups (for example, kidney disease); particular risk factors (for example, nutrition, intimate partner violence, social determinants of health); and certain population groups (for example, working age adults, older Australians). With appropriate data, further work could also be undertaken to disaggregate subnational estimates (for example, by state and territory by remoteness) or to explore the burden at local levels (for example, by Primary Health Networks).

Where do I go for more information?

More information from the ABDS 2011, including an overview of methods and limitations, can be found on the AIHW website www.aihw.gov.au/burden-of-disease/.

Analysis from the Indigenous component of the ABDS 2011, and full documentation of methods, will be available later this year.

Reference

GBD (Global Burden of Disease) 2013 Collaborators 2015. Supplement to global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 386(9995):743–800; doi:10.1016/S0140-6736(15)60692-4.