



Australian Government

Australian Institute of Health and Welfare

Australian Burden of Disease Study  
**Impact and causes of illness  
and death in Australia 2011**

# Summary report



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## Key findings

There were 4.5 million years lost to premature death or living with illness in Australia in 2011. This was based on an analyses of the impact of nearly 200 diseases and injuries in terms of their fatal and non-fatal burden for the Australian population.

Most of the burden was from chronic diseases and injuries. The five disease groups that caused the most burden in 2011 were cancer (19%), cardiovascular diseases (15%), mental and substance use disorders (12%), musculoskeletal conditions (12%), and injuries (9%). Chronic diseases accounted for 61% of the total burden.

At the specific disease level, coronary heart disease, other musculoskeletal conditions, back pain and problems, chronic obstructive pulmonary disease (COPD) and lung cancer caused the most burden.

### Large proportion of the burden can be prevented

Around one-third (31%) of the burden of disease in 2011 could have been prevented by reducing the exposure to the modifiable risk factors included in this study. Risk factors that caused the most burden were tobacco use (9%), high body mass (5.5%), alcohol use (5%), physical inactivity (5%) and high blood pressure (5%). An analysis of the combined effects of all dietary risks included in the study suggested that they accounted for 7% of the burden.

### Substantial gains in population health

After accounting for population increase and ageing between 2003 and 2011, there was a:

- 10% reduction in total burden
- 15% reduction in fatal burden
- 3.8% reduction in non-fatal burden.

The largest absolute reductions in rates of total burden were for cardiovascular diseases, musculoskeletal conditions and cancer.

### Reduction in the proportion of burden due to some risk factors

There were notable decreases in the burden attributable to high cholesterol, high blood pressure and tobacco use between 2003 and 2011, after adjusting for population increase and ageing. There was a small increase in the burden attributable to high body mass and drug use.

### How does burden differ across Australia?

- Rates of total burden were similar across states and territories, except for the Northern Territory, where total burden rates were around 1.5 times as high as the national average.
- *Very remote* areas experienced 1.7 times the rate of total burden of *Major cities*.
- The lowest socioeconomic group experienced 1.5 times the rate of total burden as the highest group. A 21% reduction in burden could have been achieved if all socioeconomic groups experienced the same disease burden as the highest socioeconomic group.

# What is burden of disease analysis and why is it important?

Burden of disease analysis measures the combined impact of living with illness and injury (non-fatal burden) and dying prematurely (fatal burden). More than merely counting deaths and disease prevalence, it takes into account age at death and severity of disease. The summary measure 'disability-adjusted life years' (or DALY) is used to count the years of healthy life lost from death and illness. The contribution of various modifiable risk factors to disease burden can also be estimated.

Information on the health impacts and distribution of different diseases, injuries and risk factors is important for monitoring population health and in providing an evidence base to inform health-policy and service planning. Burden of disease information can also be used to measure the health impact of interventions, and to highlight which diseases or risk factors to focus on when investigating the cost-effectiveness of programs and interventions.

## Australian Burden of Disease Study (ABDS) 2011

The ABDS 2011 provides Australian-specific burden of disease estimates for the Australian population and the Aboriginal and Torres Strait Islander population for 2011 and 2003. The study uses and adapts the methods of global studies to produce estimates that are more relevant to the Australian health policy context.

The burden of disease estimates provided in this summary report are for the total Australian population and subnational populations (state and territories, remoteness areas and socioeconomic groups). Estimates for the Aboriginal and Torres Strait Islander population are included in a separate summary and detailed report, expected to be published in the second half of 2016.

### Burden of disease summary measures

**Attributable burden:** The amount of burden that could be reduced if exposure to the risk factor had been avoided.

**Disability-adjusted life years (DALY):** A measure (in years) of healthy life lost, either through premature death (defined as dying before the ideal life span [YLL]) or, equivalently, through living with ill health due to illness or injury (YLD). DALY represent total burden.

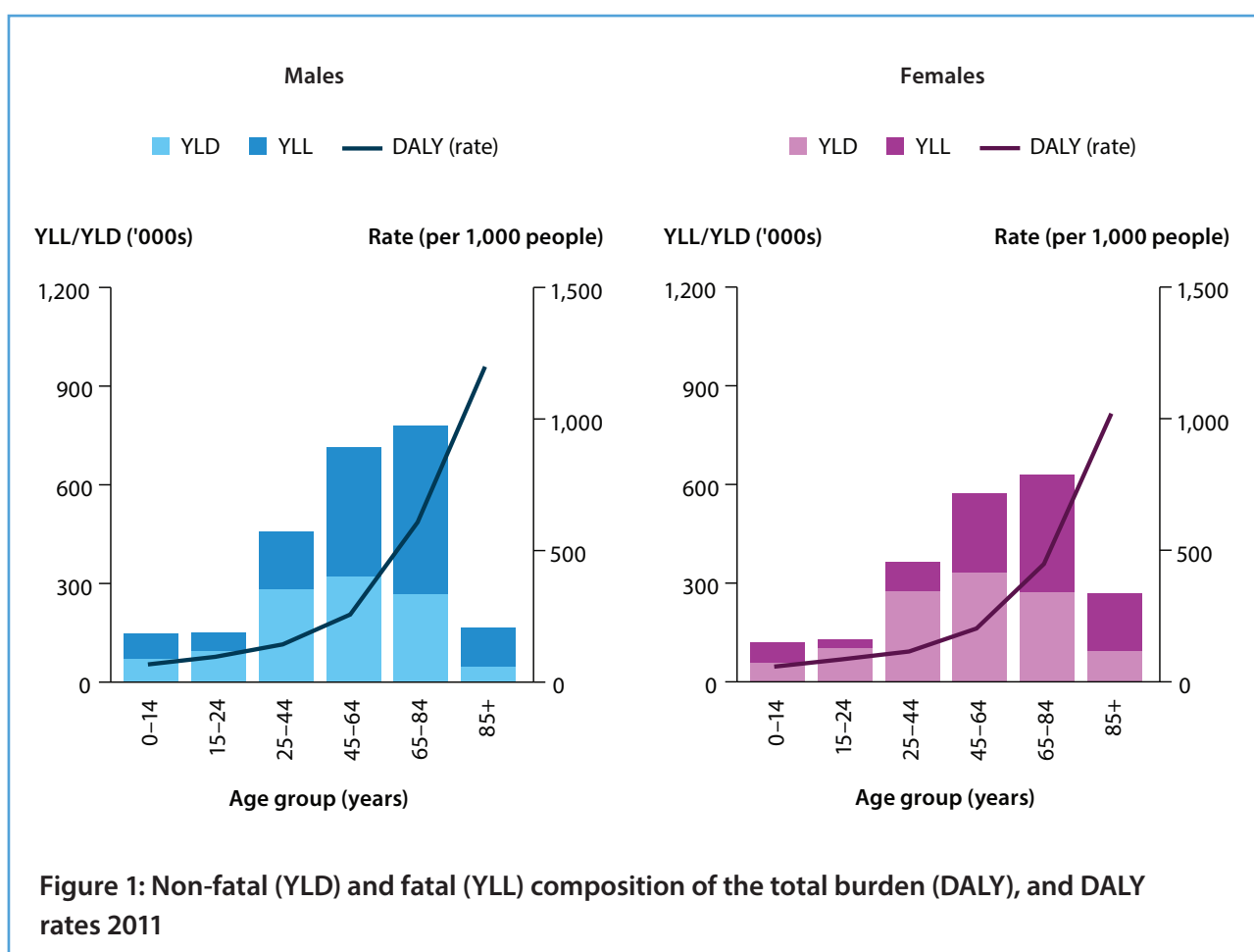
**Years lived with disability (YLD):** A measure of the years of what could have been a healthy life but were instead spent in states of less than full health. YLD represent non-fatal burden.

**Years of life lost (YLL):** A measure of the years of life lost due to premature death, defined as dying before the ideal life span. YLL represent fatal burden.

Details on the methods used to calculate burden of disease estimates in the ABDS 2011 will be included in a separate methods report expected to be published in the second half of 2016.

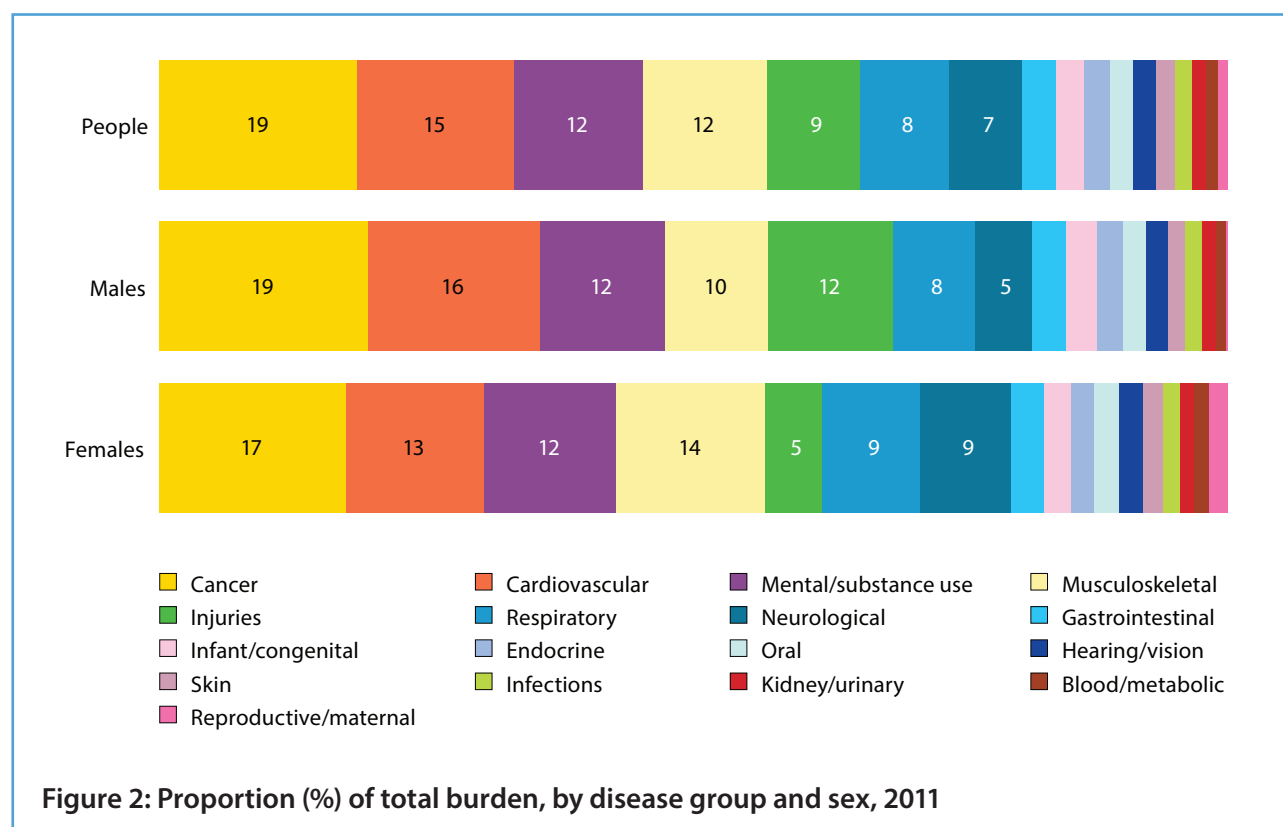
## Health loss across the life course

- In 2011, there were 201 years of healthy life lost due to premature death or living with disease or injury for every 1,000 people in Australia. This is equivalent to 4.5 million DALY.
- People generally experienced more burden as they aged. Total DALY (overall burden) increased with age, except for those aged 85 and over, where it was much lower due to the smaller population (Figure 1). The rate of burden (that is, the number of DALYs per 1,000 people) increased with age.
- In children aged under 15 years, the burden was evenly shared between fatal and non-fatal outcomes. In people aged 15–44, ill health accounted for more burden than dying prematurely. In adults aged 65 and over, fatal burden was higher than non-fatal burden.
- Males experienced more burden than females at almost all ages except for those aged 85 and over. This was mostly due to more fatal burden in males compared to females in these age groups.



## Chronic disease and injury dominate

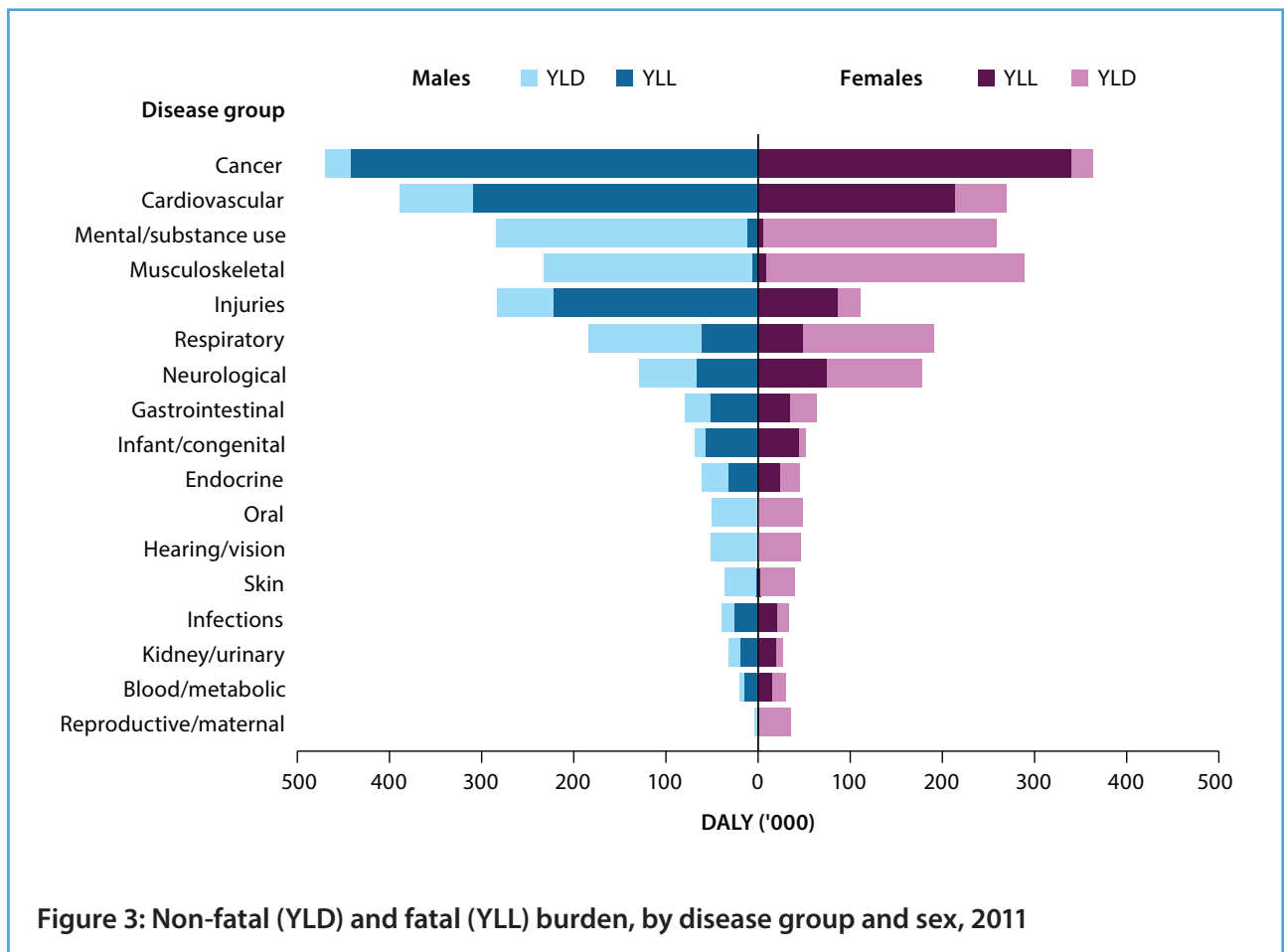
- The disease groups contributing the most burden in 2011 were cancer (19%), cardiovascular diseases (15%), mental and substance use disorders (12%), musculoskeletal conditions (12%) and injuries (9%) (Figure 2). Together, they accounted for around two-thirds (66%) of the disease burden (Figure 2).
- The patterns for males and females were largely similar, though cardiovascular diseases and injuries accounted for a higher proportion of the burden for males than females, and musculoskeletal conditions accounted for a higher proportion of the burden for females (Figure 2).



## Fatal to non-fatal composition differed across disease groups

- Among the five disease groups with the highest burden:
  - the burden from cancer, cardiovascular diseases and injuries was mainly due to people dying early (Figure 3)
  - the burden from mental and substance use disorders and musculoskeletal conditions was mainly due to people living with disease.
- For other disease groups:
  - most of the burden from gastrointestinal disorders, infant and congenital conditions, infectious diseases and kidney and urinary diseases was fatal
  - most of the burden from respiratory conditions, oral disorders, skin disorders, and reproductive and maternal conditions was non-fatal.

- There were also sex differences in the fatal to non-fatal burden composition. For example, the total burden from endocrine disorders (which includes diabetes) and from blood and metabolic disorders was due to more fatal burden for males than for females (Figure 3).



## Burden by disease group differed by sex

The distribution of overall burden between the sexes varied by disease group (Figure 3).

- Males experienced almost three-quarters (72%) of the burden due to injuries and a greater share of the burden due to cardiovascular diseases (59%), endocrine disorders (which includes diabetes) and infant and congenital conditions (57% each) and cancer (56%).
- Females experienced a greater share of the burden from blood and metabolic disorders (which include conditions such as iron-deficiency anaemia) (59%), neurological conditions (which include dementia) (58%) and musculoskeletal conditions (56%).

## Diseases that caused the most burden across the life course

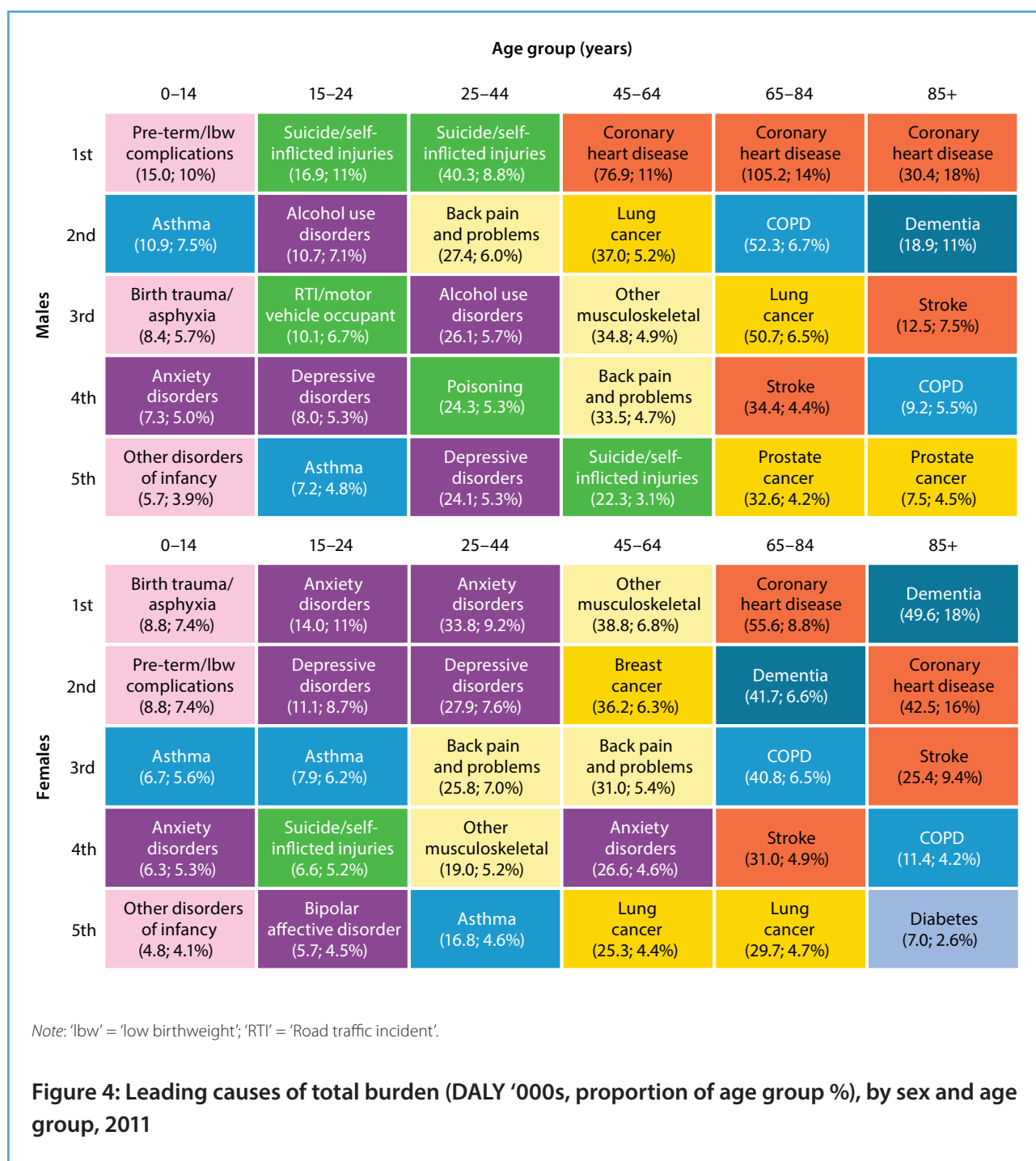
### Disease groups

- Infant and congenital conditions were the main cause of burden in infancy while mental and substance use disorders were the main cause of burden for those aged 15–49.
- Cancer caused the most burden for those aged 50–79 while cardiovascular diseases were the major cause of burden in older Australians aged 80 and over.

### Specific diseases

- Ages 0–14:
  - Pre-term/low birthweight complications, asthma and birth trauma/asphyxia were the leading causes of burden for both sexes (Figure 4).
- Ages 15–44:
  - Suicide and self-inflicted injuries was the leading cause of burden for males, while it was anxiety and depressive disorders for females.
  - Musculoskeletal conditions, such as back pain and problems, and other musculoskeletal disorders, emerged in the top five causes of burden for those aged 25–44.
- Ages 45–64:
  - Coronary heart disease was the leading cause of burden for males, followed by lung cancer.
  - In females, other musculoskeletal disorders (which includes ill-defined arthritis, chronic pain in joints, muscles and other soft tissue) was the leading cause of burden. This was followed by breast cancer.
- Ages 65 and over:
  - Coronary heart disease was the leading causes of burden in males aged 65 and over. COPD was the second leading cause of burden in males aged 65–84, and dementia was the second leading cause of burden in males aged 85 and over.
  - In females, coronary heart disease and dementia were the leading causes of burden for those aged 65 and over.
  - Cancers also featured in the top five causes of burden for males (lung and prostate cancer) and females (lung cancer) for those aged 65 and over.



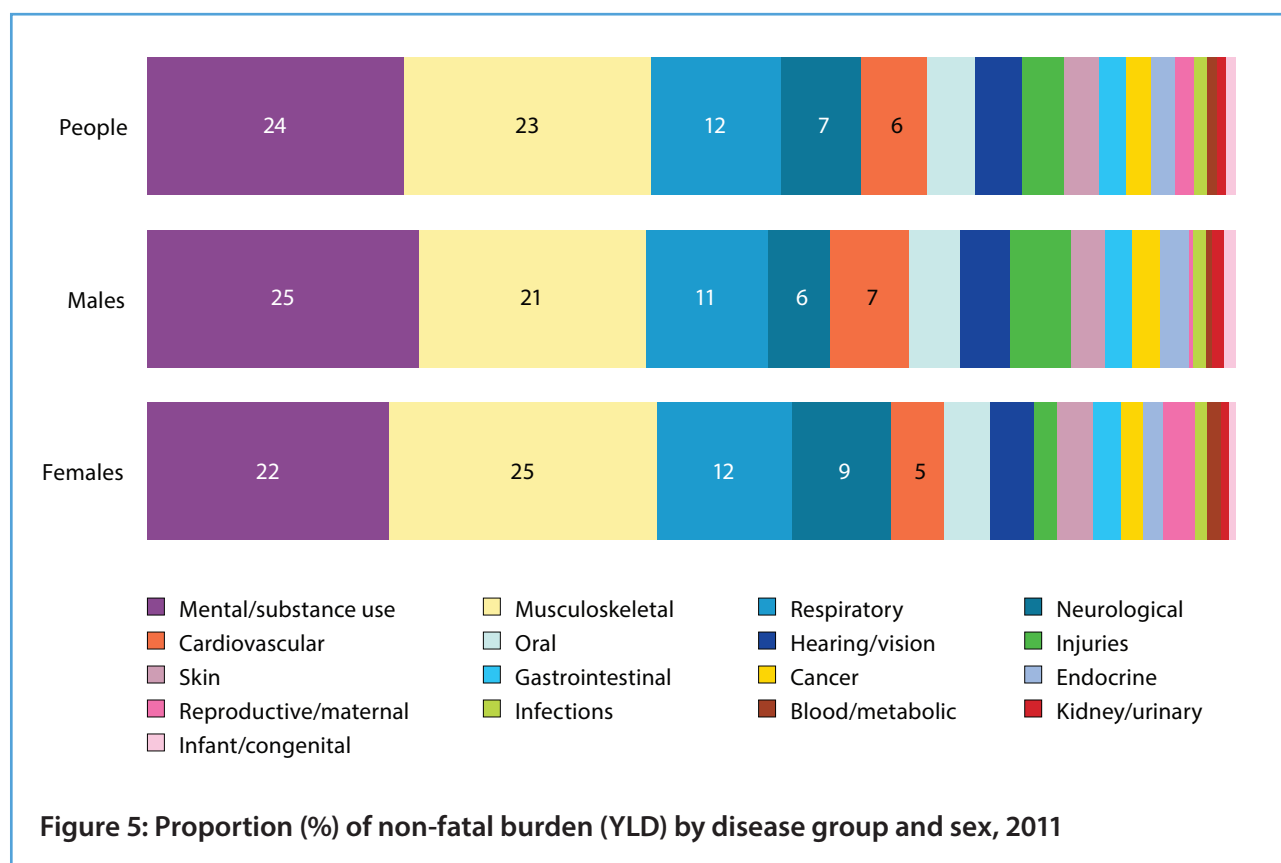


## Impact of living with illness or injury

- In 2011, Australians lost 2.2 million years of healthy life due to the impact of living with illness or injury. This accounted for approximately half (49.5%) of the total burden.
- There was little overall difference in health loss between males and females although males generally experienced a slightly higher rate of non-fatal burden for most age groups.
- A substantial amount of health loss was experienced by the elderly population.

### Five disease groups caused almost three-quarters of the non-fatal burden

- The top two disease groups in 2011—mental and substance use disorders and musculoskeletal conditions—accounted for 46% of the non-fatal burden in males and 47% in females (Figure 5).
- Respiratory diseases, neurological conditions and cardiovascular diseases accounted for the next 24% in males and 26% in females.



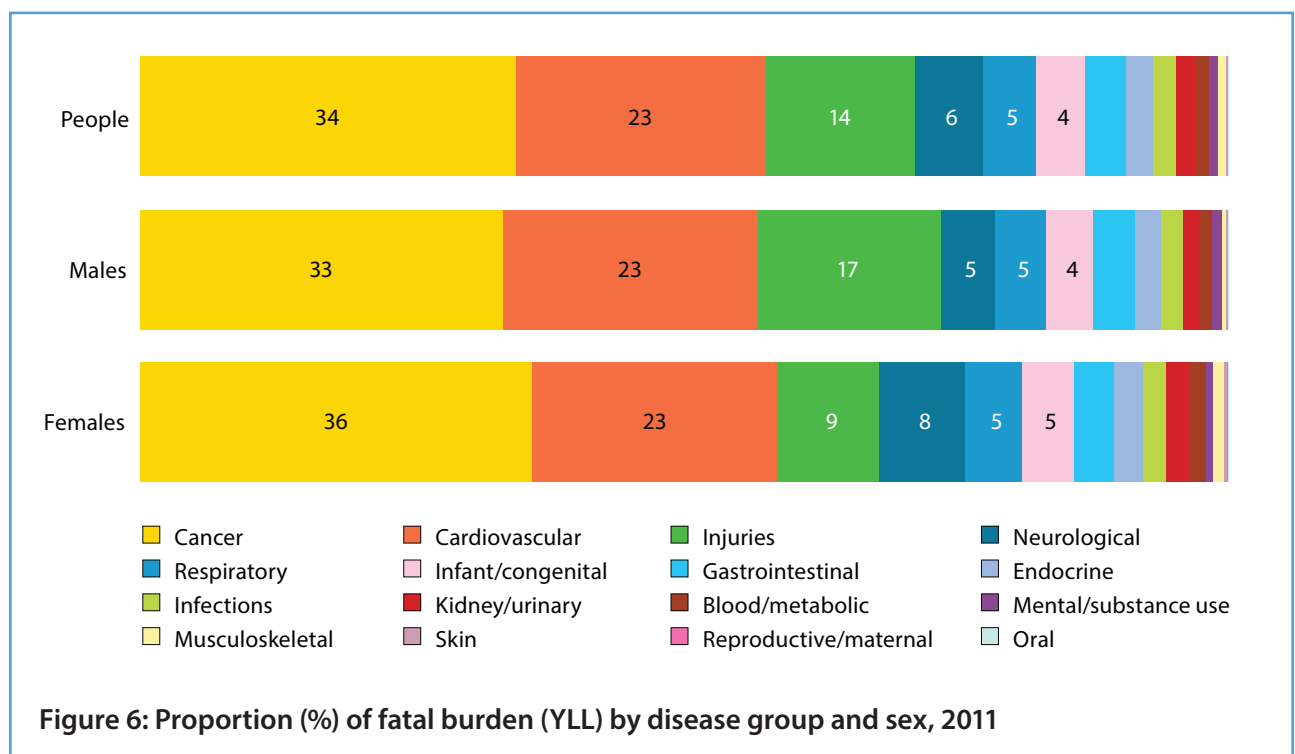
- The specific diseases causing the most non-fatal burden for males were other musculoskeletal conditions, back pain and problems, anxiety disorders, depressive disorders and asthma.
- For females, the leading diseases were other musculoskeletal conditions, anxiety disorders, back pain and problems, depressive disorders and osteoarthritis.

## Impact of dying prematurely

- In 2011, Australians lost 2.3 million years of life due to dying prematurely. This resulted from the nearly 150,000 deaths in that year. The fatal burden accounted for 50.5% of the total burden of disease and injury.
- Males experienced more of the fatal burden than females (58% compared to 42%). After adjusting for differences in age structure of the population, males experienced a 61% higher rate of fatal burden than females.
- Australia has an ageing population and the majority of deaths occurred at older ages: 38% of deaths are of people aged 85 or over and 66% are of people aged 75 and over. The high number of deaths in these age groups contributed substantially to the fatal burden.

### Cancer and cardiovascular diseases caused most of the fatal burden

- Cancer (33% males; 36% females) and cardiovascular diseases (23% in both males and females) accounted for the majority of the fatal burden (YLL) in 2011 (Figure 6).
- Other disease groups that contributed substantially to YLL included injuries (17% males; 9% females), neurological conditions (5% males; 8% females), respiratory diseases (5% in both males and females) and infant and congenital conditions (4% males; 5% females).









- In those aged 5–44, injuries (such as road traffic injuries, suicide and poisoning), and cancers (such as brain/central nervous system cancer and other cancers) were some of the main causes of fatal burden.
- In those aged 45 and over, coronary heart disease, cancers (lung, breast, bowel and prostate cancer), stroke and dementia became the leading causes of fatal burden. COPD also contributed considerable fatal burden for both men and women.

## Large proportion of burden can be prevented

- 31% of the burden of disease experienced by the population in 2011 could have been prevented by reducing exposure to the modifiable risk factors included in this study.
- The five risk factors that caused the most burden in 2011 were tobacco use (9%), high body mass (5.5%), alcohol use (5%), physical inactivity (5%) and high blood pressure (5%) (Table 1). An analysis of the combined effects of all 13 dietary risks included in the study suggested that they accounted for around 7% of the disease burden.
- Tobacco use contributed to 36% of all respiratory burden and 22% of all cancer burden. High body mass was responsible for almost half the burden from endocrine disorders, and alcohol use contributed to over one-fifth of the injury burden.

**Table 1: Proportion (%) of burden attributable to the leading risk factors, for selected disease groups, 2011**

Disease group	 Tobacco use	 High body mass	 Alcohol use	 Physical inactivity	 High blood pressure	 Dietary risks (joint effect) <sup>(a)</sup>
<b>Proportion of total burden</b>						
<b>All diseases</b>	<b>9.0</b>	<b>5.5</b>	<b>5.1</b>	<b>5.0</b>	<b>4.9</b>	<b>7.2</b>
<b>Proportion of disease group burden</b>						
Cancer	22.0	4.5	3.3	6.4	..	7.0
Cardiovascular	12.0	21.0	4.8	21.0	32.0	35.0
Mental	..	..	12.0	..	..	..
Injuries	..	..	21.0	..	..	..
Respiratory	36.0	..	..	..	..	..
Endocrine	3.5	49.0	2.0	30.0	..	32.7
Kidney/urinary	..	28.0	..	..	22.0	..

(a) Estimates for diet are based on an analysis of the joint effects of all dietary risk factors included in the study following methods used in recent global burden of disease studies.

Note: Blank cells '..' indicate that the risk factor has no associated diseases or injuries in the disease group.

### Why risk factor estimates cannot be added together

The estimates for different risk factors cannot simply be added to derive their total DALY, due to complex pathways and interactions between them. For example, physical inactivity increases the chance of having high body mass, and both increase the risk of cardiovascular diseases. While there are known *associations* between risk factors for many diseases and conditions, burden was attributed to a risk factor only where there is sufficient evidence that the risk factor *causes* the disease.

# Substantial gains in population health

## Reduction in overall burden of disease

After taking account of the increasing size and age of the population (by using age-standardised rates), there was a 10% decrease in total burden between 2003 and 2011 (from 210 to 190 DALY per 1,000 people).

## Large reduction in burden from dying prematurely

Most of the improvement in the overall burden came from a large reduction of 15% in the age-standardised rate of fatal burden (from 111 to 94 YLL per 1,000 people). This was a result of preventing or delaying deaths from particular diseases or injuries.

At the disease group level, there was a large decrease in the rate of fatal burden for cardiovascular diseases between 2003 and 2011.

## Small reduction in burden from people living with disease

There was also a small reduction of 3.8% in non-fatal burden between 2003 and 2011 after accounting for population increases and ageing (from 100 to 96 YLD per 1,000 people), suggesting that success in reducing premature deaths has not resulted in more health loss due to illness.

Despite the general decrease in non-fatal burden, there have been increases for particular disease groups, notably for kidney and urinary diseases (mostly chronic kidney disease) and endocrine disorders (mostly diabetes).

## Reductions in the proportion of burden due to some risk factors

Between 2003 and 2011, there was a small decrease in the proportion of burden attributable to the risk factors measured at both time points (from 28% in 2003 to 27% in 2011). This reflects reductions in exposure to the risk factors, or reductions in burden from the linked disease and injury, or both.

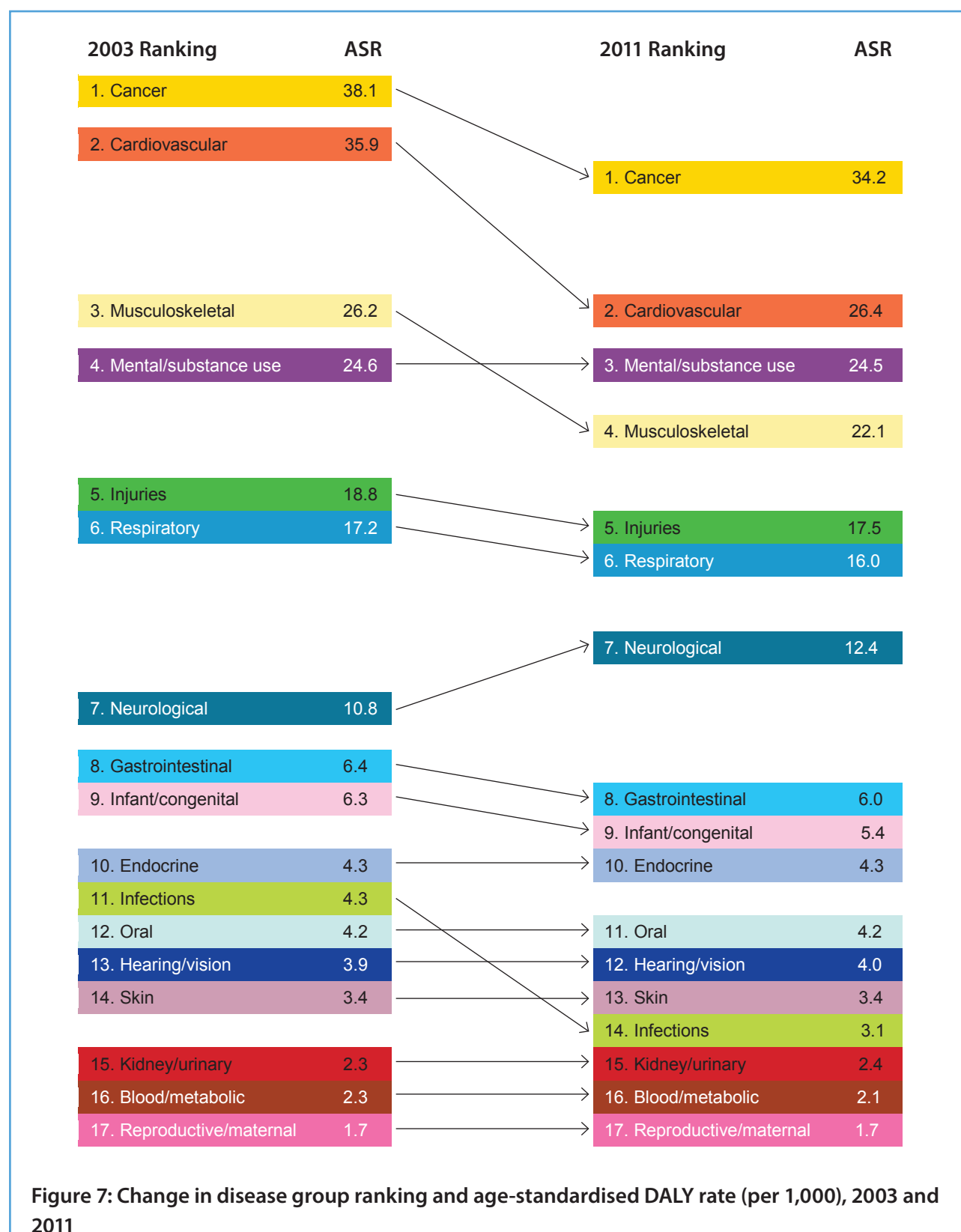
After accounting for population increase and ageing between 2003 and 2011 (using age-standardised rates), there were notable decreases in total DALY attributable to high cholesterol (41%), high blood pressure (35%) and tobacco use (18%). There were small increases in age-standardised rates of total DALY attributable to drug use (6%) and high body mass (2%).

## Changes in overall burden by disease group

After accounting for population increase and ageing, a number of disease groups had a reduction in burden between 2003 and 2011, indicating an improvement in underlying disease burden (prevalence, mortality and/or severity) (Figure 7):

- Out of the 17 disease groups, cardiovascular diseases had the biggest absolute reduction. Burden from cancer, musculoskeletal conditions and infectious diseases also fell considerably.
- Disease groups that had modest reductions were: gastrointestinal disorders, and infant and congenital conditions.
- Burden from neurological conditions increased between 2003 and 2011—the only disease group to do so. Burden stayed more or less the same between 2003 and 2011 for most other disease groups.

- There was little change in the rankings of disease groups in terms of burden in 2003 compared to 2011 with the exception of mental and substance use disorders (which increased from 4th to 3rd), musculoskeletal conditions (which decreased from 3rd to 4th), and infectious diseases (which decreased from 11th to 14th) (Figure 7).

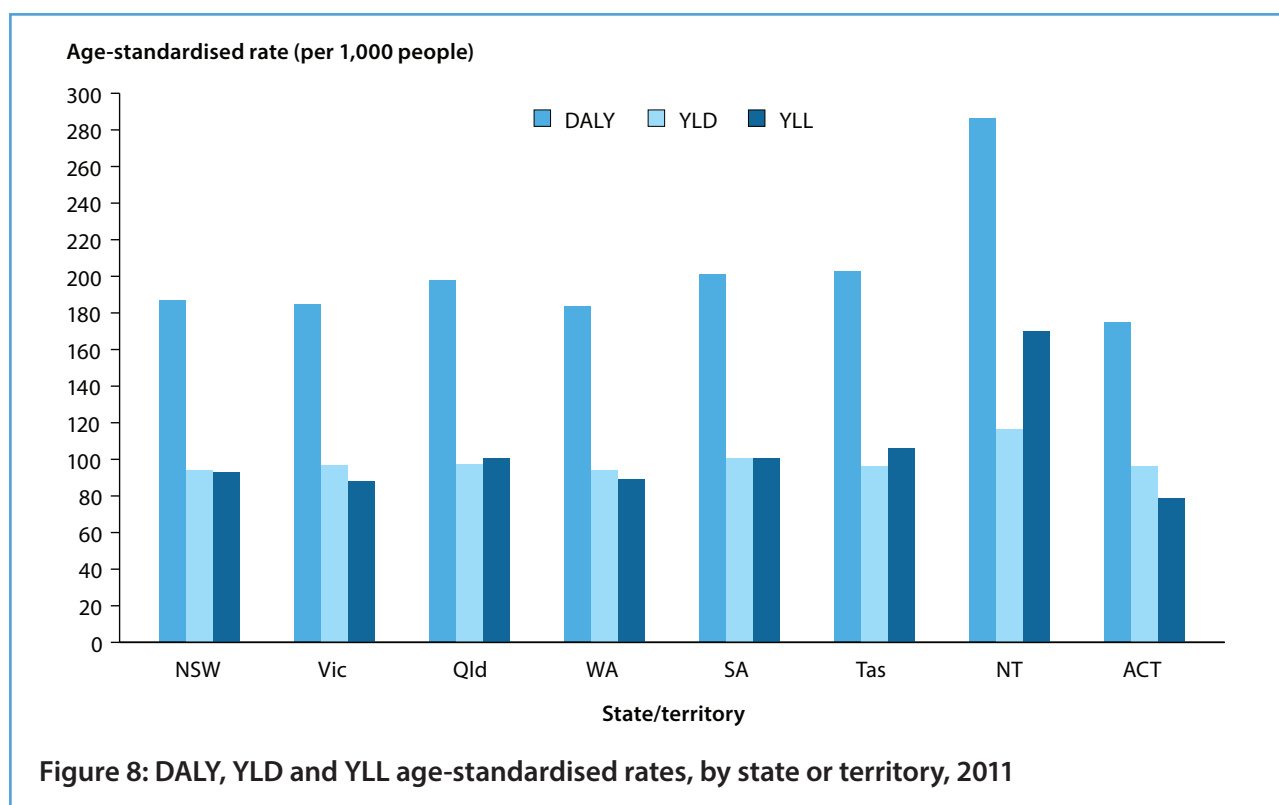


## Variations across geographic and population groups

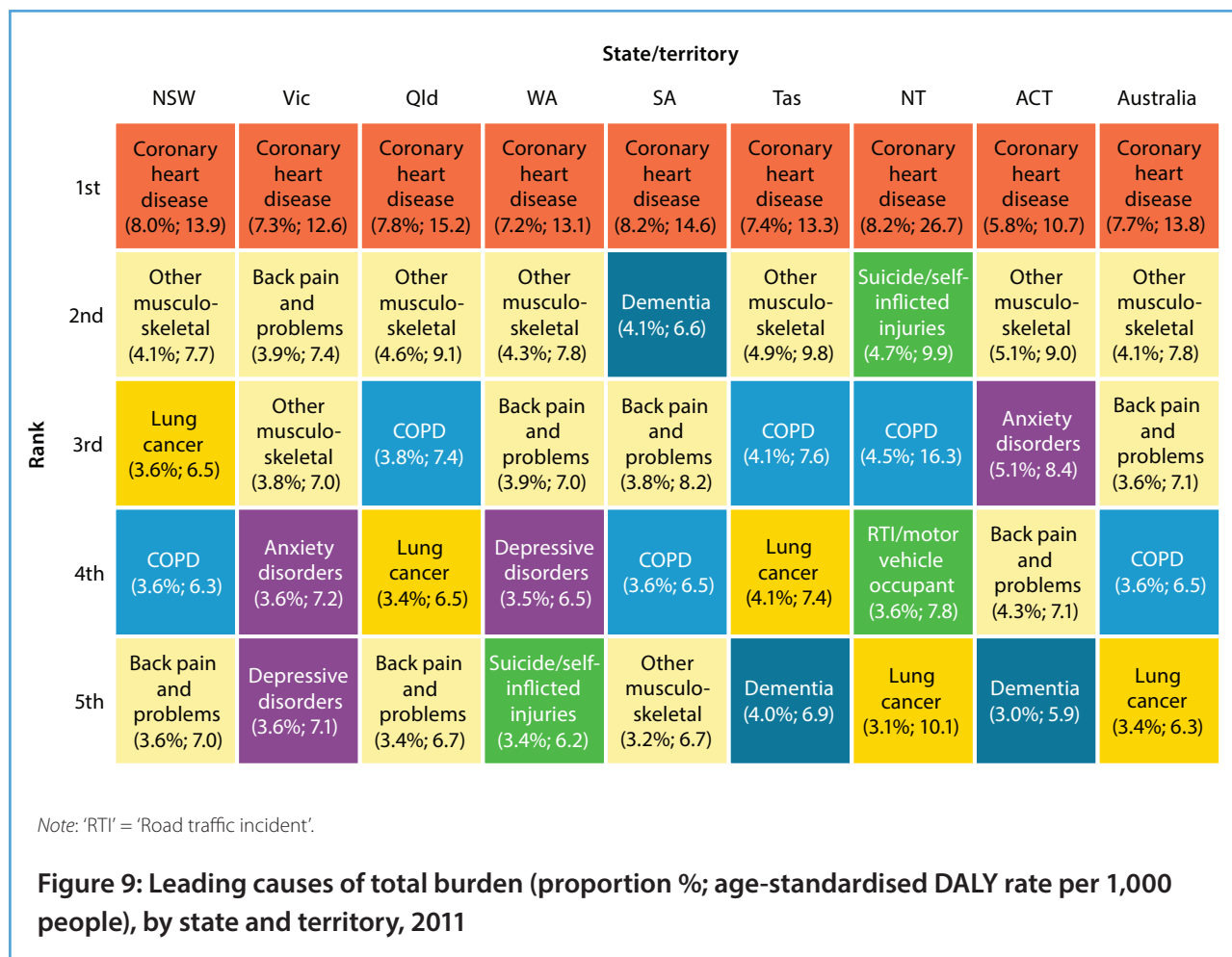
Variations in burden across geographic and population groups reflect a complex interaction of factors, such as demographic (including the age structure of the population), socioeconomic and environmental variations. The differing age structures and size of the various populations are accounted for in the age-standardised rates presented.

### State and territory

- Overall, age-standardised rates of burden were similar across states and territories, except for the Northern Territory, where DALY rates were around 1.5 times as high as the national rate. The higher rate of burden for the Northern Territory was mostly due to fatal burden, and to much higher rates of burden due to kidney and urinary diseases, infectious diseases, endocrine disorders (which includes diabetes), injuries and cardiovascular diseases.



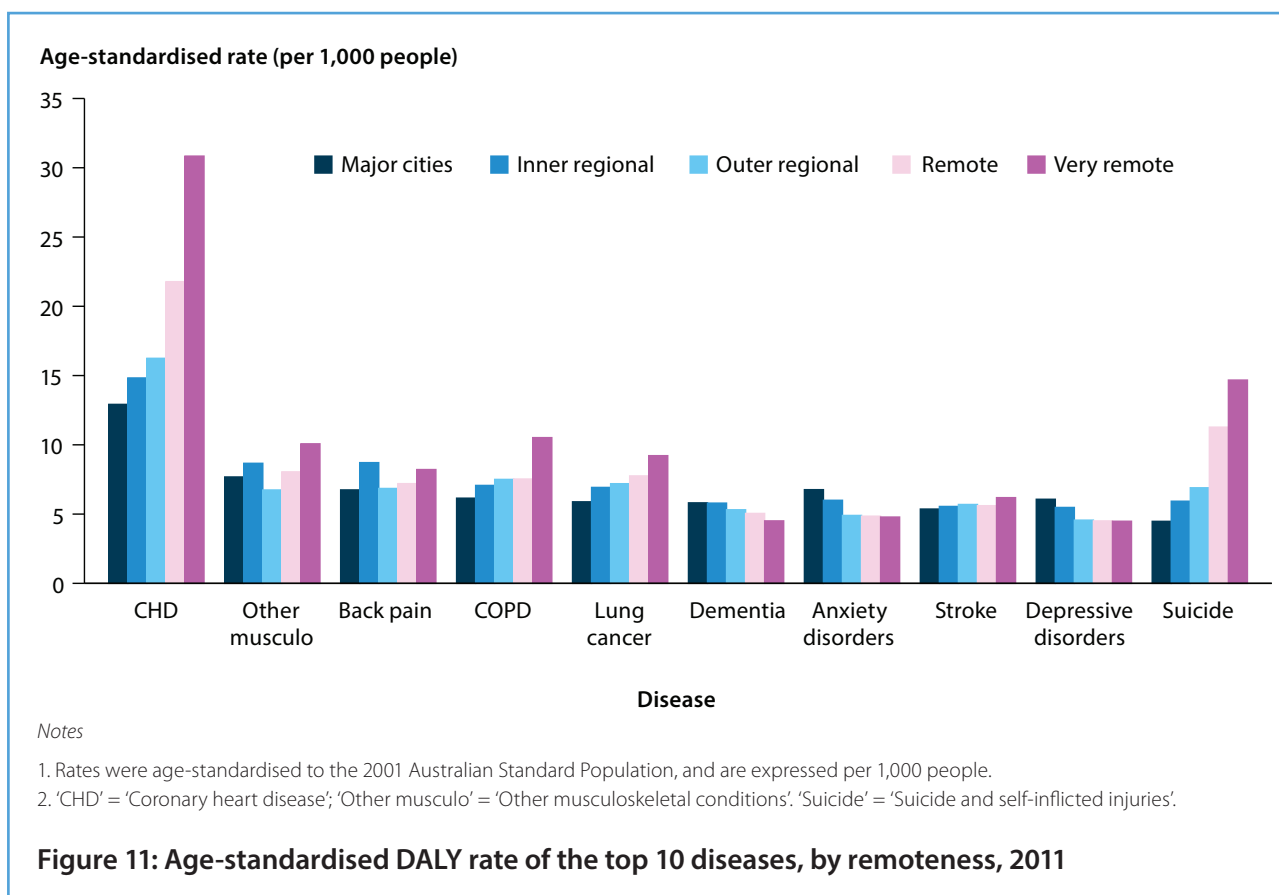
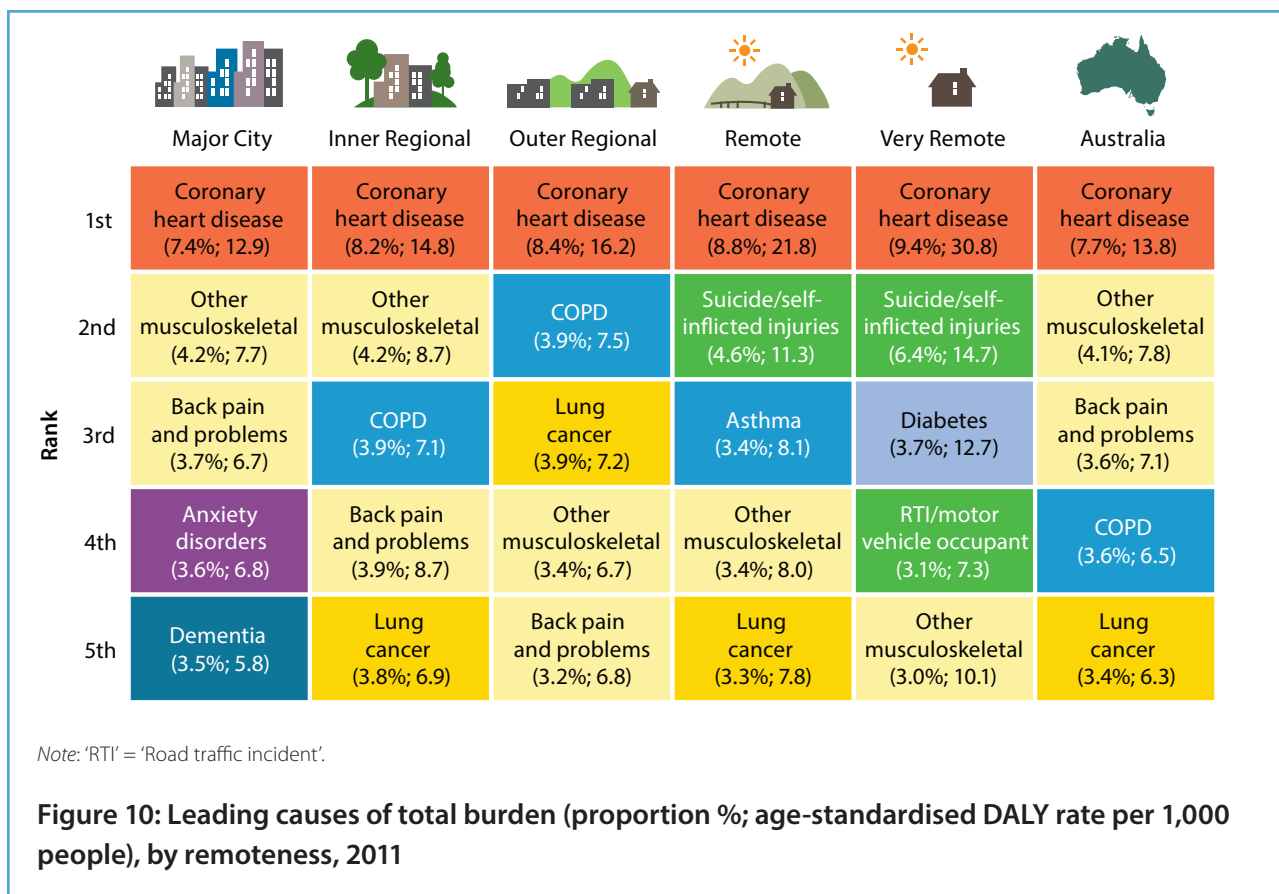
- When looking at the specific diseases that contributed the most burden in 2011 for each state and territory (Figure 9):
  - coronary heart disease was the leading cause of burden across all jurisdictions (however the age-standardised DALY rate was higher in the Northern Territory)
  - anxiety disorders and/or depressive disorders were among the top five leading causes of burden for Victoria, Western Australia and the Australian Capital Territory, but not nationally
  - suicide and self-inflicted injuries and motor vehicle occupant injuries were among the top five causes of burden for Western Australia and the Northern Territory, but not nationally.



## Remoteness

- The age-standardised rate of burden was higher in more remote areas. *Very remote* areas experienced 1.7 times the rate of burden of *Major cities*. This pattern of higher burden with increasing remoteness was consistent across most disease groups.
- In all remoteness areas, coronary heart disease was the leading cause of burden (which was also the leading cause nationally). There were several leading causes that did not rank as highly on a national level. These included anxiety disorders and dementia (for *Major cities*), asthma (for *Remote*), suicide and self-inflicted injuries (for *Remote* and *Very remote*), and diabetes and motor vehicle occupant injuries (for *Very remote*) (Figure 10).
- The gradient of the inequality in disease burden across remoteness areas varied by disease (Figure 11). There was a clear gradient for coronary heart disease and suicide and self-inflicted injuries, with greater rates of burden in more remote areas. Dementia, anxiety disorders and depressive disorders had lower rates of burden in more remote areas.





## Socioeconomic group

Socioeconomic groups here are based on an index of relative socioeconomic disadvantage defined by the area in which a person lives. The population is divided into five equally sized socioeconomic groups (quintiles).

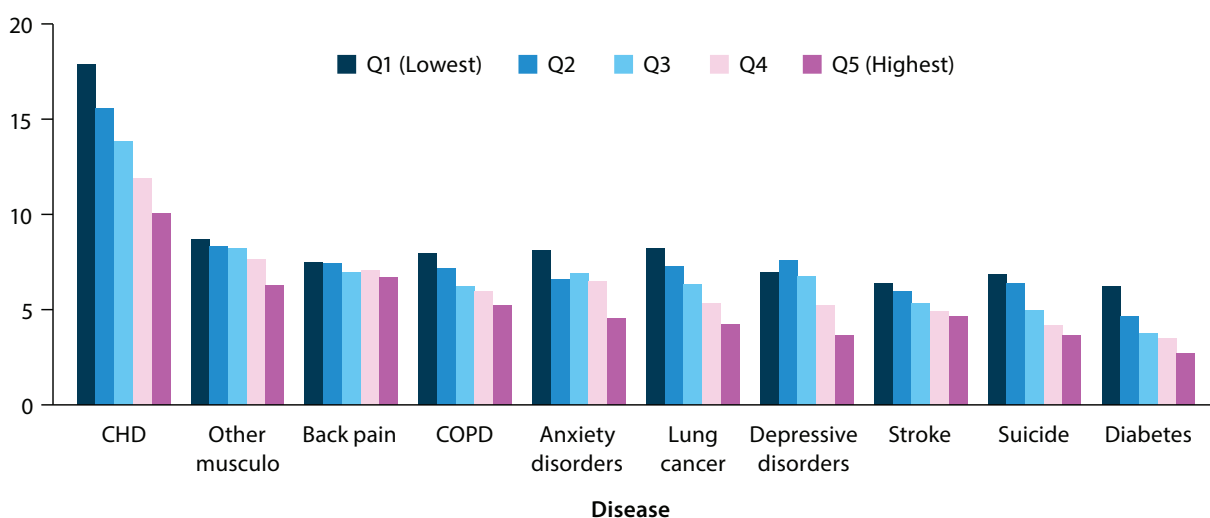
- After taking differing age structures into consideration, the lowest socioeconomic group had the highest rate of burden, at 1.5 times the rate of the highest socioeconomic group. However, the gap varied across the life course, with lower inequality in the youngest age groups.
- Total burden would have been 21% lower if all socioeconomic groups in Australia had the same rate of burden as the most well-off socioeconomic group.
- Mental and substance use disorders, cardiovascular diseases, cancer and injuries had the greatest absolute disparity in burden rates between the lowest and highest socioeconomic groups.
- Coronary heart disease was the leading cause of burden across all socioeconomic groups (Figure 12). In the lowest socioeconomic group, this was followed by lung cancer, COPD, other musculoskeletal conditions and anxiety disorders. In the highest socioeconomic group, this was followed by other musculoskeletal conditions, back pain and problems, COPD and lung cancer.

		Socioeconomic quintile					
		1 (Lowest quintile)	2	3	4	5 (Highest quintile)	Australia
Rank	1st	Coronary heart disease (8.4%; 17.9)	Coronary heart disease (8.0%; 15.6)	Coronary heart disease (7.7%; 13.8)	Coronary heart disease (6.9%; 11.9)	Coronary heart disease (6.9%; 10.1)	Coronary heart disease (7.7%; 13.8)
	2nd	Lung cancer (3.8%; 8.2)	Other musculoskeletal (3.8%; 8.3)	Other musculoskeletal (4.3%; 8.2)	Other musculoskeletal (4.4%; 7.6)	Back pain and problems (4.5%; 6.7)	Other musculoskeletal (4.1%; 7.8)
	3rd	COPD (3.8%; 7.9)	Lung cancer (3.7%; 7.3)	Back pain and problems (3.5%; 7.0)	Back pain and problems (4.1%; 7.1)	Other musculoskeletal (4.4%; 6.3)	Back pain and problems (3.6%; 7.1)
	4th	Other musculoskeletal (3.7%; 8.7)	COPD (3.6%; 7.2)	Lung cancer (3.5%; 6.3)	Anxiety disorders (3.8%; 6.5)	Dementia (4.0%; 5.7)	COPD (3.6%; 6.5)
	5th	Anxiety disorders (3.1%; 8.1)	Back pain and problems (3.3%; 7.4)	COPD (3.4%; 6.2)	COPD (3.4%; 5.9)	COPD (3.5%; 5.2)	Lung cancer (3.4%; 6.3)

**Figure 12: Leading causes of total burden (proportion %; age-standardised DALY rate per 1,000 people), by socioeconomic group, 2011**

- Generally, a strong gradient was seen across socioeconomic groups, with higher rates of burden in the lowest socioeconomic group for the leading causes of burden (Figure 13). There was a clear gradient of decreasing burden from coronary heart disease, lung cancer, suicide, COPD and stroke with increasing socioeconomic group.

### Age-standardised rate (per 1,000 people)



#### Notes

1. Rates were age-standardised to the 2001 Australian Standard Population, and are expressed as per 1,000 people.
2. 'CHD' = 'Coronary heart disease'; 'Other musculo' = 'Other musculoskeletal conditions'. 'Suicide' = 'Suicide and self-inflicted injuries'.

**Figure 13: Age-standardised DALY rate of the top 10 diseases, by socioeconomic quintile, 2011**

## Where can I find out more?

More information on the ABDS 2011 can be found on the AIHW website <<http://www.aihw.gov.au/burden-of-disease/>>.

Burden of disease results for the Aboriginal and Torres Strait Islander population and a detailed methods report for the ABDS 2011 will be available in the second half of 2016.

## Abbreviations

ACT	Australian Capital Territory	Qld	Queensland
CHD	coronary heart disease	SA	South Australia
COPD	chronic obstructive pulmonary disease	Tas	Tasmania
DALY	disability-adjusted life years	Vic	Victoria
NSW	New South Wales	WA	Western Australia
NT	Northern Territory	YLD	years lived with disability
Q	Quintile (socioeconomic)	YLL	years of life lost

## Acknowledgments

This summary report on national estimates from the ABDS 2011 was authored by Julianne Garcia, Melanie Dunford, Michelle Gourley and Miriam Lum On at the Australian Institute of Health and Welfare. The full list of authors for the ABDS 2011 can be found in the *Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2011* report.

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This summary report presents key findings from the Australian Institute of Health and Welfare's report: *Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2011*. It provides estimates of the burden due to different diseases and injuries in Australia and the contribution of various risk factors to this burden. It includes new analyses of the burden attributed to all dietary risk factors included in the study.

