



## 4.4 Contribution of selected risk factors to burden of disease

Risk factors such as tobacco use, risky alcohol consumption, illicit drug use, not getting enough exercise, and poor eating patterns can have a detrimental effect on health. Almost one-third of the overall disease burden could be prevented by reducing exposure to these and other modifiable risk factors (AIHW 2016a). Even small changes to our daily exercise routines or body weight could substantially reduce disease burden. For example, an extra 15 minutes of brisk walking, 5 days each week, could reduce the disease burden in the population due to physical inactivity by about 14% (AIHW 2017c). The loss of 3 kilograms by a person of average height could reduce disease burden in the population due to overweight and obesity by 14% (AIHW 2017b).

Burden of disease analysis (Box 4.4.1) measures the combined impact of morbidity (non-fatal burden) and mortality (fatal burden) in a consistent manner so as to assess and compare the health loss from different diseases and injuries in a population. The analysis also estimates the contribution of various risk factors to disease burden. Burden of disease estimates are designed to inform health policy for the prevention, early intervention and treatment of diseases and risk factors, as well as to inform health promotion and management strategies and resource allocation.

### Box 4.4.1: What is burden of disease?

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 the health consequences of living with ill health and injury (non-fatal burden) and of dying prematurely from illness and injury (fatal burden). It also quantifies the contribution of various risk factors to this burden.

Burden of disease is measured using the summary measure disability-adjusted life years (DALYs). One DALY is 1 year of 'healthy life' lost due to illness and/or death—the more DALYs associated with a disease or injury, the greater the burden. The total disease burden is the sum of all DALYs (burden) estimated for all diseases and injuries in the year of study for the whole population.

The attributable burden reflects the direct relationship between a risk factor (for example, overweight and obesity) and a disease outcome. It is the amount of burden that could be avoided if the risk factor were removed or reduced to the lowest possible exposure. When the risk factor is a disease, such as diabetes, the additional burden from diseases linked to the disease risk factor represents the indirect burden. More information about indirect burden can be found in section 'Diabetes and chronic kidney disease as risk factors for other diseases'.

(continued)



**Box 4.4.1 (continued): What is burden of disease?**

Linked diseases are those that have a causal association with the risk factor of interest. A disease was included in the analysis if it was considered to have a 'convincing' or 'probable' level of evidence supporting a causal association, according to criteria set by the World Cancer Research Fund—a highly regarded set of criteria for evaluating evidence. Burden of disease studies use data on how prevalent the risk factor is in the population, and relative risks, to measure the size of the association between risk factors and linked diseases. Relative risks are a measure of how much more likely an outcome is in people exposed to the risk factor than in people who are not (AIHW 2016b).

Details on the methods used to calculate burden of disease in the Australian Burden of Disease Study are in the AIHW report [Australian Burden of Disease Study 2011: methods and supplementary material](#).

The Australian Burden of Disease Study (ABDS) 2011, undertaken by the AIHW, provides information on the burden of disease and injury for the Australian population for around 200 diseases and injuries (grouped into 17 disease groups) and 29 risk factors (see Chapter 3.1 'Burden of disease across the life stages').

This article presents information on estimates of disease burden attributable to selected risk factors for 2011. This work draws on the latest evidence on the causal association between different diseases and injuries (referred to as 'linked diseases' in this article) and the risk factor. The following risk factors are included: overweight and obesity, physical inactivity, alcohol and illicit drug use, intimate partner violence, and diseases considered as risk factors for other diseases—chronic kidney disease (CKD) and diabetes. Table 4.4.1 summarises the proportion of disease burden attributed to these risk factors, by selected disease groups, and in total.

See Chapter 3.14 'Dementia' for information on the contribution of vascular risk factors and diseases to the burden of dementia in Australia.

This article does not cover other leading risk factors included in the ABDS 2011, such as tobacco use (representing 9.0% of the burden in 2011) and high blood pressure (4.9%). See chapters 4.5 'Tobacco smoking', 4.11 'Biomedical risk factors' for more information on these risk factors.





Table 4.4.1: Proportion of disease burden attributed to selected risk factors, 2011

|                                  | Risk factor            |             |                                |                  |  |
|----------------------------------|------------------------|-------------|--------------------------------|------------------|--|
|                                  | Overweight and obesity | Alcohol use | Insufficient physical activity | Illicit drug use | Intimate partner violence <sup>(a)</sup> |
| <b>All diseases and injuries</b> | <b>7.0</b>             | <b>4.6</b>  | <b>2.6</b>                     | <b>2.3</b>       | <b>1.4</b>                               |
| <b>Disease group</b>             |                        |             |                                |                  |  |
| Cancer                           | 7.2                    | 4.4         | 2.9                            | 0.7              | ..                                       |
| Cardiovascular                   | 18.0                   | 1.8         | 8.0                            | ..               | ..                                       |
| Mental <sup>(b)</sup>            | ..                     | 12.2        | ..                             | 6.1              | 7.2                                      |
| Injuries                         | ..                     | 17.9        | ..                             | 12.7             | 7.1                                      |
| Endocrine                        | 50.6                   | ..          | 18.0                           | ..               | ..                                       |

(a) Estimates are for women who were subject to violence from cohabiting partners only.

(b) Includes mental and substance use disorders.

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

Sources: AIHW 2017b, 2017c, 2018b; Ayre et al. 2016.

## Overweight and obesity

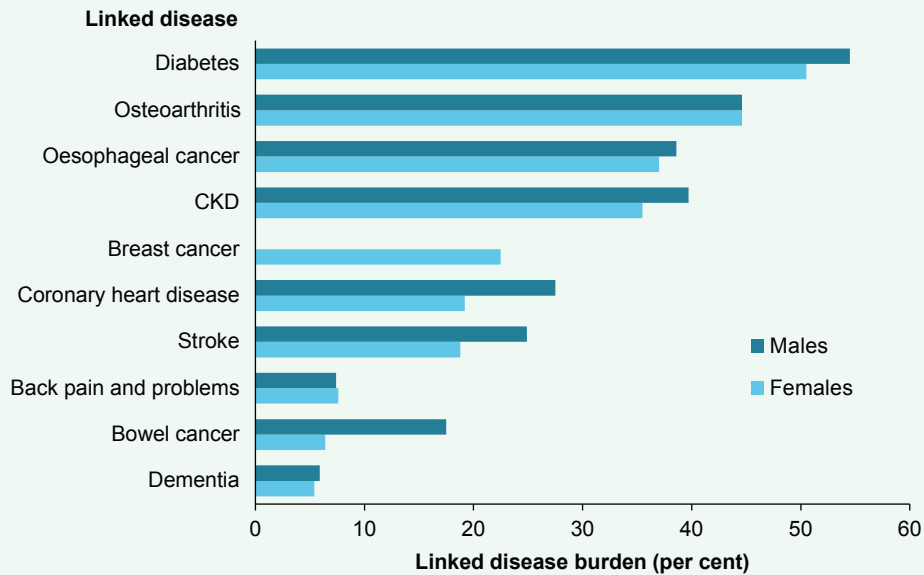
Overweight and obesity is a major public health issue, with nearly 2 in 3 (63%) adults and more than 1 in 4 (28%) children in Australia considered overweight or obese (ABS 2015). Overweight and obese adults have an increased risk of cardiovascular disease, CKD, some types of cancer, diabetes and musculoskeletal problems (AIHW 2017c).

Seven per cent (7.0%) of the total health burden in Australia in 2011 was due to overweight and obesity. The attributable burden due to overweight and obesity was higher in males (7.3% of all burden) than in females (6.6%). Around 63% of the burden was due to fatal outcomes.

Overweight and obesity was linked to 22 diseases; 11 types of cancer, 3 cardiovascular conditions, CKD, diabetes, dementia, gallbladder disease, gout, back pain and problems, osteoarthritis, and asthma. Figure 4.4.1 presents the top 10 linked diseases. Overweight and obesity was responsible for 53% of diabetes burden, 45% of osteoarthritis burden and 38% of CKD burden in 2011. An estimated 22% of breast cancer burden in females was due to overweight and obesity.



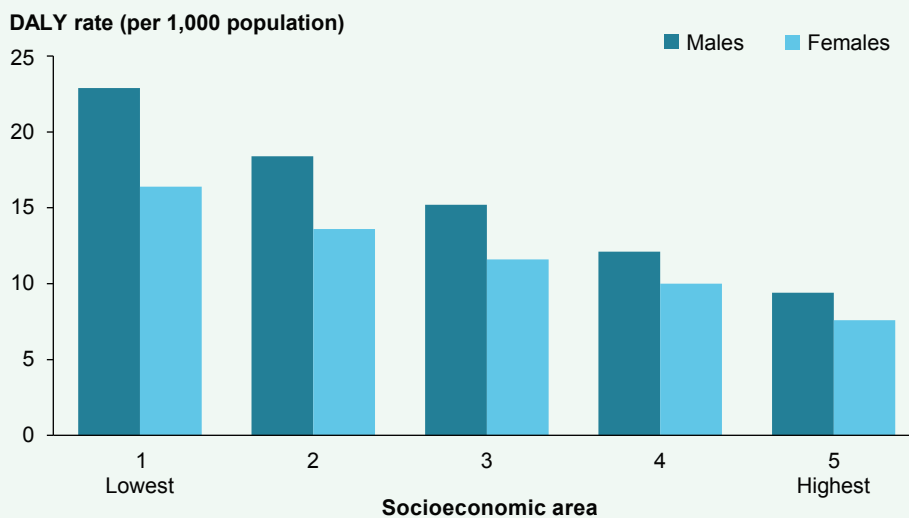
Figure 4.4.1: Proportion of linked disease burden (DALYs) due to overweight and obesity, by sex and top 10 linked diseases, 2011



Source: AIHW 2017b; Table S4.4.1.

The lowest socioeconomic area experienced the greatest burden attributable to overweight and obesity, at a rate 2.3 times that of the highest socioeconomic area. There was a clear pattern of decreasing burden with increasing socioeconomic area for both males and females (Figure 4.4.2).

Figure 4.4.2: Age-standardised DALY rate due to overweight and obesity, by sex and socioeconomic area, 2011



Note: Rates were age standardised to the 2001 Australian Standard Population.

Source: AIHW 2017b; Table S4.4.2.





Around 14% of disease burden due to overweight and obesity in 2020 could be avoided if everyone in the population at risk in 2011 reduced their body mass index (BMI) by 1 (equivalent to around 3 kilograms in a person of average height), and maintained that loss to 2020 (AIHW 2017b). BMI is a commonly used method to determine if a person is normal weight, underweight, overweight or obese and is calculated by dividing the person's weight (in kilograms) by their height (in metres) squared. See Chapter 4.10 'Overweight and obesity' for more information on overweight and obesity.

Even if the current rises in overweight and obesity in the population were halted (by people just maintaining their current weight), an estimated 6.3% of future disease burden due to overweight and obesity could be avoided.



For more scenario modelling results see the online data visualisation tool at <[www.aihw.gov.au/reports/australias-health/australias-health-2018/contents/burden-of-disease-scenario-modelling](http://www.aihw.gov.au/reports/australias-health/australias-health-2018/contents/burden-of-disease-scenario-modelling)>.

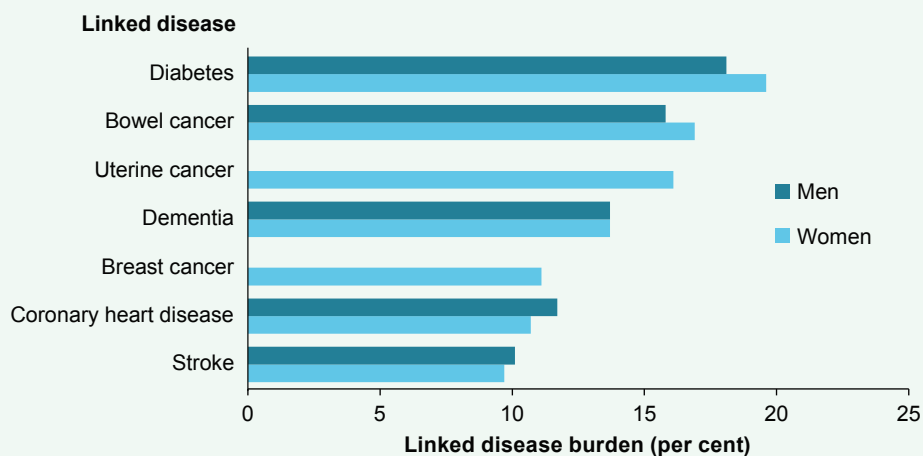
## Insufficient physical activity

Insufficient physical activity is a major risk factor for ill health in Australia, with more than half of adults not meeting the current Australian recommended physical activity guidelines (ABS 2015). Physical activity is an important factor in preventing or reducing overweight and obesity, which is a leading contributor to disease in Australia. Insufficient physical activity increases the risk of a range of diseases, such as cardiovascular disease, type 2 diabetes and some cancers (Kyu et al. 2016).

In 2011, 2.6% of the total disease burden was due to insufficient physical activity in people aged 20 and over. This finding was similar for both men and women. Around 74% of this burden was due to fatal outcomes.

Insufficient physical activity was linked to 7 diseases—coronary heart disease, diabetes, bowel cancer, dementia, stroke, breast cancer, and uterine cancer. It was responsible for between 10% and 20% of disease burden for each of these diseases (Figure 4.4.3).

Figure 4.4.3: Proportion of linked disease burden (DALYs) due to insufficient physical activity for people aged 20 and over, by sex, 2011



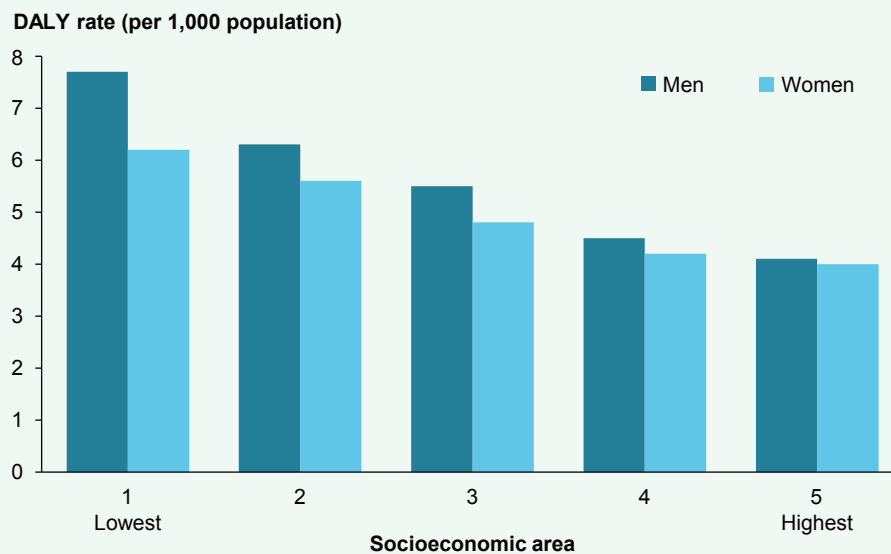
Source: AIHW 2017c; Table S4.4.3.





People in the lowest socioeconomic area experienced rates of disease burden due to insufficient physical activity at 1.7 times those of the highest socioeconomic area. There was a clear pattern of decreasing burden with increasing socioeconomic area for both men and women (Figure 4.4.4).

**Figure 4.4.4: Age-standardised DALY rate due to insufficient physical activity for people aged 20 and over, by sex and socioeconomic area, 2011**



*Note:* Rates were age standardised to the 2001 Australian Standard Population.  
*Source:* AIHW 2017c; Table S4.4.4.

An extra 15 minutes of moderate activity (such as brisk walking), 5 days each week by everyone in the population at risk in 2011—maintained over time to 2020—could reduce disease burden due to insufficient physical activity in the population by an estimated 14%. If this activity time were increased to 30 minutes, the burden could be reduced by 26% (AIHW 2017c). All ages would benefit, particularly people aged 65 and over.



For more scenario modelling results see the online data visualisation tool at [www.aihw.gov.au/reports/australias-health/australias-health-2018/contents/burden-of-disease-scenario-modelling](http://www.aihw.gov.au/reports/australias-health/australias-health-2018/contents/burden-of-disease-scenario-modelling).

After taking into account the complex interactions between insufficient physical activity and overweight and obesity, an estimated 9.0% of the total disease burden in 2011 was due to these risk factors combined.

See Chapter 4.8 'Insufficient physical activity' for more information on physical activity.



## Alcohol and illicit drug use

Alcohol and illicit drug use contribute substantially to the health burden in Australia, both on their own as dependency disorders, and as risk factors for other diseases and injuries. They present many risks of immediate and chronic harm to the individual and their families, bystanders and the broader community. Immediate consequences include antisocial behaviour and exposure to violence (including domestic and family violence), traffic accidents, injury, poisoning, crime and trauma (Department of Health 2017; Laslett et al. 2011; NHMRC 2009; Stafford & Burns 2015). Chronic harms include chronic health conditions that may result from alcohol or illicit drug use, such as cardiovascular disease, cancer, mental health problems and dependency disorders (AIHW 2016c). The broader societal and economic impacts—such as antisocial behaviour, crime, productivity losses, costs associated with health care and law enforcement, and harm to families and communities—are not measured in the Australian Burden of Disease Study.

Alcohol and illicit drug use were the two leading risk factors for disease burden in males aged 15–44 in 2011 (AIHW 2016a).

Together, alcohol and illicit drug use were responsible for 6.7% of the total disease burden in Australia in 2011, of which three-quarters was experienced by males. Alcohol and illicit drug use were responsible for 4.5% (6,660) of deaths and a higher proportion of years of life lost (8.1%) due to the relatively young age at which these deaths occurred. These estimates are based on analysis of the combined impact of both risk factors, adjusted for the interaction between them.

### Alcohol use

Alcohol use was linked to 26 diseases or injuries (which included alcohol use disorders): 11 types of injury (including suicide and self-inflicted injuries, road traffic injuries—motor vehicle occupants, homicide and violence, and accidental poisoning), 6 types of cancer (including liver, breast, and mouth and pharyngeal cancer), 4 cardiovascular diseases (including stroke, coronary heart disease and hypertensive heart disease), alcohol dependence, chronic liver disease, epilepsy, lower respiratory infections, and pancreatitis.

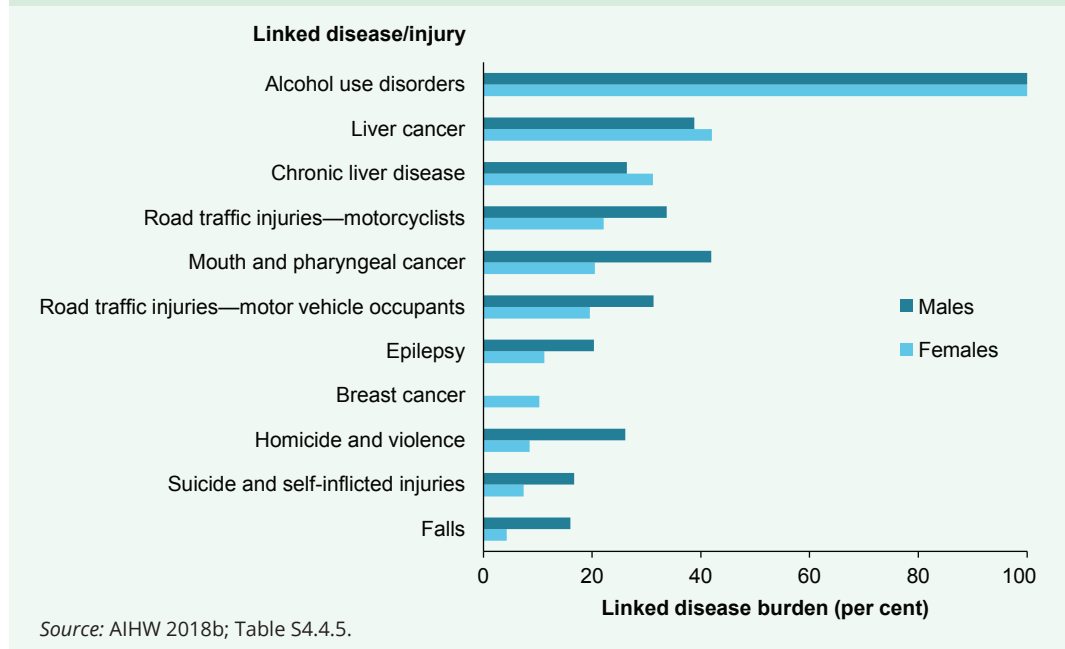
Alcohol use was responsible for 4.6% of the total disease burden in Australia in 2011, of which three-quarters (73%) was experienced by males. Around 59% of the burden attributable to alcohol use was due to fatal outcomes; however, this varied by age, sex and linked disease.

Alcohol use was responsible for 100% of the burden due to alcohol dependence, 37% of the mouth and pharyngeal cancer burden, between 30% and 35% of the burden due to different types of road traffic injuries, and 23% of the homicide and violence burden (Figure 4.4.5).





Figure 4.4.5: Proportion of linked disease burden (DALYs) due to alcohol use for people aged 15 and over, by sex and selected linked diseases or injuries, 2011



The lower the socioeconomic area, the higher the rate of burden attributable to alcohol use. The lowest socioeconomic area experienced rates of burden attributable to alcohol use that were 1.9 times those of the highest socioeconomic area.

There was also a clear pattern of increasing attributable burden with increasing remoteness, with *Very remote* areas experiencing 2.4 times the rate of burden attributable to alcohol use as *Major cities* (AIHW 2018b).

### Illicit drug use

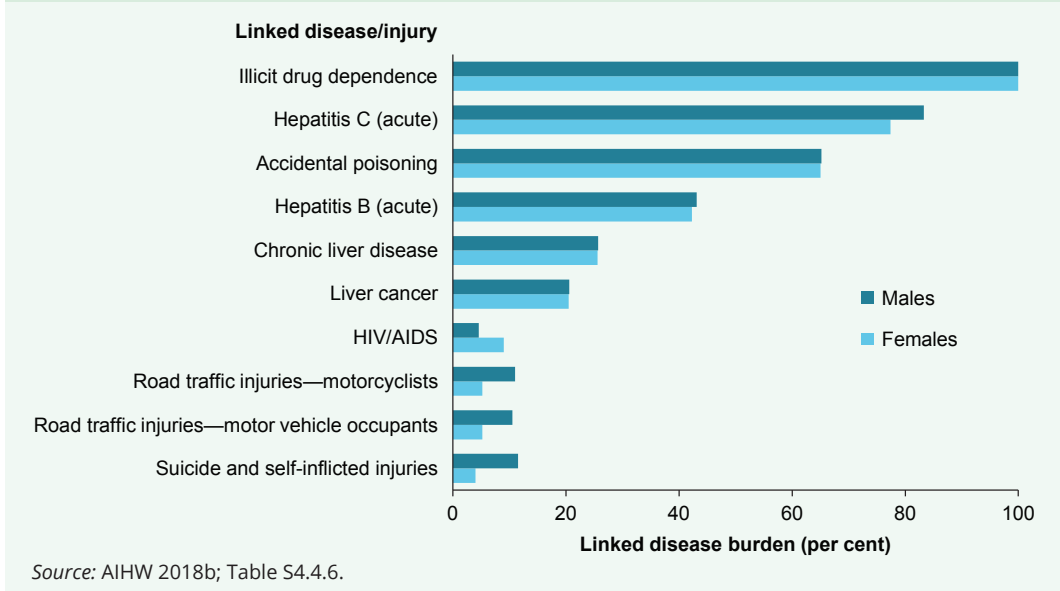
Illicit drug use—which includes opioids (such as heroin and prescription opioids), amphetamines, cannabis, cocaine and other illicit drugs, as well as unsafe injecting practices—was linked to 13 diseases and injuries: drug use disorders, chronic liver disease, hepatitis B, hepatitis C, liver cancer, suicide and self-inflicted injury, human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS), accidental poisoning, road traffic injuries—motorcyclists, road traffic injuries—motor vehicle occupants, depressive disorders, schizophrenia, and anxiety disorders.

Overall, illicit drug use was responsible for 2.3% of the total burden of disease and injury in Australia in 2011, of which three-quarters (75%) was experienced by males. More than two-thirds (69%) of the burden attributable to illicit drug use was due to fatal burden; however, this varied by age, sex and linked disease.

Illicit drug use was responsible for 65% of the accidental poisoning burden. For other linked diseases, illicit drug use was responsible for 42% of hepatitis B burden, 26% of chronic liver disease burden, and 21% of liver cancer burden (Figure 4.4.6).



Figure 4.4.6: Proportion of linked disease burden (DALYs) due to illicit drug use for people aged 15 and over, by sex and selected linked diseases or injuries, 2011



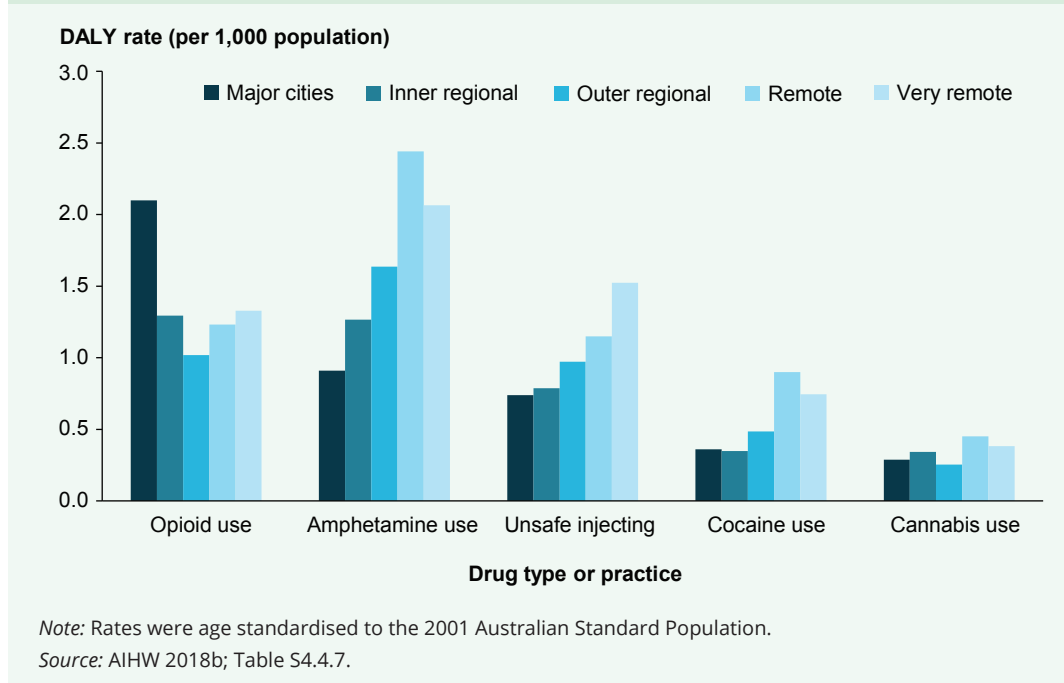
The majority of the burden due to illicit drug use was from opioid use (41%), followed by amphetamine use (18%). As well, 18% was from diseases contracted through unsafe injecting practices. Cocaine use and cannabis use accounted for a further 8.0% and 6.6%, respectively.

Opioid use was responsible for around half (52%) of the total disease burden due to accidental poisoning. Amphetamine use was responsible for around 7.5% of the total burden of road traffic injuries. One-quarter (26%) of the burden of chronic liver disease and one-fifth (21%) of liver cancer disease burden was a result of unsafe injecting practices.

There was a clear pattern of increasing attributable burden due to illicit drug use with decreasing socioeconomic area. The lowest socioeconomic area experienced rates of burden attributable to illicit drug use that were 2.6 times those of the highest socioeconomic area.

There was a general pattern of increasing attributable burden with increasing remoteness, for amphetamine use, unsafe injecting practices and cocaine use. For cannabis use, there was no clear pattern by remoteness in rates of attributable burden (Figure 4.4.7). For opioid use, the rate in *Major cities* was 1.6 to 2 times as high as those for other remoteness areas.

Figure 4.4.7: Age-standardised DALY rate due to drug use for people aged 15 and over, by drug type or practice and remoteness area, 2011



See Chapter 3.17 'Opioid harm'; chapters 4.6 'Alcohol risk and harm', 4.7 'Illicit drug use' for more information on alcohol and drug use in Australia.

## Intimate partner violence

Intimate partner violence is an important public health issue that can have substantial social, economic and health impacts (AIHW 2018a). Around 1 in 4 (23%) women experienced violence by an intimate partner in 2016, compared with 1 in 13 (7.8%) men (ABS 2017). The seriousness of this issue prompted the development of The National Plan to Reduce Violence against Women and their Children 2010–2022. The Plan aims to ensure that fewer women experience violence and that more women and children can live safely (COAG 2011).

Intimate partner violence was associated with 7 diseases or injuries: depressive disorders, anxiety, early pregnancy loss, suicide and self-inflicted injuries, homicide and violence, alcohol use disorders, and preterm birth and low birthweight complications (AIHW 2016a).

An estimated 1.4% of the total disease burden in 2011 was attributable to physical/sexual intimate partner violence by the current or previous cohabiting partner of women aged 18 and over. This increased to 2.0% when intimate partner violence by non-cohabiting partners was included (Ayre et al. 2016).

Anxiety disorders made up the greatest proportion of this attributable burden (37%), followed by depressive disorders (33%) and suicide and self-inflicted injuries (20%).

See Chapter 3.16 'Family, domestic and sexual violence' for more information on intimate partner violence in Australia.



## Diabetes and chronic kidney disease as risk factors for other diseases

Diseases such as diabetes and CKD are increasingly common in Australia, in part due to changing lifestyle and behaviour, and an ageing population. These and other diseases can also act as risk factors for other diseases (referred to as linked diseases, see Box 4.4.1). For example, diabetes can increase the risk of coronary heart disease, stroke, peripheral vascular disease and dementia (Cheng et al. 2014; Emerging Risk Factors Collaboration 2010; Prince et al. 2014; Vigneri et al. 2009).

The burden of each disease, as calculated in the ABDS 2011, captured the 'direct' disease burden. For example, the direct burden of diabetes is the burden most closely related to diabetes, such as diagnosed diabetes, diabetic neuropathy and retinopathy. To fully account for the health loss attributable to diabetes, the 'indirect' or additional burden from diseases linked to diabetes must also be calculated. This includes the proportion of burden of linked diseases caused by other diabetes complications (for example, coronary heart disease and stroke). To estimate the collective burden, the direct and indirect burden are added.

This section focuses on diabetes and CKD as risk factors for other diseases, as they are increasingly common in Australia and have major impacts on health and other support services.

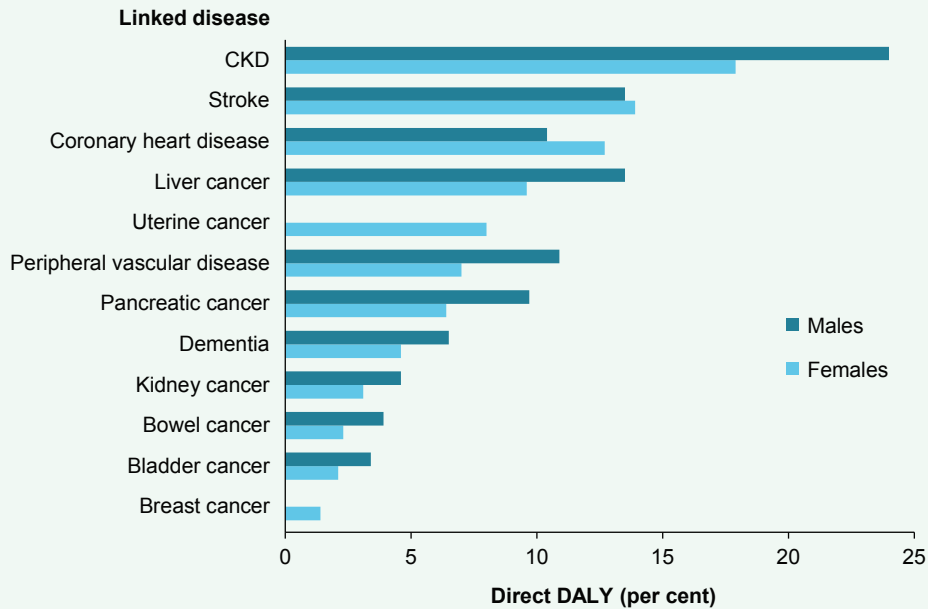
The ABDS 2011 reported that diabetes and CKD were responsible for 2.3% and 0.9%, respectively, of the total burden of disease and injury in Australia in 2011 (the direct burden). When the indirect burden due to linked diseases was taken into account, the burden due to either diabetes or CKD doubled (the collective burden) (4.2% for diabetes and 2.0% for CKD).

Diabetes was responsible for 21% of the CKD burden, 14% of the stroke burden and 11% of the coronary heart disease burden (Figure 4.4.8). Males had a larger proportion of disease burden attributable to diabetes for all linked diseases, except coronary heart disease and stroke.





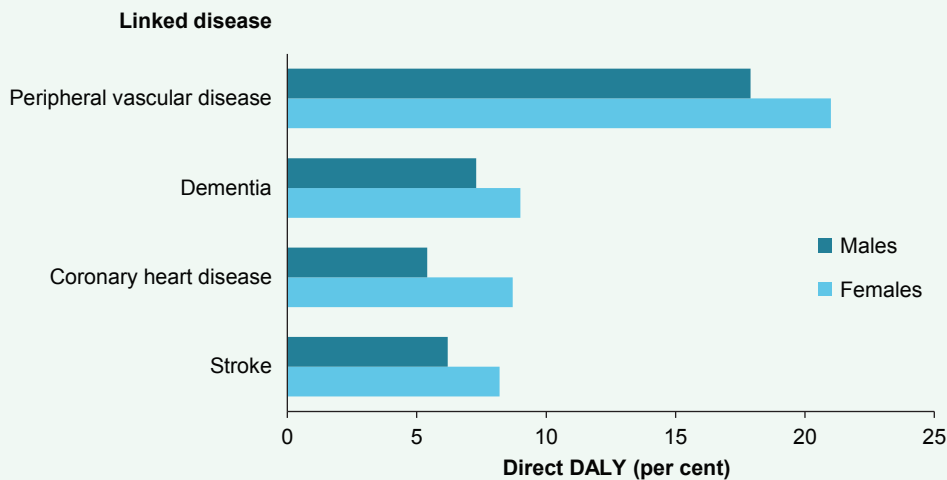
Figure 4.4.8: Proportion of burden (DALYs) attributable to diabetes, by sex and linked disease, 2011



Source: AIHW 2016d; Table S4.4.8.

CKD was responsible for 19% of peripheral vascular disease burden, 8.4% of dementia burden and 7.2% of stroke burden (Figure 4.4.9). A larger proportion of disease burden was attributable to CKD in females in every linked disease.

Figure 4.4.9: Proportion of burden (DALYs) attributable to CKD, by sex and linked disease, 2011



Source: AIHW 2016d; Table S4.4.9.



Scenario modelling analysis showed that, in 2020, around one-fifth (21%) of future diabetes burden, and 4.8% of future CKD burden could be avoided if the current rise in these diseases were halted (AIHW 2016d).

See chapters 3.8 'Diabetes', 3.9 'Chronic kidney disease' for more information on diabetes and CKD in Australia.

## What is the AIHW doing?

The AIHW is currently updating Australia's burden of disease estimates to the 2015 reference year; results are expected to be released in early 2019. This will include updated information on the burden due to different diseases and risk factors in Australia, such as those described in this article. As part of this work, the AIHW will be including disease expenditure estimates to align with burden of disease categories, to enable health system expenditure and corresponding disease burden to be compared.

## What is missing from the picture?

While the studies described here add important information about the contribution of certain risk factors to the burden of disease in the Australian population, there are still gaps which, if filled, could improve current insights. For instance, the burden of risk factors such as insufficient physical activity and alcohol and illicit drugs could not be estimated in children due to a lack of evidence on their association with diseases in younger ages. The full impact that overweight and obesity in children has on disease burden in adulthood is also currently unknown.

## Where do I go for more information?

More information on the Australian Burden of Disease Study is available at <[www.aihw.gov.au/reports-statistics/health-conditions-disability-deaths/burden-of-disease/overview](http://www.aihw.gov.au/reports-statistics/health-conditions-disability-deaths/burden-of-disease/overview)>. The report *Australian Burden of Disease Study: impact and causes of illness and death in Australia 2011* and other recent releases are available for free download.

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