



Australian Government

Australian Institute of  
Health and Welfare

AIHW



# Heart, stroke and vascular disease: Australian Facts

Web report

Cat. no: CVD 92

Updated: 29 September 2021

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# Heart, stroke and vascular disease—Australian facts

Web report | Last updated: 29 Sep 2021 | Topic: [Heart, stroke & vascular diseases](#) | [Media release](#) |

## Citation


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## Latest edition

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## About

*Heart, stroke and vascular disease: Australian facts* provides key information for monitoring cardiovascular disease (CVD) in the Australian population, focussing on cardiovascular risk factors, major subtypes, treatment and impact. Incidence, prevalence, hospitalisation and mortality are described for each disease, with additional analysis of priority population groups. An interactive data tool allows for further exploration of CVD hospitalisation and mortality data.

- [Cat. no: CVD 92](#)
- [Explore the data](#)
- [Stories from the heart](#)
- [Data tables](#)
- **Findings from this report:**
  - [58,700 acute coronary events \(heart attack or unstable angina\) among people aged 25 and over—around 161 every day](#)
  - [591,000 hospitalisations with CVD as principal diagnosis in 2018-19 \(5.2% of all hospitalisations\)](#)
  - [CVD was the underlying cause of 42,300 deaths \(25% of all deaths\) in 2019](#)

[6.2% of adults \(1.2 million\) had 1 or more conditions related to heart, stroke or vascular disease in 2017-18](#)

### In this report:

#### Risk factors

Explore the risk factors that increase the risk of a person developing heart, stroke and vascular disease.

- [Smoking](#)
- [High blood pressure](#)
- [Abnormal blood lipids](#)
- [Diabetes](#)
- [Overweight and obesity](#)
- [People with heart, stroke and vascular disease](#)
- [Multiple risk factors](#)
- [Absolute cardiovascular risk](#)

#### Heart, stroke and vascular disease and subtypes

Explore heart, stroke and vascular disease and its subtypes.

- [Total heart, stroke and vascular disease](#)
- [Coronary heart disease](#)
- [Stroke](#)
- [Heart failure and cardiomyopathy](#)
- [Atrial fibrillation](#)
- [Peripheral arterial disease](#)
- [Acute rheumatic fever and rheumatic heart disease](#)
- [Congenital heart disease](#)

#### Comorbidity of heart, stroke and vascular disease

- [Comorbidity of heart, stroke and vascular disease](#)

#### Treatment and management

Explore the treatment and management of heart, stroke and vascular disease.

- [Primary health care](#)
- [Medicines for cardiovascular disease](#)
- [Emergency department presentations](#)
- [Hospital care and procedures](#)
- [Rehabilitation](#)
- [Safety and quality of care](#)

#### Impacts

Explore the impact of heart, stroke and vascular disease on the Australian population.

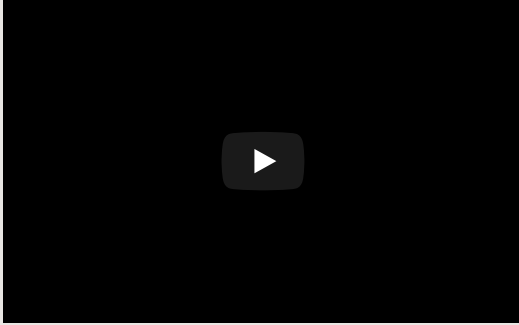
- [Burden of cardiovascular disease](#)
- [Expenditure on cardiovascular disease](#)



## Stories from the heart

### Kylie's story

*'I always thought that the typical candidate was someone who smoked, sported a beer belly, and had high blood pressure. I was a fit, young, non-smoking woman in my forties. A heart attack couldn't happen to me - right?'*



Kylie survived a heart attack and said cardiac rehab was a turning point in her recovery.

**Kylie's one piece of advice:** *'See your doctor and find out about your heart disease risk factors. Do it for the ones you love.'*

### Cyril's story

*'I always say, "you're the CEO in charge of your own body", you need to take control. Cardiac rehab provided me with the structure to get back to the activities I used to do.'*

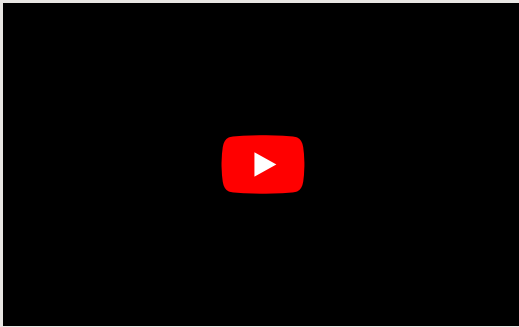


Cyril survived a heart attack and said cardiac rehab changed his life.

**Cyril's one piece of advice:** *'I feel cardiac rehab changed my life. It's the best investment you could make - for yourself and your family.'*

## Warrawatja's story


*'My attitude at that time was that while I was training, I could eat whatever I wanted. Ice cream. Junk food. I was burning it all up, so what did it matter? I knew for some time that I had high cholesterol, but I didn't really heed the warnings I was given and thought because I was fit, I'd be fine'*



Warrawatja is a proud Wiradjuri/Wonnarua man who at age 48, had a heart attack while training for a boxing match.

**Warrawatja's one piece of advice:** *'Take cholesterol tests seriously. I probably had high cholesterol for some time but thought because I was fit that they didn't really matter. But they're a matter of life and death.'*

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## Risk factors

### 57% of adults

had 3 or more key modifiable cardiovascular risk factors in 2014-18

### An estimated 34% of adults

had high blood pressure in 2017-18

### 16% of adults

with heart, stroke and vascular disease also had diabetes

### What is a risk factor?

Risk factors are attributes, characteristics or exposures that increase the likelihood of a person developing a disease or health disorder.

**Behavioural risk factors** are health-related behaviours that individuals have the most ability to modify. Behavioural risk factors for cardiovascular disease (CVD) include:

- smoking
- poor diet
- insufficient physical activity
- alcohol consumption.

**Biomedical risk factors** are bodily states that have an impact on a person's risk of disease. Some biomedical risk factors can be influenced by health behaviours. Others, such as type 1 diabetes, occur independently of behaviours. Biomedical risk factors for CVD include:

- high blood pressure (also known as hypertension)
- abnormal blood lipids, including raised cholesterol
- diabetes
- overweight and obesity.

There are other risk factors. Both age and sex can increase the risk of developing certain types of CVD, as can family history—through inherited genes or through sharing an environment of risky health behaviours. A large body of research shows that mental health is closely associated with CVD, with suggestions that each may have a role in causing the other (De Hert et al. 2018, Chaddha et al. 2016). These effects can arise both directly, through biological pathways, and indirectly, through health behaviors.

For most risk factors there is no known threshold at which risk begins. The relationship between risk and disease is continuous—there is an increasing effect as exposure to the risk factor increases. Having multiple risk factors further escalates risk.

Many chronic diseases, including CVD, share behavioural and biomedical risk factors. Modifying these risk factors can reduce an individual's risk of developing CVD prematurely and result in large health gains by reducing illness and rates of death.

This section presents statistics on 5 key modifiable risk factors that increase the risk of a person developing CVD—smoking, high blood pressure, abnormal blood lipids and diabetes and overweight and obesity.

The selection focusses on risk factors that are used to calculate absolute cardiovascular risk—an integrated approach that estimates the likelihood of an individual having a serious cardiovascular event, such as a heart attack or stroke, in the next 5 years.

### Warrawatja's story

*'My attitude at that time was that while I was training, I could eat whatever I wanted. Ice cream. Junk food. I was burning it all up, so what did it matter? I knew for some time that I had high cholesterol, but I didn't really heed the warnings I was given and thought because I was fit, I'd be fine.'*

Warrawatja is a proud Wiradjuri/Wonnarua man who at age 48, had a heart attack while training for a boxing match.

[Learn more about Warrawatja's heart story](#)



## View the risk factors of heart, stroke and vascular disease:

- [Smoking](#)
- [High blood pressure](#)
- [Abnormal blood lipids](#)
- [Diabetes](#)
- [Overweight and obesity](#)
- [People with heart, stroke and vascular disease](#)
- [Multiple risk factors](#)
- [Absolute cardiovascular risk](#)

## Further information

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For more information on these and other CVD risk factors, see:

- [Smoking](#)
- [High blood pressure](#)
- [Diabetes](#)
- [Overweight and obesity: an interactive insight](#)
- [Insufficient physical activity](#)
- [Poor diet](#)
- [Alcohol](#)
- [Health risk factors among Indigenous Australians](#)
- [Australian Burden of Disease Study 2015: Interactive data on risk factor burden](#)

Visit [Risk factors](#) for more information on this topic

## References

Chaddha A, Robinson EA, Kline-Rogers E, Alexandris-Souphis T, Rubenfire M 2016. Mental health and cardiovascular disease. *American Journal of Medicine* 129:1145-8.

De Hert M, Detraux J, Vancampfort D 2018. The intriguing relationship between coronary heart disease and mental disorders. *Dialogues in Clinical Neuroscience* 20: 31-40.

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## Smoking

**Tobacco smoking** is the leading cause of preventable disease and death in Australia today (AIHW 2019). Over one third of CVD deaths and one quarter of acute coronary syndrome hospitalisations in Australia for people aged less than 65 have been attributed to smoking (Banks et al. 2019).

Smoking increases the risk of coronary heart disease by raising blood pressure, decreasing physical activity tolerance and lowering blood levels of HDL ('good') cholesterol. As tobacco smoke is absorbed into the bloodstream, it damages blood vessels, increases the risk of plaques and clots, and reduces blood oxygen levels.

Giving up smoking is associated with greatly improved cardiovascular function, improved quality of life and reduced risk of cardiovascular morbidity and mortality.

While there have been reductions in smoking over the past 40 years, largely attributable to public health strategies (OECD 2019), the proportion of people continuing to smoke is still concerning, particularly in some population groups.

In 2019, based on results from the National Drug Strategy Household Survey:

- 11.0% of people aged 14 and over smoked daily (males 12.2%, females 9.9%) (AIHW 2020)
- men aged 40-49 had the highest proportion of current daily smokers (18.4%), while the highest proportion among women were aged 50-59 (15.2%) after adjusting for different population age structures over time, the proportion of males aged 14 and over who smoked daily fell from 20.9% in 2001 to 12.2% in 2019, and females from 17.9% in 2001 to 9.9% in 2019
- daily smoking rates among males aged 15-24 fell from 20.7% in 2001 to 8.5% in 2019, and among females aged 15-24 from 20.4% in 2001 to 6.4% in 2019.

CVD mortality has been estimated to be almost 3 times as high in current smokers than never-smokers. Quitting smoking by age 45 avoids almost all of the excess risk of CVD (Banks et al. 2019).



## Risk factors

Figure 1: Tobacco smoking status, people aged 14 and over, 2001 to 2019

The data visualisation shows the proportion of people smoking, by sex and smoking status between 2001 and 2019. Daily smokers fell from 19.4% in 2001 to 11.0% in 2019.

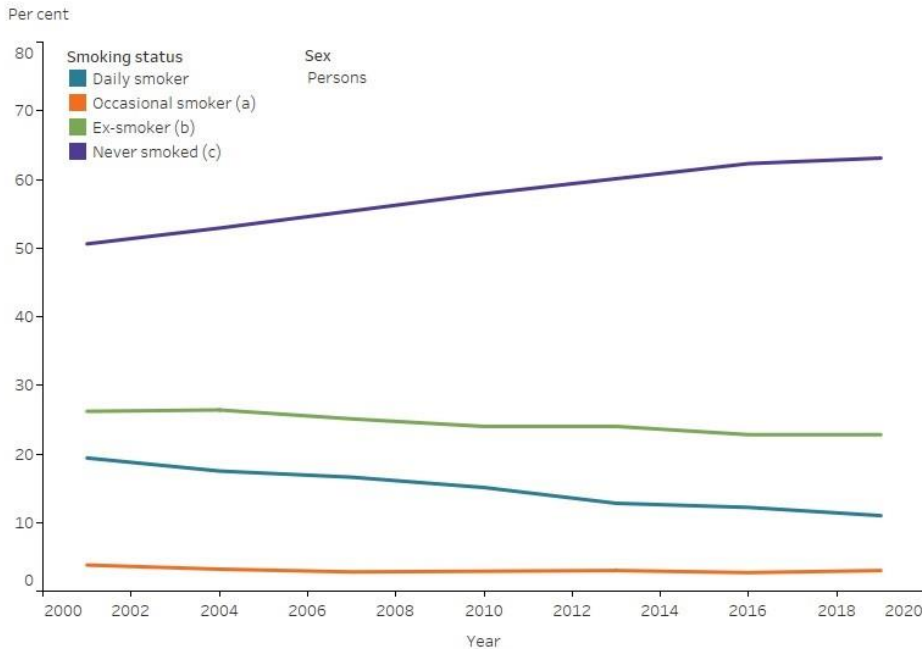


Figure 1: Tobacco smoking status, people aged 14 and over, 2001 to 2019

(a) Includes people who reported smoking weekly or less than weekly.

(b) Smoked at least 100 cigarettes (manufactured and/or roll-your-own) or the equivalent amount of tobacco in their life, and reported no longer smoking.

(c) Never smoked 100 cigarettes (manufactured and/or roll-your-own) or the equivalent amount of tobacco.

Note: Smoking status in 2010 has been revised. Trend data may not match previously published results.

Chart: AIHW. Source: AIHW 2020. Alcohol, tobacco & other drugs in Australia. Cat. no. PHE 221. Canberra AIHW.  
<http://www.aihw.gov.au>

## Population groups

After adjusting for different population age structures:

- 19.6% of people aged 14 and over living in *Remote/very remote* areas smoked daily in 2019, compared to 9.7% in *Major cities* (AIHW 2020)
- 18.1% of persons aged 14 and over living in the lowest socioeconomic areas smoked daily in 2019, compared with 5.0% living in the highest socioeconomic areas
- 38.4% of Indigenous people aged 15 and over smoked daily in 2018-19, compared to 13.0% of non-Indigenous people in 2017-18 (AIHW & NIAA 2020)

## References

AIHW 2019. Australian Burden of Disease Study: impact and causes of illness and death in Australia 2015. Cat. no. BOD 22. Canberra: AIHW.

AIHW 2020. Alcohol, tobacco & other drugs in Australia. Cat. no. PHE 221. Canberra AIHW.

AIHW & NIAA (National Indigenous Australians Agency) 2020. Aboriginal and Torres Strait Islander Health Performance Framework 2020 web report. Measure 2.15 Tobacco use. Canberra: AIHW.

Banks E, Joshy G, Korda RJ, Stavreski B, Soga K, Egger S, Day C et al. 2019. Tobacco smoking and risk of 36 cardiovascular disease subtypes: fatal and non-fatal outcomes in a large prospective Australian study. *BMC Medicine* 17(1):128. doi: 10.1186/s12916-019-1351-4.

OECD (Organisation for Economic Cooperation and Development) 2019. Health at a glance 2019: OECD indicators. Paris: OECD Publishing.

## High blood pressure

**Blood pressure** is the force exerted by blood on the walls of the arteries, depending on whether the heart muscle is contracting (systolic blood pressure), or relaxing between contractions (diastolic blood pressure). High blood pressure, also known as raised blood pressure or hypertension, is where blood pressure is permanently higher than normal.

The World Health Organization defines high blood pressure as any of the following:

- systolic blood pressure of 140 mmHg or more, or diastolic
- blood pressure of 90mmHg or more, or receiving medication
- for high blood pressure (Whitworth 2003).

Blood pressure is considered to be uncontrolled if measured levels of systolic or diastolic blood pressure are high, regardless of the use of blood pressure medication.

The risk of stroke, coronary heart disease, heart failure, peripheral arterial disease and many other forms of CVD is directly related to high levels of blood pressure.

Drug treatment and changes to health-related behaviours such as weight loss, a healthy diet and physical activity are effective in lowering blood pressure.

In 2017-18, based on measured data from the National Health Survey:

- an estimated 34% of adults had high blood pressure. This included 23% who had uncontrolled high blood pressure, and 11% whose blood pressure was controlled with medication (AIHW 2019) men were more likely to have uncontrolled high blood pressure than women (25% and 20%)
- the proportion of adults with uncontrolled high blood pressure increased with age—from 7.5% among 18-34 year-olds (10.2% men, 4.9% women) to a peak of 47% at age 85 and over (51% men, 48% women).

The proportion of Australian adults with high blood pressure has remained stable since 2011-12.

**Figure 1: Prevalence distribution of systolic and diastolic blood pressure measurements among adults, 2017-18**

The two line charts show the distribution of systolic and diastolic blood pressure levels by sex in 2017-18.

## Risk factors

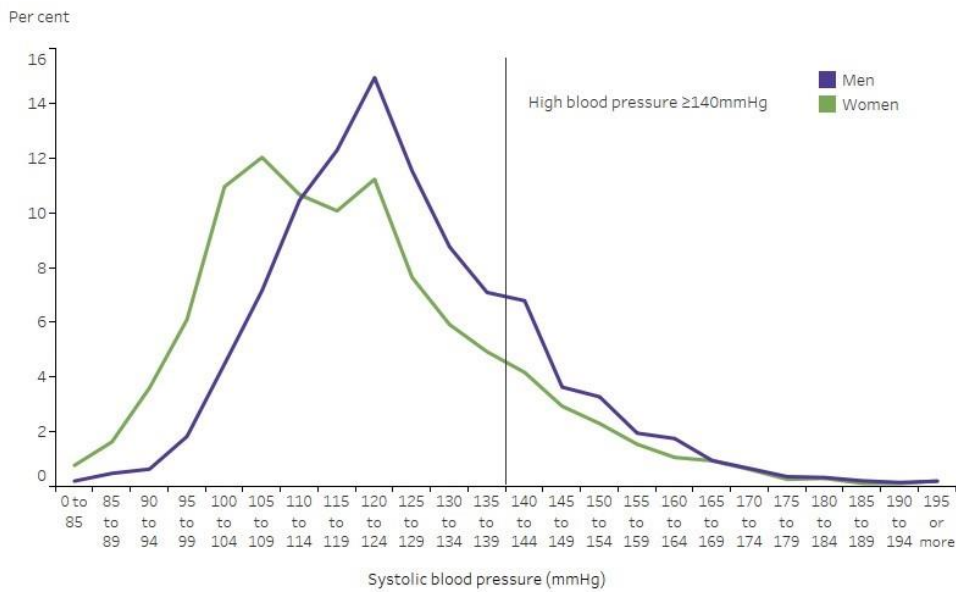


Figure 1: Prevalence distribution of systolic blood pressure measurements among adults, 2017-18

**Notes:**

1. Persons with measured high blood pressure regardless of whether they were taking high blood pressure medication. Measured high blood pressure excludes self-reported hypertension prevalence rates.
2. In 2017-18, 31.6% of respondents aged 18 years and over did not have their blood pressure measured. For these respondents, imputation was used to obtain blood pressure. For more information see Appendix 2: Physical measurements in the 2017-18 National Health Survey (ABS 2018a)
3. Measured high blood pressure excludes self-reported hypertension prevalence rates. In 2017-18, 31.6% of respondents aged 18 years and over did not have their blood pressure measured. For these respondents, imputation was used to obtain blood pressure. For more information see Appendix 2: Physical measurements in the National Health Survey.

Chart: AIHW. Source: ABS 2019. Microdata: National Health Survey 2017-18. AIHW analysis of Detailed Microdata. <http://www.aihw.gov.au>

## Population groups

After adjusting for different population age structures:

- the prevalence of uncontrolled high blood pressure was similar between remoteness areas in 2017-18—24% for *Outer regional and remote* areas, 22% for *Inner regional* areas, 22% for *Major cities* (AIHW 2019) uncontrolled high blood pressure was more common in the lowest socioeconomic areas (24%), compared with the highest socioeconomic areas (19%)
- Indigenous adults were more likely to have high blood pressure in 2018-19 than non-Indigenous adults (37% and 29%) (AIHW & NIAA 2020).

## References

AIHW 2019. [High blood pressure](#). Cat. no. PHE 250. Canberra: AIHW.

AIHW & NIAA (National Indigenous Australians Agency) 2020. [Aboriginal and Torres Strait Islander Health Performance Framework 2020 web report](#). Measure 1.07 High blood pressure. Canberra: AIHW.

Whitworth JA 2003. 2003 World Health Organization/International Society of Hypertension statement on management of hypertension. *Journal of Hypertension* 21:1983-92.

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## Abnormal blood lipids

**Abnormal levels of blood lipids**, such as cholesterol and triglycerides—known as dyslipidaemia—can contribute to the development of atherosclerosis, a build-up of fatty deposits in the blood vessels. This build-up increases the risk of a number of cardiovascular diseases, including coronary heart disease, stroke and peripheral arterial disease.

Blood tests are used to determine levels of the most commonly measured lipids. The standard blood tests include measurement of total cholesterol, low-density lipoprotein cholesterol (LDL, or 'bad' cholesterol), high-density lipoprotein cholesterol (HDL, or 'good' cholesterol), as well as triglycerides.

In the ABS 2011-12 Australian Health Survey, a person had dyslipidaemia if they had one or more of the following:

- total cholesterol  $\geq 5.5$  mmol/L
- LDL cholesterol  $\geq 3.5$  mmol/L
- HDL cholesterol  $< 1.0$  mmol/L for men, and  $< 1.3$  mmol/L for women
- triglycerides  $\geq 2.0$  mmol/L taking lipid-modifying medication (ABS 2013).

For most people, saturated fat in the diet is the most important factor associated with dyslipidaemia. Sufficient physical activity and a healthy diet help maintain normal blood cholesterol levels. People with dyslipidaemia may also be treated with lipid-modifying medicines such as statins.

In 2011-12, based on estimates from the most recent large-scale biomedical survey of the Australian population:

- 2 in 3 Australian adults (63%, or 8.5 million) had abnormal blood lipid levels. This included 57% with uncontrolled abnormal blood lipids and 6.6% with normal blood lipid levels who were taking lipid-modifying medication (AIHW 2015)
- 33% of adults had raised levels of LDL (bad) cholesterol, 23% had low levels of HDL (good) cholesterol and 14% had raised levels of triglycerides. One-in-3 Australian adults (33%) had a total cholesterol level that was considered high (Figure 1) men (64%, or 4.2 million) and women (63%, or 4.3 million) had similar levels of dyslipidaemia in 2011-12 the proportion of adults with dyslipidaemia increased with age—from 34% among 18-24 year olds (31% men, 36% women) to a peak of 81% at age 65-74 (78% men, 84% women).

**Figure 1: Total blood cholesterol, persons aged 18 and over, by sex, 2011-12**

The line chart shows the distribution of total blood cholesterol levels in 2011-12, peaking at around 4.5 mmol/L for both men and women.



## Risk factors

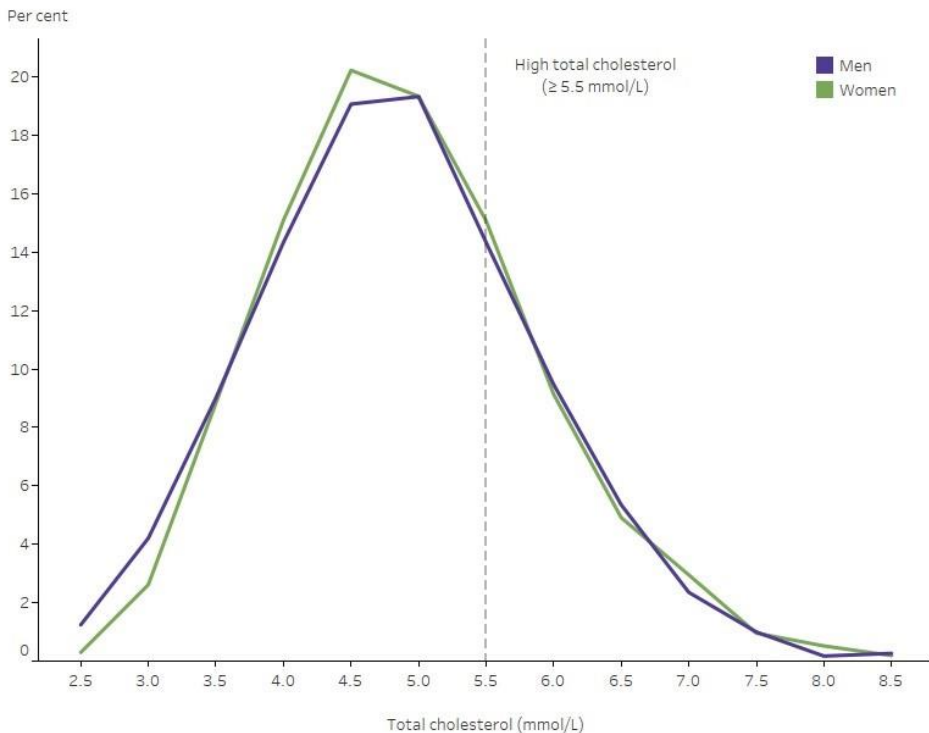


Figure 1: Total blood cholesterol, persons aged 18 and over, by sex, 2011-12

Note: Excludes persons who did not participate in a blood test.

Chart: AIHW. Source: AIHW 2015. Cardiovascular disease, diabetes and chronic kidney disease - Australian facts: Risk factors. Cat. no. CDK 4. Canberra: AIHW.  
<http://www.aihw.gov.au>

### Population groups

- There were no statistically significant differences in the proportion of adults with dyslipidaemia across remoteness areas in 2011-12—crude rates of 62% in *Major cities*, 68% in *Inner regional* areas and 66% in *Outer regional and remote* areas.
- There were no statistically significant differences in the proportion of adults with dyslipidaemia across socioeconomic groups in 2011-12—crude rates of 67% of people living in the lowest socioeconomic areas, 61% in the highest socioeconomic areas.

### References

ABS 2013. Australian Health Survey: user's guide, 2011-13. ABS cat. no. 4363.0.55.001. Canberra: ABS.

AIHW 2015. Cardiovascular disease, diabetes and chronic kidney disease—Australian facts: Risk factors. Cat. no. CDK 4. Canberra: AIHW.

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## Diabetes

**Diabetes** is a chronic condition marked by high levels of glucose in the blood. It is caused by the inability of the body to produce or effectively use insulin, a hormone made by the pancreas to control blood glucose levels.

Type 2 diabetes is the most common form. It involves a genetic component, but is largely preventable, and can be managed with changes to diet and physical activity, and with medications.

Diabetes is an independent risk factor for developing many forms of heart disease (Baker Heart & Diabetes Institute 2018, AIHW 2016). Over time, high blood sugar levels from diabetes can damage blood vessels in the heart, making them more likely to develop fatty deposits. Diabetes and elevated blood glucose are associated with an approximate doubling of the risk of cardiovascular disease (IDF 2019).

Diabetes and cardiovascular disease (CVD) also share risk factors. Many of the complications from having diabetes come from damage to blood vessels as a result of high blood pressure, abnormal blood lipids, and smoking.

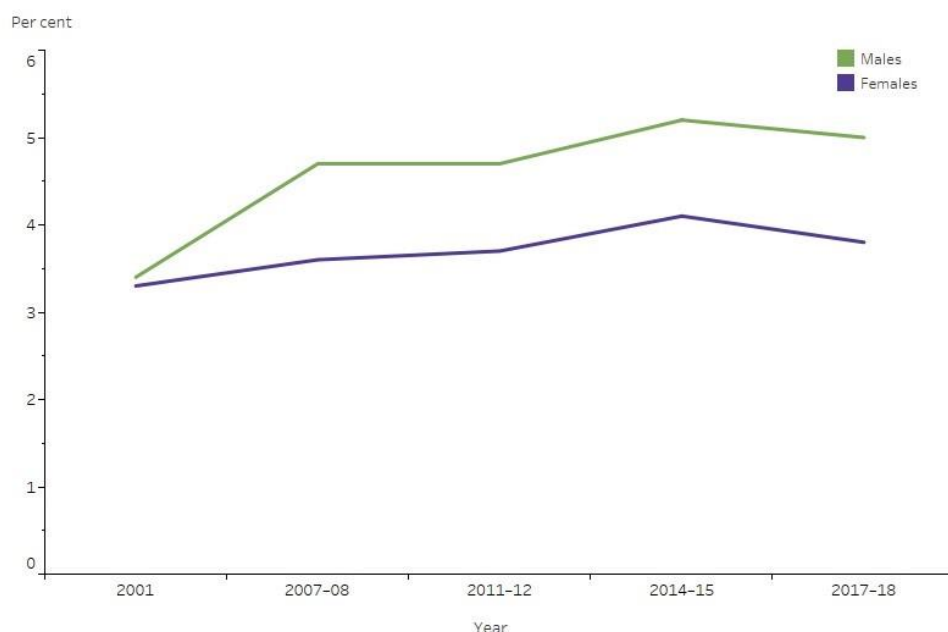
In 2017-18, based on self-reported data from the ABS 2017-18 National Health Survey:

- an estimated 1.2 million Australians (4.9% of the total population) had diabetes (AIHW 2020a). This includes people with type 1 diabetes, type 2 diabetes, and type unknown, but excludes gestational diabetes diabetes prevalence was higher for males (5.5%) than females
- (4.3%) prevalence increased with age, from 1.0% at age 0-44 to 18.6% at age 75 and over age-standardised prevalence increased from
- 3.3% in 2001 to 4.4% in 2017-18 an estimated 660,000 adults with self-reported diabetes also reported having CVD, corresponding to 57%
- of adults with diabetes (AIHW 2020b).

Information based on self-reported data underestimates prevalence as it does not include people with undiagnosed diabetes. The ABS 2011-12 Australian Health Survey, which included both measured and self-reported data, showed that for every 4 adults with diagnosed diabetes, there was 1 who was undiagnosed.

**Figure 1: Prevalence of self-reported diabetes, by sex, 2001 to 2017-18**

The line chart shows that self-reported diabetes increased from 3.4% in 2001 to 5.0% in 2017-18 for males, and from 3.3% to 3.8% for females.



**Figure 1: Prevalence of self-reported diabetes, by sex, 2001 to 2017-18**

**Notes:**

1. Confidence Interval = A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.
2. Respondent ever told by a doctor or a nurse that they had diabetes. Estimates include persons who reported they had diabetes but that it was not current at time of interview. Data for 2004-05 are not available using this definition.
3. Includes diabetes type 1, type 2 and type unknown but excludes gestational diabetes.
4. Rates are age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Source: AIHW 2020a. Diabetes web-report. Cat. no. CVD 82. Canberra: AIHW.  
<http://www.aihw.gov.au>

## Population groups

After adjusting for different population age structures:

- the prevalence of self-reported diabetes in 2017-18 was similar across remoteness areas—4.3% in *Major cities*, 3.9% in *Inner regional* areas and 5.3% in *Outer regional and remote* areas (AIHW 2020a) prevalence varied by socioeconomic disadvantage, being twice as high
- for people living in the lowest socioeconomic areas (6.3%) as for people living in the highest socioeconomic areas (3.2%)
- 13% of Indigenous Australians aged 18 and over self-reported having diabetes or high blood/urine sugar levels (HSL) in 2018-19.
- Indigenous Australians were 2.8 times as likely to report having diabetes or HSL as non-Indigenous Australians (17% and 6.1%) (AIHW & NIAA 2020).

## References

AIHW 2016. Diabetes and chronic kidney disease as risks for other diseases: Australian Burden of Disease Study 2011. Cat. no. BOD 9. Canberra: AIHW.

AIHW 2020a. Diabetes web-report. Cat. no. CVD 82. Canberra: AIHW.

AIHW 2020b. Indicators for the Australian National Diabetes Strategy 2016-2020: data update. Cat. no. CVD 81. Canberra: AIHW.



## Risk factors

AIHW & NIAA (National Indigenous Australians Agency) 2020. [Aboriginal and Torres Strait Islander Health Performance Framework 2020 web report](#). Measure 1.09 Diabetes. Canberra: AIHW.

Baker Heart & Diabetes Institute 2018. The dark heart of type 2 diabetes. Melbourne: Baker Heart & Diabetes Institute.

IDF (International Diabetes Federation) 2019. IDF diabetes atlas, ninth edition 2019. Brussels: IDF.

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## Overweight and obesity

**Overweight and obesity** increase the risk of chronic diseases including heart attack and stroke, and are associated with increased morbidity and mortality. Excess body fat can contribute to the development of biomedical risk factors, raising levels of blood pressure and abnormal blood lipids, and increasing the risk of type 2 diabetes.

Overweight and obesity usually occur because of an imbalance between energy intake from the diet and energy expenditure through physical activities and bodily functions. This energy imbalance is influenced by a complex interplay of individual, environmental and societal determinants (AIHW 2017).

Adults with a body mass index (BMI) ( $\text{kg}/\text{m}^2$ ) of 25-29 are considered to be overweight but not obese, while a BMI of 30 or over is classified as obese. A separate classification of overweight and obesity based on age and sex is used for children and adolescents.

In 2017-18, based on measured data from the 2017-18 National Health Survey:

- an estimated 25% children and adolescents aged 2-17 were overweight or obese, with 17% overweight but not obese, and 8.2% obese. Rates varied across age groups, but were similar for males and females (AIHW 2020) an estimated 2 in 3 (67%) Australians aged 18 and over were overweight or obese (36% overweight but not obese, and 31% obese) men had higher rates of overweight and obesity than women (75% men, 60% women), and higher rates of obesity (33% men, 30% women) obesity is more common in older age groups—16% of adults aged 18-24 were obese, compared with 41% of adults aged 65-74.

After adjusting for different population age structures over time, the prevalence of overweight and obesity among Australians aged 18 and over increased from 57% in 1995 to 67% in 2017-18. This was largely due to an increase in obesity rates, from 19% in 1995 to 31% in 2017-18 (Figure 1).

### Figure 1: Distribution of BMI among persons aged 18 and over, 1995 and 2017-18

The line chart compares the distribution of body mass index in 1995 and 2017-18, and shows that a greater proportion were overweight or obese in 2017-18.

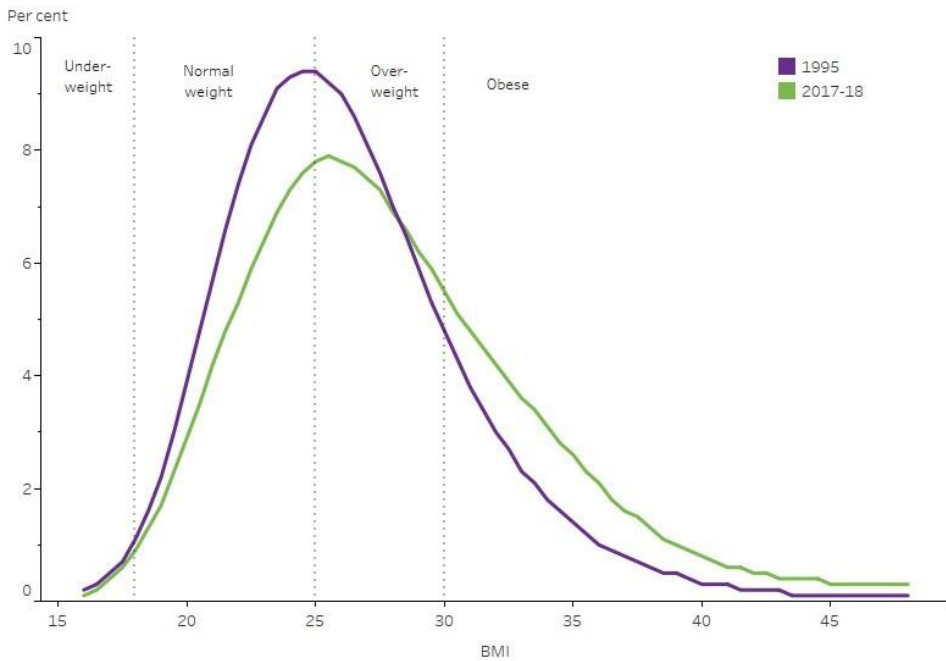


Figure 1: Distribution of BMI among persons aged 18 and over, 1995 and 2017-18

*Notes:*

1. The distributions have been smoothed, including the minimum and maximum values which are based on aggregates of 15 or less and 48 or more.
2. Overweight and obesity classification is based on measured height and weight.
3. In 2017-18, imputation was used to obtain BMI for respondents aged 18 and over who did not have a measured BMI (34% of respondents).

Chart: AIHW. Source: AIHW 2020. Overweight and obesity: an interactive insight. Cat. no. PHE251. Canberra: AIHW. <http://www.aihw.gov.au>

## Population groups

After adjusting for different population age structures:

- 70% of adults living in *Outer regional and remote* areas and 71% in *Inner regional* areas were overweight or obese in 2017-18, compared with 65% in *Major cities* (AIHW 2020) adults living in the lowest socioeconomic areas were more likely to be overweight or obese than those in the highest socioeconomic areas (72% and 62%)
- Indigenous Australians aged 15 and over were less likely than non-Indigenous Australians to be overweight (29% and 35%), but 1.5 times as likely to be obese (46% and 30%) (AIHW & NIAA 2020).

## References

AIHW 2017. [A picture of overweight and obesity in Australia](#). Cat. no. PHE 216. Canberra: AIHW.

AIHW 2020. [Overweight and obesity: an interactive insight](#). Cat. no. PHE 251. Canberra: AIHW.

AIHW & NIAA (National Indigenous Australians Agency) 2020. [Aboriginal and Torres Strait Islander Health Performance Framework 2020 web report](#). Measure 2.22 Overweight and obesity. Canberra: AIHW.

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## Risk factors

### People with heart, stroke and vascular disease

This section compares risk factor levels among people who report having heart, stroke and vascular disease and those who do not.

The populations with and without heart, stroke and vascular disease were obtained by pooling self-reported data on long-term health conditions from the ABS 2014-15 and 2017-18 National Health Surveys (ABS 2016, ABS 2019).

Adults who had heart, stroke or vascular disease in the 2014-15 and 2017-18 National Health Surveys had statistically significantly higher levels of current smoking, insufficient physical activity, high blood pressure and self-reported diabetes, than adults who did not have heart, stroke or vascular disease.

Higher levels of risk factors among people who have developed cardiovascular disease highlight the need for secondary prevention to limit increased severity or the occurrence of additional cardiovascular disease events.

### Behavioural risk factors

After adjusting for different population age structures,

- an estimated 23% of adults who had heart, stroke and vascular disease in the 2014-15 and 2017-18 National Health Surveys were current smokers, 1.5 times as high as the 16% of adults without heart, stroke and vascular disease who were current smokers (Figure 1)
- 90% of adults with heart, stroke and vascular disease were inactive or insufficiently active, 1.1 times as high as the 85% of adults without heart, stroke and vascular disease who were inactive or insufficiently active
- 96% of adults with heart, stroke and vascular disease did not consume an adequate amount of fruit and vegetables, similar to the 95% of adults without heart, stroke and vascular disease who did not consume an adequate amount of fruit and vegetables.

### Figure 1: Risk factors among adults with, and adults without heart, stroke and vascular disease

The horizontal bar chart shows that in 2014-18 adults with heart, stroke and vascular disease had higher levels of key risk factors than adults without. High blood pressure was 1.7 times as high among adults with heart, stroke and vascular disease.

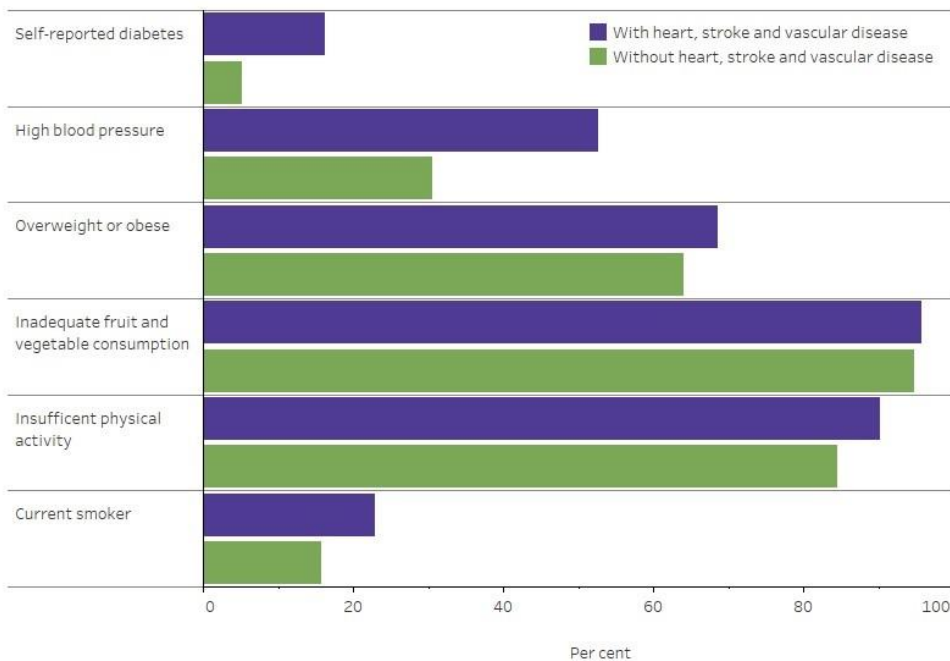


Figure 1: Risk factors among adults with, and adults without heart, stroke and vascular disease, 2014-2018

*Notes:*

1. Confidence Interval = A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.
2. Rates are age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Sources: ABS 2016 & ABS 2019. Microdata: National Health Survey, 2014-15 & 2017-18. AIHW analysis of Detailed Microdata. Viewed 19 February 2021.  
<http://www.aihw.gov.au>

### Biomedical risk factors

After adjusting for different population age structures:

- an estimated 69% of adults who had heart, stroke and vascular disease in the 2014-15 and 2017-18 National Health Surveys were overweight or obese, similar to the 64% of adults without heart, stroke and vascular disease who were overweight or obese
- 53% of adults with heart, stroke and vascular disease had high blood pressure, 1.7 times as high as the 31% of adults without heart, stroke and vascular disease who had high blood pressure
- 16% of adults with heart, stroke and vascular disease also had diabetes, more than 3 times as high as the 5.2% of adults without heart, stroke and vascular disease who had diabetes.

Blood lipid levels were not measured in the 2014-15 or 2017-18 National Health Surveys. However, results from the 2011-12 Australian Health Survey indicate that 78% of adults with CVD had dyslipidaemia, compared with 59% among those without CVD. Levels of uncontrolled dyslipidaemia were similar among those with CVD (60%) and those without CVD (56%). More than half (57%) of people with CVD aged 18-39 had dyslipidaemia, increasing to 82% for those aged 55 and over (AIHW 2015).


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## Risk factors

### Multiple risk factors

**Multiple risk factors** have an interactive or cumulative effect on disease risk. The more risk factors a person has, and the greater the degree of each risk factor, the higher the risk of developing cardiovascular disease, including coronary heart disease, stroke or angina (AIHW 2005, Poulter 1999).

The increased risk of cardiovascular disease associated with multiple risk factors presents an increased risk of poorer health outcomes, reduced life expectancy and death (Li et al. 2018, Berry et al. 2012).

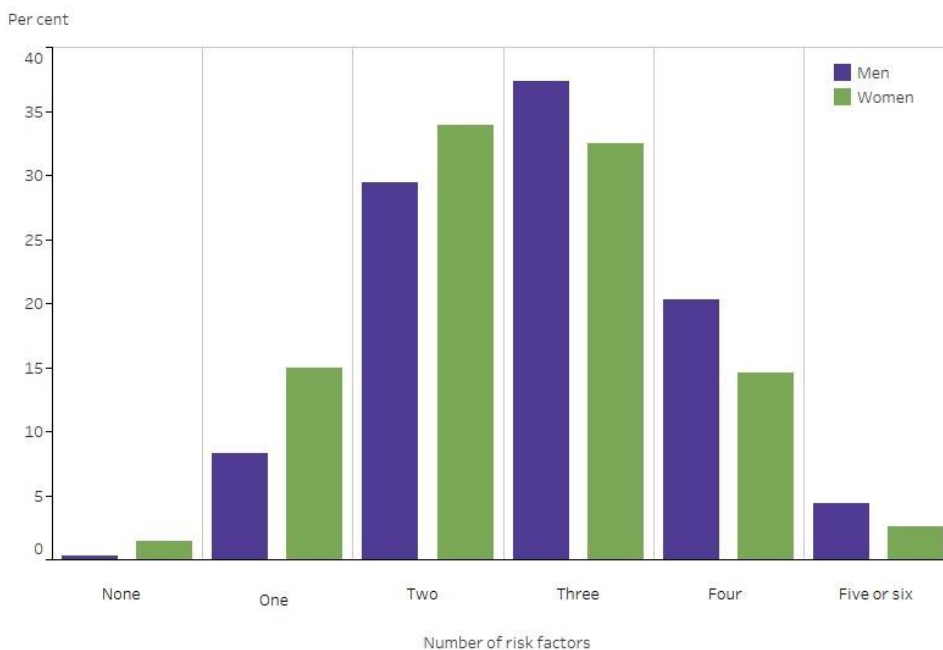
One recent study reported that men and women aged 50 who have a favourable lifestyle—overweight but not obese, light / moderate drinker, non-smoker and participating in vigorous physical activity—lived between 7 and 15 years longer than those with an unfavourable lifestyle (O’Doherty et al. 2016). Interventions that reduce levels of multiple risk factors have been shown to help prevent cardiovascular disease in high-risk groups (Ebrahim & Davey Smith 2000).

Based on pooled data from the ABS 2014-15 and 2017-18 National Health Surveys:

- almost all Australian adults (99%) had at least 1 of 6 selected cardiovascular risk factors—either inadequate fruit and vegetable consumption, insufficient physical activity, daily smoking, overweight or obese, uncontrolled high blood pressure or self-reported diabetes (AIHW analysis of ABS 2016 and ABS 2019)
- 1 in 3 adults (31%) had 2 of these risk factors in combination, while 57% had 3 or more risk factors in combination, including 3.6% who had 5 or 6 risk factors (Figure 1) men (62%) were more likely than women (50%) to have 3 or more risk factors in combination.

**Figure 1: Multiple risk factor prevalence, persons aged 18 years and over, by sex, 2014-2018**

The bar chart shows the distribution of number of risk factors in 2014-18, with men (62%) more likely than women (50%) to have high levels of 3 or more risk factors.



**Figure 1: Multiple risk factor prevalence, persons aged 18 years and over, by sex, 2014-2018**

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Risk factors include inadequate fruit and vegetable consumption, insufficient physical activity, daily smoking, overweight or obese, uncontrolled high blood pressure and self-reported diabetes.
3. Estimates based on self-reported data, except for high blood pressure, which was measured.

Chart: AIHW. Sources: ABS 2016 & ABS 2019. Microdata: National Health Survey, 2014-15 & 2017-18. AIHW analysis of Detailed Microdata. Viewed 5 May 2021.  
<http://www.aihw.gov.au>

### Multiple behavioural risk factors

Many adults who are overweight or obese are also insufficiently active and/or have inadequate fruit and vegetable consumption. Based on pooled data from the ABS 2014-15 and 2017-18 National Health Surveys:

- an estimated 7.7 million adults (42%) had all 3 of these risk factors (men 47%, women 37%) (Figure 2)—rising to 50% among adults who had heart, stroke and vascular disease.

**Figure 2: Selected risk factor prevalence, persons aged 18 and over, 2014-2018**

The Venn diagram shows the overlapping proportion of adults who were overweight/obese, insufficiently active or had inadequate fruit and vegetable consumption in 2014-18. An estimated 42% had all 3 risk factors.

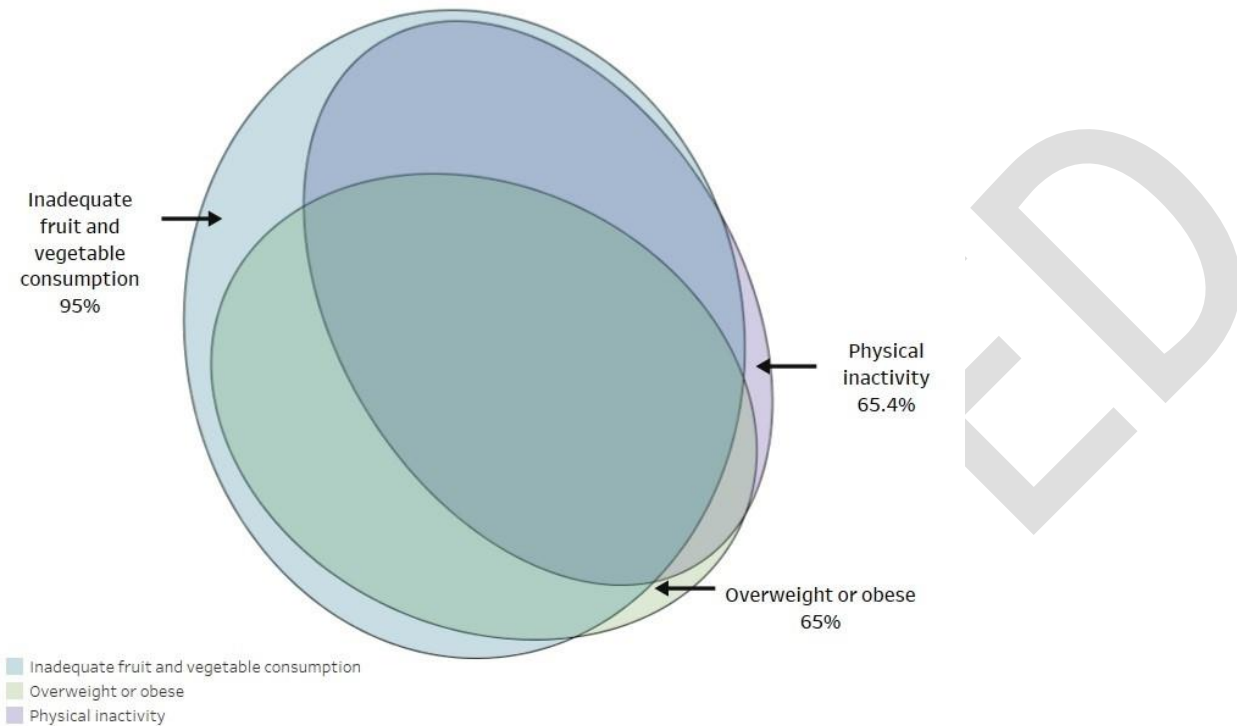


Figure 2: Selected risk factor prevalence, persons aged 18 and over, 2014-2018

Chart: AIHW. Source: ABS 2016 & ABS 2019. Microdata: National Health Survey, 2014-15 & 2017-18. AIHW analysis of Detailed Microdata. Viewed 5 May 2021. <http://www.aihw.gov.au>

## Multiple biomedical risk factors

Based on pooled data from the ABS 2014-15 and 2017-18 National Health Surveys:

- an estimated 2.9 million adults (16%) were overweight or obese, and had uncontrolled high blood pressure (men 18%, women 13%) 2.1%
- of adults were overweight or obese, had uncontrolled blood pressure and had diabetes (men 2.4%, women 1.8%)—rising to 4.8% among adults who had heart, stroke and vascular disease.

Blood lipid levels were not measured in the 2014-15 or 2017-18 National Health Surveys. An estimated 1-in-4 (25%) adult respondents to the 2011-12 Australian Health Survey had both high blood pressure and abnormal blood lipids. This includes people with measured high blood pressure and abnormal blood lipids, and those who took medication to control these conditions. The proportion increased with age, from 4.3% in people aged 18-34 to 65% in people aged 75 and over (AIHW analysis of ABS 2014; AIHW 2015).

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## Risk factors

### Absolute cardiovascular risk

**Absolute risk** is a term used to define the probability of a person developing a disease within a specified time period. Absolute cardiovascular risk is the chance of an individual developing cardiovascular disease (CVD), which includes all heart, stroke and blood vessel diseases (ACDPA 2020).

An absolute risk approach to disease uses data for multiple risk factors. Assessing CVD risk based on the combined effect of risk factors is more accurate than looking at risk factors in isolation—because of the cumulative or influencing effects of multiple factors—and allows for more tailored risk factor management for each person (NVDPA 2012, Nelson 2020).

The [Australian absolute CVD risk calculator](#) is a tool recommended by the Australian Chronic Disease Prevention Alliance for health professionals to measure individual cardiovascular risk.

Banks et al recently estimated that almost 20% of Australians aged 45-74 (1.4 million adults) were at high absolute risk of a future CVD event—such as heart attack, stroke, PVD or heart failure—over the next 5 years. A further 8.6% (625,000) were at moderate risk (Banks et al. 2016).

Of those at high absolute risk who already had CVD, many were not receiving recommended treatment. Less than half (44%) were receiving blood pressure- and lipid-lowering medication, 35% were receiving only one of these, and 20% were receiving neither.

### Absolute risk among Aboriginal and Torres Strait Islander people

Based on 2012-13 data, an estimated 16% of Indigenous people aged 35-74 (26,100 adults) were at high absolute risk of a future CVD event (Calabria et al. 2018). Many are undertreated—just over half (53%) of Indigenous people aged 35-74 at high absolute risk who already had CVD were receiving lipid-lowering therapy.

Nationally, as at June 2020, an estimated 34% of regular clients of Indigenous primary health care aged 35-74 with no known history of CVD who had a CVD risk assessment result recorded in the previous 2 years were assessed at high risk, with 5.9% at moderate risk and 60% at low risk (AIHW 2021).

The high risk in the Indigenous population is attributed to the greater prevalence of CVD risk factors than in the general Australian population, particularly of diabetes, dyslipidaemia, chronic kidney disease and smoking (Calabria et al. 2018). High absolute CVD risk was evident at younger ages among Indigenous people than among the general population. **References**

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# Heart, stroke and vascular disease and subtypes

## Total heart, stroke and vascular disease

On this page

- [How many Australians have heart, stroke and vascular disease?](#)
- [Hospitalisations](#)
- [Deaths](#)

### How many Australians have heart, stroke and vascular disease?



An estimated 1.2 million Australians aged 18 and over (6.2% of the adult population) had 1 or more conditions related to heart, stroke or vascular disease, based on self-reported data from the ABS 2017-18 National Health Survey.

#### Age and sex

In 2017-18, based on self-reported data, the prevalence of heart, stroke and vascular disease among adults:

- was higher among men (641,000, an age-standardised rate of 6.5%) than women (509,000, an age-standardised rate of 4.8%) increased
- with age—more than 1 in 4 (26%) of persons aged 75 and over had heart, stroke and vascular disease (Figure 1).

**Figure 1: Prevalence of self-reported heart, stroke and vascular disease among persons aged 18 and over, by age and sex, 2017-18.**

The bar chart shows the prevalence of self-reported heart, stroke and vascular disease by age group in 2017-18. Rates were highest among men and women aged 75 and over (32% and 20%).

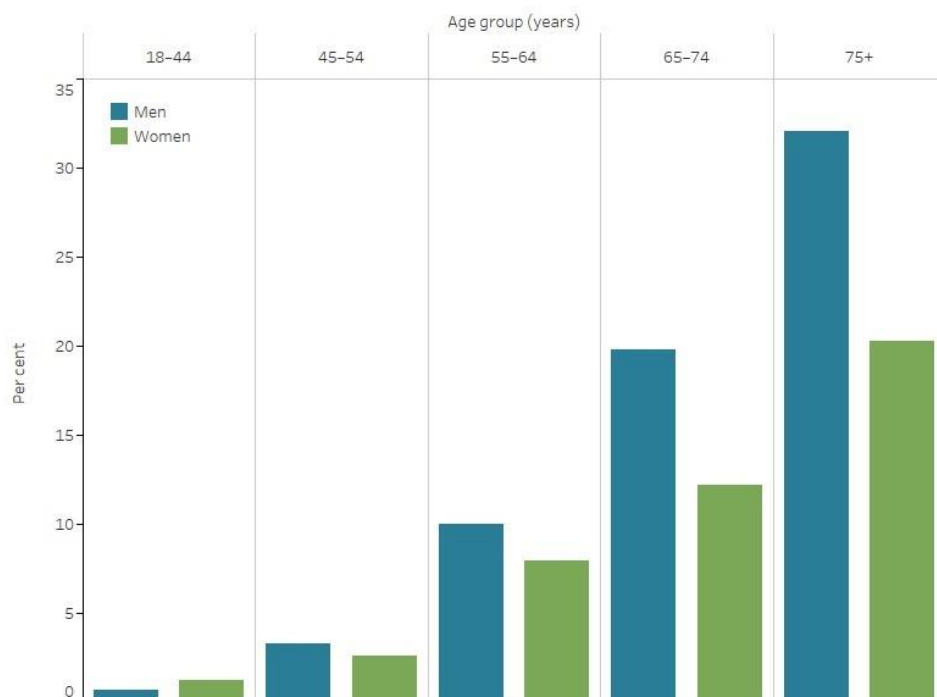


Figure 1: Prevalence of self-reported heart, stroke and vascular disease among persons aged 18 and over, by age and sex, 2017-18

*Note:* Confidence Interval = A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.

*Chart:* AIHW.

*Source:* ABS 2019. Microdata: National Health Survey, 2017-18. ABS cat. no. 4324.0.55.001. Canberra: ABS. Findings based on Detailed Microdata analysis.

<https://www.aihw.gov.au>

### Women and cardiovascular disease

Cardiovascular disease (CVD) is a leading cause of illness and death among Australian women. While more men than women have heart, stroke and vascular disease, the risk in women is largely under-recognised by the population (AIHW 2019). There are aspects of cardiovascular health that are unique among women, with important sex differences in prevention, diagnosis and treatment.



Increased awareness and recognition of these differences will help women avoid under-diagnosis, under-treatment, and underestimating the risk of dying or becoming seriously unwell due to heart, stroke and vascular disease (World Heart Federation 2021). **More than half a million women have CVD**

- Based on self-reported data, an estimated 509,000 (5.4%) women aged 18 and over in Australia had 1 or more heart, stroke and vascular diseases in 2017-18.

#### **A major cause of illness and death**

- Around 20,400 women had an acute coronary event (heart attack or unstable angina), and 18,400 women had a stroke in 2018
- 248,000 hospitalisations of women with CVD in 2018-19
- 21,000 women died from CVD in 2019, equivalent to 1 in 4 female deaths.

#### **Indigenous women are disproportionately affected**

- Indigenous women were up to twice as likely as non-Indigenous women to have CVD in 2018-19, and to die from coronary heart disease or stroke in 2017-19.

CVD and other chronic conditions are key priorities in the National Women's Health Strategy 2020-2030 (Department of Health 2018). Increased public awareness and education, investment in research, implementing evidence-based practice, and strategies to address equity issues have been identified as areas for action to improve the heart health of Australian women (Heart Foundation 2021).

For more information:

[Cardiovascular disease in Australian women—a snapshot of national statistics](#), and [Cardiovascular disease in women](#).

#### **Kylie's story**

*'I always thought that the typical candidate was someone who smoked, sported a beer belly, and had high blood pressure. I was a fit, young, non-smoking woman in my forties. A heart attack couldn't happen to me - right?'*

Kylie survived a heart attack and said cardiac rehab was a turning point in her recovery.

[Learn more about Kylie's heart story](#)



#### **Variation among population groups**

##### **Aboriginal and Torres Strait Islander people**

An estimated 42,700 Aboriginal and Torres Strait Islander adults had heart, stroke and vascular disease, based on self-reported data from the ABS 2018-19 Australian Aboriginal and Torres Strait Islander Health Survey (AIHW analysis of ABS 2019b).

After adjusting for different population age structures, the rate of heart, stroke and vascular disease among Indigenous adults was more than twice that of non-Indigenous adults (11.4% and 5.4%).

Indigenous men were 2.1 times as likely to report having heart, stroke and vascular disease as non-Indigenous men (12.8% and 6.2%), as were Indigenous women (10.1% and 4.7%) (Figure 2).

##### **Socioeconomic group**

After adjusting for different population age structures, the prevalence of heart, stroke and vascular disease did not vary significantly between adults living in the most and least disadvantaged socioeconomic areas in 2017-18 (6.4% and 4.8%) (Figure 2).

##### **Remoteness area**

After adjusting for different population age structures, the prevalence of heart, stroke and vascular disease among adults did not vary significantly by remoteness area in 2017-18 (5.6% in *Major cities*, 6.0% in *Inner regional*, 5.1% in *Outer regional and remote*) (Figure 2).

#### **Figure 2: Prevalence of self-reported heart, stroke and vascular disease, among persons aged 18 and over, by population group and sex, 2017-18**

The horizontal bar chart shows that the prevalence of self-reported heart, stroke and vascular disease in 2017-18 was higher among Indigenous Australians, but did not vary significantly by socioeconomic or remoteness areas.

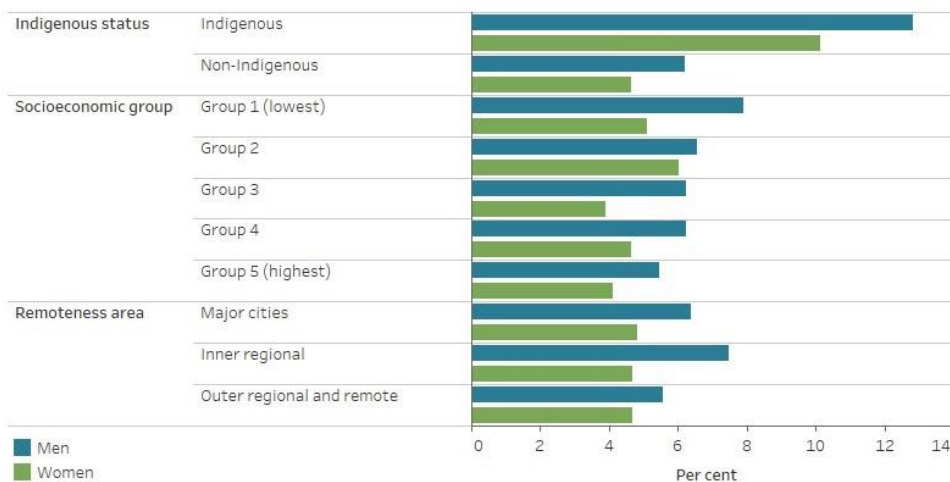


Figure 2: Prevalence of self-reported heart, stroke and vascular disease, among persons aged 18 and over, by population group and sex, 2017-18

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Confidence Interval = A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.
3. Indigenous estimates are sourced from the ABS National Aboriginal and Torres Strait Islander Health Survey, 2018-19.
4. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage (IRSD) based on Statistical area Level 1 (SA1) of current residence.
5. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on usual residence. Excludes those living in Very remote areas. Aggregation of Outer regional with Remote areas may mask important differences in remote areas, given the population in Outer regional areas is much larger than in remote areas.

Chart: AIHW.

*Sources:*

ABS 2019a. Microdata: National Health Survey, 2017-18. AIHW analysis of Detailed Microdata. Viewed 4 March 2021.  
 ABS 2019b. Microdata: National Aboriginal and Torres Strait Islander Health Survey, 2018-19. AIHW analysis of Detailed Microdata. Viewed 4 March 2021.  
<https://www.aihw.gov.au>

## Hospitalisations



In 2018-19, there were **591,000 hospitalisations** where CVD was recorded as the principal diagnosis. This represented **5.2% of all hospitalisations** in Australia in 2018-19.

Of these, 530,000 (90%) were for acute care—that is, care in which the intent is to perform surgery, diagnostic or therapeutic procedures in the treatment of illness or injury).

Of all hospitalisations for CVD in 2018-19:

- 27% had a principal diagnosis of coronary heart disease, followed by
- atrial fibrillation (12%) heart failure and cardiomyopathy (12%)
- stroke (11%) peripheral arterial disease (5.5%) hypertensive disease
- (2.4%) rheumatic heart disease (0.7%) (Figure 3).

• **Figure 3: Major causes of cardiovascular disease hospitalisations (principal diagnosis), by sex, 2018-19**

• The bar chart shows the number of hospitalisations for selected cardiovascular diseases in 2018-19, ranging from 161,000 for a principal diagnosis of coronary heart disease to 4,400 for rheumatic heart disease.

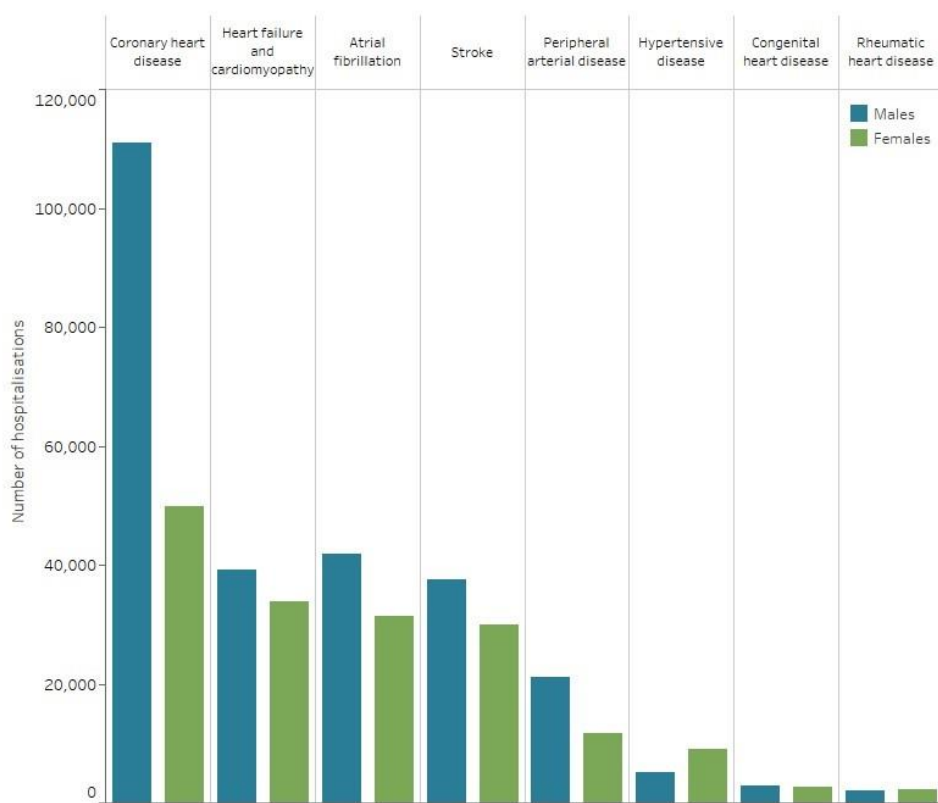


Figure 3: Major causes of cardiovascular disease hospitalisations (principal diagnosis), by sex, 2018-19

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

### Age and sex

In 2018-19, rates of hospitalisation with CVD as the principal diagnosis:

- were 1.4 times as high for males compared with females (age-standardised rates of 2,460 and 1,560 per 100,000 population). Age-specific rates were higher among males than females across all age groups (Figure 4) increased with age, with over 4 in 5 (83%) CVD hospitalisations occurring in those aged 55 and over. CVD hospitalisation rates for males and females were highest in the 85 and over age group (20,700 and 16,200 per 100,000 population)—1.4 times as high as those in the 75- 84 age group for males and 1.6 times as high among females (15,000 and 10,200 per 100,000) (Figure 4).

### Figure 4: Cardiovascular disease hospitalisation rates, principal diagnosis, by age and sex, 2018-19

The bar chart shows cardiovascular disease hospitalisation rates by age group in 2018-19. These were highest among men and women aged 85 and over (21,000 and 16,000 per 100,000 population).

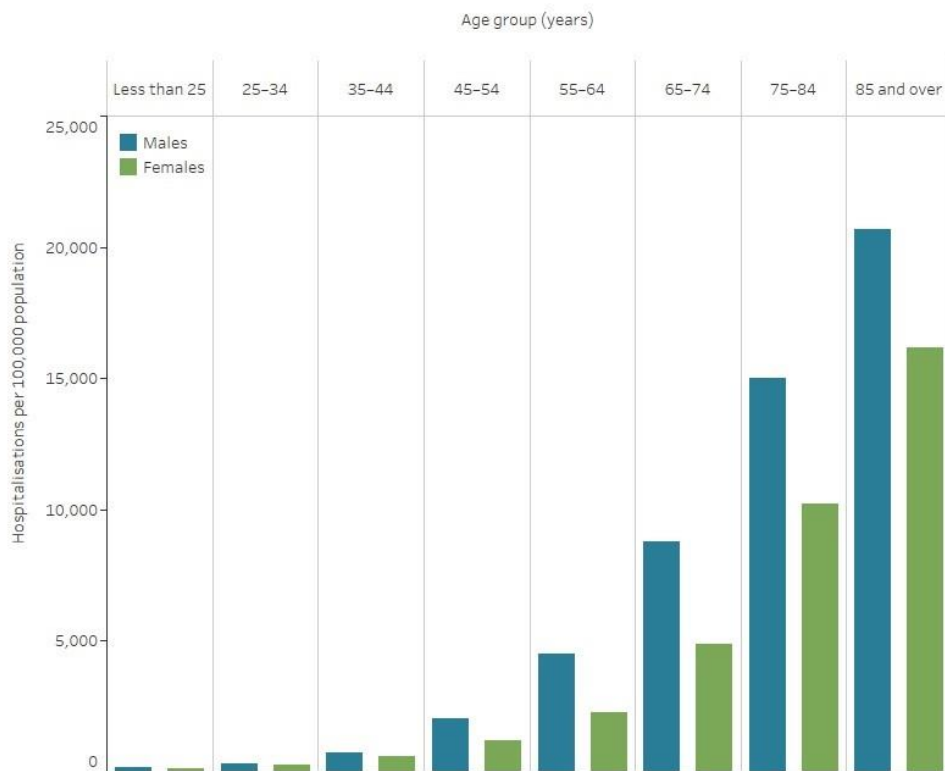


Figure 4: Cardiovascular disease hospitalisation rates, principal diagnosis, by age and sex, 2018-19

Chart: AIHW. Source: AIHW Hospital Morbidity Database.  
<https://www.aihw.gov.au>

### Trends

The number of acute care hospitalisations with CVD as the principal diagnosis increased by 35% between 2000-01 and 2018-19, from 391,000 to 530,000 hospitalisations.

Despite increases in the number of hospitalisations, the age-standardised rate declined by 13% over this period, from 2,060 to 1,790 per 100,000 population; the difference being due to population changes.

The rate of CVD hospitalisations for males was higher than for females across the period, with both showing similar declines (Figure 5).

### Figure 5: Acute care cardiovascular disease hospitalisations rates, principal diagnosis, by sex, 2000-01 to 2018-19

The line chart shows declines in age-standardised rates of male and female acute care CVD hospitalisations between 2000-01 and 2018-19, from 2,570 to 2,219 per 100,000 population for males, and from 1,614 to 1,398 for females.

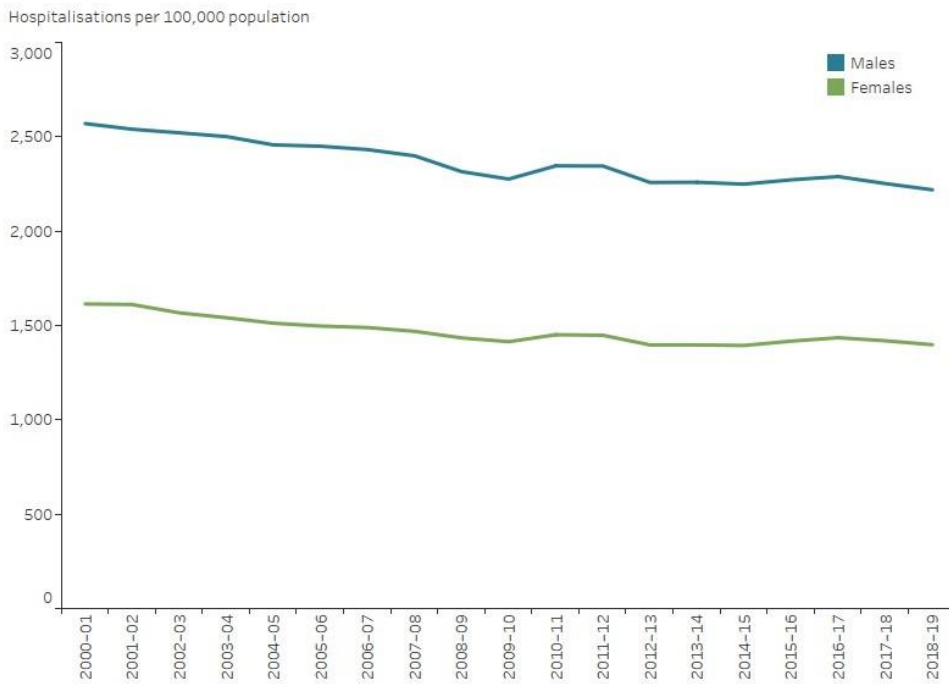


Figure 5: Acute care cardiovascular disease hospitalisation rates, principal diagnosis, by sex, 2000-01 to 2018-19

**Notes:**

1. Age-standardised to the 2001 Australian Standard Population.

2. Analysis includes care types: 1 (acute care). 7.1 (newborn with qualified days only). 7.2 (newborn with qualified and unqualified days) and 99 (not reported/unknown) only.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.

<https://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2018-19, there were around 16,100 hospitalisations with a principal diagnosis of CVD among Aboriginal and Torres Strait Islander people.

After adjusting for differences in the age structure of the populations:

- the rate among Indigenous Australians was 1.7 times as high as the non-Indigenous rate (3,300 and 1,900 per 100,000 population) the
- disparity between Indigenous and non-Indigenous Australians was greater for females—2.0 times as high (3,000 and 1,500 per 100,000 population) compared with 1.5 times as high for males (3,600 and 2,400 per 100,000 population).

### Socioeconomic group

In 2018-19, age-standardised CVD hospitalisation rates were almost 20% higher for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas—2,200 and 1,800 per 100,000 population.

This disparity between the lowest and highest socioeconomic areas was greater for females than males (1.24 and 1.16 times as high) (Figure 6).

### Remoteness area

In 2018-19, the age-standardised CVD hospitalisation rate was around 30% higher among those living in *Remote and very remote* areas compared with those in *Major cities* (2,500 and 1,900 per 100,000 population).

This largely reflects disparities in female rates—2,200 and 1,500 per 100,000 population—for males the difference was smaller (2,700 and 2,400 per 100,000).

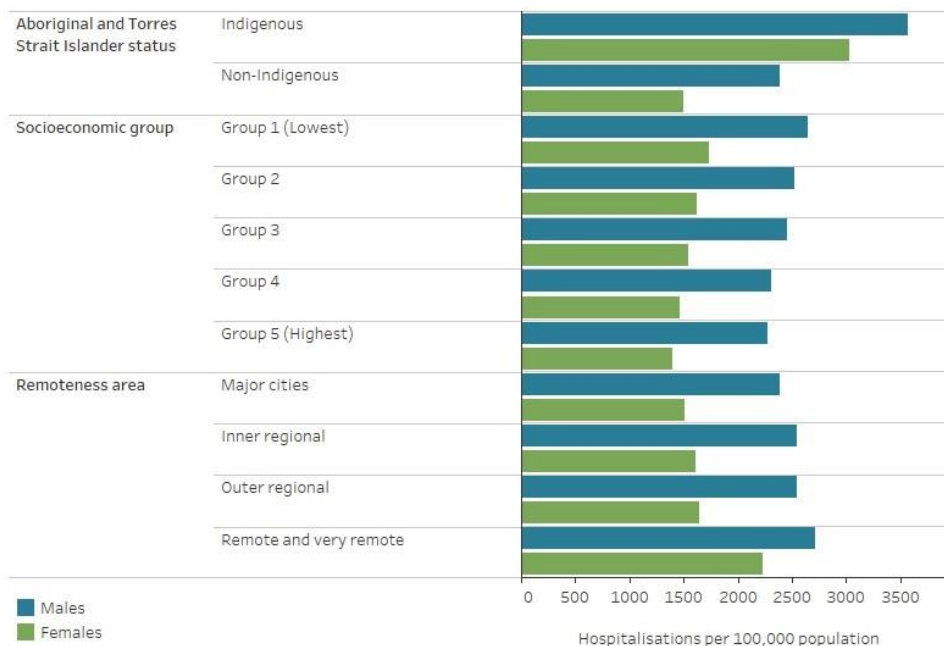
Higher hospitalisation rates in *Remote and very remote* areas are likely to be influenced by the higher proportion of Aboriginal and Torres Strait Islander people living in these areas, who have higher rates of CVD than other Australians.

CVD patients are often transferred from a local regional hospital to a larger urban hospital where more intense or critical care can be provided. In 2018-19, 17% of CVD hospitalisations (principal and/or additional diagnosis) in *Remote and very remote* areas were transferred to another acute hospital, compared with 16% in *Outer regional* areas, 14% in *Inner regional* areas and 10% in *Major cities*.

The higher rates of transfers are often necessary because certain cardiac procedures, such as angiograms and cardiac revascularisation, are generally performed in large hospitals, which are predominantly located in urban areas.

**Figure 6: Cardiovascular disease hospitalisation rates, principal diagnosis, by population group and sex, 2018-19**

The horizontal bar chart shows that male and female CVD hospitalisation rates in 2018-19 were higher among Indigenous Australians, people living in the lowest socioeconomic areas, and people living in remote and very remote areas.



**Figure 6: Cardiovascular disease hospitalisation rates, principal diagnosis, by population group and sex, 2018-19**

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Excludes persons whose Indigenous status was not stated or inadequately described.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage based on 2016 ASGS Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.

Chart: AIHW. Source: AIHW National Mortality Database. <https://www.aihw.gov.au>

## Deaths



In 2019, CVD was the underlying cause of 42,300 deaths (25% of all deaths).

CVD was the second leading cause of death group in 2019 behind cancers (29% of all deaths), but ahead of diseases of the respiratory system (9.7%), external causes (6.9%), and mental and behavioural disorders (6.6%).

Where CVD was listed as the underlying cause of death in 2019:

- 42% were due to coronary heart disease
- 20% were due to stroke
- 11% were due to heart failure and cardiomyopathy
- 5.2% were due to atrial fibrillation
- 5.1% were due to hypertensive disease
- 4.6% were due to peripheral arterial disease
- 0.9% were due to rheumatic heart disease (Figure 7).

**Figure 7: Major causes of cardiovascular disease death, 2019**

The bar chart shows the number of deaths from selected cardiovascular diseases in 2019, ranging from 18,000 for coronary heart disease as an underlying cause to 400 for rheumatic heart disease.

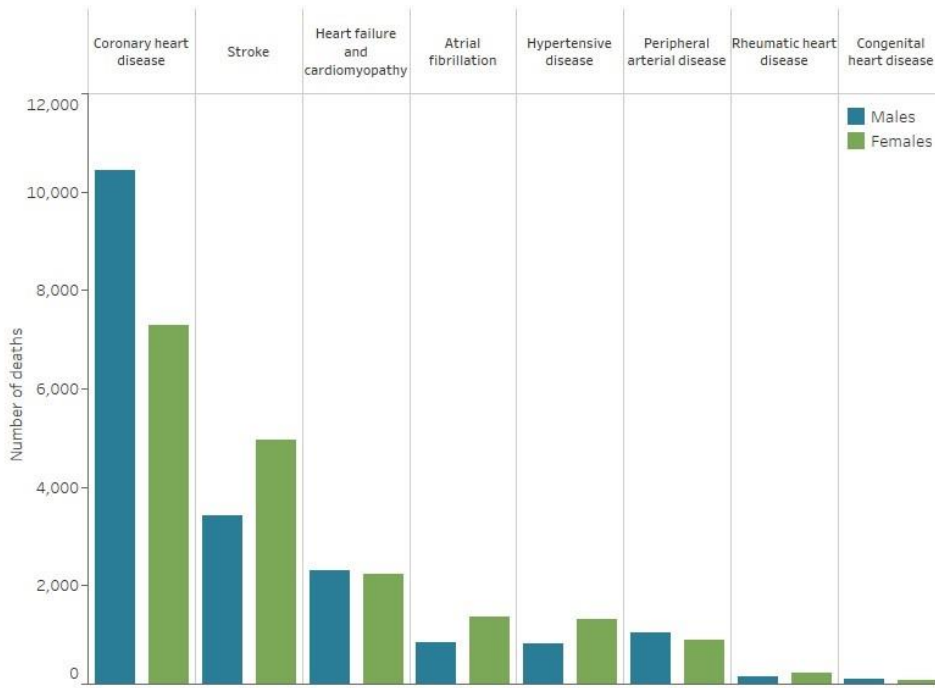


Figure 7: Major causes of cardiovascular disease death, 2019

*Notes:*

1. Deaths are reported by year of registration of death (or year of occurrence of death). Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics (ABS).
2. These data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Hospital Mortality Database.  
<http://www.aihw.gov.au>

## COVID-19 and CVD deaths

Coronavirus disease 2019 (COVID-19) was declared a pandemic by the World Health Organization in March 2020. Research has found that patients with COVID-19 and pre-existing CVD are at increased risk of severe disease and death (Zaman et al. 2020). COVID-19 itself can also cause acute cardiovascular injury in the form of left ventricular dysfunction, heart failure, arrhythmias and acute coronary syndromes.

In 2019-20, there were around 2,600 hospitalisations in Australia that involved a COVID-19 diagnosis. The most common comorbid conditions associated with COVID-19 hospitalisations were cardiovascular disease (13%) and Type 2 diabetes (10%) (AIHW 2021).

The Australian Bureau of Statistics has made available provisional data on deaths for the timely measurement of patterns of mortality during the COVID-19 pandemic and recovery period (ABS 2021). These data also allow for observing changes in CVD mortality.

A total of 141,116 deaths occurred in 2020 and were registered by 28 February 2021—in line with the baseline average for 2015-19. Deaths due to coronary heart disease and cerebrovascular disease were below average for every month of 2020, and were 10.7% and 7.8% below average for the year respectively. Deaths due to cancer, dementia and diabetes were above historical averages. **Coronary**

### heart disease

- 13,500 deaths occurred from coronary heart disease in 2020.
- The average number recorded between 2015 and 2019 was 15,100.
- Counts of coronary heart disease deaths were lower than the baseline average since the week ending 12 May 2020. Between 13 May and 29 Dec, there were 8,700 deaths, 1,300 below the average of 10,000.

### Cerebrovascular disease

- 9,000 deaths from cerebrovascular diseases (including strokes) occurred in 2020.
- The average number recorded between 2015 and 2019 was 9,700.
- The number of deaths from cerebrovascular diseases has been mostly below the 5-year average since the week ending Jun 23. Between 24 Jun and 29 Dec, there have been 4,650 deaths, 500 below the average of 5,150.

### Pre-existing cardiac conditions and complications

COVID-19 was the underlying cause of death of 682 registered deaths occurring up to 31 August 2020 (ABS 2020). Pre-existing chronic cardiac conditions—including coronary atherosclerosis, cardiomyopathies and atrial fibrillation—were reported on 32% of the death certificates. Pre-existing chronic diseases have been found to be risk factors for severity of COVID-19 in people who have contracted it.

Cardiac complications that were found to be caused by COVID-19 were reported on 10.1% of death certificates.

## Age and sex

In 2019, CVD death rates:

- were 1.4 times as high for males as for females (age-standardised rates of 150 and 107 per 100,000 population). Age-specific rates for males were higher than females across all age groups increased with age, with over half (52%) of CVD deaths occurring in persons aged 85 and over. CVD death rates for males and females were highest in those aged 85 and over (both 4,300 per 100,000)—4.3 times as high for males and 6.2 times as high for females aged 75-84 (1,010 and 687 per 100,000) (Figure 8).

### Figure 8: Cardiovascular disease death rates, by age and sex, 2019

The bar chart shows cardiovascular disease death rates by age group in 2019. These were highest among men and women aged 85 and over (4,340 and 4,250 per 100,000 population).



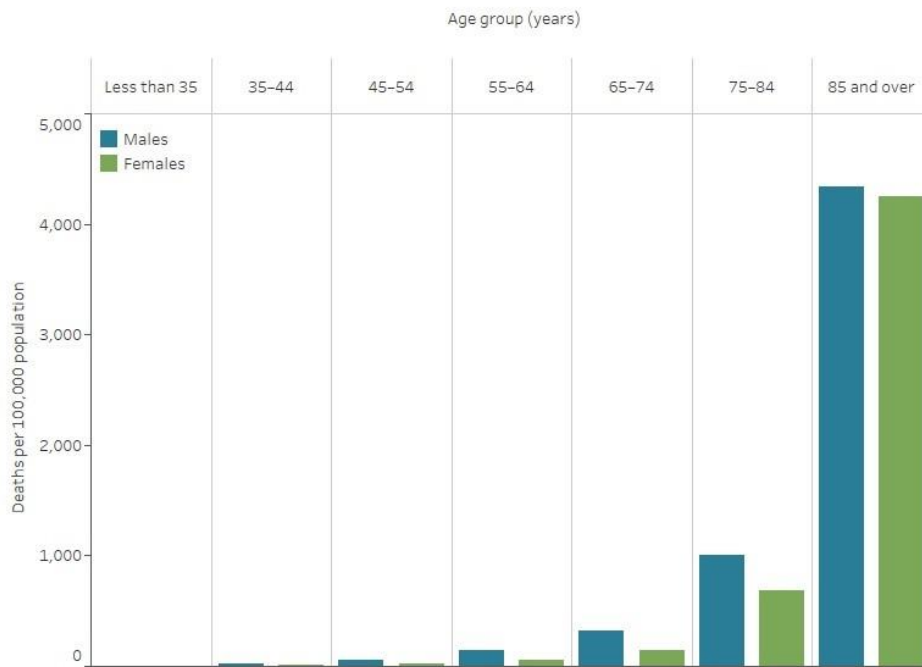


Figure 8: Cardiovascular disease death rates, by age and sex, 2019

*Notes:*

1. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
2. Data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database. <http://www.aihw.gov.au>

### Trends

Since its peak in the late 1960s, the CVD death rate has declined substantially, and the gap between males and females has narrowed.

The main driver of this decline was the large fall in coronary heart disease deaths, accompanied by falling rates of cerebrovascular disease deaths.

The large fall represents a public health success, which can be attributed to both prevention and treatment—a combination of reductions in risk factor levels, clinical research, improvements in detection and secondary prevention, and advances in treatment and care (AIHW 2017).

Between 1980 and 2019:

- the number of CVD deaths declined by 22%, from 55,800 to 42,300
- age-standardised CVD death rates declined by around three-quarters—falling from 700 to 150 per 100,000 population for males and 452 to 107 per 100,000 for females (Figure 9).

Although CVD death rates have fallen for all age groups in Australia, the rate of decline in younger age groups has slowed in recent decades (AIHW 2017).

### Figure 9: Cardiovascular disease death rates, by sex, 1980-2019

The line chart shows the decline in age-standardised cardiovascular disease death rates between 1980 and 2019, from 700 to 150 per 100,000 population for males and 560 to 128 for females.

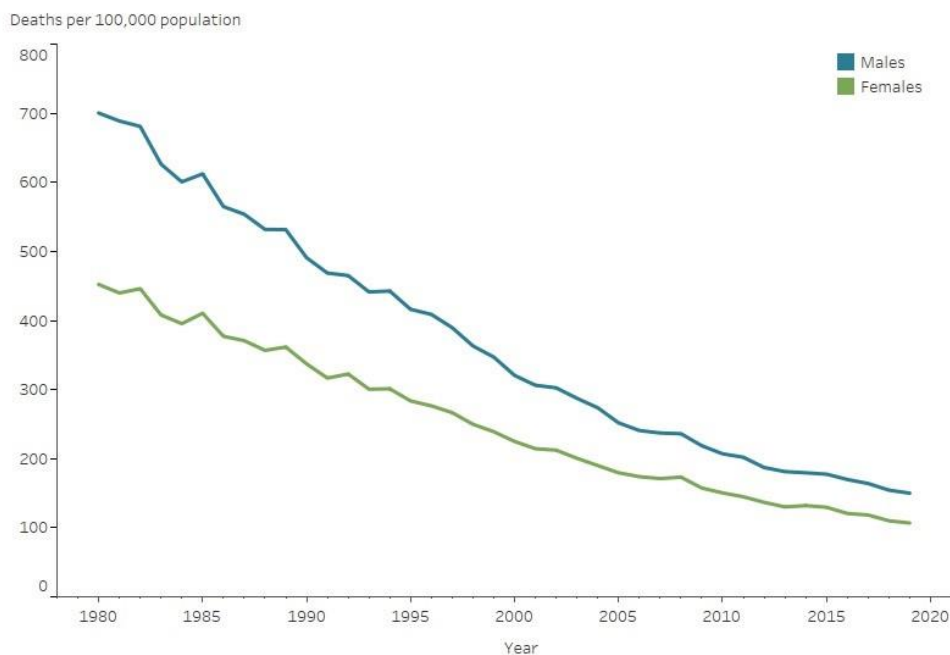


Figure 9: Cardiovascular disease death rates, by sex, 1980-2019

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics (ABS).
3. These data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019, (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2017-2019, there were 2,100 CVD deaths among Aboriginal and Torres Strait Islander people in jurisdictions with adequate Indigenous identification.

After adjusting for differences in the age structure of the populations, the rate of death from CVD for Indigenous Australians was 1.8 times as high as for non-Indigenous Australians (238 and 130 deaths per 100,000 population).

Indigenous males and females had CVD death rates 1.8 times and 1.9 times as high as non-Indigenous males and females (Figure 10).

### Socioeconomic group

In 2017-2019, the CVD death rate was 1.5 times as high for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas (age-standardised rates of 158 and 106 per 100,000 population).

This difference was greater for males (1.6 times as high) than females (1.4 times as high) (Figure 10).

### Remoteness area

In 2017-2019, the CVD death rate in *Remote and very remote* areas was 1.4 times as high as in *Major cities* (age-standardised rates of 172 and 124 per 100,000 population).

The difference was similar for males and females (Figure 10).

## Figure 10: Cardiovascular disease death rates, by population group and sex, 2017-2019.

The horizontal bar chart shows that CVD death rates in 2017-2019 were higher among Indigenous Australians, people living in the lowest socioeconomic areas, and people living in remote and very remote areas.

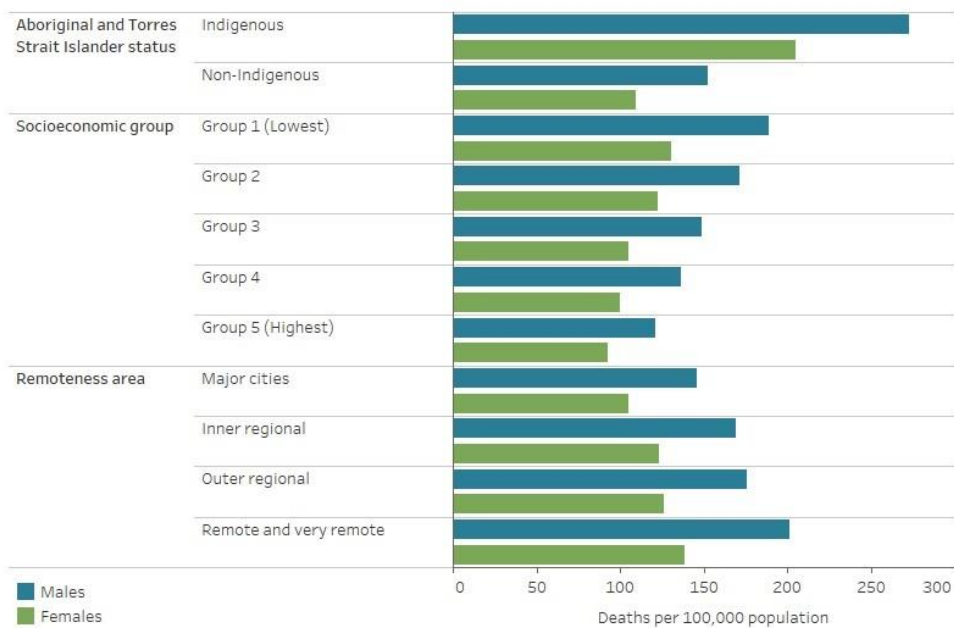


Figure 10: Cardiovascular disease death rates, by population group and sex, 2017-19.

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Aboriginal and Torres Strait Islander status includes data from people residing in NSW, QLD, WA, SA and NT only.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage (IRSD) based on Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness areas are classified according to the Australian Statistical geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.
5. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics (ABS).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

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# Heart, stroke and vascular disease and subtypes

## What is coronary heart disease?

Coronary heart disease is an [Australia's health](#) topic

- [Cancer](#) | 07 Jul 2022
- [Health of older people](#) | 30 Nov 2021
- [Stroke](#) | 29 Sep 2021

### On this page

- [How common is coronary heart disease?](#)
- [Impact](#)
- [Treatment and management](#)
- [Variation between population groups](#)
- [COVID-19 and coronary heart disease](#)
- [Where do I go for more information?](#)

Coronary heart disease (CHD) occurs when there is a narrowing or blockage in the blood vessels that supply blood to the heart muscle. There are 2 major clinical forms - heart attack (also known as acute myocardial infarction) and angina (see [Glossary](#)).

CHD is largely preventable, as many of its risk factors are modifiable. These include [tobacco smoking](#), [biomedical risk factors](#) such as high blood pressure and high blood cholesterol, [insufficient physical activity](#), [poor diet and nutrition](#), and [overweight and obesity](#).

CHD is the leading single cause of disease burden and death in Australia. As a result of the substantial impact of CHD on the Australian population, a [National Strategic Action Plan for Heart Disease and Stroke](#) has been developed. The action plan aims to reflect priorities and identify implementable actions to reduce the impact of CHD in the community.

## How common is coronary heart disease?

In 2020-21, an estimated 571,000 Australians aged 18 and over (2.9% of the adult population) had CHD, based on self-reported data from the Australian Bureau of Statistics 2020-21 National Health Survey (ABS 2022b). The prevalence of CHD increases rapidly with age, affecting around 1 in 9 (11%) adults aged 75 and over.

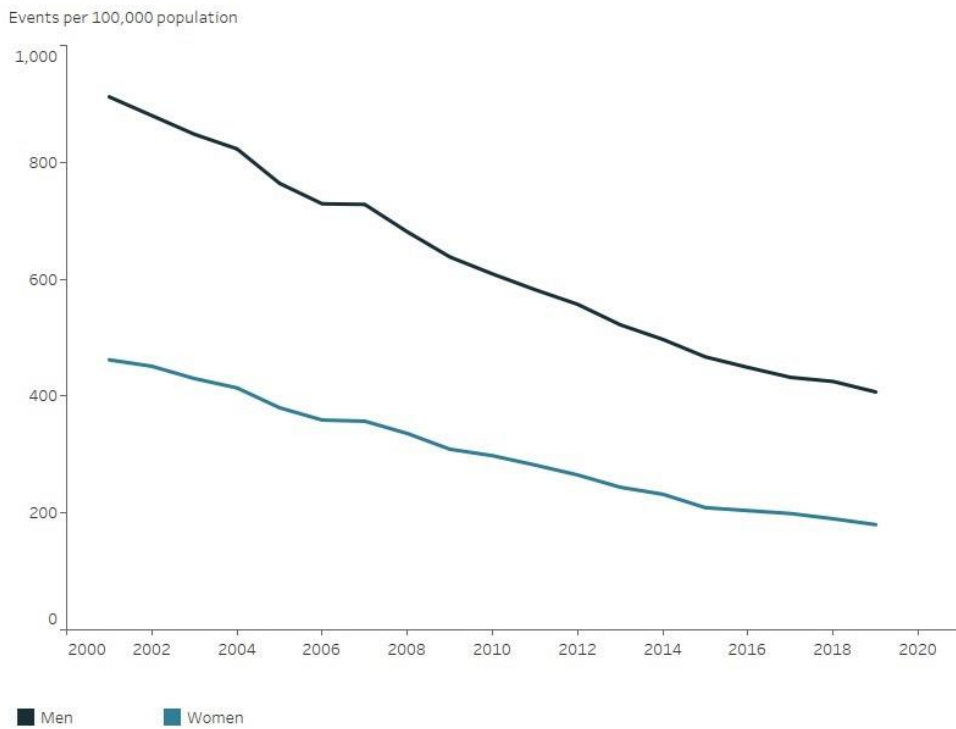
In 2019, an estimated 57,700 people aged 25 and over had an acute coronary event in the form of a heart attack or unstable angina - around 158 events every day. Of these, 7,400 (13%) were fatal.

The age-standardised rate of acute coronary events fell by more than half (57%) between 2001 and 2019 (from 675 to 290 per 100,000 population). The decline was slightly higher for women (61%, from 460 to 180 per 100,000 population) than men (55%, from 910 to 410 per 100,000 population) (Figure 1).

### Figure 1: Acute coronary events, persons aged 25 and over, by sex, 2001-2019

The chart shows declines in the number and age-standardised rates of acute coronary events for persons aged 25 and over between 2001 and 2019. Rates fell from 910 to 410 per 100,000 population for men, and from 460 to 180 for women.

**Figure 1: Acute coronary events among persons aged 25 and over, by sex, 2001 to 2019**



**Notes**

- 1. Age-standardised to the 2001 Australian Standard Population.
  - 2. Acute coronary events include heart attack (acute myocardial infarction) and unstable angina.
- Sources: AIHW 2022b, 2022c.  
<http://www.aihw.gov.au>

**Impact**

**Deaths**

In 2020, CHD was the leading single cause of death in Australia, accounting for 16,600 deaths (AIHW 2022c). This represents 10% of all deaths, and 41% of cardiovascular disease deaths. Thirty-nine per cent (6,500) of CHD deaths resulted from a heart attack.

Overall, the CHD death rate has fallen by more than 80% since 1980 - from 414 to 68 deaths per 100,000 population for males, and 209 to 32 per 100,000 population for females. CHD death rates fell substantially in each age group, although the decline has slowed among younger age groups in recent decades (Figure 2).

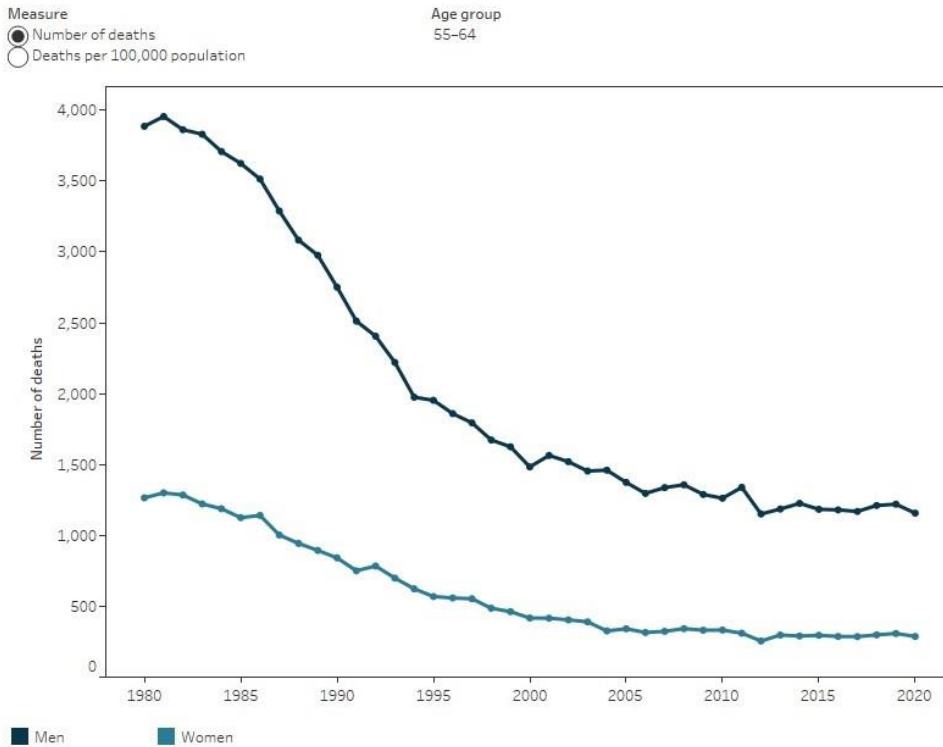
The decline in CHD death rates has been attributed to a combination of factors, including reductions in some risk factor levels, better treatment and care, and improved secondary prevention (ABS 2018; AIHW 2021c).

See 'Chapter 4 Changing patterns of mortality in Australia since 1900' in *Australia's health 2022: data insights*.

**Figure 2: CHD deaths among people aged 55-64, 65-74, 75-84 and 85 and over, by sex, 1980 to 2020**

The chart shows the number and rate of deaths from CHD for males and females aged 55-64, 65-74, 75-84 and 85 and over, from 1980 to 2020. CHD death rates fell substantially in each age group - for example, from 1,500 to 160 deaths per 100,000 population for men aged 65-74, and from 640 to 46 for women aged 65-74.

Figure 2: CHD deaths among people aged 55-64, 65-74, 75-84 and 85 and over, by sex, 1980 to 2020



Notes

1. A comparability factor of 1.01 has been applied to deaths before 1996 to make them comparable with data from 1997 onwards, following the introduction of automated coding and ICD-10 codes (see Glossary).
  2. Rates are calculated using the sum of estimated resident populations at 30 June for each year. Rates are expressed as deaths per 100,000 men/women.
- Source: AIHW 2022c.  
<http://www.aihw.gov.au/>

## Burden of disease

Burden of disease refers to the quantified impact of living with and dying prematurely from a disease or injury and is measured using disability-adjusted life years (DALY). One DALY is equivalent to one year of healthy life lost.

In 2018, CHD accounted for 6.3% of the total burden of disease in Australia (AIHW 2021a). It comprised 10% of the fatal burden and 2.6% of the non-fatal burden.

The total burden due to CHD was twice as high in males, at 208,000 DALY, as in females (104,000 DALY). It increased rapidly from age 45 onwards - from 8.6 DALY per 1,000 among people aged 45-49, to 210 per 1,000 among people aged 95-99.

Between 2003 and 2018, there was a 26% fall in CHD burden (-112,000 DALY), and the CHD DALY rate reduced by 50%, from 21 to 10 DALY per 100,000 population. The rate of fatal burden of CHD fell by 53%, and the non-fatal burden by 40%. The fall has been attributed to a number of factors, including population growth (+22%), population ageing (+15%) and change in the amount of disease (-63%). See [Burden of cardiovascular disease](#).

## Expenditure

In 2018-19, the estimated expenditure on CHD was \$2.4 billion. The greatest cost was due to private hospital services and public hospital admitted patient services (\$892.2 million and \$823.4 million respectively). The estimated Pharmaceutical Benefits Scheme (PBS) expenditure related to CHD was \$156.3 million (AIHW 2021b).

See [Health expenditure](#).

## Treatment and management

### Primary care

Primary health care professionals, including general practitioners (GPs), practice nurses, nurse practitioners and Aboriginal and Torres Strait Islander health workers, are often the first point-of-care for people who have non-acute cardiovascular disease.

Common actions by primary health care professionals when managing cardiovascular problems include undertaking checks, prescribing medicines, ordering pathology or imaging tests, and referral to specialists.

- In a 2019-20 survey of GP practices, high blood pressure was the single most common chronic condition newly recorded for patients (5.9% of patients) (NPS MedicineWise 2021). Abnormal blood lipids were newly recorded for 3.1% of patients, and cardiovascular disease conditions (including coronary heart disease) for 1.2% of patients.
- In 2019-20, over 93,000 Heart Health Checks (males 46,000, females 47,000) were processed by Medicare. Checks were most commonly conducted among people aged 55-64 (34,000) and 65-74 (28,000) (Services Australia 2022).

See [Primary health care](#).

## Medicines

Almost 112 million PBS prescriptions for cardiovascular system medicines were supplied to the Australian community in 2020-21. These comprised more than one-third (36%) of total PBS prescriptions (Department of Health 2021).

More than three-quarters (79%) of the estimated 1.2 million Australian adults aged 18 and over who had heart, stroke or vascular disease in 2017-18 used a cardiovascular system medicine in the 2 weeks prior to survey (AIHW analysis of ABS 2019b).

See [Medicines for cardiovascular disease](#).

## Emergency Departments

There were 75,900 presentations to Australian public hospital Emergency Departments (EDs) with a principal diagnosis of CHD in 2020-21 - a rate of 295 presentations per 100,000 population (AIHW 2022d).

Of these, 58,200 (77%) were admitted to the hospital to which they presented, 9,600 (13%) departed without being admitted or referred, and 7,300 (10%) were referred to another hospital for admission.

## Hospitalisations

In 2019-20, CHD was the principal diagnosis in about 155,600 hospitalisations (1.4% of all hospitalisations) (AIHW 2022b). Of these, 36% were for heart attack (56,100) and 22% for angina (34,100).

Between 2000-01 and 2019-20, the age-standardised rate of hospitalisations where CHD was the principal diagnosis declined by 39%, from 830 to 510 hospitalisations per 100,000 population. The decline in hospitalisations over this period was greater among females than among males (46% and 36% respectively).

CHD was the leading cause of hospitalisation for cardiovascular disease in 2019-20 (26% of all hospitalisations with a principal diagnosis of cardiovascular disease).

Of all CHD hospitalisations (principal and/or additional diagnoses), 57% had a coronary angiography (a diagnostic procedure) and 31% underwent revascularisation (surgical procedures to restore blood supply to the heart).

See [Hospital care and procedures](#).

## Variation between population groups

The impact of CHD varies between population groups. To account for differences in the age structures of these groups, the data presented below is based on age-standardised rates.

Age-standardised rates of CHD hospitalisation in 2019-20 were 1.5 times as high in *Remote and very remote* areas as in *Major cities* (727 and 475 per 100,000 population), and 1.3 times as high in the lowest socioeconomic areas as in the highest (576 and 443 per 100,000 population) (Figure 3).

The age-standardised rate of hospitalisations, deaths and total burden due to CHD were more than twice as high among Aboriginal and Torres Strait Islander people as among non-Indigenous Australians.

### Figure 3. Impact of coronary heart disease, by population group

The figure shows the rate ratio of CHD prevalence (2017-18), hospitalisation (2019-20), death (2020) and burden of disease (2018) among selected population groups.

Rates of CHD prevalence, hospitalisations, deaths and burden of disease were 2-3 times as high among Aboriginal and Torres Strait Islander persons when compared with non-Indigenous Australians.

Rates of hospitalisations and deaths due to CHD were 1.5 and 1.3 times as high among those living in *Remote and very remote* areas compared to those living in *Major cities* and were 1.3 and 1.7 times as high among those living in the most disadvantaged areas when compared to those living in the least disadvantaged areas.

**Figure 3: Impact of Coronary heart disease—Variation among selected population groups**

Hover on the numbers for more information on the impact of CHD in each population group.

Comparing rates for:	Indigenous / non-Indigenous	Remote and Very remote / Major cities	Lowest / highest socioeconomic areas
Having CHD	2.8x	0.9x	1.6x
Hospitalised for CHD	2.3x	1.5x	1.3x
Dying from CHD	2.5x	1.5x	1.7x
Burden of disease	2.8x	2.2x	2.0x

Note: This figure uses age-standardised rates to remove the impact of differences in age structures between these groups.  
Sources: ABS 2019a, 2019b; AIHW 2021a, 2022a, 2022b, 2022c.  
<http://www.aihw.gov.au/>

## COVID-19 and coronary heart disease

People with pre-existing chronic conditions such as CHD are at higher risk of contracting COVID-19 and experiencing complications or more severe illnesses as a result.

In 2020-21, there were over 4,700 hospitalisations in Australia that involved a COVID-19 diagnosis. The most common comorbid conditions associated with COVID-19 hospitalisations over this period were cardiovascular disease (which includes coronary heart disease and a range of other heart, stroke and vascular diseases) (20%) and Type 2 diabetes (20%) (AIHW 2022e).

Of those COVID-19 hospitalisations with comorbid diagnosis of cardiovascular disease in 2020-21, 18% involved time spent in an Intensive Care Unit, 12% involved continuous ventilatory support and 20% had a separation mode indicating the patient died in hospital.

Among COVID-19 deaths that occurred by 30 April 2022, chronic cardiac conditions including coronary atherosclerosis, cardiomyopathies and atrial fibrillation were the most certified comorbidities, present in 37% of deaths (ABS 2022a).

Counts of CHD deaths during 2021 were below the 2015-19 average but were higher than the number certified in 2020 (ABS 2022c).

## Where do I go for more information?

For more information on coronary heart disease, see:

- [Heart, stroke and vascular disease - Australian facts.](#)

## References

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## Heart, stroke and vascular disease and subtypes

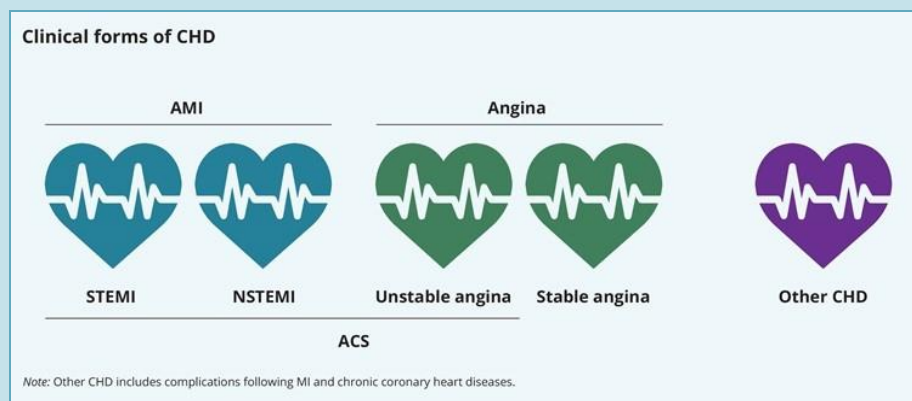
### Coronary heart disease

On this page

- [How many Australians have coronary heart disease?](#)
- [Acute coronary events](#)
- [Hospitalisations](#)
- [Deaths](#)

#### What is coronary heart disease?

Coronary heart disease (CHD), also known as ischaemic heart disease, is the most common cardiovascular disease. There are 2 main clinical forms—heart attack and angina.



**Heart attack**—or acute myocardial infarction (AMI)—is a life-threatening event that occurs when a blood vessel supplying the heart is suddenly blocked, threatening to damage the heart muscle and its functions. STEMI (ST segment elevation myocardial infarction) is the most serious type of heart attack. It is almost always caused by a complete blockage of a major coronary artery, leading to a long interruption of blood supply. NSTEMI (Non-ST segment elevation myocardial infarction) is characterised by a partially blocked artery, which severely reduces blood flow.

**Angina** is chest pain caused by reduced blood flow to the heart. With stable angina, periodic episodes of chest pain occur when the heart has a temporary deficiency in blood supply. Unstable angina is an accelerating pattern of chest discomfort, and is the more dangerous form due to a changing severity in partial coronary artery blockages. It is treated in a similar manner to heart attack.

Both heart attack and unstable angina are sudden, severe life-threatening events. They are part of a continuum of acute coronary heart diseases, and are together described as **acute coronary syndrome (ACS)**.

#### How many Australians have coronary heart disease?



An estimated **580,000 Australians** aged 18 and over (3.1% of the adult population) had CHD at some time in their lives, based on self-reported data from the ABS 2017-18 National Health Survey (AIHW analysis of ABS 2019).

Of those with CHD, 227,000 had experienced angina while 430,000 had a heart attack or another form of CHD, noting that a person may report more than 1 disease.

#### Age and sex

- After adjusting for age, a higher percentage of men (3.8%) than women (1.9%) were estimated to have CHD in 2017-18.
- CHD occurred more commonly in older age groups, increasing from 1.1% in those aged 45-54 to 14% among those aged 75 and over.
- At age 75 and over, there is a marked difference between men (21%) and women (8.1%) reporting having CHD (Figure 1).

#### Figure 1: Prevalence of self-reported coronary heart disease among persons aged 18 and over, by age and sex, 2017- 18

The bar chart shows the prevalence of self-reported coronary heart disease by age group in 2017-18. Rates were highest among men and women aged 75 and over (21% and 8.1%).

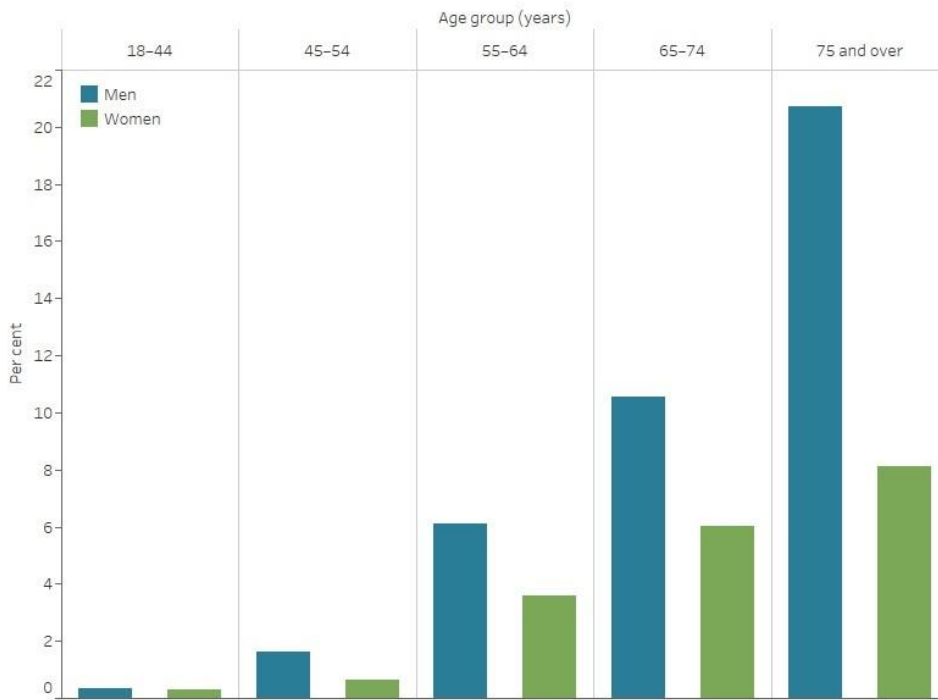


Figure 1: Prevalence of self-reported coronary heart disease among persons aged 18 and over, by age and sex, 2017-18

Note: Confidence Interval = A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.

Chart: AIHW. Source: ABS 2019. Microdata: National Health Survey, 2017-18. AIHW analysis of Detailed Microdata. Viewed 4 March 2021.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

- An estimated 27,400 Aboriginal and Torres Strait Islander adults had CHD, based on self-reported data from the ABS 2018-19 Australian Aboriginal and Torres Strait Islander Health Survey (AIHW analysis of ABS 2019b).
- After adjusting for age, the rate of CHD among Indigenous adults was more than twice that of non-Indigenous adults (7.4% and 2.7%).
- Indigenous men were 2.5 times as likely to report having CHD as non-Indigenous men (9.1% and 3.6%), and Indigenous women 3.3 times as likely as non-Indigenous women (5.9% and 1.8%) (Figure 2).

### Socioeconomic group

- In 2017-18, the percentage of adults who reported having CHD was higher among those living in the most socioeconomically disadvantaged areas compared with those in the least disadvantaged areas (age-standardised rates of 3.2% and 2.0%) (Figure 2).
- Rates were significantly higher for men than women across most socioeconomic groups.

### Remoteness area

In 2017-18, the prevalence of CHD among adults, based on self-reported data, did not vary significantly by remoteness area (age-standardised rates of 2.7% in *Major cities*, 3.3% in *Inner regional*, 2.4% in *Outer regional and remote*) (Figure 2).

## Figure 2: Prevalence of self-reported coronary heart disease, among persons aged 18 and over, by population group and sex, 2017-18

The horizontal bar chart shows that the prevalence of self-reported coronary heart disease in 2017-18 was higher among Indigenous Australians and people living in socioeconomically disadvantaged areas, but did not vary significantly by remoteness areas.

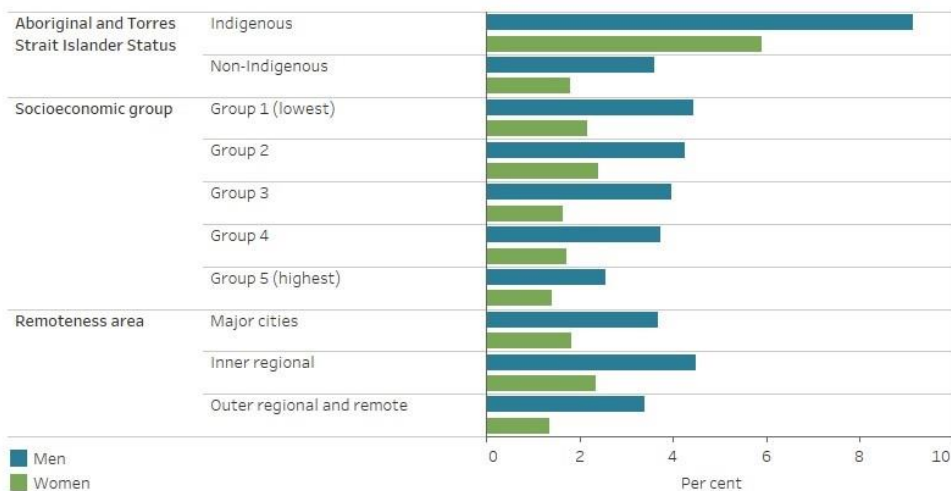


Figure 2: Prevalence of self-reported coronary heart disease, among persons aged 18 and over, by population group and sex, 2017-18

Notes:

1. Age-standardised to the 2001 Australian Standard Population.
2. Confidence Interval = A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.
3. Indigenous estimates are sourced from the ABS National Aboriginal and Torres Strait Islander Health Survey, 2018-19.
4. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage (IRSD) based on Statistical Area Level 1 (SA1) of current residence.
5. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on usual residence. Excludes those living in Very remote areas. Aggregation of Outer regional with Remote areas may mask important differences in remote areas, given the population in Outer regional areas is much larger than in Remote areas.

Chart: AIHW.

Sources:

- ABS 2019a. Microdata: National Health Survey, 2017-18. AIHW analysis of Detailed Microdata. Viewed 4 March 2021.
  - ABS 2019b. Microdata: National Aboriginal and Torres Strait Islander Health Survey, 2018-19. AIHW analysis of Detailed Microdata. Viewed 4 March 2021.
- <http://www.aihw.gov.au>

## Acute coronary events

There are no national data sources on the number of new cases (incidence) of CHD each year. However, a related measure can be used as an estimate—the number of acute coronary events (including heart attack and unstable angina)—developed by the AIHW using unlinked hospital and deaths data (AIHW 2014).



In 2018, there were an estimated **58,700 acute coronary events** among people aged 25 and over—equivalent to around **161 events every day**. Around 13% of these events (7,700 cases) were fatal.

### Age and sex

In 2018, an estimated two-thirds (65%) of acute coronary events among persons aged 25 and over occurred in men.

### Rates of acute coronary events:

- were more than twice as high in men than women (age-standardised rates of 424 and 190 per 100,000 population)
- increased with age, with the rate among the 85 and over age group (2,100 per 100,000 population) more than 3 times the rate of the 65-74 age group (639 per 100,000 population) and 5 times the rate for the 55-64 year old age group (408 per 100,000 population) (Figure 3).

### Figure 3: Acute coronary events among persons aged 25 and over, by age and sex, 2018

The bar chart shows rates of acute coronary events by age group in 2017-18. These were highest among men and women aged 85 and over (2,500 and 1,800 per 100,000 population).

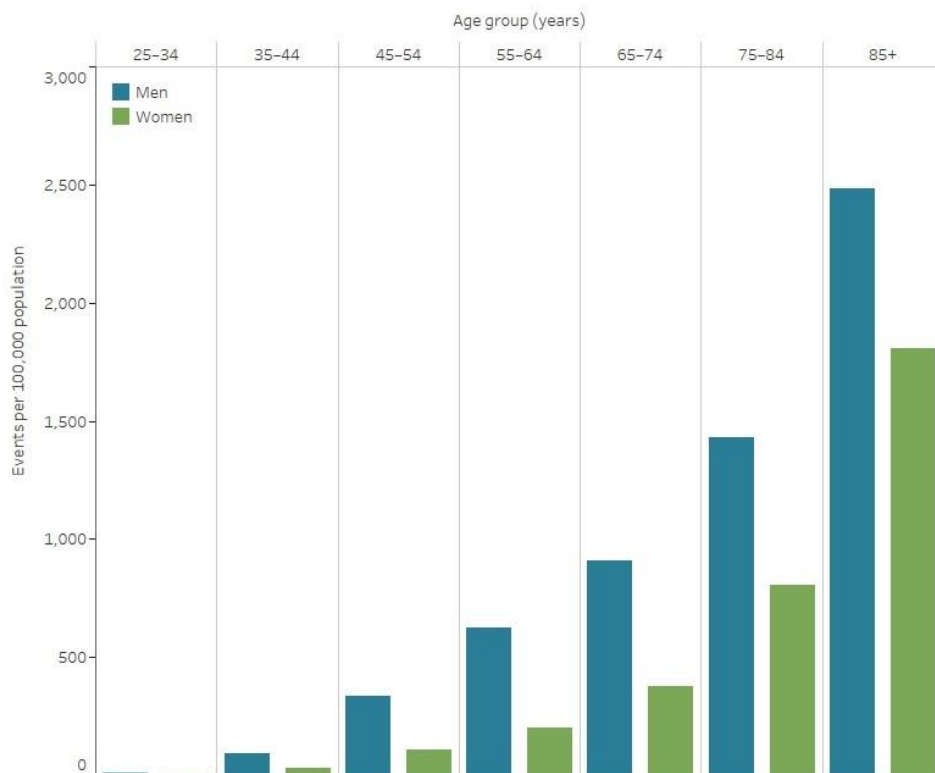


Figure 3: Acute coronary events among persons aged 25 and over, by age and sex, 2018

Chart: AIHW. Sources: AIHW National Hospital Morbidity Database and AIHW National Mortality Database.  
<http://www.aihw.gov.au>

### Trends

The age-standardised rate of acute coronary events fell by more than half (55%) between 2001 and 2018 (675 to 302 per 100,000 population). The decline was slightly higher for women (59%) than men (54%) (Figure 4).

The decline in rates of acute coronary events has been attributed to a number of factors, including improvements in medical and surgical treatment, and the increased use of antithrombotic drugs as well as drugs to lower blood pressure and cholesterol. Reductions in risk factor levels—including tobacco smoking, high blood cholesterol and high blood pressure—have also contributed to these declines (Taylor et al. 2006).

Figure 4: Acute coronary events among persons aged 25 and over, by sex, 2001-2018

The line chart shows declines in age-standardised rates of acute coronary events between 2001 and 2018, from 912 to 424 per 100,000 population for men aged 25 and over, and from 462 to 190 for women.

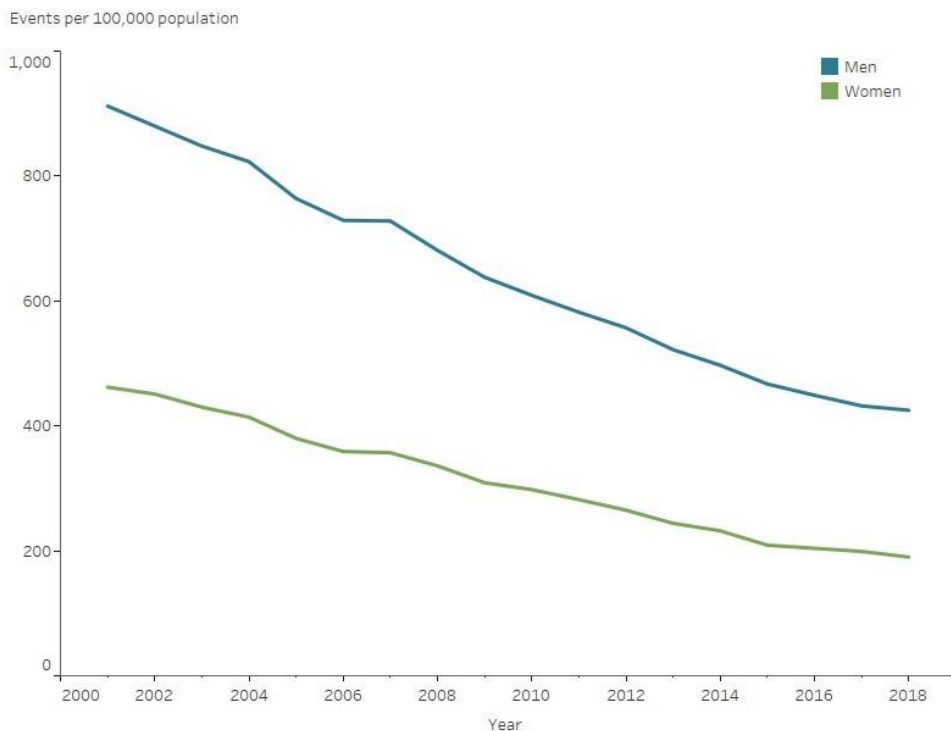


Figure 4: Acute coronary events among persons aged 25 and over, by sex, 2001-2018

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Acute coronary events include heart attack (acute myocardial infarction) and unstable angina.

Chart: AIHW. Sources: AIHW National Hospital Morbidity Database and AIHW National Mortality Database.  
<http://www.aihw.gov.au>

### Aboriginal and Torres Strait Islander people

Indigenous Australians have considerably higher rates of acute coronary events than non-Indigenous Australians—2.6 times as high in 2018 (age-standardised rates of 757 and 293 per 100,000 population).

The rate of acute coronary events among younger Indigenous people is many times that of younger non-Indigenous people (AIHW 2015).

### Hospitalisations



In 2018-19 there were **161,000 hospitalisations** where **CHD** was recorded as the principal diagnosis, equivalent to 1.4% of all hospitalisations, and 27% of all CVD hospitalisations in Australia.

Of these, angina accounted for 23% (37,600 hospitalisations) and acute myocardial infarction (AMI) for 36% (57,300 hospitalisations).

#### Age and sex

In 2018-19, CHD hospitalisation rates as the principal diagnosis: were overall 2.5 times as high for males as females (784 and 313 per 100,000 population) after adjusting for age. Age-specific rates were higher among males than females across all age groups (Figure 5) increased to age 75-84, with two-thirds (65%) of CHD hospitalisations occurring in those aged 65 and over. CHD hospitalisation rates for males were highest in the 75-84 age group (4,500 per 100,000 population) and for females in the 85 and over age group (2,300 per 100,000 population).

#### Figure 5: Coronary heart disease hospitalisation rates, principal diagnosis, by age and sex, 2018-19

The bar chart shows coronary heart disease hospitalisation rates by age group in 2018-19. Rates were highest among males aged 75-84 (4,520 per 100,000 population) and females aged 85 and over (2,346 per 100,000 population).

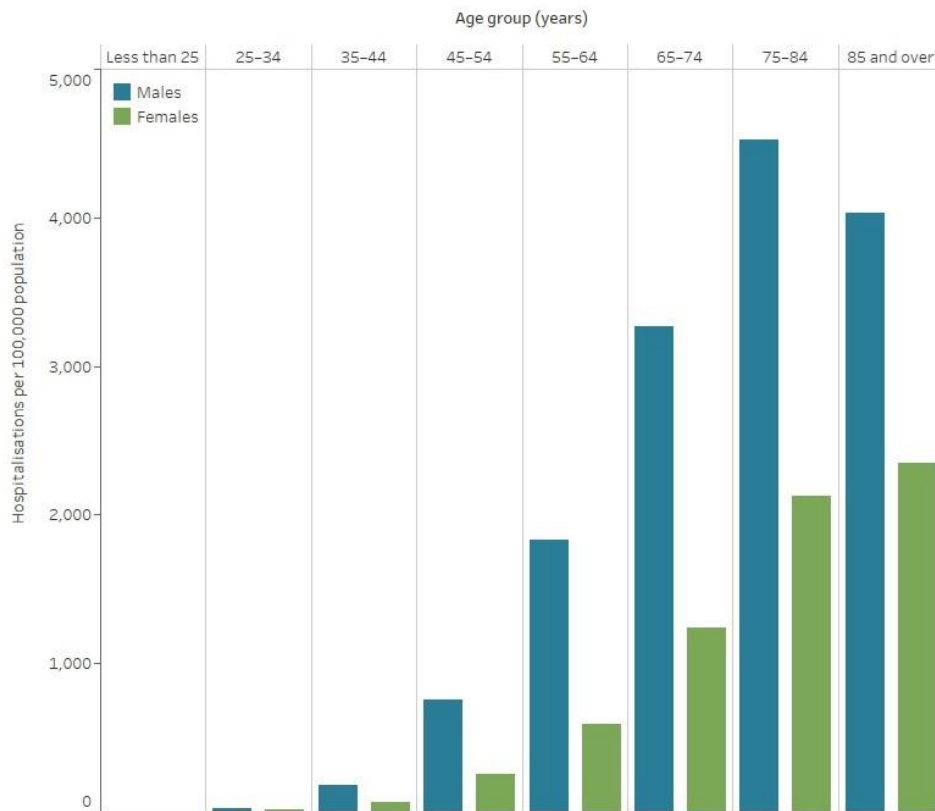


Figure 5: Coronary heart disease hospitalisation rates, principal diagnosis, by age and sex, 2018-19

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

### Trends

After adjusting for different population age structures over time, there was a 35% reduction in the rate of hospitalisations with a principal diagnosis of CHD between 2000-01 and 2018-19, from 833 to 539 per 100,000 population.

The number of CHD hospitalisations increased by 7.6% for males and fell by 9.9% for females, while the rate of CHD hospitalisation fell by 41% for females (from 532 to 313 per 100,000 population) and 33% for males (from 1,165 to 784) (Figure 6).

### Figure 6: Coronary heart disease hospitalisation rates, principal diagnosis, by sex, 2000-01 to 2018-19

The line chart shows the decline in age-standardised rates of coronary heart disease hospitalisations between 2000-01 and 2018-19, from 1,165 to 784 per 100,000 population for males, and from 532 to 313 for females.

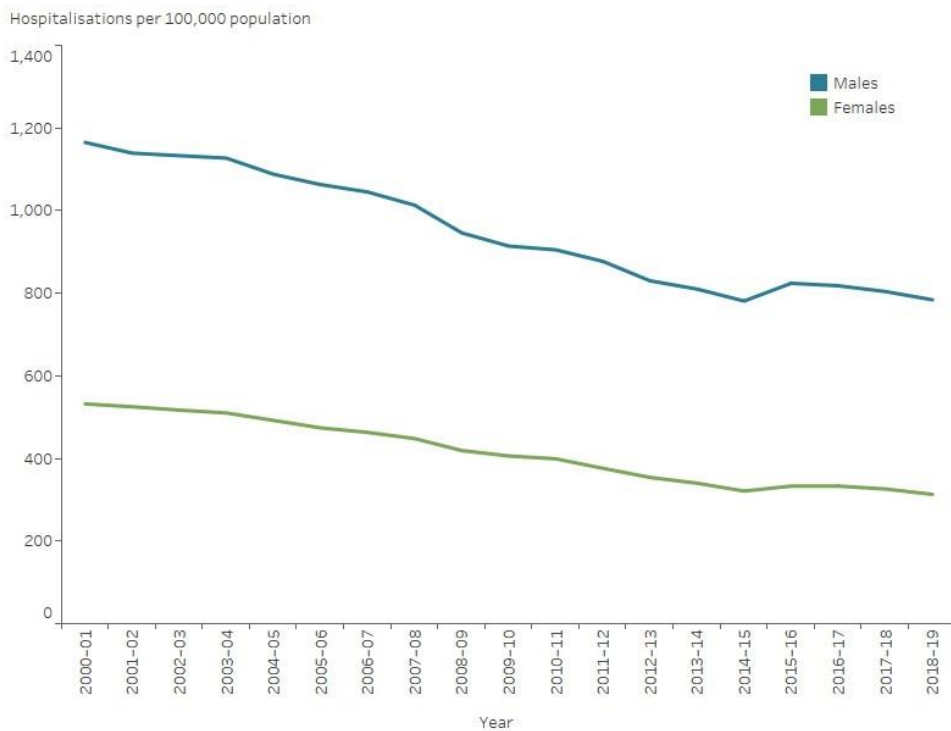


Figure 6: Coronary heart disease hospitalisation rates, principal diagnosis, by sex, 2000-01 to 2018-19

Note: Age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database. <http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2018-19, there were around 5,400 hospitalisations with a principal diagnosis of CHD among Aboriginal and Torres Strait Islander people.

After adjusting for differences in the age structure of the populations:

- the rate among Indigenous Australians was 2.1 times as high as the non-Indigenous rate (1,103 and 516 per 100,000 population) the
- disparity between Indigenous and non-Indigenous Australians was greater for females than males—3.1 times as high for females (920 and 295 per 100,000 population) and 1.7 times as high for males (1,312 and 756 per 100,000 population) (Figure 7).

### Socioeconomic group

In 2018-19, CHD hospitalisation rates were almost 30% higher for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas—age-standardised rates of 609 and 475 per 100,000 population.

The disparity was greater for females (382 and 246 per 100,000 population) than males (853 and 727 per 100,000 population) (Figure 7).

### Remoteness area

In 2018-19, CHD hospitalisation rates were around 45% higher among those living in *Remote and very remote* areas compared with those in *Major cities* (age-standardised rates of 742 and 510 hospitalisations per 100,000 population).

This largely reflects disparities in female rates, which were twice as high in *Remote and very remote* areas as in *Major cities* (566 and 287 per 100,000 population)—while males rates were 1.2 times as high (895 and 759 per 100,000 population) (Figure 7).

## Figure 7: Coronary heart disease hospitalisation rates, principal diagnosis, by population group and sex, 2018-19

The horizontal bar chart shows that male and female coronary heart disease hospitalisation rates in 2018-19 were higher among Indigenous Australians, people living in the lowest socioeconomic areas, and people living in remote and very remote areas.



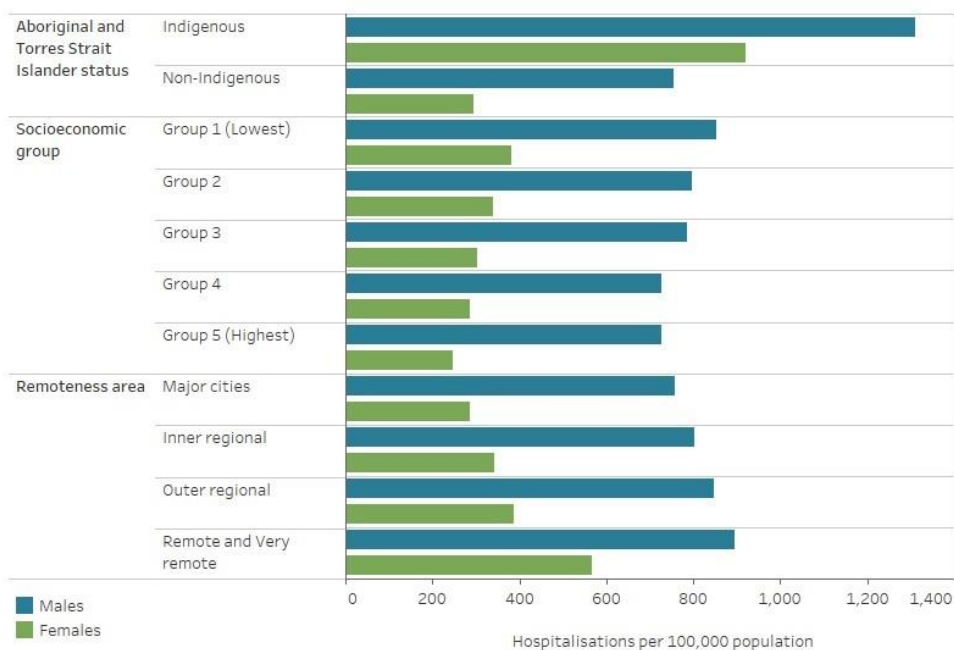


Figure 7: Coronary heart disease hospitalisation rates, principal diagnosis, by population group and sex, 2018-19

Notes:

1. Age-standardised to the 2001 Australian Standard Population.
2. Excludes persons whose Indigenous status was not stated or inadequately described.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage based on 2016 ASGS Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.

Chart: AIHW. Source: AIHW National Morbidity Database. <http://www.aihw.gov.au>

## Deaths



In 2019, coronary heart disease (CHD) was the underlying cause of 17,700 deaths (11% of all deaths and 42% of all CVD deaths).

Almost 2 in 5 (39%) CHD deaths in 2019 (7,000) resulted from acute myocardial infarction (AMI, or heart attack).

### Age and sex

In 2019:

- CHD death rates were twice as high for males as for females (age-standardised rates of 73 and 37 per 100,000 population)
- CHD death rates increased with age, with around half of all CHD deaths (48%) occurring in persons aged 85 and over. CHD death rates for males and females were highest in the 85 and over age group (1,900 and 1,500 per 100,000 population)—4 times as high for males and 6 times as high for females aged 75-84 (473 and 238 per 100,000 population) (Figure 8)
- CHD was responsible for a large proportion of premature deaths before age 75, especially in the male population—37% of males dying from CHD were aged less than 75 years, compared with 15% of females.

Figure 8: Coronary heart disease death rates, by age and sex, 2019

The bar chart shows coronary heart disease death rates by age groups in 2019. Rates were highest among men and women aged 85 and over (1,926 and 1,462 per 100,000 population).

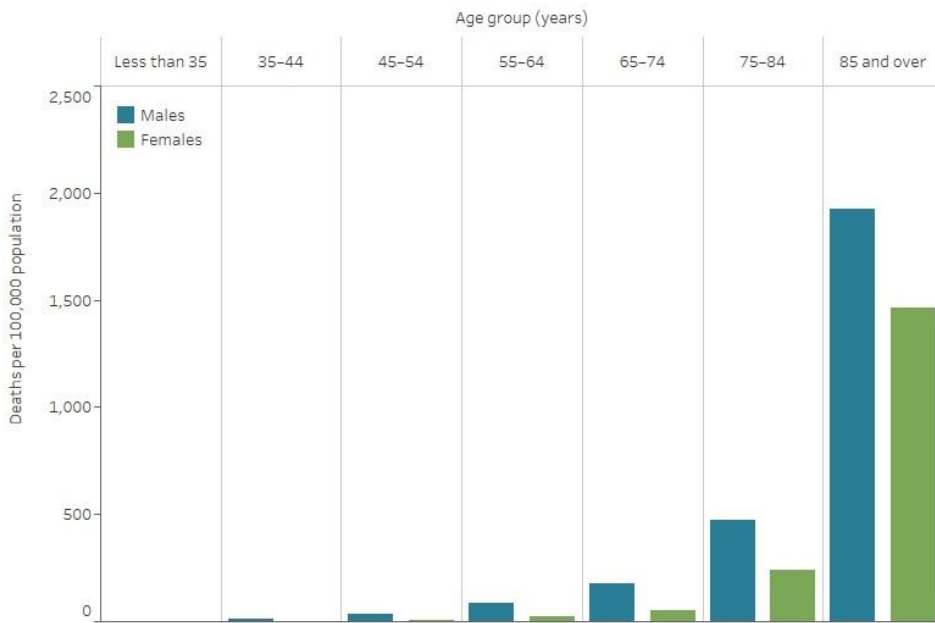


Figure 8: Coronary heart disease death rates, by age and sex, 2019

**Notes:**

1. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
2. Data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

**Trends**

CHD death rates have been declining in Australia since the late 1960s. Between 1980 and 2019:

- the number of CHD deaths declined by 42%, from 30,700 to 17,700
- age-standardised CHD death rates declined substantially, by around 80%—falling from 414 to 73 per 100,000 population for males, and 209 to 37 per 100,000 population for females (Figure 9).

Much of the decline in CHD mortality in Australia over recent decades can be attributed to reductions in levels of population risk factors, including tobacco smoking, abnormal blood lipids and high blood pressure.

Declines in CHD mortality can also be attributed to improvements in medical and surgical treatment. Better emergency care, the use of statins and agents to lower blood pressure and anti-platelet drugs, along with revascularisation procedures, have each contributed to better CHD outcomes, both in and out of hospital.

Evidence from a number of countries attributes lower CHD death rates to improvements in risk factors levels and to better treatment in about equal proportion (AIHW 2017).

**Figure 9: Coronary heart disease death rates, by sex, 1980-2019**

The line chart shows the decline in age-standardised coronary heart disease death rates between 1980 and 2019, from 414 to 73 per 100,000 population for males and from 209 to 37 for females.

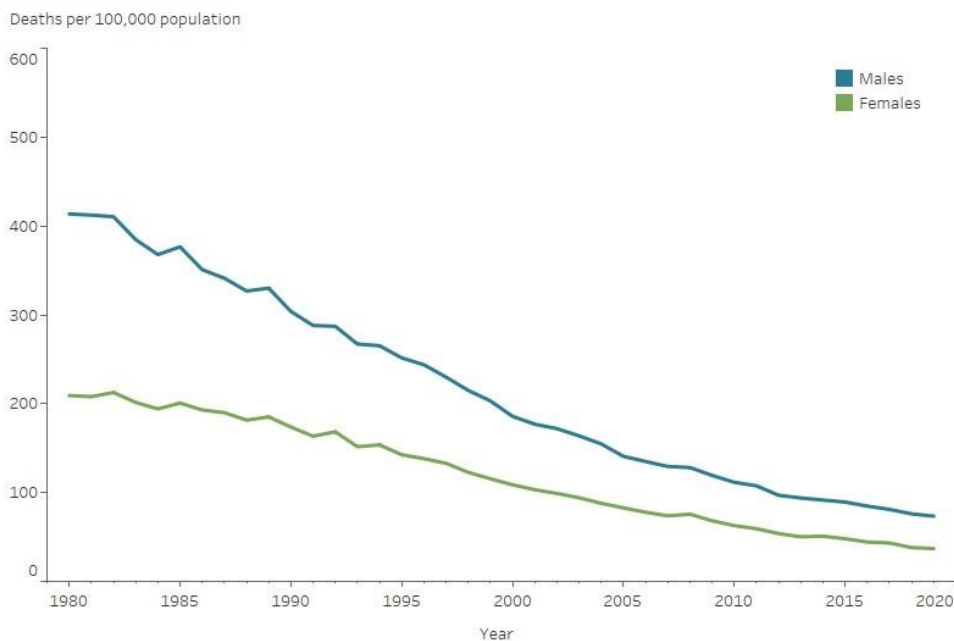


Figure 9: Coronary heart disease death rates, by sex, 1980-2019

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Death rates for 1980-1996 have been adjusted to ICD-10 standards using a comparability factor of 1.01.
3. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
4. These data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

CHD is the leading cause of death in the Aboriginal and Torres Strait Islander population.

In 2017-2019:

- CHD was the underlying cause of death for 1,143 Indigenous people in jurisdictions with adequate Indigenous identification.
- After adjusting for differences in the age structure of the populations, the CHD death rate for Indigenous Australians was twice as high as for non-Indigenous Australians (118 and 55 deaths per 100,000 population).
- CHD death rates for Indigenous males and females were 2.1 and 2.3 times as high as for non-Indigenous males and females (Figure 10).

### Socioeconomic group

- In 2017-2019, the CHD death rate was 1.6 times as high for people living in the lowest socioeconomic areas compared with those living in the highest socioeconomic areas (age-standardised rates of 70 and 43 per 100,000 population). The difference was greater for males (1.7 times as high) than females (1.5 times as high) (Figure 10).

### Remoteness area

- In 2017-2019, the CHD death rate was 1.6 times as high in *Remote and very remote* areas compared with *Major cities* (age standardised rates of 82 and 53 per 100,000 population).
- The male CHD death rate in *Remote and very remote* areas was 1.5 times as high as in *Major cities* (108 and 71 deaths per 100,000 population), and the female rate 1.4 times as high (53 and 37 per 100,000 population) (Figure 10).

## Figure 10: Coronary heart disease rates, by population group and sex, 2017-2019

The horizontal bar chart shows that coronary heart disease death rates in 2017-2019 were higher among Indigenous Australians, people living in the lowest socioeconomic areas, and people living in remote and very remote areas.

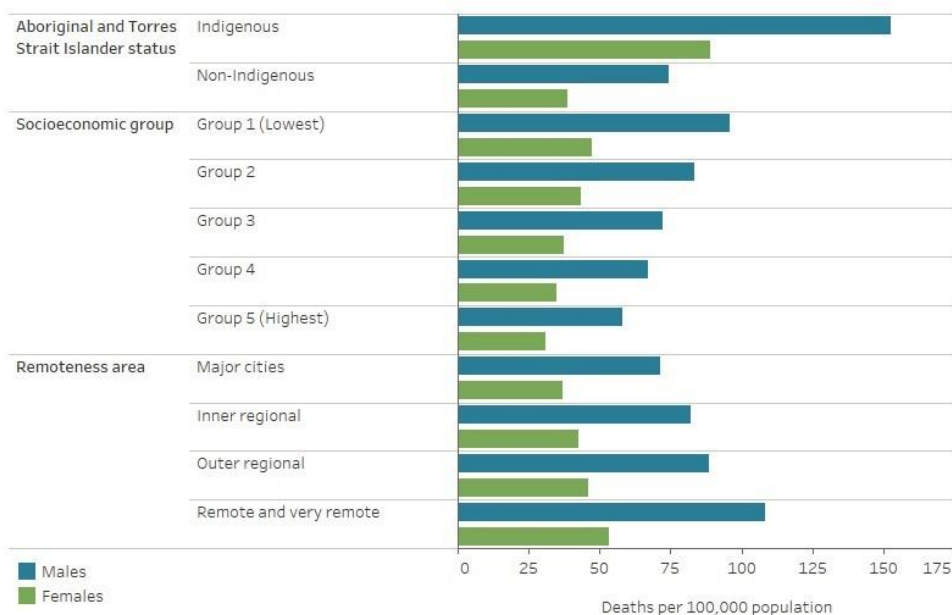


Figure 10: Coronary heart disease death rates, by population group and sex, 2017-2019

Notes:

1. Age-standardised to the 2001 Australian Standard Population.
2. Aboriginal and Torres Strait Islander status includes data from people residing in NSW, QLD, WA, SA and NT only.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage (IRSD) based on Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness areas are classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.
5. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

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## Heart, stroke and vascular disease and subtypes

### What is stroke?

Stroke is an [Australia's health topic](#)

- Causes of death | 09 Jun 2022
- Coronary heart disease | 29 Sep 2021
- Burden of disease | 18 Aug 2021

## On this page

- [How common is stroke?](#)
- [Impact](#)
- [Treatment and management](#)
- [Variation between population groups](#)
- [COVID-19 and stroke](#)
- [Where do I go for more information?](#)

Stroke occurs when a blood vessel supplying blood to the brain either suddenly becomes blocked (ischaemic stroke) or ruptures and begins to bleed (haemorrhagic stroke). Either may result in part of the brain dying, leading to sudden impairment that can affect a number of functions. Stroke often causes paralysis of parts of the body normally controlled by the area of the brain affected by the stroke or speech problems and other symptoms, such as difficulties with swallowing, vision and thinking.

Stroke can be prevented because many of its risk factors are modifiable. These include [biomedical risk factors](#) such as high blood pressure, [insufficient physical activity](#), [overweight and obesity](#), and [tobacco smoking](#).

Stroke contributes to premature death, disability, and preventable hospitalisations. As a result of the substantial impact of stroke on the Australian population, a [National Strategic Action Plan for Heart Disease and Stroke](#) has been developed. The action plan aims to reflect priorities and identify implementable actions to reduce the impact of stroke in the community.

### How common is stroke?

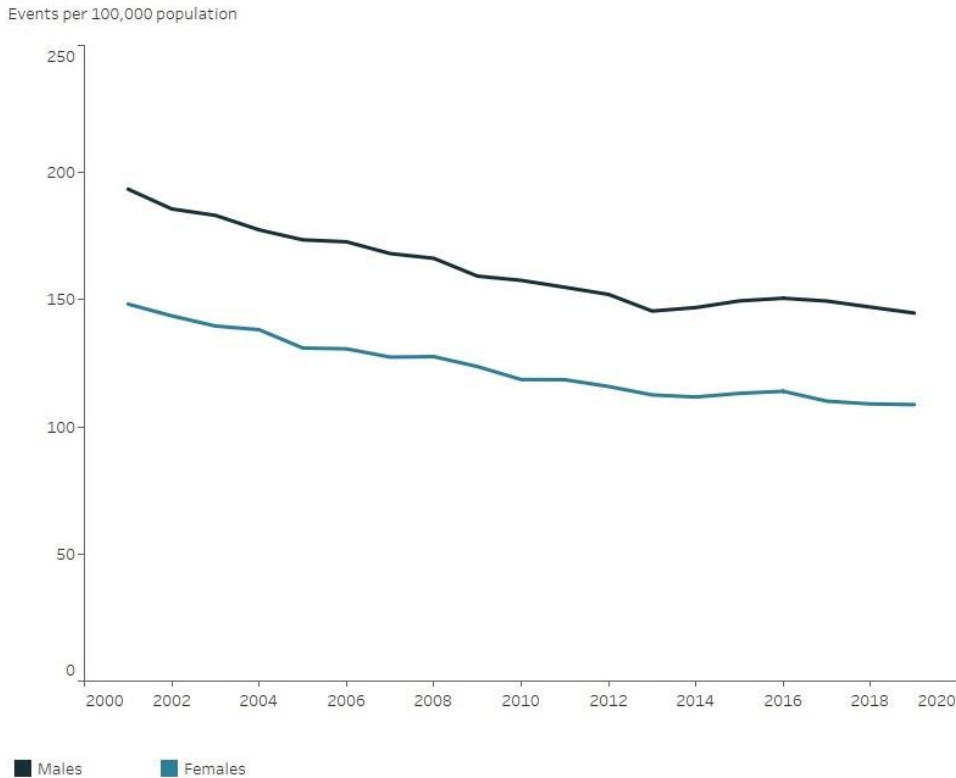
In 2018, an estimated 387,000 people aged 15 years and over - 214,000 males and 173,000 females - had had a stroke at some time in their lives, based on self-reported data from the Australian Bureau of Statistics (ABS) 2018 Survey of Disability, Ageing and Carers (ABS 2019, AIHW 2021c). The estimated prevalence of stroke was similar in 2003 (1.7%) and 2018 (1.3%) (ABS 2019; AIHW 2013).

In 2019, there were around 39,200 stroke events (20,500 among males and 18,800 among females) - more than 100 every day. The stroke event rate fell by one quarter (25%) between 2001 and 2019, from an age-standardised rate of 170 to 125 per 100,000 population (Figure 1).

Figure 1: Stroke events, by sex, 2001-2019

The chart provides the number and rate of stroke events between 2001 and 2019. The age-standardised rate of stroke events decreased by 25% for males (from 193 to 145 per 100,000 population), and by 26% for women (from 148 to 109 per 100,000 population).

**Figure 1: Stroke events, by sex, 2001 to 2019**



Note: Age-standardised to the 2001 Australian Standard Population.  
Source: AIHW 2022b, 2022c.  
<http://www.aihw.gov.au>

## Impact

### Deaths

In 2020, stroke was recorded as the underlying cause of 8,200 deaths, accounting for 5.1% of all deaths in Australia.

Stroke was one of the 5 leading causes of death in Australia - on average, 22 Australians died of stroke each day in 2020.

Rates of death increase with age - in 2020, rates among males and females aged 85 and over (690 and 900 per 100,000 population) were 4-5 times as high as rates among males and females aged 75-84 years (175 and 165 per 100,000 population).

Between 1980 and 2020, death rates for stroke have fallen by three-quarters - from 110 to 23 per 100,000 population for males, and from 99 to 24 per 100,000 population for females. The rate of decline has remained steady in people aged 75 and over but has slowed among younger age groups (Figure 2).

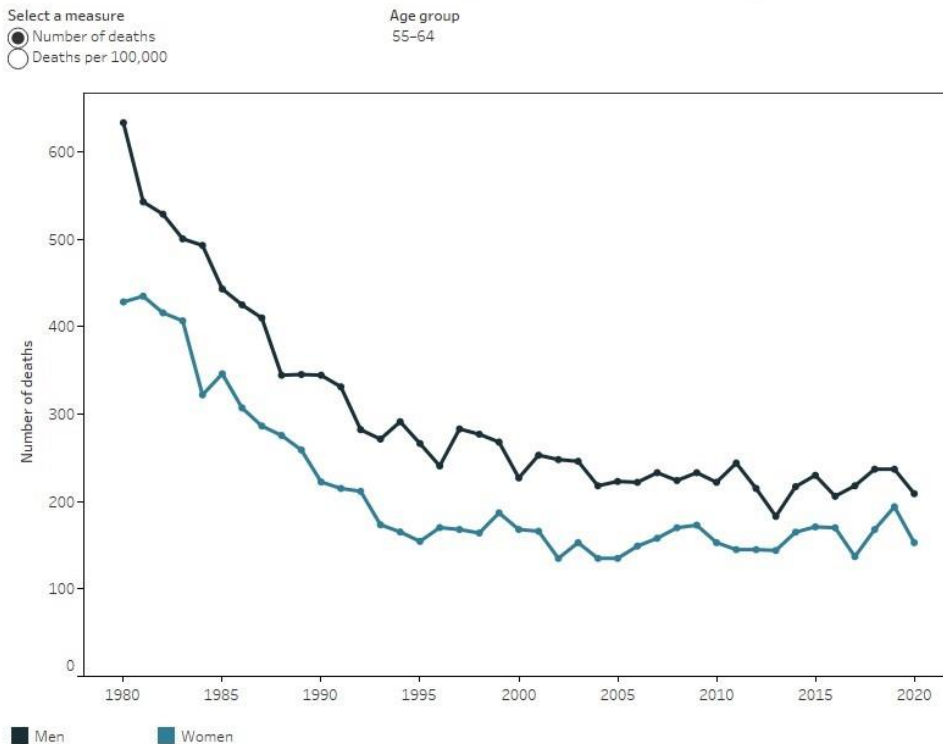
Falling stroke death rates have been driven by a number of factors, including improvements in some risk factors such as lower rates of tobacco smoking, an increased use of blood pressure-lowering drugs, treatment to prevent blood clots, access to stroke units in hospitals and other advances in medical care (AIHW 2013, 2021c).

See 'Chapter 4 Changing patterns of mortality in Australia since 1900' in *Australia's health 2022: data insights*.

### Figure 2: Stroke deaths among people aged 55-64, 65-74, 75-84 and 85 and over, by sex, 1980 to 2020

The chart shows the number and rate of deaths from stroke for males and females aged 55-64, 65-74, 75-84 and 85 and over, from 1980 to 2020. Stroke death rates fell substantially in each age group - for example, from 938 to 175 deaths per 100,000 population for men aged 75-84, and from 871 to 165 for women aged 75-84.

Figure 2: Stroke deaths among people aged 55-64, 65-74, 75-84 and 85 and over, by sex, 1980 to 2020



Notes

1. A comparability factor of 0.83 has been applied to deaths before 1996 to make them comparable with data from 1997 onwards, following the introduction of automated coding and ICD-10 codes.
  2. Rates are calculated using the sum of estimated resident populations at 30 June for each year. Rates are expressed as deaths per 100,000 men/women.
- Source: AIHW 2022c.  
<http://www.aihw.gov.au/>

## Burden of disease

Burden of disease refers to the quantified impact of living with and dying prematurely from a disease or injury and is measured using disability-adjusted life years (DALY). One DALY is equivalent to one year of healthy life lost.

In 2018, stroke accounted for 2.4% of the total burden of disease in Australia and was the 11th leading specific cause of disease burden.

Stroke ranks high in disease burden among older people - for age 85 and over, it accounted for 5.5% of the burden in males and 6.6% of the burden in females.

The total burden of disease due to stroke decreased by 44% between 2003 and 2018, from 7.4 to 4.2 DALY per 1,000 population. This included a 46% decline in the fatal burden and a 19% decline in the non-fatal burden (AIHW 2021a).

See [Burden of disease](#).

## Expenditure

In 2018-19, the estimated health system expenditure on stroke was more than \$660 million. The greatest cost was for public hospital admitted patient services (\$364.2 million) followed by private hospital services (\$115.0 million) (AIHW 2021b).

See [Health expenditure](#).

## Treatment and management

### Emergency departments

There were 41,100 presentations to Australian public hospital Emergency Departments with a principal diagnosis of stroke in 2020-21. Of these, 34,000 (83%) were admitted to the hospital to which they presented, 4,400 (11%) were referred to another hospital for admission, and 2,200 (5%) departed without being admitted or referred (AIHW 2022d).

### Hospitalisations

In 2019-20, there were 40,000 acute care hospitalisations with a principal diagnosis of stroke, at a rate of 129 per 100,000 population. Acute care hospitalisation rates were higher among males than females (1.4 times as high), and most hospitalisations (72%) were for people aged 65 and over.

The average length of stay for stroke patients in acute hospital care was 6.6 days in 2019-20.

See [Hospitals](#).

## Rehabilitation

Stroke rehabilitation helps stroke survivors to relearn and maintain their skills and functioning. It also seeks to protect them from developing new medical problems.

- In 2019-20, stroke patients in hospital rehabilitation care had an average length of stay of 14 days.
- Of a group of 2,800 stroke survivors assessed before hospital discharge in 2019, 64% were referred for further rehabilitation in the community (Stroke Foundation 2020).

## Variation between population groups

The impact of stroke varies between population groups, with age-standardised rates higher among Aboriginal and Torres Strait Islander people than among non-Indigenous Australians for both hospitalisation (1.5 times as high) and death (1.8 times as high) (Figure 3).

Age-standardised death rates and burden of disease were 1.1 and 1.2 times as high in *Remote and very remote* areas as in *Major cities*. The rate of death for stroke was 1.4 times as high in the lowest socioeconomic areas as in the highest.

Figure 3: Impact of stroke, by population group

The figure shows the age-standardised rate ratio of stroke prevalence (2018), hospitalisation (2019-20), death (2020) and burden of disease (2018) among selected population groups.

Rates were higher among Aboriginal and Torres Strait Islander people than among non-Indigenous Australians for both hospitalisation (1.5 times as high) and death (1.8 times as high). Death rates and burden of disease were 1.1 and 1.2 times as high in *Remote and very remote* areas as in *Major cities*. The rate of death for stroke was 1.4 times as high in the lowest socioeconomic areas as in the highest.

Figure 3: The impact of stroke—Variation among selected population groups

Hover on the numbers for more information on the impact of stroke in each population group.

Comparing rates for:	Indigenous / non-Indigenous	Remote and Very remote / Major cities	Lowest / highest socioeconomic areas
Having stroke	n.a.	1.2x	2.3x
Being hospitalised for stroke	1.5x	1.1x	1.1x
Dying from stroke	1.8x	1.1x	1.4x
Burden of disease	1.9x	1.2x	1.5x

Note: This figure uses age-standardised rates to remove the impact of differences in age structures between these groups.  
Sources: ABS 2019; AIHW 2021a, 2022a, 2022b, 2022c.  
<http://www.aihw.gov.au/>

## COVID-19 and stroke

People who have had a stroke are at a higher risk of severe symptoms and complications from COVID-19. People with COVID-19 are also at greater risk of stroke (Nannoni et al. 2021).

The first wave of the pandemic negatively impacted access to specialised stroke units in hospitals, with fewer resources available for treatment, leading to concerns about reduced quality of care (Cadilhac et al. 2022).



There were 9,100 deaths from cerebrovascular disease (including strokes) during 2021, 6.9% below the 2015-19 average, and comparable to the 9,000 deaths in 2020 (ABS 2022).

## Where do I go for more information?

For more information on stroke, see:

- [Heart, stroke and vascular disease - Australian facts.](#)

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## Heart, stroke and vascular disease and subtypes

### Stroke

On this page

- [How many Australians have had a stroke?](#)
- [Stroke events](#)
- [Hospitalisations](#)
- [Deaths](#)

What is stroke?

Stroke occurs when a blood vessel supplying blood to the brain either suddenly becomes blocked (**ischaemic stroke**) or ruptures and begins to bleed (**haemorrhagic stroke**).

Either may result in part of the brain dying, leading to impairment that can affect a range of activities such as speaking, thinking, movement and communication. Stroke is often fatal.

A condition related to stroke is **transient ischaemic attack (TIA)**. TIA occurs when the blood supply to the brain is blocked temporarily. The signs are the same as for a stroke, but they disappear within a short time, and there is no evidence of damage on brain imaging. TIA is an important predictor of stroke.

Risk factors for stroke include tobacco smoking, high blood pressure, abnormal blood lipids, TIA, atrial fibrillation, diabetes and other heart disease.

Stroke is sometimes referred to as **cerebrovascular disease**, although cerebrovascular disease is a broader category of diseases which include stroke and other disorders of the blood vessels supplying the brain or its covering membranes. Stroke is the most common form of cerebrovascular disease.

## How many Australians have had a stroke?



In 2018, an estimated **387,000 Australians** aged 15 and over (1.3% of the population) had **experienced a stroke** at some time in their lives, based on self-reported data from the ABS Survey of Disability, Ageing and Carers (ABS 2019).

### Age and sex

After adjusting for age, the prevalence of stroke was:

- higher in males (1.6%) than females (1.1%)
- more common in older age groups—over 2 in 3 (71%) people who had a stroke were aged 65 and over. Proportions were highest for those aged 85 and over—almost 3 times as high as for those aged 65-74 (13.6% and 4.6%) (Figure 1).

### Figure 1: Prevalence of self-reported stroke among persons aged 15 and over, by age and sex, 2018

The bar chart shows the prevalence of self-reported stroke by age group in 2018. Rates were highest among men and women aged 85 and over (16.0% and 12.3%).

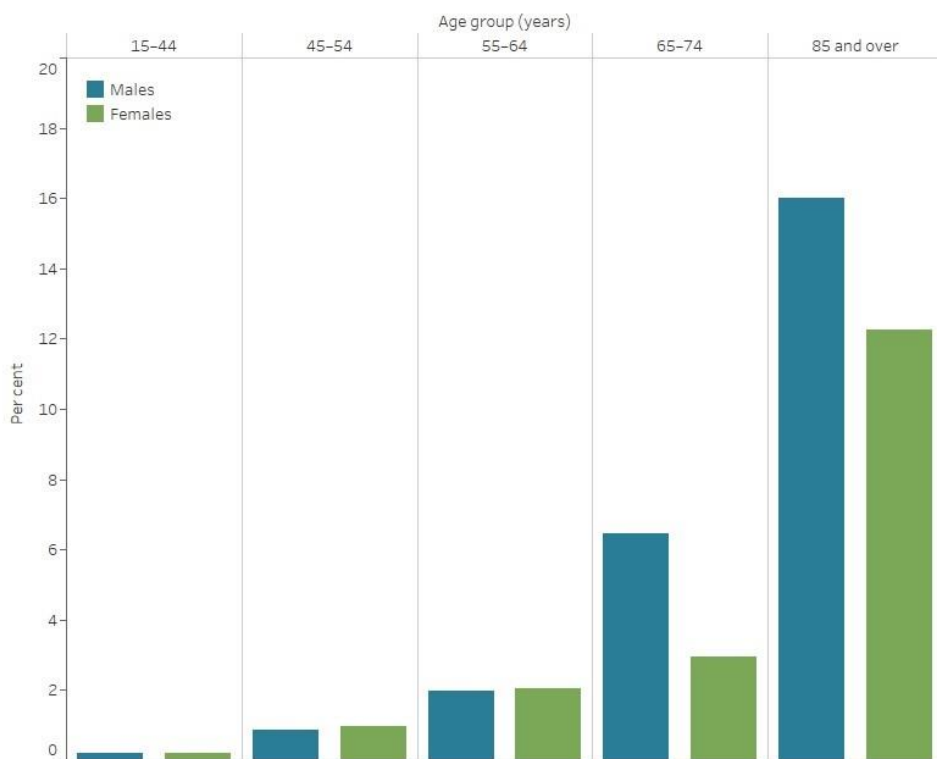


Figure 1: Prevalence of self-reported stroke among persons aged 15 and over, by age and sex, 2018

*Note:* Confidence Interval = A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.

Chart: AIHW. Source: ABS 2019. 2018 Survey of Disability, Ageing and Carers, Customised data report.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

Limited national information on the occurrence of stroke is available for the Indigenous population, with under-identification in hospital and death data and small case numbers often hampering accurate estimates (Katzenellenbogen et al. 2011). However, studies in a number of jurisdictions have found rates to be higher than for the non-Indigenous population, including:

- a first-ever stroke incidence rate of 116 per 100,000 population in South Australia in 2009–2011—1.7 times as high as for the non-Indigenous population (Balabanski et al. 2018)
- a first-ever stroke incidence rate of 307 per 100,000 population in the Northern Territory in 1999–2011—2.2 times as high as for the non-Indigenous population (You et al. 2015) stroke incidence rates of 377 for Indigenous males and 341 for Indigenous females in Western Australia in 1997–2002—2.6 and 3.0 times as high as for the non-Indigenous population (Katzenellenbogen et al. 2011).

### Socioeconomic group

Based on the 2018 Survey of Disability, Ageing and Carers, the age-standardised prevalence of stroke among people aged 15 and over living in the lowest socioeconomic areas (1.8%) was more than twice as high than for those than in the highest areas (0.8%).

### Remoteness area

Based on the 2018 Survey of Disability, Ageing and Carers, for both men and women, there were no statistically significant differences in the age-standardised prevalence of stroke across remoteness areas (Figure 2).

### Figure 2: Prevalence of self-reported stroke among persons aged 15 and over, by population group and sex, 2018

The horizontal bar chart shows that the prevalence of self-reported stroke in 2017–18 was higher among people living in socioeconomically disadvantaged areas, but did not vary significantly by remoteness areas.

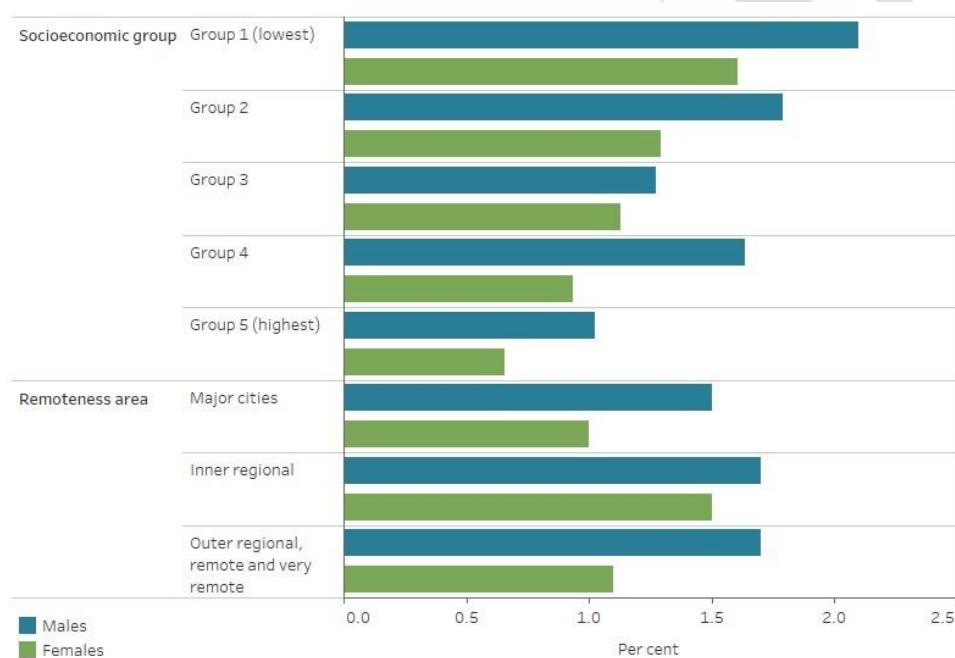


Figure 2: Prevalence of self-reported stroke among persons aged 15 and over, by population group and sex, 2018

#### Notes:

1. Age-standardised to the 2001 Australian Standard Population.
2. Confidence Interval = A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage (IRSD) based on Statistical Area Level 1 (SA1) of current residence.
4. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on usual residence.

Chart: AIHW. Source: ABS 2019. 2018 Survey of Disability, Ageing and Carers, Customised data report.  
<http://www.aihw.gov.au>

## Stroke events

There are no national data sources on the annual number of strokes. However, a related measure can be used as an estimate—the number of stroke events—developed by the AIHW using unlinked hospital and deaths data.

The number of stroke events includes new and recurrent strokes.



In 2018, there were an estimated **38,600 stroke events** in Australia—more than **100 every day**. The rate of stroke events was 154 per 100,000 population.

### Age and sex

In 2018, there were an estimated 20,200 stroke events among males and 18,400 among females.

Rates of stroke events:

- were higher in males than females (age-standardised rates of 147 and 109 per 100,000 population) increased with age, with the rate
- of the 85 and over age group (2,150 per 100,000 population) more than twice the rate of the 75-84 year age group (900 per 100,000 population), and almost 6 times the rate of the 65-74 year age group (360 per 100,000 population) (Figure 3).

### Figure 3: Stroke events, by age and sex, 2018

The bar chart shows the prevalence of stroke events by age group in 2018. Rates were highest among men and women aged 85 and over (2,099 and 2,173 per 100,000 population).

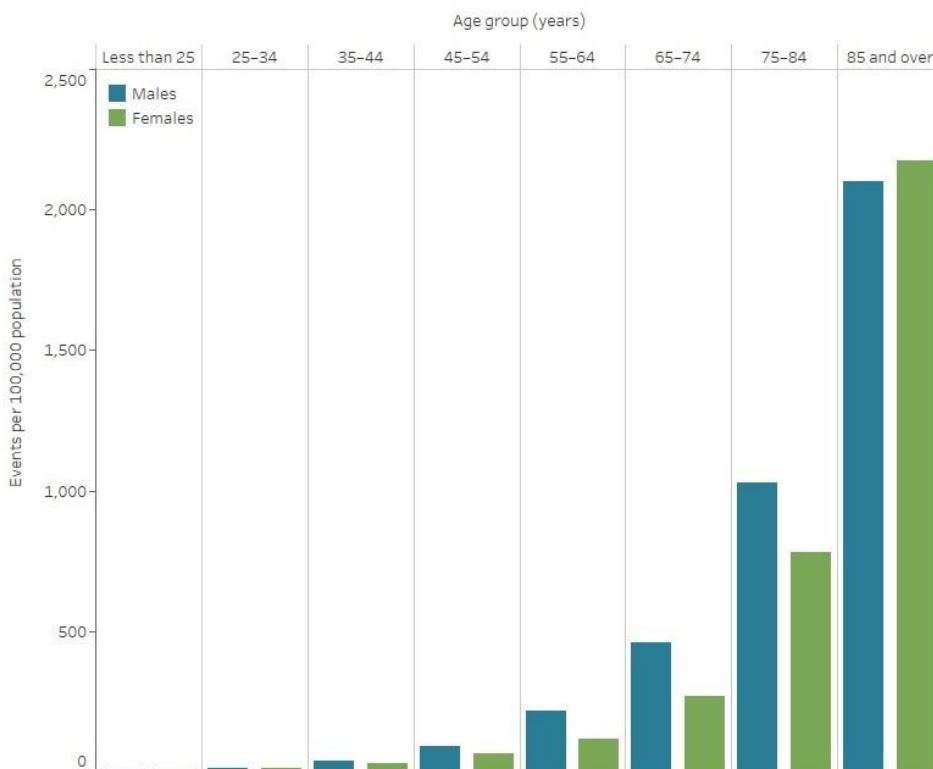


Figure 3: Stroke events, by age and sex, 2018

Note: Age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database and AIHW National Mortality Database.  
<http://www.aihw.gov.au>

### Trends

The rate of stroke events fell by one quarter (25%) between 2001 and 2018, from 169 to 127 events per 100,000 population.

The decline in rates was slightly greater for females (26%) than males (24%) (Figure 4). Since 2013, however, stroke event rates have levelled for both males and females.

### Figure 4: Stroke events, by sex, 2001-2018

The line chart shows the decline in age-standardised rates of stroke events between 2001 and 2018, from 193 to 147 per 100,000 population for males and 148 to 109 for females.

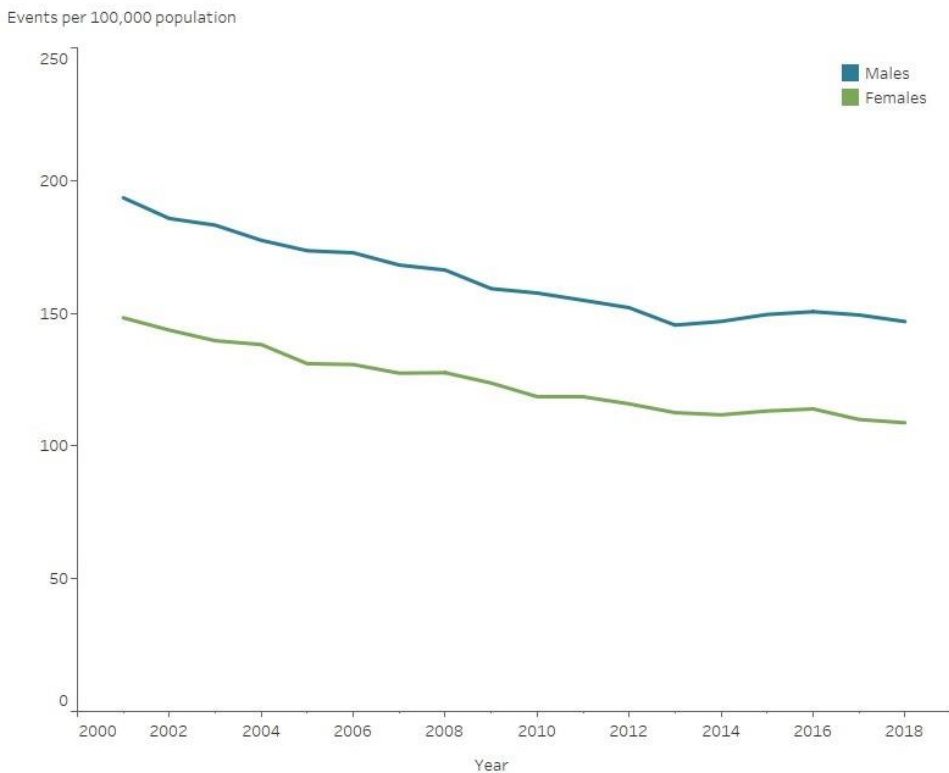


Figure 4: Stroke events, by sex, 2001-2018

Note: Age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database and AIHW National Mortality Database.  
<http://www.aihw.gov.au>

## Transient ischaemic attack

Transient ischemic attack (TIA) is a condition related to stroke. It is a temporary blockage of the blood supply to the brain, often lasting only a few minutes, and producing stroke-like symptoms that disappear within a short time.

Unlike stroke, there is no permanent damage to the brain, with no remaining symptoms, and no evidence of damage on brain imaging. TIA is, however, an important predictor of stroke—after a TIA, the risk of stroke is much higher (Stroke Foundation 2021).

- In 2018-19 there were 18,300 presentations to public hospital emergency departments with a principal diagnosis of TIA—two-thirds (12,400 or 68%) were subsequently admitted to hospital.
- There were 16,400 admissions to hospital with a principal diagnosis of TIA—a rate of 65 per 100,000 population. Male rates were higher than female rates (age-standardised rates of 59 and 49 per 100,000 population).
- Around 6.4% (1,040) of TIA admissions had an additional diagnosis of atrial fibrillation.

One quarter (4,050 or 25%) of TIA admissions were on a same-day basis. The average length of stay in hospital for all TIA admissions was 2.9 days.

## Hospitalisations



There were around **67,700 hospitalisations** where stroke was recorded as the principal diagnosis in 2018-19.

This represents 0.6% of all hospitalisations, and 11% of all cardiovascular disease (CVD) hospitalisations in Australia.

Of these, 39,600 (58%) required acute care, and 28,100 (42%) were for rehabilitation and other types of care.

## Age and sex

In 2018-19, where stroke was recorded as the principal diagnosis, hospitalisation rates:

- were 1.5 times higher for males than females (age-standardised rates of 269 and 183 hospitalisations per 100,000 population) increased
- with age, with rates for males and females highest in those aged 85 and over (2,900 and 2,600 per 100,000 population)—around 1.5 times as high as males aged 75-84 (1,900 per 100,000) and 1.9 times as high as females aged 75-84 (1,300 per 100,000) (Figure 5) close to half
- (49%) of all stroke hospitalisations occurred among persons aged 75 and over.

**Figure 5: Stroke hospitalisation rates, principal diagnosis, by age and sex, 2018-19**

The bar chart shows stroke hospitalisation rates by age groups in 2018-19. Rates were highest among men and women aged 85 and over (2,877 and 2,554 per 100,000 population).

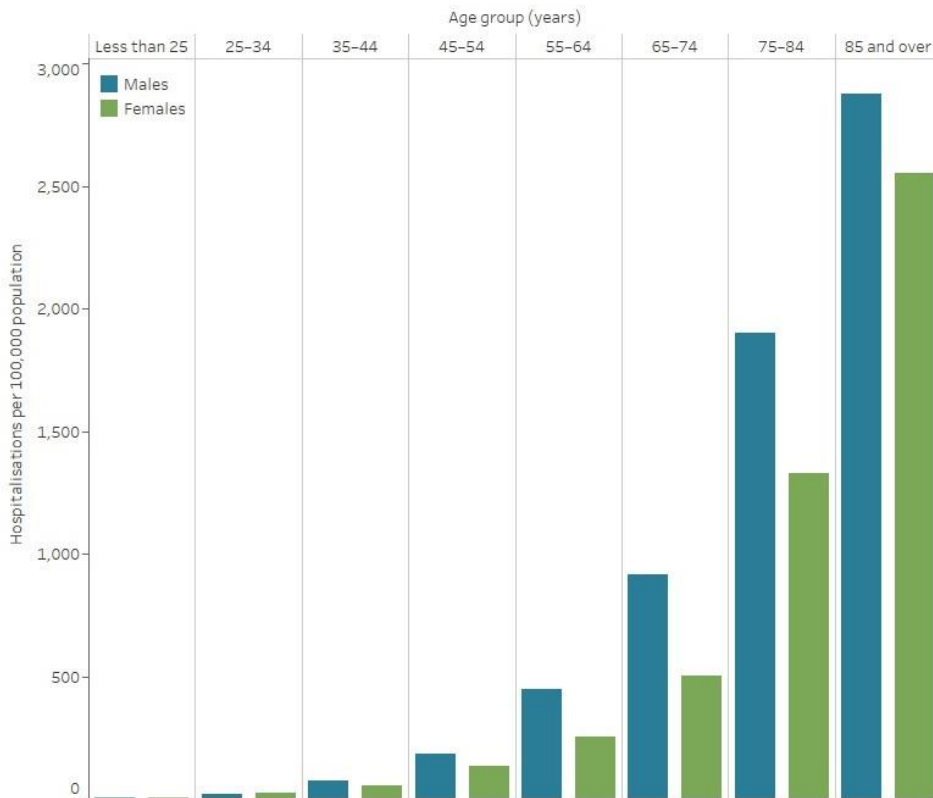


Figure 5: Stroke hospitalisation rates, principal diagnosis, by age and sex, 2018-19

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

## Trends

- Between 2000-01 and 2018-19, the number of acute care stroke hospitalisations increased by 35% for males, and 12% for females.
- The age-standardised rate of hospitalisation for acute care stroke fell by 22%, from 169 to 131 per 100,000 population. Rates fell by 21% for males (from 197 to 156 per 100,000 population) and 26% for females (from 145 to 108 per 100,000 hospitalisations) (Figure 6).
- Hospitalisation rates fell for most age groups, but increased for those age 45-54 years, from 82 to 95 per 100,000 hospitalisations.

**Figure 6: Acute care stroke hospitalisation rates, principal diagnosis, by sex, 2000-01 to 2018-19**

The line chart shows the decline in age-standardised rates of acute care stroke hospitalisations between 2000-01 and 2018-19, from 197 to 156 per 100,000 population for males, and from 145 to 108 for females.



Figure 6: Acute care stroke hospitalisation rates, principal diagnosis, by sex, 2000-01 to 2018-19

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Analysis includes care types: 1 (acute care), 7.1 (newborn with qualified days only), 7.2 (newborn with qualified and unqualified days) and 99 (not reported / unknown) only.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2018-19, there were around 1,500 hospitalisations with a principal diagnosis of stroke among Aboriginal and Torres Strait Islander people.

After adjusting for differences in the age structure of the populations:

- the rate among Indigenous Australians was 1.5 times as high as the non-Indigenous rate (329 and 217 per 100,000 population) the disparity
- between Indigenous and non-Indigenous Australians was greater for females than males—1.7 times as high for females (307 and 177 per 100,000 population) and 1.3 times as high for males (350 and 260 per 100,000 population) (Figure 7).

### Socioeconomic group

In 2018-19, age-standardised stroke hospitalisation rates for people living in the lowest and highest socioeconomic areas were similar—235 and 217 per 100,000 population (Figure 7).

### Remoteness area

In 2018-19, age-standardised stroke hospitalisation rates for people living in *Remote and very remote* areas were around 10% higher than for people living in *Major cities* (248 and 226 hospitalisations per 100,000 population) (Figure 7).

## Figure 7: Stroke hospitalisation rates, principal diagnosis, by population group and sex, 2018-19

The horizontal bar chart shows that stroke hospitalisation rates in 2018-19 were higher among Indigenous Australians and people living in Remote and very remote areas, but did not differ significantly by socioeconomic area.

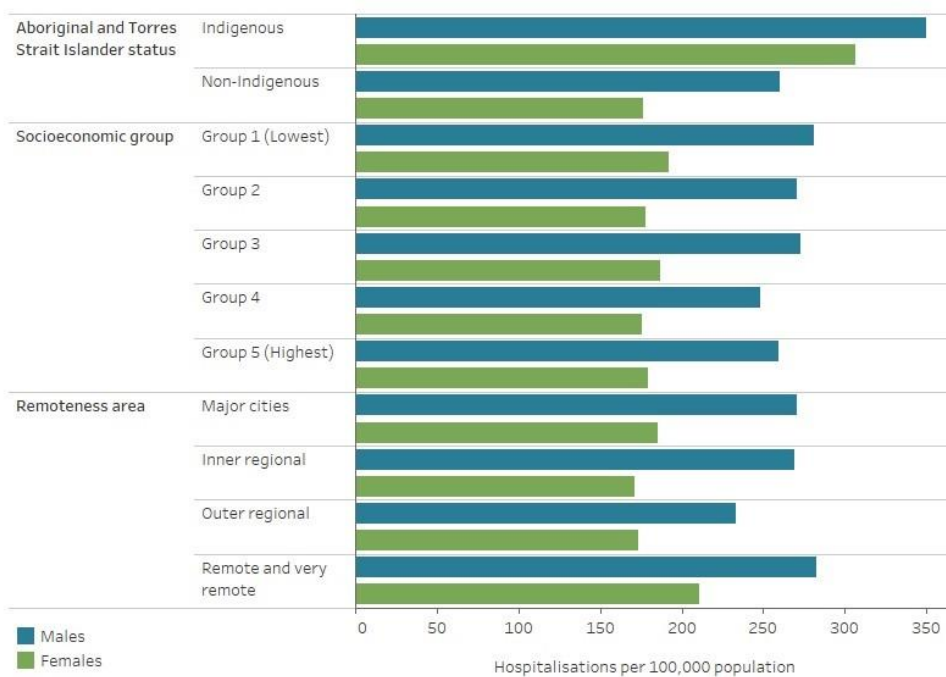


Figure 7: Stroke hospitalisation rates, principal diagnosis, by population group and sex, 2018-19

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Excludes persons whose Indigenous status was not stated or inadequately described.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage based on 2016 ASGS Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

## Deaths



In 2019, stroke was the underlying cause of **8,400 deaths** (5.0% of all deaths and 20% of CVD deaths).

Stroke was one of the 5 leading causes of death in Australia—on average, 23 Australians died of stroke each day in 2019.

### Age and sex

In 2019, stroke death rates:

- were similar for males and females (age-standardised rates of 24 and 25 per 100,000 population) were higher for males than females in
- each age group, except for 85 and over, where rates were higher among females than males (969 and 739 per 100,000 population) increased with age, with over half (54%) of all stroke deaths occurring in those aged 85 and over, where stroke death rates were 4 times
- as high for males and 6 times as high for females aged 75-84 (179 and 172 per 100,000 population) (Figure 8).

Figure 8: Stroke death rates, by age and sex, 2019

The bar chart shows stroke death rates by age groups in 2019. Rates were highest among men and women aged 85 and over (739 and 969 per 100,000 population).



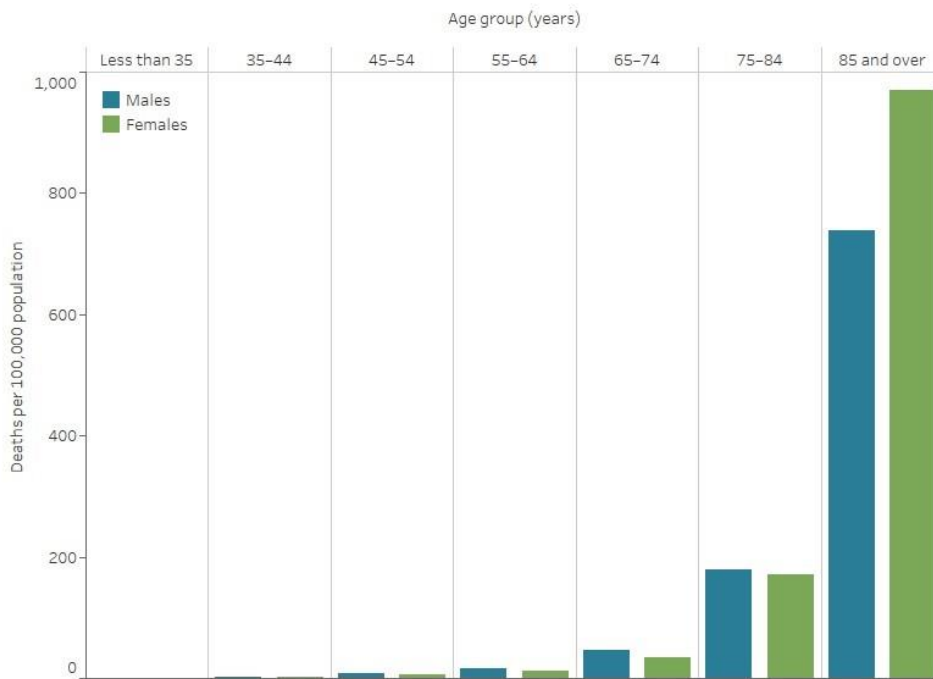


Figure 8: Stroke death rates, by age and sex, 2019

**Notes:**

1. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
2. Data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

**Trends**

The number and rate of stroke deaths declined substantially between 1980 and 2019:

- the number of stroke deaths declined by 30%, from around 12,100 to 8,400 the age-standardised stroke death rate declined by three-quarters (76%), falling from 104 to 25 deaths per 100,000 population. Stroke death rates declined in a similar fashion for males and females (Figure 9).

Falling stroke death rates have been driven by a number of factors, including improvements in risk factors such as lower rates of tobacco smoking, an increased use of blood pressure-lowering drugs, treatment to prevent blood clots, access to stroke units in hospitals and other advances in medical care (AIHW 2013).

**Figure 9: Stroke death rates, by sex, 1980-2019**

The line chart shows the decline in age-standardised coronary heart disease death rates between 1980 and 2019, from 108 to 24 per 100,000 population for males and from 99 to 25 for females.

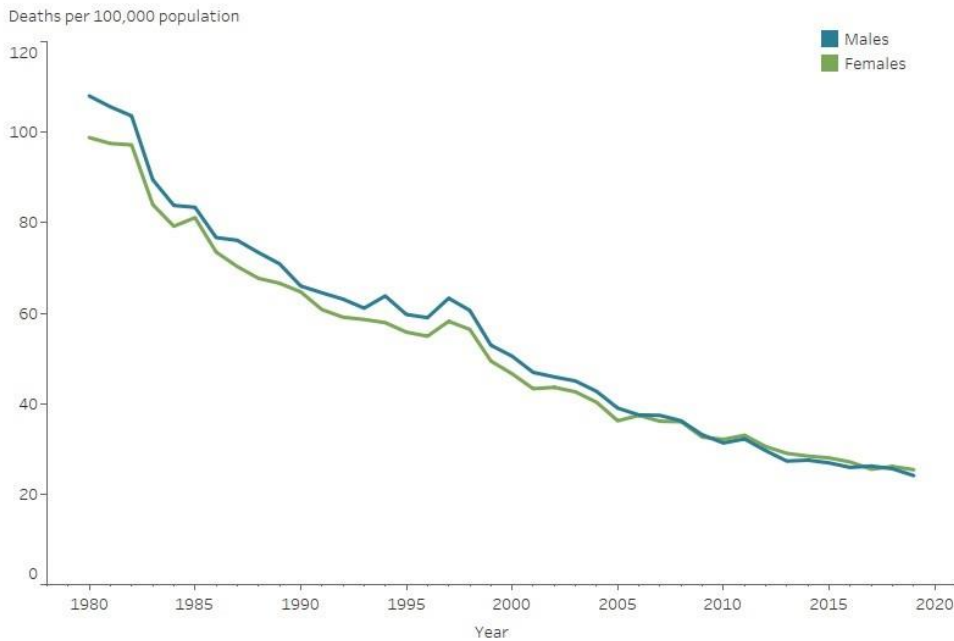


Figure 9: Stroke death rates, by sex, 1980-2019

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Death rates for 1980-1996 have been adjusted for ICD-10 standards using a comparability factor of 0.83.
3. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
4. These data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2017-2019:

- there were 276 deaths with an underlying cause of stroke among Aboriginal and Torres Strait Islander people in jurisdictions with adequate identification of Indigenous status.
- after adjusting for differences in the age structure of the populations, the stroke death rate for Indigenous people was 1.5 times as high as that for non-Indigenous people (38 compared with 26 deaths per 100,000 population).
- Indigenous males and females had stroke death rates 1.5 times as high as non-Indigenous males and females (Figure 10).

### Socioeconomic group

In 2017-2019, the stroke death rate was 1.3 times as high for people living in the lowest socioeconomic areas compared with those living in the highest socioeconomic areas (age-standardised rates of 29 and 22 per 100,000 population).

The difference was similar for males (1.4 times as high) and females (1.3 times as high) (Figure 10).

### Remoteness area

In 2017-2019, the stroke death rate in *Remote and very remote* areas was 1.1 times as high as in *Major cities* (age-standardised rates of 28 and 25 per 100,000 population).

The female rate in *Remote and very remote* areas was 1.1 times as high as in *Major cities* (28 and 24 deaths per 100,000 population), as was the male rate (26 and 24 deaths per 100,000 population) (Figure 10).

## Figure 10: Stroke death rates, by population group and sex, 2017-2019

The horizontal bar chart shows that stroke death rates in 2017-2019 were higher among Indigenous Australians and people living in the lowest socioeconomic areas, but did not differ significantly by remoteness area.

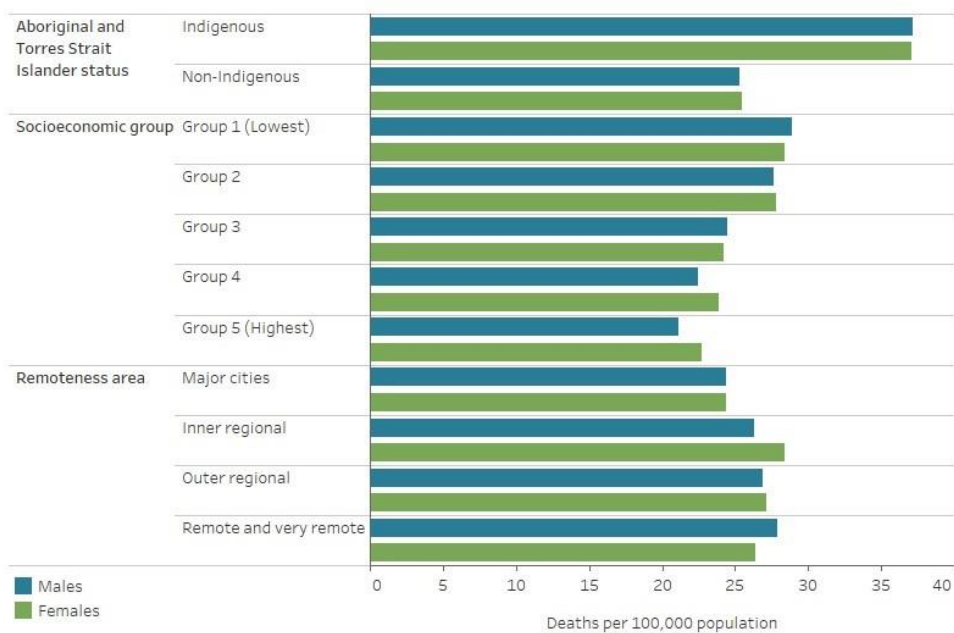


Figure 10: Stroke death rates, by population group and sex, 2017-2019

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Aboriginal and Torres Strait Islander status includes data from people residing in NSW, QLD, WA, SA and NT only.
3. Socioeconomic groups are classified according to population based quintiles using the Index of Relative Socio-economic Disadvantage (IRSD) based on Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness areas are classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.
5. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subjected to further revision by the Australian Bureau of Statistics.

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

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## Heart, stroke and vascular disease and subtypes

### Heart failure and cardiomyopathy

On this page

- [How many Australians have heart failure?](#)
- [Hospitalisations](#)
- [Deaths](#)

## What is heart failure and cardiomyopathy?

**Heart failure** occurs when the heart begins to function less effectively in pumping blood around the body. It can occur suddenly, although it usually develops slowly as the heart gradually becomes weaker.

Heart failure can result from a variety of diseases and conditions that impair or overload the heart. These include heart attack, high blood pressure, damaged heart valves or cardiomyopathy.

**Cardiomyopathy** is where the entire heart muscle, or a large part of it, is weakened. Causes of weakening include coronary heart disease, hypertension, viral infections and alcohol consumption above guideline levels. Cardiomyopathy and heart failure commonly occur together.

People with mild heart failure may have few symptoms, but in more severe cases it can result in chronic tiredness, reduced capacity for physical activity and shortness of breath. It often occurs as a comorbid condition with other chronic diseases, including CHD, diabetes and chronic kidney disease.

Generally, heart failure cannot be cured because the heart muscle has been irreversibly damaged, although some forms, caused by particular impairments such as heart valve defects or certain effects of a heart attack, may be cured if treated early enough. Treatment may improve quality of life, reduce hospital admissions and extend a person's life. In certain end-stage patients, heart transplantation may be used.

## How many Australians have heart failure?

### Prevalence



An estimated **102,000 people** aged 18 and over (0.5%) had **heart failure** in 2017-18, based on self-reported data from the ABS 2017-18 National Health Survey (ABS 2018).

Two-thirds of adults with heart failure (68,500 people) were aged 65 and over.

However, using self-reported data to estimate the number of people with heart failure underestimates the true burden, as the early stages of the disease are only mildly symptomatic, and a substantial proportion of cases are undiagnosed. A recent review of studies reported the prevalence of heart failure in the Australian population as ranging between 1.0% and 2.0% (Sahle et al. 2016).

Since heart failure and cardiomyopathy have a considerable impact on the health of Australians, estimates of prevalence based on self-report should be interpreted with caution.

### Age and sex

An estimated 70,700 men and 40,200 women aged 18 and over had heart failure in 2017-18, based on self-reported data from the 2017-18 NHS (ABS 2018).

This corresponds to rates of 0.5% for men and 0.4% for women.

### Hospitalisations

Heart failure and cardiomyopathy often occur alongside other chronic diseases, so both the principal and additional diagnoses of heart failure or cardiomyopathy should be counted when estimating their contribution to hospitalisations. As heart failure has historically been under recorded in hospital data and the accuracy of coding heart failure varies between Australian hospitals, it is likely that estimates are undercounts (Coory & Cornes 2005, Powell et al. 2000, Teng et al. 2008).



There were around **181,200 hospitalisations** where **heart failure or cardiomyopathy** was recorded as the principal and/or additional diagnosis in 2018-19. This represents 1.6% of all hospitalisations in Australia in 2018-19.

Heart failure or cardiomyopathy was recorded as the principal diagnosis in 40% (73,000) of these hospitalisations.

In those cases where heart failure or cardiomyopathy was listed as an additional diagnosis, more than half (55%) had either a cardiovascular or respiratory disease listed as the principal diagnosis. The most common principal diagnoses in these cases were CHD (9.7% of hospitalisations), chronic lower respiratory diseases including bronchitis and chronic pulmonary obstructive disease (8.8%), influenza or pneumonia (9.4%) and atrial fibrillation or flutter (5.6%).

### Age and sex

Where heart failure or cardiomyopathy was recorded as the principal and/or additional diagnosis, hospitalisation rates:

- were overall 1.4 times as high for males as females (age-standardised rates of 689 and 485 per 100,000 population). Age-specific rates were higher among males than females in all age groups increased with age, with rates highest for males and females aged 85 and over
- (13,600 and 10,700 per 100,000 population)—at least 2.5 times as high as those aged 75-84 (5,500 and 4,000 per 100,000) (Figure 1).

**Figure 1: Heart failure and cardiomyopathy hospitalisation rates, principal and/or additional diagnosis, by age and sex, 2018-19**

The bar chart shows that heart failure and cardiomyopathy hospitalisation rates in 2018-19 were highest among men and women aged 85 and over (13,600 and 10,700 per 100,000 population, respectively).

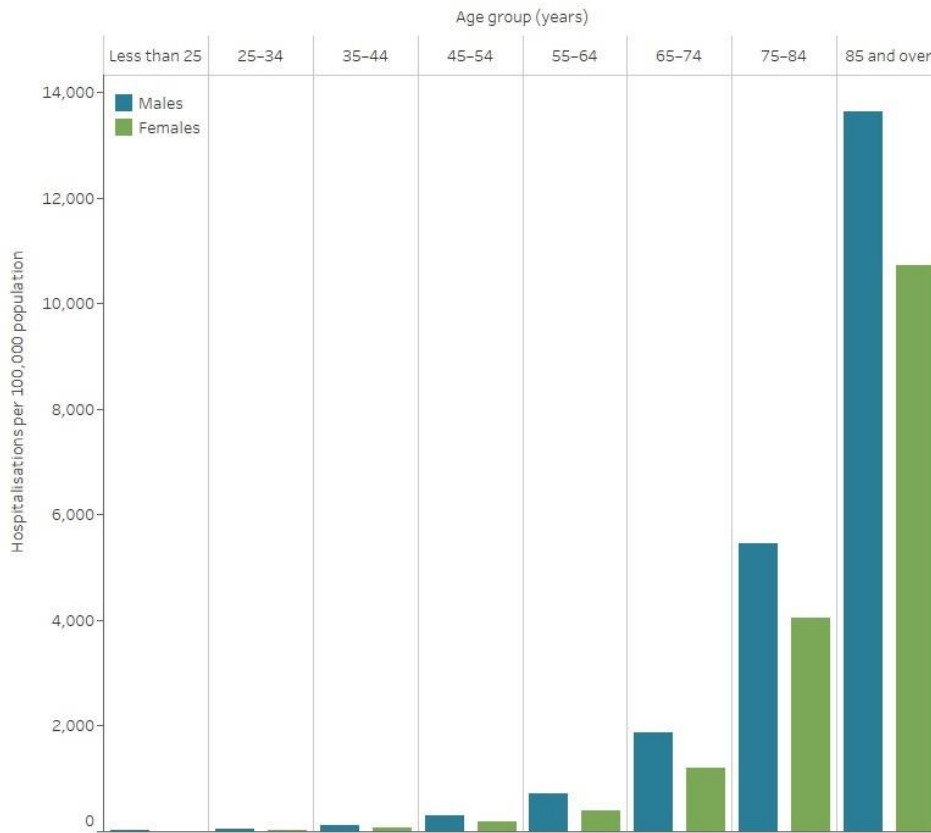


Figure 1: Heart failure and cardiomyopathy hospitalisation rates, principal and/or additional diagnosis, by age and sex, 2018-19

Chart: AIHW. Source: AIHW National Hospital Morbidity Database...

### Trends

Between 2000-01 and 2018-19, there was a 25% reduction in the age-standardised rate of hospitalisations with a principal and/or additional diagnosis of heart failure or cardiomyopathy (767 to 579 per 100,000 population).

The number of heart failure and cardiomyopathy hospitalisations increased by 33% for males and 17% for females, while age-standardised rates fell by 25% for both males (from 922 to 689 per 100,000 population) and females (from 646 to 485) (Figure 2).

**Figure 2: Heart failure and cardiomyopathy hospitalisation rates, principal and/or additional diagnosis, by sex, 2000- 01 to 2018-19**

The line chart shows the decline in age-standardised heart failure and cardiomyopathy hospitalisation rates between 2000-01 and 2009-10 from 922 to 684 per 100,000 population for males and 646 to 458 per 100,000 population for females. Rates remained steady between 2010-11 and 2018-19 for both males and females.

Hospitalisations per 100,000 population

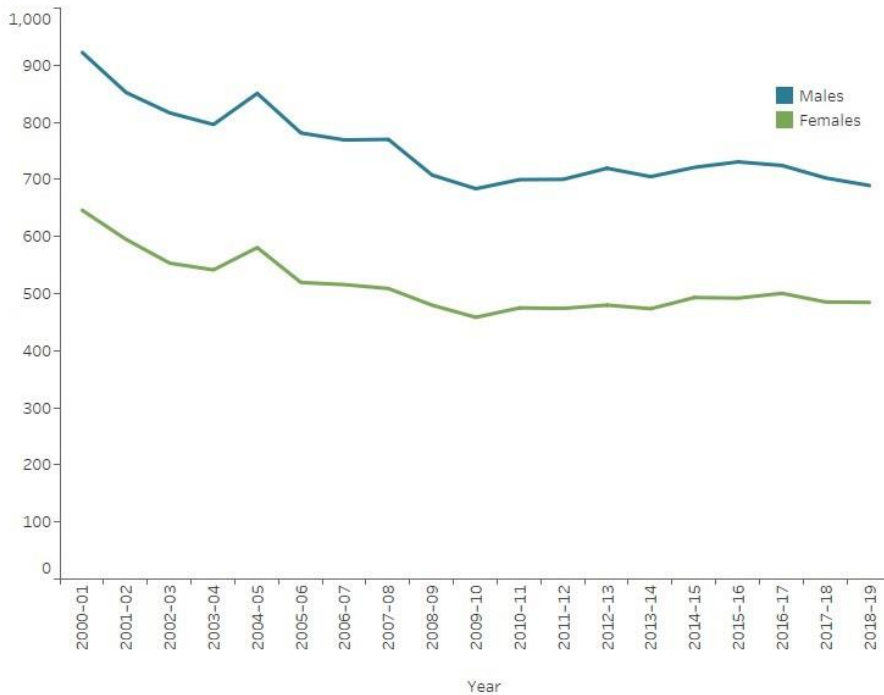


Figure 2: Heart failure and cardiomyopathy hospitalisation rates, principal and/or additional diagnosis, by sex, 2000-01 to 2018-19

Note: Age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2018-19, there were around 6,200 hospitalisations with a principal and/or additional diagnosis of heart failure or cardiomyopathy among Aboriginal and Torres Strait Islander people.

After adjusting for differences in the age structure of the populations:

- the rate among Indigenous Australians was 2.6 times as high as the non-Indigenous rate (1,452 and 556 per 100,000 population) the
- disparity between Indigenous and non-Indigenous Australians was greater for females than males—3.1 times as high for females (1,442 and 462 per 100,000 population) and 2.2 times as high for males (1,467 and 666 per 100,000 population) (Figure 3).

### Socioeconomic group

In 2018-19, age-standardised heart failure and cardiomyopathy hospitalisation rates were almost 70% higher for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas—734 and 435 per 100,000 population.

The gap in hospitalisation rates between the lowest and highest socioeconomic areas was similar for both males and females—1.7 times as high—for males 866 and 520 per 100,000 population, and for females 619 and 365 per 100,000 population (Figure 3).

### Remoteness area

In 2018-19, the age-standardised heart failure and cardiomyopathy hospitalisation rate in *Remote and very remote* areas was around 60% higher compared with *Major cities* (885 and 555 hospitalisations per 100,000 population).

There were greater disparities in female rates (1.9 times as high—867 and 465 per 100,000 population) than males rates (1.4 times times as high—902 and 662 per 100,000 population) (Figure 3).

## Figure 3: Heart failure and cardiomyopathy hospitalisation rates, principal and/or additional diagnosis, by population group and sex, 2018-19

The horizontal bar chart shows that heart failure and cardiomyopathy hospitalisation rates were higher among Indigenous Australians, people living in the lowest socioeconomic areas and people living in Remote and very remote areas.

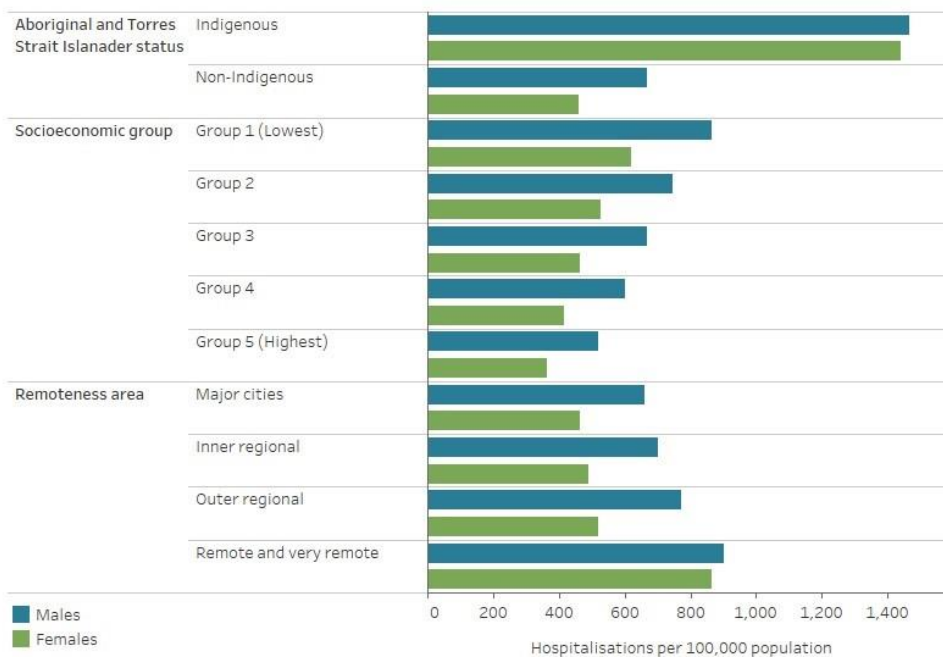


Figure 3: Heart failure and cardiomyopathy hospitalisation rates, principal and/or additional diagnosis, by population group and sex, 2018-19

**Notes:**

1. Age-standardised to the 2001 Australian Standard Population.
2. Excludes persons whose Indigenous status was not stated or inadequately described.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage based on 2016 ASGS Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Area structure based on Statistical Area Level 2 (SA2) of usual residence.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

## Deaths

Heart failure and cardiomyopathy contributed to 24,000 deaths (14% of all deaths) in 2019.



Heart failure or cardiomyopathy was the underlying cause of 4,500 deaths in 2019, and was an associated cause in a further 19,500 deaths.

Heart failure and cardiomyopathy are more likely to be listed as an associated cause of death. This is because it is often not heart failure or cardiomyopathy that leads directly to death—rather, one of their complications or comorbidities will be listed as the underlying cause of death on the death certificate.

When heart failure or cardiomyopathy are examined as an associated cause of death, the conditions most commonly listed as the underlying cause of death were:

- chronic ischaemic heart disease (17%) other
- chronic obstructive pulmonary disease (8.0%) acute
- myocardial infarction (6.2%) atrial fibrillation and flutter (4.7%) non-rheumatic aortic valve disorders
- (3.4%).

### Age and sex

In 2019, death rates for heart failure and cardiomyopathy as the underlying or associated cause:

- were 1.4 times as high for males as for females (age-standardised rates of 83 and 61 per 100,000 population). Age-specific rates were higher for males than females across all age groups increased with age, with over 80% of deaths occurring among those aged 75 and over. Death rates for males and females were highest in the 85 and over age group (3,000 and 2,600 per 100,000 population)—5.0 times as high for males and 6.7 times as high for females aged 75-84 (598 and 389 per 100,000 population) (Figure 4).

Figure 4: Heart failure and cardiomyopathy death rates, underlying or associated cause, by age and sex, 2019

The bar chart shows that heart failure and cardiomyopathy death rates in 2019 were highest among males and females 85 years and over (3,000 and 2,600 per 100,000 population, respectively).

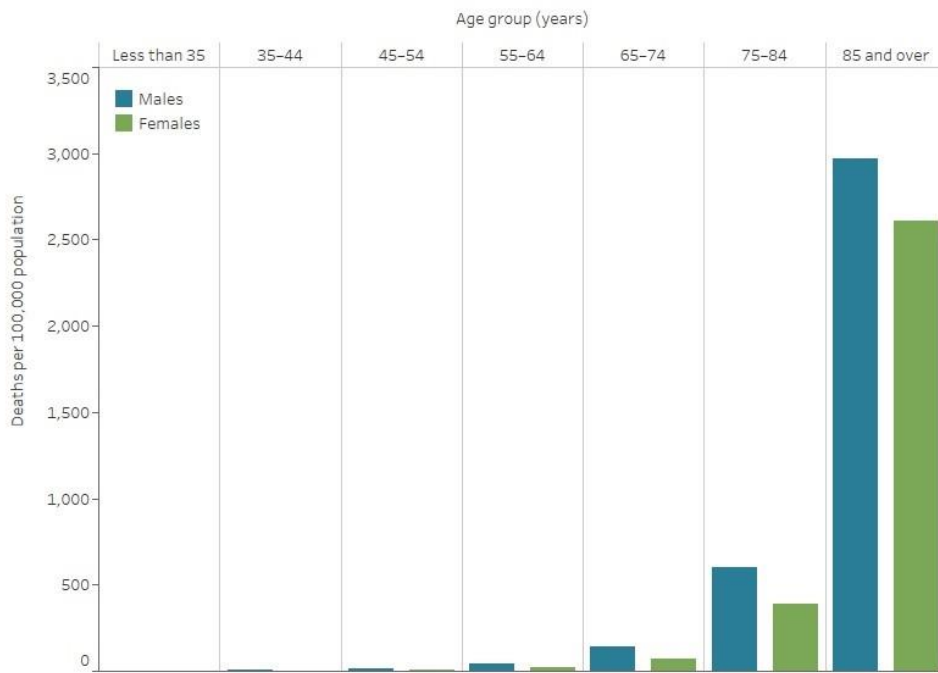


Figure 4: Heart failure and cardiomyopathy death rates, underlying or associated cause, by age and sex, 2019

*Notes:*

1. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
2. Data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

**Trends**

Between 1997 and 2019:

- the number of deaths where heart failure or cardiomyopathy was an underlying or associated cause increased by 15%, from 20,800 to 24,000
- age-standardised heart failure and cardiomyopathy death rates declined by more than 40%—falling from 152 to 83 per 100,000 population for males, and from 106 to 61 per 100,000 population for females (Figure 5).

Figure 5: Heart failure and cardiomyopathy death rates, underlying or associated cause, by sex, 1997-2019

The line chart shows the decline in age-standardised heart failure and cardiomyopathy death rates between 1997 and 2019 from 152 to 83 and 106 to 61 per 100,000 population for males and females, respectively.



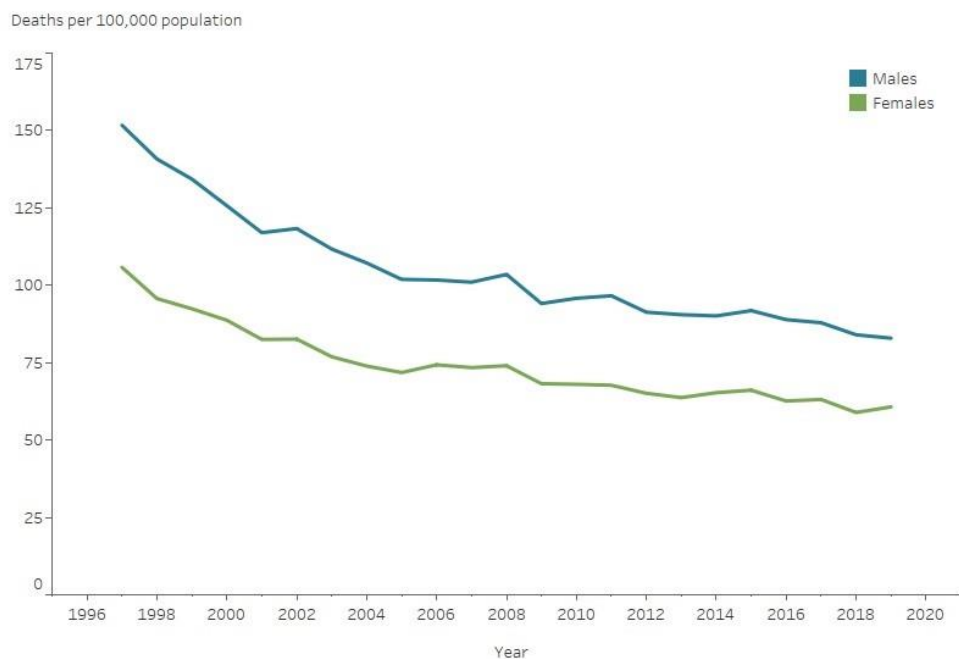


Figure 5: Heart failure and cardiomyopathy death rates, underlying or associated cause, by sex, 1997-2019

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
3. These data have been applied for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

### Variation among population groups

#### Aboriginal and Torres Strait Islander people

In 2017-2019, heart failure or cardiomyopathy was an underlying or associated cause of death for 1,089 Indigenous Australians in the jurisdictions with adequate Indigenous identification.

The age-standardised Indigenous death rate (140 per 100,000 population) was 2.0 times as high as the non-Indigenous rate (70 per 100,000 population). Indigenous males and females had heart failure and cardiomyopathy death rates 1.8 and 2.2 times as high as non-Indigenous males and females (Figure 6).

#### Socioeconomic group

In 2017-2019, the age-standardised death rate for heart failure or cardiomyopathy as an underlying or associated cause was 1.6 times as high for people living in the lowest socioeconomic areas compared with those living in the highest socioeconomic areas (88 and 56 per 100,000 population).

The disparity was slightly higher for males (1.6 times as high) than females (1.5 times as high) (Figure 6).

#### Remoteness area

In 2017-2019, age-standardised heart failure and cardiomyopathy death rates were lowest for those living in *Major cities* (66 deaths per 100,000 population) and highest for those in *Remote and very remote* areas (103 per 100,000 population).

Males had higher heart failure and cardiomyopathy death rates than females in all remoteness areas (Figure 6).

### Figure 6: Heart failure and cardiomyopathy death rates, underlying or associated cause, by population group and sex, 2017-2019

The horizontal bar chart shows that age-standardised heart failure and cardiomyopathy death rates in 2017-2019 were higher among Indigenous Australians, people living in the lowest socioeconomic areas and people living in Remote and very remote areas.

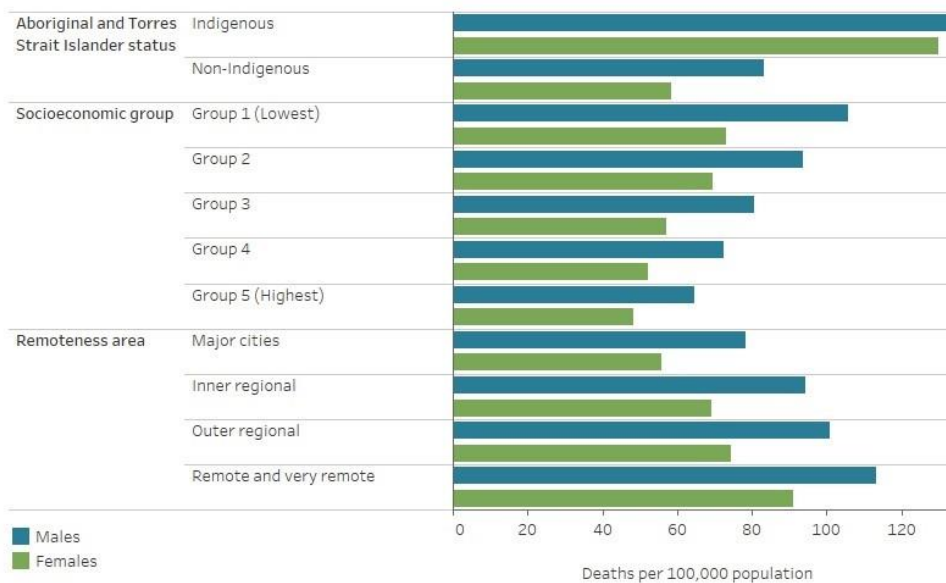


Figure 6: Heart failure and cardiomyopathy death rates, underlying or associated cause, by population group and sex, 2017-2019

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population
2. Aboriginal and Torres Strait Islander status includes data from people residing in NSW, QLD, WA, SA and NT only.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage (IRSD) based on Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness areas are classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.
5. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
5. Rates are age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

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# Heart, stroke and vascular disease and subtypes

## Atrial fibrillation

On this page

- [How many Australians have atrial fibrillation?](#)
- [Hospitalisations](#)
- [Deaths](#)

### What is atrial fibrillation?

**Atrial fibrillation (AF)** is a disturbance of the electrical system of the heart, where the heart beats with an abnormal rhythm, and does not pump blood regularly or work as efficiently as it should.

Often, people with AF do not know that they have it, and they do not experience any symptoms. Others may experience an irregular pulse, heart palpitations ('fluttering'), fatigue, weakness, discomfort, shortness of breath or dizziness.

Common causes of AF include long-term high blood pressure, coronary heart disease and valvular heart disease. For some people, there is no apparent cause.

The risk of developing AF is higher in older people. Other risks include obesity, diabetes, CKD, obstructive sleep apnoea, smoking and alcohol consumption above guideline levels.

AF increases the risk of stroke, and strokes associated with AF are more severe with a risk of death twice that of other stroke causes. An individual's risk may be even higher if their AF is associated with previous heart disease or with other chronic diseases (NHFA 2016).

## How many Australians have atrial fibrillation?

Currently, there are no national data sources that report on the total number of Australians who have AF.



Surveys and studies on sections of the Australian population suggest that **AF affects approximately 2.2% of the general population**—equivalent to **more than 500,000 people** in 2021 (AIHW 2020).

The proportion affected increases with age. An estimated 5.4% of the Australian population aged 55 and over have AF.

## Hospitalisations

Often, AF can be managed through the primary care that is provided by general practitioners, allied health services, community health services and community pharmacy. However, some patients with AF will need admission to hospital for investigation and management, and they may require surgical or therapeutic procedures during the admission.

Note that the hospitalisation data presented here are based on admitted patient episodes of care, which exclude non-admitted emergency department care, but can include multiple events experienced by the same individual.

Atrial fibrillation often occurs alongside other chronic diseases, so both the principal and additional diagnoses of AF should be counted when estimating its contribution to hospitalisations.



There were around **223,000 hospitalisations** where **AF** was recorded as the principal and/or additional diagnosis in 2018-19. This represents 1.9% of all hospitalisations in Australia.

Atrial fibrillation was recorded as the principal diagnosis in 33% (73,400) of these hospitalisations.

In those cases where AF was listed as an additional diagnosis, common principal diagnoses include other cardiovascular diseases (heart failure, stroke, acute myocardial infarction), pneumonia, sepsis, chronic obstructive pulmonary disease and fracture of femur (AIHW 2020).

## Age and sex

Where AF was recorded as the principal and/or additional diagnosis, hospitalisation rates:

- were overall 1.5 times as high for males as females (age-standardised rates of 876 and 583 per 100,000 population). Age-specific rates were higher among males than females in all age groups increased with age, with rates highest for males and females aged 85 and over (10,800 and 9,700 per 100,000 population)—at least 1.7 times as high as those aged 75-84 (6,600 and 5,400 per 100,000) (Figure 1).

### Figure 1: Atrial fibrillation hospitalisation rates, principal and/or additional diagnosis, by age and sex, 2018-19

The bar chart shows that atrial fibrillation hospitalisation rates in 2018-19 were highest among males and females 85 years and over (10,800 and 9,700 per 100,000 population, respectively).

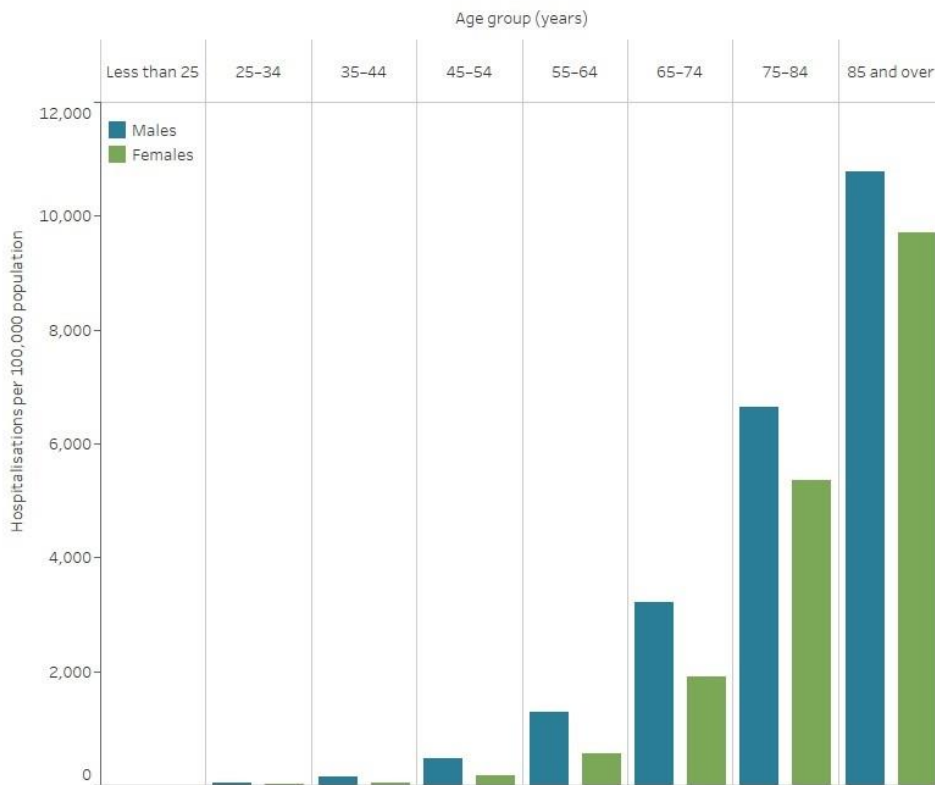


Figure 1: Atrial fibrillation hospitalisation rates, principal and/or additional diagnosis, by age and sex, 2018-19

Chart: AIHW. Source: AIHW National Hospital Morbidity Database. <http://www.aihw.gov.au>

### Trends

Between 2000-01 and 2018-19, there was little reduction in the age-standardised rate of hospitalisations with a principal and/or additional diagnosis of AF (748 to 723 per 100,000 population).

The number of AF hospitalisations increased by two-thirds (67%) for males and 48% for females, while rates fell by 3.9% for males (from 911 to 876 per 100,000 population) and 4.9% for females (from 613 to 583 per 100,000 population) (Figure 2).

The hospitalisation rate where AF was the principal diagnosis, however, increased by almost 40%, from 175 to 244 per 100,000 population.

The use of linked hospitalisations data in Western Australia has shown that the increase in that state was driven more by repeat hospitalisations for the same person, rather than new hospitalisations (Briffa et al. 2016, Weber et al. 2019).

### Figure 2: Atrial fibrillation hospitalisation rates, principal and/or additional diagnosis, by sex, 2000-01 to 2018-19

The line chart shows that age-standardised atrial fibrillation hospitalisation rates have remained steady between 2000-01 and 2018-19 at around 900 and 600 per 100,000 population for males and females respectively.

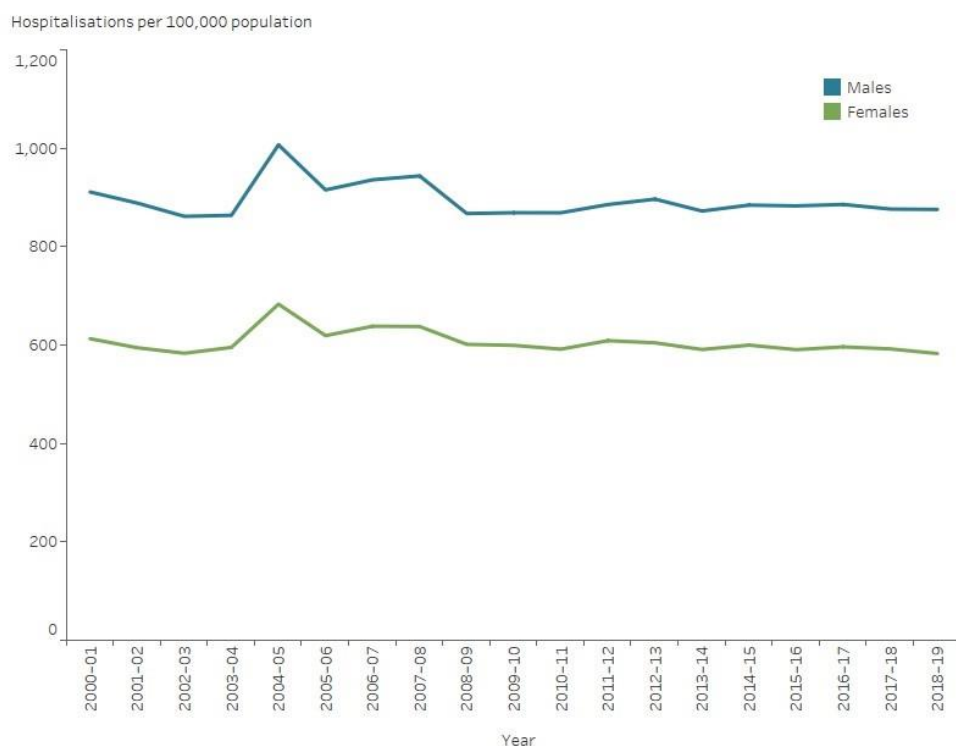


Figure 2: Atrial fibrillation hospitalisation rates, principal and/or additional diagnosis, by sex, 2000-01 to 2018-19

Note: Age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2018-19, there were around 4,700 hospitalisations with a principal and/or additional diagnosis of AF among Aboriginal and Torres Strait Islander people.

After adjusting for differences in the age structure of the populations:

- the rate among Indigenous Australians was 1.6 times as high as the non-Indigenous rate (1,161 and 705 per 100,000 population) the
- disparity between Indigenous and non-Indigenous Australians was greater for females than males—1.9 times as high for females (1,061 and 566 per 100,000 population) and 1.5 times as high for males (1,270 and 855 per 100,000 population) (Figure 3).

### Socioeconomic group

In 2018-19, age-standardised AF hospitalisation rates were 22% higher for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas—796 and 651 per 100,000 population.

For males, the gap in hospitalisations between the lowest and highest socioeconomic areas was 1.2 times as high (947 and 800 per 100,000 population), and for females 1.3 times as high (655 and 513 per 100,000 population) (Figure 3).

### Remoteness area

In 2018-19, age-standardised AF hospitalisation rates were around 30% higher among those living in *Remote and very remote* areas compared with those in *Major cities* (890 and 691 hospitalisations per 100,000 population).

The disparities in male and female rates were similar—male rates were 1.2 times as high in *Remote and very remote* areas as in *Major cities* (1,011 and 834 per 100,000 population), while females rates were 1.3 times as high (753 and 562 per 100,000 population) (Figure 3).

### Figure 3: Atrial fibrillation hospitalisation rates, principal and/or additional diagnosis, by population group and sex, 2018-19

The horizontal bar chart shows that age-standardised atrial fibrillation hospitalisation rates in 2018-19 were higher among Indigenous Australians, people living in the lowest socioeconomic areas and people living in Remote and very remote areas.

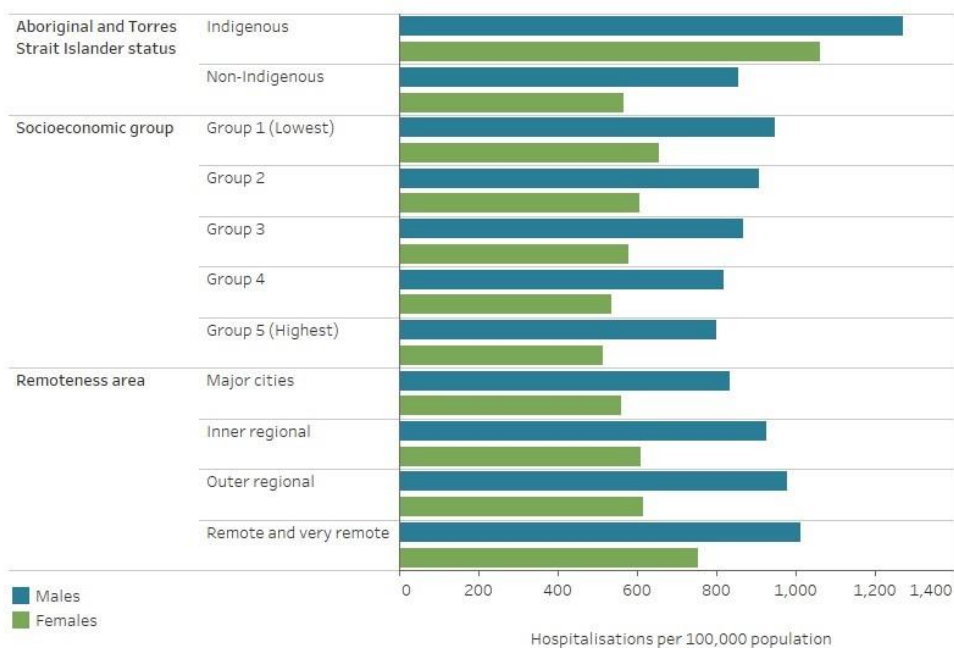


Figure 3: Atrial fibrillation hospitalisation rates, principal and/or additional diagnosis, by population group and sex, 2018-19

Notes:

1. Age-standardised to the 2001 Australian Standard Population.
2. Excludes persons whose Indigenous status was not stated or inadequately described.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage based on 2016 ASGS Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Area structure based on Statistical Area Level 2 (SA2) of usual residence.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

## Deaths

Atrial fibrillation (AF) contributed to 14,300 deaths (8.6% of all deaths) in 2019.



AF was the underlying cause of 2,200 deaths in 2019, and was an associated cause in a further 12,100 deaths.

AF is far more likely to be listed as an associated cause of death. This is because it is often not AF that leads directly to death—rather, one of its accompanying comorbidities or complications will be listed as the underlying cause of death on the death certificate.

When AF is examined as an associated cause of death, the conditions most commonly listed as the underlying cause of death were other diseases of the circulatory system such as coronary heart disease (CHD) or stroke, as well as chronic obstructive pulmonary disease and dementia (AIHW 2020).

### Age and sex

In 2019, age-standardised death rates for AF as the underlying or associated cause:

- were 1.3 times as high for males as for females (48 and 37 per 100,000 population). Age-specific rates were higher for males than females across all age groups increased with age, with over 60% of deaths occurring among those aged 85 and over. Atrial fibrillation death rates
- for males and females in the 85 and over age group (1,800 and 1,700 per 100,000 population) were 4.9 times as high for males and 6.7 times as high for females aged 75-84 (370 and 249 per 100,000 population) (Figure 4).

Figure 4: Atrial fibrillation death rates, underlying or associated cause, by age and sex, 2019

The bar chart shows that atrial fibrillation death rates in 2019 were highest among males and females 85 and over (1,800 and 1,700 per 100,000 population, respectively).

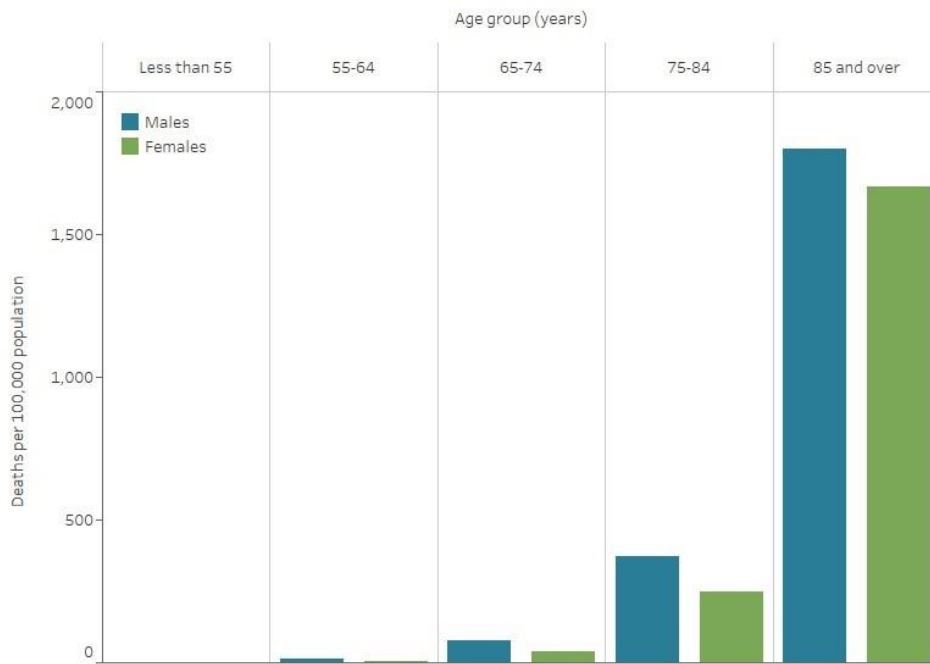


Figure 4: Atrial fibrillation death rates, underlying or associated cause, by age and sex, 2019

**Notes:**

1. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
2. Data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

**Trends**

Between 1997 and 2019:

- the number of deaths where AF was an underlying or associated cause increased more than 3-fold, from 4,400 to 14,300 age-standardised
- AF death rates increased by 60%—from 30 to 48 per 100,000 population for males, and from 23 to 37 per 100,000 population for females (Figure 5).

Figure 5: Atrial fibrillation death rates, underlying or associated cause, by sex, 1997-2019

The line chart shows the increase in age-standardised atrial fibrillation death rates between 1997 and 2019 for both males and females, from 30 to 48 and 23 to 37 per 100,000 population, respectively.

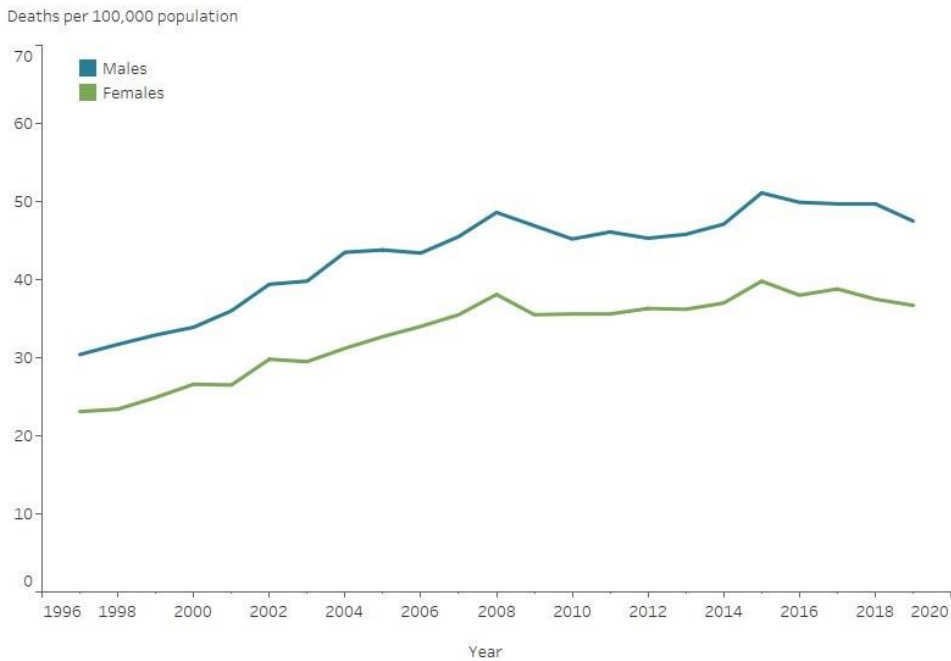


Figure 5: Atrial fibrillation death rates, underlying or associated cause, by sex, 1997-2019

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
3. These data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2017-2019, AF was the underlying or associated cause of death for 420 Indigenous Australians in the jurisdictions with adequate Indigenous identification.

The age-standardised Indigenous death rate (69 per 100,000 population) was 1.6 times as high as the non-Indigenous rate (44 per 100,000 population). Indigenous males and females had AF death rates 1.4 and 1.8 times as high as non-Indigenous males and females (Figure 6).

### Socioeconomic group

In 2017-2019, the age-standardised death rate for AF as an underlying or associated cause was 1.5 times as high for people living in the lowest socioeconomic areas compared with those living in the highest socioeconomic areas (51 and 35 per 100,000 population).

The difference was slightly greater for males (1.5 times as high) than females (1.4 times as high) (Figure 6).

### Remoteness area

In 2017-2019, age-standardised AF rates were lowest for those living in *Major cities* (40 deaths per 100,000 population) and highest for those in *Remote and very remote* areas (53 per 100,000).

Males had higher AF rates than females in all remoteness areas (Figure 6).

## Figure 6: Atrial fibrillation death rates, underlying or associated cause, by population group and sex, 2017-2019

The horizontal bar chart shows that age-standardised atrial fibrillation death rates in 2017-2019 were higher among Indigenous Australians, people living in the lowest socioeconomic areas and people living in Remote and very remote areas.



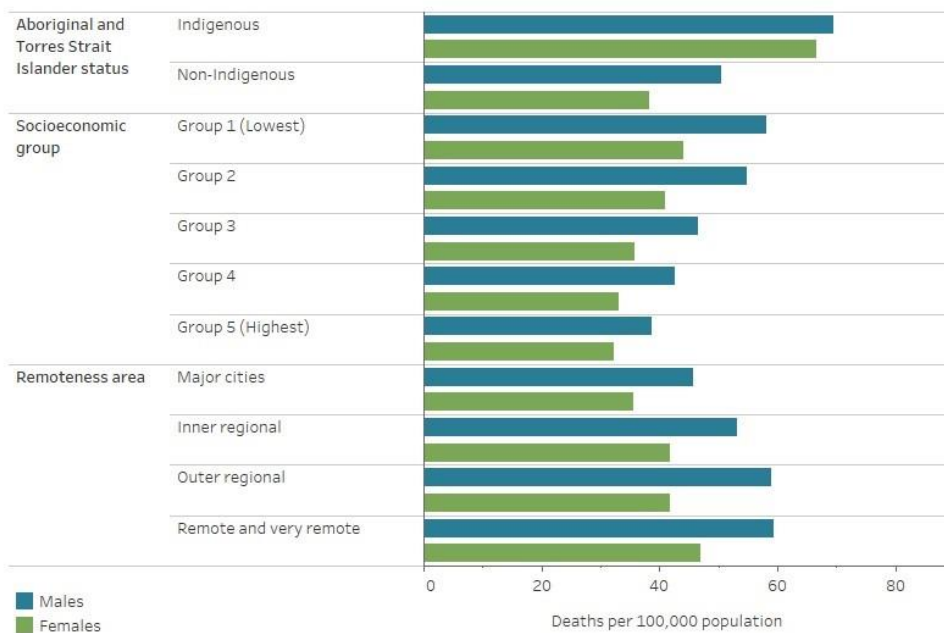


Figure 6: Atrial fibrillation death rates, underlying or associated cause, by population group and sex, 2017-2019

Notes:

1. Age-standardised to the 2001 Australian Standard Population.
2. Aboriginal and Torres Strait Islander status includes data from people residing in NSW, QLD, WA, SA and NT only.
3. Remoteness areas are classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.
4. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage (IRSD) based on Statistical Area Level 2 (SA2) of usual residence.
5. Deaths are reported by year of registration of death. Deaths registered by 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

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# Heart, stroke and vascular disease and subtypes

## Peripheral arterial disease

On this page

- [How many Australians have peripheral arterial disease?](#)
- [Hospitalisations](#)
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### What is peripheral arterial disease?

Peripheral arterial disease (PAD), also known as peripheral vascular disease, is the reduced circulation of blood to a body part outside of the heart or brain.

PAD occurs most commonly in the arteries leading to the legs and feet. It is often the result of atherosclerosis, where fatty deposits build up in the walls of arteries. In some people it does not present any symptoms, while others may experience pain at rest or while walking. In severe cases it can lead to tissue loss, and the amputation of a limb.

A notable form of PAD is abdominal aortic aneurysm. This is abnormal widening of the aorta (the main artery leading from the heart) below the level of the diaphragm. It can be a life-threatening condition if the arterial wall ruptures. Surgery is necessary in some cases.

Tobacco smoking and diabetes are primary risk factors for PAD. Type 2 diabetes in people with PAD can accelerate atherosclerosis, and increase the risk of amputation, of other cardiac events such as stroke, and death.

Other PAD risk factors include abnormal blood lipids, high blood pressure, overweight or obesity, and family history of the disease. PAD has increasingly been associated with other chronic conditions such as atrial fibrillation, heart failure, obstructive sleep apnoea and chronic kidney disease.

## How many Australians have peripheral arterial disease?

Currently, there are no national data on the number of Australians who have PAD.

PAD has been estimated to affect up to 10% of patients in primary care settings, and over 20% when studied in populations aged 75 and over (Aitken 2020, Conte & Vale 2018). Over half of all people with PAD show no symptoms, leading to under-diagnosis and under-treatment.

## Hospitalisations

Peripheral arterial disease often occurs alongside other chronic diseases, so both the principal and additional diagnoses of PAD should be counted when estimating its contribution to hospitalisations.



There were around **57,500 hospitalisations** where PAD was recorded as the principal and/or additional diagnosis in 2018-19. This represents 0.5% of all hospitalisations in Australia.

PAD was recorded as the principal diagnosis in 57% (32,800) of these hospitalisations.

Over half of all hospitalisations where PAD was the principal diagnosis (59%) were for atherosclerosis of the peripheral arteries, while abdominal aortic aneurysm accounted for a further 11%. The remainder was comprised largely of embolisms and other aneurysms.

## Age and sex

Where PAD was recorded as the principal and/or additional diagnosis, hospitalisation rates:

- were overall twice as high for males as females (age-standardised rates of 257 and 131 per 100,000 population). Age-specific rates were higher among males than females in all age groups, except for age 25-34 (19 and 23 per 100,000 population) increased with age, with
- rates highest for males and females aged 85 and over (2,610 and 1,640 per 100,000 population)—at least 1.4 times as high as those aged 75-84 (1,850 and 934 per 100,000) (Figure 1).

## Figure 1: Peripheral arterial disease hospitalisation rates, principal and/or additional diagnosis, by age and sex, 2018- 19

The bar chart shows in 2018-19, peripheral arterial disease hospitalisation rates were highest among males aged 75-84 and 85 and over (1,900 and 2,600 per 100,000 population, respectively) and females aged 85 and over (1,600 per 100,000 population).

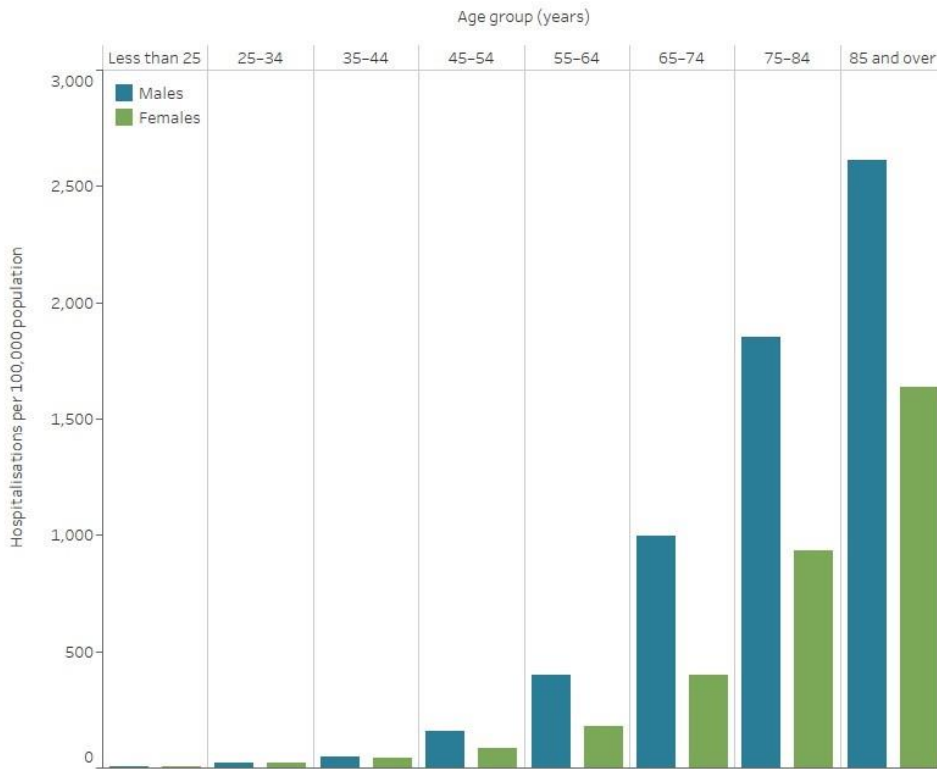


Figure 1: Peripheral arterial disease hospitalisation rates, principal and/or additional diagnosis, by age and sex, 2018-19

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

### Trends

Between 2000-01 and 2018-19, the age-standardised rate of hospitalisations with a principal and/or additional diagnosis of PAD declined by almost half (46%)—from 350 to 190 per 100,000 population.

The number of PAD hospitalisations declined by 11% for males and 17% for females, while rates fell by 48% for males (from 492 to 257 per 100,000 population) and 45% for females (from 237 to 131) (Figure 2).

### Figure 2: Peripheral arterial disease hospitalisation rates, principal and/or additional diagnosis, by sex, 2000-01 to 2018-19

The line chart shows that age-standardised peripheral arterial disease hospitalisation rates declined between 2000-01 and 2018-19, from 492 to 257 and 237 to 131 per 100,000 population for males and females, respectively.



Figure 2: Peripheral arterial disease hospitalisation rates, principal and/or additional diagnosis, by sex, 2000-01 to 2018-19

Note: Age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database. <http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2018-19, there were 1,421 hospitalisations with a principal and/or additional diagnosis of PAD among Aboriginal and Torres Strait Islander people.

After adjusting for differences in the age structure of the populations:

- the rate among Indigenous Australians was 1.6 times as high as the non-Indigenous rate (305 and 185 per 100,000 population) the disparity
- between Indigenous and non-Indigenous Australians was greater for females than males—1.8 times as high for females (222 and 126 per 100,000 population) and 1.6 times as high for males (405 and 250 per 100,000 population) (Figure 3).

### Socioeconomic group

In 2018-19, age-standardised PAD hospitalisation rates were 40% higher for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas—224 and 158 per 100,000 population.

For males, the rate of PAD hospitalisations among people living in lowest socioeconomic areas was 1.5 times as high as in the highest socioeconomic areas (305 and 209 per 100,000 population), and for females 1.3 times as high (150 and 113 per 100,000 population) (Figure 3).

### Remoteness area

In 2018-19, age-standardised PAD hospitalisation rates among those living in *Remote and very remote* areas were similar to those in *Major cities* (191 and 178 hospitalisations per 100,000 population) (Figure 3).

## Figure 3: Peripheral arterial disease hospitalisation rates, principal and/or additional diagnosis, by population group and sex, 2018-19

The horizontal bar chart shows in 2018-19, peripheral arterial disease hospitalisation rates were higher among Indigenous Australians and people living in the lowest socioeconomic areas, but did not differ significantly by remoteness area.

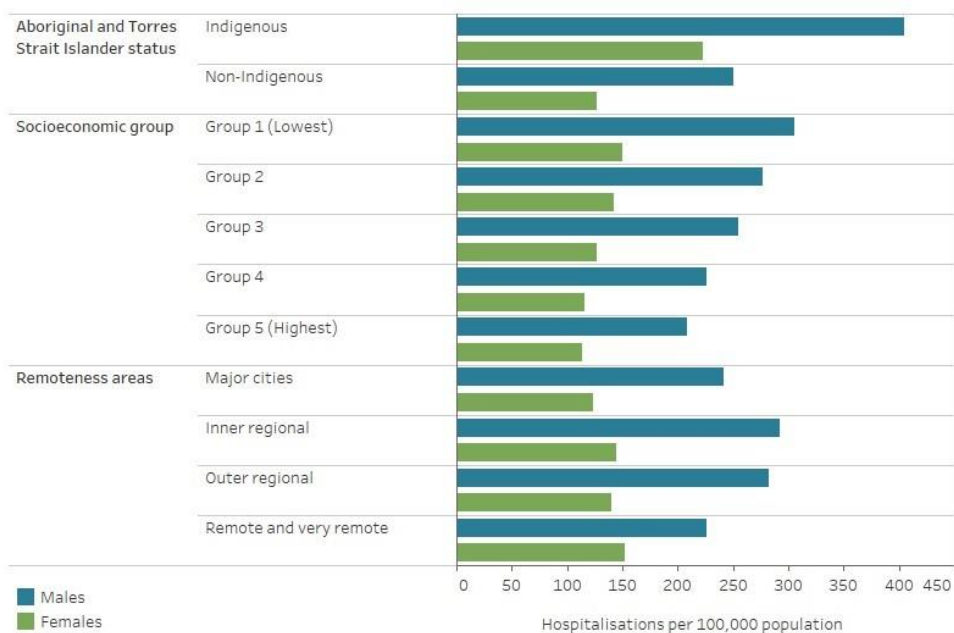


Figure 3: Peripheral arterial disease hospitalisation rates, principal and/or additional diagnosis, by population group and sex, 2018-19

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Excludes persons whose Indigenous status was not stated or inadequately described.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage based on 2016 ASGS Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

## Deaths



PAD was the underlying cause of **1,933 deaths** in 2019—equating to 1.2% of all deaths, and 4.6% of all cardiovascular disease deaths.

Abdominal aortic aneurysm accounted for 26% of PAD deaths with the remainder resulting from atherosclerosis of peripheral arteries, other aneurysms, embolisms and unspecified PAD.

Leading causes of death in people diagnosed with PAD, however, were chronic ischaemic heart disease (12%), acute myocardial infarction (9.3%) and type 2 diabetes mellitus (7.8%).

### Age and sex

In 2019, PAD death rates:

- were 1.5 times as high for males as for females (age-standardised rates of 7.3 and 4.8 per 100,000 population). Age-specific rates for males were higher than for females across all age groups increased with age, with three-quarters (74%) of PAD deaths occurring in
- persons aged 75 and over. PAD death rates for males and females were highest in the 85 and over age group (187 and 145 per 100,000 population)—3.3 times as high for males and 3.5 times as high for females aged 75-84 (57 and 41 per 100,000 population) (Figure 4).

Figure 4: Peripheral arterial disease death rates, by age and sex, 2019

The bar chart shows the age-standardised peripheral arterial disease death rates in 2019 were highest among males and females aged 85 and over (187 and 145 per 100,000 population, respectively).

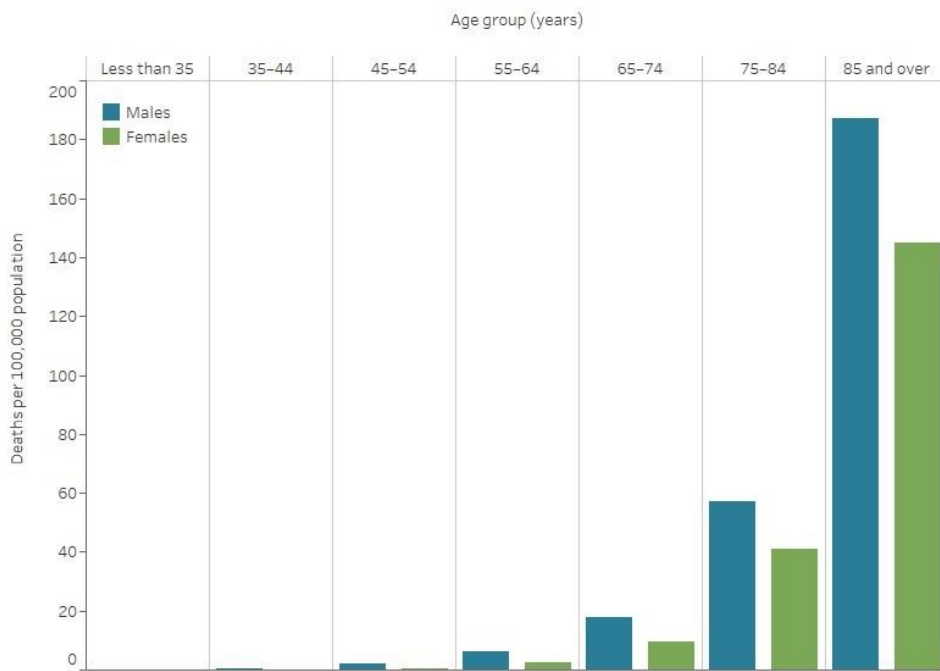


Figure 4: Peripheral arterial disease death rates, by age and sex, 2019

Notes:

1. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
2. Data have been adjusted for Victorian additional death registration in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.

<http://www.aihw.gov.au>

## Trends

Between 1980 and 2019:

- the annual number of PAD deaths declined by almost 40%, from 3,229 to 1,933 age-standardised PAD death rates declined by over 80%—
- falling from 44 to 7.3 per 100,000 population for males and 28 to 4.8 per 100,000 for females (Figure 5).

### Figure 5: Peripheral arterial disease death rates, by sex, 1980-2019

The line chart shows the decline in age-standardised peripheral arterial disease death rates between 1980 and 2019 for both males and females, from 44 to 7 and 28 to 5 per 100,000 population, respectively.

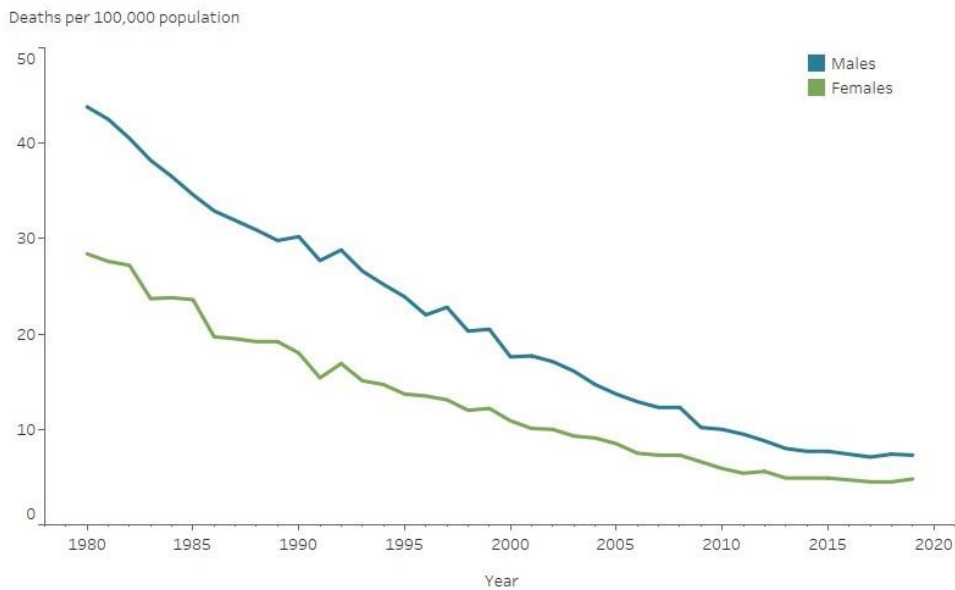


Figure 5: Peripheral arterial disease death rates, by sex, 1980-2019

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Death rates for 1980-1996 have been adjusted to ICD-10 standards using a comparability factor of 0.97
3. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
4. These data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail, please refer to Technical note: Victorian additional age and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality database.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2017-2019, there were 66 deaths from PAD as an underlying cause among Aboriginal and Torres Strait Islander people in jurisdictions with adequate Indigenous identification.

After adjusting for differences in the age structure of the populations, the rate of death from PAD for Indigenous Australians was 1.4 times as high as for non-Indigenous Australians (8.0 and 5.7 per 100,000 population).

Indigenous males and females both had PAD death rates 1.4 times as high as non-Indigenous males and females (Figure 6).

### Socioeconomic group

In 2017-2019, the age-standardised PAD death rate was 1.5 times as high for people living in the lowest socioeconomic areas compared with those living in the highest socioeconomic areas (6.9 and 4.6 per 100,000 population).

The difference was similar for males and females (both 1.5 times as high) (Figure 6).

### Remoteness area

In 2017-2019, the age-standardised PAD death rate was similar in *Remote and very remote* areas compared with *Major cities* (5.6 and 5.5 per 100,000 population).

The male rate in *Remote and very remote* areas was 1.1 times as high as that in *Major cities* (7.2 and 6.8 deaths per 100,000 population) The female rate was higher in *Major cities* compared to *Remote and very remote* areas (4.4 and 3.9 deaths per 100,000 population) (Figure 6).

## Figure 6: Peripheral arterial disease death rates, by population group and sex, 2017-2019

The horizontal bar chart shows in 2017-2019 age-standardised peripheral arterial disease death rates were higher among Indigenous Australians and people living in the lowest socioeconomic areas but did not differ significantly by remoteness area.

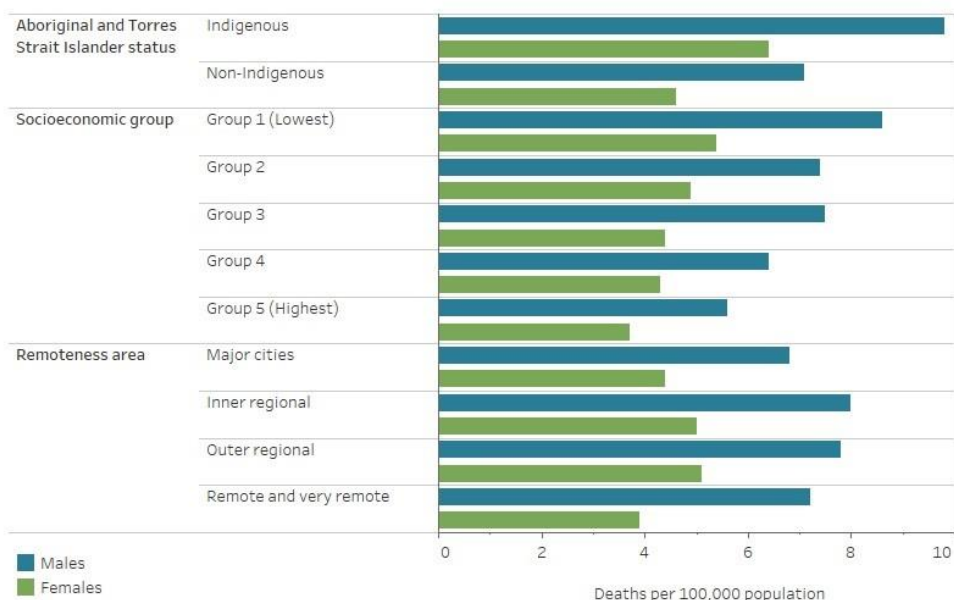


Figure 6: Peripheral arterial disease death rates, by population group and sex, 2017-2019

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population
2. Aboriginal and Torres Strait Islander status includes data from people residing in NSW, QLD, WA, SA and NT only.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Socio-Economic Disadvantage (IRSD) based on Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness areas are classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.
5. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

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## Heart, stroke and vascular disease and subtypes

### Acute rheumatic fever and rheumatic heart disease

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- [Risk factors and prevention of acute rheumatic fever and rheumatic heart disease How many Australians have rheumatic heart disease?](#)
- [Hospitalisations](#)
- [Deaths](#)

#### What are acute rheumatic fever and rheumatic heart disease?

##### Acute rheumatic fever

Acute rheumatic fever (ARF) is an autoimmune response to an infection of the upper respiratory tract by group A streptococcus bacteria. The infection can cause inflammation throughout the body including the heart, brain, skin and joints.

ARF is rare among most Australians, but still has a substantial impact on Aboriginal and Torres Strait Islander communities.

Early detection and treatment can prevent the bacterial infection progressing to ARF. The risk of ARF recurrence is high following an initial episode, and repeated episodes increase the chance of long-term heart valve damage.



## Rheumatic heart disease

Rheumatic heart disease (RHD) is permanent damage of the heart muscle or heart valves as a result of ARF. RHD reduces the ability of the heart to pump blood effectively around the body, leading to symptoms such as shortness of breath after physical activity, fatigue and weakness. Severe forms can result in serious incapacity or death.

Symptoms of RHD can also occur with other heart conditions, making a diagnosis more difficult. Signs of damage detected by echocardiography and a history of ARF are both important clinical indicators for RHD diagnosis.

## Risk factors and prevention of acute rheumatic fever and rheumatic heart disease

ARF and RHD are closely associated with social and environmental factors such as poverty, overcrowding, and reduced access to health care.

Secondary prevention of the progression from ARF to RHD relies on correct diagnosis, to enable commencement of regular antibiotic preventive medication. Guidelines recommend admission to hospital for clinical investigation and confirmation of the diagnosis of ARF (RHD Australia 2020).

Effective prevention, diagnosis and treatment remain a challenge in remote Indigenous communities. Under the Rheumatic Fever Strategy (RFS), the Australian Government provides funding to support RHD control programs in Queensland, Western Australia, South Australia and the Northern Territory.

## Notifications of acute rheumatic fever

There were 2,244 notifications of ARF were recorded in Queensland, Western Australia, South Australia and the Northern Territory in 2015-2019 (4.7 per 100,000 population) (AIHW 2021). Of these:

- 95% (2,128 ARF notifications) were recorded among Indigenous Australians—a rate of 96 per 100,000 population over 2015-2019
- ARF was more common among Indigenous females than males, and rates were highest among Indigenous people aged 5-14 (1,029 notifications, 208 per 100,000) the number and rate of notifications has increased—from 342 (3.7 per 100,000) in 2015 to 477 (5.0 per 100,000) in 2019.

## How many Australians have rheumatic heart disease?



As at 31 December 2019, there were **5,385 (56 per 100,000 population) people** living with RHD recorded on registers in Queensland, Western Australia, South Australia and the Northern Territory (AIHW 2021).

Of these:

- 81% were Indigenous Australians (4,337 diagnoses, 955 per 100,000 population)
- 39% were aged under 25 (1,558 diagnoses)
- 66% were female (3,561 diagnoses)
- Northern Territory had the highest prevalence (2,308 diagnoses, 938 per 100,000).

Of those RHD diagnoses with severity status recorded, 41% had mild disease (2,206 diagnoses), while 28% had severe disease (1,532).

Older people were more likely to have severe RHD, with 42% aged 45 or over having severe disease (777 diagnoses), compared to 16% of those aged 15-24 (173 diagnoses).

## New rheumatic heart disease diagnoses

In 2015-2019, there were 1,776 new RHD diagnoses in Queensland, South Australia, Western Australia and the Northern Territory (3.7 per 100,000 population).

Of these, 75% (1,325) were Indigenous Australians (60 per 100,000 population).

For the 4 jurisdictions combined, RHD diagnosis rates between 2015 and 2019 have remained relatively stable, at around 3-4 diagnoses per 100,000 population annually (Figure 1).

During this period, diagnosis rates varied by state and territory, but in general:

- South Australia had less than 1 diagnosis per 100,000 population
- Western Australia and Queensland had 2-5 diagnoses per 100,000
- Northern Territory had 40-60 diagnoses per 100,000.

## Figure 1: New RHD diagnoses in Qld, WA, SA and NT, 2015 to 2019

The bar chart shows the number and rate of new rheumatic heart disease diagnoses in Queensland, Western Australia, South Australia and the Northern Territory in 2015-2019. Among all Australians in these four states and territories combined, there was an increase in the agestandardised rate of new rheumatic heart disease diagnoses between 2015 and 2018 (3.1 to 4.5 per 100,000 population). The agestandardised rate of new rheumatic heart disease diagnoses was consistently higher among Indigenous Australians compared to the total Australian population.

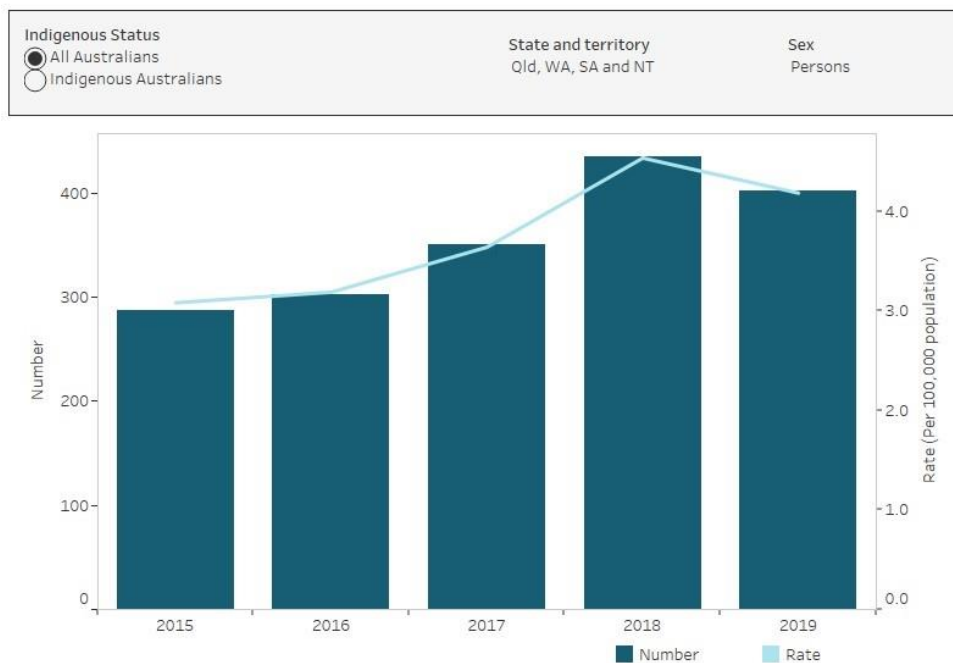


Figure 1: New RHD Diagnoses in Qld, WA, SA and NT, 2015 to 2019.

*Notes:*

1. Crude age-specific rates per 100,000 calculated using the number of notifications of each calendar year divided by the corresponding 30 June populations of each year based on the 2016 census.
2. QLD and SA population data were unavailable for 2019 so rates for this year are based on 2018 population data.
3. WA population data were unavailable for 2015-2017 based on the 2016 Census so these years are based on the 2011 Census.
4. 20 people with an unknown or blank Indigenous status are included in All Australians.
5. Data from NT, Qld, SA and WA combined.

Chart: AIHW. Source: Acute rheumatic fever and rheumatic heart disease in Australia, 2015-2019.  
<http://www.aihw.gov.au>

## Hospitalisations

Because hospital records may not always distinguish between ARF and RHD, the 2 diseases are here grouped together.



In 2018-19, there were **4,400 hospitalisations** with a principal diagnosis of **ARF or RHD**—0.7% of all cardiovascular disease (CVD) hospitalisations, and equating to an age-standardised rate of 16 hospitalisations per 100,000 population.

### Age and sex

In 2018-19, where ARF or RHD was recorded as the principal diagnosis, hospitalisation rates:

- were similar for males and females (age-standardised rates of 15 and 16 hospitalisations per 100,000 population)
- were higher for females than males up to age 45-54, but higher for males among those aged 55-64 and over (Figure 2)
- were highest among males and females aged 75-84 (114 and 105 per 100,000 population)—around twice as high as those aged 65-74 (56 and 46 per 100,000).

Figure 2: Acute rheumatic fever and rheumatic heart disease hospitalisation rates, principal diagnosis, by age and sex, 2018-19

The bar chart shows in 2018-19 acute rheumatic fever and rheumatic heart disease hospitalisation rates were highest among males and females aged 75-84 years with 114 and 105 hospitalisations per 100,000 population, respectively.

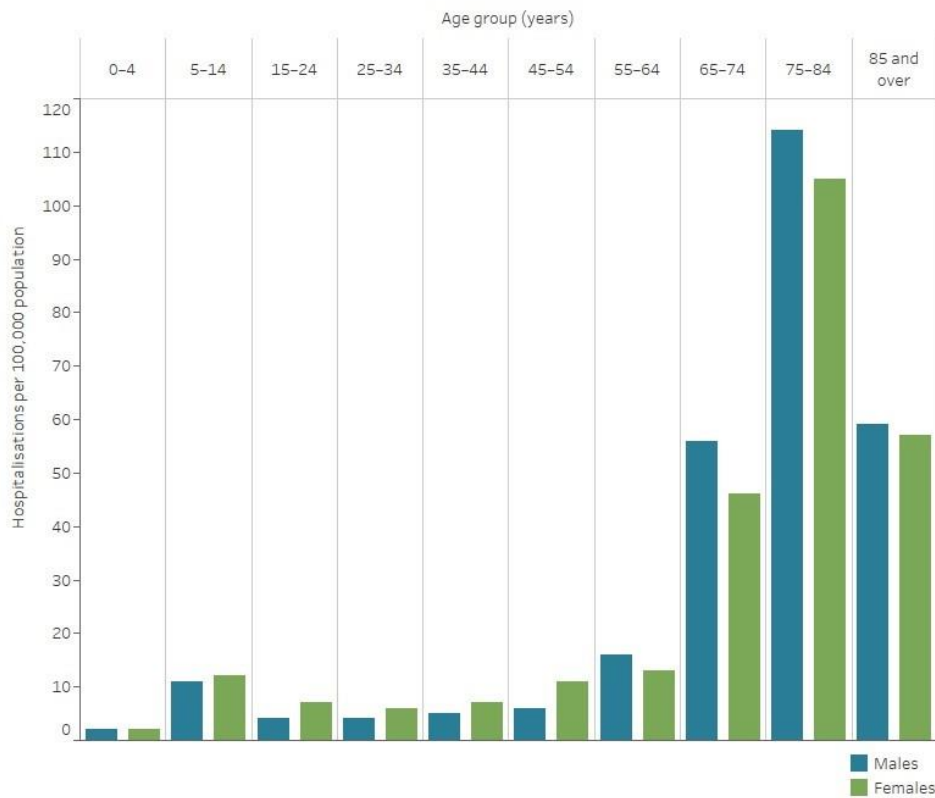


Figure 2: Acute rheumatic fever and rheumatic heart disease hospitalisation rates, principal diagnosis, by age and sex, 2018-19

Chart: AIHW. Source: National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

### Trends

Between 2000-01 and 2018-19 the number of hospitalisations with ARF or RHD increased from 2,070 to 4,400. Over this period the age-standardised hospitalisation rate for ARF and RHD increased from 10.8 to 15.7 per 100,000 population. Females had consistently higher rates than males, though the difference decreased over time (Figure 3).

### Figure 3: Acute rheumatic fever and rheumatic heart disease hospitalisation rates, principal diagnosis, by sex, 2000- 01 to 2018-19

The line chart shows the overall increase in age-standardised acute rheumatic fever and rheumatic heart disease hospitalisation rates between 2000-01 and 2018-19 from 9 to 15 and 13 to 16 per 100,000 population for males and females, respectively.

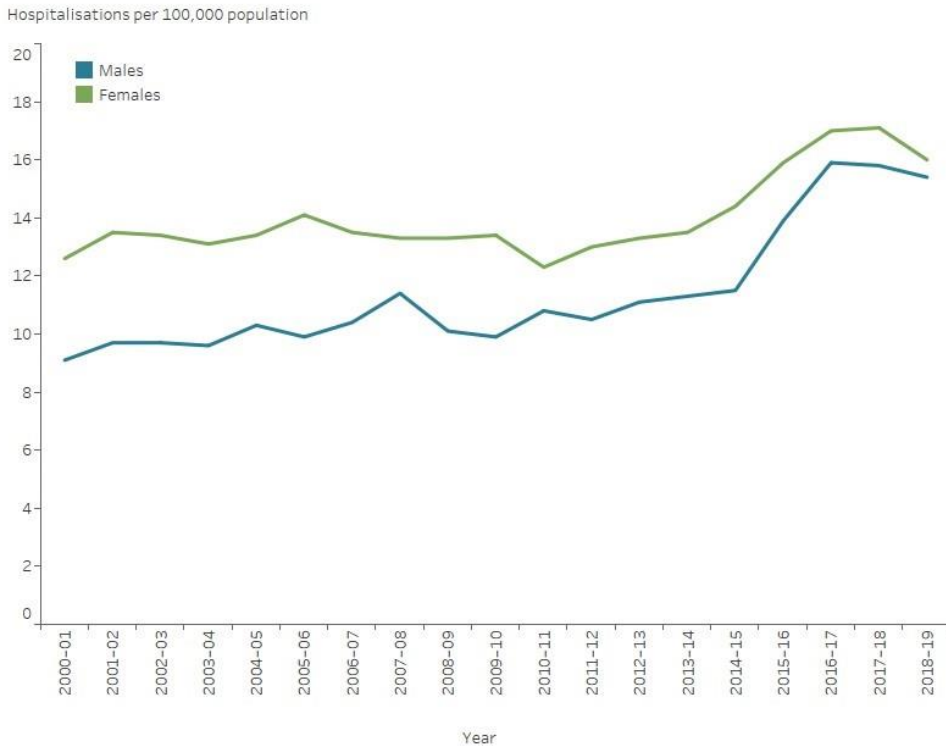


Figure 3: Acute rheumatic fever and rheumatic heart disease hospitalisation rates, principal diagnosis, by sex, 2000-01 to 2018-19

Note: Age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2018-19, there were around 730 hospitalisations with a principal diagnosis of ARF or RHD among Aboriginal and Torres Strait Islander people.

After adjusting for differences in the age structure of the populations:

- the rate among Indigenous Australians was 6.7 times as high as the non-Indigenous rate (83 and 12 per 100,000 population) the disparity
- between Indigenous and non-Indigenous Australians was greater for females than males—8.4 times as high for females (102 and 12 per 100,000 population) and 5.0 times as high for males (63 and 13 per 100,000 population) (Figure 4).

### Socioeconomic group

In 2018-19, the ARF and RHD hospitalisation rate was almost twice as high for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas—age-standardised rates of 24 and 13 per 100,000 population.

The difference was greater for females (2.5 times as high) than males (1.4 times as high) (Figure 4).

### Remoteness area

In 2018-19, age-standardised ARF and RHD hospitalisation rates were 9.0 times higher among those living in *Remote and very remote* areas compared with those in *Major cities* (118 and 13 hospitalisations per 100,000 population) (Figure 4).

The high *Remote and very remote* rates reflect both the high proportion of Indigenous Australians living in these areas and that Indigenous Australians in remote areas continue to experience new cases of ARF and RHD, often at a young age. In non-remote areas, hospitalisations with ARF and RHD occur mostly among older people.

## Figure 4: Acute rheumatic fever and rheumatic heart disease hospitalisation rates, principal diagnosis, by socioeconomic group and sex, 2018-19

The horizontal bar chart shows in 2018-19 age-standardised acute rheumatic fever and rheumatic heart disease hospitalisation rates were higher among Indigenous Australians, people living in the lowest socioeconomic areas and people living in Remote and very remote areas.

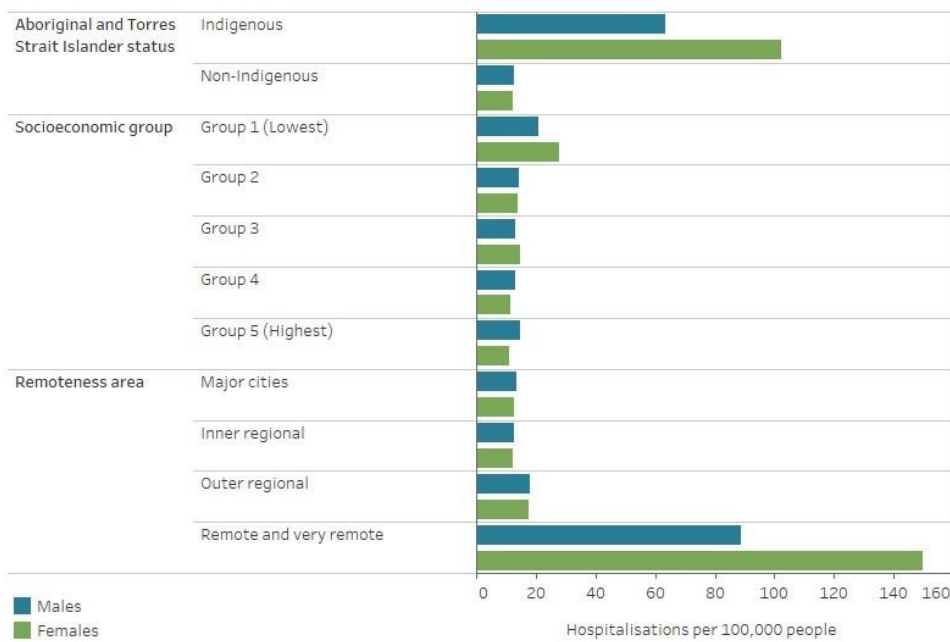


Figure 4: Acute rheumatic fever and rheumatic heart disease hospitalisation rates, principal diagnosis, by socioeconomic group and sex, 2018-19

Notes:

1. Age-standardised to the 2001 Australian Standard Population.
2. Excludes persons whose Indigenous status was not stated or inadequately described.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage based on 2016 ASGS Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database. <http://www.aihw.gov.au>

## Deaths

Deaths from ARF and RHD are uncommon in Australia, and, as with hospitalisations, death records may not distinguish well between ARF and RHD. The 2 conditions are here presented together.



In 2019, ARF or RHD was the underlying cause of **380 deaths**, representing 0.2% of all deaths and 0.9% of CVD deaths.

### Age and sex

Unlike many other forms of CVD, more females die from ARF and RHD than males. In 2019, females accounted for 60% of ARF and RHD deaths –230 compared with 150 for males.

In 2019, ARF and RHD death rates:

- were higher for females than males (age-standardised rates of 1.3 and 1.1 per 100,000 population) increased with age, with over 70% of
- all ARF and RHD deaths occurring in those aged 75 and over. ARF and RHD death rates for males and females were highest in the 85 and over age group (29 and 35 per 100,000 population)—3.0 times as high for males and 4.0 times as high for females aged 75-84 (9.7 and 8.8 per 100,000 population) (Figure 5).

Figure 5: Acute rheumatic fever and rheumatic heart disease death rates, by age and sex, 2019

The bar chart shows in 2019 acute rheumatic fever and rheumatic heart disease death rates were highest among males and females aged 85 and over, at 29 and 35 per 100,000 population, respectively.

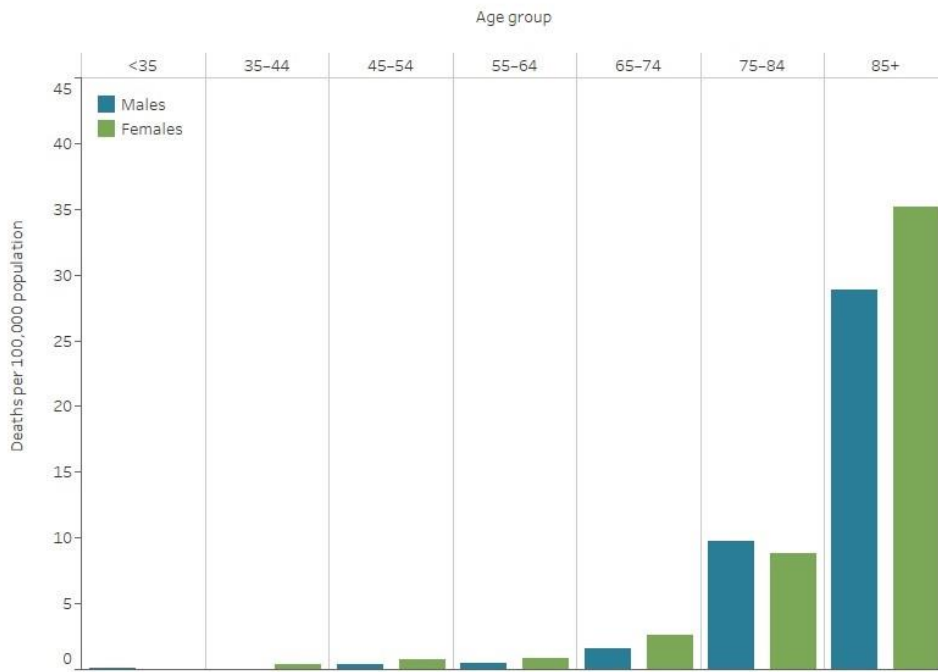


Figure 5: Acute rheumatic fever and rheumatic heart disease death rates, by age and sex, 2019

**Notes:**

1. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
2. Data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

**Trends**

The number and rate of ARF and RHD deaths has declined between 1980 and 2019. Most of the decline occurred before 2000 (Figure 6):

- the number of ARF and RHD deaths declined by 14%, from 444 to 380 the age-standardised ARF and RHD death rate
- declined by 55%, falling from 2.7 to 1.2 deaths per 100,000 population.

**Figure 6: Acute rheumatic fever and rheumatic heart disease death rates, by sex, 1980-2019**

The line chart shows the decline in age-standardised acute rheumatic fever and rheumatic heart disease death rates between 1980 and 2019 from 2.1 to 1.1 and 3.1 to 1.3 for males and females, respectively.

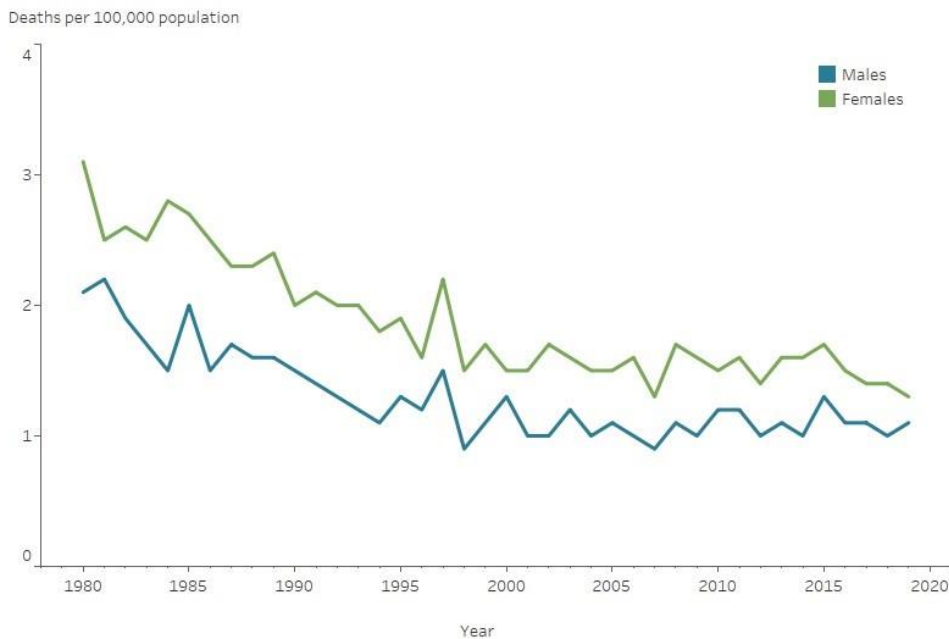


Figure 6: Acute rheumatic fever and rheumatic heart disease death rates, by sex, 1980-2019

Notes:

1. Age-standardised to the 2001 Australian Standard Population.
2. Death rates for 1980-1996 have been adjusted to ICD-10 standards using a comparability factor of 0.69.
3. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
4. These data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2017-2019, there were 71 deaths from ARF or RHD among Aboriginal and Torres Strait Islander people in jurisdictions with adequate identification of Indigenous status.

After adjusting for differences in the age structure of the populations, the ARF and RHD death rate for Indigenous people was 5.1 times as high as that for non-Indigenous people (5.6 compared with 1.1 deaths per 100,000 population).

Indigenous males and females had ARF and RHD death rates 3.3 times and 6.0 times as high as non-Indigenous males and females (Figure 7).

In the 25-64 year age group, the Indigenous death rate was 18 times greater than the non-Indigenous rate (5.5 and 0.3 per 100,000 population).

### Socioeconomic group

In 2017-2019, the age-standardised ARF and RHD death rate was 1.6 times as high for people living in the lowest socioeconomic areas compared with those living in the highest socioeconomic areas (1.6 and 1.0 per 100,000 population).

The difference was similar for males and females (both 1.6 times as high) (Figure 7).

### Remoteness area

In 2017-2019, age-standardised death rates for ARF and RHD increased with remoteness, from 1.1 deaths per 100,000 population in *Major cities* to 4.3 per 100,000 in *Remote and very remote* areas (Figure 7).

The differences between regions are closely related to Indigenous status. In *Remote and very remote* areas, Aboriginal and Torres Strait Islander people comprise a high proportion of the overall population, and patterns of deaths across age groups seen among Indigenous Australians resemble those of the most remote areas.

## Figure 7: Acute rheumatic fever and rheumatic heart disease death rates, by population group and sex, 2016-2018

The horizontal bar chart shows in 2016-2018 age-standardised acute rheumatic fever and rheumatic heart disease death rates were higher among Indigenous Australians, people living in the lowest socioeconomic areas and people living in Remote and very remote areas.

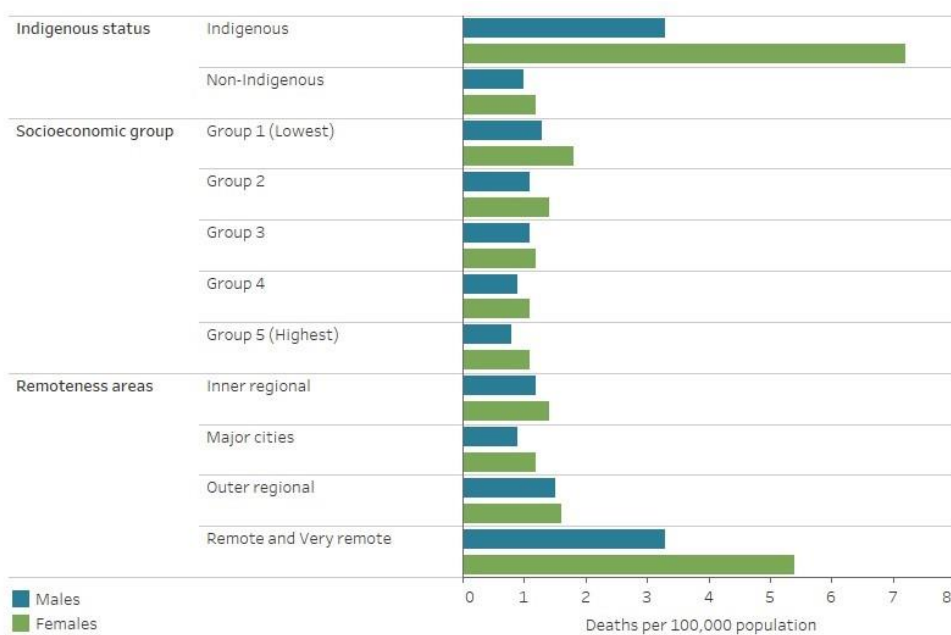


Figure 7: Acute rheumatic fever and rheumatic heart disease death rates, by population group and sex, 2016-2018

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Aboriginal and Torres Strait Islander status includes data from people in NSW, QLD, WA, SA and NT only.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage (IRSD) based on Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness areas are classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area 2 (SA2) of usual residence.
5. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

### Deaths among Australians with RHD

In 2015-2019, 399 deaths were reported for people with RHD listed on one of the four jurisdictional registers in Queensland, Western Australia, South Australia and the Northern Territory (AIHW 2021). Note that people with RHD may have died of any cause, and that cause-of-death is not captured on most registers.

Of these, 287 people (72%) were Indigenous Australians. The median age of death was 52 years for Indigenous males and 53 years for Indigenous females, compared with 72 years for non-Indigenous males and 71 years for non-Indigenous females.

### References

AIHW 2021. Acute rheumatic fever and rheumatic heart disease in Australia, 2015-2019. AIHW cat. no. CVD 90. Canberra: AIHW.

RHD Australia 2020. The 2020 Australian guideline for the prevention, diagnosis and management of acute rheumatic fever and rheumatic heart disease (3rd ed.). Darwin: Menzies School of Health Research.

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## Heart, stroke and vascular disease and subtypes

### Congenital heart disease

On this page

- [How many Australians have congenital heart disease?](#)
- [Hospitalisations](#)
- [Deaths](#)

#### What is congenital heart disease?

Congenital heart disease is a general term for any defect of the heart, heart valves or central blood vessels that is present at birth.



It can take many forms, such as holes between the pumping chambers of the heart, valves that do not open or close properly and narrowing of major blood vessels such as the aorta and pulmonary artery. Congenital heart disease can range from simple to complex, and more than 1 anomaly can occur in the same heart.

Diagnosis usually occurs within the first month of life. Common symptoms include bluish lips, fingers and toes, breathlessness or trouble breathing, low birth weight, difficulty feeding and gaining weight, and chest pain.

Most congenital heart disease is multifactorial and arises through combinations of genetic and environmental factors. Some of the known risk factors include a family history of congenital heart disease, maternal illnesses such as rubella (German measles), misuse of alcohol, illicit drugs and medications, and maternal health factors such as preeclampsia and poorly controlled diabetes.

## How many Australians have congenital heart disease?

- National rates of congenital heart disease are not routinely reported. Globally, an estimated 9.4 in every 1,000 live births were affected by congenital heart disease during the period 2010-2017 (Liu et al. 2019).
- In Australia, an estimated 65,000 children and adults live with congenital heart disease (Department of Health 2019).
- A number of Australian jurisdictions publish their incidence of congenital heart disease, noting that data collection methods vary (AIHW 2019). Ventricular septal defect was the most commonly reported congenital heart disease, followed by atrial septal defect and patent ductus arteriosus.

## Main types of congenital heart disease

**Ventricular septal defect**—a hole in the muscle wall between the right and left ventricles.

**Atrial septal defect**—a hole in the muscle wall between the right and left atria.

**Patent ductus arteriosus**—where the ductus arteriosus, the connection between the aorta and pulmonary artery, fails to close after birth.

**Tetralogy of Fallot**—a condition that consists of 4 heart anomalies: ventricular septal defect, a narrowing of the outflow tract into the pulmonary artery, an enlarged aorta and thickening of the muscle wall of the right ventricle.

**Transposition of great vessels**—a condition that is usually characterised by the aorta arising from the right ventricle and the pulmonary artery from the left ventricle.

**Coarctation of the aorta**—narrowing of the aorta.

**Aortic stenosis**—obstruction of the aorta. This can be due to a narrowing of the aorta or a problem with the aortic valve.

**Hypoplastic left heart syndrome**—where the left ventricle is small and functionally inadequate.

**Pulmonary atresia**—a condition in which there is no pulmonary valve and no blood flow to the pulmonary artery.

## Hospitalisations



In 2018-19, there were around **5,600 hospitalisations** in Australia where **congenital heart disease** was the principal diagnosis—a rate of 22 hospitalisations per 100,000 population.

### Age and sex

In 2018-19, where congenital heart disease was recorded as the principal diagnosis, hospitalisation rates:

- were similar for males and females (age-standardised rates of 23 and 22 hospitalisations per 100,000 population)
- were highest for infant boys and girls (601 and 467 per 100,000 population), followed by boys and girls aged 1-4 (45 and 50 per 100,000 population)

Unlike many other cardiovascular conditions, the number and rate of hospitalisation for congenital heart disease declines with age (Figure 1).

### Figure 1: Congenital heart disease hospitalisation rates, principal diagnosis, by age and sex, 2018-19

The bar chart shows in 2018-19 congenital heart disease hospitalisation rates were highest among boys and girls aged less than 1, at 600 and 470 per 100,000 population, respectively.

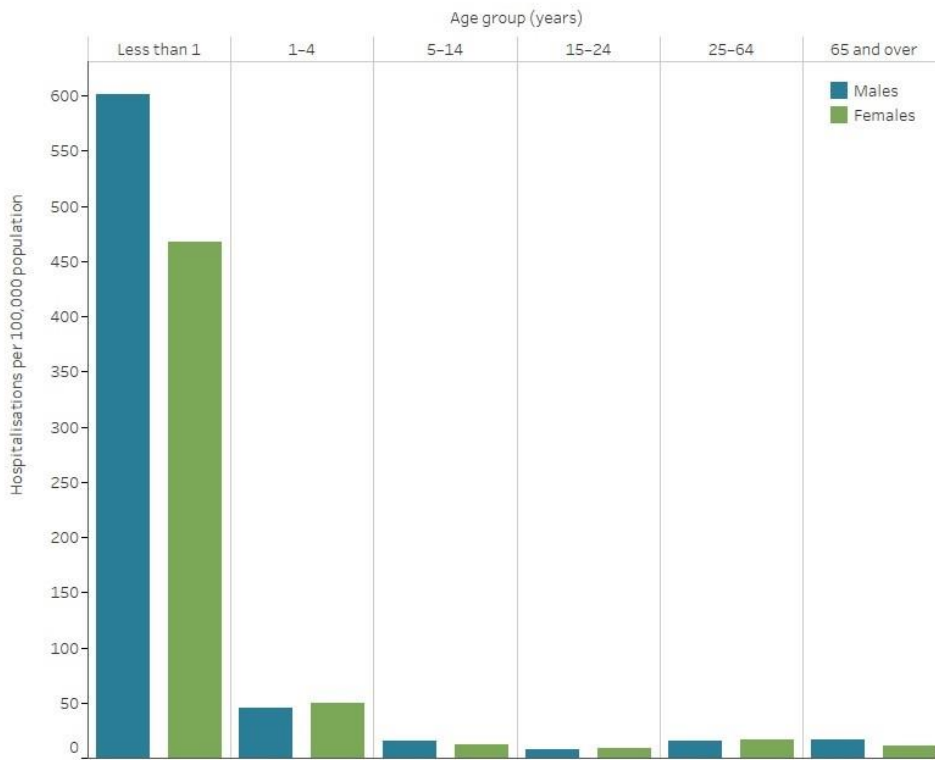


Figure 1: Congenital heart disease hospitalisation rates, principal diagnosis, by age and sex, 2018-19

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

### Adults with congenital heart disease

Advances in paediatric cardiac care mean that people with congenital heart disease are now living longer, and the burden of disease is shifting from early childhood into the adult population (Celemajer et al. 2016).

Patients with complex and severe congenital heart disease will continue to require specialist treatment throughout their life. Often, they also require management of other health and welfare issues, including for family planning and pregnancy, lifestyle choices, dietary strategies, work choices and physical limitations.

In 2011, it was estimated that there were between 26,000 and 32,000 adults with congenital heart disease in Australia, with an annual increase of around 5% (Leggatt 2011).

### Trends

Between 2000-01 and 2018-19 the number of hospitalisations with congenital heart disease as a principal diagnosis increased from 4,000 to 5,600.

Over this period the age-standardised hospitalisation rate for congenital heart disease has changed little (21 per 100,000 in 2000-01 and 23 in 2018-19). The male rate has been slightly higher than the female rate in recent years (Figure 2).

### Figure 2: Congenital heart disease hospitalisation rates, principal diagnosis, by sex, 2000-01 to 2018-19

The line chart shows age-standardised congenital heart disease hospitalisation rates remained relatively stable between 2000-01 and 2018-19 with males recording 20-24 and females recording 19-23 hospitalisations per 100,000 population across the period.

Hospitalisations per 100,000 population

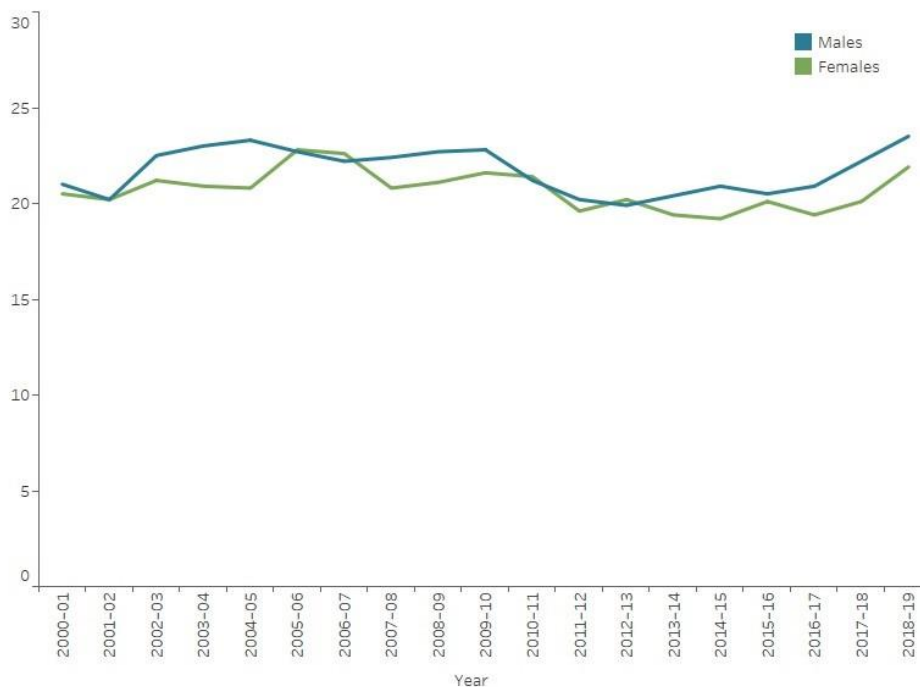


Figure 2: Congenital heart disease hospitalisation rates, principal diagnosis by sex, 2000-01 to 2018-19

Note: Age-standardised to the 2001 Australian Standard Population.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2018-19, there were around 280 hospitalisations with a principal diagnosis of congenital heart disease among Aboriginal and Torres Strait Islander people.

After adjusting for differences in the age structure of the populations:

- the rate among Indigenous Australians was similar to the non-Indigenous rate (25 and 22 per 100,000 population) the female
- Indigenous rate was slightly higher than the female non-Indigenous rate (26 and 21 per 100,000 population) (Figure 3).

### Socioeconomic group

In 2018-19, the congenital heart disease hospitalisation rate was 1.2 times as high for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas—age-standardised rates of 24 and 20 per 100,000 population.

The difference was greater for females (1.4 times as high), with male rates being similar (Figure 3).

### Remoteness area

In 2018-19, congenital heart disease hospitalisation rates were slightly higher among those living in *Remote and very remote* areas compared with those in *Major cities* (age-standardised rates of 25 and 22 hospitalisations per 100,000 population).

The difference was largely driven by disparities in female rates (28 and 21 per 100,000 population), with male rates being similar (23 per 100,000 population) (Figure 3).

## Figure 3: Congenital heart disease hospitalisation rates, principal diagnosis, by socioeconomic group and sex, 2018-19

The horizontal bar chart shows that variation in age-standardised congenital heart disease hospitalisation rates among population groups was largely driven by higher rates among females. Rates were higher among Indigenous females than non-Indigenous females and females living in the lowest socioeconomic areas and Remote and very remote areas.

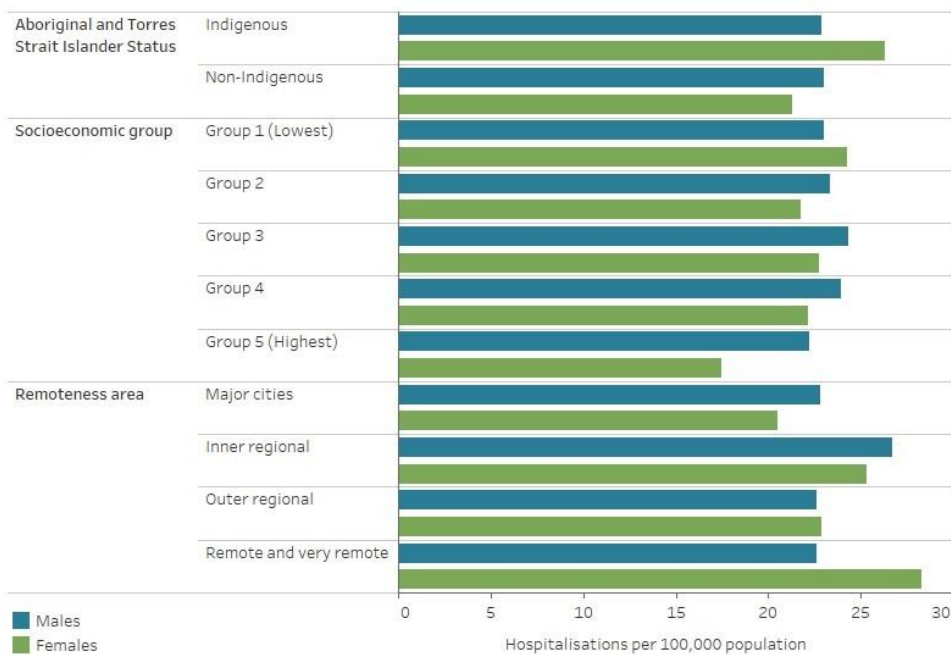


Figure 3: Congenital heart disease hospitalisation rates, principal diagnosis, by socioeconomic group and sex, 2018-19

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Excludes persons whose Indigenous status was not stated or inadequately described.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of relative Socio-Economic Disadvantage based on 2016 ASGS Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Area structure based on Statistical Area Level 2 (SA2) of usual residence.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database. <http://www.aihw.gov.au>

## Procedures

About half of all babies born with congenital heart disease require surgical or catheter-based interventions to correct any defect, with onethird needing these interventions in the first year of life (Blue et al. 2012; Leggatt 2011).

Where congenital heart disease was the principal and/or additional diagnosis, there were almost 2,200 surgical procedures conducted in Australian hospitals for closure of an atrial septal defect in 2018-19, around 470 for closure of ventricular septal defect and 600 for closure of patent ductus arteriosus:

- procedure rates for infants aged under 1 year were 100 per 100,000 for closure of atrial septal defect, 104 per 100,000 for ventricular septal defect and 108 per 100,000 for patent ductus arteriosus in 2018-19 most procedures for patent ductus arteriosus and ventricular septal defect were among children aged under 5 (74% and 82%) procedures for atrial septal defect were spread more evenly across
- ages, with 20% among children aged under 5 years, and 53% among adults aged 45 and over
- trends in procedure rates have changed little over the last decade—for atrial septal defect (6.2 and 8.5 per 100,000 in 2007-08 and 2018-19), ventricular septal defect (2.1 and 1.9 per 100,000 in 2007-08 and 2018-19) and patent ductus arteriosus (2.8 and 2.5 per 100,000 in 2007-08 and 2018-19).

## Diagnostic and treatment options for congenital heart disease

**Echocardiography**—an ultrasound of the heart. This test is non-invasive and can be conducted before birth.

**Pulse oximetry**—a non-invasive test that measures the oxygen levels in the blood to see how efficiently the heart is pumping oxygen to the rest of the body.

**Medications**—often used for mild congenital heart defects, especially those found later in childhood or in adulthood. Medications can help the heart work more efficiently by lowering blood pressure, regulating the heartbeat or lowering the amount of fluid in the chest.

**Cardiac catheterisation**—a thin flexible tube is inserted into an artery in the leg and moved towards the heart to measure blood pressure and flow. Sometimes used in conjunction with imaging procedures including contrast studies and X-ray. Also a form of treatment to stretch narrowed vessels and valves, implant stents or close a hole.

**Corrective surgery**—usually reserved for more complex congenital heart conditions. There are many different procedures. Surgery is often undertaken in the first year of life.

**Heart transplant**—total replacement of the heart muscle.

Compassionate care—an alternative to surgery, often using palliation and other forms of end-of-life care.

## Deaths



In 2019, congenital heart disease was the underlying cause of 174 deaths (0.1% of all deaths) in Australia.

Congenital heart disease is a leading cause of death among infants. In 2019, congenital heart disease caused 74 deaths in infants aged under 1 year, equivalent to 7.4% of all infant deaths.

### Age and sex

In 2019, 100 males and 74 females died as a result of congenital heart disease, equivalent to age-standardised rates of 0.8 and 0.6 per 100,000 population (Figure 4). Of these:

- 43% were aged 1 year or under (44 boys and 30 girls)
- 16% were aged 1-24 (15 males and 12 females)
- 25% were aged 25-64 (28 males and 16 females)
- 17% were aged 65 or over (13 males and 16 females).

Figure 4: Congenital heart disease death rates, by age and sex, 2019

The bar chart shows in 2019 congenital heart disease death rates were highest among boys and girls aged less than 1, at 28 and 20 deaths per 100,000 population, respectively.

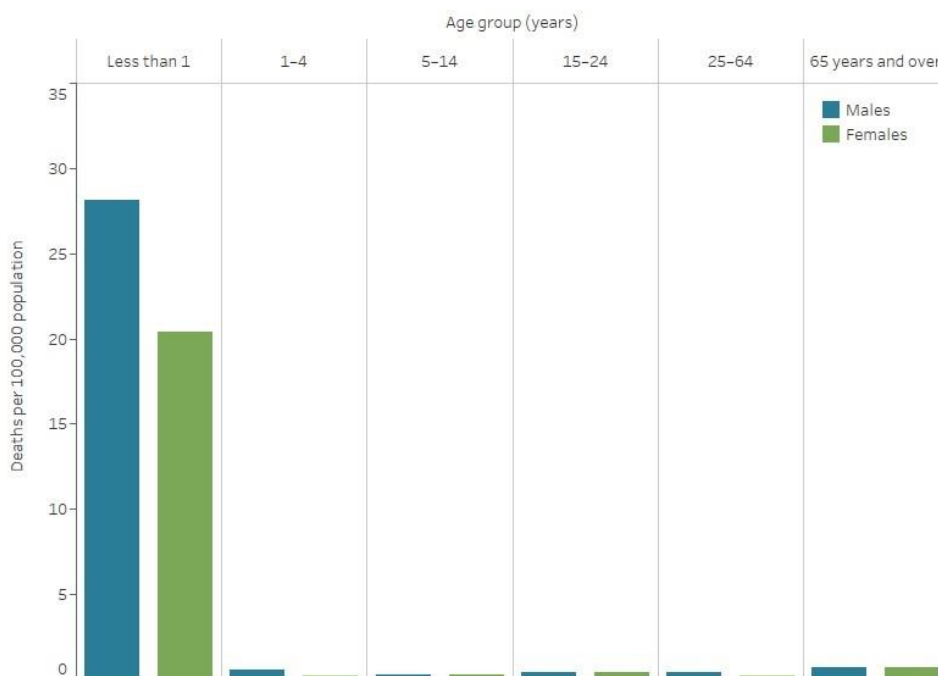


Figure 4: Congenital heart disease death rates, by age and sex, 2019

#### Notes:

1. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
2. Data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

## Trends

Both the number and rate of congenital heart disease deaths declined between 1980 and 2019:

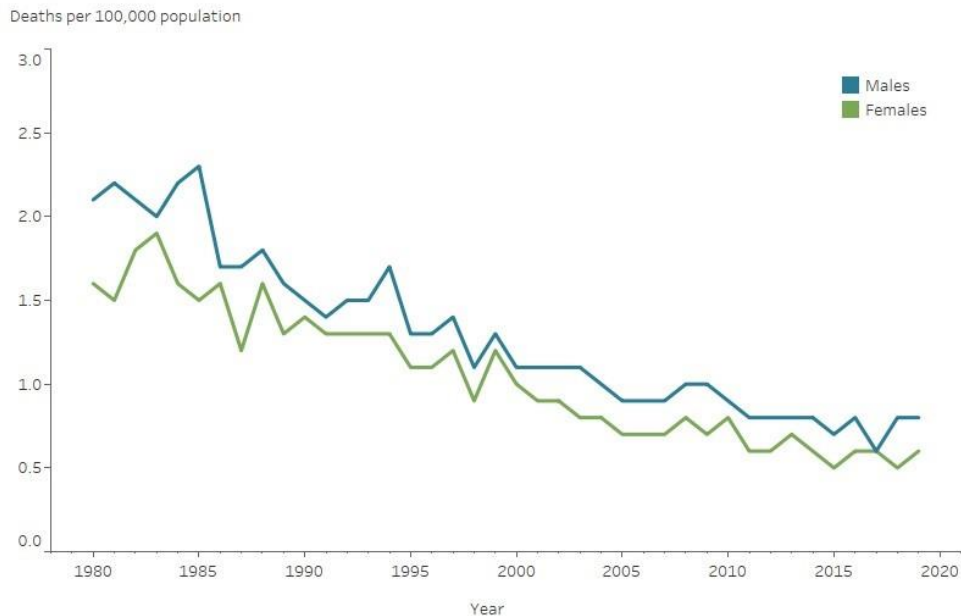
- the number of congenital heart disease deaths declined by 37%, from 277 to 174 the age-standardised congenital heart disease
- death rate declined by almost two-thirds, falling from 1.9 to 0.7 deaths per 100,000 population. Congenital heart disease death rates declined in a similar fashion for males and females (Figure 5).

In 1987, 71% of congenital heart disease deaths occurred in children aged under 5 years. By 1997, this figure had fallen to 55%, falling further to 50% in 2007 and to 45% in 2019.

Fewer deaths as a result of treatment improvements and an increase in the number of terminations of pregnancies after antenatal diagnosis have been suggested as factors that have contributed to the decrease in mortality rates (Leggatt 2011).

**Figure 5: Congenital heart disease death rates, by sex, 1980-2019**

The line chart shows age-standardised congenital heart disease death rates declined between 1980 and 2019, from 2.1 to 0.8 and 1.6 to 0.6 per 100,000 population for males and females, respectively.



**Figure 5: Congenital heart disease death rates, by sex, 1980-2019**

**Notes:**

1. Age-standardised to the 2001 Australian Standard Population.
2. Death rates for 1980-1996 have been adjusted to ICD-10 standards using a comparability factor of 1.12.
3. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.
4. These data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

## Variation among population groups

### Aboriginal and Torres Strait Islander people

In 2017-2019, there were 22 deaths from congenital heart disease among Aboriginal and Torres Strait Islander people in jurisdictions with adequate identification of Indigenous status.

After adjusting for differences in the age structure of the populations, the congenital heart disease death rate for Indigenous people was similar to that for non-Indigenous people (both 0.7 deaths per 100,000 population) (Figure 6).

### Socioeconomic group

In 2017-2019, the age-standardised congenital heart disease death rate in the lowest socioeconomic areas (0.8 per 100,000 population) was higher than in the highest socioeconomic areas (0.4 per 100,000 population) (Figure 6).

### Remoteness area

In 2017-2019, the age-standardised congenital heart disease death rates in *Remote and very remote* areas was 1.5 times as high as in *Major cities* (0.9 and 0.6 per 100,000 population) (Figure 6).

**Figure 6: Congenital heart disease death rates, by population group and sex, 2017-2019**

The horizontal bar chart shows in 2017-2019, age-standardised congenital heart disease death rates were similar among Indigenous and non-Indigenous Australians. Rates were slightly higher in the lowest socioeconomic areas, and among people living in Outer regional and Remote and very remote areas.

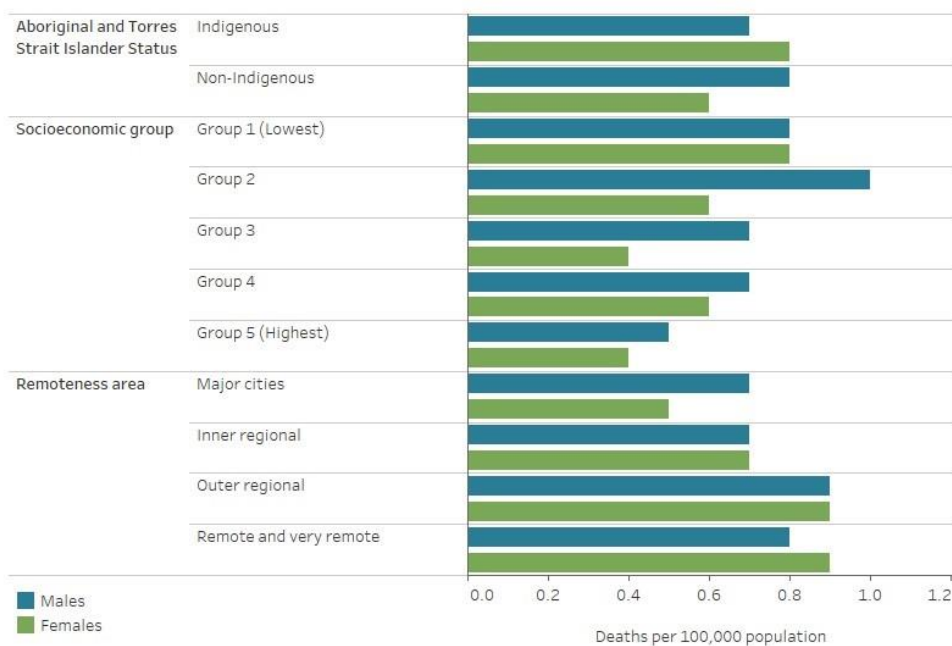


Figure 6: Congenital heart disease death rates, by population group and sex, 2017-2019

Notes:

1. Age-standardised to the 2001 Australian Standard Population
2. Aboriginal and Torres Strait Islander status includes data from people residing in NSW, QLD, WA, SA and NT only.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage (IRSD) based on Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness areas are classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.
5. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics.

Chart: AIHW. Source: AIHW National Mortality Database...

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## Comorbidity of heart, stroke and vascular disease

### On this page

- [Prevalence of CVD, diabetes and CKD](#)
- [Hospitalisations of CVD, diabetes and CKD](#)
- [Deaths from CVD, diabetes and CKD](#)

What is multimorbidity and comorbidity?

Many people with chronic conditions do not have a single, predominant condition, but rather they experience multimorbidity—the presence of 2 or more chronic conditions in a person at the same time (AIHW 2021).

The health effect of multimorbidity can be greater than the combined effect of individual conditions, leading to more severe illness, poorer prognosis and premature death. People with multimorbidity generally use more health services, including increased contact with primary health care services, with more complex hospitalisations and poorer outcomes.

People with cardiovascular disease (CVD) often live with other chronic conditions besides CVD. The additional conditions experienced by a person who has CVD is known as comorbidity. In this report, the focus is on the comorbidity of CVD (noting that a person may have more than 1 cardiovascular disease) in combination with diabetes and/or chronic kidney disease (CKD). These 3 diseases are closely associated, with shared underlying causes and risk factors, along with common prevention, management and treatment strategies. The interrelationship between their effects means that diabetes and CKD also act as risk factors for coronary heart disease, stroke and other cardiovascular diseases (AIHW 2016).

An ageing population, along with unfavourable risk factor trends and a high prevalence of chronic disease in the community are expected to result in a rise in the prevalence of CVD comorbidity, and higher rates of CVD among people with other chronic conditions.

In 2017-18, based on self-reported data, of the estimated 1.2 million Australians who had heart, stroke and vascular disease, 950,000 (82%) also had at least 1 of 9 other selected chronic conditions, including:

- arthritis, 572,000 (49%) back problems
- (dorsopathies), 401,000 (35%) mental and
- behavioural conditions, 342,000 (30%) diabetes
- mellitus, 261,000 (23%) asthma, 195,000 (17%)
- osteoporosis, 166,000 (14%) chronic obstructive
- pulmonary disease, 119,000 (10%) cancer, 82,400
- (7.1%) kidney disease, 76,900 (6.6%) (ABS 2018).
- 
- Heart, stroke and vascular disease was reported as a comorbidity by 32% of people with kidney disease, 22% of people with diabetes mellitus, 20% of people with chronic obstructive pulmonary disease and 19% of people with cancer (ABS 2018).

Note that these data are based on self-report, and rely on respondents providing accurate information—some conditions, such as chronic kidney disease, are under-reported.

### Prevalence of CVD, diabetes and CKD

Reliable estimates of the comorbidity of CVD, diabetes and CKD in the Australian population can be derived from large-scale biomedical health surveys. The most recent of these was the National Health Measures Survey, the biomedical component of the 2011-13 Australian Health Survey (ABS 2013).

In 2011-12, an estimated 4.9 million Australian adults (29%) had CVD or diabetes or CKD (AIHW 2014). Of these, over three-quarters (3.7 million or 22% of adults) had only 1 of CVD, diabetes or CKD, however 1.2 million (7.2% of adults) had at least 2 of CVD, diabetes or CKD:

- 601,000 (3.5%) had CVD and CKD
- 342,000 (2.0%) had CVD and diabetes
- 96,000 (0.6%) had diabetes and CKD
- 182,000 (1.1%) had all 3 conditions (Figure 1).

Men were more likely than women to have all 3 conditions (1.5% compared with 0.6%).

Among adults with CVD, 30% also had diabetes and/or CKD.

The prevalence of comorbidity of CVD, diabetes and/or CKD increased with age, more than tripling between the ages of 18-44 and 65 and over (from 12% to 44%) (AIHW 2014).

### Figure 1: Prevalence of CVD, diabetes, CKD and their comorbidity, persons aged 18 and over, 2011-12

The Venn diagram shows the overlapping proportion of adults who had CVD, diabetes or CKD in 2011-12. An estimated 15.1% had CVD only and 1.1% had all 3 conditions.



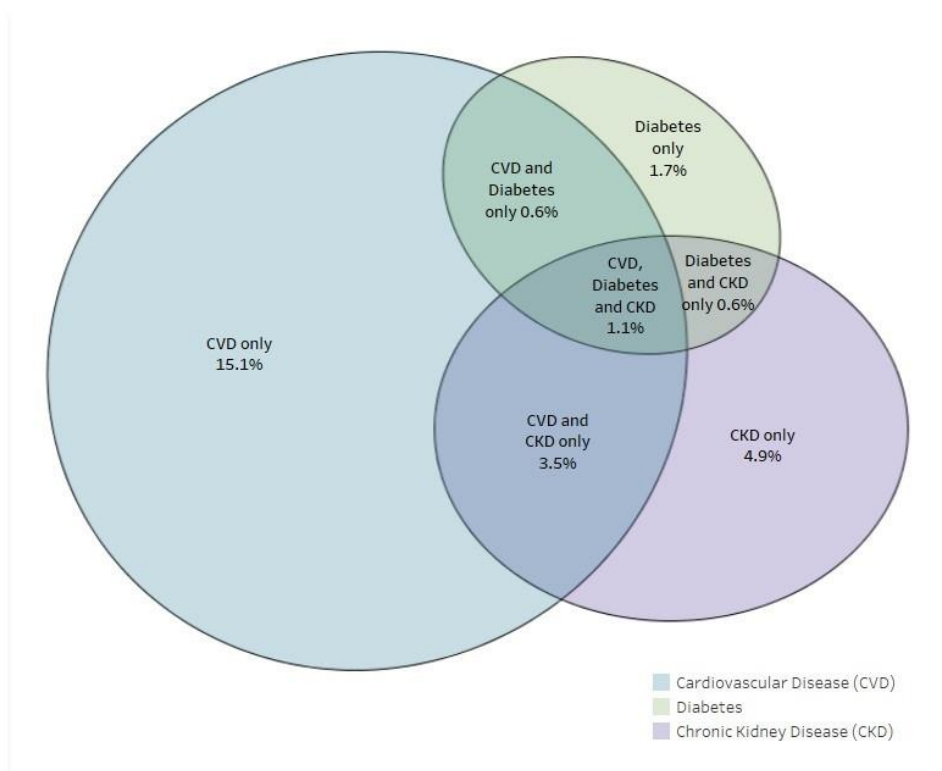


Figure 1: Prevalence of CVD, diabetes, CKD and their comorbidity, persons aged 18 and over, 2011-12

*Note:* CVD prevalence is based on self-reported data of people who participated in the measured component of the 2011-13 Australian Health Survey. Diabetes prevalence is based on HbA1c and self-reported data, and CKD prevalence on eGFR and ACR test results.

*Chart:* AIHW. *Source:* AIHW 2014. Cardiovascular disease, diabetes and chronic kidney disease -- Australian facts: Prevalence and incidence. Cat. no. CDK 2. Canberra: AIHW. <http://www.aihw.gov.au>

### Prevalence of CVD, diabetes and CKD in the Aboriginal and Torres Strait Islander population

In 2012-13, an estimated 117,000 Indigenous adults (35%) had CVD, diabetes or CKD. This proportion was higher than in the non-Indigenous population (30%) (AIHW 2015).

Of all Indigenous adults with CVD, diabetes or CKD, 38% had 2 or more conditions together, compared with an equivalent figure of 26% for the non-Indigenous population—11% had all 3 conditions together, compared with 3.9% of the non-Indigenous population.

In the Indigenous population, 33% had CVD only without diabetes or CKD comorbidities—a lower proportion than in the non-Indigenous population (51%).

### Hospitalisations with CVD, diabetes and CKD

#### Hospital comorbidity

Where a person has 2 or more of CVD, diabetes or CKD recorded in their episode of hospitalisation, this is referred to as hospital comorbidity.

Dialysis hospitalisations have been excluded because they are often performed as routine treatments on a same-day basis and have no other comorbid diagnoses recorded.

Note also the coding rule for diabetes—if present, diabetes is universally coded on a patient's hospital record. This is unlike CVD and CKD, which are coded only if they affected the care and treatment provided during the hospitalisation. This may under-report hospital comorbidity of these diseases.

In 2018-19, there were around 2.2 million hospitalisations in people aged 18 or over in which CVD, diabetes or CKD was present as the principal and/or an additional diagnosis. This equates to 21% of all non-dialysis hospitalisations for people 18 and older.

The majority of hospitalisations (1.2 million, or 55%) included CVD, either alone (853,000, or 39%) or in combination with diabetes and/or CKD (354,000, or 16%) (Figure 2).

The most common comorbidity was CVD and diabetes (185,000, or 8.4%), with CVD and CKD present in 55,100 hospitalisations (2.5%). There were a further 114,000 hospitalisations (5.2%) where all 3 diseases were present.

**Figure 2: Hospitalisations (excluding dialysis) with CVD, diabetes or CKD, persons aged 18 and over, 2018-19**

The Venn diagram shows the overlapping proportion of hospitalisations among adults in 2018-19 with CVD, diabetes or CKD as the principal and/or additional diagnosis. 38.8% of hospitalisations were for CVD only, but 5.2% of hospitalisations had all 3 conditions.

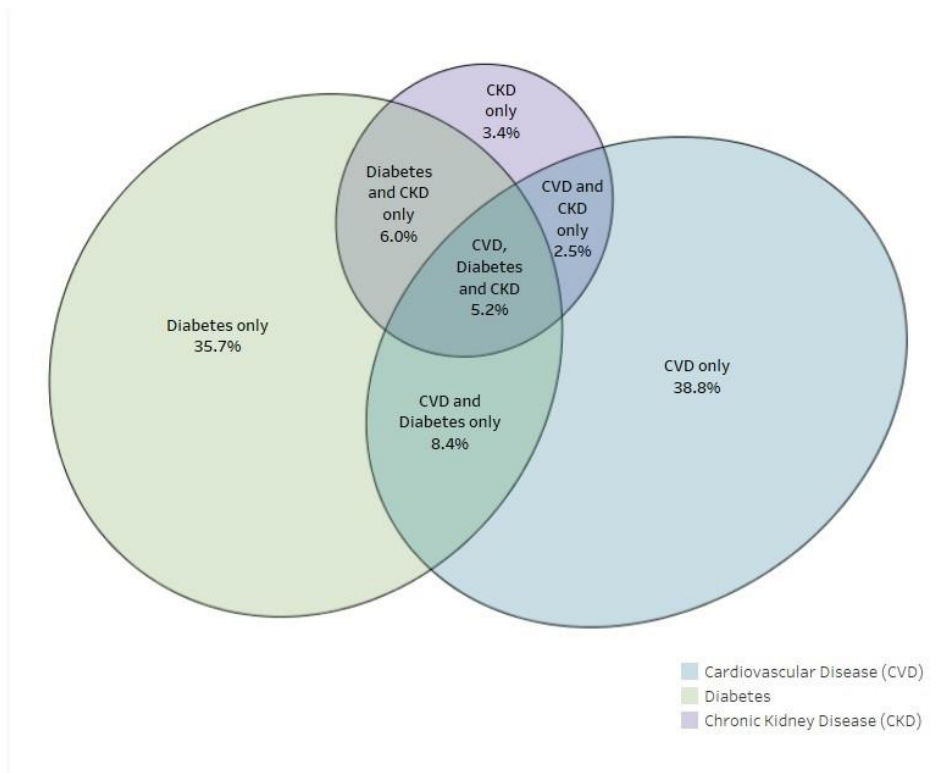


Figure 2: Hospitalisations (excluding dialysis) with CVD, diabetes or CKD, persons aged 18 and over, 2018-19

*Notes:*

1. CKD excludes dialysis as a principal diagnosis.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.

<http://www.aihw.gov.au>

### Age and sex

The rate of hospitalisations with comorbidity of CVD, diabetes and/or CKD increases with age.

In 2018-19, for example, people aged 45-64 were 8.6 times as likely to have a combination of CVD and diabetes recorded on their hospital record as people aged 18-44 (730 and 85 per 100,000 population). For those aged 65 and over, this difference increased to more than 40 times the rate of those aged 18-44 (3,600 and 85 per 100,000 population).

Men were more likely to be hospitalised with comorbidity than women. After adjusting for age, the rate of hospitalisation where all 3 diseases were recorded was 1.6 times as high for men as for women (625 and 379 per 100,000 population).

### Hospital comorbidity in the Aboriginal and Torres Strait Islander population

In 2018-19, there were 89,100 non-dialysis hospitalisations of Indigenous people aged 18 and over where CVD, diabetes or CKD was present as a principal diagnosis and/or additional diagnoses.

Of these hospitalisations, 33,100 (37%) recorded 2 or 3 of the diseases—8,200 (9.2%) recorded diabetes and CVD together, 1,900 (2.1%) recorded CVD and CKD, 13,600 (15%) recorded CKD and diabetes, and 9,300 (10%) recorded all 3 diseases.

A higher proportion of Indigenous adults had CVD, diabetes and CKD hospital comorbidity, compared with non-Indigenous adults (37% and 22%). The proportion of Indigenous hospitalisations with all 3 diseases (10.5%) was also higher than that in the non-Indigenous population (5.0%).

After adjusting for age differences in the populations, the rate of hospitalisation of Indigenous people recording all 3 diseases was 2.3 times as high as the rate of non-Indigenous people (22,000 and 9,400 per 100,000 population).

### Deaths from CVD, diabetes and CKD

Often, more than 1 disease contributes to a death. Along with the underlying cause of death, a medical practitioner or coroner will also record associated causes on a death certificate. The most complete representation of cause-of-death will consider the contribution of both underlying and associated causes (Harding et al. 2014).

Whereas CVD is a common underlying cause of death, diabetes and CKD are more likely to be recorded as associated causes of death. Both diabetes and CKD are known to be under-reported in national mortality statistics, and can be omitted from death certificates as contributory causes of death (Sypek et al. 2018, McEwen et al. 2011).

### Association of CVD, diabetes and CKD deaths

Of the 165,000 deaths registered among persons aged 18 and over in Australia in 2019, CVD, diabetes and CKD were listed as underlying or associated causes in 93,300 of these.

CVD was listed as either an underlying or associated cause of death in 85,800 (52% of adult deaths), while diabetes (17,100) and CKD (17,600) were each associated with about 10%. In total, 57% of adult deaths had at least 1 of these diseases recorded.

At least 2 of CVD, diabetes and CKD were recorded as causes of death in 24,000 death certificates, representing 14% of all adult deaths. CVD and diabetes occur together in half of these, contributing to 10,100 (6.1%), while CVD and CKD was associated with 9,400 deaths (5.7%). Diabetes and CKD (800 deaths) accounted for less than 1% of adult deaths. About 2% of adult deaths (3,500) in 2019 had all 3 diseases recorded (Figure 3).

**Figure 3: Deaths with CVD, diabetes and CKD listed as any cause of death, persons aged 18 and over, 2019**

The Venn diagram shows the proportion of deaths among adults in 2019 with CVD, diabetes or CKD as any cause of death. CVD was recorded as the only cause in 38.1% of deaths, and all 3 diseases were recorded as the underlying or associated cause in 2.1% of deaths.

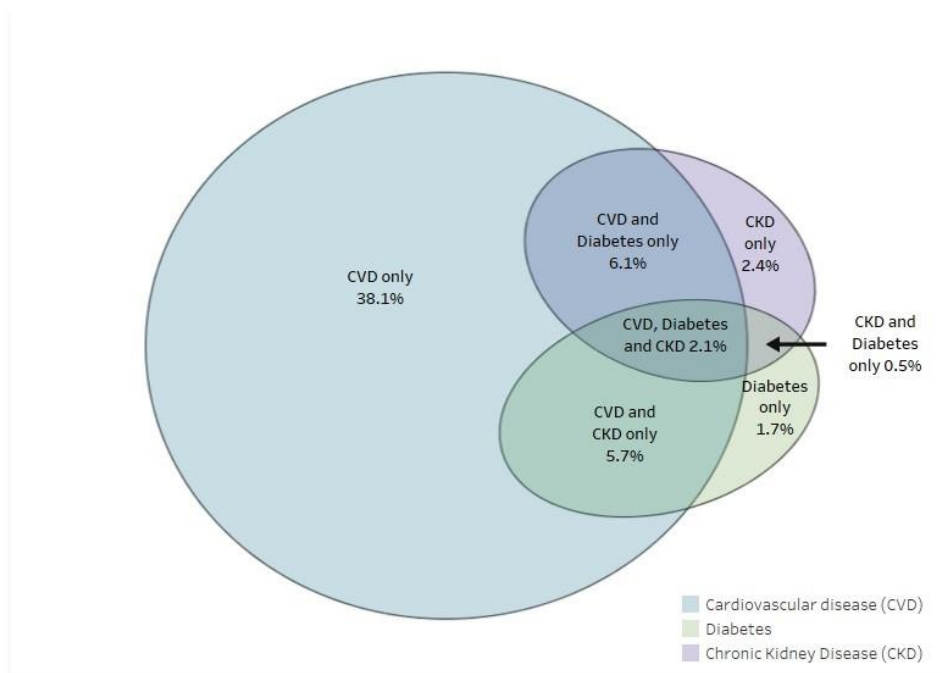


Figure 3: Deaths with CVD, diabetes and CKD listed as any cause of death, persons aged 18 and over, 2019

**Notes:**

1. Deaths are reported by year of registration of death. Deaths registered in 2019 are based on preliminary data and are subject to further revision by the Australian Bureau of Statistics (ABS).
2. These data have been adjusted for Victorian additional death registrations in 2019. Due to the adjustment, totals do not equal the sum of their components. For more detail please refer to Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australia, 2019 (ABS Cat. no. 3303.0).

Chart: AIHW. Source: AIHW National Mortality Database.  
<http://www.aihw.gov.au>

### Diseases commonly associated with CVD deaths

When the underlying cause of death is a cardiovascular disease, another cardiovascular disease is often listed as an associated cause of death (Table 1). Associated causes commonly listed with coronary heart disease deaths, for example, include heart failure, hypertensive diseases and cardiac arrhythmias.

Non-CVD causes that were commonly associated with CVD deaths in 2019 included dementia, diabetes and diseases of the urinary system (largely CKD).

Table 1: Common associated causes where a cardiovascular disease is the underlying cause of death, 2019

Coronary heart disease (I20-I25)	Cerebrovascular diseases (I60-I69)	Heart failure (I50-I51)
N=17,731	N=9,783	N=3,580

Heart failure (I50-I51) 5,183 (29%)	Hypertensive diseases (I10-I15) 2,627 (27%)	Diseases of urinary system (N00-N39) 797 (22%)
Hypertensive diseases (I10-I15) 4,103 (23%)	Dementia, incl. Alzheimer's disease (F01, F03, G30) 1,644 (17%)	Symptoms, signs and abnormal clinical and laboratory findings (R00-R99) 551 (15%)
Cardiac arrhythmias (I47-I49) 2,955 (17%)	Symptoms, signs and abnormal clinical and laboratory findings (R00-R99) 1,279 (13%)	Influenza, pneumonia (J09-J18) 442 (12%)
Diabetes mellitus (E10-E14) 2,469 (14%)	Cardiac arrhythmias (I47-I49) 1,210 (12%)	Cardiac arrest (I46) 313 (8.7%)
Diseases of urinary system (N00-N39) 2,517 (14%)	Coronary heart diseases (I20-I25) 1,036 (11%)	Dementia, incl. Alzheimer's disease (F01, F03, G30) 297 (8.3%)

Source: AIHW National Mortality Database.

### Cardiovascular diseases commonly associated with other causes of death

CVD was listed as an associated cause of death for 44% of all deaths registered in 2019. When a type of CVD was listed as an associated cause in 2019, the most common underlying causes of death include:

- **Heart failure as associated cause:** common underlying causes included coronary heart disease (25%), malignant neoplasms (cancer) (9.8%), chronic lower respiratory diseases (8.6%)
- **Hypertensive disease as associated cause:** common underlying causes include coronary heart disease (22%), malignant neoplasms (cancer) (15%), cerebrovascular diseases (mostly stroke) (14%)
- **Coronary heart disease as associated cause:** common underlying causes include malignant neoplasms (cancer) (21%), diabetes mellitus (13%), dementia, including Alzheimer's disease (9.6%)
- **Cardiac arrhythmias as associated cause:** common underlying causes include coronary heart disease (22%), malignant neoplasms (cancer) (15%), cerebrovascular diseases (mostly stroke) (8.9%).

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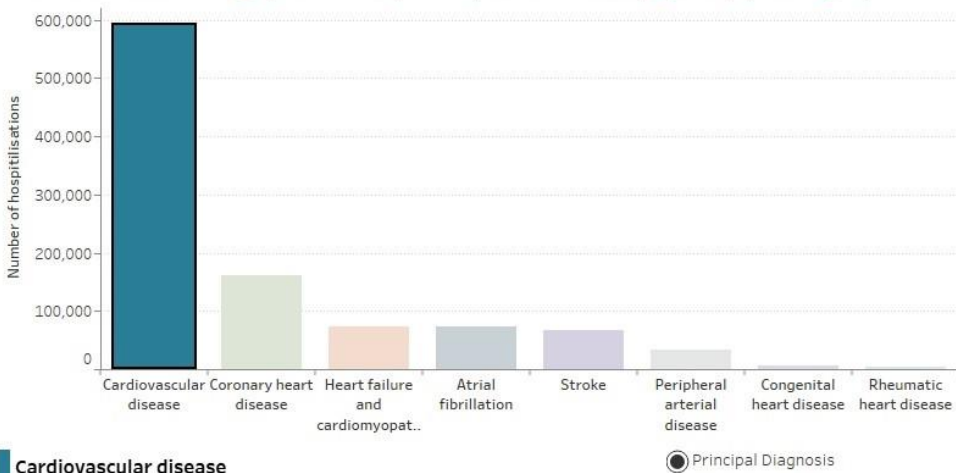
## Explore the data

These data visualisations show hospitalisations and deaths due to Cardiovascular disease in 2019. The data can be explored by condition and by age group, Aboriginal and Torres Strait Islander status, Socioeconomic group and Remoteness area. For all conditions, Indigenous Australians experienced higher age-standardised rates of hospitalisations and deaths. Age-standardised rates of hospitalisation and death were generally higher in socioeconomic group 1 (lowest) and in remote and very remote areas when compared to socioeconomic group 5 (highest) and Major cities, respectively. The rate of hospitalisation and death for most conditions increased with age, except for congenital heart disease which disproportionately affected the 'less than one' age group.

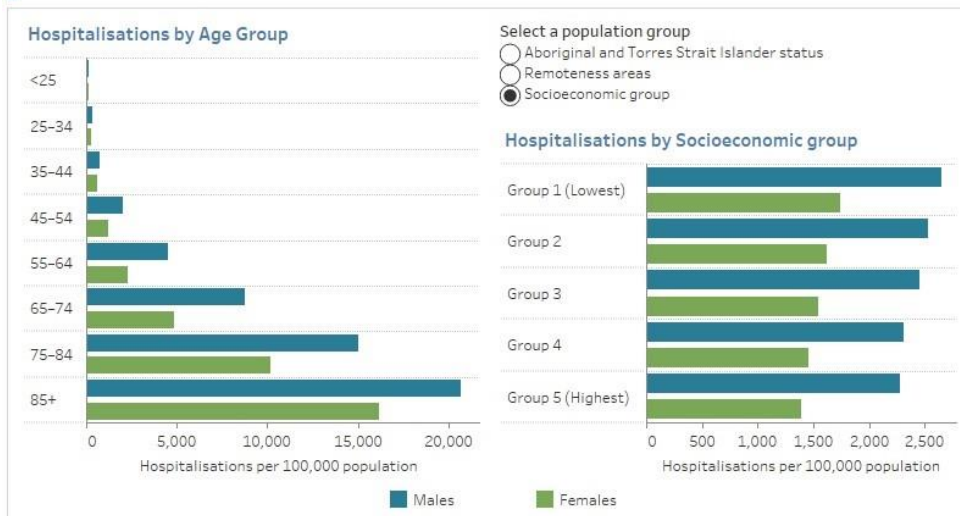
### Cardiovascular disease hospitalisations in Australia 2018-19

Hospitalisations  
Deaths

Select a condition in the graph below to explore hospitalisations data by age and population group.



#### Cardiovascular disease Principal Diagnosis



Source: Heart, Stroke and Vascular Disease: Australian Facts, 2021.  
<http://www.aihw.gov.au>

These data visualisations show the trends in hospitalisations and deaths due to cardiovascular diseases over time. The data can be explored by condition, age-group and sex. Between 2000-01 and 2018-19, there was a gradual decline in the age-standardised rate of hospitalisations and deaths for Cardiovascular disease. The age-standardised hospitalisation and death rates was higher for males than females and the agespecific rate of hospitalisations and deaths for Cardiovascular disease increased with age.



## Cardiovascular disease hospitalisation trends

Use the menus below to explore trends in cardiovascular disease hospitalisations over time by age group and sex.

Hospitalisations

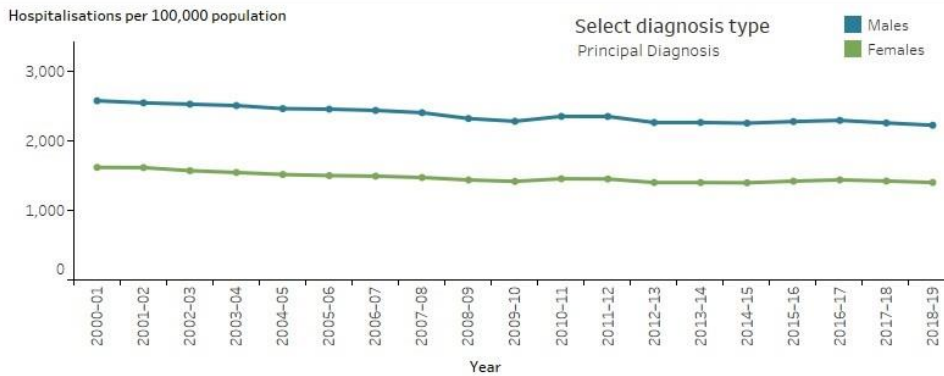
Deaths

Select a condition

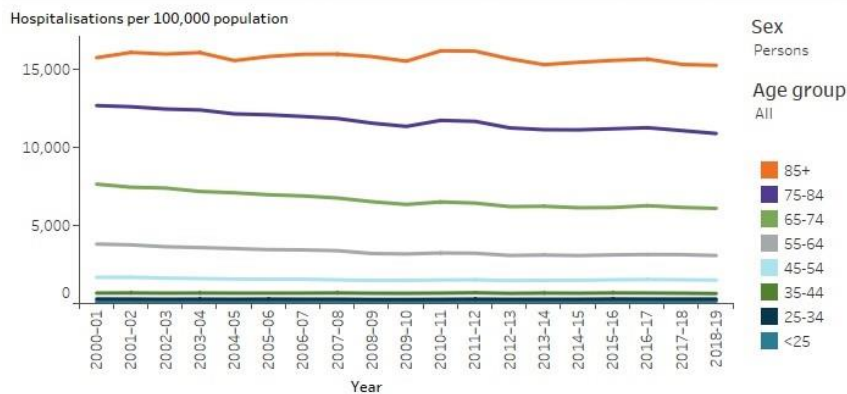
Cardiovascular disease

### Cardiovascular disease

#### Trends in age-standardised hospitalisation rates for Cardiovascular disease



#### Age-specific hospitalisation rates for Cardiovascular disease as a principal diagnosis



Source: Heart, Stroke and Vascular Disease: Australian Facts, 2021. <http://aihw.gov.au>.

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## Treatment and management

### High blood pressure (hypertension)

was the most common chronic condition newly recorded for patients in 2018-19

**591,000 hospitalisations** where CVD was recorded as the principal diagnosis, representing 5.2% of all hospitalisations in Australia

### 107 million PBS prescriptions

for cardiovascular medicines were supplied to the Australian community in 2019-20

## What is treatment and management of heart, stroke and vascular disease?

The treatment and management of heart, stroke and vascular disease (HSVD) can be regarded as having 3 broad phases—prevention, acute care and secondary prevention.

### Prevention

Prevention activities help people at risk of cardiovascular disease (CVD) before symptoms appear or before a cardiovascular event occurs. Healthy living—including not smoking, a balanced diet, regular physical activity—and the use of medicines can help manage levels of biomedical risk factors such as high blood pressure and abnormal blood lipids (WHO 2007).

Prevention services are commonly delivered by general practitioners (GPs), alongside nurses, pharmacists, Indigenous health workers and allied health professionals.

### Acute care

Acute care is the treatment given during and immediately after an acute CVD event such as a heart attack or stroke. It includes emergency care provided before a patient reaches hospital, as well as care given in the emergency department and in hospital.

### Secondary prevention

Secondary prevention here refers to health care which aims to prevent a recurrence of CVD events or complications in patients with diagnosed CVD. Secondary prevention involves medical treatment, modification of risk factors, psychosocial care, education and support for self-management.

Cardiac and stroke rehabilitation services are 2 examples of evidence-based secondary prevention strategies (Anderson & Taylor 2014, Stroke Foundation 2013).

## View the treatment and management of HSVD:

- [Primary health care](#)
- [Medicines for cardiovascular disease](#)
- [Emergency department presentations](#)
- [Hospital care and procedures](#)
- [Rehabilitation](#)
- [Safety and quality of care](#)

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## Treatment and management

### Primary health care

#### On this page

- [What CVD problems do GPs manage?](#)
- [Heart Health Checks](#)
- [Prescriptions ordered by GPs](#)

Primary health care professionals, including general practitioners (GPs), practice nurses, nurse practitioners and Aboriginal and Torres Strait Islander health workers are often the first point-of-care for people who have non-acute cardiovascular disease. Primary health care professionals deliver a range of services, from health checks, diagnosis and treatment to prevention and rehabilitation activities.

Primary health care professionals can also direct patients through the health system, including to specialised care when necessary.

Common actions by primary health care professionals when managing cardiovascular problems include undertaking checks, prescribing medicines, ordering pathology or imaging tests, and referral to specialists (AIHW 2011).

### What CVD problems do GPs manage?

GPs manage a range of risk factors and conditions related to heart, stroke and vascular disease.



In a 2018-19 survey of GP practices, [high blood pressure](#) (hypertension) was the **single most common chronic condition** newly recorded for patients (5.7% of patients) (NPS MedicineWise 2020).

Abnormal blood lipids was newly recorded for 3.2% of patients, and cardiovascular disease (CVD) conditions (including coronary heart disease, PVD, AF, heart failure, stroke or TIA) for 1.1% of patients (Table 1).

The survey also measured condition prevalence, defined as patients who were recorded as having a condition at any time before or during 2018-19 (NPS MedicineWise 2020). Hypertension was the most common condition, with 16.3% of patients having a diagnosis of hypertension ever recorded at any time in their medical record. Dyslipidaemia was recorded for 13.7% of patients. The patient prevalence estimate for CVD was 4.9%, including atrial fibrillation (2.2%), heart failure (1.0%) and stroke (1.0%).

For every 100 GP clinical encounters during 2018-19:

- 10 were with a patient with hypertension recorded in 2018-19, and 30 were with a patient with hypertension ever recorded
- 5 were with a patient with dyslipidaemia recorded in 2018-19, and 24 were with a patient with dyslipidaemia ever recorded
- 3 were with a patient with CVD recorded in 2018-19, and 12 were with a patient with CVD ever recorded (NPS MedicineWise 2020).

**Table 1: Selected CVD conditions managed by GPs, 2018-19**

	% patients, recorded in 2018-19 (95% CI)	% patients, ever recorded (95% CI)	Per 100 GP encounters, recorded in 2018-19 (95% CI)	Per 100 GP encounters, ever recorded (95% CI)
Hypertension	5.7 (5.3, 6.0)	16.3 (15.5, 17.1)	10.3 (9.3, 11.3)	29.7 (27.1, 32.4)
Dyslipidaemia	3.2 (3.0, 3.4)	13.7 (13.0, 14.4)	5.3 (4.7, 5.9)	24.0 (21.8, 26.2)
CVD	1.1 (1.1, 1.2)	4.8 (4.4, 5.1)	2.9 (2.7, 3.2)	11.5 (10.5, 12.5)
Atrial fibrillation	0.7 (0.7, 0.8)	2.2 (2.0, 2.3)	2.0 (1.8, 2.2)	5.7 (5.2, 6.2)



Heart failure	0.4 (0.3, 0.4)	1.0 (1.0, 1.1)	1.4 (1.2, 1.5)	3.4 (3.1, 3.7)
Stroke	0.2 (0.2, 0.2)	1.0 (0.9, 1.1)	0.5 (0.5, 0.6)	2.5 (2.3, 2.7)

#### Notes

1. CI: confidence interval.
2. CVD includes coronary heart disease, peripheral vascular disease, atrial fibrillation, heart failure, stroke and transient ischaemic attack.

Source: NPS MedicineWise 2020.

### Heart Health Checks

A Heart Health Check is a comprehensive assessment of CVD risk and management conducted by a GP or by a medical practitioner working in primary care. The 20-minute consultation includes the recording of patient's blood pressure, cholesterol levels and blood sugar, a discussion of health history and lifestyle, an absolute risk assessment, and if needed a management plan to improve risk factor levels, which may include blood pressure and cholesterol lowering medication for high risk patients.

Heart Health Checks help to address the high disease burden posed by CVD. They assist patients to better understand and lower their risk of heart attack or stroke. The Checks also promote the use of absolute risk calculators by health professionals, and the regular assessment and optimal treatment of at-risk patients.

Heart Health Checks have been covered by Medicare since April 2019 for eligible patients aged 45 and over and for Aboriginal and Torres Strait Islander people aged 30 and over.

In 2019-20, almost 100,000 Heart Health Checks (males 49,000, females 49,000) were processed by Medicare. Checks were most commonly conducted among people aged 55-64 (35,200) and 65-74 (28,900) (Services Australia 2021).

As at June 2020, 34% of regular clients of Indigenous primary health care aged 35-74 had a CVD risk assessment result that classified them as being at high risk (AIHW 2021).

### Prescriptions ordered by GPs

In a 2018-19 survey of GP practices, medicines for the cardiovascular system accounted for the largest proportion of prescriptions ordered for patients (31%) (Table 2). Note that medicines in this class may be used to help manage other conditions besides heart, stroke and vascular disease. The survey also found:

- medicines to treat hypertension (ATC class C07A, C08C, C09A, C09B, C09C, C09D) together accounted for 17% of the total volume of prescriptions ordered for patients
- lipid-lowering medicines (ATC class C10A and C10B) accounted for 11% of total prescriptions ordered for patients.
- For every 100 GP encounters in 2018-19, 14 cardiovascular system prescriptions were ordered. When repeat prescriptions are added, the total rises to 76 per 100 GP encounters (NPS MedicineWise 2020).

Table 2: Selected CVD medicines prescribed by GPs, 2018-19

ATC medicine class	% issued prescriptions (95% CI)	% total (issued + repeat) prescriptions (95% CI)
C - Cardiovascular system	17.8 (17.3, 18.4)	31.2 (30.6, 31.7)
C10A - Lipid modifying agents, single agent	5.0 (4.9, 5.2)	9.8 (9.6, 10.0)
C09C - Angiotensin II receptor blockers, single agents	2.2 (2.1, 2.3)	4.1 (4.0, 4.2)
C09A - ACE inhibitors, single ingredient	2.0 (2.0, 2.1)	3.8 (3.7, 3.9)
C07A - Beta blocking agents	1.7 (1.6, 1.8)	2.9 (2.9, 3.0)

C09D - Angiotensin II receptor blockers, combinations	1.4 (1.4, 1.5)	2.7 (2.6, 2.8)
C08C - Selective calcium channel blockers with mainly vascular effects	1.3 (1.3, 1.4)	2.4 (2.3, 2.5)
C09B - ACE inhibitors, combinations	0.7 (0.7, 0.7)	1.3 (1.3, 1.4)
C10B - Lipid modifying agents, combinations	0.5 (0.5, 0.6)	1.0 (1.0, 1.1)

#### Notes

1. CI: Confidence interval
2. Total prescriptions include issued and repeat prescriptions.
3. Includes blood pressure-lowering and lipid-modifying medicines only.

Source: NPS MedicineWise 2020.

#### References

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## Treatment and management

### Medicines for cardiovascular disease

On this page

- [Supply of cardiovascular medicines](#)
- [Use of cardiovascular medicines](#)

Cardiovascular medicines are key elements in preventing and treating cardiovascular disease (CVD) and its risk factors. They are most commonly used to help control levels of blood pressure and blood lipids, and to regulate heartbeat.

#### Cardiovascular medicines

**Blood pressure lowering medicines**—treat high blood pressure. They include:

- *Antihypertensives*—suppress signals that make the heart beat harder, or open and relax peripheral arteries.
- *Diuretics*—increase urination, helping rid the body of water and salt and thus reduce blood volume
- *Beta-blockers*—suppress signals that cause the heart to beat fast and hard
- *Calcium channel blockers*—block a conduction pathway in the heart, reducing the force of contraction and widening blood vessels
- *Renin-angiotensin system agents*—block effects of the renin-angiotensin system, a hormone system that regulates blood pressure and the volume of fluids in the body. The group includes ACE inhibitors (plain and in combinations), angiotensin II receptor blockers (plain and in combinations), and other agents acting on the renin-angiotensin system.

**Lipid-modifying medicines**—control blood lipid levels. Statins, resin binders, nicotinic acid, fibrates and probucol reduce blood LDL cholesterol ('bad' cholesterol), possibly increase HDL cholesterol ('good' cholesterol), and lower blood triglycerides.

**Antithrombotic medicines**—prevent or dissolve blood clots, reducing the risk of heart attack, or further strokes among patients with a history of ischaemic stroke.

**Cardiac therapy**—includes cardiac glycosides, antiarrhythmics and cardiac stimulants. They regulate heart rhythm, and treat angina and heart failure. Also includes vasodilators which open the main blood vessels of the body, as well as other cardiac preparations.

**Peripheral vasodilators**—open blood vessels in outer parts of the body, such as the arms and legs, making it easier for the heart to pump blood.

**Vasoprotectives**—relieve or prevent conditions of the blood vessels.

#### Supply of cardiovascular medicines

A wide range of subsidised cardiovascular medicines are made available to the Australian community through the Pharmaceutical Benefits Scheme (PBS), and through other arrangements where appropriate.



**Over 107 million PBS prescriptions** for cardiovascular medicines were supplied to the Australian community in 2019-20. These comprised **one-third (35%) of total PBS prescriptions** (Department of Health 2020).

- 69% of these medicines (75 million) were subsidised by the PBS, with the remainder (33 million) priced below the co-payment level.
- Rosuvastatin (12.7 million) and atorvastatin (11.0 million), both lipid-modifying medicines—and perindopril (6.6 million), a blood pressure lowering medicine—were among the most commonly supplied PBS medicines in Australia in 2019-20.
- The supply of lipid-modifying agents increased by 66% between 2005 and 2015, while calcium channel blockers and renin-angiotensin system agents—both classes of blood pressure lowering medicines—increased by 41 and 38%, and antithrombotic medicines by 24% (Figure 1).

#### Figure 1: Supply of cardiovascular medicines, 2005-2015

The line chart shows that between 2005 and 2015, the supply of renin-angiotensin system agents increased from 155.0 to 213.2 DDD/1,000/day, lipid-modifying agents increased from 90.7 to 150.7 DDD/1,000/day while the supply of calcium-channel blockers increased from 47.6 to 67.2 DDD/1,000/day. The supply of beta-blocking agents, antithrombotic agents and diuretics remained largely unchanged throughout the period.

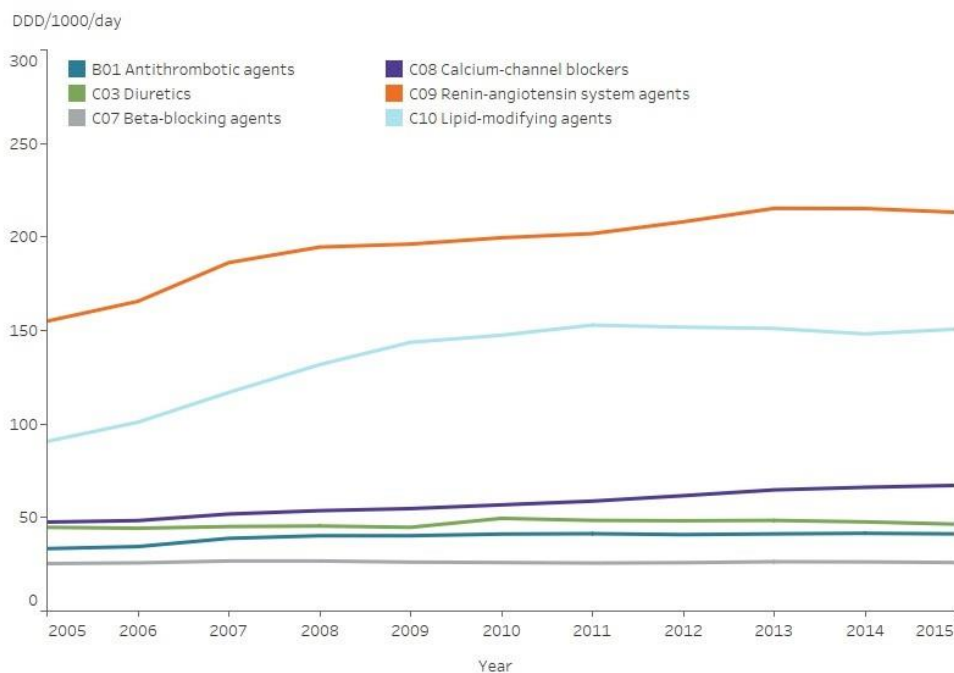


Figure 1: Supply of cardiovascular medicines, 2005-2015

**Notes:**

1. Medicine supply is expressed as Defined Daily Dose per 1,000 population per day (DDD/1,000/day). This measure is based on an assumed average dose per day of a medicine used by adults for its main indication.
2. Excludes medicines supplied to in-patients in public hospitals, over-the-counter medicines, private prescriptions from 2012 onwards, and the supply of highly specialised drugs to outpatients through public hospitals before 2014.

Chart: AIHW. Source: Department of Health 2016. Australian statistics on medicines 2015. Canberra: Department of Health, and previous editions.

<http://www.aihw.gov.au>

### Medicine supply to Australians in remote communities

Under the Remote Area Aboriginal Health Services (RAAHS) program, established under section 100 of the *National Health Act 1953*, any person attending an approved RAAHS can receive eligible PBS medicines without the need for a PBS prescription and without cost.

These arrangements seek to address barriers experienced by people living in remote areas of Australia, which may have limited access to a GP or a community pharmacy, in accessing essential medicines through the PBS.

- 1.7 million PBS items at a cost of \$39.3 million dollars were supplied to participating Aboriginal Health Services in 2019-20 (Department of Health 2021)

### Use of cardiovascular medicines



More than three-quarters (79%) of the estimated 1.2 million Australian adults aged 18 and over who had heart, stroke or vascular disease in 2017-18 used a cardiovascular system medicine in the 2 weeks prior to survey (AIHW analysis of ABS 2019).

- The most common medications used were blood pressure-lowering agents—including beta-blocking agents (33%), ACE inhibitors, plain (25%), angiotensin II antagonists, plain (18%) and calcium channel blockers (17%)—and lipid-modifying agents (58%) (Figure 2). These patterns largely reflect GP prescription and PBS supply data.
- There was no statistically significant difference in the proportion of men (82%) and women (76%) using cardiovascular system medications for their condition in the previous 2 weeks.
- Use was more common in older people with heart, stroke and vascular disease, with around 22% of persons aged 18-44 years, 79% of persons aged 55-64 years, and 90% of persons aged 75 and over using a cardiovascular system medication in the previous 2 weeks.

Two-thirds (66%) of a study population of PBS concessional beneficiaries aged 65 and over used more than one class of cardiovascular medicine to manage their conditions in 2014-15. One-quarter (23%) received blood pressure lowering, lipid-modifying and antithrombotic medicines (AIHW 2017).

### Figure 2: Adults aged 18 and over with a cardiovascular condition taking cardiovascular system medications in the last 2 weeks, 2017-18

The horizontal bar chart shows the most commonly used cardiovascular medications used by adults in the 2 weeks prior to survey in 2017-18 were lipid modifying agents (58.1%) followed by beta-blocking agents (32.7%) and ACE inhibitors, plain (20.8%).

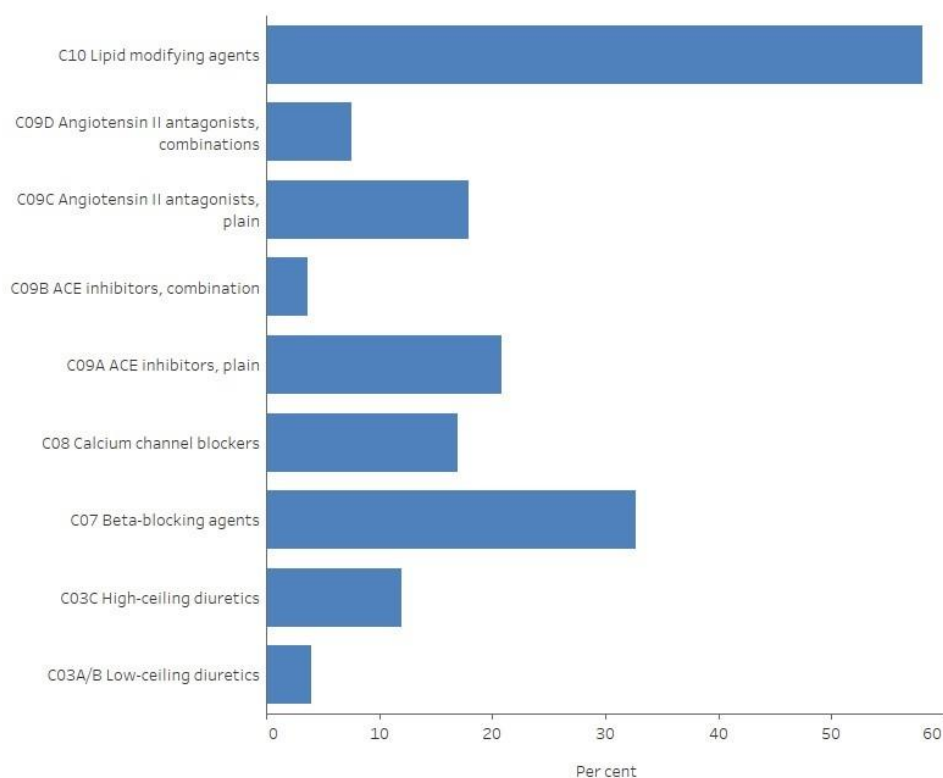


Figure 2: Adults aged 18 years and over with a cardiovascular condition taking cardiovascular system medications in the last 2 weeks, 2017-18

Chart: AIHW. Source: ABS 2019. Microdata: National Health Survey, 2017-18. AIHW analysis of Detailed Microdata. Viewed 19 February 2021.  
<http://www.aihw.gov.au>

### Impact of COVID-19 on cardiovascular medicine use

The COVID-19 pandemic has impacted both patients and health practitioners in terms of the number of medical services, type of services and the way in which services are delivered (Sutherland et al. 2020). Medication access and supply has also been affected.

Analysis of the total volume of PBS scripts for ATC group C, Cardiovascular system dispensed during 2020 shows little change from 2019. During 2019, 97.4 million CVD scripts were dispensed, compared with 101.9 million for 2020 (AIHW 2021).

There were, however, changes in consumer behaviour. An unusually high volume of CVD scripts were dispensed in March 2020 (10.0 million), coinciding with the introduction of national restrictions, followed by a decrease in April 2020 (7.3 million).

In March 2020, the Australian Government implemented temporary changes to medicines regulation to support Australians' continued access to PBS medicines during the COVID-19 pandemic. Some of these changes were in response to the dramatic increase in demand for medicines during early March, which resulted in pharmacies and wholesalers reporting medicine shortages.

The measures included a restriction on the quantity of medicines purchased to discourage unnecessary medicine stockpiling, continued dispensing emergency measures to allow 1 month supply of a patient's usual medicines without a prescription, a home delivery service for eligible patients, digital image-based prescriptions to support telehealth medical services, and arrangements for medicine substitution by pharmacists without prior approval from the prescribing doctor (AIHW 2020).

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## Treatment and management

### Emergency department presentations

Emergency departments (ED) are an essential component of Australia's health care system. Many of Australia's public hospitals have purpose-built EDs, staffed 24 hours a day, providing care for patients with heart, stroke or vascular disease who require urgent medical, surgical or other attention.



There were **327,000 presentations to Australian public hospital EDs** with a principal diagnosis of cardiovascular disease (CVD) in 2019-20—a rate of 1,300 presentations per 100,000 population.

The triage category indicates the urgency of the patient's need for care. Of ED presentations with a principal diagnosis of CVD in 2019-20, 14,700 (4.5%) were triaged as 'resuscitation' and needed immediate care, 139,900 (43%) were 'emergency' (within 10 minutes), 124,600 (38%) were 'urgent' (within 30 minutes), 43,200 (13%) were 'semi-urgent' (within 60 minutes) and 4,600 (1.4%) were 'non-urgent' (within 120 minutes) (AIHW 2020).

Almost two-thirds (64%) of ED presentations with a principal diagnosis of CVD were subsequently admitted to the hospital they presented to in 2019-20, with another 29% departing without being admitted or referred, and 5.6% referred to another hospital for admission.

In addition to ED presentations with a principal diagnosis of CVD, there were 353,000 ED presentations with symptoms of 'Pain in throat and chest' (ICD-10-AM R07) in 2019-20. Of these, 153,000 (43%) were subsequently admitted to hospital for further investigation and treatment (AIHW 2020).

#### Age and sex

In 2019-20:

- there were 174,000 male and 153,000 female presentations to Australian public hospital ED with a principal diagnosis of CVD the age-standardised male rate of presentation was 1.3 times as high as the female rate (1,248 and 988 per 100,000 population) more than half of presentations (184,000, or 56%) were among people aged 65 and over presentation rates increased with age, to be highest among males and females aged 85 and over (9,100 and 7,900 per 100,000 population)—more than twice as high as age 65-74 (3,600 and 2,600 per 100,000 population) at age 55-64, the male rate of presentation was 1.6 times as high as the female rate (2,200 and 1,400 per 100,000 population). At age 25-34, the female rate of presentation was 1.1 times as high as the male rate (374 and 350 per 100,000 population).

#### Variation among population groups

In 2019-20:

- Indigenous people presented to EDs with a principal diagnosis of CVD at 2.3 times the rate of non-Indigenous people (age-standardised rates of 2,500 and 1,100 per 100,000 population) rates increased with remoteness, being 1.6 times as high in *Remote/very remote* areas compared to *Major cities* (age-standardised rates of 1,600 and 1,000 per 100,000 population) rates for people living in the lowest socioeconomic areas were 1.9 times as high as for people in highest socioeconomic areas (age-standardised rates of 1,500 and 760 per 100,000 population).

#### Figure 1: Emergency Department presentation rates, principal diagnosis, by age group, 2019-20

The line chart shows the increasing rate of Emergency Department presentations for CVD with age in 2018-19, most notably for heart failure and stroke from age 65-74.

ED presentations per 100,000 population

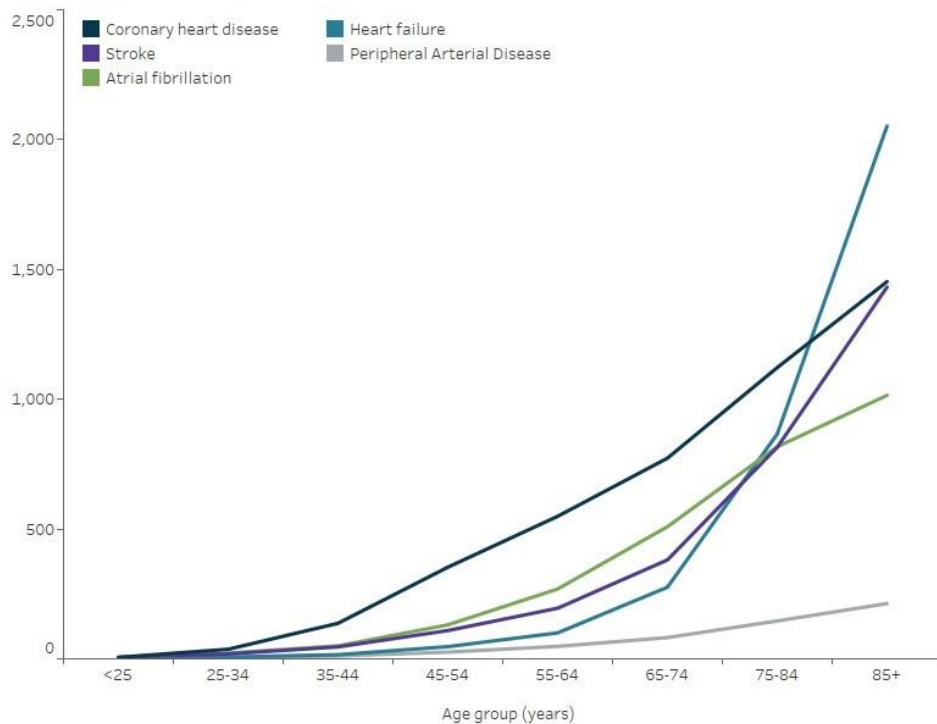


Figure 1: Emergency Department presentation rates, principal diagnosis, by age group, 2019-20

Note: Age-standardised to the 2001 Australian Standard Population

Chart: AIHW. Source: AIHW National Non-admitted Patient Emergency Department Care Database.  
<http://www.aihw.gov.au>

## Principal diagnosis In

2019-20:

- there were 73,800 ED presentations with a principal diagnosis of coronary heart disease (CHD), 42,400 with atrial fibrillation (AF), 38,700 with stroke, 33,400 with heart failure, and 7,800 with peripheral arterial disease (PAD)
- the age-standardised rate of ED presentation by principal diagnosis for males compared to females varied, from 1.3 times as high for AF, 1.4 for stroke, 1.7 for CHD and 2.1 times for PAD
- Indigenous Australians had much higher age-standardised ED presentation rates than non-Indigenous people for CHD and for heart failure (both 3.4 times as high) people living in the lowest socioeconomic areas had much higher age-standardised ED presentation rates than people in the highest socioeconomic areas for CHD (2.7 times as high), heart failure and PAD (both 2.5 times as high) the rate of admission to hospital following ED presentation varied by principal diagnosis, from 63% for AF presentations, to 78% for CHD presentations, and 83% for stroke and for heart failure presentations.

## Reference

AIHW 2020. My Hospitals. Emergency department care. Emergency department care 2019-20 data tables. Table 4.6-4.10. Canberra: AIHW.

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# Treatment and management

## Hospital care and procedures

On this page

- [Hospitalisation for all cardiovascular disease](#)
- [Hospital procedures](#)



This section provides an overview of hospital care for all cardiovascular diseases (CVD) in the Australian population. For information on hospitalisations for particular CVD subtypes, refer to the relevant page.

A hospitalisation for CVD may be for medical, surgical, or other acute care, for subacute care (for example rehabilitation) or for non-acute care (for example, maintenance care for a person with limitations due to a cardiovascular condition).

Many patients who are hospitalised with acute cardiovascular events will be cared for in a specialist unit:

- in 2019, there were 101 coronary care units in Australian public hospitals and a further 38 cardiac surgery units (AIHW 2020)
- in 2019, there were 91 specialised stroke units (Stroke Foundation 2019).

## Hospitalisation for all cardiovascular disease



In 2018-19, there were **591,000 hospitalisations** where CVD was recorded as the principal diagnosis. This represented 5.2% of all hospitalisations in Australia in 2018-19.

Of these, 530,000 (90%) were for acute care—that is, care in which the intent is to perform surgery, diagnostic or therapeutic procedures in the treatment of illness or injury).

Of all hospitalisations for CVD in 2018-19:

- 27% had a principal diagnosis of coronary heart disease, followed by
- atrial fibrillation (12%) heart failure and cardiomyopathy (12%)
- stroke (11%) peripheral arterial disease (5.5%) hypertensive disease
- (2.4%) rheumatic heart disease (0.7%) (Figure 1).

### • Figure 1: Major causes of cardiovascular disease hospitalisations (principal diagnosis), by sex, 2018-19

• The bar chart shows the number of hospitalisations for selected cardiovascular diseases in 2018-19, ranging from 161,000 for a principal diagnosis of coronary heart disease to 4,400 for rheumatic heart disease.

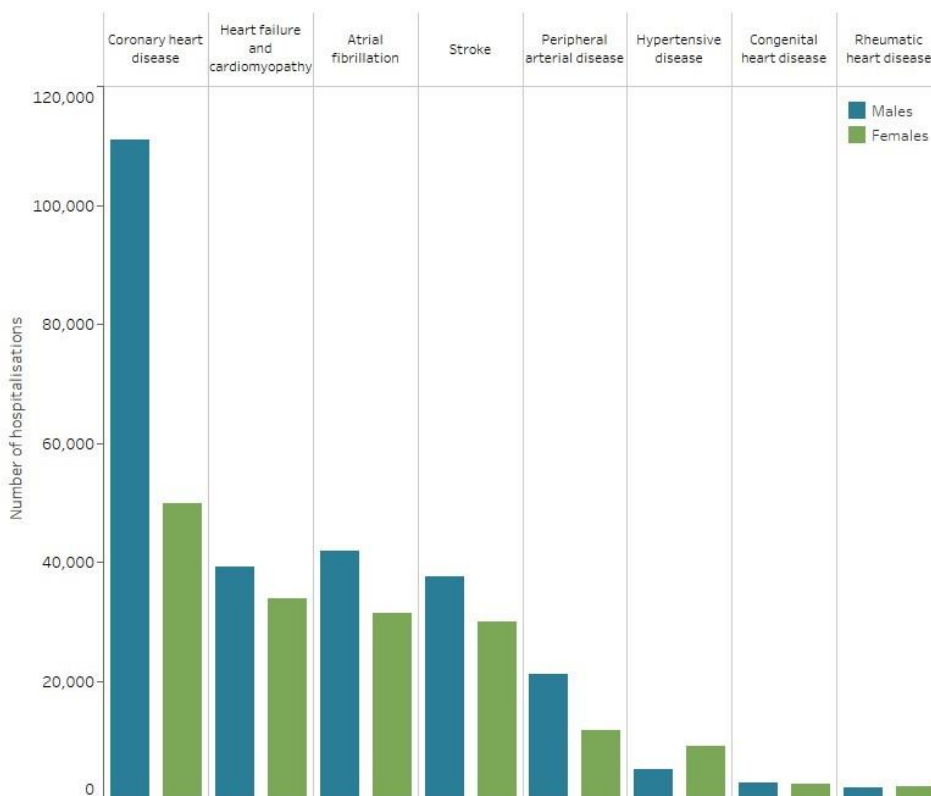


Figure 1: Major causes of cardiovascular disease hospitalisations (principal diagnosis), by sex, 2018-19

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

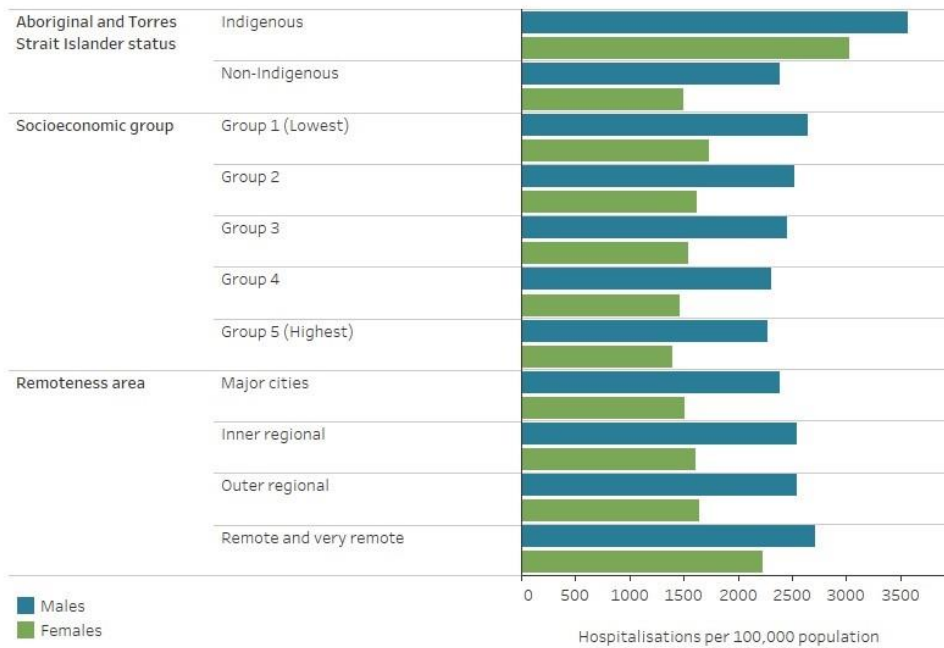
## Age and sex

In 2018-19, rates of hospitalisation with CVD as the principal diagnosis:

- were 1.6 times as high for males compared with females (2,500 and 1,600 per 100,000 population), after adjusting for age. Age-specific rates were higher among males than females across all age groups (Figure 2) increased with age, with over 4 in 5 (83%) CVD hospitalisations occurring in those aged 55 and over. CVD hospitalisation rates for males and females were highest in the 85 and over age group (20,700 and 16,200 per 100,000 population)—1.4 times as high as those in the 75- 84 age group for males and 1.6 times as high among females (15,000 and 10,200 per 100,000) (Figure 2).

**Figure 2: Cardiovascular disease hospitalisation rates, principal diagnosis, by age and sex, 2018-19**

The bar chart shows cardiovascular disease hospitalisation rates by age group in 2018-19. These were highest among men and women aged 85 and over (21,000 and 16,000 per 100,000 population).



**Figure 4: Cardiovascular disease hospitalisation rates, principal diagnosis, by population group and sex, 2018-19**

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Excludes persons whose Indigenous status was not stated or inadequately described.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage based on 2016 ASGS Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.

Chart: AIHW. Source: AIHW National Mortality Database.  
<https://www.aihw.gov.au>

**Trends**

The number of acute care hospitalisations with CVD as the principal diagnosis increased by 35% between 2000-01 and 2018-19, from 391,000 to 530,000 hospitalisations.

Despite increases in the number of hospitalisations, the age-standardised rate declined by 13% over this period, from 2,100 to 1,800 per 100,000 population.

The rate of CVD hospitalisations for males was higher than for females across the period, with both showing similar declines (Figure 3).

**Figure 3: Acute care cardiovascular disease hospitalisations rates, principal diagnosis, by sex, 2000-01 to 2018-19**

The line chart shows declines in age-standardised rates of male and female acute care CVD hospitalisations between 2000-01 and 2018-19, from 2,570 to 2,219 per 100,000 population for males, and from 1,614 to 1,398 for females.

Hospitalisations per 100,000 population

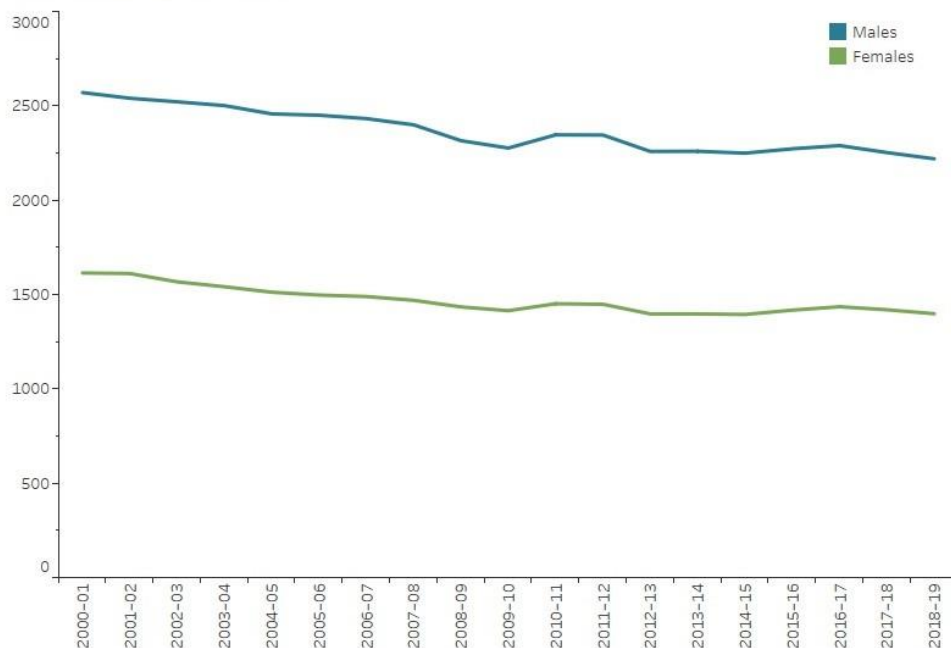


Figure 3: Acute care cardiovascular disease hospitalisation rates, principal diagnosis, by sex, 2000-01 to 2018-19

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.

2. Analysis includes care types: 1 (acute care), 7.1 (newborn with qualified days only), 7.2 (newborn with qualified and unqualified days) and 99 (not reported/unknown) only.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.

<https://www.aihw.gov.au>

### Length of stay in hospital

The length of time that people spend in hospital for CVD has decreased over the past 3 decades. Among those hospitalised for 1 night or more with CVD as a principal diagnosis, the average length of stay declined from 9.6 days in 1993-94 to 7.9 days in 2007-08 and 6.0 days in 2018-19. In 2018-19, 28% of people admitted to hospital with CVD were discharged the same day.

Of those hospitalised with CVD in 2018-19, patients with stroke tended to stay longest—an average of 11.9 days, followed by patients with congenital heart disease (8.2 days) peripheral arterial disease (6.9 days), and coronary heart disease (4.4 days).

Average length of stay in hospital increases with age. Those aged 85 and over stayed an average of 7.2 days, compared with 4.9 days for those aged 25-34 years. The longer lengths of stay among older people reflect the increased complexity and multiplicity of their conditions.

### Variation among population groups

#### Aboriginal and Torres Strait Islander people

In 2018-19, there were around 16,100 hospitalisations with a principal diagnosis of CVD among Aboriginal and Torres Strait Islander people.

After adjusting for differences in the age structure of the populations:

- the rate among Indigenous Australians was 1.7 times as high as the non-Indigenous rate (3,300 and 1,900 per 100,000 population) the
- disparity between Indigenous and non-Indigenous Australians was greater for females—2.0 times as high (3,000 and 1,500 per 100,000 population) compared with 1.5 times as high for males (3,600 and 2,400 per 100,000 population).

#### Socioeconomic group

In 2018-19, CVD hospitalisation rates were almost 20% higher for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas—2,200 and 1,800 per 100,000 population.

The disparity between the lowest and highest socioeconomic areas was greater for females than males (1.24 and 1.16 times as high) (Figure 4).

## Remoteness area

In 2018-19, CVD hospitalisation rates were around 30% higher among those living in *Remote and very remote* areas compared with those in *Major cities* (2,500 and 1,900 per 100,000 population).

This largely reflects disparities in female rates—2,200 and 1,500 per 100,000 population—for males, the difference was smaller (2,700 and 2,400 per 100,000).

Higher hospitalisation rates in *Remote and very remote* areas are likely to be influenced by the higher proportion of Aboriginal and Torres Strait Islander people living in these areas, who have higher rates of CVD than other Australians.

CVD patients are often transferred from a local regional hospital to a larger urban hospital where more intense or critical care can be provided. In 2018-19, 17% of CVD hospitalisations (principal and/or additional diagnosis) in *Remote and very remote* areas were transferred to another acute hospital, compared with 16% in *Outer regional* areas, 14% in *Inner regional* areas and 10% in *Major cities*.

The higher rates of transfers are often necessary because certain cardiac procedures, such as angiograms and cardiac revascularisation, are generally performed in large hospitals, which are predominantly located in urban areas.

### Figure 4: Cardiovascular disease hospitalisation rates, principal diagnosis, by population group and sex, 2018-19

The horizontal bar chart shows that male and female CVD hospitalisation rates in 2018-19 were higher among Indigenous Australians, people living in the lowest socioeconomic areas, and people living in remote and very remote areas.

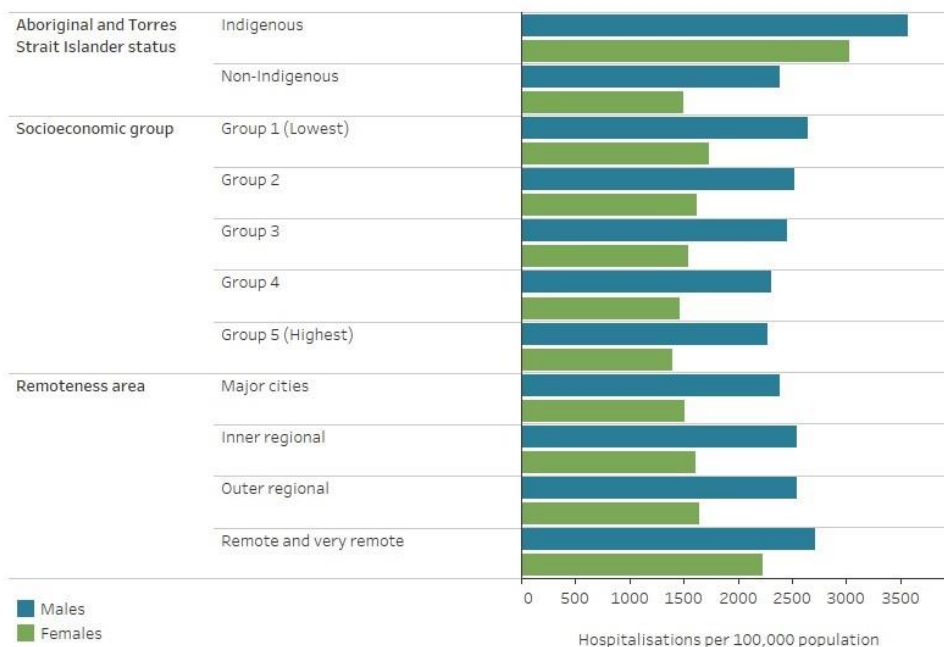


Figure 4: Cardiovascular disease hospitalisation rates, principal diagnosis, by population group and sex, 2018-19

#### Notes:

1. Age-standardised to the 2001 Australian Standard Population.
2. Excludes persons whose Indigenous status was not stated or inadequately described.
3. Socioeconomic groups are classified according to population-based quintiles using the Index of Relative Socio-Economic Disadvantage based on 2016 ASGS Statistical Area Level 2 (SA2) of usual residence.
4. Remoteness is classified according to the Australian Statistical Geography Standard 2016 Remoteness Areas structure based on Statistical Area Level 2 (SA2) of usual residence.

Chart: AIHW. Source: AIHW National Mortality Database.  
<https://www.aihw.gov.au>

## Hospital procedures

This section reports on a range of common procedures which diagnose or treat CVD, and are performed on patients admitted to hospital.

### Coronary angiography

Coronary angiography is a diagnostic procedure which provides a picture of the coronary arteries—those that supply blood to the heart itself—to determine whether they may be narrowed or blocked. A catheter is guided to the heart where a special dye is released into the coronary arteries before X-rays are taken.

Coronary angiography provides medical professionals with the information to decide on treatment options, such as the need for coronary revascularisation procedures.

- In 2018-19, there were 141,000 coronary angiography procedures reported for patients admitted to hospital—93,400 (66%) for males and 47,500 (34%) for females.
- Between 2000-01 and 2018-19, the age-standardised rate of coronary angiography procedures increased from 572 to 662 per 100,000 population (15%) in males, and from 263 to 305 per 100,000 population (16%) in females.

### Echocardiography

Echocardiography is a diagnostic procedure which takes moving pictures of the heart using high frequency sound waves (ultrasound).

With these it is possible to measure the size of the various heart chambers, to study the appearance and motions of the heart valves, and to assess blood flow through the heart.

Imaging services, including intraoperative ultrasounds are not usually coded on hospital records, although transoesophageal echocardiogram (TOE) are an exception and are generally coded. Note, however, that the numbers reported here may be underestimates.

- In 2018-19, there were 47,000 echocardiography procedures reported for patients admitted to hospital—31,800 (68%) for males and 15,100 (32%) for females.
- The age-standardised rate of echocardiography procedures was 228 per 100,000 population in males, and 101 per 100,000 population in females.

### Percutaneous coronary interventions

Percutaneous coronary interventions (PCIs) restore blood flow to blocked coronary arteries. There are two types: coronary angioplasty without stent, and coronary stenting.

Coronary angioplasty involves inserting a catheter with a small balloon into a coronary artery, which is inflated to clear the blockage.

Coronary stenting is similar, but involves inserting a stent (an expandable mesh tube) into the affected coronary arteries.

- In 2018-19, 45,900 PCIs were performed on patients admitted to hospital, of which 34,800 (76%) were for males and 11,200 (24%) for females (Figure 1).
- Between 2000-01 and 2018-19, the age-standardised rate of PCIs increased from 178 to 247 per 100,000 population (39%) in males, and from 57 to 71 per 100,000 population (25%) in females.

### Coronary artery bypass grafting

Coronary artery bypass grafting (CABG) is a surgical procedure that uses blood vessel grafts to bypass blockages in the coronary arteries and restore adequate blood flow to the heart muscle. The surgery involves taking a blood vessel from a patient's inner chest, arm or leg and attaching it to the vessels on the outside of the heart to bypass a blocked artery.

- In 2018-19, there were 12,600 CABG procedures performed on patients admitted to hospital—10,400 (83%) for males and 2,200 (17%) for females (Figure 1).
- Between 2000-01 and 2018-19, the age-standardised rate of CABG decreased from 141 to 72 per 100,000 population (-49%) in males, and from 39 to 14 per 100,000 population (-64%) in females.
- Although rates of CABG have declined, the procedure remains a recommended treatment for certain patients with complex cardiovascular conditions (NHF & CSANZ 2016).

### Figure 1: Percutaneous coronary interventions and coronary artery bypass grafts, by sex, 2000-01 to 2018-19

The line chart shows that the number of percutaneous coronary interventions for both males and females increased between 2000-01 and 2018-19, whereas the number of coronary artery bypass grafts declined.

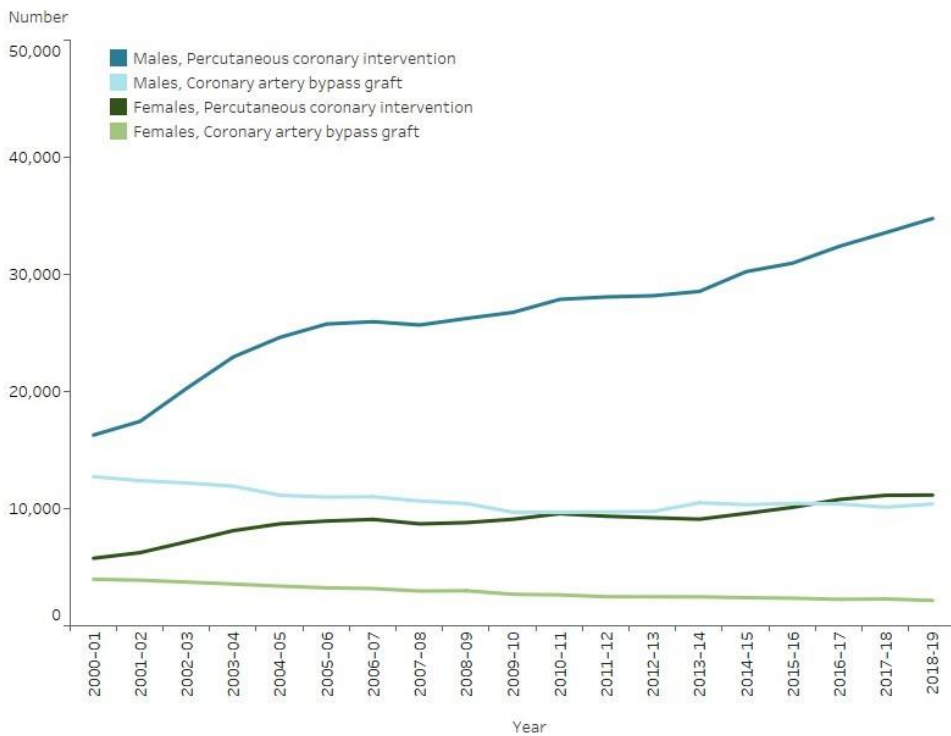


Figure 1: Percutaneous coronary interventions and coronary artery bypass grafts, 2000-01 to 2018-19

*Notes:*

1. Age-standardised to the 2001 Australian Standard Population.
2. Hospitals procedures are for admitted patients only.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database.  
<http://www.aihw.gov.au>

### Heart valve repair or replacement

Heart valve repair or replacement procedures are performed when the normal flow of blood through the heart is disrupted by damaged valves, making it harder for the heart to pump blood effectively. This can lead to heart failure. The damage to heart valves may be caused by acute rheumatic fever or rheumatic heart disease, coronary heart disease, or forms of congenital heart disease.

- In 2018-19, there were 11,400 heart valve repair or replacement procedures performed on patients admitted to hospital—7,300 (64%) for males and 4,100 (36%) for females.
- The age-standardised rate of heart valve repair or replacement procedures was 53 per 100,000 population in males, and 26 per 100,000 population in females.

### Pacemaker insertion

Pacemakers are small devices that are placed in the chest or abdomen to help control abnormal heart rhythms. These devices use electrical pulses to prompt the heart to beat at a normal rate.

- In 2018-19, there were 18,100 pacemaker insertion procedures performed on patients admitted to hospital—10,700 (59%) for males and 7,400 (41%) for females.
- The age-standardised rate of pacemaker insertion procedures was 77 per 100,000 population in males, and 44 per 100,000 population in females.

### Cardiac defibrillator implant

A cardiac defibrillator implant is a device implanted into a patient's chest that monitors the heart rhythm and delivers electric shocks to the heart when required to eliminate abnormal rhythms. They are effective in preventing sudden cardiac death in people at high risk of the life-threatening cardiac arrhythmia known as ventricular fibrillation.

- In 2018-19, there were 4,000 cardiac defibrillator implant procedures performed on patients admitted to hospital—3,100 (78%) for males and 867 (22%) for females.
- The age-standardised rate of cardiac defibrillator implant procedures was 22.4 per 100,000 population in males, and 5.9 per 100,000 population in females.

## Carotid endarterectomy

Carotid endarterectomy is a procedure where atherosclerotic plaques are surgically removed from the carotid arteries in the neck, which supply blood to the brain. This procedure is used to reduce the risk of stroke caused by blockage.

- In 2018-19, there were 2,000 carotid endarterectomy procedures performed on patients admitted to hospital—1,500 (74%) for males and 500 (26%) for females.
- The age-standardised rate of carotid endarterectomy procedures was 10.5 per 100,000 population in males, and 3.3 per 100,000 population in females.

## Heart transplants

A heart transplant involves implanting a working heart from a recently deceased organ donor into a patient. It is usually used to treat severe forms of heart failure or coronary artery disease.

- In 2018-19, there were 123 heart transplants performed—78 (63%) for males and 45 (37%) for females.
- The age-standardised rate of heart transplants was 0.6 per 100,000 population in males, and 0.4 per 100,000 population in females.

The Australian and New Zealand Organ Donation Registry (ANZOD) records and reports on organ donation within Australia and New Zealand. Of the 548 deceased organ donors in 2019 in Australia, 123 (22%) had a heart retrieved. From these heart donors there were 113 heart transplant recipients. Of these, 2 received heart/double lung transplants and 4 received a combined heart/kidney transplant (ANZOD 2020).

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## Treatment and management

### Rehabilitation

#### Cardiac rehabilitation

Cardiac rehabilitation helps people who have recently had a heart event, procedure or the diagnosis of a heart condition to rebuild health-related quality of life, stay out of hospital and reduce the risk of future health complications.

Hospital and community-based health programs provide physical activity, education and support, working alongside patient's GPs and cardiologists. Outpatient cardiac rehabilitation usually commences soon after discharge from hospital:

- of 49,900 eligible patients assessed in 2013-2015, 30% were referred to cardiac rehabilitation, and of these 28% attended (Astley et al. 2020) in 2018-19 there were 298,000 cardiac rehabilitation service events conducted by allied health and/or clinical nurse specialists,
- an increase from 216,000 events in 2014-15 (AIHW 2020).

A set of indicators to evaluate cardiac rehabilitation performance has recently been developed (NHF 2019, Gallagher et al. 2020).

#### Cyril's story

*'I always say, "you're the CEO in charge of your own body", you need to take control. Cardiac rehab provided me with the structure to get back to the activities I used to do.'*

Cyril survived a heart attack and said cardiac rehab changed his life.

[Learn more about Cyril's cardiac rehab story](#)



#### Stroke rehabilitation

Stroke rehabilitation helps stroke survivors to relearn and maintain their skills and functioning. It also seeks to protect them from developing new medical problems.

Therapy often begins in hospital soon after the condition has stabilised. It can continue out-of-hospital, through attending outpatient units, or participating in home-based rehabilitation programs.

- in 2019, there were 9,400 patients in surveyed hospitals who required stroke rehabilitation services, accounting for 30% of all inpatient stroke admissions of a group of 2,800 stroke survivors assessed before hospital discharge in 2019, 64% were referred for further
- rehabilitation in the community (Stroke Foundation 2020).

The National Stroke Audit reviews in-hospital rehabilitation services biennially to promote the delivery of evidence-based stroke care (Stroke Foundation 2020). **References**

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# Treatment and management

## Safety and quality of care

The safety and quality of the care provided in Australia's health system is important to all heart, stroke and vascular disease patients, their families and carers. A safe and high-quality health system provides the most appropriate and best-value care, while keeping patients from preventable harm (AIHW 2020a).

At a national level, the Australian Commission on Safety and Quality in Health Care (ACSQHC) provides leadership to improve the safety and quality of health care in Australia.

## Performance and safety reporting

A selection of indicators of safety and quality in the Australian health care system are reported through the Australian Health Performance Framework (AHPF) (NHIPPC 2017), MyHospitals (AIHW 2019) and at a variety of other national, state and territory and local levels, including within individual services and clinical teams.

Two measures of safety in the AHPF that are relevant to patients with heart, stroke or vascular disease are:

- in-hospital mortality rate for acute myocardial infarction (AMI), heart failure and stroke unplanned
- hospital readmission for AMI and heart failure.

## Variations in practice

The Australian Atlas of Health Care Variation maps differences in health care use according to where people live. Health care variation is appropriate where it reflects difference in patients' needs or preferences. When variation does not reflect these differences, it is considered unwarranted and represents an opportunity for the health system to improve.

Since 2015, 4 Atlases have been published. They have identified variations in hospital admissions for AMI, heart failure and AF, and in lengths of hospital stay for stroke, as well as variations in diagnostic procedures such as echocardiography and myocardial perfusion scans.

The most recent Atlas found that in 2017-18 hospitalisation rates of heart failure varied significantly by remoteness and socioeconomic position, and were higher for Aboriginal and Torres Strait Islander people.

Reducing variation will involve a combination of approaches, including primary prevention, better care in the community including improved integration with hospital care, consumer enablement, more effective use of medicines, and greater use of exercise and cardiac rehabilitation programs (ACSQHC & AIHW 2021).

## Better Cardiac Care measures for Aboriginal and Torres Strait Islander people

The Better Cardiac Care for Aboriginal and Torres Strait Islander People project is an initiative of the Australian Health Ministers' Advisory Council. It aims to reduce deaths and ill health from cardiac conditions among Indigenous Australians.

Five priority areas consisting of 21 measures were developed to monitor the progress of the project. The fifth national report 2020 notes that the level of access for cardiac-related health services has improved, and that the mortality rate from cardiac conditions is falling among the Indigenous population. Challenges remain, including high rates of disease incidence, and the need to increase the uptake recommended interventions (AIHW 2021).

## Clinical quality registries

Clinical quality registries collect and analyse clinical and other data to identify benchmarks for clinical performance and related variation in clinical outcomes (AIHW 2020b). Registries report this information to clinicians to improve clinical practice, patient outcomes and the quality and value of health care.

Some examples of clinical quality registries in the cardiovascular field include (ACSQHC 2021):

- National Cardiac Registry (NCR)
- Australian Stroke Clinical Registry (AuSCR)
- Victorian Cardiac Outcomes Registry (VCOR)
- Queensland Cardiac Outcomes Registry (QCOR)
- Coronary Angiogram Database of South Australia (CADOSA)
- Australian and New Zealand Society of Cardiac and Thoracic Surgeons Database Program (ANZSCTS Database) Australian
- Genetic Heart Disease Registry (AGHDR)

The National Clinical Quality Registry and Virtual Registry Strategy 2020-2030 coordinates efforts to maximise the potential of registries to deliver improved cardiovascular care (Department of Health 2020).

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## Impacts

### Cardiovascular disease

accounted for almost 13% of total burden of disease in 2018—third behind cancer and musculoskeletal conditions

### Coronary heart disease

was the individual leading cause of burden in 2018, accounting for 6.3% of the total burden

### 8.7% of total allocated expenditure

in the Australian health system (\$11.8 billion) attributed to CVD in 2018-19

This section presents two key measures of the impact of heart, stroke and vascular disease on the Australian population:

- estimates of the burden of cardiovascular disease, and
- estimates of expenditure on cardiovascular disease.

### What is burden of disease?

Burden of disease is a measure of the years of healthy life lost from living with, or dying from disease and injury.

The measure used is the ‘disability adjusted life year’ (DALY). This combines health loss from living with illness and injury (non-fatal burden, or YLD) and dying prematurely (fatal burden, or YLL) to estimate total health loss (total burden, or DALY).

Burden of disease estimates seek to capture both the quantity and health-related quality of life, and to reflect the magnitude, severity and impact of disease and injury within a population. Burden of disease does not quantify the social or financial consequences of disease and injury.

Further information can be found in [Australian Burden of Disease Study: impact and causes of illness and death in Australia 2015](#).

### What is expenditure on cardiovascular disease?

This section provides recent data on health care expenditure on CVD, with details by type of condition, health care service, age group, and sex.

It includes expenditure by the Australian Government, state, territory and local governments and the non-government sector (including private health insurance and individual contributions).

These estimates report direct, allocated and recurrent expenditure only. They do not account for the total amount spent on cardiovascular health.

Further information on how the estimates were derived is available from the [Disease expenditure in Australia](#) web report.

### Learn more about the impact of cardiovascular disease by section:

- [Burden of cardiovascular diseases](#)
- [Expenditure on cardiovascular diseases](#)

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# Impacts

## Burden of cardiovascular disease

On this page

- [What is burden of disease?](#)
- [Leading cause](#)
- [Aboriginal and Torres Strait Islander people](#)
- [Contribution of risk factors](#)

### What is burden of disease?

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Further information can be found in [Australian Burden of Disease Study: impact and causes of illness and death in Australia 2015](#).

In 2018, Australians lost an estimated 646,000 years of healthy life (DALY) due to all forms of cardiovascular disease (CVD), equivalent to 21.7 per 1,000 population (AIHW 2021).



**CVD as a disease group** accounted for almost **13% of the total burden of disease** (15% males, 11% females), ranking third behind cancer and other neoplasms, and musculoskeletal conditions (Figure 1).

- Most of the burden from CVD (76%) came from years of life lost to premature death (YLL), with the remainder (24%) from years lived with illness (YLD).

### Figure 1: Cardiovascular disease and other burden of disease groups, 2018

The tree map shows the contribution of the major disease groups to the total burden of disease in Australia in 2018. CVD ranks third behind cancer and other neoplasms and musculoskeletal conditions. Within the CVD disease group, coronary heart disease and stroke represent the major contributors to disease burden.



Figure 1: Cardiovascular disease and other burden of disease groups

Note: the size of each box is proportional to the magnitude of the Burden of Disease.

Chart: AIHW. Source: Australian Burden of Disease Database.  
<http://www.aihw.gov.au>

## Age and sex

In 2018, the burden from CVD:

- for males (28.2 DALY per 1,000 population) was 1.8 times as high as for females (15.6 DALY per 1,000 population) was low in childhood and increased with age. CVD was the major cause of burden of disease in older Australians aged 75 and over was higher for males than females at all ages, except for the very old (aged 100 and over) (Figure 2).

## Figure 2: Burden of disease for cardiovascular disease, by age group and sex, 2018

The bar chart shows the burden of disease for cardiovascular disease in 2018 increased with age, and was higher among males than females in all age groups, except for those aged 100 and over.

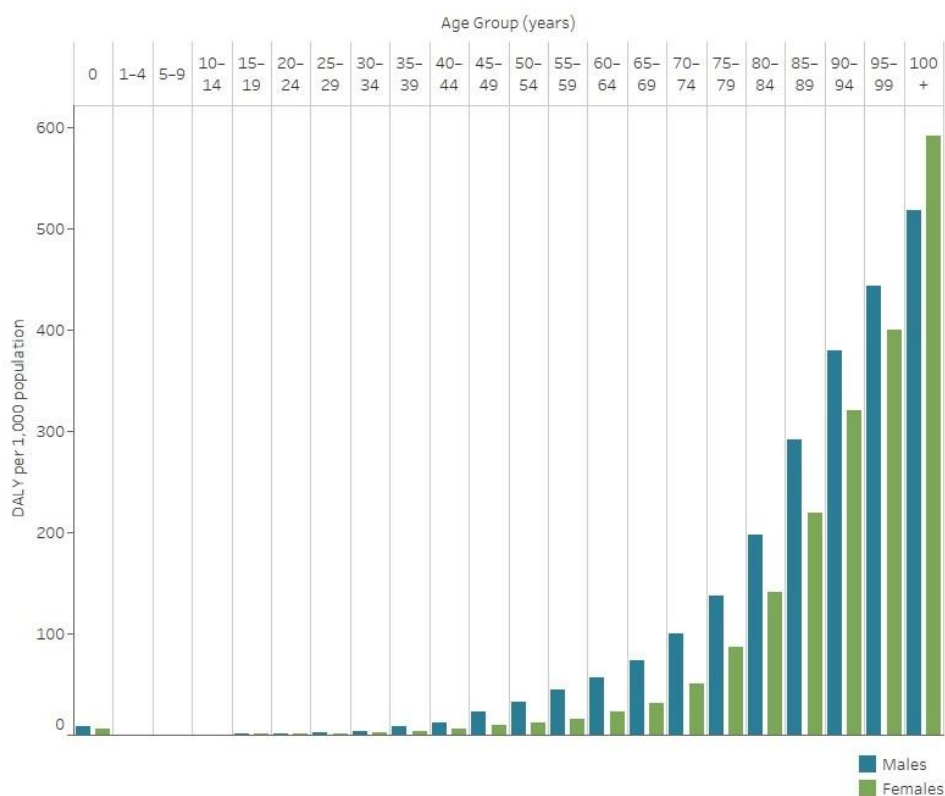


Figure 2: Burden of disease for cardiovascular disease, by age group and sex, 2018

Chart: AIHW. Source: AIHW Australian Burden of Disease Database.  
<http://www.aihw.gov.au>

## Population groups

In 2018, the burden from CVD:

- for the lowest socioeconomic group was 1.8 times as high as for the highest group (29.0 and 15.9 DALY per 1,000 population)—42% of DALY in the lowest socioeconomic group could have been avoided if the burden was the same as the highest group
- in *Remote and very remote* areas was 1.9 times as high as in *Major cities* (37.9 and 20.2 DALY per 1,000 population)—49% of DALY in *Remote and very remote* areas could have been avoided if the burden was the same as in *Major cities*.

## Trends

- The burden from CVD fell by 41% between 2003 and 2018—age-standardised rates of 36 and 22 DALY per 1,000 population.
- The fall in the burden from CHD between 2003 and 2018 (50%) was higher than for stroke (44%).
- The 12% fall in the burden from CVD between 2003 and 2018 (-90,000 DALY) was driven by change in the amount of disease (-51%), by population growth (+23%) and by population ageing (+16%).

## Leading causes

Leading causes contributing to the CVD burden of disease in 2018 include coronary heart disease, stroke and atrial fibrillation (Figure 1).

Congenital heart disease was a leading contributor to the burden of disease among infants aged less than 1 year.

## Coronary heart disease

- 312,000 years of healthy life were lost in 2018, equivalent to 10.4 DALY per 1,000 population
- CHD was the leading individual cause of burden for males, and fifth leading cause for females (Figure 3), accounting for 6.3% of the total burden (7.9% for males and 4.4% for females)
- The contribution of CHD to the total burden of CVD was greater in males (54%) than females (40%)
- 80% of the burden from CHD in males and 74% in females was due to premature death (YLL). Years of healthy life lost due to poor health or disability (YLD) accounted for the remainder—20% for males and 26% for females.

## Stroke

- 125,000 years of healthy life were lost in 2018, equivalent to 4.2 DALY per 1,000 population
- stroke ranked tenth in the leading diseases causing burden, accounting for 2.5% of total burden (2.4% males, 2.7% females)
- The contribution of stroke to the total burden of CVD was greater in females (24%) than males (16%)
- 85% of the burden from stroke in males and 88% in females was due to premature death (YLL). Years of healthy life lost due to poor health or disability (YLD) accounted for the remainder—15% for males and 12% for females.

## Atrial fibrillation

- 59,000 years of healthy life lost in 2018, equivalent to 1.9 DALY per 1,000 population
- AF accounted for 1.2% of total burden (1.2% for males, 1.2% for females)
- The contribution of AF to the total burden of CVD was greater in females (10.4%) than males (8.1%)
- 23% of the burden from AF in males and 34% in females was due to premature death (YLL). Years of healthy life lost due to poor health or disability (YLD) accounted for the remainder—77% for males and 66% for females.

## Congenital heart disease

- congenital heart disease is a leading cause of burden of disease among infants aged under 1 year, contributing 8.1% in 2018 the
- burden from congenital heart disease fell by 20% between 2003 and 2018, from 14,900 to 12,000 DALY.

**Figure 3: Leading causes of total burden of disease, by age group and sex, 2018 ('000 DALY, % age group)**

The table shows coronary heart disease was the leading cause of total disease burden for males from the age of 45 and over. Coronary heart disease was the second leading cause of disease burden among females aged 75 and over. Stroke was a top 5 cause of disease burden for males and females aged 75-84 and 85 and over.

		Age group (years)					
Rank		25-44	45-54	55-64	65-74	75-84	85+
Men	1	Suicide and self-inflicted injuries (47.6, 10.0%)	Coronary heart disease (25.8, 8.2%)	Coronary heart disease (43.0, 10.1%)	Coronary heart disease (51.5, 10.4%)	Coronary heart disease (45.3, 11.5%)	Coronary heart disease (32.3, 15.1%)
	2	Back pain and problems (33.4, 7.0%)	Back pain and problems (20.8, 6.6%)	Lung cancer (23.9, 5.6%)	Lung cancer (33.1, 6.7%)	Dementia (27.8, 7.1%)	Dementia (28.2, 13.2%)
	3	Poisoning (29.5, 6.2%)	Suicide and self-inflicted injuries (17.2, 5.4%)	Back pain and problems (22.3, 5.2%)	COPD (29.2, 5.9%)	COPD (23.9, 6.1%)	COPD (12.4, 5.8%)
	4	Alcohol use disorders (28.6, 6.0%)	Anxiety disorders (12.0, 3.8%)	Type 2 diabetes mellitus (16.0, 3.8%)	Type 2 diabetes mellitus (20.4, 4.1%)	Lung cancer (19.7, 5.0%)	Stroke (11.8, 5.5%)
	5	Depressive disorders (27.0, 5.7%)	Depressive disorders (10.6, 3.4%)	COPD (13.1, 3.1%)	Prostate cancer (17.0, 3.4%)	Stroke (17.7, 4.5%)	Prostate cancer (9.9, 4.6%)
Women	1	Anxiety disorders (37.9, 9.4%)	Back pain and problems (20.8, 7.4%)	Back pain and problems (20.7, 6.5%)	COPD (28.3, 7.2%)	Dementia (36.4, 10.0%)	Dementia (65.4, 20.9%)
	2	Back pain and problems (33.3, 8.2%)	Anxiety disorders (17.6, 6.3%)	Osteoarthritis (19.5, 6.1%)	Lung cancer (22.4, 5.7%)	Coronary heart disease (27.3, 7.5%)	Coronary heart disease (36.9, 11.8%)
	3	Depressive disorders (31.6, 7.8%)	Depressive disorders (14.5, 5.2%)	Lung cancer (19.1, 6.0%)	Osteoarthritis (22.0, 5.6%)	COPD (26.4, 7.3%)	Stroke (20.6, 6.6%)
	4	Asthma (21.2, 5.2%)	Breast cancer (14.4, 5.1%)	Breast cancer (18.6, 5.8%)	Coronary heart disease (18.3, 4.7%)	Stroke (17.9, 4.9%)	COPD (19.1, 6.1%)
	5	Eating disorders (18.2, 4.5%)	Osteoarthritis (11.0, 3.9%)	Rheumatoid arthritis (16.7, 5.2%)	Back pain and problems (16.2, 4.2%)	Lung cancer (13.7, 3.8%)	Falls (11.6, 3.7%)

Figure 3: Leading causes of total burden of disease, by age group and sex, 2018 ('000 DALY, % age group)

Chart: AIHW. Source: AIHW Australian Burden of Disease Database.  
<http://www.aihw.gov.au>

## Aboriginal and Torres Strait Islander people

Burden of disease estimates are available for Aboriginal and Torres Strait Islander Australians for the year 2011 (AIHW 2016):

- CVD accounted for 12% (24,000 DALY) of total burden in Indigenous Australians in 2011 (13% males, 11% females), making it the disease group with the third greatest contribution, behind mental and substance use disorders (19%) and injuries (including suicide) (15%)
- coronary heart disease accounted for 58% of CVD DALY and stroke 14%. In terms of overall DALY, coronary heart disease caused the most of any disease or injury (7% of total DALY) and stroke ranked 15th (2% of total DALY)
- 88% of the burden from CVD among Indigenous Australians was fatal, and 12% non-fatal. The disease that had the highest proportion of fatal burden among Indigenous Australians was cardiomyopathy (98% fatal) the rate of DALY for CVD among Indigenous males was 2.6 times that of non-Indigenous males, compared with 3.2 times for Indigenous and non-Indigenous females
- CVD was responsible for 19% of the total health gap between Indigenous and non-Indigenous Australians
- the rate of DALY for rheumatic heart disease among Indigenous Australians was 6.6 times as high as the rate among non-Indigenous Australians (2.8 and 0.4 DALY per 1,000 population). The rate for CHD was 3.1 times as high (41.3 and 13.4 DALY per 1,000 population).

### Contribution of risk factors

A portion of burden of disease is preventable, being due to modifiable health risk factors. The Australian Burden of Disease Study 2018 has estimated the disease burden which can be attributed to these modifiable risk factors (AIHW 2021).

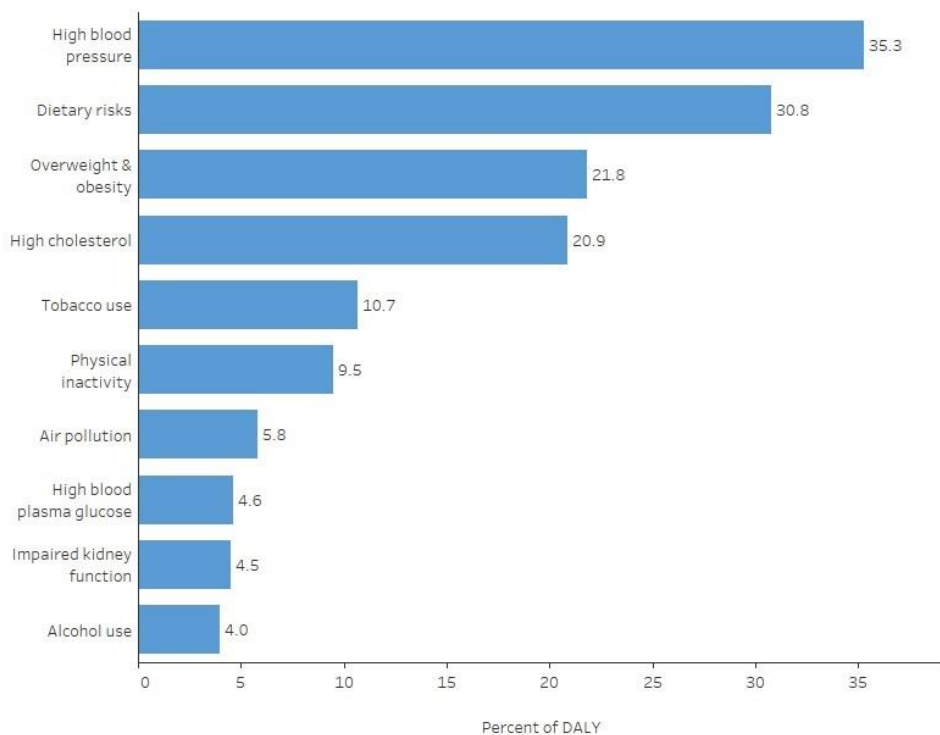
Of the total burden of CVD in Australia in 2018, 68% was attributable to the risk factors included in the study.

The leading risk factors contributing to the total CVD burden in 2018 include high blood pressure (36%), dietary risks (31%), overweight (including obesity) (22%), high cholesterol (21%) and tobacco use (11%) (Figure 4).

Note that as each risk factor was analysed separately, percentages cannot be added together, and do not add up to the joint effect of all risk factors.

**Figure 4: Proportion of cardiovascular disease DALY attributed to selected risk factors, 2018**

The bar chart shows high blood pressure was the leading risk factor attributed to the burden of cardiovascular disease in 2018, followed by dietary risks, overweight and obesity and high cholesterol.



**Figure 4: Proportion of cardiovascular disease DALY attributed to selected risk factors, 2018**

- Notes:
1. Attributable burden is expressed as a % of total CVD burden (DALY)
  2. Percentages cannot be added together as risk factors were analysed independently.

Chart: AIHW. Source: AIHW Australian Burden of Disease Database.  
<http://www.aihw.gov.au>

Estimations of the contribution of risk factors varied across individual cardiovascular conditions (AIHW 2021):



- **coronary heart disease**—air pollution 8.6%, alcohol use 3.7%, dietary risks 51%, high blood plasma glucose 6.5%, high blood pressure 42%, high cholesterol 37%, impaired kidney function 6.4%, overweight and obesity 28%, physical inactivity 16%, tobacco use 13%.
- **stroke**—air pollution 8.3%, alcohol use 5.9%, dietary risks 26%, high blood plasma glucose 5.8%, high blood pressure 39%, high cholesterol 16%, impaired kidney function 6.3%, overweight and obesity 24%, physical inactivity 9.2%, tobacco use 11%. **atrial fibrillation**—alcohol use 9.8%, dietary risks 6.0%, high blood pressure 31%, overweight and obesity 29%, tobacco use 7.8%.

## References

AIHW 2016. [Australian Burden of Disease Study: Impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2011](#). Cat. no. BOD 7. Canberra: AIHW.

AIHW 2019a. [Australian Burden of Disease Study: impact and causes of illness and death in Australia 2015](#). Australian Burden of Disease Study series no. 19. Cat. no. BOD 22. Canberra: AIHW.

AIHW 2019b. [Australian Burden of Disease Study: methods and supplementary material 2015](#). Australian Burden of Disease Study series no. 20. Cat. no. BOD 23. Canberra: AIHW.

AIHW 2021. [Australian Burden of Disease Study 2018 - Key findings](#). Cat. no. BOD 30. Canberra: AIHW.

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## Impacts

### Expenditure on cardiovascular disease

On this page

- [How much is spent on cardiovascular disease?](#)
- [Where is the money spent?](#)
- [Who is it spent on?](#)

#### What is expenditure on cardiovascular disease?

This section provides recent data on health care expenditure on cardiovascular disease (CVD), with details by type of condition, health care service, age group, and sex.

It includes expenditure by the Australian Government, state, territory and local governments and the non-government sector (including private health insurance and individual contributions).

These estimates report direct, allocated and recurrent expenditure only. They do not account for the total amount spent on cardiovascular health.

[Further information on how the estimates were derived is available from the Disease expenditure in Australia web report.](#)

#### How much is spent on cardiovascular disease?

 In 2018-19, an estimated **8.7% of total allocated expenditure** in the Australian health system (**\$11.8 billion**) was attributed to CVD.

CVD was the disease group with the second highest expenditure in 2018-19, behind musculoskeletal disorders (\$14.0 billion). The high expenditure on CVD reflects its position as a leading cause of death and a major contributor to the overall burden of disease in Australia.

The most expensive cardiovascular conditions in 2018-19 were CHD, AF and stroke. An estimated:

- 19.9% of CVD expenditure (\$2.4 billion) was spent on CHD
- 10.2% of CVD expenditure (\$1.2 billion) was spent on AF
- 5.6% of CVD expenditure (\$663 million) was spent on stroke (Figure 1).

**Figure 1: Health care expenditure on selected cardiovascular conditions, 2018-19**

The horizontal bar chart shows the leading cardiovascular conditions in terms of health care expenditure in 2018-19. Coronary heart disease was most costly, estimated at \$2,352 million followed by atrial fibrillation and flutter at \$1,202 million.

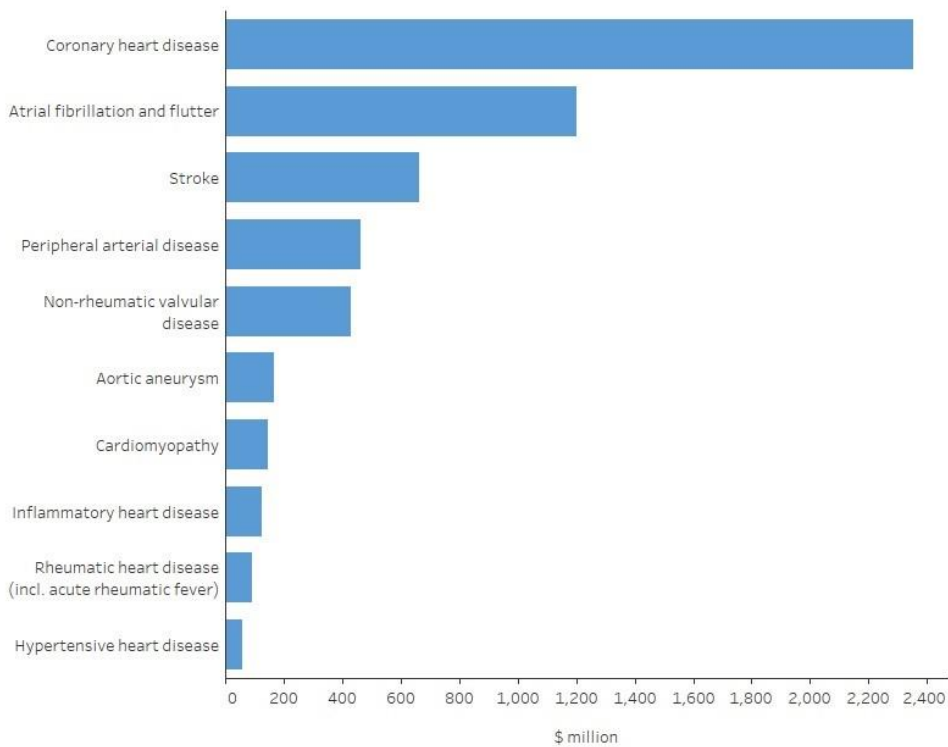


Figure 1: Health care expenditure on selected cardiovascular conditions

Notes:

1. Pharmaceutical benefit expenditure includes over and under copayment prescriptions
2. Dental expenditure does not contain age or demographic disaggregation.

Chart: AIHW. Source: AIHW Disease Expenditure Database.  
<http://www.aihw.gov.au>

### Where is the money spent?

In 2018-19, over two thirds of allocated CVD expenditure (69% or \$8.1 billion) was spent on hospital services. This included expenditure on public hospital admitted patients (\$4.4 billion), private hospital services (\$2.6 billion), public hospital outpatients (\$687 million) and public hospital emergency departments (\$443 million).

Another 15% (\$1.8 billion) related to non-hospital medical services (primary care), comprising GP services (\$880 million), specialist services (\$479 million), medical imaging (\$193 million), pathology (\$204 million) and allied health and other services (\$35 million).

A small amount of CVD expenditure (1% or \$107 million) was spent on dental services.

The remaining 15% (\$1.8 billion) was spent on prescription pharmaceuticals dispensed through the PBS (Figure 2).

### Figure 2: Health care expenditure on cardiovascular disease, by area of expenditure, 2018-19

The horizontal bar chart shows health care expenditure areas for cardiovascular disease in 2018-19. The most costly areas were Public hospital admitted patients at \$4,419 million, Private hospital services at \$2,581 million and Pharmaceutical benefits scheme at \$1,809 million.

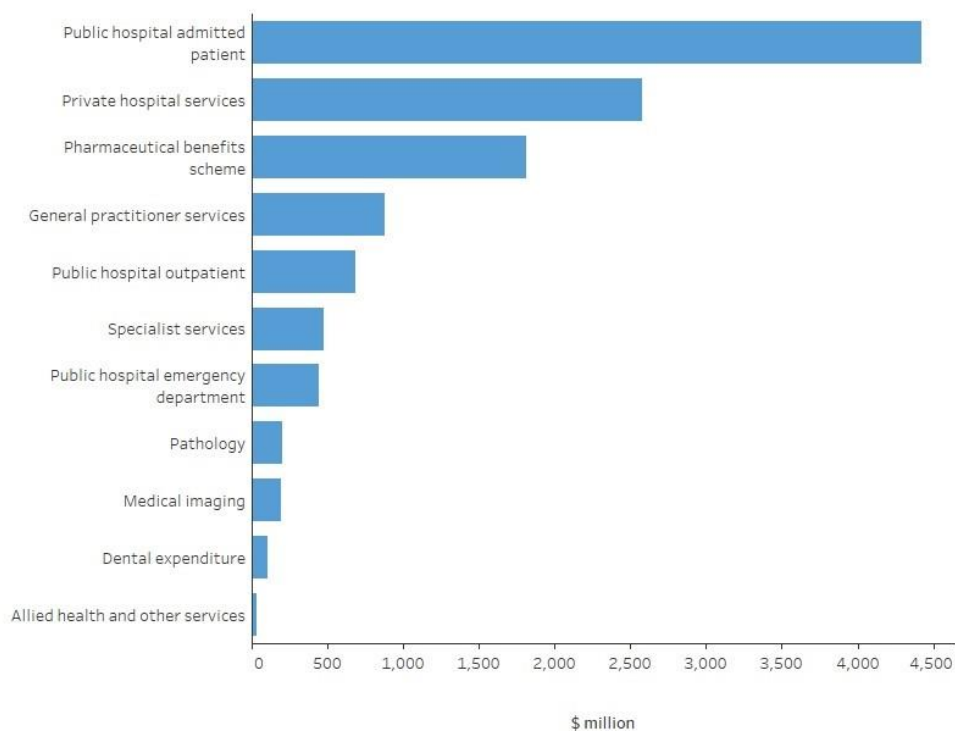


Figure 2: Health care expenditure on cardiovascular disease, by area of expenditure, 2018-19

*Notes:*

1. Pharmaceutical benefit expenditure includes over and under copayment prescriptions
2. Dental expenditure does not contain age or demographic disaggregation.

Chart: AIHW. Source: AIHW Disease Expenditure Database.  
<http://www.aihw.gov.au>

Expenditure was distributed differently for each cardiovascular condition. To illustrate, in 2018-19:

- hospital services represented 83% of CHD expenditure, 61% of AF expenditure, and 90% of stroke expenditure
- non-hospital medical services represented 9.4% of CHD expenditure, 11% of AF expenditure, and 7.1% of stroke expenditure
- Pharmaceutical Benefits Scheme costs represented 6.6% of CHD expenditure, 28% of AF expenditure, and 3.0% of stroke expenditure.

### Who is it spent on?

Expenditure on CVD in 2018-19 was low among young people, but increased sharply from age 45-54 years, to be highest among males aged 65-74 and females aged 75-84 (Figure 3).

From age 45-54 years, expenditure on CVD was higher among males than females, except at age 85 and over, reflecting the higher prevalence of CVD among males. At ages 55-64, 60-64 and 65-74 years, expenditure for males was 1.7 times as high as for females.

Most of this difference was related to expenditure on hospital services, where a total of \$4.9 billion was spent on males, compared with \$3.2 billion on females.

Expenditure on non-hospital medical services (primary care) was higher among females (\$902 million, compared to \$887 million among males), despite the higher prevalence of CVD among males.

Expenditure in the area of prescription pharmaceuticals was higher among males (\$951 million) compared to females (\$848 million).

Figure 3: Health care expenditure on cardiovascular disease, by age and sex, 2018-19

The bar chart shows health care expenditure for cardiovascular disease in 2018-19 was highest among males aged 65-74 at \$1,966 million, and males aged 75-84 at \$1,680 million. Expenditure was higher for females than males in the 85 and over age group.

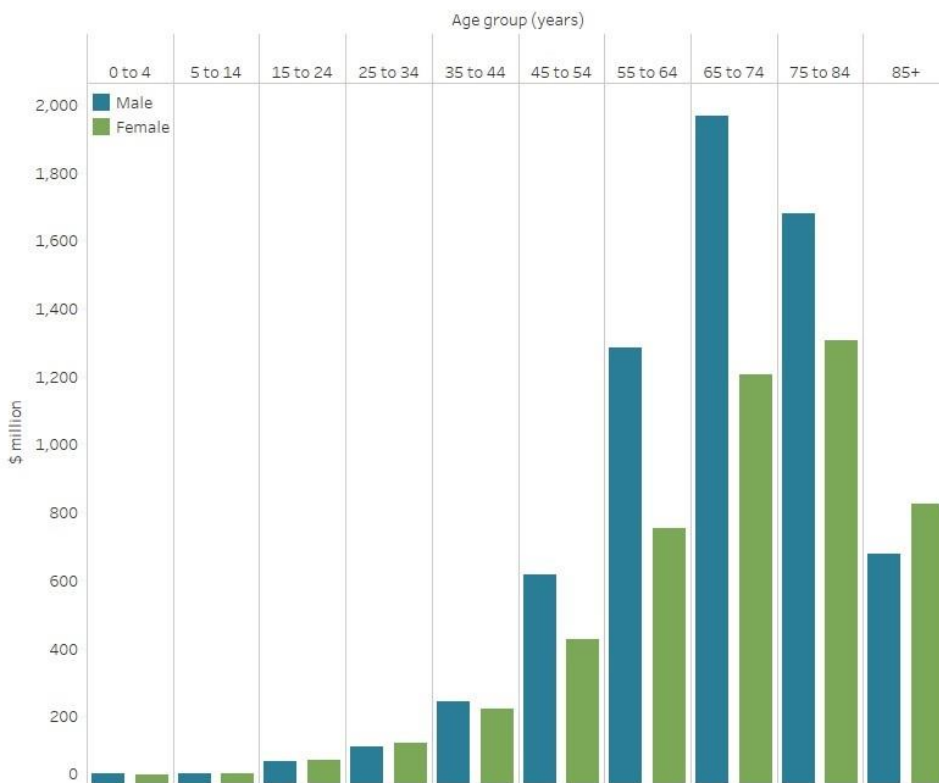


Figure 3: Health care expenditure on cardiovascular disease, by age and sex, 2018-19.

Chart: AIHW. Source: AIHW Disease Expenditure Database.  
<http://www.aihw.gov.au>

### Aboriginal and Torres Strait Islander people

In 2015-16, expenditure on hospitalisations for Indigenous people with CVD was \$173.3 million—equivalent to 3.1% of total expenditure on hospitalisations for people with CVD. This equated to \$230 per Indigenous person, compared with \$236 for non-Indigenous persons (AIHW & NIAA 2020).

Hospitalisation for rheumatic heart disease (RHD) among Aboriginal and Torres Strait Islander people accounted for 6.8% of total Indigenous hospital expenditure on CVD. The per person expenditure on RHD hospitalisation for the Indigenous population was almost 5 times the per person expenditure for the non-Indigenous population.

### References

AIHW 2021. Disease expenditure in Australia 2018-19. Cat. no. HWE 81. Canberra: AIHW

AIHW & NIAA (National Indigenous Australians Agency) 2020. Aboriginal and Torres Strait Islander Health Performance Framework 2020 web report. Tables D3.21.10, D3.21.11. Canberra: AIHW.

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## Data gaps and opportunities

Comprehensive, accurate and timely data are necessary for effective population health monitoring of heart, stroke and vascular disease. Although national health information collections continue to develop and improve, gaps still remain and the information that is collected is not always used to its full potential (AIHW 2020). In addition to data gaps, analysis gaps exist where data may be available but are not brought together efficiently.

Australian health data, however, are undergoing rapid change. Increasing digitisation of health information means more detailed data are being collected, expanding the possibilities for analysing and reporting. There is greater demand for information that is available in real time and at small geographic levels for service planning and delivery; easily accessible, flexible and interactive; comparable at national and sub-national levels; and which maintains privacy and confidentiality.

## Data gaps and limitations

Current gaps relating to the health of people with heart, stroke and vascular disease include: incidence and prevalence data for some conditions, and some health determinants national, comparable and reportable data on primary health care activity and outcomes

- person-centred data, including social and economic factors that affect health and patient pathways through the health system, across jurisdictional boundaries and between sectors
- information on some population groups, including Aboriginal and Torres Strait Islander people, people with disability, culturally and linguistically diverse populations, refugees, and LGBTQI+ populations
- data for smaller geographical areas to identify variations in health status and care by location
- measures of health system efficiency and cost-effectiveness
- indicators of health system safety and quality, including outcomes of interventions and patient rated outcome and experience measures.

## Data developments and opportunities

### Person-centred data

Data on the Australian health system is largely organised around occasions of service. Linking these data together and with other data including data from surveys allows for a richer understanding of how people and population groups interact with services and their health outcomes.

Following individuals from a diagnosis of cardiovascular disease, through interactions with the health system, to recovery, further illness or death improves our ability to analyse the development and trajectory of disease; the interaction of determinants and interventions; and the role and performance of the health system in managing, treating and preventing disease.

Current opportunities for improving person-centred heart, stroke and vascular disease data include:

- collecting comprehensive GP data from the primary health care setting, which have the potential to provide a fuller picture of cardiovascular disease management, associated comorbidities, and long-term outcomes. A National Primary Health Care Data Asset is currently under development (AIHW 2021)
- future health surveys measuring markers of cardiovascular disease and other markers of chronic disease and nutrition status will allow for the determination of population health trends and the calculation absolute cardiovascular risk in the Australian population. The Australian Bureau of Statistics is undertaking a comprehensive multi-year Intergenerational Health and Mental Health Survey in 2020-2023, which will include a biomedical component (ABS 2021)
- better measurement of treatment times to thrombolysis for stroke, and to percutaneous coronary interventions for heart attack will provide key information to help improve quality of care and service delivery for individuals a nationally agreed set of minimum data
- will enable cardiac rehabilitation services to collect and measure referral, participation, completion and readmission rates.

## Digital health

Digital health is the use of technology by individuals and by clinicians and administrators to collect and share health information (ADHA 2021). Digital health technology has the potential to remove barriers to service access, for example through the use of telemedicine to provide specialist care to remote or isolated communities.

Digital health records can improve continuity in patient care through the use of electronic health records, such as My Health Record, and enhance clinical decision making and system-wide responses with real-time access to health information between services, sectors and jurisdictions.

## Data linkage and integration

Data linkage, also known as data integration, brings together information from more than one source. Matching disparate pieces of information together can fill gaps in our knowledge on specific diseases, effectiveness and quality of health services, population groups and across the health and welfare sectors.

Two examples of recently linked data sets include the National Integrated Health Services Information Analysis Asset (NIHSI AA) developed by the AIHW, and the Multi-Agency Data Integration Project (MADIP) developed by the Australian Bureau of Statistics (ABS).

Some opportunities presented by health data linkage include:

- better estimates of new cases of CHD and stroke. Current proxy measures rely on unlinked hospital and mortality data, exclude cases that do not result in hospitalisation, and cannot differentiate between first-time and repeat hospitalisations, and transfers the prevalence
- of some commonly non-hospitalised heart, stroke and vascular diseases in the general population is also largely unknown, and is not well captured within currently available population health survey data
- linkage between clinical quality registries and other administrative health databases allows for detailed investigation of the relationships between clinical measures and long-term health outcomes. An investment in scoping work will determine the benefits of establishing national enduring linkage to clinical quality registers to identify and

assess data improvement opportunities • establishment of a large-scale heart, stroke and vascular disease data system, consisting of multiple administrative, clinical and electronic health data assets (Paige et al. 2021).

## References

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ABS 2021. [Intergenerational Health and Mental Health Study \(IHMHS\)](#). Canberra: ABS. Viewed 9 August 2021.

ADHA (Australian Digital Health Agency) 2021. [National Digital Health Strategy](#). Sydney: ADHA. Viewed 7 April 2021.

AIHW 2020. 'Health data in Australia' in: [Australia's health 2020 data insights](#). Cat. no. AUS 231. Canberra: AIHW.

AIHW 2021. [Primary health care](#). Viewed 7 April 2021.

Paige EP, Doyle K, Jorm L, Banks E, Hsu M-P, Nedkoff L et al. 2021. [A versatile big data health system for Australia: Driving improvements in cardiovascular health](#). *Heart, Lung and Circulation*.

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## Technical notes

The technical notes detail the information about the data gaps and opportunities, data sources, codes and classifications, and methods used in compiling the data for the *Heart, stroke and vascular disease: Australian facts*.

[View the technical notes by section:](#)

- [Data sources](#)
  - [Classifications](#)
  - [Methods](#)
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## Technical notes

### Data sources

#### National Health Survey

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The National Health Survey (NHS) is conducted by the Australian Bureau of Statistics to obtain national information on the health status of Australians, their use of health services and facilities, and health-related aspects of their lifestyle. The most recent NHS was conducted in 2017-18.

The NHS collects self-reported data on whether a respondent had 1 or more long-term health conditions; that is, conditions that lasted, or were expected to last, 6 months or more.

The NHS refers to 'heart, stroke and vascular disease', which comprises people who reported having been told by a doctor or a nurse that they had any of a range of circulatory conditions comprising:

- ischaemic heart diseases (angina, heart attack and other ischaemic heart diseases)
- cerebrovascular diseases (stroke and other cerebrovascular diseases) oedema
- heart failure
- diseases of the arteries, arterioles and capillaries,
- 

and that their condition was current and long-term; that is, their condition was current at the time of interview and had lasted, or was expected to last, 6 months or more.

Persons who reported having ischaemic heart diseases, cerebrovascular diseases and heart failure that were not current and long term at the time of interview are also included.

When interpreting data from the 2017-18 NHS, some limitations need to be considered:

- data that are self-reported rely on respondents knowing and providing accurate information the survey does not include information
- from people living in nursing homes or otherwise institutionalised residents of Very remote areas and discrete Aboriginal and Torres Strait Islander communities were excluded from the survey. This is unlikely to affect national estimates, but will impact prevalence estimates by remoteness.

Further information can be found in [National Health Survey: First results, 2017-18](#).

#### National Aboriginal and Torres Strait Islander Health Survey

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The National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) is conducted by the Australian Bureau of Statistics to obtain national information on the health of Indigenous Australians, their use of health services and health-related aspects of their lifestyle. The most recent NATSIHS was conducted in 2018-19.

The NATSIHS collects information from Aboriginal and Torres Strait Islander people of all ages in non-remote and remote areas of Australia, including discrete Indigenous communities.

Further information can be found in [ABS National Aboriginal and Torres Strait Islander Health Survey, 2018-19](#).

#### Survey of Disability, Ageing and Carers

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The Survey of Disability, Ageing and Carers (SDAC) is conducted by the Australian Bureau of Statistics to collect information about people of all ages with a disability, older people aged 65 and over, and carers of people with disability or a long-term health condition or older people. The surveys included people in both private and non-private dwellings (including people in establishments where care is provided) but excluded those in correctional institutions.

ABS SDAC 2018 has been used in this report to provide estimates on the prevalence of stroke. SDAC includes comprehensive questions on long-term conditions and associated activity limitations, and includes non-private dwellings, such as residential aged care facilities. This is particularly important when reporting on stroke because stroke is associated with increasing age, and many survivors of stroke require the special care that these facilities provide.

Further information can be found in [ABS Disability, Ageing and Carers, Australia: Summary of Findings, 2018](#).



## AIHW National Hospital Morbidity Database

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The AIHW National Hospital Morbidity Database (NHMD) is a compilation of episode-level records from admitted patient morbidity data collection systems in Australian hospitals.

Reporting to the NHMD occurs at the end of a person's admitted episode of care (separation or hospitalisation) and is based on the clinical documentation for that hospitalisation.

The NHMD is based on the Admitted Patient Care National Minimum Data Set (APC NMDS). It records information on admitted patient care (hospitalisations) in essentially all hospitals in Australia, and includes demographic, administrative and length-of-stay data, as well as data on the diagnoses of the patients, the procedures they underwent in hospital and external causes of injury and poisoning.

The hospital separations data do not include episodes of non-admitted patient care given in outpatient clinics or emergency departments. Patients in these settings may be admitted subsequently, with the care provided to them as admitted patients being included in the NHMD.

The following care types were excluded when undertaking the analysis: 7.3 (newborn—unqualified days only), 9 (organ procurement—posthumous) and 10 (hospital boarder).

Further information about the NHMD can be found in [Admitted patient care NMDS 2019-20](#).

## AIHW National Mortality Database

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The AIHW National Mortality Database (NMD) comprises information about causes of death and other characteristics of the person, such as sex, age at death, area of usual residence and Indigenous status. The cause of death data are provided to the AIHW by the Registries of Births, Deaths and Marriages and the National Coronial Information System (managed by the Victorian Department of Justice) and include cause of death coded by the ABS. The data are maintained by the AIHW in the NMD.

In this report, deaths registered in 2015 and earlier are based on the final version of cause of death data; deaths registered in 2016 are based on the revised version; and deaths registered in 2017 and 2018 are based on the preliminary version.

For data by Indigenous status, the level of identification of Indigenous status is considered sufficient to enable analysis in 5 jurisdictions— New South Wales, Victoria, Queensland, Western Australia and the Northern Territory.

The data quality statements underpinning the AIHW National Mortality Database can be found in the following Australian Bureau of Statistics (ABS) publications:

- ABS quality declaration summary for [Deaths, Australia](#).
- ABS quality declaration summary for [Causes of death, Australia](#).

For more information see [National Mortality Database \(NMD\)](#).

## AIHW Disease Expenditure Database

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The AIHW Disease Expenditure Database provides a broad picture of the use of health system resources classified by disease groups and conditions.

It contains estimates of expenditure by Australian Burden of Disease Study condition, age group, and sex for admitted patient, emergency department, and outpatient hospital services, out-of-hospital medical services, and prescription pharmaceuticals.

It does not allocate all expenditure on health goods and services by disease—for example, neither administration expenditure nor capital expenditure can be meaningfully attributed to any particular condition due to their nature.

For more information see [Disease expenditure in Australia](#).

## AIHW Australian Burden of Disease Study

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The Australian Burden of Disease Study undertaken by the AIHW provides information on the burden of disease for the Australian population. Burden of disease analysis measures the impact of fatal (or years of life lost, YLL) and non-fatal burden (years lived with disability, YLD), with the sum of non-fatal and fatal burden equating the total burden (disability-adjusted life year, DALY).

The 2015 study builds on the AIHW's previous burden of disease studies and disease monitoring work and provides Australian-specific estimates for 216 diseases and injuries, grouped into 17 disease groups, for 2003, 2011 and 2015. It also provides estimates of how much of the burden can be attributed to 38 different risk factor exposures.

AIHW is currently updating Australia's burden of disease estimates for the 2018 reference year. Key findings were release in August 2021, with detailed findings to be released in November 2021.

For further information see [Burden of disease](#)

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## Technical notes

### Classifications

#### International Classification of Disease and Related Health Problems

Australia uses the International Statistical Classification of Diseases and Related Health Conditions to code causes of death (WHO 2019).

In this report, deaths between 1981 and 1996 were coded using the Ninth Revision (ICD-9), and deaths from 1997 using the Tenth Revision (ICD-10) (Table 1).

**Table 1: International Classification of Disease (ICD) codes**

Disease	ICD-9 Codes	ICD-10 Codes
<b>Cardiovascular disease</b>	<b>390-459</b>	<b>I00-I99</b>
Acute rheumatic fever and Rheumatic heart disease	390-398	I00-I09
Hypertensive disease		I10-I15
Coronary heart disease	410-414	I20-I25
Angina	413	I20
Acute myocardial infarction	410	I21
Atrial fibrillation and flutter	427.3	I48
Heart failure and cardiomyopathy	414.8, 428.0, 428.1, 428.9, 425.2, 425.4, 425.5, 425.7, 425.8, 425.9	I50, I25.5, I42.0, I42.5-I42.9, I43
Heart failure	428	I50
Cerebrovascular disease	430-438	I60-I69
Stroke	430-434, 436	I60-I64
Peripheral arterial disease	440-444	I70-I74
Atherosclerosis of peripheral arteries		I70.2
Abdominal aortic aneurysm		I71.3-I71.4

Transient ischaemic attack	435	G45
Congenital heart disease	745-746	Q20-Q26

Source: WHO 2019.

The change in classification between ICD-9 and ICD-10 has resulted in a break in the underlying cause of death series between 1996 and 1997. Where available, comparability factors been applied to allow underlying cause of death data to be compared across this time period (Table 2).

**Table 2: Comparability factors for the ICD-9 to ICD-10 transition**

Condition	Comparability factor
Cardiovascular disease	1.00
Coronary heart disease	1.01
Stroke	0.83
Heart failure & cardiomyopathy	0.98
Peripheral arterial disease	(a)0.97
Acute rheumatic fever and rheumatic heart disease	0.69
Congenital heart disease	(b)1.12

(a) Uses the comparability factor for Diseases of arteries, arterioles and capillaries (ICD-10 codes I70-I79).

(b) Uses the comparability factor for Congenital malformations of the circulatory system (ICD-10 codes Q20-Q28).

Source: ABS 2009.

For hospital diagnoses and procedures, a classification modified for Australia is used. Hospital data to 1997-98 used the ICD-9-CM (International Classification of Diseases and Related Health Conditions, Ninth Revision, Clinical Modification) classification. After 1997-98, the ICD-10-AM classification (International Statistical Classification of Diseases and Related Health Conditions, Tenth Revision, Australian Modification) was used.

Diagnosis and procedure data for 2018-19 were reported to the NHMD using the 11th edition of the ICD-10-AM (ACCD 2018a), incorporating the Australian Classification of Health Interventions (ACHI) (ACCD 2018b) (Tables 3 and 4).

**Table 3: ICD-9-CM and ICD-10-AM codes**

Disease	ICD-9-CM codes	ICD-10-AM codes
Cardiovascular disease	390-459	100-199, excluding 184 (haemorrhoids)
Acute rheumatic fever and Rheumatic heart disease	390-398	100-109
Hypertensive disease		I10-I15
Coronary heart disease	410-414	I20-I25
Angina	413	I20
Acute myocardial infarction	410	I21
Atrial fibrillation and flutter	427.3	I48

Heart failure and cardiomyopathy	414.8, 428.0, 428.1, 428.9, 425.2, 425.4, 425.5, 425.7, 425.8, 425.9	I50, I25.5, I42.0, I42.5-I42.9, I43
Heart failure	428	I50
Cerebrovascular disease	430-438	I60-I69
Stroke	430-434, 436	I60-I64
Peripheral arterial disease	440-444	I70-I74
Atherosclerosis of peripheral arteries		I70.2
Abdominal aortic aneurysm		I71.3-I71.4
Transient ischaemic attack	435	G45
Congenital heart disease	745-746	Q20-Q26

Source: ACCD 2018a.

**Table 4: Australian Classification of Health Interventions (ACHI) codes**

Health intervention	ACHI code
<b>Diagnostic procedures</b>	
Coronary angiography	Block no: 668
Echocardiography	Block no: 1942
<b>Therapeutic procedures</b>	
Heart valve repair / replacement	Block no: 621-638
Pacemaker insertion	Block no: 650
Cardiac defibrillator implant	Block no: 653
Heart transplant	Block no: 660
Percutaneous coronary intervention	Block no: 670, 671
Coronary artery bypass graft	Block no: 672-679
Carotid endarterectomy	Procedure code: 33500-00

Source: ACCD 2018b.

## Anatomical Therapeutic Chemical classification

### Anatomical Therapeutic Chemical classification

Anatomical Therapeutic Chemical (ATC) codes are used in this report to classify medicines. This classification groups medicines according to the body organ or system they act upon, their therapeutic characteristics, and their chemical characteristics.


A list of the medicine groups included in this report is shown in Table 5.

More information on the ATC classification system can be found at the [WHO Collaborating Centre for Drug Statistics Methodology](#).

**Table 5: Anatomic Therapeutic Chemical medicine groups**

ATC code	Description
B01	Antithrombotic agents
C	Cardiovascular system
C01	Cardiac therapy
C02	Antihypertensives
C03	Diuretics
C04	Peripheral vasodilators
C05	Vasoprotectives
C07	Beta-blocking agents
C08	Calcium-channel blockers
C09	Renin-angiotensin system agents
C10	Lipid-modifying agents

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## Technical notes

### Methods

#### Age-standardised rates

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Age-standardisation is a method of removing the influence of age when comparing populations with different age structures—either different populations at one time or the same population at different times.

Direct age-standardisation was used in this report. The Australian estimated resident population as at 30 June 2001 has been used as the standard population.

#### Significance testing

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The observed value of a rate may vary because of the influence of chance and natural variation. To provide an indication of whether 2 rates are statistically different, 95% confidence intervals can be calculated, and statistically significant differences highlighted.

A 95% confidence interval describes a span of numbers around the estimate which has a 95% chance of including the true value. When comparing 2 groups, if the 2 confidence intervals do not overlap, the reader can be confident that the difference between the groups is real, and not due to chance.

Confidence intervals were calculated for survey data in this report.

#### Remoteness

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Comparisons of regions in this report use the ABS Australian Statistical Geography Standard (ASGS) 2016 Remoteness Structure, which groups Australian regions into 6 remoteness areas.

The 6 remoteness areas are Major cities, Inner regional, Outer regional, Remote, Very remote and Migratory. These areas are defined using the Accessibility/Remoteness Index for Australia (ARIA), which is a measure of the remoteness of a location from the services that large towns or cities provide.

In some instances, data for remoteness areas have been combined because of small sample sizes.

Further information on the ASGS is available on the [ABS website](#).

#### Socioeconomic areas

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Socioeconomic classifications in this report are based on the ABS Index of Relative Socio-economic Disadvantage (IRSD). Geographic areas are assigned a score based on social and economic characteristics of that area, such as income, educational attainment, public sector housing, unemployment and jobs in low-skill occupations. The IRSD relates to the average disadvantage of all people living in a geographical area. It cannot be presumed to apply to all individuals living in the area.

For the analyses in this report, the population is divided into 5 socioeconomic groups, with roughly equal populations (each around 20% of the total), based on the level of disadvantage of the statistical local area of their usual residence. The first group includes the 20% of areas with the highest levels of relative disadvantage (referred to as Group 1, most disadvantaged), while the last group includes the 20% of areas with the lowest levels of relative disadvantage (referred to as Group 5, least disadvantaged).

The IRSD values used in this report are based on the 2016 Census. Further information is available on the ABS website. **Aboriginal**

#### and Torres Strait Islander persons

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In this report, comparisons are made between Aboriginal and Torres Strait Islander persons and people who do not identify as Indigenous.

People with 'not-stated' Indigenous status are excluded from any analysis by Indigenous status.

## Populations used

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### National populations

Population data are used throughout this report to calculate rates. The population data used are estimated resident populations (ERPs) derived from the ABS Census of Population and Housing.

Throughout this report, rates of deaths and hospitalisations are age-standardised. In these cases, the standard population used to calculate the age-standardised rate is the Australian ERP as at 30 June 2001.

### Aboriginal and Torres Strait Islander populations

The ABS 2016 Census base series B Indigenous population projections were used to derive rates (ABS 2019). To calculate non-Indigenous estimates, the Indigenous projections was subtracted from the total Australian estimated resident population data.

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## Glossary

**abnormal blood lipid levels:** Abnormal levels of fats in the blood, such as cholesterol or triglycerides. Here it has been defined as total cholesterol  $\geq 5.5$  mmol/L, LDL cholesterol  $\geq 3.5$  mmol/L, HDL cholesterol  $< 1.0$  mmol/L in men or  $< 1.3$  mmol/L in women, triglycerides  $\geq 2$  mmol/L, or use of lipid-modifying medication.

**Aboriginal or Torres Strait Islander:** A person of Aboriginal and/or Torres Strait Islander descent who identifies as an Aboriginal and/or Torres Strait Islander.

**acute coronary event (ACE):** An umbrella term that is used to describe sudden and life threatening conditions that result in reduced blood flow to the heart. The term includes acute myocardial infarction (sometimes referred to as heart attack), unstable angina, and deaths due to acute coronary heart disease.

**acute coronary syndrome:** Describes an *acute myocardial infarction (AMI)* and *unstable angina* when they first present as clinical emergencies with chest pain or other features.

**acute myocardial infarction (AMI):** Life-threatening emergency that occurs when a vessel supplying blood to the heart muscle is suddenly blocked completely by a blood clot.

**additional diagnosis:** The diagnosis of a condition or recording of a complaint—either coexisting with the principal diagnosis or arising during the episode of admitted patient care (hospitalisation), episode of residential care or attendance at a health care establishment—that requires the provision of care. Multiple diagnoses may be recorded.

**age-standardisation:** A way to remove the influence of age when comparing populations with different age structures. This is usually necessary because the rates of many diseases vary strongly (usually increasing) with age. The age structures of the different populations are converted to the same 'standard' structure, and then the disease rates that would have occurred with that structure are calculated and compared.

**angina:** Temporary chest pain or discomfort when the heart's own blood supply is inadequate to meet extra needs, as can occur during physical activity.

**angioplasty:** A method of reducing a blockage in an artery by opening out a balloon placed inside the artery at the point of narrowing.

**arrhythmia:** Also known as dysrhythmia, is a fault in the heart's electrical system, which affects its pumping rhythm. The abnormal electrical activity makes the heart muscle beat too fast, slow or in an irregular way.

**associated cause(s) of death:** A cause(s) listed on the Medical Certificate of Cause of Death, other than the underlying cause of death. They include the immediate cause, any intervening causes, and conditions that contributed to the death but were not related to the disease or condition causing death.

**atherosclerosis:** A process in which fatty and fibre-like deposits build up on the inner walls of arteries, often forming plaques that can then cause blockages. It is the main underlying condition in *heart attack*, *angina*, *stroke* and *peripheral arterial disease*. **atrial fibrillation:** An uneven and fast heartbeat.

**blood cholesterol:** Fatty substance produced by the liver and carried by the blood to supply the rest of the body. Its natural function is to supply material for cell walls and for steroid hormones, but if levels in the blood become too high this can lead to *atherosclerosis* and heart disease.

**blood pressure:** The force exerted by the blood on the walls of the arteries as it is pumped around the body by the heart. It is written, for example, as 134/70 mmHg, where the upper number is the systolic pressure (the maximum force against the arteries as the heart muscle contracts to pump the blood out) and the lower number is the diastolic pressure (the minimum force against the arteries as the heart relaxes and fills again with blood). Levels of blood pressure can vary greatly from person to person and from moment to moment in the same person. See also *high blood pressure/hypertension*.

**body mass index (BMI):** The most commonly used method of assessing whether a person is normal weight, underweight, overweight or obese (see *obesity*). It is calculated by dividing the person's weight (in kilograms) by their height (in metres) squared—that is,  $\text{kg} \div \text{m}^2$ . For both men and women, underweight is a BMI below 18.5, normal weight is from 18.5 to less than 25, overweight but not obese is from 25 to less than 30, and obese is 30 and over. Sometimes overweight and obese are combined—defined as a BMI of 25 and over.

**burden of disease and injury:** The term that refers to the quantified impact of a disease or injury on an individual or population, using the *disability-adjusted life year (DALY)* measure.



**cardiomyopathy:** A condition in which there is direct and widespread damage to the heart muscle, weakening it. The condition can be due to various causes such as viral infections and severe alcohol abuse, and it can lead to an enlarged, thickened and dilated heart as well as *heart failure*.

**cardiovascular disease (CVD):** Any disease of the circulatory system, namely the heart (cardio) or blood vessels (vascular). Includes *heart attack*, *angina*, *stroke* and *peripheral arterial disease*. CVD is also known as *circulatory disease*.

**cause(s) of death:** All diseases, morbid conditions or injuries that either resulted in or contributed to death—and the circumstances of the accident or violence that produced any such injuries—that are entered on the Medical Certificate of Cause of Death. Causes of death are commonly reported by the underlying cause of death. See also *associated cause(s) of death* and *multiple causes of death*.

**cerebrovascular disease:** Any disorder of the blood vessels supplying the brain or its covering membranes. A notable and major form of cerebrovascular disease is *stroke*.

**chronic diseases:** Term applied to a diverse group of diseases, such as heart disease, cancer and arthritis, that tend to be long-lasting and persistent in their symptoms or development. Although these features also apply to some communicable diseases, the term is usually confined to non-communicable diseases. **circulatory disease:** Alternative name for *cardiovascular disease*.

**circulatory system:** The heart and the blood vessels, comprising the system that circulates blood around the body to supply oxygen and nutrients to all body tissues and to carry away waste products from them. Also known as the cardiovascular system.

**comorbidity:** Defined in relation to an index disease/condition, comorbidity describes any additional disease that is experienced by a person while they have the index disease. The index and comorbid disease/condition will change depending on the focus of the study. Compare with multimorbidity.

**confidence interval:** A range determined by variability in data, within which there is a specified (usually 95%) chance that the true value of a calculated parameter lies.

**congenital:** A condition that is recognised at birth, or that is believed to have been present since birth, including conditions that are inherited or caused by environmental factors.

**coronary artery bypass graft (CABG):** Surgical procedure using blood vessel grafts to bypass blockages in the coronary arteries and restore adequate blood flow to the heart muscle.

**coronary heart disease (CHD):** Disease due to blockages in the heart's own (coronary) arteries, expressed as *angina* or a *heart attack*. Also known as *ischaemic heart disease*.

**disability-adjusted life year (DALY):** A year of healthy life lost, either through premature death or equivalently through living with disability due to illness or injury. It is the basic unit used in *burden of disease and injury* estimates. **first-ever stroke:** A stroke occurring for the first time in a person's life.

**heart attack:** Life-threatening emergency that occurs when a vessel supplying blood to the heart muscle is suddenly blocked completely by a blood clot. The medical term commonly used for a heart attack is *acute myocardial infarction*.

**heart failure:** When the heart functions less effectively in pumping blood around the body. It can result from a wide variety of diseases and conditions that can impair or overload the heart, such as heart attack, other conditions that damage the heart muscle directly (see *cardiomyopathy*), *high blood pressure*, or a damaged heart valve. **high blood cholesterol:** Total cholesterol levels above 5.5 mmol/L.

**high blood pressure/hypertension:** The definition of high blood pressure (also known as hypertension) can vary but a well-accepted one is from the World Health Organization: a systolic blood pressure of 140 mmHg or more or a diastolic blood pressure of 90 mmHg or more, or [the person is] receiving medication for high blood pressure. Also see *blood pressure*.

**hospitalisation:** Synonymous with admission and separation; that is, an episode of hospital care that starts with the formal admission process and ends with the formal separation process. An episode of care can be completed by the patient's being discharged, being transferred to another hospital or care facility, or dying, or by a portion of a hospital stay starting or ending in a change of type of care (for example, from acute to rehabilitation). **hypertension:** See *high blood pressure*. **incidence:** The number of new cases (of an illness or event, and so on) occurring during a given period. Compare with *prevalence*. **ischaemic heart disease:** See *heart attack* and *angina* (chest pain). Also known as *coronary heart disease*. **lipids:** Fatty substances, including cholesterol and triglycerides, that are in blood and body tissues.

**multiple causes of death:** All the causes listed on the Medical Certificate of Cause of Death. These include the underlying cause of death and all associated cause(s) of death. See also *cause(s) of death*. **peripheral arterial disease:** Characterised by pain in the extremities, often the legs, due to an inadequate blood supply to them. **plaque (atherosclerotic):** A localised area of *atherosclerosis*, especially when raised or built up, and that may cause blockages in arteries. **prevalence:** The number or proportion (of cases, instances, and so forth) in a population at a given time. For example, in relation to cancer, refers to the number of people alive who had been diagnosed with cancer in a prescribed period (usually 1, 5, 10 or 26 years).

Compare with *incidence*.

**principal diagnosis:** The diagnosis established after study to be chiefly responsible for occasioning an episode of patient care (hospitalisation), an episode of residential care or an attendance at the health care establishment. Diagnoses are recorded using the relevant edition of the International statistical classification of diseases and related health problems, 10th revision, Australian modification (ICD-10-AM).

**procedure:** A clinical intervention that is surgical in nature, carries a procedural risk, carries an anaesthetic risk, and requires specialist training and/or special facilities or equipment available only in the acute-care setting.

**remoteness:** A system which classifies geographical locations into groups (Major cities, Inner regional, Outer regional, Remote, Very remote) according to distance from major population centres and services. In these analysis, remoteness is based on Accessibility/Remoteness Index of Australia (ARIA) and defined as Remoteness Areas by the Australian Statistical Geographical Standard (ASGS) (in each Census year). Remoteness is a geographical concept and does not take account of accessibility which is influenced by factors such as the socioeconomic status or mobility of a population.

**revascularisation:** ('re-vesselling') Restoring adequate blood flow to the heart or other part of the body, usually after the supply has been reduced or blocked, as in angina or a *heart attack*. Revascularisation includes methods such as *angioplasty* and *coronary artery bypass graft* surgery.

**rheumatic fever:** An acute, serious disease that affects mainly children and young adults and can damage the heart valves, the heart muscle and its lining, the joints and the brain. Is brought on by a reaction to a throat infection by a particular bacterium. Now very rare in the non-Indigenous population, it is still at unacceptably high levels among Indigenous Australians living in remote areas. See *rheumatic heart disease*. **rheumatic heart disease (RHD):** Chronic disease from damaged heart valves caused by earlier attack(s) of *rheumatic fever*.

**risk factor:** Any factor which represents a greater risk of a health disorder or other unwanted condition or event. Some risk factors are regarded as causes of disease, others are not necessarily so. Along with their opposites, protective factors, risk factors are known as *determinants*.

**socioeconomic groups:** Is an indication of how 'well off' a person or group is. Socioeconomic groups are reported using the Australian Bureau of Statistics' Socio-Economic Indexes for Areas (SEIFA), whereby areas are classified on the basis of social and economic information (such as low income, low educational attainment, high levels of public sector housing, high unemployment and jobs in relatively unskilled occupations) collected in the Census of Population and Housing. Socio-Economic Indexes for Areas, are divided into 5 groups, from the most disadvantaged (worst off) to the least disadvantaged (best off). Note, that this index refers to the average disadvantage of all people living in an area, not to the level of disadvantage of a specific individual. **stent:** A metal mesh tube that is expanded within an artery at a point of narrowing and left there to hold the artery open.

**stroke:** An event that occurs when an artery supplying blood to the brain suddenly becomes blocked or bleeds. A stroke often causes paralysis of parts of the body normally controlled by that area of the brain, or speech problems and other symptoms. It is a major form of *cerebrovascular disease*. **thrombolysis:** Emergency 'clot-busting' drug treatment for a *heart attack*. **thrombosis:** Clotting of blood, with the term usually applied to clotting within a blood vessel due to disease, as in a *heart attack* or *stroke*.

**transient ischaemic attack (TIA):** A 'mini' *stroke*, with temporary problems in speech or paralysis that last for 24 hours or less, often only minutes. It is a strong warning sign of a more severe stroke.

**underlying cause of death:** The disease or injury that initiated the train of events leading directly to death, or the circumstances of the accident or violence that produced the fatal injury. See also *cause(s) of death* and *associated cause(s) of death*.

**unstable angina:** A form of *angina* that is more dangerous than normal angina but less so than a *heart attack*. It can feature chest pain that occurs at rest; and in someone who already has angina it can be marked by new patterns of onset with exertion or by pain that comes on more easily, more often or for longer than previously. **vascular:** Relating to blood vessels.

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