Australian Government
Australian Institute of Health and Welfare

Heart, stroke and vascular disease: Australian facts

Web report | Last updated: **17 Jun 2024** | Topic: Heart, stroke & vascular diseases | Media release

About

This web report is part of Australian Centre for Monitoring Population Health

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.

This report is regularly updated with data from a range of sources. There are differences in the source year and frequency of publication. See Data sources and Notes for more information.

Cat. no: CVD 92

- Explore the data
- Stories from the heart
- Data tables

Findings from this report:

- 6.7% of adults (1.3 million) had 1 or more conditions related to heart, stroke or vascular disease in 2022
- 57,300 acute coronary events (heart attack or unstable angina) among people in 2021 –around 157 every day
- 40,700 stroke events in 2021– around 112 every day
- CVD was the underlying cause of 45,000 deaths (24% of all deaths) in 2022

In this report:

Risk factors for heart, stroke and vascular disease

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

All heart, stroke and vascular disease

Explore all heart, stroke and vascular disease by prevalence (existing cases), incidence (new cases), hospitalisations and deaths.

- All heart, stroke and vascular disease

Heart, stroke and vascular disease subtypes

Explore all heart, stroke and vascular subtypes by prevalence (existing cases), incidence (new cases), hospitalisations and deaths.

- 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

Explore heart, stroke and vascular disease, diabetes and chronic kidney disease comorbidity.

- 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

Impact of COVID-19

Explore the impact of COVID-19 on people living with heart, stroke and vascular disease in Australia.

- Impact of COVID-19

Summary

Heart, stroke and vascular disease is an Australia's health topic

- Chronic conditions | 17 Jun 2024
- Multimorbidity | 17 Jun 2024
- Diabetes | 17 Jun 2024

Heart, stroke and vascular disease – also known as cardiovascular disease (CVD) – is a broad term that describes the many different diseases and conditions that affect the heart and blood vessels.

Coronary heart disease, stroke and heart failure are common forms of CVD. Other forms include atrial fibrillation, peripheral arterial disease, rheumatic heart disease and congenital heart disease.

Some types of CVD are caused by atherosclerosis, a condition where deposits of cholesterol and other substances build up in the arteries to form plaque. Atherosclerosis can reduce or block blood supply to the heart (causing angina or heart attack) or to the brain (causing stroke).

A number of risk factors can increase a person's chance of developing CVD, including behavioural (for example, smoking, insufficient physical activity and poor diet), biomedical (for example, high blood pressure or abnormal blood lipids) and others that can't be controlled such as age and sex.

For more information, see:

- What is heart, stroke and vascular disease?
- Risk factors.

How common is heart, stroke and vascular disease?

An estimated 1.3 million Australians aged 18 and over (6.7% of the adult population) were living with one or more conditions related to heart, stroke and vascular disease, based on self-reported data from the Australian Bureau of Statistics (ABS) 2022 National Health Survey (ABS 2023c). This includes 600,000 adults (3.0%) who reported having coronary heart disease (including angina and heart attack).

CVD was more commonly reported by men than women (7.6% and 5.8%, respectively) and increased with age, affecting around 1 in 4 (28%) adults aged 75 and over in 2022.

For more information, see How many Australians have heart, stroke and vascular disease?

Acute coronary events

There are no national data sources on the number of new cases of coronary heart disease. However, a proxy measure can be used as an estimate – the number of acute coronary events, which includes heart attack and unstable angina (AIHW 2022b).

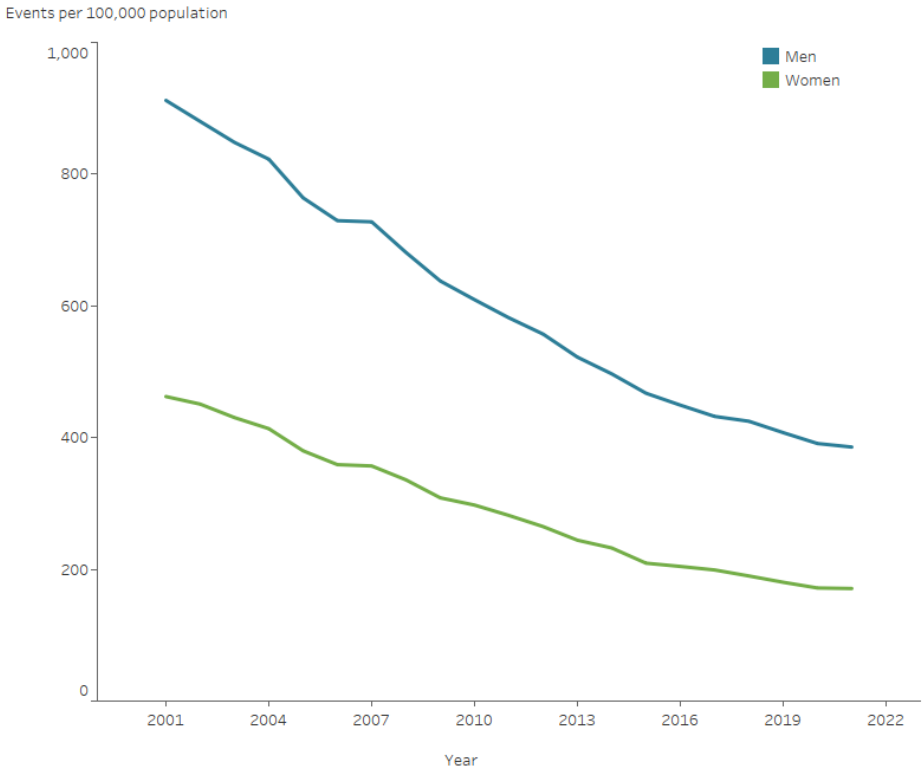
In 2021, there were an estimated 57,300 acute coronary events among people aged 25 and over – equivalent to 157 events every day. Around 12% of these events (6,900 cases) were fatal.

After adjusting for age, rates of acute coronary events:

- were 2.3 times as high in men than women
- were 4.6 times as high among people aged 85 and over compared with people aged 55–64
- were 2.8 times as high among Aboriginal and Torres Strait Islander (First Nations) people compared with non-Indigenous people (men 2.5 times as high, women 3.7 times as high)
- fell by 63% for women and 58% for men between 2001 and 2021 (Figure 1).

Figure 1: Acute coronary events among persons aged 25 years and over, by sex, 2001–2021

The line chart shows declines in age-standardised rates of acute coronary events between 2001 and 2021, from 912 to 386 per 100,000 population for men aged 25 and over, and from 462 to 171 for women aged 25 and over.



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

For more information, see Acute coronary events.

Stroke

In 2018, an estimated 387,000 Australians aged 15 and over (1.6% 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 2019b).

The prevalence of stroke in 2018 was:

- higher in males (1.6%) than females (1.1%), after adjusting for age
- more common in older age groups, with over 2 in 3 (71%) occurring in people aged 65 and over.

In 2021, there were an estimated 40,700 stroke events in Australia – around 112 every day. The rate of stroke events:

- was 1.4 times as high among males as females, after adjusting for age
- increased with age, being 6 times as high among people aged 85 and over as those aged 65–74
- fell by one-quarter (27%) between 2001 and 2021, after adjusting for age.

For more information, see Stroke.

Heart failure

An estimated 144,000 people aged 18 and over (0.7% of the adult population) had heart failure in 2022, based on self-reported data from the ABS 2022 National Health Survey (ABS 2023c).

Heart failure was more commonly reported by men (1.0%) than women (0.5%). The prevalence of heart failure increases with age, affecting around 4.1% of adults aged 75 and over in 2022.

Using self-reported data underestimates the true burden of heart failure, as early stages are only mildly symptomatic, and many cases are undiagnosed. A 2016 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).

For more information, see Heart failure and cardiomyopathy.

Impact of heart, stroke and vascular disease

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 2023, Australians lost an estimated 666,000 years of healthy life due to CVD (19 DALY per 1,000 population). CVD accounted for almost 12% of the total burden of disease (14% males, 10% females), ranking fourth behind cancer, mental and substance use disorders, and musculoskeletal conditions.

Coronary heart disease was the leading single cause of burden for males, and eighth leading single cause for females in 2023.

After adjusting for age, the rate of burden from CVD fell by 47% between 2003 and 2023 (AIHW 2023a).

Expenditure

In 2020–21, an estimated 9.5% of total allocated expenditure in the Australian health system ($14.3 billion) was attributed to CVD.

Nearly two-thirds (65%, or $9.2 billion) was spent on hospital services, with another 20% ($2.9 billion) related to non-hospital medical services (largely primary care) and 14% ($2.0 billion) spent on prescription medicines dispensed through the Pharmaceutical Benefits Scheme (PBS) (AIHW 2023b).

Deaths

In 2022, CVD was the underlying cause of 45,000 deaths (24% of all deaths), a rate of 173 per 100,000 population. CVD was the second leading cause of death group, behind cancers (27% of all deaths).

The proportion of CVD deaths (as the underlying cause of death) by subtype in 2022 was:

- coronary heart disease: 41%
- stroke: 19%
- heart failure and cardiomyopathy: 11%
- hypertensive disease: 5.9%
- atrial fibrillation: 5.7%
- peripheral arterial disease: 4.3%
- rheumatic heart disease: 0.8%.

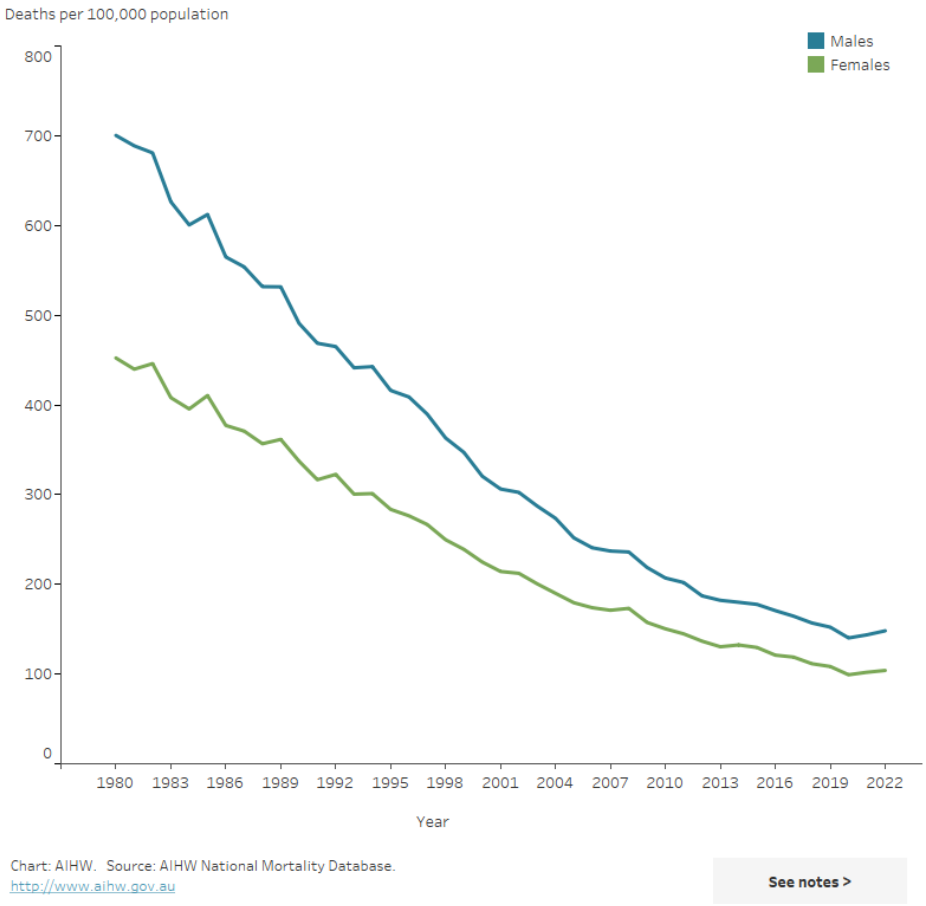
In 2022, CVD death rates:

- were 1.4 times as high among males as females, after adjusting for age
- increased with age, with over half (52%) occurring in persons aged 85 and over.

After adjusting for age, the CVD death rate has declined by more than three-quarters for both males (79%) and females (77%) between 1980 and 2022 (Figure 2). This downward trend has been driven by major public health improvements with advancements in both prevention and treatment.

Although CVD mortality rates reached an all-time low in 2020 at 158 per 100,000 population (the first year of the pandemic), they increased year-on-year in both 2021 and 2022 (2.3% and 2.1%, respectively, after adjusting for age). The CVD mortality rate remains 3.4% below that recorded in 2019 and recent increases should be interpreted in the context of higher overall mortality in 2022, with two-thirds of excess deaths being associated with COVID-19 (ABS 2023b). People with pre-existing chronic conditions are also at higher risk of more severe outcomes from COVID-19 with chronic cardiac conditions being the most common pre-existing diseases among those who died from the virus (deaths registered to February 2023) (ABS 2023a).

Figure 2: Cardiovascular disease death rates, by sex, 1980–2022



For more information, see Impacts and Death.

Treatment and management of heart, stroke and vascular disease

Primary care

Primary health care professionals, including general practitioners (GPs), are often the first point-of-care for people who have non-acute cardiovascular disease.

In a 2020–21 survey of GP practices, high blood pressure (hypertension) was the single most common condition recorded for patients (6.0%). Cardiovascular medicines were the largest proportion of total prescriptions ordered by GPs for patients (32%) (NPS MedicineWise 2022).

In 2023, over 188,000 Heart Health Checks were processed by Medicare (males 91,300, females 96,900). Checks were most commonly conducted among people aged 55–64 (58,500) and 65–74 (51,400) (Services Australia 2024).

Medicines

Almost 120 million PBS prescriptions for cardiovascular system medicines were dispensed to the Australian community in 2022–23. These comprised 36% of total PBS prescriptions (Department of Health and Aged Care 2023).

Around two-thirds of these prescriptions (68%, 81 million) were PBS-subsidised, with the remainder being under co-payment.

Rosuvastatin (16.5 million) and atorvastatin (12.1 million), both lipid-modifying medicines, and perindopril (7.1 million), a blood pressure-lowering medicine, were among the most commonly supplied PBS medicines in 2022–23.

Emergency department presentations

In 2022–23, there were 331,400 presentations to hospital emergency departments with a principal diagnosis of CVD – a rate of 1,300 presentations per 100,000 population.

- 17,100 (5.2%) were triaged as 'resuscitation' and needed immediate care, 145,900 (44%) as 'emergency' (should be seen within 10 minutes), 123,300 (37%) as 'urgent' (within 30 minutes), 40,600 (12%) as 'semi-urgent' (within 60 minutes) and 4,600 (1.4%) as 'non-urgent' (within 120 minutes).
- 195,500 (59%) were subsequently admitted to the hospital they presented to; 109,300 (33%) departed without being admitted or referred; and 19,700 (6.0%) were referred to another hospital for admission (AIHW 2023c).

Hospitalisations

In 2021–22, CVD was recorded as the principal diagnosis of around 568,000 hospitalisations – 4.9% of all hospitalisations in Australia.

Coronary heart disease was the most common principal diagnosis among CVD hospitalisations (26%), followed by atrial fibrillation (13%), heart failure and cardiomyopathy (12%), stroke (12%), peripheral arterial disease (5.5%), hypertensive disease (2.4%) and rheumatic heart disease (0.8%).

After adjusting for age, rates of hospitalisation with CVD as the principal diagnosis were 1.6 times as high for males compared with females.

Acute care CVD hospitalisations as a principal diagnosis declined by 22% between 2000–01 and 2021–22, from 2,100 to 1,600 per 100,000 population, after adjusting for age.

Procedures

CVD-related diagnostic or treatment procedures performed on hospital patients in 2021–22 included:

- 131,700 coronary angiographies (88,000 males, 43,700 females)
- 48,100 echocardiographies (32,600 males, 15,500 females)
- 43,700 percutaneous coronary interventions (PCI) (32,800 males, 10,900 females)
- 19,000 pacemaker insertions (11,600 males, 7,400 females)
- 12,700 coronary artery bypass grafts (CABG) (10,600 males, 2,100 females)
- 12,200 heart valve repair or replacement procedures (7,800 males, 4,400 females)
- 3,800 cardiac defibrillator implants (2,900 males, 870 females)
- 1,800 carotid endarterectomy procedures (1,300 males, 460 females)
- 105 heart transplants (67 males, 38 females).

For more information, see Treatment and management.

Population groups

The impact of heart, stroke and vascular disease varies between population groups.

Rates of prevalence, hospitalisation, mortality and burden of disease are, on average, greater among First Nations people, people living in lower socioeconomic areas, and people living in *Remote and very remote* areas. For example:

- Around 42,000 First Nations adults (8.6%) were living with heart stroke and vascular disease in 2018–19. First Nations adults were 2.1 times as likely as non-Indigenous adults to have heart, stroke and vascular disease, after adjusting for age (ABS 2019a).
- CVD accounted for 10% of total disease burden among First Nations people in 2018 (24,600 DALY). The proportion attributed to fatal burden (86%) was higher than non-fatal burden (13%). The burden of disease from CVD was 2.4 times as high among First Nations people as non-Indigenous people (AIHW 2021, 2022a).
- Among people living in the lowest socioeconomic areas, there were 31,200 deaths where CVD was the underlying cause in 2020–2022 – a rate of 202 per 100,000 population. The CVD death rate for this group was 1.5 times as high as for people living in the highest socioeconomic areas, after adjusting for age.
- Among people living in *Remote and very remote* areas, there were 11,400 CVD hospitalisations in 2021–22 – a rate of 2,300 per 100,000 population. People living in these areas were 1.3 times as likely to be hospitalised for CVD as people living in *Major cities*, after adjusting for age.

Where do I go for more information?

For more information, see Heart, stroke and vascular disease: Australian facts.

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Notes

Report summary and data tables updated 17 June 2024 with the latest available data at that time. Updates to the report's main content will be released by December 2024.

Introduction

Substantial progress has been made over many decades in improving the cardiovascular health of Australians. Death rates have fallen, levels of certain risk factors have improved and there have been major advances in prevention, treatment and management.

However, illness, disability and premature death from heart, stroke and vascular disease and their comorbidities continue to impose a large burden on Australians. Health care expenditure is high, and the number of people with cardiovascular disease (CVD) is expected to increase in the future as the population ages.

Some populations have higher rates of illness and death from CVD than others, particularly Aboriginal and Torres Strait Islander people, people who are socioeconomically disadvantaged and those living in remote areas of Australia.

Some of the illness and premature death caused by heart, stroke and vascular disease can be prevented. Many Australians remain at high risk of CVD because of unfavourable levels of risk factors that can be modified—high blood pressure and abnormal blood lipids, smoking, overweight and obesity, insufficient physical activity and poor diet. Improved diagnostics, therapies and management will also contribute to future declines in cardiovascular morbidity and mortality.

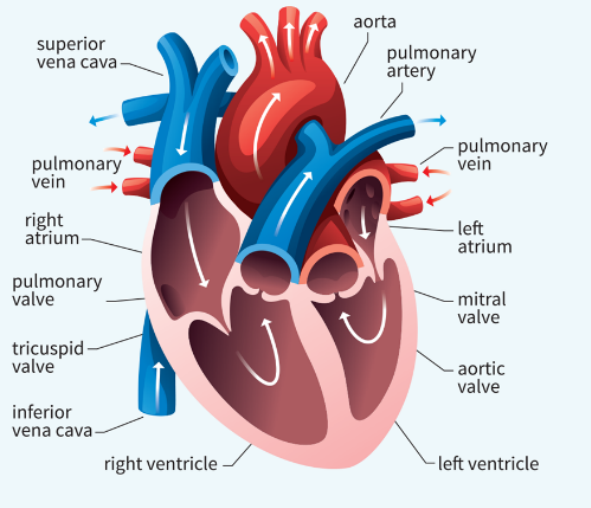
What is heart, stroke and vascular disease?

Heart, stroke and vascular disease—also known as cardiovascular disease or CVD—is a broad term that describe the many different diseases and conditions that affect the heart and blood vessels.

Two common types of CVD in Australia are coronary heart disease and stroke. These, and other cardiovascular conditions are described separately in this report.

Many forms of CVD are caused by atherosclerosis. This is a condition where deposits of fat, cholesterol and other substances build up in the inner lining of the arteries to form plaque. Atherosclerosis can reduce or block blood supply to the heart (causing angina or heart attack) or to the brain (causing stroke). The process leading to atherosclerosis is slow and complex, often starting early in life and progressing with age.

Figure 1: Anatomy of the heart



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.

Risk factors for heart, stroke and vascular disease

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. Key behavioural risk factors for cardiovascular disease (CVD) include:

- smoking
- diet
- physical activity
- alcohol consumption.

Biomedical risk factors are bodily states that have an impact on a person's risk of disease. Biomedical risk factors for CVD include:

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

Some biomedical risk factors can be influenced by health behaviours. Others, such as type 1 diabetes, occur independently of behaviours.

Fixed risk factors cannot be modified. Fixed risk factors for CVD include:

- ageing
- sex recorded at birth
- family history of cardiovascular disease (through inherited genes or through sharing an environment of risky health behaviours).

Other non-traditional risk factors such as living with a mental health condition can also increase the risk of developing heart disease (Heart Foundation 2023).

For most behavioural and biomedical 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 substantial health benefits by reducing illness and mortality rates.

This section presents statistics on selected key risk factors that increase the risk of a person developing CVD.

View the risk factors for heart, stroke and vascular disease

Further information

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

- Smoking and e-cigarettes
- High blood pressure
- Diabetes
- Overweight and obesity
- Physical activity
- Diet
- Alcohol
- Determinants of health for First Nations people
- Australian Burden of Disease Study 2018: Interactive data on risk factor burden

Visit Risk factors for more information on this topic.

References

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Smoking

Tobacco smoking is the leading cause of preventable disease and death in Australia today (AIHW 2021). Over one third of cardiovascular disease (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. As tobacco smoke is absorbed into the bloodstream, it damages blood vessels, increases the formation of plaques and clots, and reduces blood oxygen levels.

While public health strategies have reduced the prevalence of smoking in Australia over many years (Department of Health and Aged Care 2023), the proportion of people continuing to smoke is still concerning, particularly in some population groups.

In 2022–23, based on results from the National Drug Strategy Household Survey:

- 8.3% of people aged 14 and over smoked daily (males 9.0%, females 7.7%)
- men and women aged 50–59 had the highest proportion of current daily smokers (12.1% and 11.9%, respectively).

Between 2001 and 2022–23:

- the proportion age 14 and over who smoked daily decreased by 57% for both males and females
- daily smoking rates among males and females aged 15–24 decreased by 74% and 82%, respectively (AIHW 2024).

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).

Use of e-cigarettes

While the proportion of Australians who smoke tobacco may be declining, the use of e-cigarettes is becoming more common, particularly among young adults. Current use of e-cigarettes among people aged 14 and over nearly tripled between 2019 (2.5%) and 2022–23 (7.0%) while quadrupling among people aged 18–24 (from 5.3% to 21%) and increasing more than five-fold among people aged 14–17 (from 1.8% to 9.7%) (AIHW 2024).

For more information see the report *National Drug Strategy Household Survey 2022–23*.

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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.

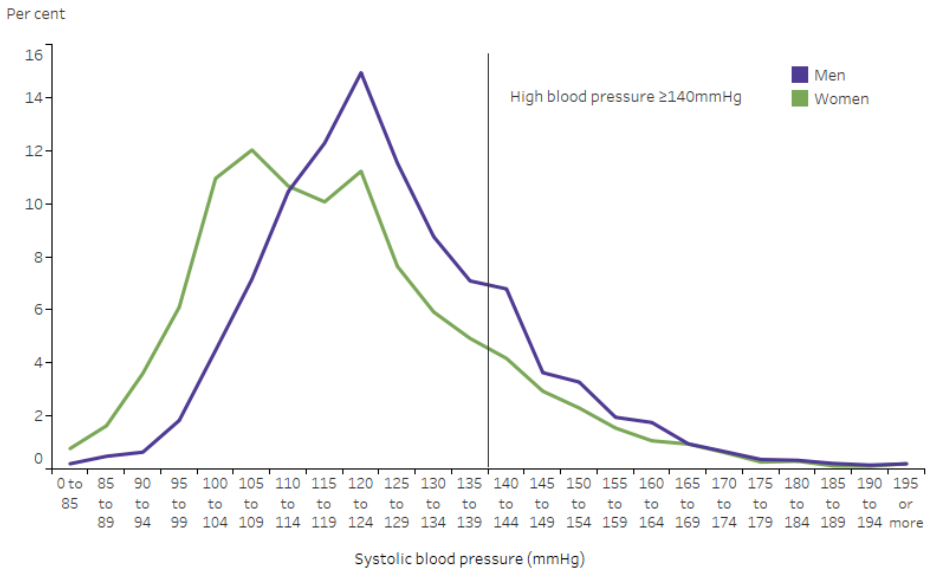

Figure 1: Prevalence distribution of systolic blood pressure measurements among adults, 2017-18

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 respondednts 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).

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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 ≥ 5.5 mmol/L
- LDL cholesterol ≥ 3.5 mmol/L
- HDL cholesterol < 1.0 mmol/L for men, and < 1.3 mmol/L for women
- triglycerides ≥ 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.

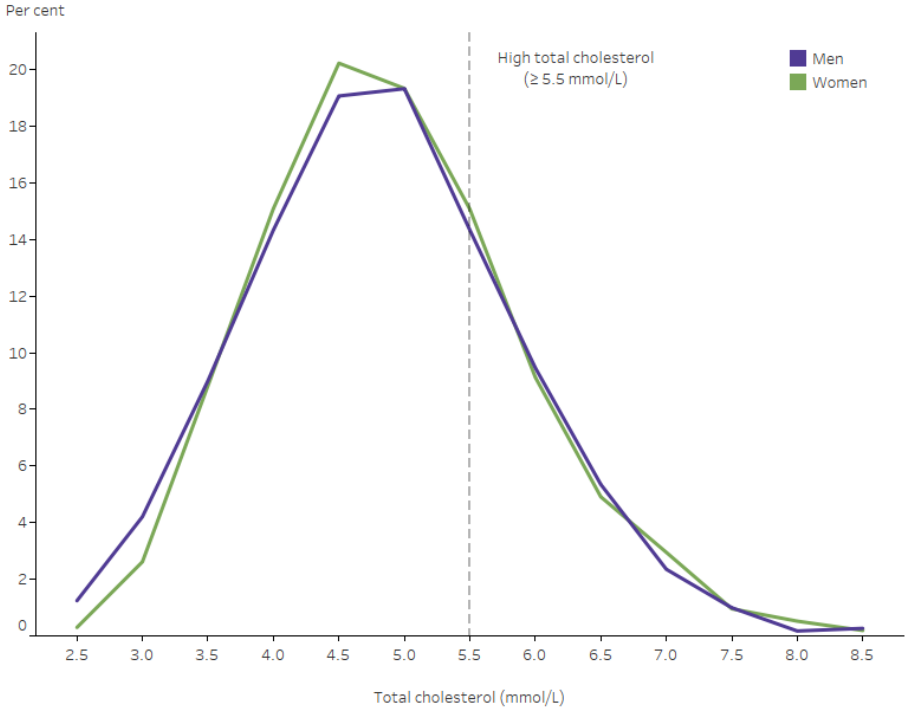

Figure 1: Total blood cholesterol, persons aged 18 and over, by sex, 2011-12

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 areas in 2011–12 – crude rates of 67% of people living in the lowest socioeconomic areas, 61% in the highest socioeconomic areas.

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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 2021, based on linked data from the National Diabetes Services Scheme (NDSS) and Australasian Paediatric Endocrine Group (APEG) state-based registers:

- more than 1 in 20 (1.3 million) Australians were living with diabetes. This includes people with type 1 diabetes, type 2 diabetes and other diabetes, but excludes gestational diabetes (AIHW 2023)
- diabetes was more common in males (4.8%) than females (3.8%) after controlling for age
- almost 1 in 5 (19.5%) Australians aged 80–84 were living with diabetes, which was almost 30 times as high as those aged under 40 (0.7%)
- age-standardised prevalence rose from 2.4% in 2000 to 4.3% in 2021. The diabetes rate remained has remained relatively stable since 2011 (Figure 1).

Information based on linked NDSS and APEG 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 (ABS 2013).

Figure 1: Prevalence of diabetes from linked NDSS and APEG data, by sex, 2000–2021

This chart shows the estimated age–standardised proportion of people with diabetes based on data from the linked National Diabetes Services Scheme and Australasian Paediatric Endocrine Group between 2000 and 2021. The proportion increased from 2.4% in 2000 to 4.3% in 2021 and has remained relatively stable since 2014.

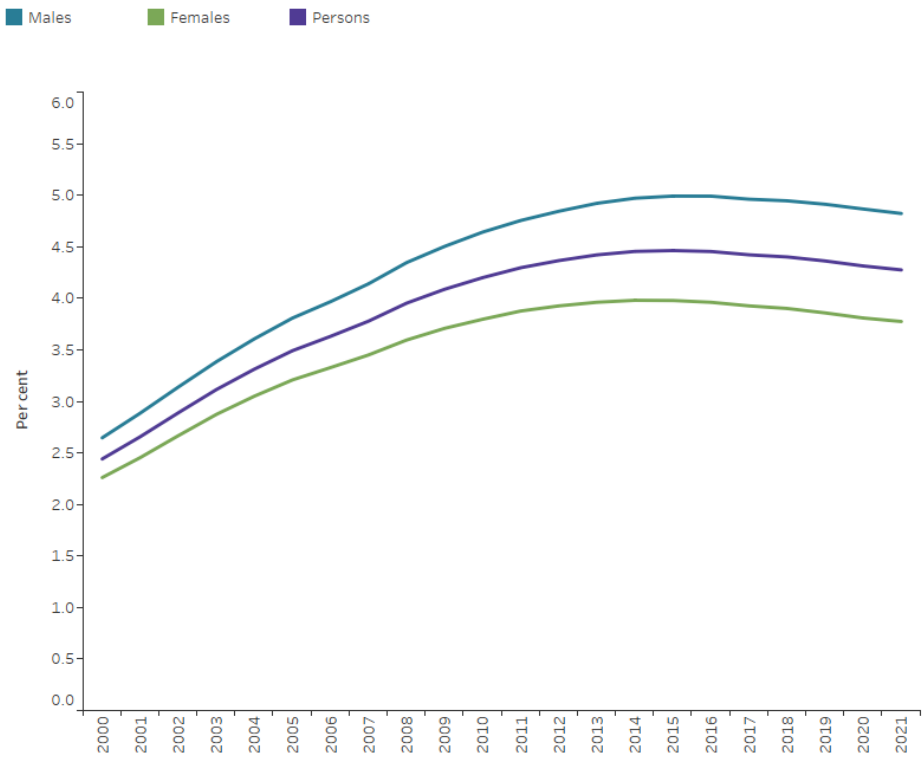

Figure 2: Prevalence of diabetes from linked NDSS and APEG data, 2000–2021

Note: Age-standardised to the 2001 Australian Standard Population.
Chart: AIHW. Source: AIHW analysis of linked National Diabetes Services Scheme and Australasian Paediatric Endocrine Group state-based registers.

https://www.aihw.gov.au

Data presented from the linked NDSS and APEG data (Figure 1) are likely to underestimate the true prevalence of diabetes in the Australian population. This is because:

- both data sources are based on people who have received a formal medical diagnosis of diabetes. However, Australian studies have shown that many people are living with undiagnosed type 2 diabetes.
- registration with the NDSS is voluntary and eligible [BD1] people with type 2 diabetes are more likely to register if they access subsidised diabetes consumables to monitor their diabetes at home or require insulin. Some people may be diagnosed with diabetes and choose not to register with the scheme.
- Indigenous Australians are under-represented on the NDSS (see Using the NDSS for reporting on Indigenous Australians).

Despite these limitations, these data sources provide the best picture into the number of people living with diabetes in Australia to monitor changes in populations at risk and trends over time. Further research is required to examine whether the proportion of people with undiagnosed type 2 diabetes in Australia has changed over time and the impact of this on the prevalence of disease in Australia.

Variation between population groups

- Around 7.9% of Aboriginal and Torres Strait Islander people (64,100 people) were living with diabetes according to self-reported data from the ABS 2018–19 National Aboriginal and Torres Strait Islander Health Survey (ABS 2019). After controlling for differences in the age structures of the populations, Indigenous Australians were almost 3 times as likely to have diabetes as non-Indigenous Australians.
- The age-standardised prevalence rate of diabetes in 2021 was around 1.8 times as high among those living in the lowest socioeconomic areas as among those living in the highest socioeconomic areas. The variation in prevalence rates between the lowest and highest socioeconomic areas was slightly higher among females than males (2.0 and 1.7 times as high, respectively).
- The age-standardised prevalence rate of diabetes in 2021 was highest in *Remote and very remote* areas where people were 1.3 times as likely to be living with diabetes as those in *Major cities*. The disparity in *Remote and very remote* areas was more pronounced among females than males (1.6 and 1.1 times as high, respectively) (AIHW 2023).

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Overweight and obesity

Overweight and obesity increases the risk of chronic diseases including heart attack and stroke and is associated with increased morbidity and mortality (AIHW 2023, 2021). Excess body fat can contribute to the development of biomedical risk factors, including raising levels of blood pressure and abnormal blood lipids, and increasing the risk of type 2 diabetes.

Adults with a body mass index BMI (kg/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 2022, based on measured BMI from the Australian Bureau of Statistics (ABS) 2022 National Health Survey:

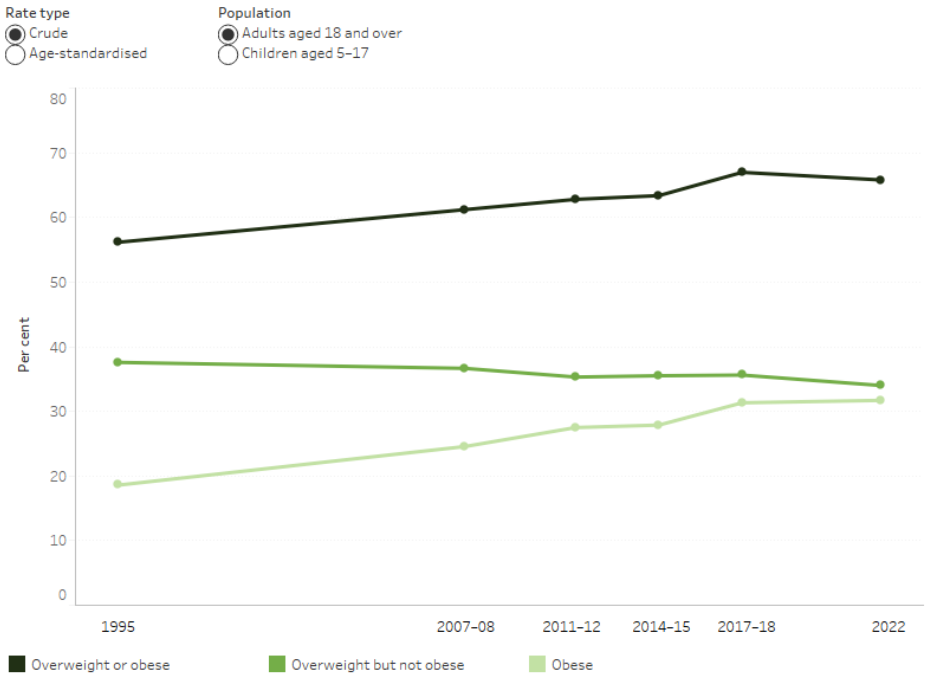
- one in 4 children and adolescents aged 2–17 (26%) were living with overweight or obesity. This is approximately 1.3 million children and adolescents. The proportion living with overweight or obesity was similar for boys and girls across most age groups, except for the youngest age group, where more girls aged 2–4 (24%) were living with overweight or obesity than boys (14%)
- 66% of adults aged 18 and over were living with overweight or obesity, with 34% living with overweight but not obesity, and 32% living with obesity
- men had higher rates of overweight or obesity than women (71% men, 61% women), and higher rates of obesity (33% men, 31% women)
- obesity was more common among older age groups – 15% of men and 16% of women aged 18–24 years were living with obesity, compared with 41% of men and 37% of women aged 65–74 (AIHW 2024).

After adjusting for different population age structures over time, the proportion of adults aged 18 and over living with overweight or obesity increased from 57% in 1995 to 65% in 2022. Over this time, the proportion living with overweight (but not obesity) declined from 38% to 34% but the proportion of those living with obesity increased, from 19% in 1995 to 31% (Figure 1) (AIHW 2024).

For more information see the report *Overweight and obesity*.

Figure 1: Proportion of overweight or obesity in children and adolescents aged 5–17, and adults aged 18 and over, 1995 to 2022

Data show that in children and adolescents and adults the prevalence of overweight/ obesity has generally increased from 1995 to 2022.



Notes:

1. Age standardised rates use the 2001 Australian population to account for differences in the age structure across population groups.
2. Age-standardised rates are only for adults aged 18 and over.

Source: Overweight and Obesity (AIHW 2024). For data and footnotes see data tables S4 and S11 in *Overweight and obesity*.

References

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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 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 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 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, 2014–2018

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.

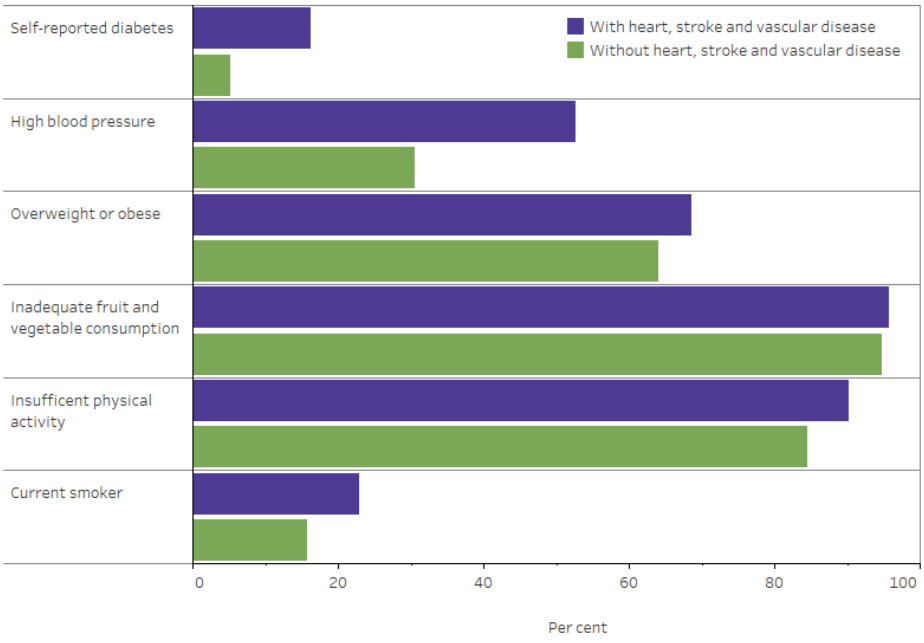

Figure 1: Risk factors among adults with, and adults without heart, stroke and vascular disease, 2014-2018

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 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 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 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).

References

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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.

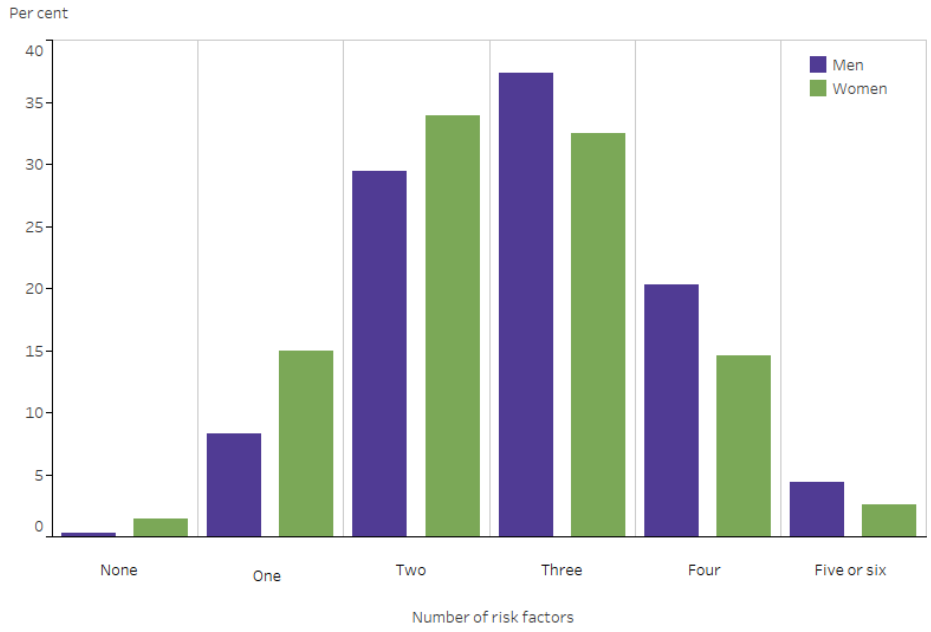

Figure 1: Multiple risk factor prevalence, persons aged 18 years and over, by sex, 2014-2018

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.

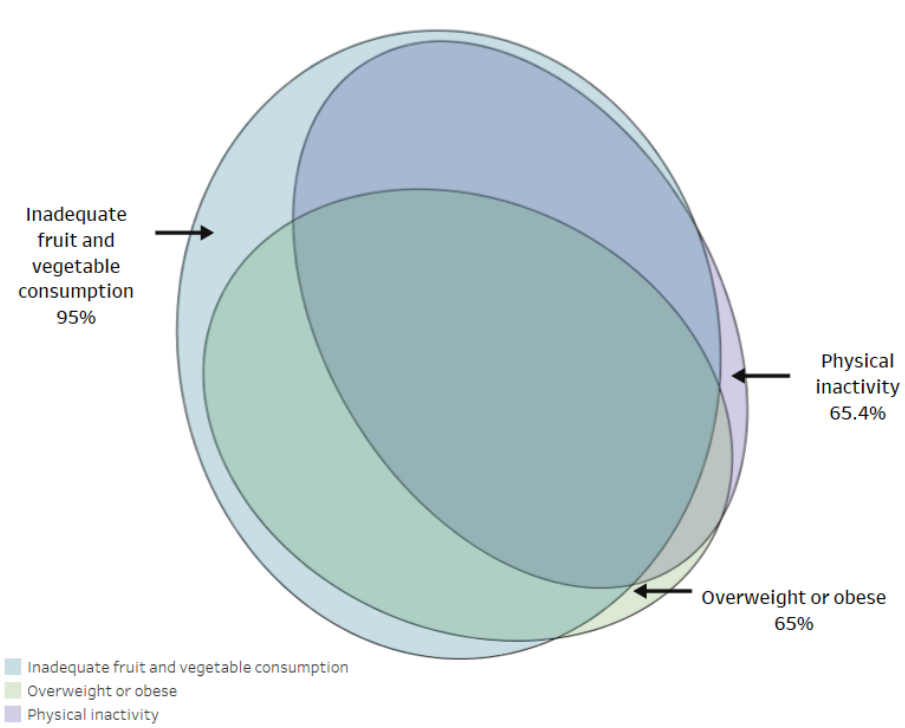

Figure 2: Selected risk factor prevalence, persons aged 18 and over, 2014-2018

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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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 - external site opens in new window 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.

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All heart, stroke and vascular disease

Page highlights:

How many Australians have heart, stroke and vascular disease?

- 1.2 million Australians aged 18 and over (6.2% of the adult population) were living with 1 or more conditions related to heart, stroke or vascular disease in 2017–18.

Hospitalisations

- In 2020–21, there were 600,000 hospitalisations where cardiovascular disease was recorded as the principal diagnosis.

Variation among population groups

- There were around 17,300 hospitalisations with a principal diagnosis of cardiovascular disease among Aboriginal and Torres Strait Islander people in 2020–21.

Deaths

- In 2021, cardiovascular disease was the underlying cause of 42,700 deaths (25% of all deaths).
- Between 1980 and 2021 the age-standardised cardiovascular disease death rate declined by around three-quarters.

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) were living with 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%).

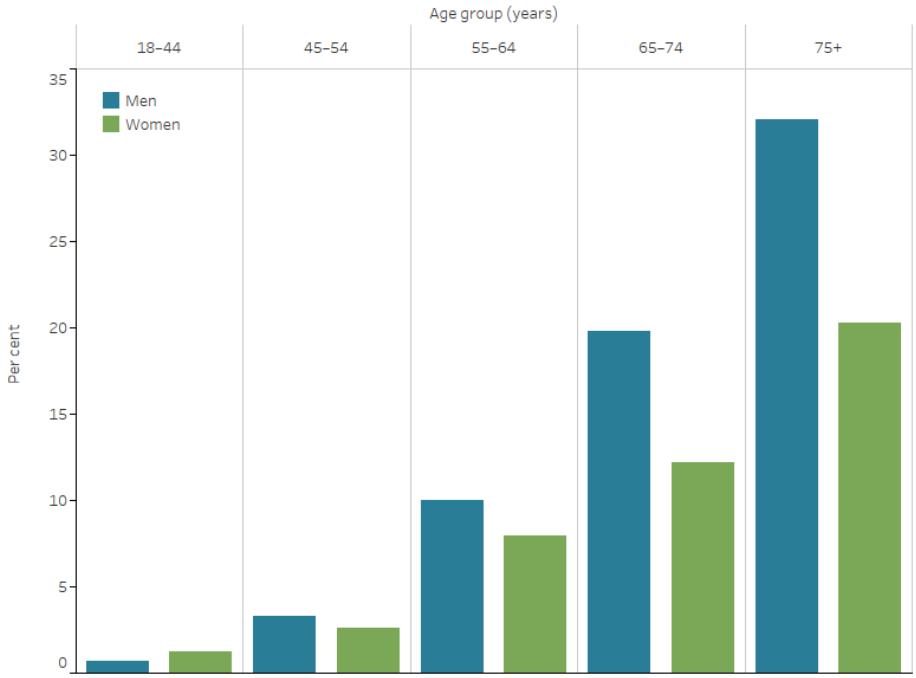

Figure 1: Prevalence of self-reported heart, stroke and vascular disease among persons aged 18 and over, by age and sex, 2017-18

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 under-estimating 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 19,400 women had an acute coronary event (heart attack or unstable angina), and 18,500 women had a stroke in 2020
- 250,000 hospitalisations of women with CVD in 2020–21
- 21,000 women died from CVD in 2021, 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 2019–21.

CVD and other chronic conditions are key priorities in the National Women's Health Strategy 2020–2030 (Department of Health 2019). 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 42,000 Aboriginal and Torres Strait Islander adults (8.6%) 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 2.1 times as high as that of non-Indigenous adults.

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

Socioeconomic area

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 (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 (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.

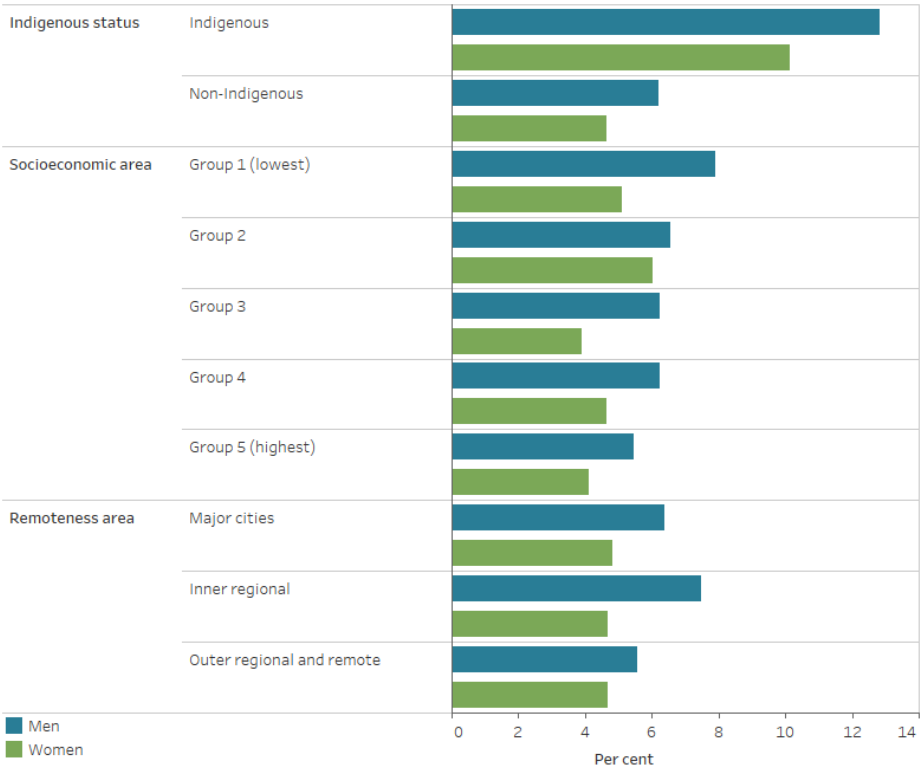

Figure 2: Prevalence of self-reported heart, stroke and vascular disease, among persons aged 18 and over, by population group and sex, 2017-18

Notes

Chart: AIHW. *Sources: AIHW analysis of* ABS 2019a, ABS 2019b.
https://www.aihw.gov.au

Hospitalisations

In 2020–21, there were 600,000 hospitalisations where CVD was recorded as the principal diagnosis, equivalent to 2,300 hospitalisations per 100,000 population. This represented 5.1% of all hospitalisations in Australia in 2020–21.

Of these, 542,000 (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 2020–21:

- 27% had a principal diagnosis of coronary heart disease, followed by
- atrial fibrillation (13%)
- heart failure and cardiomyopathy (12%)
- stroke (11%)
- peripheral arterial disease (5.5%)
- hypertensive disease (2.7%)
- rheumatic heart disease (0.8%) (Figure 3).

Figure 3: Major causes of cardiovascular disease hospitalisations (principal diagnosis), by sex, 2020–21

The bar chart shows the number of hospitalisations for selected cardiovascular diseases in 2020–21, ranging from 160,000 for a principal diagnosis of coronary heart disease to 4,600 for rheumatic heart disease.

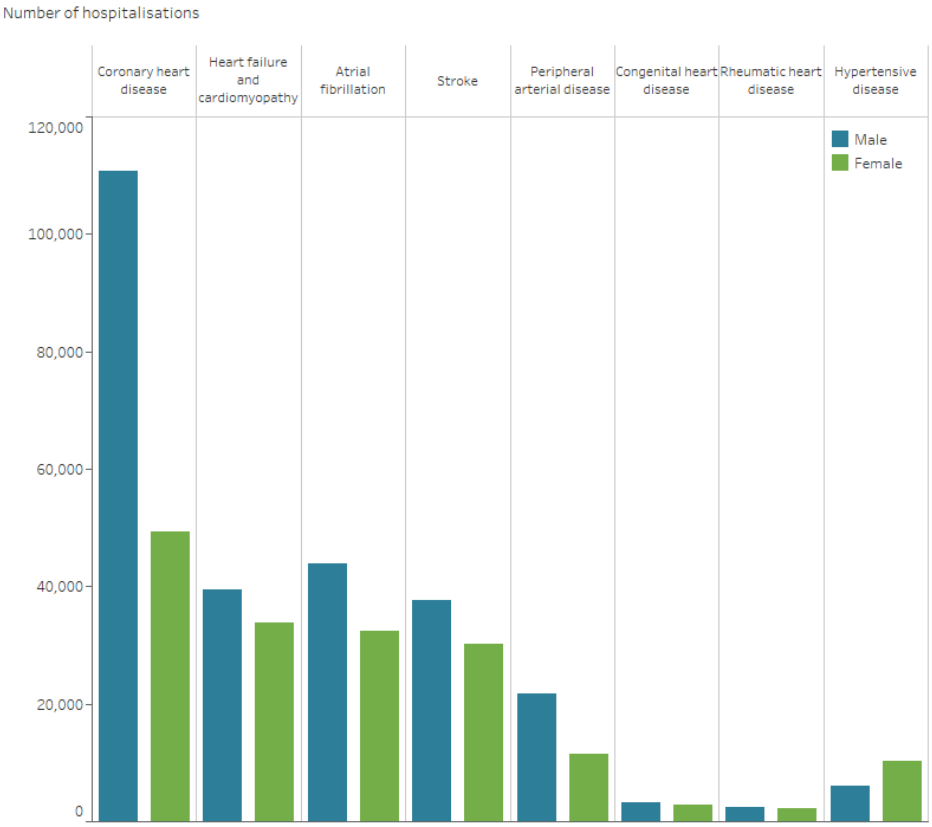

Figure 3: Major causes of cardiovascular disease hospitalisations, principal diagnosis, by sex, 2020–21

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

Age and sex

In 2020–21, rates of hospitalisation with CVD as the principal diagnosis:

- were 1.6 times as high for males compared with females, after adjusting for differences in the age structure of the populations. Age-specific rates were higher among males than females across all age groups (Figure 4)
- increased with age, with over 4 in 5 (84%) 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 (20,200 and 15,700 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 (14,400 and 9,800 per 100,000) (Figure 4).

Figure 4: Cardiovascular disease hospitalisation rates, principal diagnosis, by age and sex, 2020–21

The bar chart shows cardiovascular disease hospitalisation rates by age group in 2020–21. These were highest among men and women aged 85 and over (20,200 and 15,700 per 100,000 population).

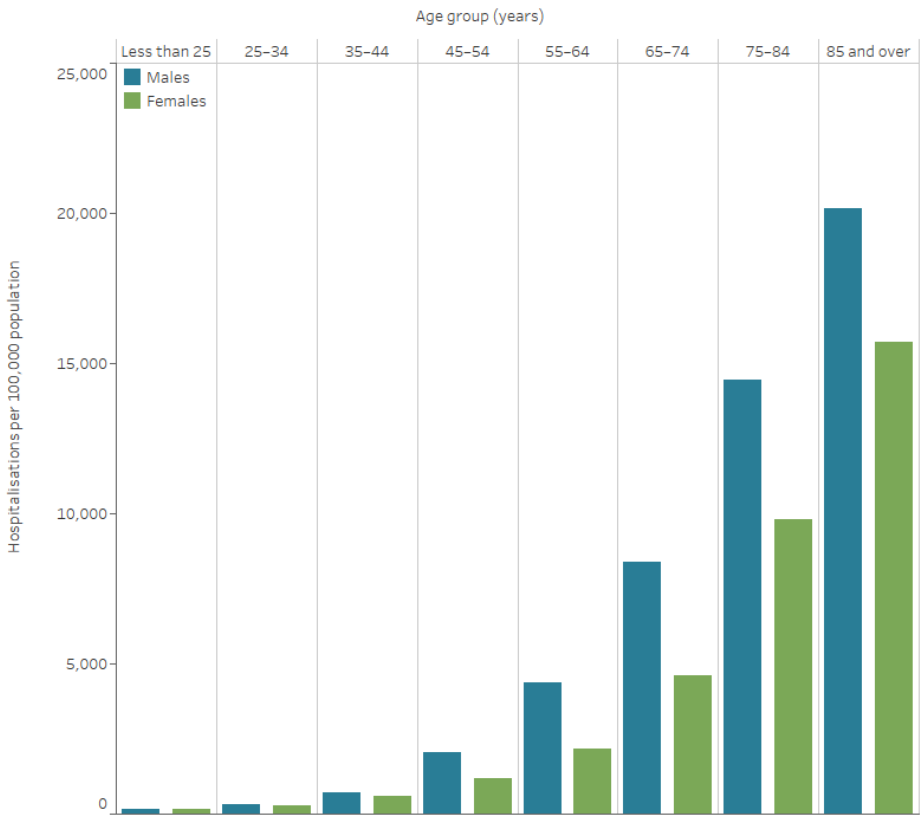

Figure 4: Cardiovascular disease hospitalisation rates, principal diagnosis, by age and sex, 2020–21

Note: Includes persons with missing information on age and/or sex.
Chart: AIHW. *Source:* AIHW National Hospital Morbidity Database. ..

Trends

The number of acute care hospitalisations with CVD as the principal diagnosis increased by 38% between 2000–01 and 2020–21, from 393,000 to 542,000 hospitalisations.

Despite increases in the number of hospitalisations, the age-standardised rate declined by 16% over this period, from 2,070 to 1,740 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 5).

Figure 5: Acute care cardiovascular disease hospitalisations rates, principal diagnosis, by sex, 2000–01 to 2020–21

The line chart shows declines in age-standardised rates of male and female acute care CVD hospitalisations between 2000–01 and 2020–21, from 2,570 to 2,160 per 100,000 population for males, and from 1,614 to 1,356 for females.

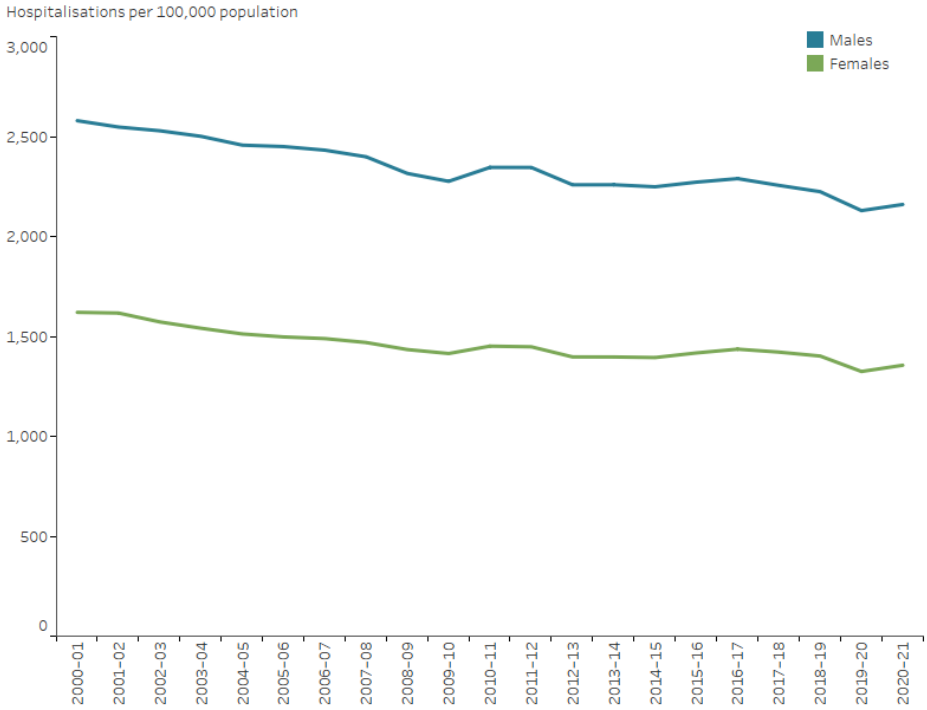

Figure 5: Acute care cardiovascular disease hospitalisation rates, principal diagnosis, by sex, 2000–01 to 2020–21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Includes persons with missing information on age and/or sex.
3. 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 2020–21, there were around 17,300 hospitalisations with a principal diagnosis of CVD among Aboriginal and Torres Strait Islander people – a rate of 2,000 per 100,000 population.

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

- the rate among Indigenous Australians was 1.8 times as high as the non-Indigenous rate
- the disparity between Indigenous and non-Indigenous Australians was greater for females – 2.2 times as high compared with 1.6 times as high for males.

Socioeconomic area

In 2020–21, the age-standardised CVD hospitalisation rate was 1.2 times as high for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas.

This disparity between the lowest and highest socioeconomic areas was greater for females than males (1.2 and 1.1 times as high, respectively) (Figure 6).

Remoteness area

In 2020–21, the age-standardised CVD hospitalisation rate was 1.4 times as high for people living in *Remote and very remote* areas compared with those in *Major cities*.

This largely reflects disparities in female rates (1.5 times as high)—for males the difference was smaller (1.2 times as high).

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 2020–21, 19% 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 9% 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, 2020–21
The horizontal bar chart shows that male and female CVD hospitalisation rates in 2020–21 were higher among Indigenous Australians, people living in the lowest socioeconomic areas, and people living in remote and very remote areas.

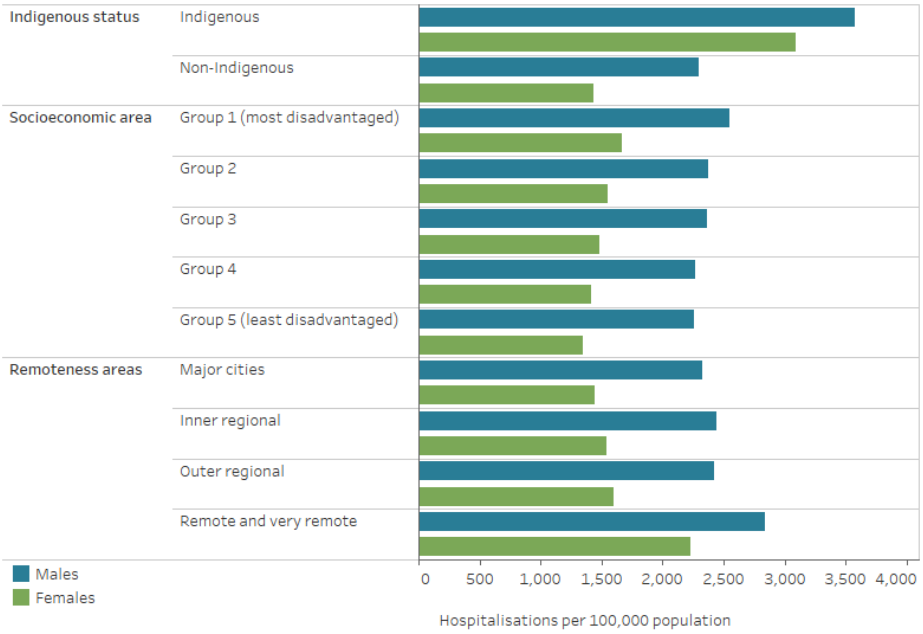

Figure 6: Cardiovascular disease hospitalisation rates, principal diagnosis, by population group and sex, 2020–21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Includes persons with missing information on age and/or sex. Excludes persons whose Indigenous status, remoteness area and/or socioeconomic area was missing.
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 2021, CVD was the underlying cause of 42,700 deaths (25% of all deaths), a rate of 166 per 100,000 population.

CVD was the second leading cause of death group in 2021 behind cancers (30% of all deaths), but ahead of diseases of the respiratory system (7.9%), external causes (6.8%), mental and behavioural disorders (6.6%) and diseases of the nervous system (6.5%).

Where CVD was listed as the underlying cause of death in 2021:

- 41% were due to coronary heart disease
- 20% were due to stroke
- 11% were due to heart failure and cardiomyopathy
- 5.7% were due to hypertensive disease
- 5.7% were due to atrial fibrillation
- 4.5% were due to peripheral arterial disease
- 0.8% were due to rheumatic heart disease (Figure 7).

Figure 7: Major causes of cardiovascular disease death, 2021
The bar chart shows the number of deaths from selected cardiovascular diseases as an underlying cause in 2021, ranging from 17,300 for coronary heart disease to 340 for rheumatic heart disease.

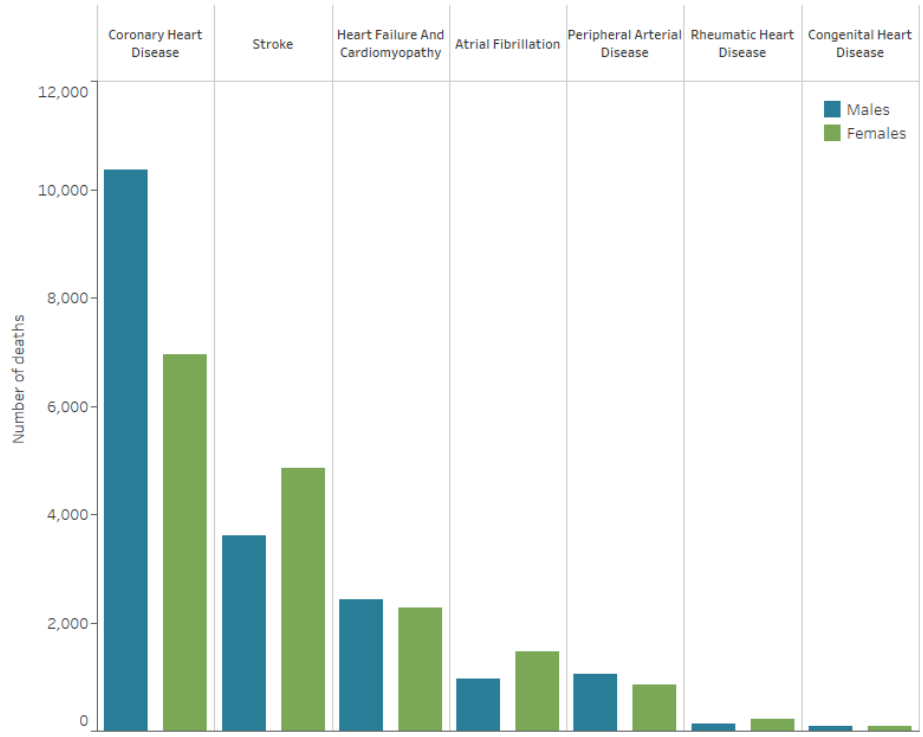

Figure 7: Major causes of cardiovascular disease death, by sex, 2021

Notes
1. Deaths are counted according to year of registration of death.
2. Deaths registered in 2021 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

Age and sex

In 2021, CVD death rates:

- were 1.4 times as high for males as for females, after adjusting for differences in the age structure of the 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 (4,300 and 4,100 per 100,000)—4.6 times as high for males and 6.7 times as high for females aged 75–84 (Figure 8).

Figure 8: Cardiovascular disease death rates, by age and sex, 2021

The bar chart shows cardiovascular disease death rates by age group in 2021. These were highest among men and women aged 85 and over (4,300 and 4,100 per 100,000 population).

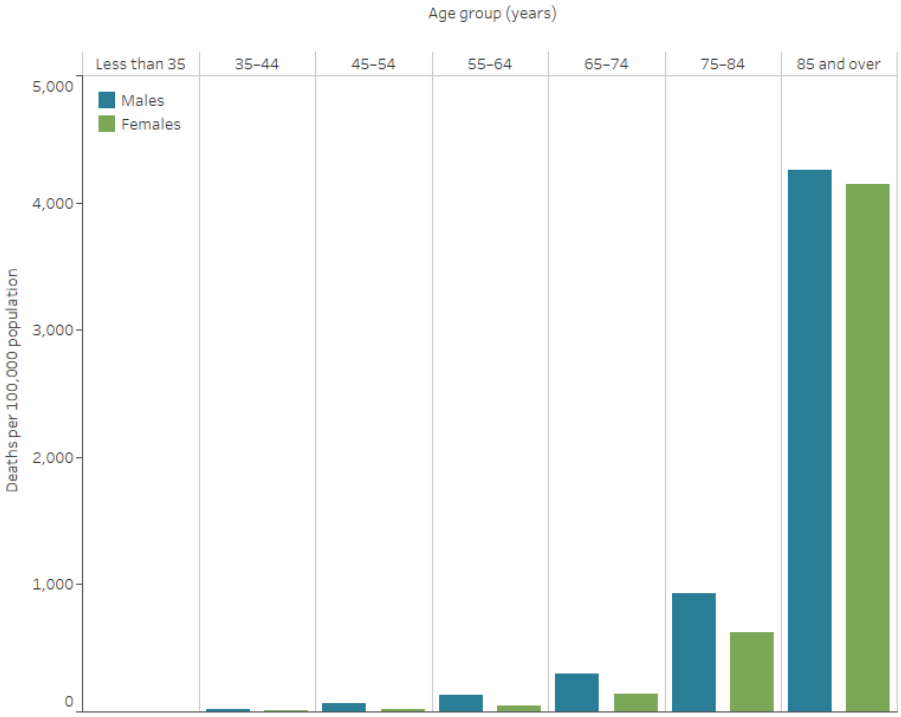

Figure 8: Cardiovascular disease death rates, by age and sex, 2021

Notes
1. Deaths are counted according to year of registration of death.
2. Deaths registered in 2021 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

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 2021:

- the number of CVD deaths declined by 23%, from 55,800 to 42,700
- age-standardised CVD death rates declined by around three-quarters–falling from 700 to 144 per 100,000 population for males and 452 to 102 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, 1980–2021

The line chart shows the decline in age-standardised cardiovascular disease death rates between 1980 and 2021, from 700 to 144 per 100,000 population for males and 452 to 102 for females.

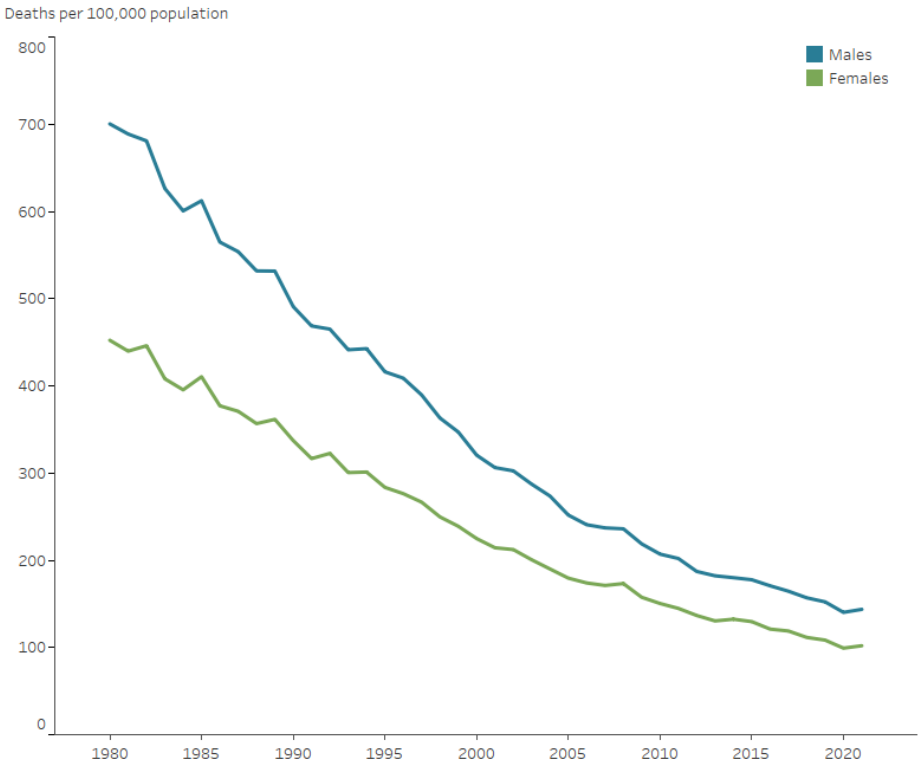

Figure 9: Cardiovascular disease death rates, by sex, 1980–2021

Notes

Chart: AIHW. *Source:* AIHW National Mortality Database.

http://www.aihw.gov.au

Variation among population groups

Aboriginal and Torres Strait Islander people

In 2019–2021, there were 2,300 CVD deaths among Aboriginal and Torres Strait Islander people in jurisdictions with adequate Indigenous identification, a rate of 101 per 100,000 population.

After adjusting for differences in the age structure of the populations, the rate of death from CVD for Indigenous Australians was twice as high as for non-Indigenous Australians.

Indigenous males and females had CVD death rates 2.0 times as high as non-Indigenous males and females (Figure 10).

Socioeconomic area

In 2019–2021, after adjusting for differences in the age structure of the populations, 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.

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

Remoteness area

In 2019–2021, after adjusting for differences in the age structure of the populations, the CVD death rate in *Remote and very remote* areas was 1.4 times as high as in *Major cities*.

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

Figure 10: Cardiovascular disease death rates, by population group and sex, 2019–2021

The horizontal bar chart shows that CVD death rates in 2019–2021 were higher among Indigenous Australians, people living in the lowest socioeconomic areas, and people living in remote and very remote areas.

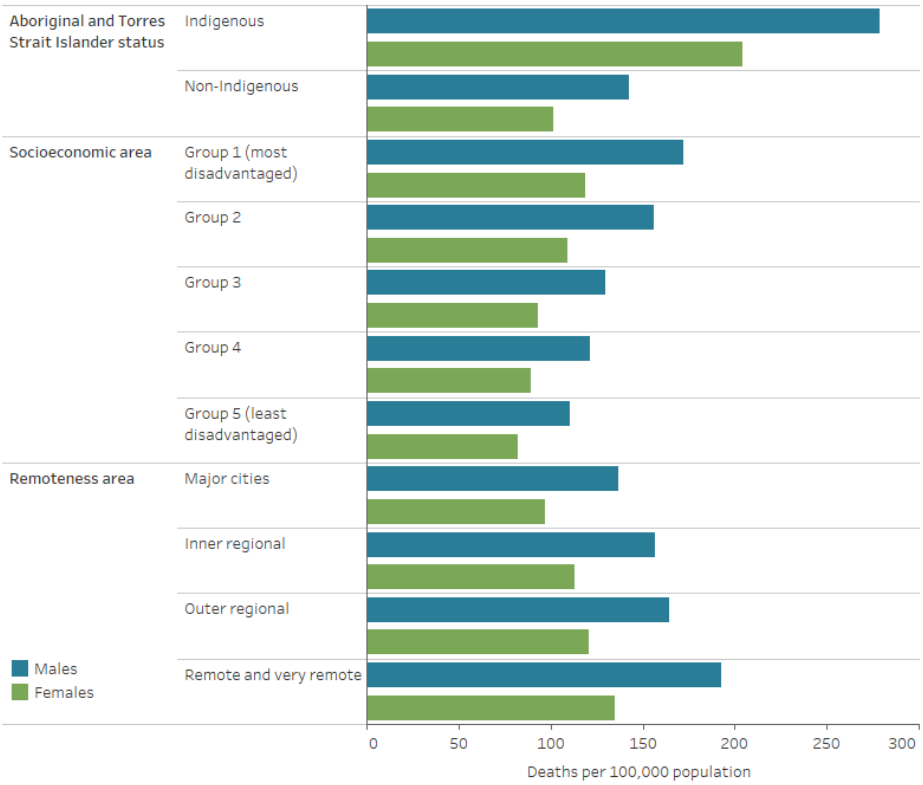

Figure 10: Cardiovascular disease death rates, by population group and sex, 2019–2021

Notes

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

References

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, 2017–18. AIHW analysis of Detailed Microdata. Viewed 4 March 2021.

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AIHW (2019) Cardiovascular disease in women. Cat. no. CDK 15. Canberra: AIHW.

Department of Health (2019) National Women's Health Strategy 2020–2030 - external site opens in new window. Canberra: Department of Health.

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World Heart Federation (2021) Women and CVD - external site opens in new window. Viewed 3 February 2021.

Australian Government
Australian Institute of Health and Welfare

Heart, stroke and vascular disease subtypes

View the Heart, stroke and vascular disease subtypes:

- Coronary heart disease
- Stroke
- Heart failure and cardiomyopathy
- Atrial fibrillation
- Peripheral arterial disease
- Acute rheumatic fever and rheumatic heart disease
- Congenital heart disease

Australian Government
Australian Institute of Health and Welfare

Coronary heart disease

Page highlights:

How many Australians have coronary heart disease?

- In 2017–18, an estimated 580,000 Australians aged 18 and over (3.1% of the adult population) had coronary heart disease at some time in their lives.
- The rate of coronary heart disease among Indigenous adults was more than twice that of non-Indigenous adults.

Acute coronary events

- In 2020, there were an estimated 56,700 acute coronary events among people aged 25 and over–equivalent to around 155 events every day.

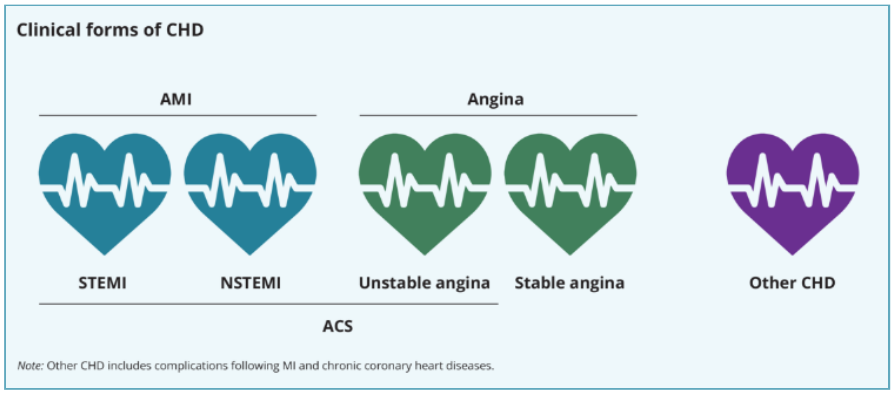
Hospitalisations

- In 2020–21, there were 160,000 hospitalisations where coronary heart disease was recorded as the principal diagnosis, equivalent to 1.4% of all hospitalisations, and 27% of all cardiovascular disease hospitalisations in Australia.

Deaths

- In 2021, coronary heart disease was the underlying cause of 17,300 deaths (10% of all deaths).

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%).

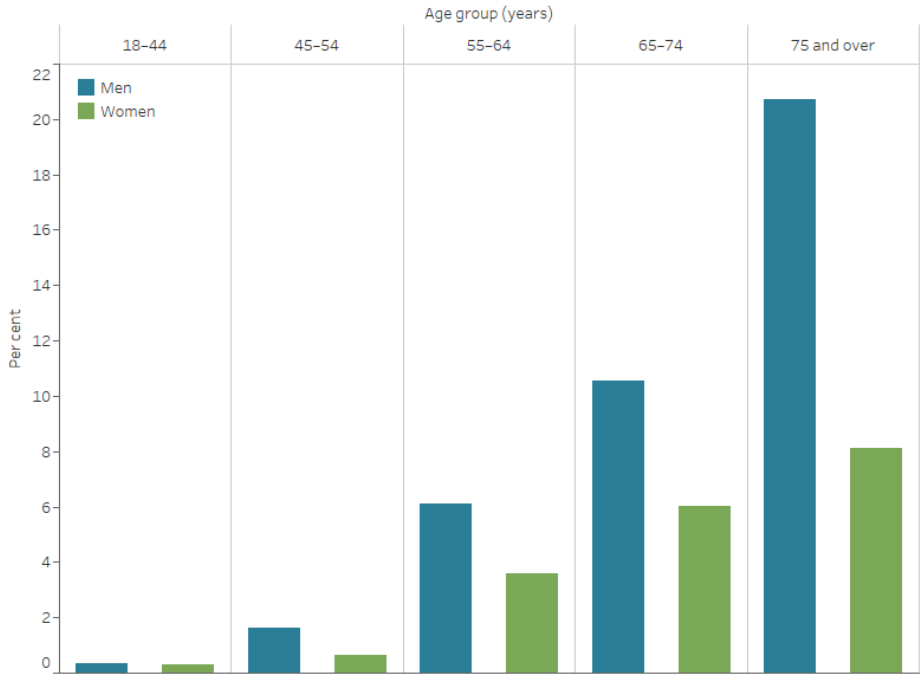


Figure 1: Prevalence of self-reported coronary heart disease among persons aged 18 and over, by age and sex, 2017-18

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 (5.6%) 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 differences in the age structure of the populations, the rate of CHD among Indigenous adults was 2.7 times that of non-Indigenous adults.

Indigenous men were 2.5 times as likely to report having CHD as non-Indigenous men, and Indigenous women 3.3 times as likely as non-Indigenous women (Figure 2).

Socioeconomic area

In 2017–18, after adjusting for differences in the age structure of the populations, adults living in the most socioeconomically disadvantaged areas were 1.6 times as likely to report having CHD compared with those in the least disadvantaged areas (Figure 2).

Rates were significantly higher for men than women, except for those living in the least disadvantaged areas.

Remoteness area

In 2017–18, the prevalence of CHD among adults, based on self-reported data, did not vary significantly by remoteness area (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.

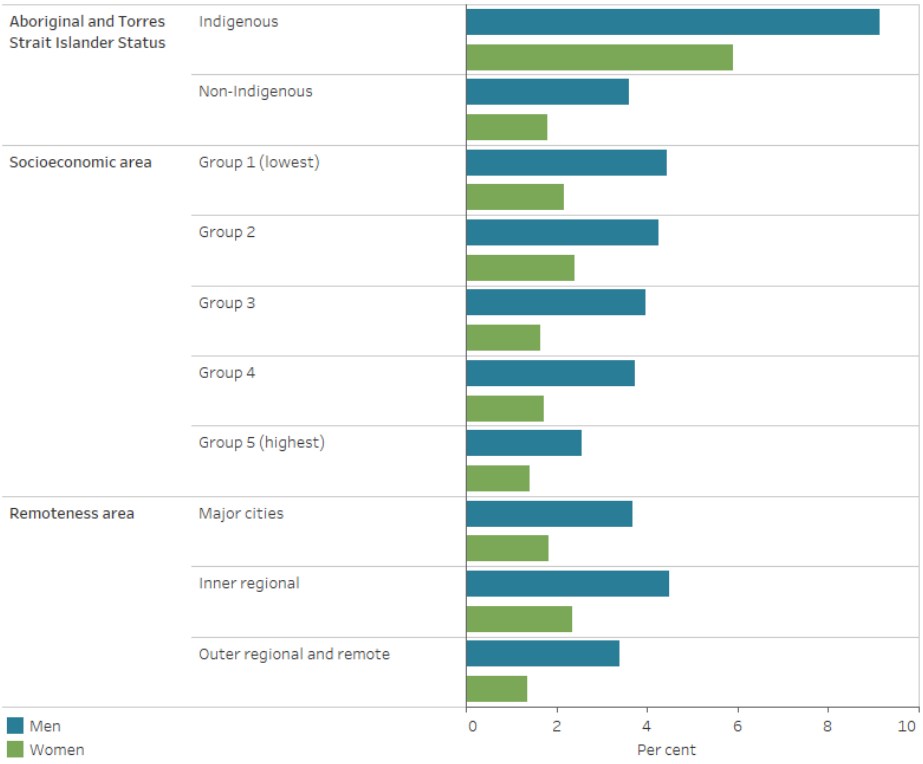


Figure 2: Prevalence of self-reported coronary heart disease, among persons aged 18 and over, by population group and sex, 2017-18

Notes

Chart: AIHW. *Sources*:AIHW analysis of ABS 2019a, ABS 2019b.
http://www.aihw.gov.au

Acute coronary events

There are no direct 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, 2022).

In 2020, there were an estimated 56,700 acute coronary events among people aged 25 and over – equivalent to around 155 events every day. Around 12% of these events (6,900 cases) were fatal.

Age and sex

In 2020, an estimated two-thirds (66%) of acute coronary events among persons aged 25 and over occurred in men.

Rates of acute coronary events:

- were 2.3 times as high in men than women, after adjusting for differences in the age structure of the populations

- increased with age, with the rate among the 85 and over age group almost 3 times the rate of the 65–74 age group and 4 times the rate for the 55–64 year old age group (Figure 3).

Figure 3: Acute coronary events among persons aged 25 and over, by age and sex, 2020

The bar chart shows rates of acute coronary events by age group in 2020. These were highest among men and women aged 85 and over (2,100 and 1,500 per 100,000 population).

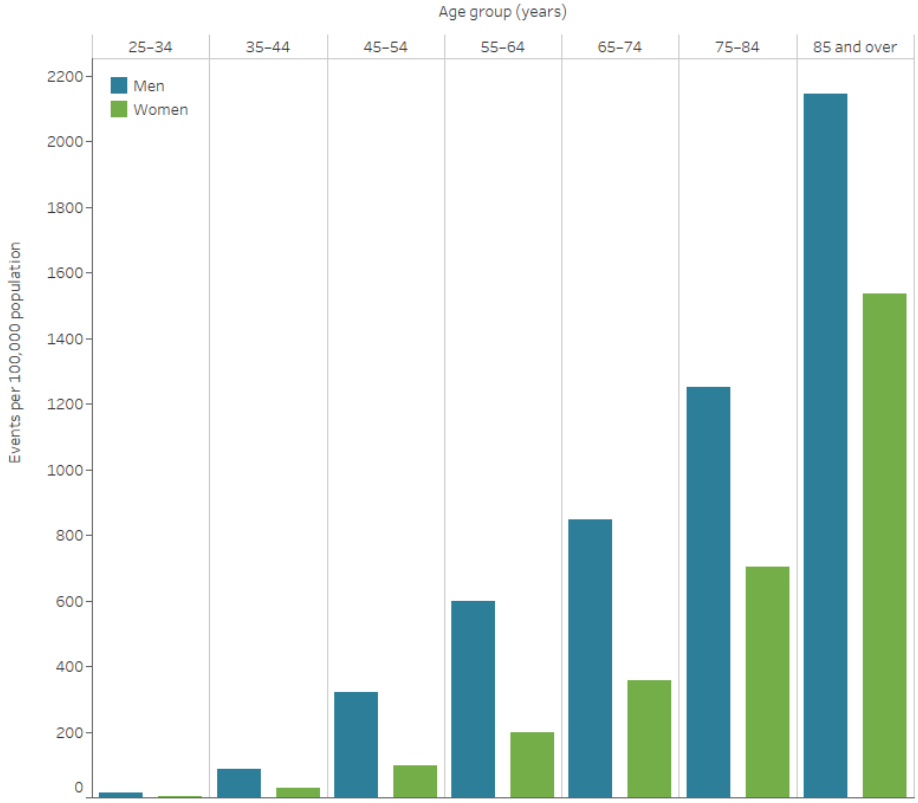


Figure 3: Acute coronary events among persons aged 25 and over, by age and sex, 2020

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 (59%) between 2001 and 2020 (675 to 277 per 100,000 population). The decline was slightly higher for women (63%) than men (57%) (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, 2001–2020

The line chart shows declines in age-standardised rates of acute coronary events between 2001 and 2020, from 912 to 391 per 100,000 population for men aged 25 and over, and from 462 to 172 for women.

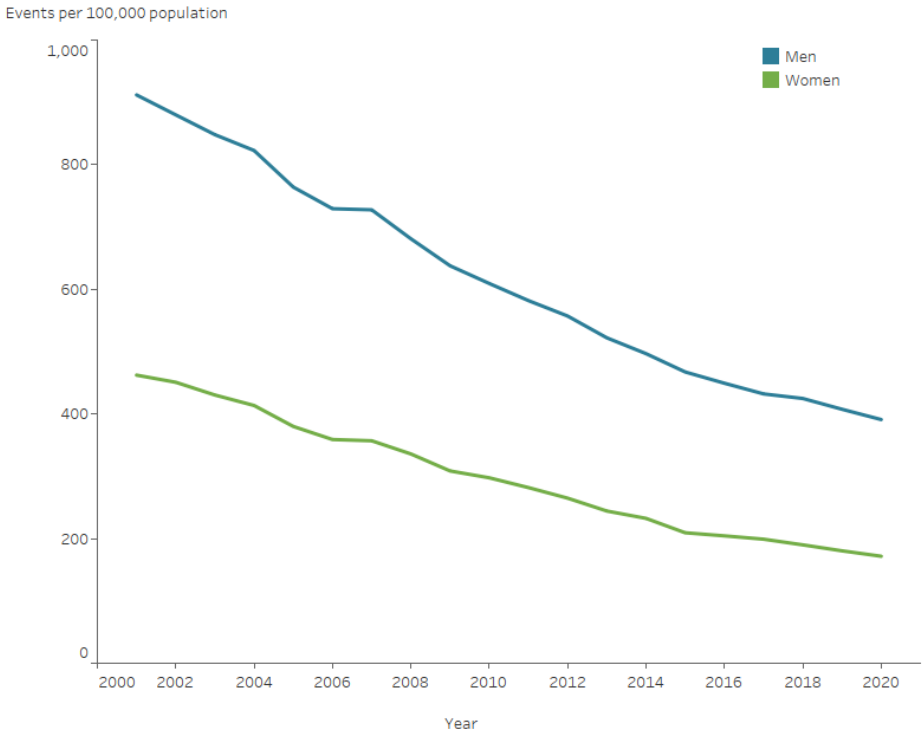


Figure 4: Acute coronary events among persons aged 25 and over, by sex, 2001-2020

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

Aboriginal and Torres Strait Islander people aged 25 and over experienced an estimated 2,200 acute coronary events in 2020.

Rates of acute coronary events among Indigenous people were higher than among non-Indigenous Australians – 2.9 times as high in 2020, after adjusting for differences in the age structure of the populations.

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

Hospitalisations

In 2020–21 there were 160,000 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 22% (35,300 hospitalisations) and acute myocardial infarction (AMI) for 36% (57,100 hospitalisations).

Age and sex

In 2020–21, CHD hospitalisation rates as the principal diagnosis:

- were overall 2.5 times as high for males as females after adjusting for differences in the age structure of the populations. 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 (4,100 per 100,000 population) and for females in the 85 and over age group (2,100 per 100,000 population).

Figure 5: Coronary heart disease hospitalisation rates, principal diagnosis, by age and sex, 2020–21

The bar chart shows coronary heart disease hospitalisation rates by age group in 2020–21. Rates were highest among males aged 75–84 (4,100 per 100,000 population) and females aged 85 and over (2,100 per 100,000 population).

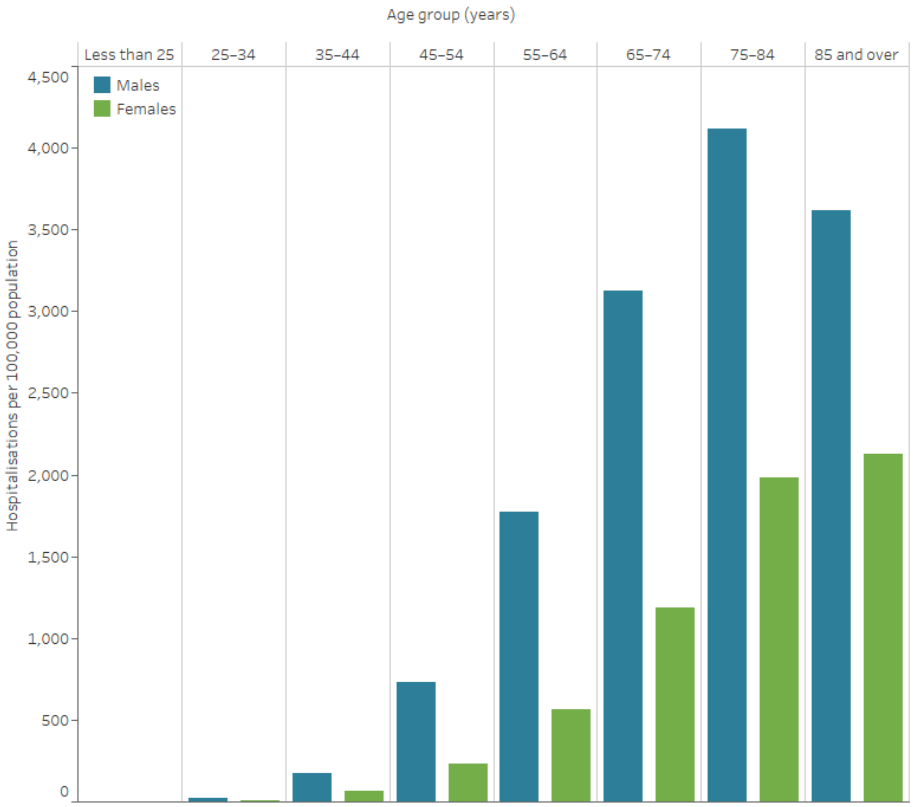


Figure 5: Coronary heart disease hospitalisation rates, principal diagnosis, by age and sex, 2020–21

Note: Includes persons with missing information on age and/or sex.

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

Trends

After adjusting for different population age structures over time, there was a 39% reduction in the rate of hospitalisations with a principal diagnosis of CHD between 2000–01 and 2020–21, from 833 to 508 per 100,000 population.

The annual number of CHD hospitalisations increased by 7.4% for males and fell by 10.9% for females, while the rate of CHD hospitalisation fell by 45% for females and 36% for males (Figure 6).

Figure 6: Coronary heart disease hospitalisation rates, principal diagnosis, by sex, 2000–01 to 2020–21

The line chart shows the decline in age-standardised rates of coronary heart disease hospitalisations between 2000–01 and 2020–21, from 1,165 to 740 per 100,000 population for males, and from 532 to 293 for females.

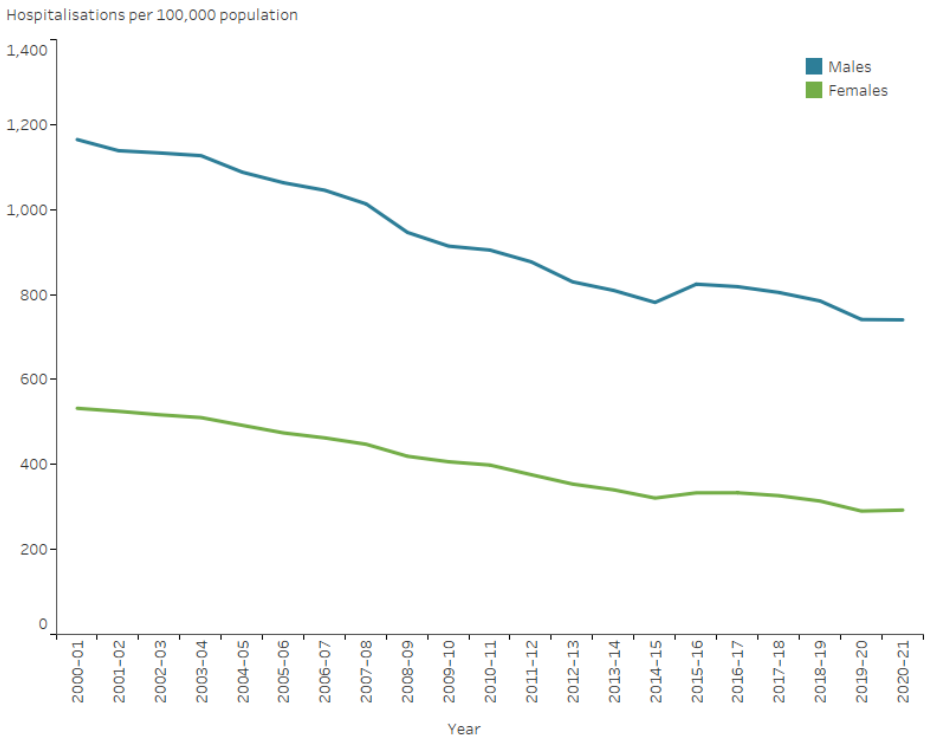


Figure 6: Coronary heart disease hospitalisation rates, principal diagnosis, by sex, 2000–01 to 2020–21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Includes persons with missing information on age and/or sex.

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

Variation among population groups

Aboriginal and Torres Strait Islander people

In 2020–21, there were around 5,400 hospitalisations with a principal diagnosis of CHD among Aboriginal and Torres Strait Islander people, a rate of 623 per 100,000 population.

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
- the disparity between Indigenous and non-Indigenous Australians was greater for females than males – 3.1 times as high for females and 1.8 times as high for males (Figure 7).

Socioeconomic area

In 2020–21, CHD hospitalisation rates were 1.2 times as high for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas.

The disparity was greater for females than males (1.4 and 1.1 times as high, respectively) (Figure 7).

Remoteness area

In 2020–21, after adjusting for differences in the age structure of the populations, CHD hospitalisation rates were around 1.5 times as high among those living in *Remote and very remote* areas compared with those in *Major cities*.

This largely reflects disparities in female rates, which were twice as high in *Remote and very remote* areas as in *Major cities* – while male rates were 1.3 times as high (Figure 7).

Figure 7: Coronary heart disease hospitalisation rates, principal diagnosis, by population group and sex, 2020–21
The horizontal bar chart shows that male and female coronary heart disease hospitalisation rates in 2020–21 were higher among Indigenous Australians, people living in the lowest socioeconomic areas, and people living in remote and very remote areas.

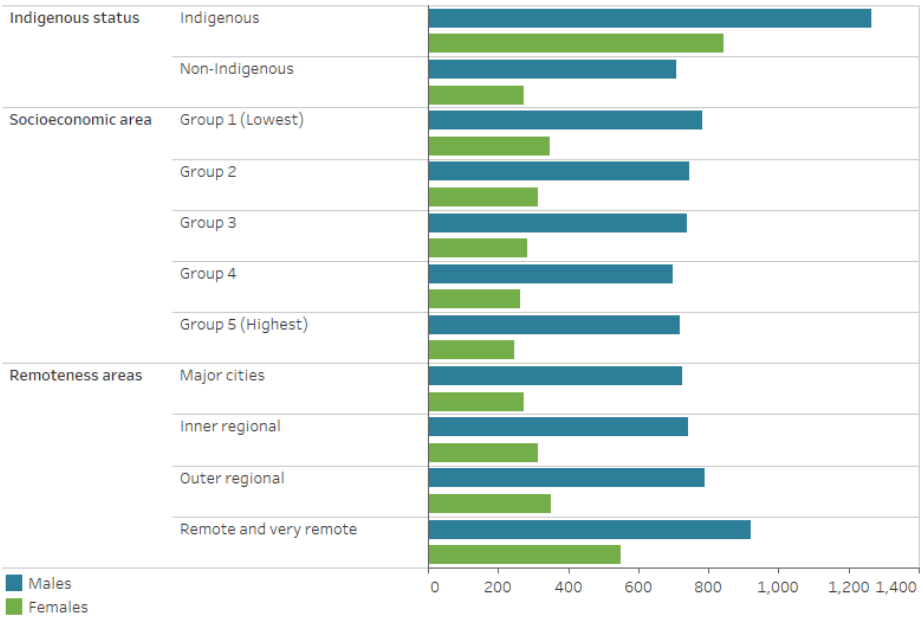


Figure 7: Coronary heart disease hospitalisation rates, principal diagnosis, by population group and sex, 2020–21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Includes persons with missing information on age and/or sex. Excludes persons whose Indigenous status, remoteness area and/or socioeconomic area was missing.
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 2021, coronary heart disease (CHD) was the underlying cause of 17,300 deaths, at a rate of 68 per 100,000 population. CHD was the leading single cause of death in Australia in 2021, equivalent to 10% of all deaths and 41% of all CVD deaths.

Almost 2 in 5 (38%) CHD deaths (6,500) resulted from acute myocardial infarction (AMI, or heart attack).

Age and sex

In 2021:

- after adjusting for differences in the age structure of the populations, CHD death rates were twice as high for males as for females
- 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 – 4 times as high for males and 7 times as high for females aged 75–84 (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, 2021

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).

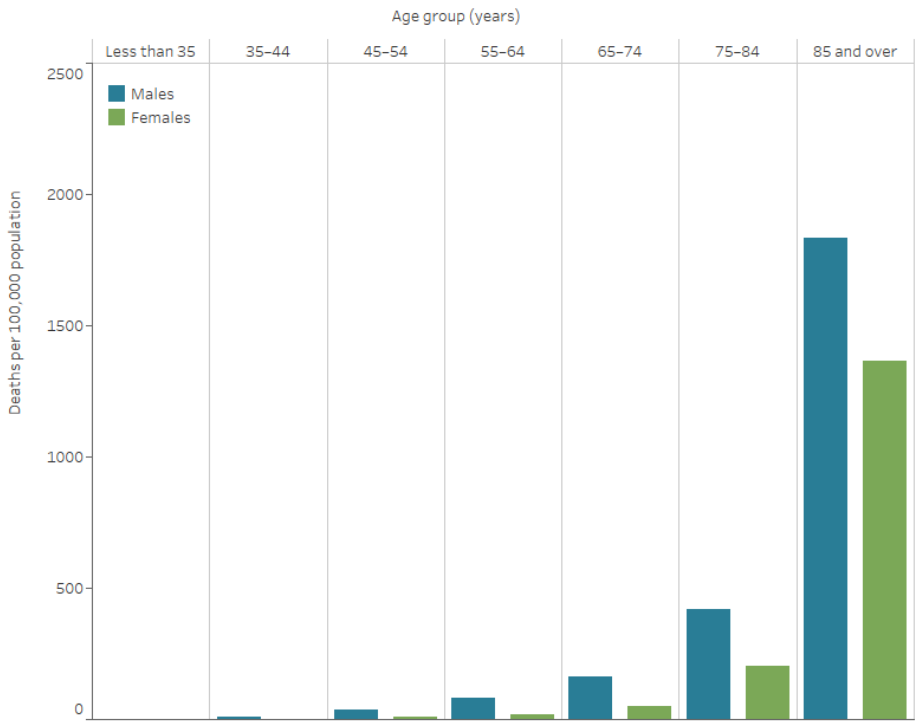


Figure 8: Coronary heart disease death rates, by age and sex, 2021

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. Deaths are counted according to year of registration of death.
3. Deaths registered in 2021 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

Trends

CHD death rates have been declining in Australia since the late 1960s. Between 1980 and 2021:

- the number of CHD deaths declined by 44%, from 31,000 to 17,300
- age-standardised CHD death rates declined substantially, by more than 80% – falling from 414 to 69 per 100,000 population for males, and 209 to 34 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).

Provisional mortality data

Australian Bureau of Statistics (ABS) provisional mortality statistics indicate that there were 13,700 doctor-certified deaths due to CHD during 2020, rising to 14,100 in 2021 and 14,900 in 2022 (ABS 2023).

CHD mortality continued its historical decline in 2020, the first year of the pandemic, but has since increased – the number of deaths in 2022 being 9.1% higher than the number in 2020.

Note that these data are preliminary, with some deaths that occurred in 2022 not yet registered. In addition, causes of death were not presented for coroner-referred deaths due to the time required to complete coronial investigations (ABS 2023).

Figure 9: Coronary heart disease death rates, by sex, 1980–2021
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.

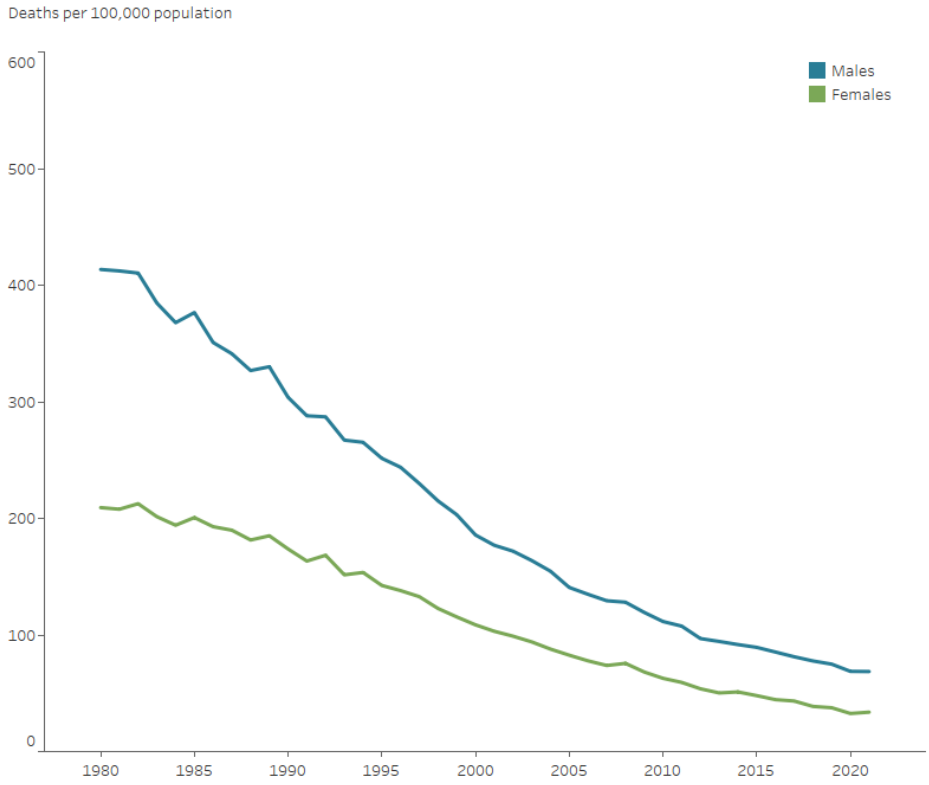


Figure 9: Coronary heart disease death rates, by sex, 1980–2021

Notes

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 2019–2021:

- CHD was the underlying cause of death for 1,197 Indigenous people in jurisdictions with adequate Indigenous identification, a rate of 53 per 100,000 population.
- After adjusting for differences in the age structure of the populations, the CHD death rate for Indigenous Australians was 2.4 times as high as for non-Indigenous Australians .
- CHD death rates for Indigenous males and females were 2.3 and 2.5 times as high as for non-Indigenous males and females (Figure 10).

Socioeconomic area

- In 2019–2021, after adjusting for differences in the age structure of the populations , the CHD death rate was 1.7 times as high for people living in the lowest socioeconomic areas compared with those living in the highest socioeconomic areas.
- The difference was similar among males and females (1.7 and 1.6 times as high) (Figure 10).

Remoteness area

- In 2019–2021, after adjusting for differences in the age structure of the populations , the CHD death rate was 1.6 times as high in *Remote and very remote* areas compared with *Major cities*.
- The male CHD death rate in *Remote and very remote* areas was 1.6 times as high as in *Major cities*, and the female rate 1.5 times as high (Figure 10).

Figure 10: Coronary heart disease rates, by population group and sex, 2019–2021

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.

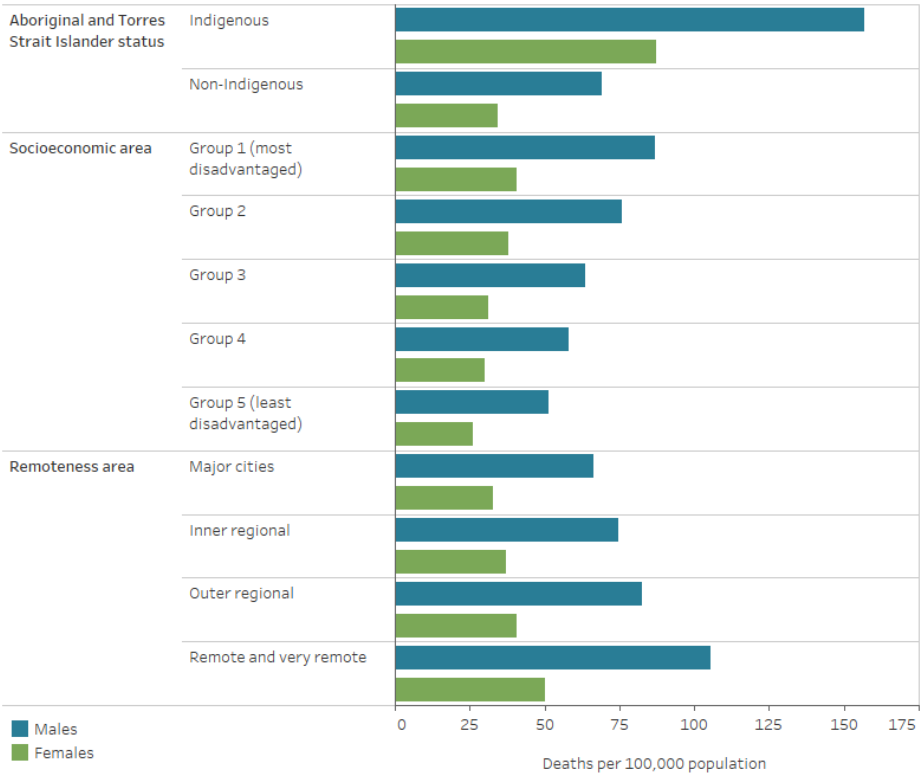


Figure 10: Coronary heart disease death rates, by population group and sex, 2019–2021

Notes

Chart: AIHW. *Source:* AIHW National Mortality Database.

http://www.aihw.gov.au

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Stroke

Page highlights:

How many Australians have had a stroke?

In 2018, an estimated 387,000 Australians aged 15 and over (1.6% of the population) had experienced a stroke at some time in their lives.

Stroke events

In 2020, there were an estimated 39,500 stroke events in Australia – more than 100 every day.

Hospitalisations

There were around 67,900 hospitalisations where stroke was recorded as the principal diagnosis in 2021–20.

Deaths

In 2021, stroke was the underlying cause of 8,500 deaths (4.9% of all deaths and 20% of cardiovascular disease 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 (1.6% 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

The prevalence of stroke was:

- higher in males (1.6%) than females (1.1%), after adjusting for differences in the age structure of the populations
- 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 (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%).

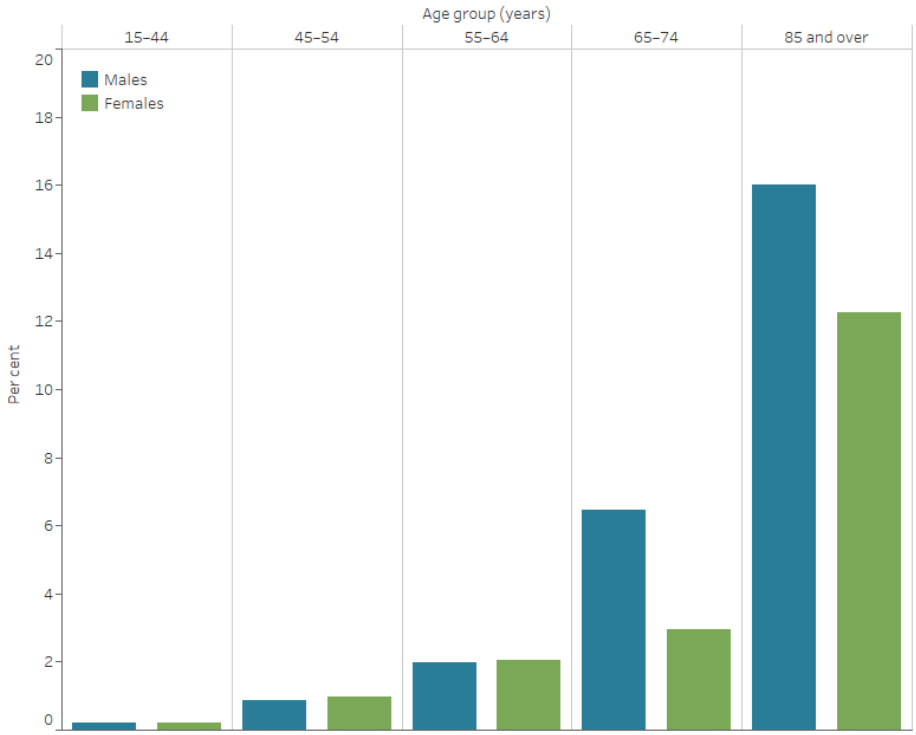

Figure 1: Prevalence of self-reported stroke among persons aged 15 and over, by age and sex, 2018

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 area

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.

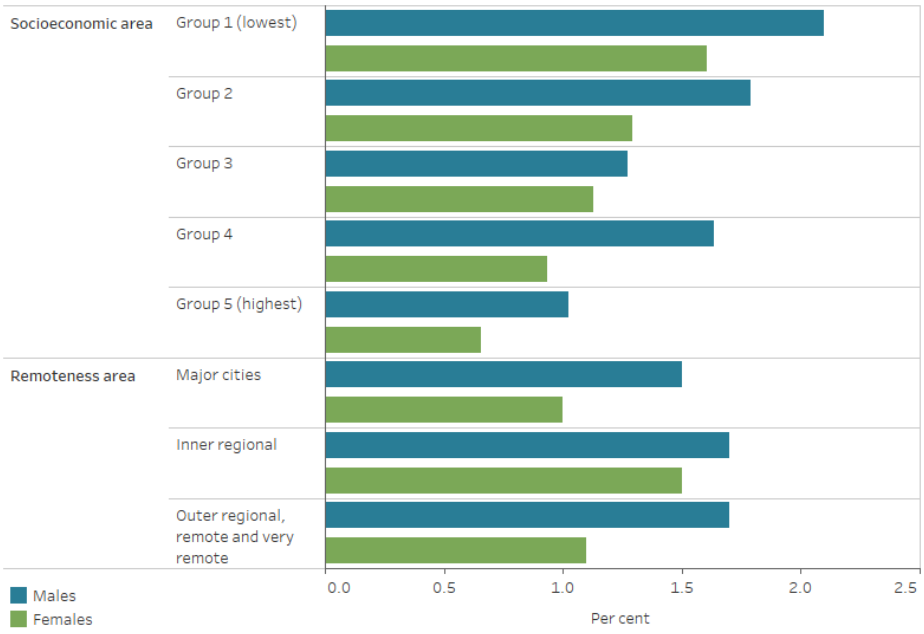

Figure 2: Prevalence of self-reported stroke among persons aged 15 and over, by population group and sex, 2018

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 direct 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 (AIHW 2022).

The number of stroke events includes new and recurrent strokes.

In 2020, there were an estimated 39,500 stroke events in Australia – more than 100 every day. The rate of stroke events was 154 per 100,000 population.

Age and sex

In 2020, there were an estimated 21,000 stroke events among males and 18,500 among females.

Rates of stroke events:

- were 1.4 times as high in males than females, after adjusting for differences in the age structure of the populations.
- increased with age, with the rate of the 85 and over age group more than twice the rate of the 75–84 year age group, and almost 6 times the rate of the 65–74 year age group (Figure 3).

Figure 3: Stroke events, by age and sex, 2020

The bar chart shows the prevalence of stroke events by age group in 2020. Rates were highest among men and women aged 85 and over (2,047 and 2,077 per 100,000 population).

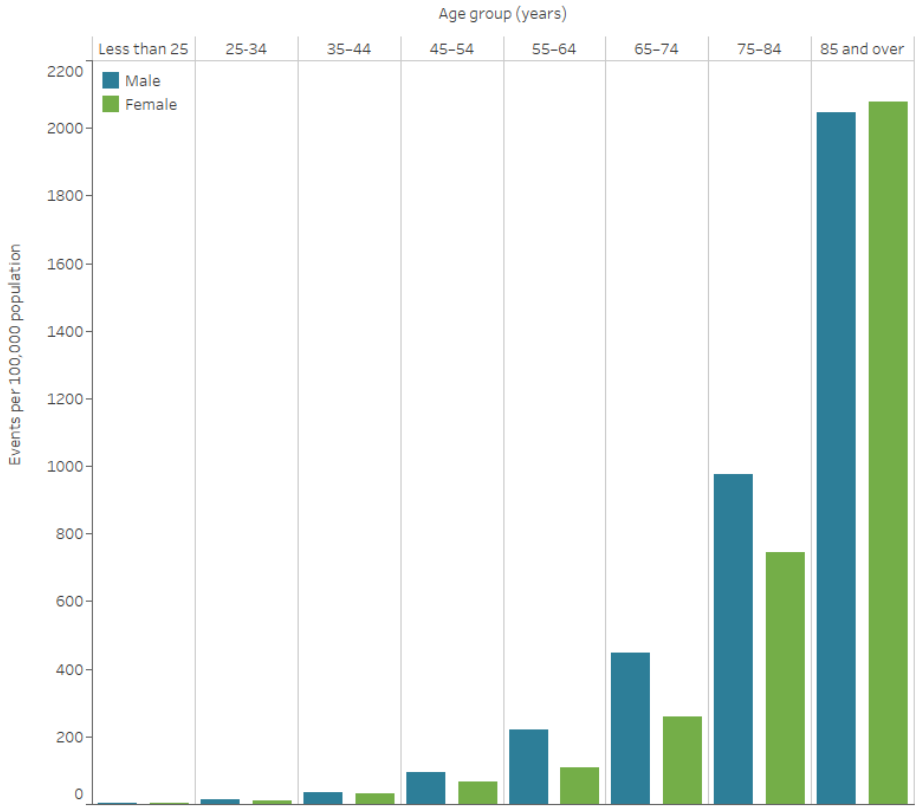

Figure 3: Stroke events, by age and sex, 2020

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

Trends

The age-standardised rate of stroke events fell by one quarter (27%) between 2001 and 2020, from 169 to 124 events per 100,000 population.

The decline in rates was slightly greater for females (29%) than males (26%) (Figure 4).

Figure 4: Stroke events, by sex, 2001–2020

The line chart shows the decline in age-standardised rates of stroke events between 2001 and 2020, from 194 to 144 per 100,000 population for males and 148 to 105 for females.

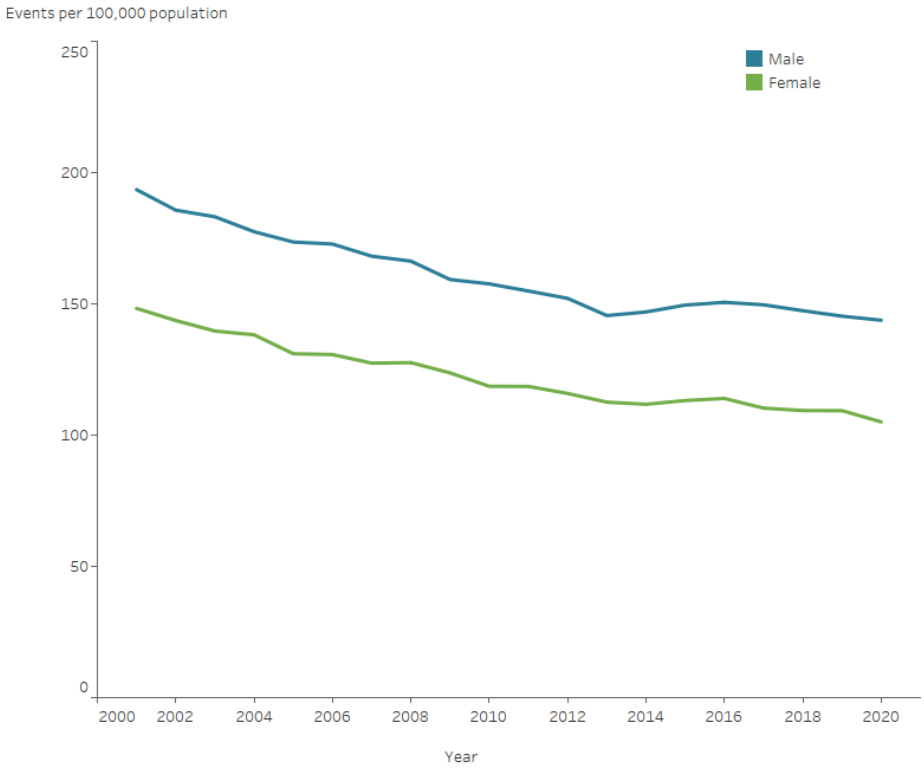

Figure 4: Stroke events, by sex, 2001-2020

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 2020–21 there were 19,700 presentations to public hospital emergency departments with a principal diagnosis of TIA – two-thirds (13,000 or 66%) were subsequently admitted to hospital.
- There were 17,000 admissions to hospital with a principal diagnosis of TIA – a rate of 66 per 100,000 population. Male rates were higher than female rates (age-standardised rates of 58 and 49 per 100,000 population).
- Around 4.9% (837) of TIA admissions had an additional diagnosis of atrial fibrillation.
- One quarter (4,500 or 27%) of TIA admissions were on a same-day basis. The average length of stay in hospital for all TIA admissions was 2.8 days.

Hospitalisations

There were around 67,900 hospitalisations where stroke was recorded as the principal diagnosis in 2020–21 – a rate of 265 per 100,000 population.

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

Of these, 41,300 (61%) required acute care, and 26,600 (39%) were for rehabilitation and other types of care.

Age and sex

In 2020–21, where stroke was recorded as the principal diagnosis, hospitalisation rates:

- were 1.4 times as high for males than females, after adjusting for differences in the age structure of the populations

- increased with age, with rates for males and females highest in those aged 85 and over – around 1.6 times as high as males aged 75–84 and 2.0 times as high as females aged 75–84 (Figure 5)
- half (50%) of all stroke hospitalisations occurred among persons aged 75 and over.

Figure 5: Stroke hospitalisation rates, principal diagnosis, by age and sex, 2020–21

The bar chart shows stroke hospitalisation rates by age groups in 2020–21. Rates were highest among men and women aged 85 and over (2,900 and 2,500 per 100,000 population).

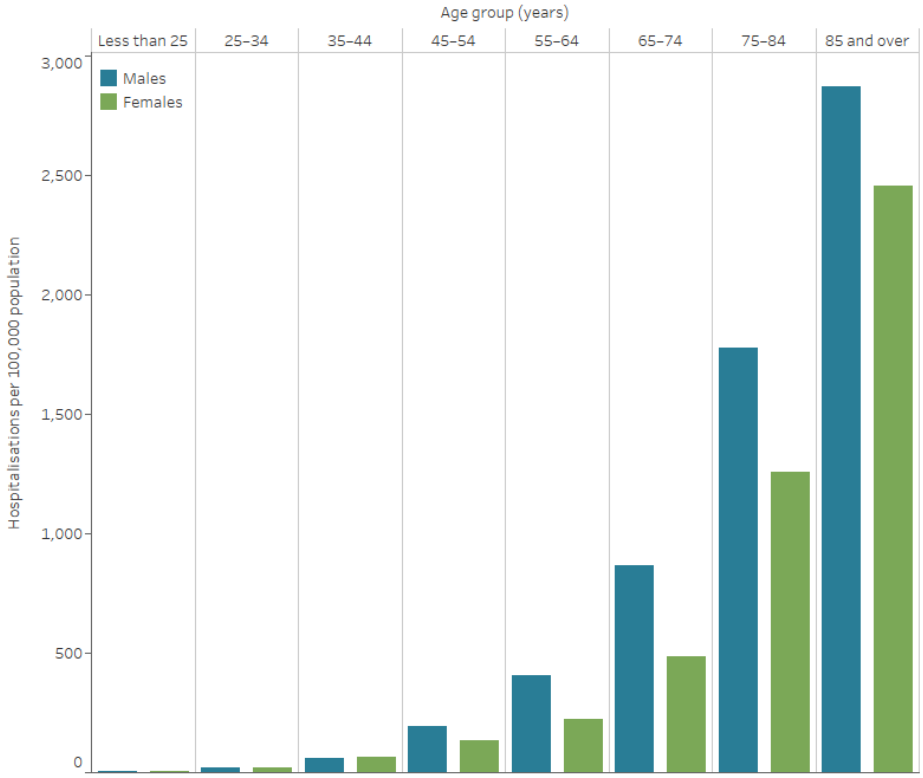

Figure 5: Stroke hospitalisation rates, principal diagnosis, by age and sex, 2020-21

Note: Includes persons with missing information on age and/or sex.

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

Trends

- Between 2000–01 and 2020–21, the number of acute care stroke hospitalisations increased by 41% for males, and 16% for females.
- The age-standardised rate of hospitalisation for acute care stroke fell by 23%, from 170 to 130 per 100,000 population. Rates fell by 22% for males and 26% for females (Figure 6).

Figure 6: Acute care stroke hospitalisation rates, principal diagnosis, by sex, 2000–01 to 2020–21

The line chart shows the decline in age-standardised rates of acute care stroke hospitalisations between 2000–01 and 2020–21, from 197 to 155 per 100,000 population for males, and from 145 to 108 for females.

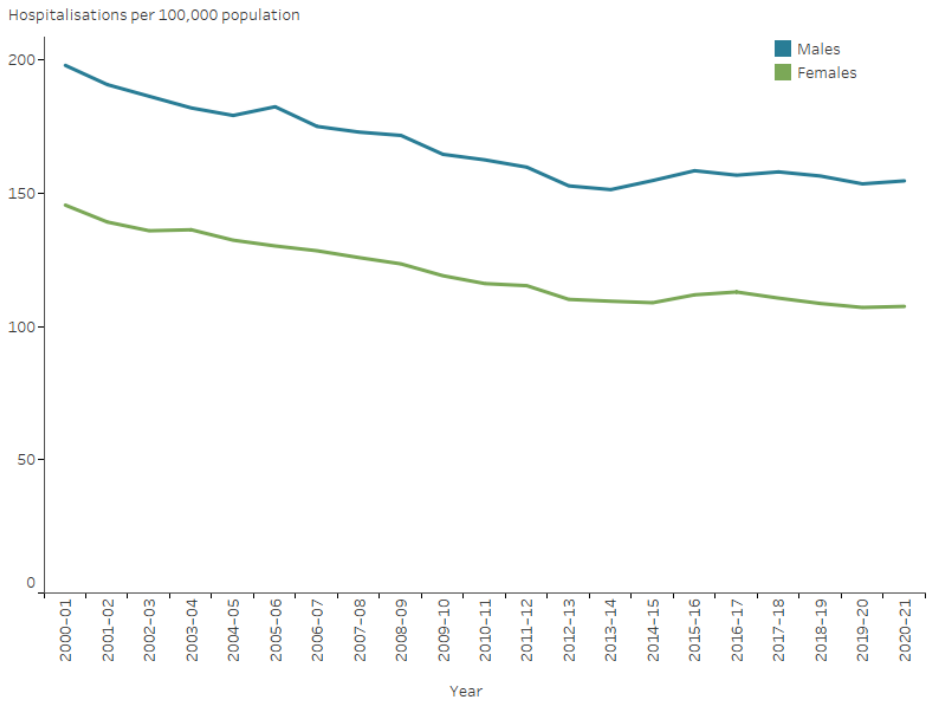

Figure 6: Acute care stroke hospitalisation rates, principal diagnosis, by sex, 2000-01 to 2020-21

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.
3. Includes persons with missing information on age and/or sex.

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

Variation among population groups

Aboriginal and Torres Strait Islander people

In 2020–21, there were around 1,600 hospitalisations with a principal diagnosis of stroke among Aboriginal and Torres Strait Islander people – a rate of 186 per 100,000 population.

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
- the disparity between Indigenous and non-Indigenous Australians was greater for females than males – 2.2 times as high for females and 1.4 times as high for males (Figure 7).

Socioeconomic area

In 2020–21, age-standardised stroke hospitalisation rates for people living in the lowest and highest socioeconomic areas were similar (Figure 7).

Remoteness area

In 2020–21, age-standardised stroke hospitalisation rates for people living in *Remote and very remote* areas were 1.2 times as high as for people living in *Major cities* (Figure 7).

Figure 7: Stroke hospitalisation rates, principal diagnosis, by population group and sex, 2020–21

The horizontal bar chart shows that stroke hospitalisation rates in 2020–21 were higher among Indigenous Australians, people living in the lowest socioeconomic areas, and people living in remote and very remote areas.

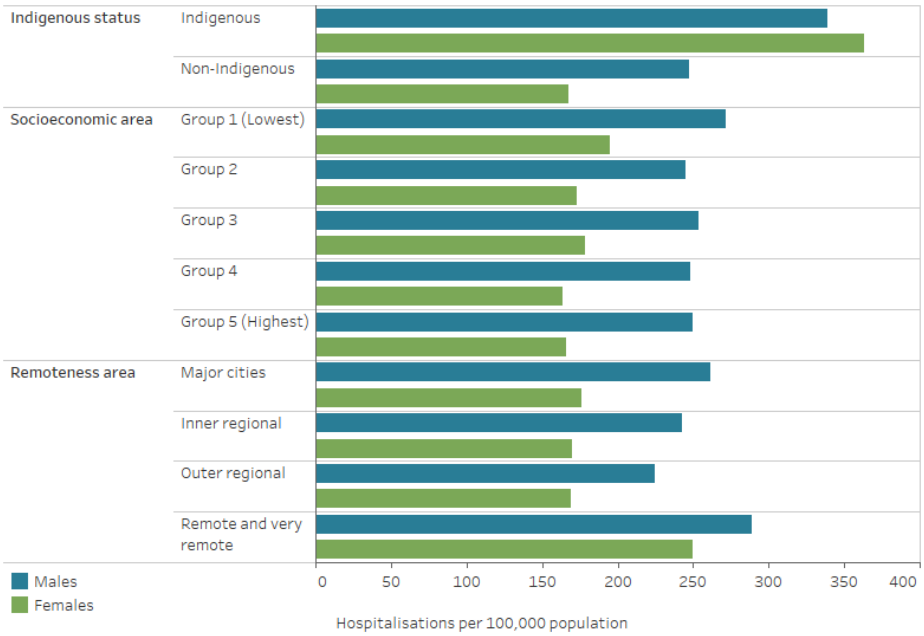

Figure 7: Stroke hospitalisation rates, principal diagnosis, by population group and sex, 2020-21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Includes persons with missing information on age and/or sex. Excludes persons whose Indigenous status, remoteness area and/or socioeconomic area was missing.
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 2021, stroke was the underlying cause of 8,500 deaths (4.9% of all deaths and 20% of CVD deaths) – a rate of 33 per 100,000 population.

Cerebrovascular disease (of which stroke is the most common form) was one of the 5 leading causes of death in Australia for both males and females.

Age and sex

In 2021, stroke death rates:

- were similar for males and females after adjusting for differences in the age structure of the populations
- were higher for males than females in most age groups – in age 85 and over rates were higher among females than males (913 and 736 per 100,000 population)
- increased with age, with over half (53%) 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 (Figure 8).

Figure 8: Stroke death rates, by age and sex, 2021

The bar chart shows stroke death rates by age groups in 2021. Rates were highest among men and women aged 85 and over (736 and 913 per 100,000 population).

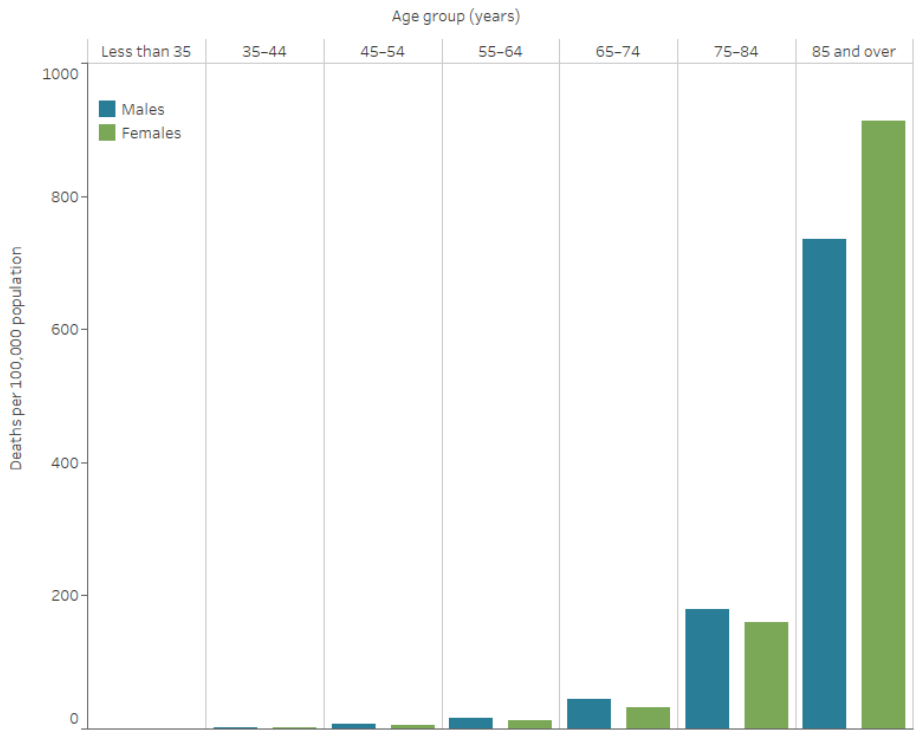

Figure 8: Stroke death rates, by age and sex, 2021

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. Deaths are counted according to year of registration of death.
3. Deaths registered in 2021 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

Trends

The number and rate of stroke deaths declined substantially between 1980 and 2021:

- the number of stroke deaths declined by 16%, from around 10,000 to 8,500
- the age-standardised stroke death rate declined by three-quarters (77%), falling from 104 to 24 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, 1980–2021

The line chart shows the decline in age-standardised coronary heart disease death rates between 1980 and 2021, from 108 to 24 per 100,000 population for males and from 99 to 24 for females.

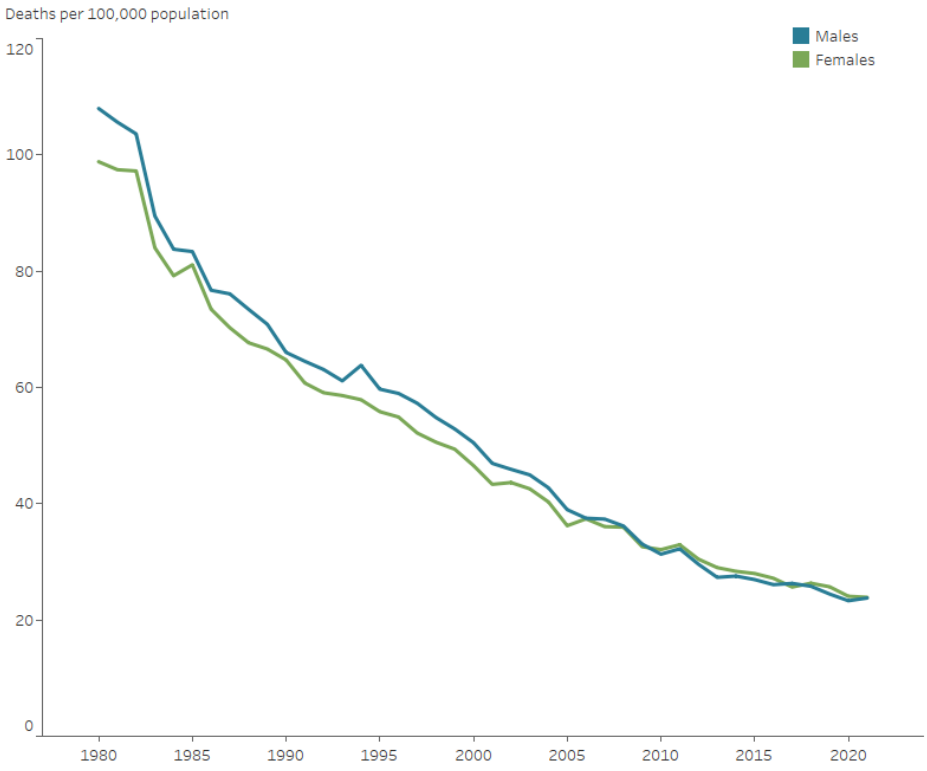

Figure 9: Stroke death rates, by sex, 1980–2021

Notes

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

Provisional mortality data

Australian Bureau of Statistics (ABS) provisional mortality statistics indicate that there were 9,100 doctor-certified deaths due to cerebrovascular diseases (including stroke) during 2020, rising to 9,300 in 2021 and 9,300 in 2022 (ABS 2023).

The increase in cerebrovascular disease deaths reverses a historical decline, with the number of deaths in 2022 being 2.2% higher than in 2020.

Note that these data are preliminary, with some deaths that occurred in 2022 not yet registered. In addition, causes of death were not presented for coroner-referred deaths due to the time required to complete coronial investigations (ABS 2023).

Variation among population groups

Aboriginal and Torres Strait Islander people

In 2019–2021:

- there were 353 deaths with an underlying cause of stroke among Aboriginal and Torres Strait Islander people in jurisdictions with adequate identification of Indigenous status, a rate of 15 per 100,000 population.
- after adjusting for differences in the age structure of the populations, the stroke death rate for Indigenous people was 1.6 times as high as that for non-Indigenous people .
- Indigenous males and females had stroke death rates 1.5 and 1.7 times as high as non-Indigenous males and females (Figure 10).

Socioeconomic area

In 2019–2021, 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, after adjusting for differences in the age structure of the populations.

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

Remoteness area

In 2019–2021, the stroke death rate in *Remote and very remote* areas was 1.1 times as high as in *Major cities,* after adjusting for differences in the age structure of the populations.

The female rate in *Remote and very remote* areas was 1.2 times as high as in *Major cities*, and the male rate 1.1 times as high (Figure 10).

Figure 10: Stroke death rates, by population group and sex, 2019–2021

The horizontal bar chart shows that stroke death rates in 2019–2021 were higher among Indigenous Australians and people living in the lowest socioeconomic areas, but did not differ significantly by remoteness area.

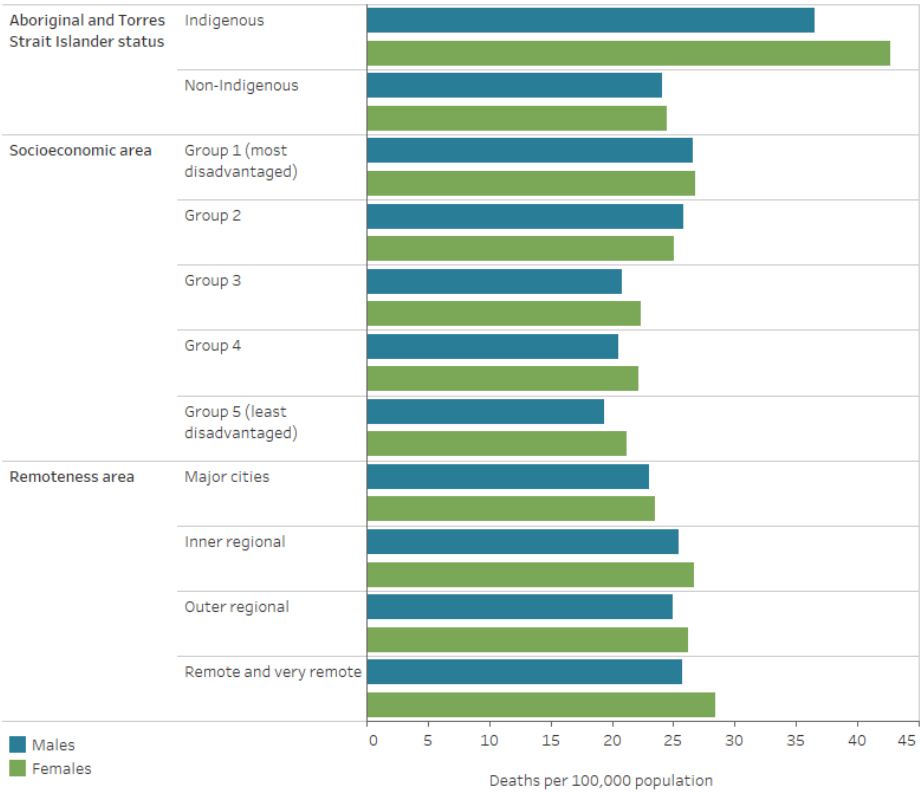

Figure 10: Stroke death rates, by population group and sex, 2019–2021

Notes

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

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Heart failure and cardiomyopathy

Page highlights:

How many Australians have heart failure?

- In 2017–18, an estimated 102,000 people aged 18 and over (0.5%) had heart failure.

Hospitalisations

- There were around 179,000 hospitalisations where heart failure or cardiomyopathy was recorded as the principal and/or additional diagnosis in 2020–21.
- The rate of heart failure or cardiomyopathy hospitalisations among Indigenous Australians was 2.9 times as high as the non-Indigenous rate.

Deaths

- Heart failure or cardiomyopathy was the underlying cause of 4,700 deaths in 2021 and was an associated cause in a further 21,300 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 179,000 hospitalisations where heart failure or cardiomyopathy was recorded as the principal and/or additional diagnosis in 2020–21 – a rate of 697 per 100,000 population. This represents 1.5% of all hospitalisations in Australia in 2020–21.

Heart failure or cardiomyopathy was recorded as the principal diagnosis in 41% (73,300) of these hospitalisations.

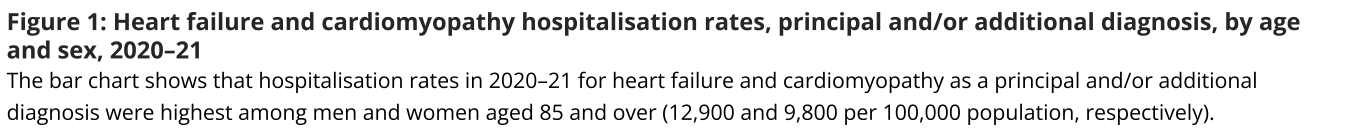
In those cases where heart failure or cardiomyopathy was listed as an additional diagnosis, more than half (51%) had either a cardiovascular or respiratory disease listed as the principal diagnosis. The most common principal diagnoses in these cases were CHD (9.6% of hospitalisations), chronic lower respiratory diseases including bronchitis and chronic pulmonary obstructive disease (7.1%), influenza or pneumonia (6.6%) and atrial fibrillation or flutter (6.1%).

Age and sex

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

- were overall 1.5 times as high for males as females after adjusting for differences in the age structure of the populations. 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 – at least 2.5 times as high as those aged 75–84 (Figure 1).

Figure 1: Heart failure and cardiomyopathy hospitalisation rates, principal and/or additional diagnosis, by age and sex, 2020–21



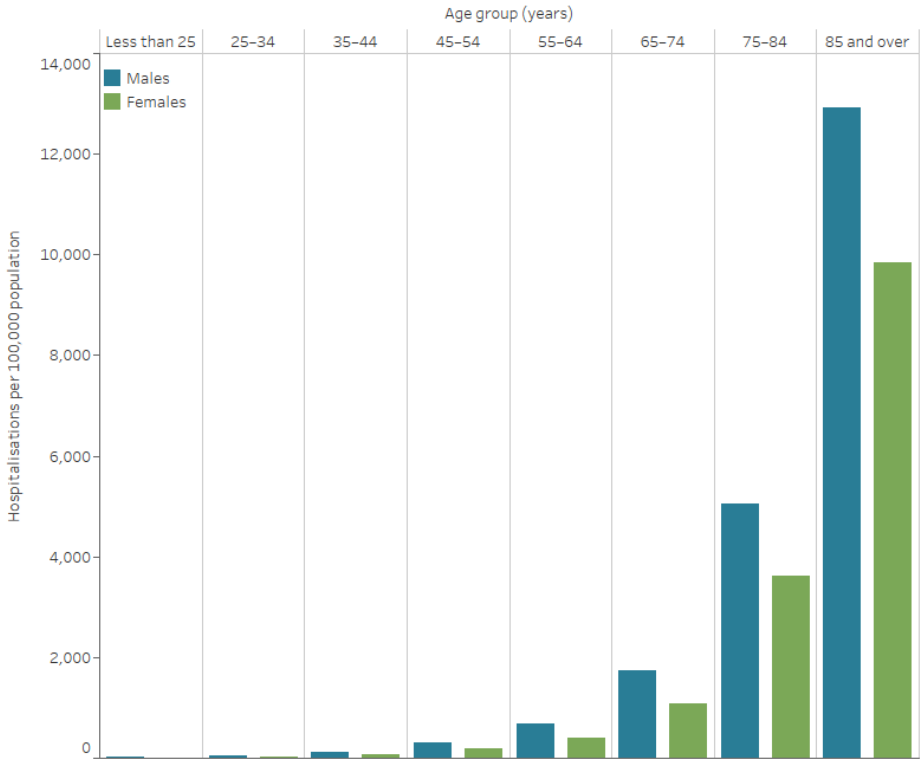


Figure 1: Heart failure and cardiomyopathy hospitalisation rates, principal and/or additional diagnosis, by age and sex, 2020-21

Note: Includes persons with missing information on age and/or sex.

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

Trends

Between 2000–01 and 2020–21, there was a 29% reduction in the age-standardised rate of hospitalisations with a principal and/or additional diagnosis of heart failure or cardiomyopathy (767 to 541 per 100,000 population).

The number of heart failure and cardiomyopathy hospitalisations increased by 33% for males and 13% for females, while age-standardised rates fell by around 30% for both males and females (Figure 2).

Figure 2: Heart failure and cardiomyopathy hospitalisation rates, principal and/or additional diagnosis, by sex, 2000–01 to 2020–21

The line chart shows the decline in age-standardised heart failure and cardiomyopathy hospitalisation rates between 2000–01 and 2020–21 from 922 to 651 per 100,000 population for males and 646 to 447 per 100,000 population for females.

Variation among population groups

Aboriginal and Torres Strait Islander people

In 2020–21, there were around 6,800 hospitalisations with a principal and/or additional diagnosis of heart failure or cardiomyopathy among Aboriginal and Torres Strait Islander people, a rate of 785 per 100,000 population.

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

- the rate among Indigenous Australians was 2.9 times as high as the non-Indigenous rate
- the disparity between Indigenous and non-Indigenous Australians was greater for females than males – 3.4 times as high for females and 2.4 times as high for males (Figure 3).

Socioeconomic area

In 2020–21, age-standardised heart failure and cardiomyopathy hospitalisation rates were 1.7 times as high for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas.

The gap in hospitalisation rates between the lowest and highest socioeconomic areas was 1.7 times as high for males, and 1.8 times as high for females (Figure 3).

Remoteness area

In 2020–21, the age-standardised heart failure and cardiomyopathy hospitalisation rate for people living in *Remote and very remote* areas was 1.8 times as high as for*Major cities*.

There were greater disparities in female rates (1.8 times as high) than male rates (1.6 times as high) (Figure 3).

Figure 3: Heart failure and cardiomyopathy hospitalisation rates, principal and/or additional diagnosis, by population group and sex, 2020–21
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.

Deaths

Heart failure and cardiomyopathy contributed to 26,000 deaths (15% of all deaths) in 2021, at a rate of 101 per 100,000 population.

Heart failure or cardiomyopathy was the underlying cause of 4,700 deaths in 2021, and was an associated cause in a further 21,300 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 (15%)
- other chronic obstructive pulmonary disease (7.5%)
- acute myocardial infarction (5.8%)
- atrial fibrillation and flutter (5.1%)
- non-rheumatic aortic valve disorders (3.3%).

Age and sex

In 2021, death rates for heart failure and cardiomyopathy as the underlying or associated cause:

- were 1.4 times as high for males as for females , after adjusting for differences in the age structure of the populations. 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 – 5.3 times as high for males and 6.8 times as high for females aged 75–84 (Figure 4).

Figure 4: Heart failure and cardiomyopathy death rates, underlying or associated cause, by age and sex, 2021

The bar chart shows that heart failure and cardiomyopathy death rates in 2021 were highest among males and females 85 years and over (3,100 and 2,700 per 100,000 population, respectively).

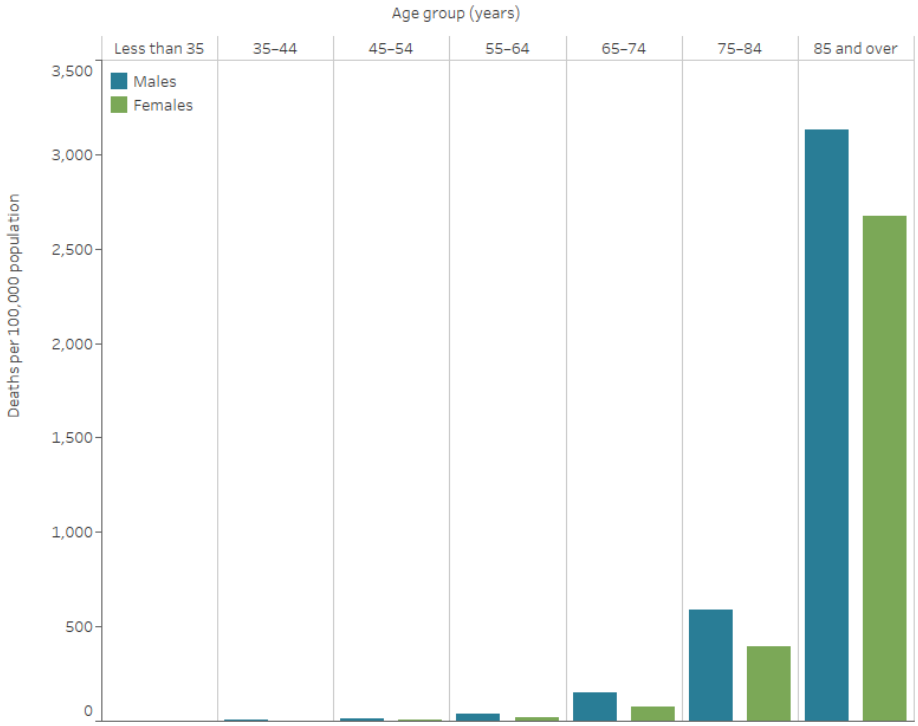


Figure 4: Heart failure and cardiomyopathy death rates, underlying or associated cause, by age and sex, 2021

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. Deaths are counted according to year of registration of death.
3. Deaths registered in 2021 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

Trends

Between 1997 and 2021:

- the number of deaths where heart failure or cardiomyopathy was an underlying or associated cause increased by 25%, from 20,800 to 26,000
- age-standardised heart failure and cardiomyopathy death rates declined by more than 40% for both males and females (Figure 5).

Figure 5: Heart failure and cardiomyopathy death rates, underlying or associated cause, by sex, 1997–2021

The line chart shows the decline in age-standardised heart failure and cardiomyopathy death rates between 1997 and 2021 from 152 to 86 and 106 to 62 per 100,000 population for males and females, respectively.

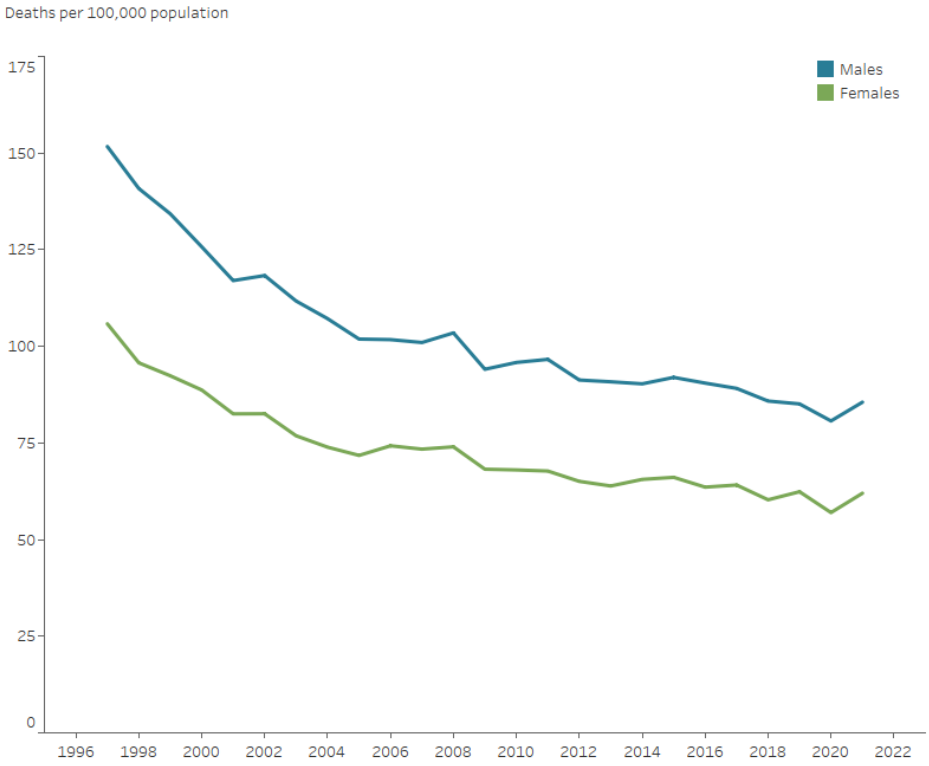


Figure 5: Heart failure and cardiomyopathy death rates, underlying or associated cause, by sex, 1997–2021

Notes

Chart: AIHW. *Source:* AIHW National Mortality Database.

http://www.aihw.gov.au

Variation among population groups

Aboriginal and Torres Strait Islander people

In 2019–2021, heart failure or cardiomyopathy was an underlying or associated cause of death for 1,400 Indigenous Australians in the jurisdictions with adequate Aboriginal and Torres Strait Islander identification – a rate of 60 per 100,000 population.

The age-standardised Indigenous death rate was 2.3 times as high as the non-Indigenous rate. Indigenous males and females had heart failure and cardiomyopathy death rates 2.2 and 2.6 times as high as non-Indigenous males and females (Figure 6).

Socioeconomic area

In 2019–2021, 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.

The disparity was similar for males and females (Figure 6).

Remoteness area

In 2019–2021, the age-standardised heart failure and cardiomyopathy death rate was 1.6 times as high for people living in *Remote and very remote* areas compared to those living in *Major cities*.

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, 2019–2021

The horizontal bar chart shows that age-standardised heart failure and cardiomyopathy death rates in 2019–2021 were higher among Indigenous Australians, people living in the lowest socioeconomic areas and people living in Remote and very remote areas.

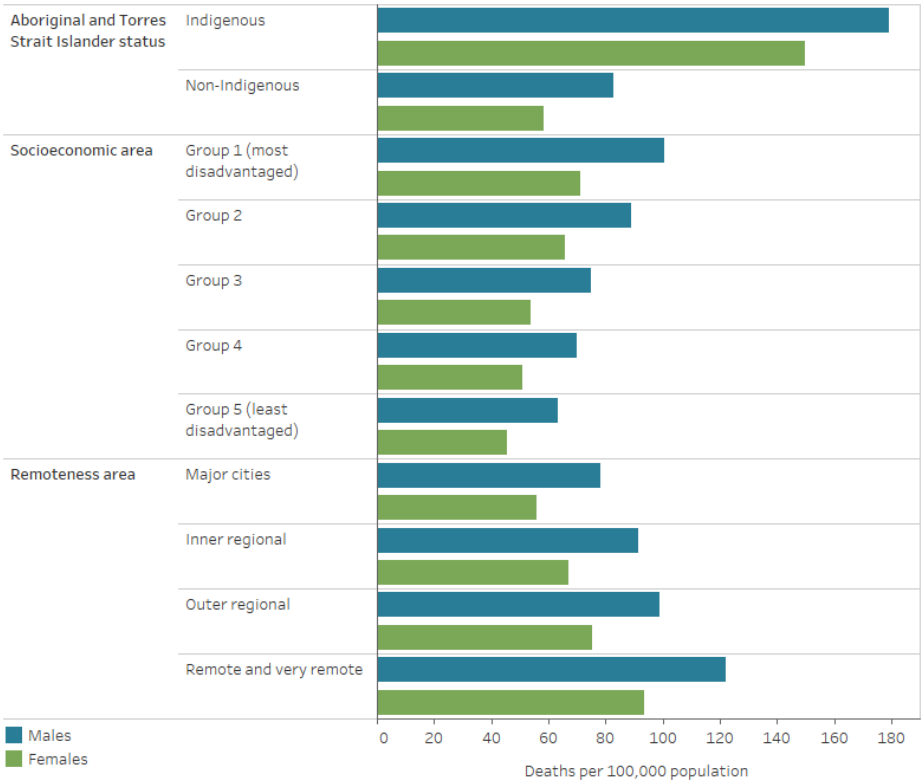


Figure 6: Heart failure and cardiomyopathy death rates, underlying or associated cause, by population group and sex, 2019–2021

Notes

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

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Atrial fibrillation

Page highlights:

How many Australians have atrial fibrillation?

- Atrial fibrillation affects approximately 2.2% of the general population – equivalent to more than 500,000 people in 2021.

Hospitalisations

- In 2020–21, there were around 201,000 hospitalisations where atrial fibrillation recorded as the principal and/or additional diagnosis.
- In 2020–21, atrial fibrillation hospitalisation rates were 21% higher for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas.

Deaths

- Atrial fibrillation contributed to 16,300 deaths (9.5% of all deaths) in 2021.

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 living with 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 201,000 hospitalisations where AF was recorded as the principal and/or additional diagnosis in 2020–21, at a rate of 785 per 100,000 population. This represents 1.7% of all hospitalisations in Australia.

Atrial fibrillation was recorded as the principal diagnosis in 38% (76,200) 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 1.6 times as high for males as females, after adjusting for differences in the age structure of the populations. 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 – at least 1.6 times as high as those aged 75–84 (Figure 1).

Figure 1: Atrial fibrillation hospitalisation rates, principal and/or additional diagnosis, by age and sex, 2020–21
The bar chart shows that atrial fibrillation hospitalisation rates in 2020–21 were highest among males and females 85 years and over (8,500 and 7,800 per 100,000 population, respectively).

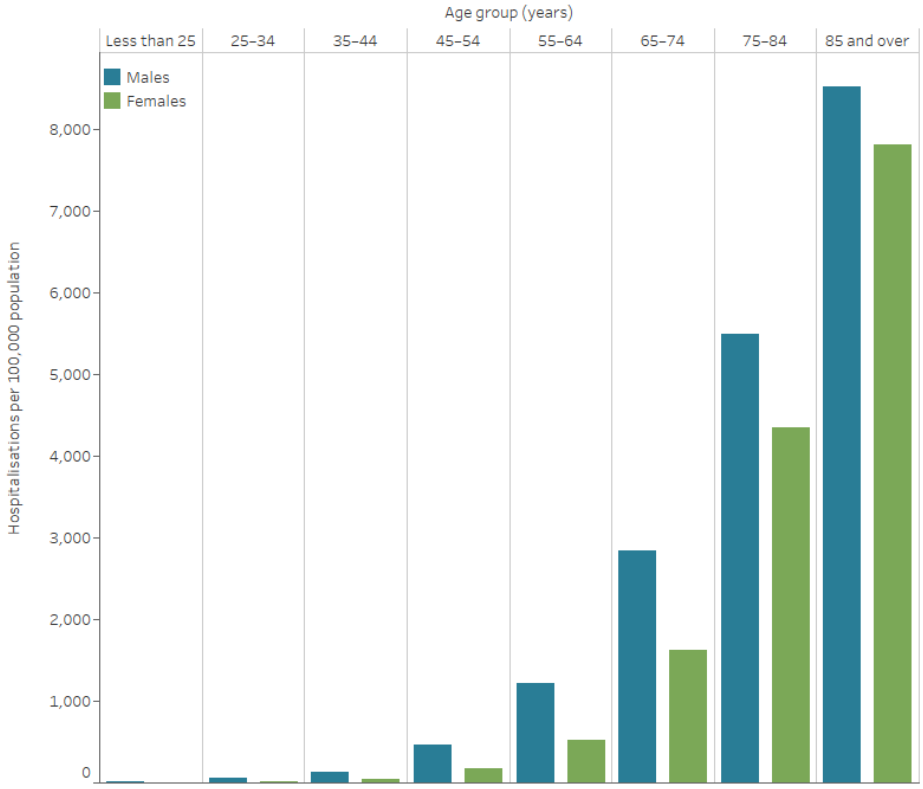

Figure 1: Atrial fibrilation hospitalisation rates, principal and/or additional diagnosis, by age and sex, 2020-21

Note: Includes persons with missing information on age and/or sex.

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

Trends

Between 2000–01 and 2020–21 the age-standardised rate of hospitalisations with a principal and/or additional diagnosis of AF fell from 748 to 618 per 100,000 population.

The number of AF hospitalisations increased by half (53%) for males and 30% for females, while rates fell by 17% for males and 20% for females (Figure 2).

The hospitalisation rate where AF was the principal diagnosis, however, increased by almost 40%, from 175 to 240 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 2020–21
The line chart shows the decline in age-standardised atrial fibrillation hospitalisation rates between 2000–01 and 2020–21 from 911 to 758 per 100,000 population for males and 613 to 488 per 100,000 population for females.

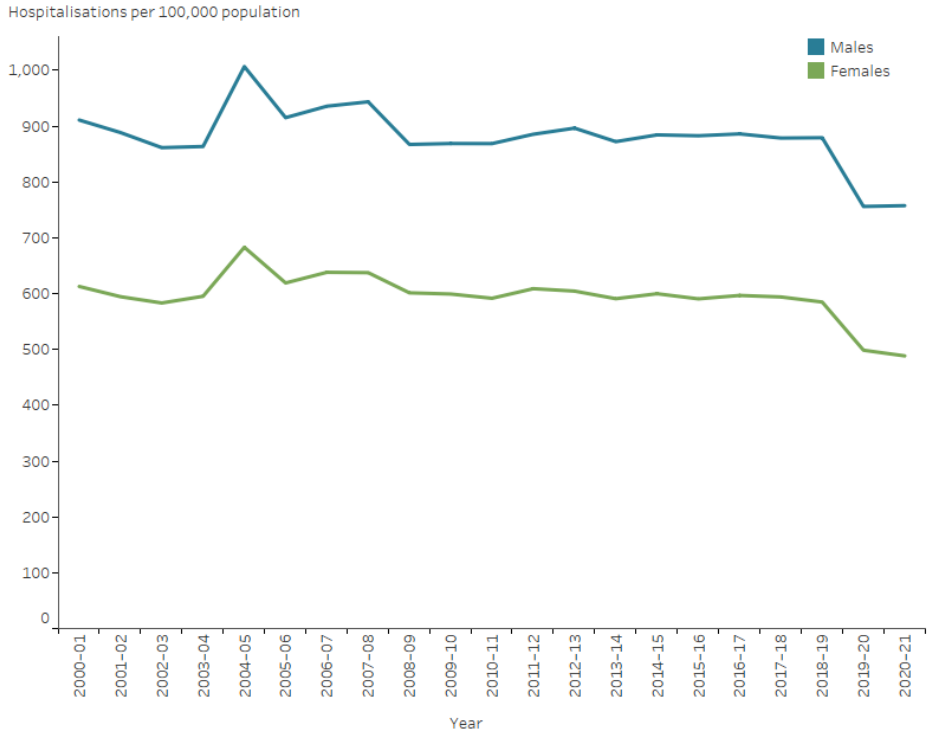

Figure 2: Atrial fibrilation hospitalisation rates, principal and/or additional diagnosis, by sex, 2000-01 to 2020-21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Includes persons with missing information on age and/or sex.

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

Variation among population groups

Aboriginal and Torres Strait Islander people

In 2020–21, there were around 4,500 hospitalisations with a principal and/or additional diagnosis of AF among Aboriginal and Torres Strait Islander people, at a rate of 518 per 100,000 population.

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
- the disparity between Indigenous and non-Indigenous Australians was greater for females than males – 1.9 times as high for females and 1.5 times as high for males (Figure 3).

Socioeconomic area

In 2020–21, age-standardised AF hospitalisation rates were 21% higher for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas.

For males, the gap in hospitalisations between the lowest and highest socioeconomic areas was 1.2 times as high, and for females 1.3 times as high (Figure 3).

Remoteness area

In 2020–21, age-standardised AF hospitalisation rates were 36% higher among those living in *Remote and very remote* areas compared with those in *Major cities*.

The disparities in male and female rates were similar – male rates were 1.3 times as high in *Remote and very remote* areas as in *Major cities*, while female rates were 1.4 times as high (Figure 3).

Figure 3: Atrial fibrillation hospitalisation rates, principal and/or additional diagnosis, by population group and sex, 2020–21

The horizontal bar chart shows that age-standardised atrial fibrillation hospitalisation rates in 2020–21 were higher among Indigenous Australians, people living in the lowest socioeconomic areas and people living in Remote and very remote areas.

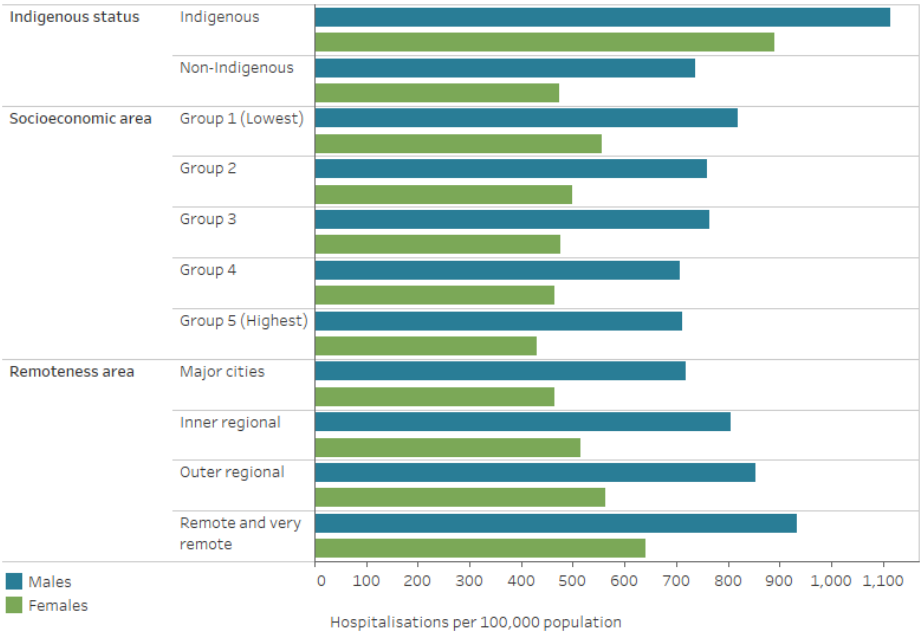

Figure 3: Atrial fibrilation hospitalisation rates, principal and/or additonal diagnosis, by population group and sex, 2020-21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Includes persons with missing information on age and/or sex. Excludes persons whose Indigenous status, remoteness area and/or socioeconomic area was missing.
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

Atrial fibrillation (AF) contributed to 16,300 deaths (9.5% of all deaths) in 2021 – a rate of 63 per 100,000 population.

AF was the underlying cause of 2,400 deaths in 2021, and was an associated cause in a further 13,900 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 2021, death rates for AF as the underlying or associated cause:

- were 1.4 times as high for males as for females after adjusting for differences in the age structure of the populations. 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 were 4.9 times as high for males and 6.7 times as high for females aged 75–84 (Figure 4).

Figure 4: Atrial fibrillation death rates, underlying or associated cause, by age and sex, 2021

The bar chart shows that atrial fibrillation death rates in 2021 were highest among males and females 85 and over (2,000 and 1,800 per 100,000 population, respectively).

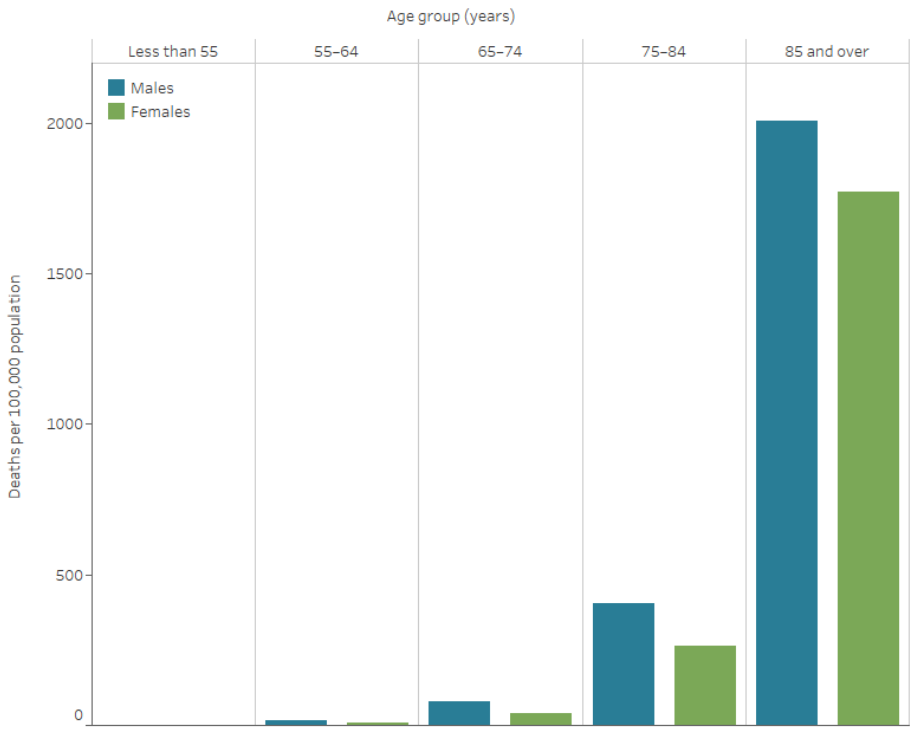

Figure 4: Atrial fibrilation death rates, underlying or associated cause, by age and sex, 2021

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. Deaths are counted according to year of registration of death.
3. Deaths registered in 2021 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

Trends

Between 1997 and 2021:

- the number of deaths where AF was an underlying or associated cause increased more than 3-fold, from 4,400 to 16,300
- age-standardised AF death rates increased by 70% – from 30 to 53 per 100,000 population for males, and from 23 to 39 per 100,000 population for females (Figure 5).

Figure 5: Atrial fibrillation death rates, underlying or associated cause, by sex, 1997–2021

The line chart shows the increase in age-standardised atrial fibrillation death rates between 1997 and 2021 for both males and females, from 30 to 53 and 23 to 39 per 100,000 population, respectively.

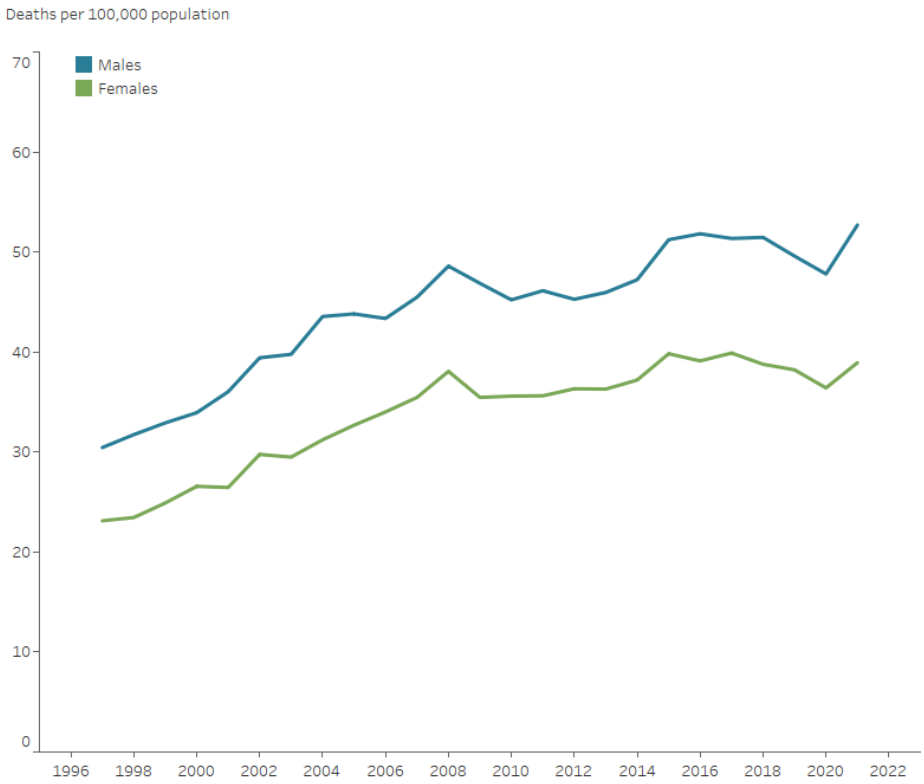

Figure 5: Atrial fibrilation death rates, underlying or associated cause, by sex, 1997–2021

Notes

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

Variation among population groups

Aboriginal and Torres Strait Islander people

In 2019–2021, AF was the underlying or associated cause of death for 557 Aboriginal and Torres Strait Islander people in the jurisdictions with adequate Indigenous identification, a rate of 24 per 100,000 population.

The age-standardised Indigenous death rate was 1.7 times as high as the non-Indigenous rate . Indigenous males and females had AF death rates 1.5 and 2.0 times as high as non-Indigenous males and females (Figure 6).

Socioeconomic area

In 2019–2021, 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.

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

Remoteness area

In 2019–2021, the age-standardised AF death rate for people living in *Remote and very remote* areas was 1.4 times as high as for those living in *Major cities*.

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

Figure 6: Atrial fibrillation death rates, underlying or associated cause, by population group and sex, 2019–2021

The horizontal bar chart shows that age-standardised atrial fibrillation death rates in 2019–2021 were higher among Indigenous Australians, people living in the lowest socioeconomic areas and people living in Remote and very remote areas.

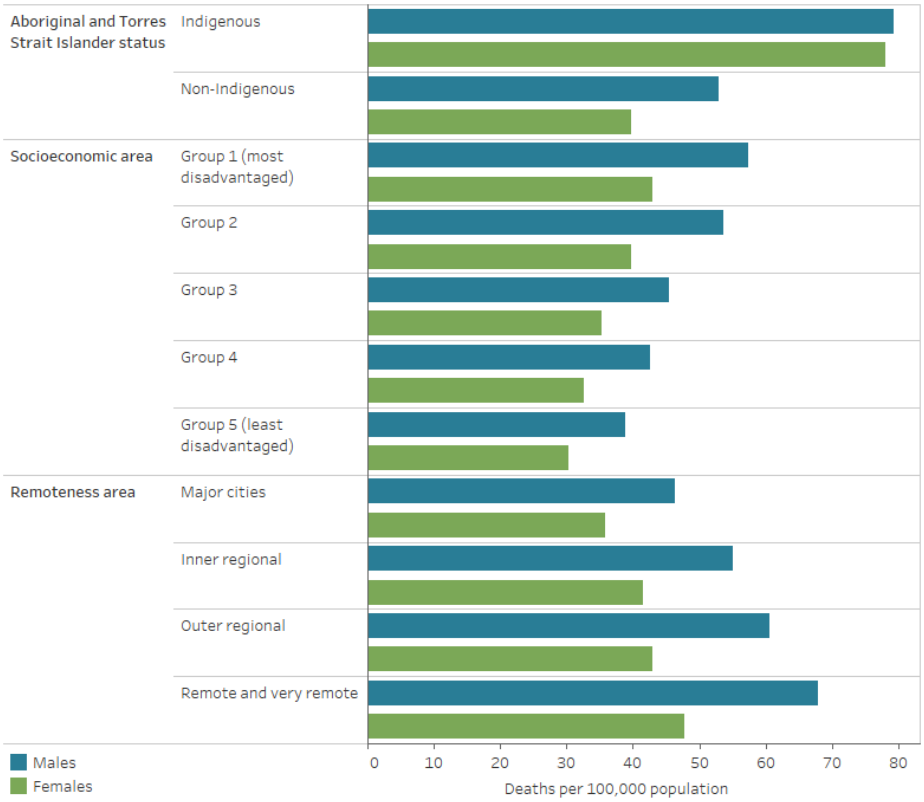

Figure 6: Atrial fibrilation death rates, underlying or associated cause, by population group and sex, 2019–2021

Notes

Chart: AIHW. *Source:* AIHW National Mortality Database.

http://www.aihw.gov.au

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Peripheral arterial disease

Page highlights:

How many Australians have peripheral arterial disease?

- Peripheral arterial disease 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.

Hospitalisations

- In 2020–21, there were around 59,100 hospitalisations where peripheral arterial disease was recorded.
- The age-standardised rate of hospitalisations of peripheral arterial disease declined by 47% between 2000–01 and 2020–21.

Deaths

- Peripheral arterial disease was the underlying cause of 1,900 deaths in 2021 — equating to 1.1% of all deaths.

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 living with 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 59,100 hospitalisations where PAD was recorded as the principal and/or additional diagnosis in 2020–21, at a rate of 230 per 100,000 population. This represents 0.5% of all hospitalisations in Australia.

PAD was recorded as the principal diagnosis in 56% (33,200) of these hospitalisations.

Over half of all hospitalisations where PAD was the principal diagnosis (60%) were for atherosclerosis of the peripheral arteries, while abdominal aortic aneurysm accounted for a further 9%. 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, after adjusting for differences in the age structure of the populations. Age-specific rates were higher among males than females in all age groups, except for age 35–44
- increased with age, with rates highest for males and females aged 85 and over – at least 1.4 times as high as those aged 75–84 (Figure 1).

Figure 1: Peripheral arterial disease hospitalisation rates, principal and/or additional diagnosis, by age and sex, 2020–21

The bar chart shows in 2020–21, peripheral arterial disease hospitalisation rates were highest among males and females aged 85 and over (2,500 and 1,600 per 100,000 population, respectively).

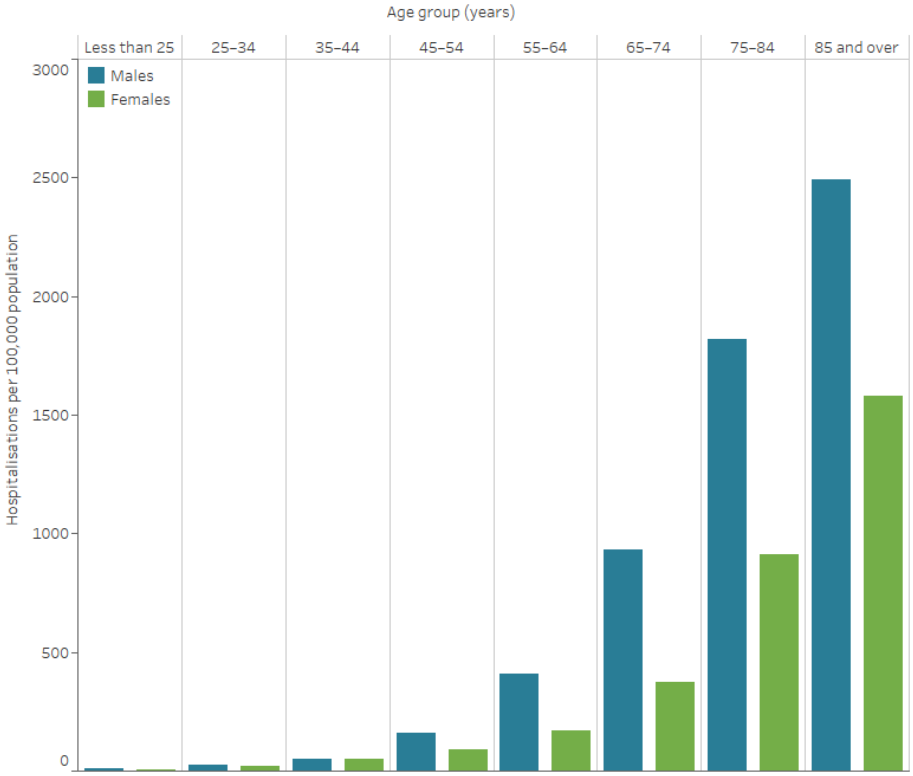

Figure 1: Peripheral arterial disease hospitalisation rates, principal and/or additional diagnosis, by age and sex, 2020–21

Note: Includes persons with missing information on age and/or sex.

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

Trends

Between 2000–01 and 2020–21, the age-standardised rate of hospitalisations with a principal and/or additional diagnosis of PAD declined by almost half (47%) — from 350 to 185 per 100,000 population.

The number of PAD hospitalisations declined by 8% for males and 15% for females, while rates fell by 49% for males and 47% for females (Figure 2).

Figure 2: Peripheral arterial disease hospitalisation rates, principal and/or additional diagnosis, by sex, 2000–01 to 2020–21

The line chart shows that age-standardised peripheral arterial disease hospitalisation rates declined between 2000–01 and 2020–21, from 492 to 251 and 237 to 127 per 100,000 population for males and females, respectively.

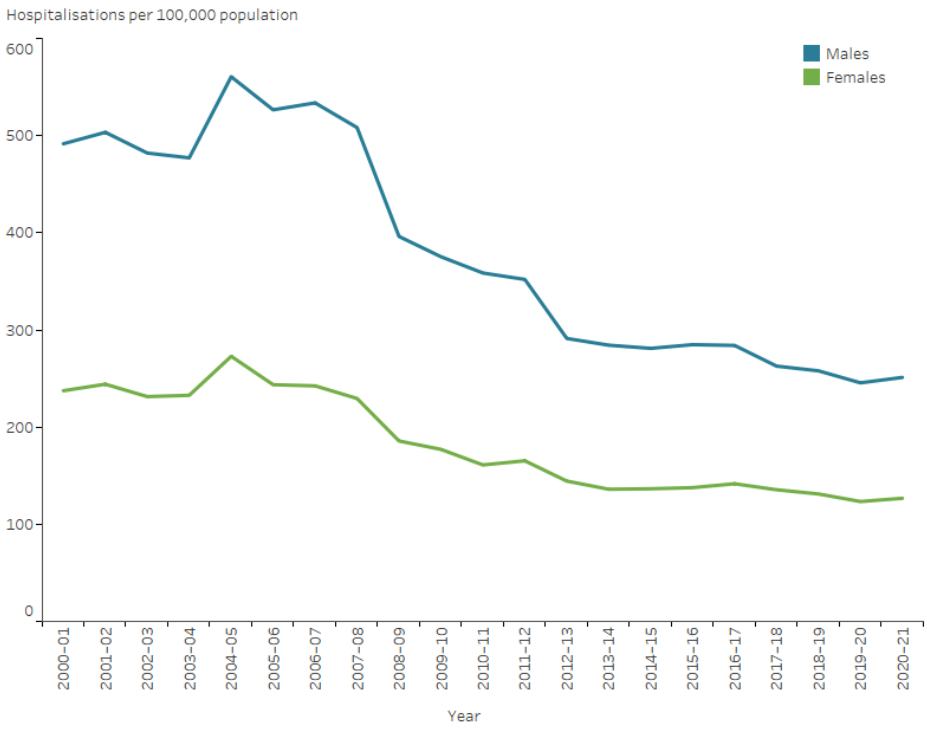

Figure 2: Peripheral arterial disease hospitalisation rates, principal and/or additional diagnosis, by sex, 2000–01 to 2020–21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Includes persons with missing information on age and/or sex.

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

Variation among population groups

Aboriginal and Torres Strait Islander people

In 2020–21, there were 1,453 hospitalisations with a principal and/or additional diagnosis of PAD among Aboriginal and Torres Strait Islander people – a rate of 167 per 100,000 population.

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
- the disparity between Indigenous and non-Indigenous Australians was greater for females than males — 1.9 times as high for females and 1.5 times as high for males (Figure 3).

Socioeconomic area

In 2020–21, age-standardised PAD hospitalisation rates were 1.3 times as high for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas.

For males, the rate of PAD hospitalisations among people living in lowest socioeconomic areas was 1.3 times as high as in the highest socioeconomic areas, and for females 1.2 times as high (Figure 3).

Remoteness area

In 2020–21, age-standardised PAD hospitalisation rates among those living in *Remote and very remote* areas were similar to those in *Major cities* (Figure 3).

Figure 3: Peripheral arterial disease hospitalisation rates, principal and/or additional diagnosis, by population group and sex, 2020–21

The horizontal bar chart shows that age-standardised peripheral arterial disease hospitalisation rates in 2020–21 were higher among Indigenous Australians, people living in the lowest socioeconomic areas and people living in Remote and very remote areas.

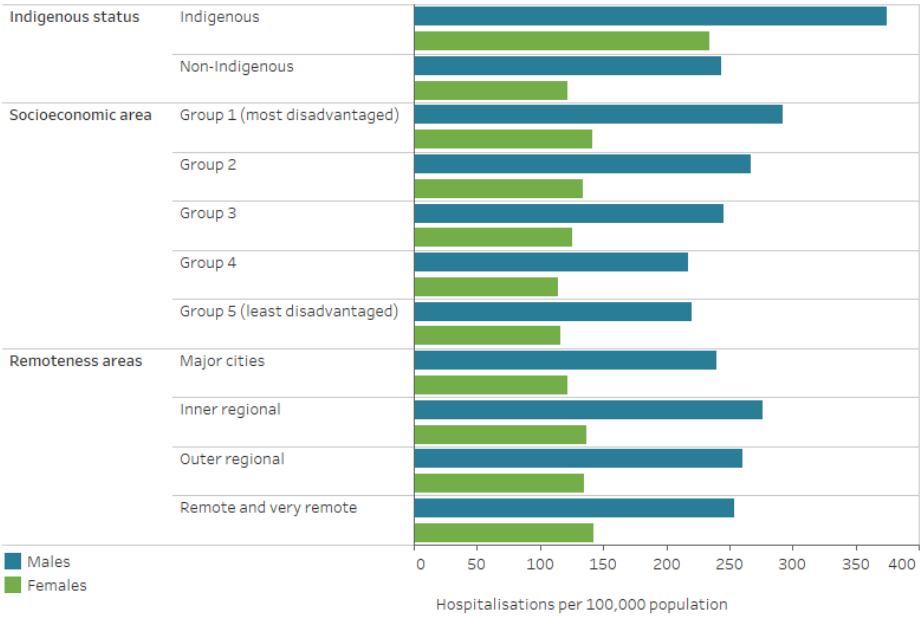

Figure 3: Peripheral arterial disease hospitalisation rates, principal and/or additional diagnosis, by population group and sex, 2020–21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Includes persons with missing information on age and/or sex. Excludes persons whose Indigenous status, remoteness area and/or socioeconomic area was missing.
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 1,900 deaths in 2021, at a rate of 7.4 per 100,000 population — equating to 1.1% of all deaths, and 4.5% of all cardiovascular disease deaths.

Abdominal aortic aneurysm accounted for 24% 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 (13%), acute myocardial infarction (7.9%) and type 2 diabetes mellitus (7.9%).

Age and sex

In 2021, PAD death rates:

- were 1.2 times as high for males as for females, after adjusting for differences in the age structure of the populations. Age-specific rates for males were higher than for females across all age groups
- increased with age, with three-quarters (73%) 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—3.6 times as high for males and 4.7 times as high for females aged 75–84 (Figure 4).

Figure 4: Peripheral arterial disease death rates, by age and sex, 2021

The bar chart shows the age-standardised peripheral arterial disease death rates in 2021 were highest among males and females aged 85 and over (184 and 144 per 100,000 population, respectively).

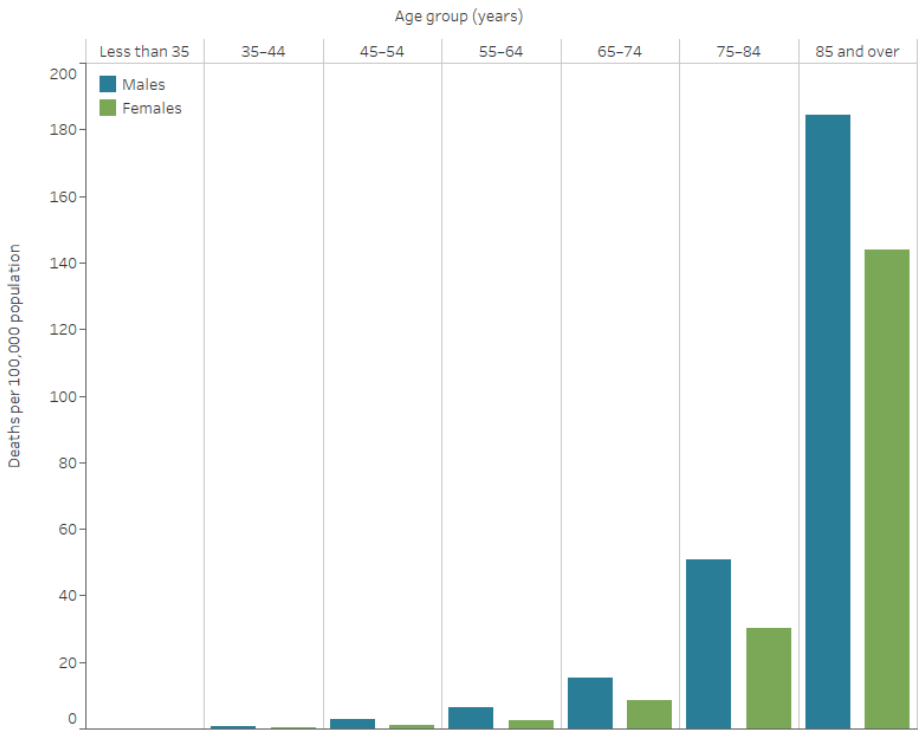

Figure 4: Peripheral arterial disease death rates, by age and sex, 2021

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. Deaths are counted according to year of registration of death.
3. Deaths registered in 2021 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

Trends

Between 1980 and 2021:

- the annual number of PAD deaths declined by almost 40%, from 3,100 to 1,900
- age-standardised PAD death rates declined by over 80% — falling from 44 to 6.9 per 100,000 population for males and 28 to 4.3 per 100,000 for females (Figure 5).

Figure 5: Peripheral arterial disease death rates, by sex, 1980–2021

The line chart shows the decline in age-standardised peripheral arterial disease death rates between 1980 and 2021 for both males and females, from 44 to 6.9 and 28 to 4.3 per 100,000 population, respectively.

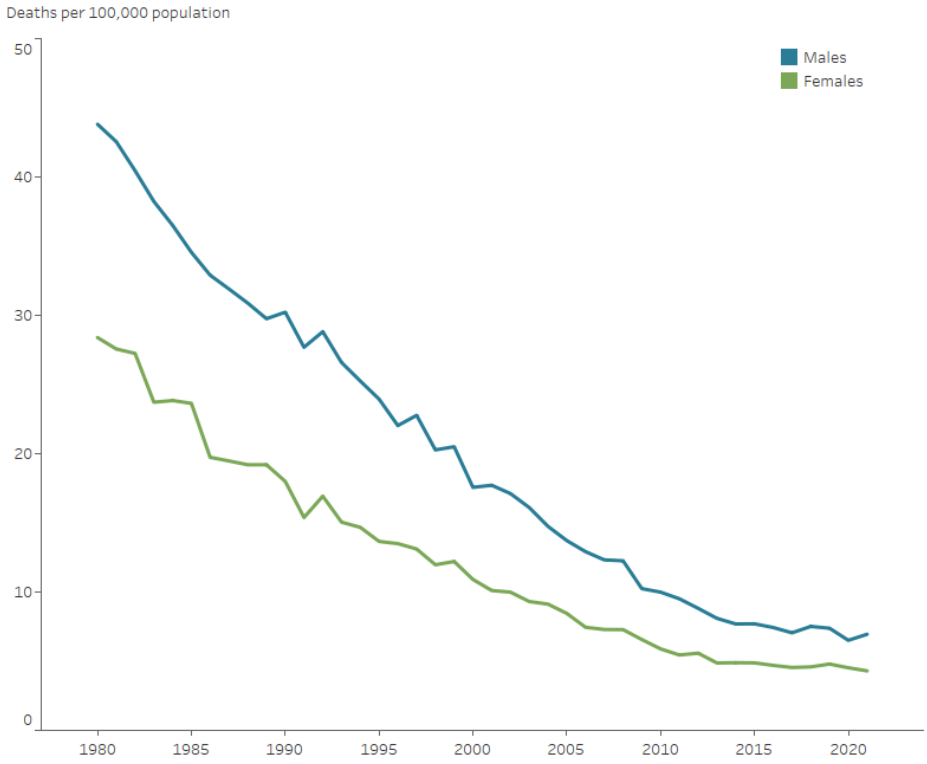

Figure 5: Peripheral arterial disease death rates, by sex, 1980–2021

Notes

Chart: AIHW. *Source:* AIHW National Mortality Database.

http://www.aihw.gov.au

Variation among population groups

Aboriginal and Torres Strait Islander people

In 2019–2021, there were 74 deaths from PAD as an underlying cause among Aboriginal and Torres Strait Islander people in jurisdictions with adequate Indigenous identification, a rate of 3.2 per 100,000 population.

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.

Indigenous males had PAD death rates 1.8 times as high as non-Indigenous males and Indigenous females 1.0 times as high (Figure 6).

Socioeconomic area

In 2019–2021, the age-standardised PAD death rate was 1.4 times as high for people living in the lowest socioeconomic areas compared with those living in the highest socioeconomic areas.

The difference was similar for males and females (1.5 times and 1.4 times as high) (Figure 6).

Remoteness area

In 2019–2021, the age-standardised PAD death rate was 1.2 times as high in *Remote and very remote* areas compared with *Major cities*.

The male rate in *Remote and very remote* areas was 1.4 times as high as that in *Major cities*. The female rate was slightly higher in *Major cities* compared to *Remote and very remote* areas (Figure 6).

Figure 6: Peripheral arterial disease death rates, by population group and sex, 2019–2021

The horizontal bar chart shows in 2019–2021 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.

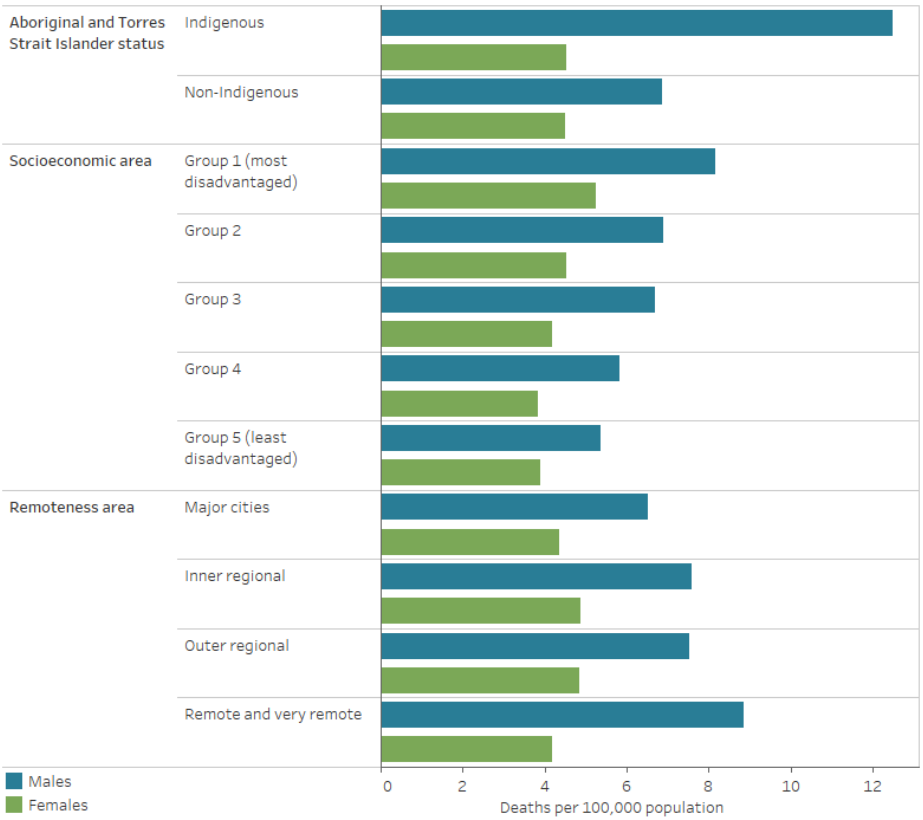

Figure 6: Peripheral arterial disease death rates, by population group and sex, 2019–2021

Notes

Chart: AIHW. *Source:* AIHW National Mortality Database.

http://www.aihw.gov.au

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Acute rheumatic fever and rheumatic heart disease

Page highlights:

How many Australians have rheumatic heart disease?

- In 2019, there were 5,385 people living with rheumatic heart disease recorded on registers in Queensland, Western Australia, South Australia and the Northern Territory.

Hospitalisations

- There were 4,600 hospitalisations with a principal diagnosis of acute rheumatic fever or rheumatic heart disease in 2020–21.
- In 2020–21, the rate of hospitalisation for acute rheumatic fever or rheumatic heart disease among Indigenous Australians was 7 times as high as the non-Indigenous rate.

Deaths

- Acute rheumatic fever or rheumatic heart disease was the underlying cause of 338 deaths in 2019.

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 age-standardised rate of new rheumatic heart disease diagnoses between 2015 and 2018 (3.1 to 4.5 per 100,000 population). The age-standardised rate of new rheumatic heart disease diagnoses was consistently higher among Indigenous Australians compared to the total Australian population.

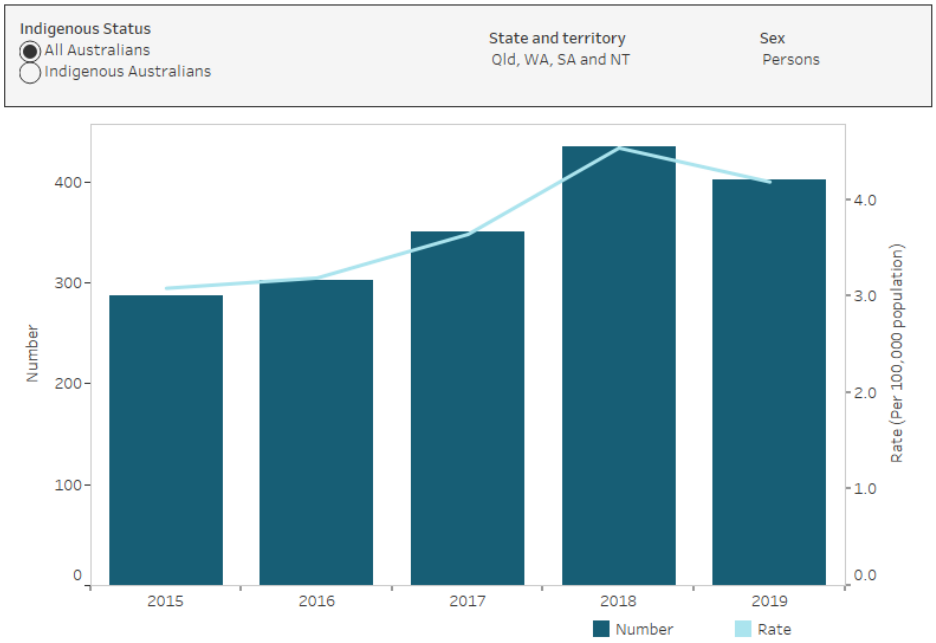

Figure 1: New RHD Diagnoses in Qld, WA, SA and NT, 2015 to 2019.

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 2020–21, there were 4,600 hospitalisations with a principal diagnosis of ARF or RHD – 0.8% of all cardiovascular disease (CVD) hospitalisations, and equating to an age-standardised rate of 18 hospitalisations per 100,000 population.

Age and sex

In 2020–21, where ARF or RHD was recorded as the principal diagnosis, hospitalisation rates:

- were similar for males and females after adjusting for differences in the age structure of the populations
- were higher for females than males aged 15–54, but higher for males aged 0–14 and 55 and over (Figure 2)
- were highest among males and females aged 75–84—around twice as high as those aged 65–74.

Figure 2: Acute rheumatic fever and rheumatic heart disease hospitalisation rates, principal diagnosis, by age and sex, 2020–21

The bar chart shows in 2020–21 acute rheumatic fever and rheumatic heart disease hospitalisation rates were highest among males and females aged 75–84 years with 122 and 85 hospitalisations per 100,000 population, respectively.

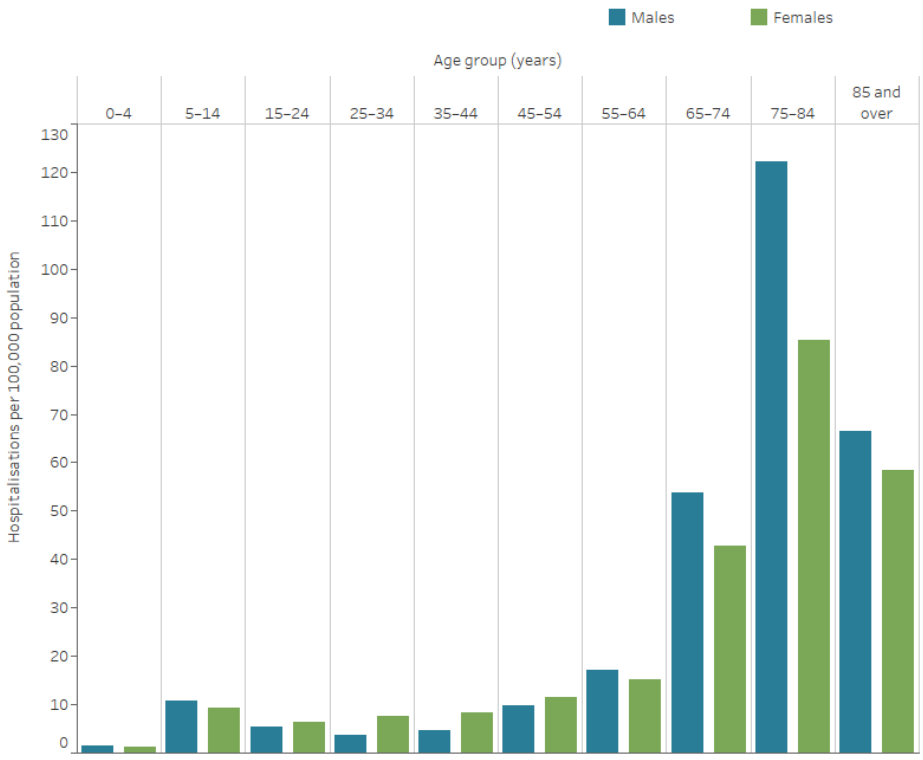

Figure 2: Acute rheumatic fever and rheumatic heart disease hospitalisation rates, principal diagnosis, by age and sex, 2020-21

Note: Includes persons with missing information on age and/or sex.

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

Trends

Between 2000–01 and 2020–21 the number of hospitalisations with ARF or RHD increased from 2,100 to 4,600. Over this period the age-standardised hospitalisation rate for ARF and RHD increased from 10.8 to 15.7 per 100,000 population. Females generally had higher rates than males, although the difference decreased over time and the male rate was higher in 2020–21 (Figure 3).

Figure 3: Acute rheumatic fever and rheumatic heart disease hospitalisation rates, principal diagnosis, by sex, 2000–01 to 2020–21

The line chart shows the overall increase in age-standardised acute rheumatic fever and rheumatic heart disease hospitalisation rates between 2000–01 and 2020–21 from 9.1 to 16.5 and 12.6 to 15.1 per 100,000 population for males and females, respectively.

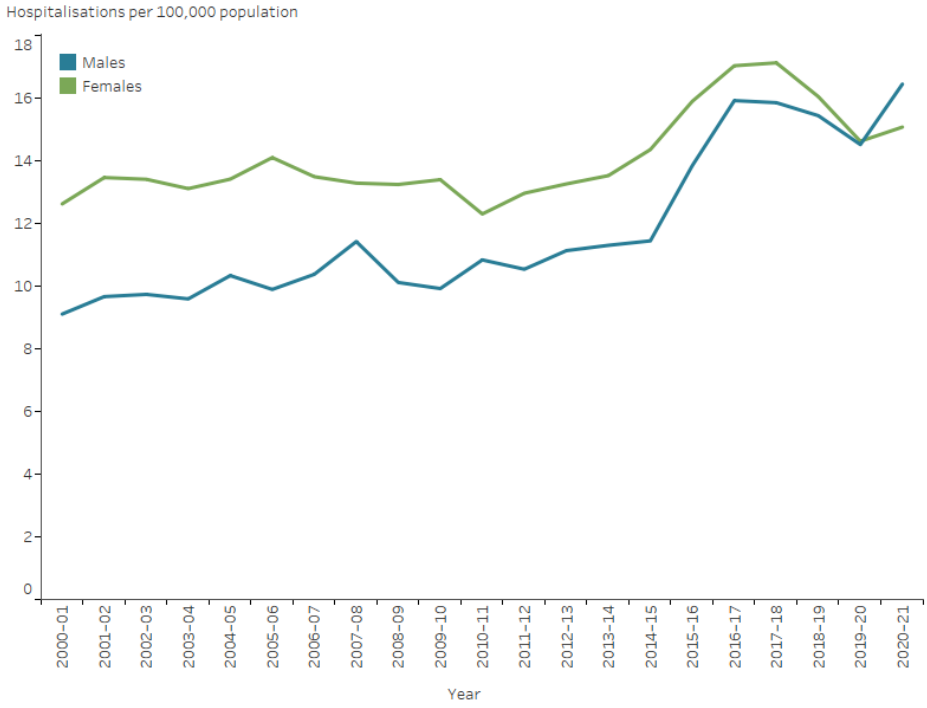

Figure 3: Acute rheumatic fever and rheumatic heart disease hospitalisation rates, principal diagnosis, by sex, 2000-01 to 2020-21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Includes persons with missing information on age and/or sex.

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

Variation among population groups

Aboriginal and Torres Strait Islander people

In 2020–21, there were around 760 hospitalisations with a principal diagnosis of ARF or RHD among Aboriginal and Torres Strait Islander people, a rate of 88 per 100,000 population.

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

- the rate among Indigenous Australians was 7 times as high as the non-Indigenous rate
- the disparity between Indigenous and non-Indigenous Australians was greater for females than males—9 times as high for females and 5 times as high for males (Figure 4).

Socioeconomic area

In 2020–21, the ARF and RHD hospitalisation rate was 1.9 times as high for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas.

The difference was greater for females (2.5 times as high) than males (1.4 times as high) (Figure 4).

Remoteness area

In 2020–21, age-standardised ARF and RHD hospitalisation rates were 8.6 times as high among those living in *Remote and very remote* areas compared with those in *Major cities* (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 population group and sex, 2020–21

The horizontal bar chart shows in 2020–21 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.

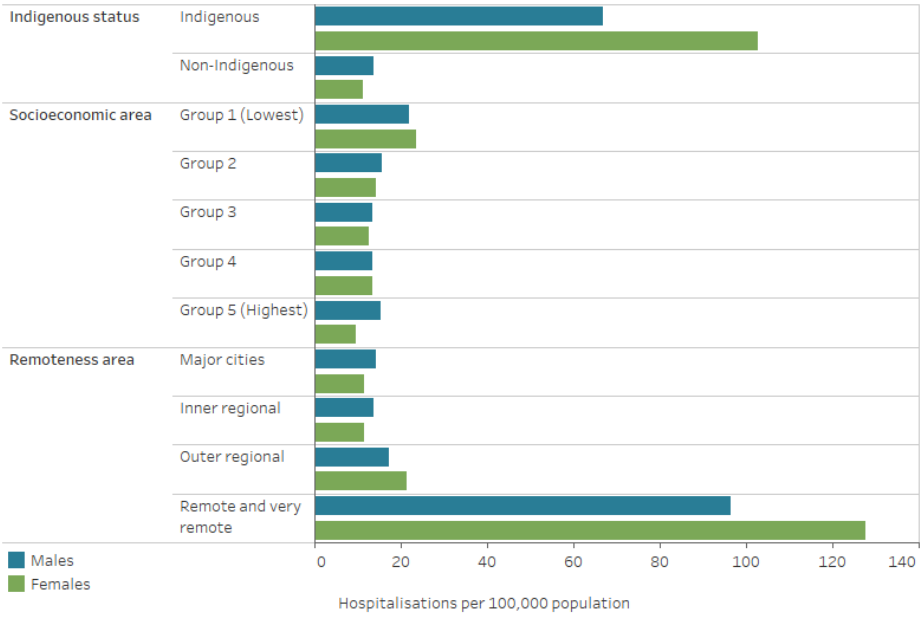

Figure 4: Acute rheumatic fever and rheumatic heart disease hospitalisation rates, principal diagnosis, by population group and sex, 2020-21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Includes persons with missing information on age and/or sex. Excludes persons whose Indigenous status, remoteness area and/or socioeconomic area was missing.
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. Here, the 2 conditions are here presented together.

In 2021, ARF or RHD was the underlying cause of 338 deaths, representing 0.2% of all deaths and 0.8% of CVD deaths, and equivalent to 1.3 deaths per 100,000 population.

Age and sex

Unlike many other forms of CVD, more females die from ARF and RHD than males. In 2021, females accounted for 60% of ARF and RHD deaths – 210 compared with 128 for males.

In 2021, ARF and RHD death rates:

- were 1.4 times as high for females than males
- increased with age, with two-thirds (68%) 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 — 3.1 times as high for males and 3.3 times as high for females aged 75–84 (Figure 5).

Figure 5: Acute rheumatic fever and rheumatic heart disease death rates, by age and sex, 2021

The bar chart shows in 2021 acute rheumatic fever and rheumatic heart disease death rates were highest among males and females aged 85 and over, at 18 and 29 per 100,000 population, respectively.

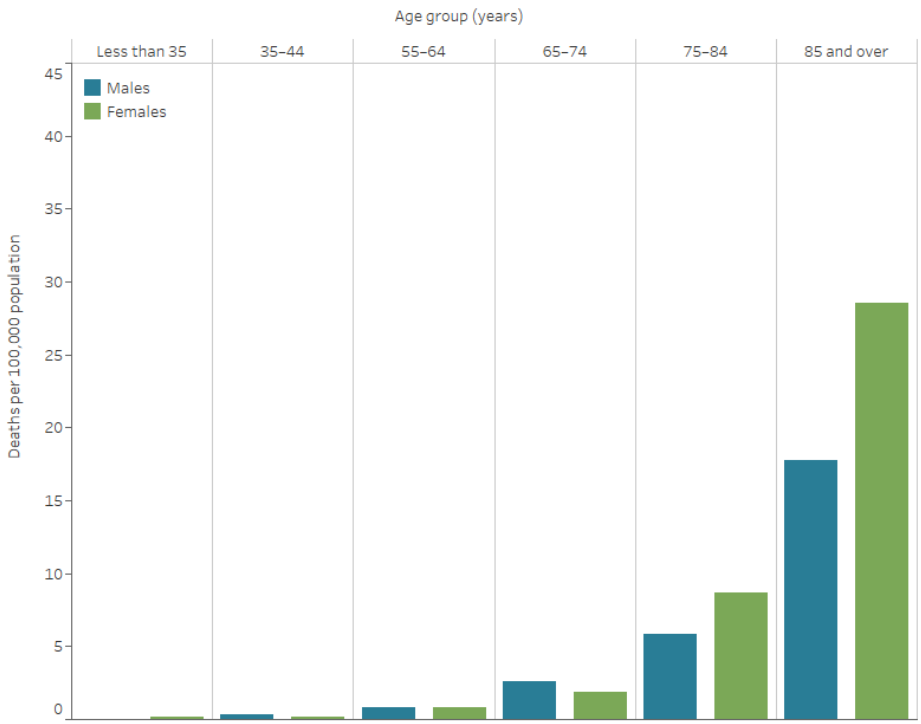

Figure 5: Acute rheumatic fever and rheumatic heart disease death rates, by age and sex, 2021

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. Deaths are counted according to year of registration of death.
3. Deaths registered in 2021 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

Trends

Between 1980 and 2021:

- the number of ARF and RHD deaths increased by 10%, from 306 to 338
- the age-standardised ARF and RHD death rate declined by 63%, falling from 2.7 to 1.0 deaths per 100,000 population (Figure 6). Much of the decline occurred before 2000.

Figure 6: Acute rheumatic fever and rheumatic heart disease death rates, by sex, 1980–2021

The line chart shows the decline in age-standardised acute rheumatic fever and rheumatic heart disease death rates between 1980 and 2021 from 2.1 to 0.8 and 3.1 to 1.1 for males and females, respectively.

Figure 6: Acute rheumatic fever and rheumatic heart disease death rates, by sex, 1980–2021

Notes

Chart: AIHW. *Source:* AIHW National Mortality Database.

http://www.aihw.gov.au

Variation among population groups

Aboriginal and Torres Strait Islander people

In 2019–2021, there were 72 deaths from ARF or RHD among Aboriginal and Torres Strait Islander people in jurisdictions with adequate identification of Indigenous status, a rate of 3.2 per 100,000 population.

After adjusting for differences in the age structure of the populations, the ARF and RHD death rate for Indigenous people was 5.2 times as high as that for non-Indigenous people.

Indigenous males and females had ARF and RHD death rates 3.6 times and 6.2 times as high as non-Indigenous males and females (Figure 7).

In the 25–64 age group, the Indigenous death rate was 17 times as high as the non-Indigenous rate.

Socioeconomic area

In 2019–2021, the age-standardised ARF and RHD death rate was 2.3 times as high for people living in the lowest socioeconomic areas compared with those living in the highest socioeconomic areas.

The rate for males was 1.6 times as high, and for females 2.7 times as high (Figure 7).

Remoteness area

In 2019–2021, age-standardised death rates for ARF and RHD increased with remoteness, from 1.0 deaths per 100,000 population in *Major cities* to 3.6 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, 2019–2021

The horizontal bar chart shows in 2019–2021 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.

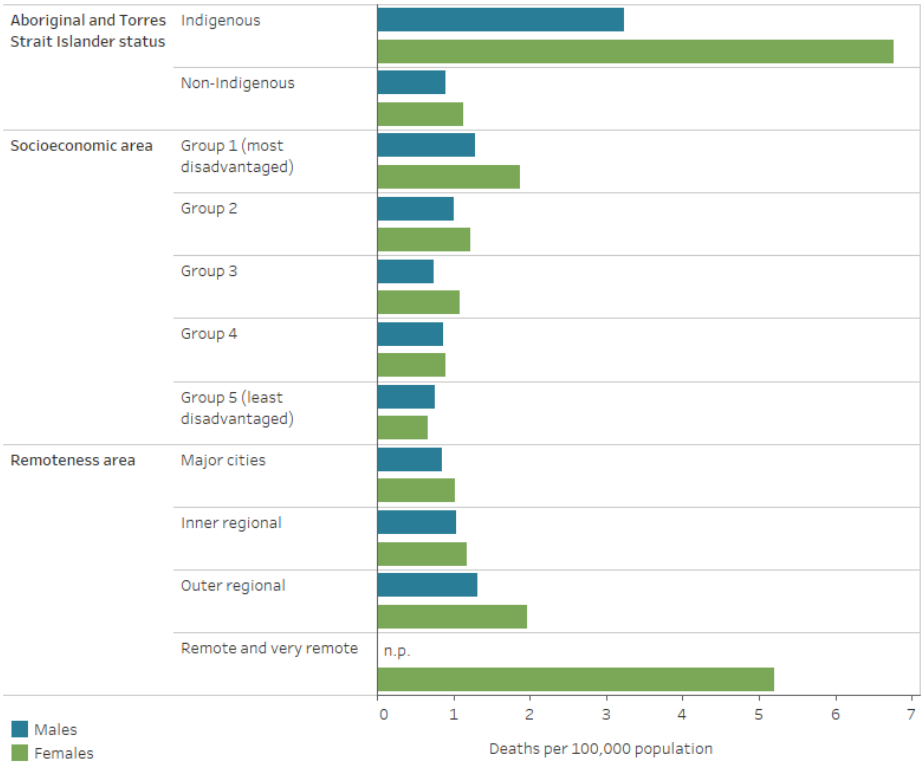

Figure 7: Acute rheumatic fever and rheumatic heart disease death rates, by population group and sex, 2019–2021

Notes
n.p. = not published.
Chart: AIHW. Source: AIHW National Mortality Database.
http://www.aihw.gov.au

Deaths among Australians with RHD

In 2017–2021, 595 deaths were reported for people with RHD who were listed on one of the four jurisdictional registers in Queensland, Western Australia, South Australia and the Northern Territory (AIHW 2023). Note that people with RHD may have died of any cause, and that cause-of-death is not captured on most registers.

Of these, 382 people (64%) were Indigenous Australians. The median age of death was 51 years for Indigenous males and 56 years for Indigenous females, compared with 73 years for non-Indigenous males and 74 years for non-Indigenous females.

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Congenital heart disease

Page highlights:

How many Australians have congenital heart disease?

- In Australia, an estimated 65,000 children and adults live with congenital heart disease.

Hospitalisations

- In 2020–21, there were around 5,900 hospitalisations in Australia where congenital heart disease was the principal diagnosis.

Deaths

- In 2021, congenital heart disease caused 79 deaths in infants aged under 1 year, equivalent to 7.8% of all infant 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.

The National Strategic Action Plan for Childhood Heart Disease - external site opens in new window aims to reduce the impact of congenital heart disease and other childhood heart diseases in Australia. It outlines priority areas and actions to help people with Childhood Heart Disease live longer, healthier and more productive lives.

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, 2022). 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 2020–21, there were around 5,900 hospitalisations in Australia where congenital heart disease was the principal diagnosis – a rate of 23 hospitalisations per 100,000 population.

Age and sex

In 2020–21, where congenital heart disease was recorded as the principal diagnosis, hospitalisation rates:

- were similar for males and females after adjusting for differences in the age structure of the populations
- were highest for infant boys and girls (605 and 513 per 100,000 population), followed by boys and girls aged 1–4 (45 and 39 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, 2020–21
The bar chart shows in 2020–21 congenital heart disease hospitalisation rates were highest among boys and girls aged less than 1, at 605 and 513 per 100,000 population, respectively.

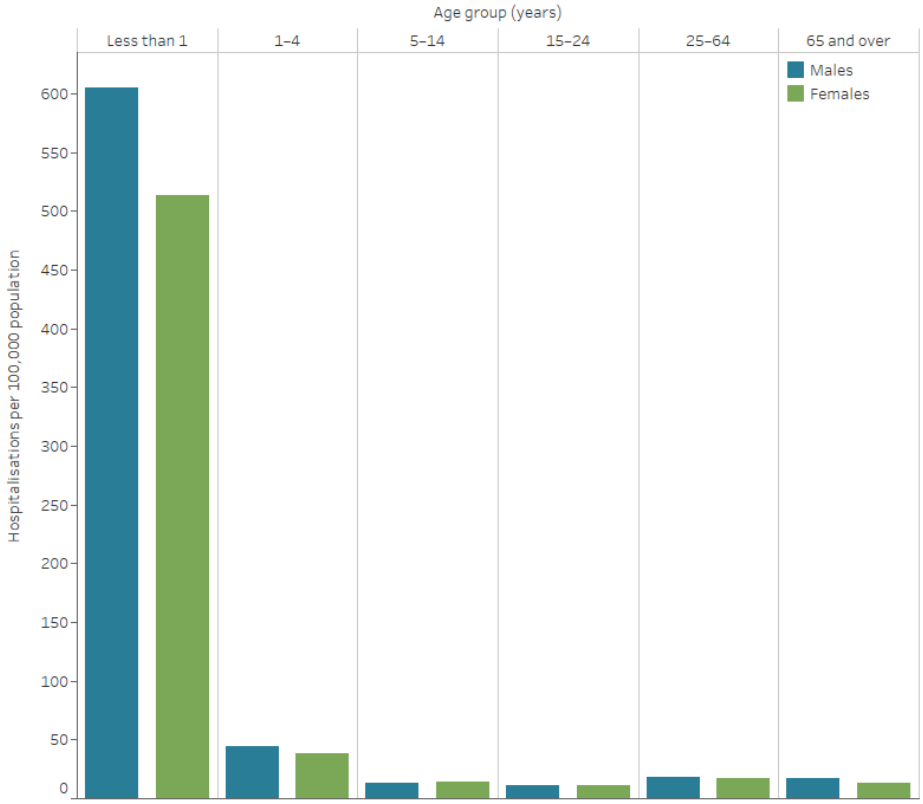

Figure 1: Congenital heart disease hospitalisation rates, principal diagnosis, by age and sex, 2020-21

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 2020–21 the number of hospitalisations with congenital heart disease as a principal diagnosis increased from 4,000 to 5,900.

Over this period the age-standardised hospitalisation rate for congenital heart disease has changed little (21 per 100,000 in 2000–01 and 24 in 2020–21). Male and female rates are similar (Figure 2).

Figure 2: Congenital heart disease hospitalisation rates, principal diagnosis, by sex, 2000–01 to 2020–21

The line chart shows age-standardised congenital heart disease hospitalisation rates remained relatively stable between 2000–01 and 2020–21 with males recording 20–25 and females recording 19–23 hospitalisations per 100,000 population across the period.

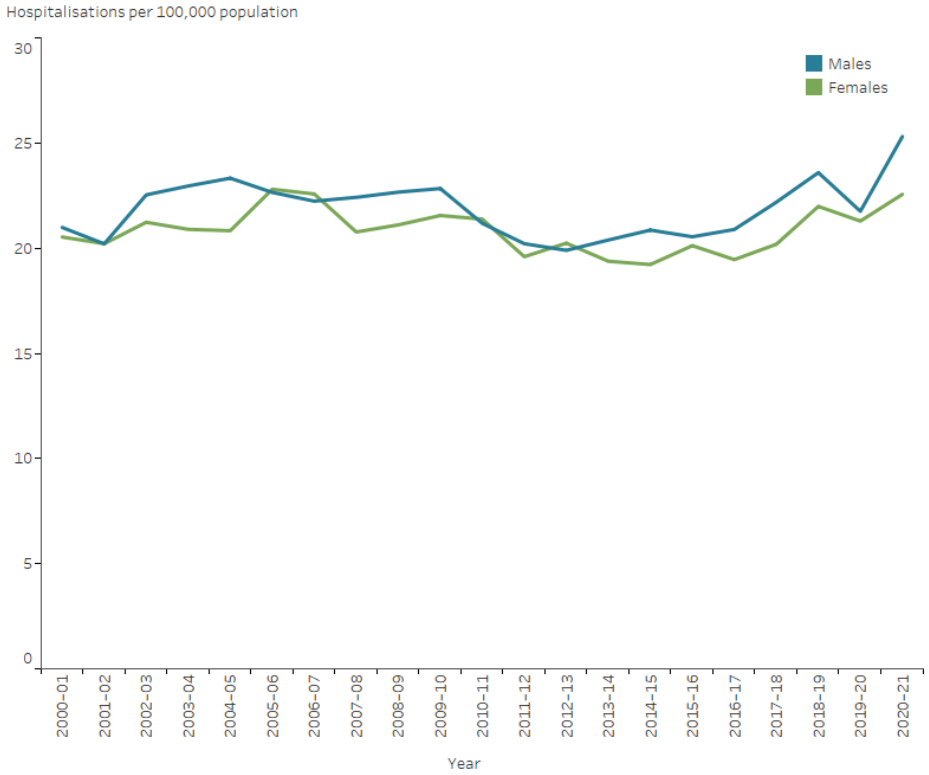

Figure 2: Congenital heart disease hospitalisation rates, principal diagnosis, by sex, 2000-01 to 2020-21

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 2020–21, there were around 340 hospitalisations with a principal diagnosis of congenital heart disease among Aboriginal and Torres Strait Islander people, a rate of 39 per 100,000 population.

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

- the rate among Indigenous Australians was 1.2 times as high as the non-Indigenous rate.

Socioeconomic area

In 2020–21, 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, after adjusting for differences in the age structure of the populations.

The difference was greater for females than males (1.3 and 1.1 times as high) (Figure 3).

Remoteness area

In 2020–21, congenital heart disease hospitalisation rates were 1.1 times as high among those living in *Remote and very remote* areas compared with those in *Major cities,* after adjusting for differences in the age structure of the populations.

The difference was largely driven by disparities in female rates (1.2 times as high), with male rates being similar (Figure 3).

Figure 3: Congenital heart disease hospitalisation rates, principal diagnosis, by population group and sex, 2020–21

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.

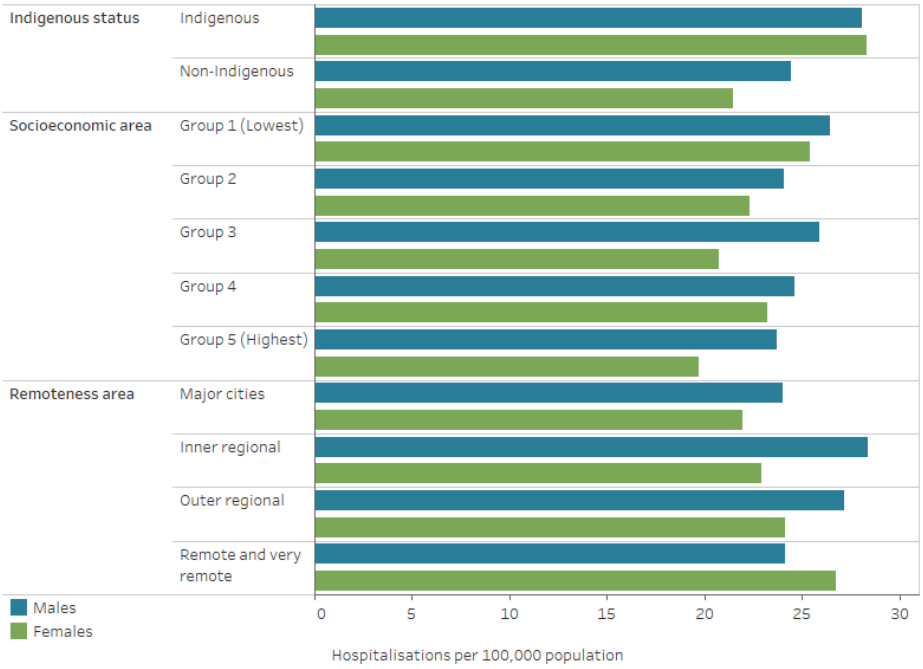

Figure 3: Congenital heart disease hospitalisation rates, principal diagnosis, by population group and sex, 2020-21

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

Procedures

About half of all babies born with congenital heart disease require surgical or catheter-based interventions to correct any defect, with one-third 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 2020–21, around 460 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, 109 per 100,000 for ventricular septal defect and 112 per 100,000 for patent ductus arteriosus in 2020–21
- most procedures for patent ductus arteriosus and ventricular septal defect were among children aged under 5 (69% and 82%)
- procedures for atrial septal defect were spread more evenly across ages, with 18% 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 8.3 per 100,000 in 2007–08 and 2020–21), ventricular septal defect (2.1 and 2.0 per 100,000 in 2007–08 and 2020–21) and patent ductus arteriosus (2.8 and 2.5 per 100,000 in 2007–08 and 2020–21).

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 2021, congenital heart disease was the underlying cause of >171 deaths (0.1% of all deaths) in Australia – a rate of 0.7 deaths per 100,000 population.

Congenital heart disease is a leading cause of death among infants. In 2021, congenital heart disease caused 79 deaths in infants aged under 1 year, equivalent to 7.8% of all infant deaths.

Age and sex

In 2021, 90 males and 81 females died as a result of congenital heart disease, equivalent to age-standardised rates of 0.7 and 0.6 per 100,000 population (Figure 4). Of these:

- 46% were aged less than 1 year (37 boys and 42 girls)
- 11% were aged 1–24 (11 males and 7 females)
- 20% were aged 25–64 (24 males and 11 females)
- 23% were aged 65 or over (18 males and 21 females).

Figure 4: Congenital heart disease death rates, by age and sex, 2021

The bar chart shows in 2021 congenital heart disease death rates were highest among boys and girls aged less than 1, at 24 and 29 deaths per 100,000 population, respectively.

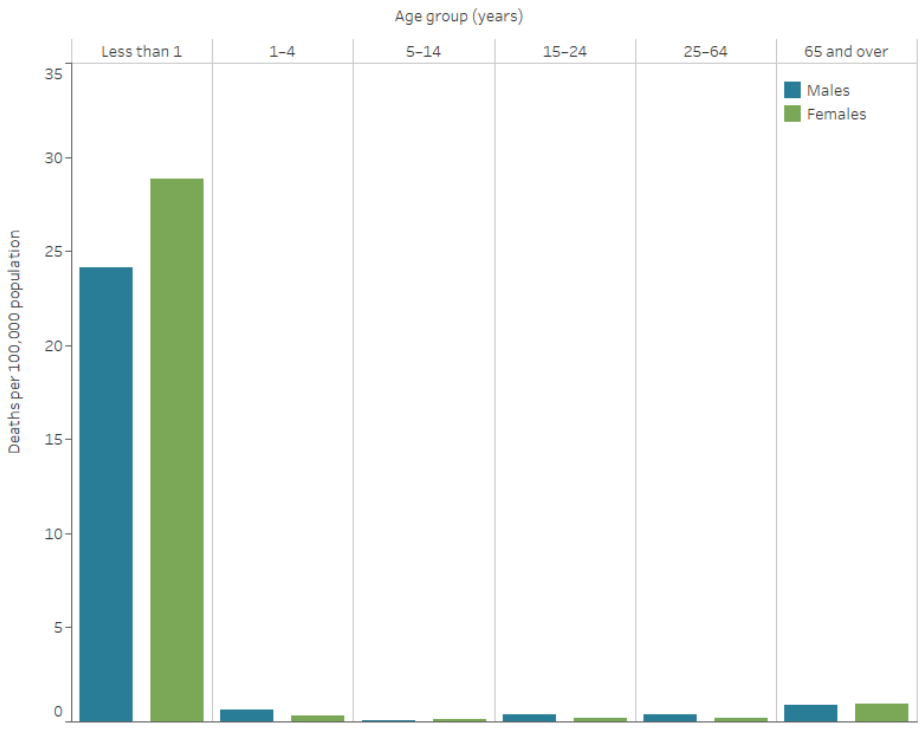

Figure 4: Congenital heart disease death rates, by age and sex, 2021

Notes
1. Age-standardised to the 2001 Australian Standard Population.
2. Deaths are counted according to year of registration of death.
3. Deaths registered in 2021 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

Trends

Both the number and rate of congenital heart disease deaths declined between 1980 and 2021:

- the number of congenital heart disease deaths declined by 45%, from 310 to 171
- 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 in 2021.

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, 1980–2021

The line chart shows age-standardised congenital heart disease death rates declined between 1980 and 2021, from 2.1 to 0.7 and 1.6 to 0.6 per 100,000 population for males and females, respectively.

Figure 5: Congenital heart disease death rates, by sex, 1980–2021

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 2019–2021, there were 29 deaths from congenital heart disease among Aboriginal and Torres Strait Islander people in jurisdictions with adequate identification of Indigenous status, a rate of 1.3 per 100,000 population.

After adjusting for differences in the age structure of the populations, the congenital heart disease death rate for Indigenous people was 1.7 times as high as for non-Indigenous people (Figure 6).

Socioeconomic area

In 2019–2021, the age-standardised congenital heart disease death rate in the lowest socioeconomic areas was 2.3 times as high as in the highest socioeconomic areas (Figure 6).

Remoteness area

In 2019–2021, the age-standardised congenital heart disease death rates in *Major cities, Inner regional* and *Outer regional* areas were similar (Figure 6).

Figure 6: Congenital heart disease death rates, by population group and sex, 2019–2021

The horizontal bar chart shows in 2019–2021, 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.

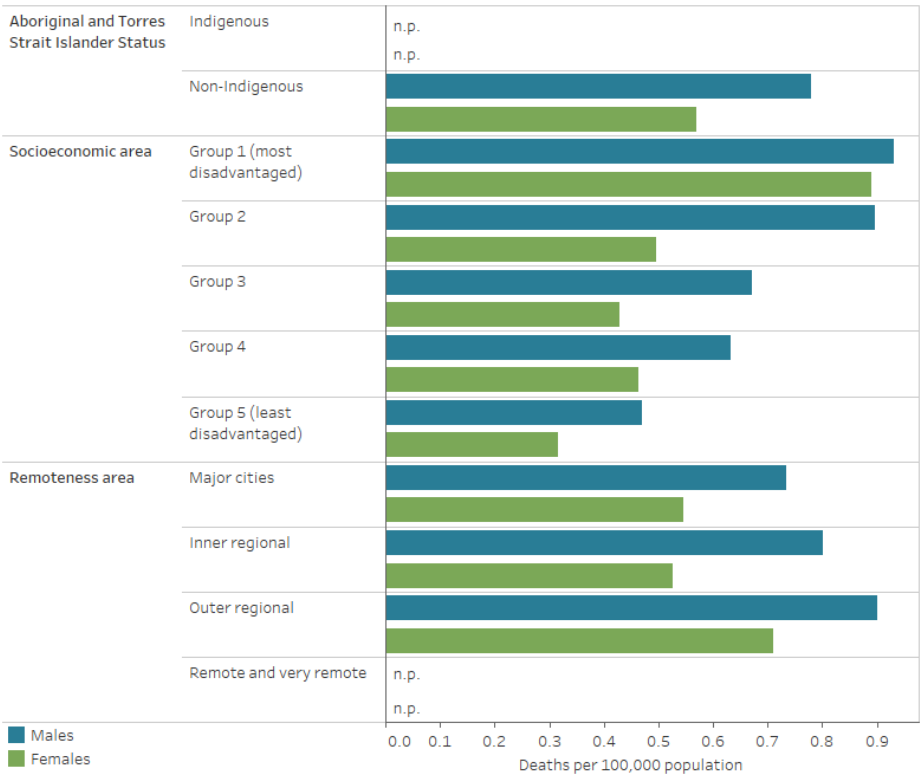

Figure 6: Congenital heart disease death rates, by population group and sex, 2019–2021

Notes

n.p. = not published.

Chart: AIHW. Source: AIHW National Mortality Database.

http://www.aihw.gov.au

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Comorbidity of heart, stroke and vascular disease

Page highlights:

Prevalence of cardiovascular disease, diabetes and chronic kidney disease

- In 2011–12, an estimated 1.2 million adults were living with at least 2 of cardiovascular disease, diabetes or chronic kidney disease.

Hospitalisations of cardiovascular disease, diabetes and chronic kidney disease

- In 2020–21, there were 341,000 hospitalisations where cardiovascular disease was present with diabetes and/or chronic kidney disease.

Deaths from cardiovascular disease, diabetes and chronic kidney disease

- In 2021, at least 2 of cardiovascular disease, diabetes and chronic kidney disease were recorded on 26,800 adult death certificates, representing 16% of all adult deaths.

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.

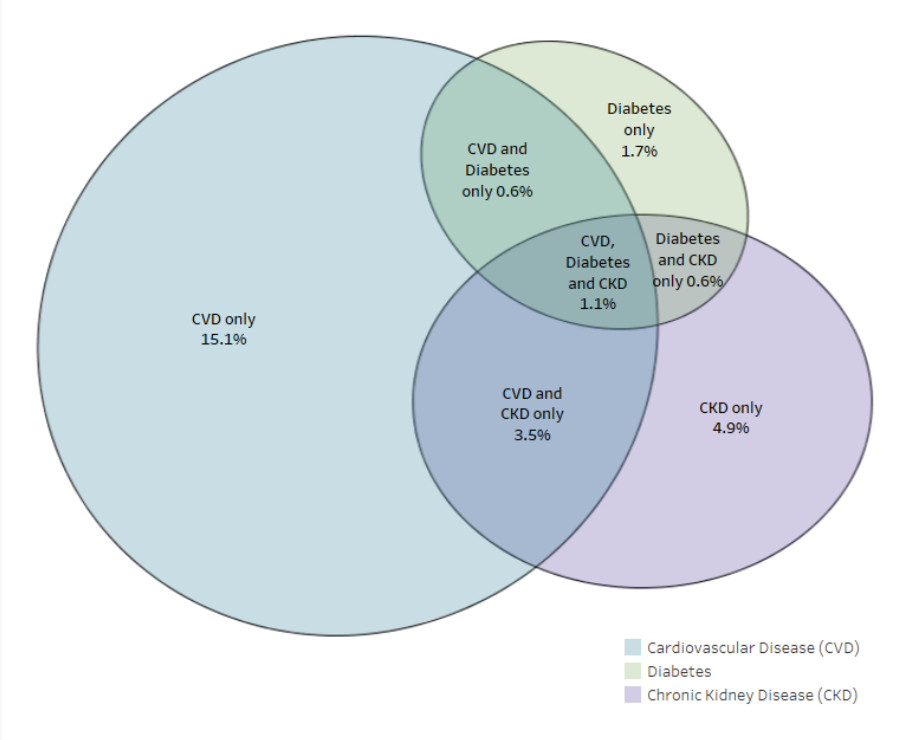

Figure 1: Prevalence of CVD, diabetes, CKD and their comorbidity, persons aged 18 and over, 2011-12

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 2020–21, 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 22% of all non-dialysis hospitalisations for people 18 and older.

Most hospitalisations (1.2 million, or 54%) included CVD, either alone (838,000, or 38%) or in combination with diabetes and/or CKD (341,000, or 15%) (Figure 2).

The most common comorbidity was CVD and diabetes (179,000, or 8.1%), with CVD and CKD present in 51,800 hospitalisations (2.4%). There were a further 110,000 hospitalisations (5.0%) where all 3 diseases were present.

Figure 2: Hospitalisations (excluding dialysis) with CVD, diabetes or CKD, persons aged 18 and over, 2020–21
The Venn diagram shows the overlapping proportion of hospitalisations among adults in 2020–21 with CVD, diabetes or CKD as the principal and/or additional diagnosis. 38% of hospitalisations were for CVD only, but 5.0% of hospitalisations had all 3 conditions.

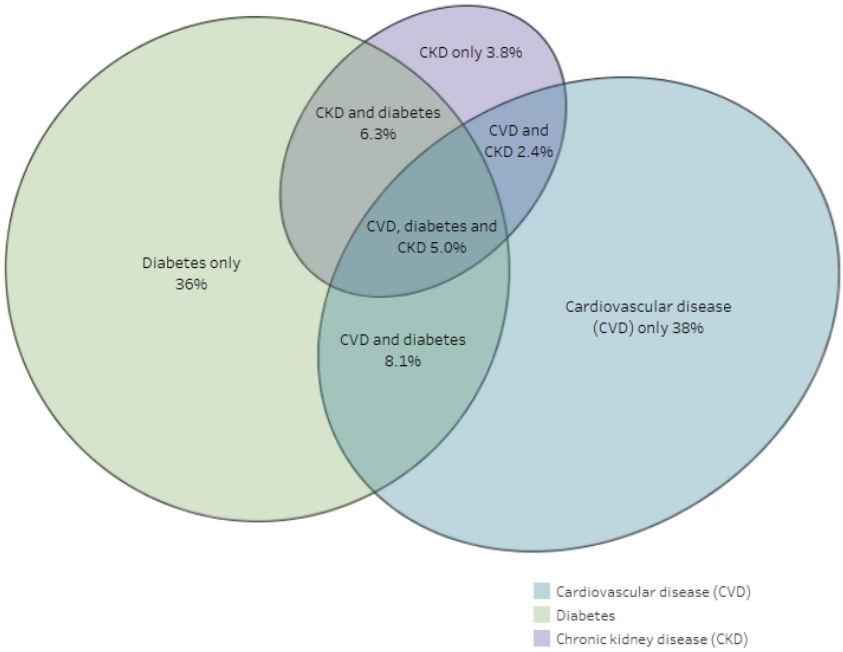

Figure 2: Hospitalisations (excluding dialysis) with CVD, diabetes or CKD, persons aged 18 and over, 2020–21

Note: CKD excludes dialysis as a principal diagnosis.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database (NHMD).
https://www.aihw.gov.au

Age and sex

The rate of hospitalisations with comorbidity of CVD, diabetes and/or CKD increases with age.

In 2020–21, for example, people aged 45–64 were 7 times as likely to have a combination of CVD and diabetes recorded on their hospital record as people aged 18–44. For those aged 65 and over, this difference increased to 30 times the rate of those aged 18–44.

Men were more likely to be hospitalised with comorbidity than women. After adjusting for differences in the age structure of the populations, the rate of hospitalisation where all 3 diseases were recorded was 1.7 times as high for men as for women.

Hospital comorbidity in the Aboriginal and Torres Strait Islander population

In 2020–21, there were 96,600 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, 34,800 (36%) recorded 2 or 3 of the diseases — 8,400 (8.7%) recorded diabetes and CVD together, 1,800 (1.8%) recorded CVD and CKD, 15,700 (16%) recorded CKD and diabetes, and 8,900 (9.2%) recorded all 3 diseases (Figure 3).

A higher proportion of Indigenous adults had CVD, diabetes and CKD hospital comorbidity, compared with non-Indigenous adults (36% and 21%). The proportion of Indigenous hospitalisations with all 3 diseases (9.2%) was also higher than in the non-Indigenous population (4.9%).

After adjusting for differences in the age structure of the populations, the rate of hospitalisation of Indigenous people recording all 3 diseases was 6 times as high as the rate of non-Indigenous people.

Figure 3: Hospitalisations (excluding dialysis) with CVD, diabetes or CKD, Aboriginal and Torres Strait Islander people aged 18 and over, 2020–21

The Venn diagram shows the overlapping proportion of hospitalisations among Indigenous adults in 2020–21 with CVD, diabetes or CKD as the principal and/or additional diagnosis. 20% of hospitalisations were for CVD only, but 9.2% of hospitalisations had all 3 conditions.

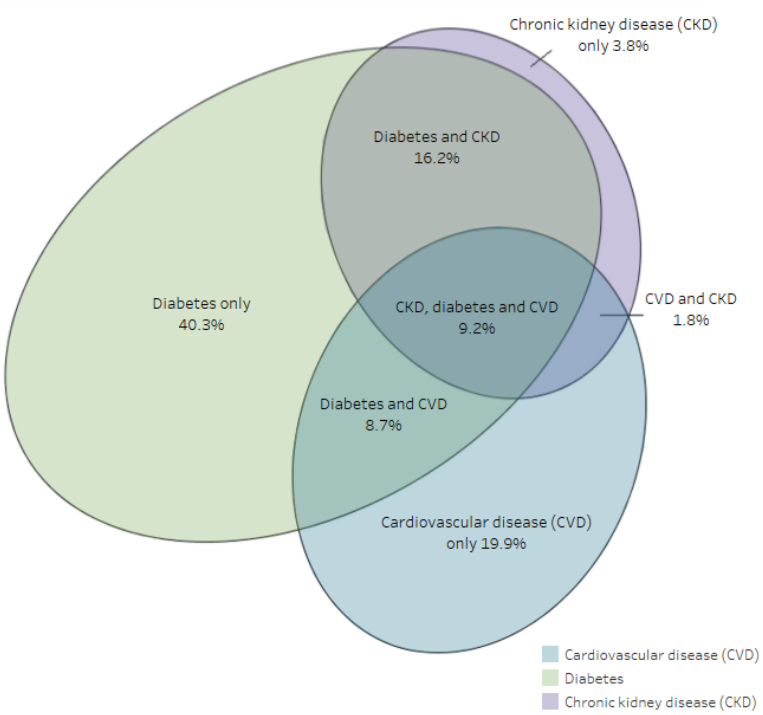

Figure 3: Hospitalisations (excluding dialysis) with CVD, diabetes or CKD, Aboriginal and Torres Strait Islander people aged 18 and over, 2020–21

Note: CKD excludes dialysis as a principal diagnosis.

Chart: AIHW. Source: AIHW National Hospital Morbidity Database (NHMD).
https://www.aihw.gov.au

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 169,800 deaths registered among persons aged 18 and over in Australia in 2021, CVD, diabetes and CKD were listed as underlying or associated causes in 99,100 of these.

CVD was listed as either an underlying or associated cause of death in 90,900 (54% of adult deaths), while diabetes (19,300) and CKD (19,900) were each associated with about 10%. In total, 58% of adult deaths had at least 1 of these diseases recorded.

At least 2 of CVD, diabetes and CKD were recorded on 26,800 adult death certificates, representing 16% of all adult deaths:

- CVD and diabetes together contributed to 11,100 adult deaths (6.5%)
- CVD and CKD together contributed to 10,600 adult deaths (6.3%)
- Diabetes and CKD together contributed to 889 adult deaths (0.5%)
- CVD, diabetes and CKD contributed to 4,200 adult deaths (2.4%) (Figure 4).

Figure 4: CVD, diabetes and CKD listed as any cause of death (% of all adult deaths), 2021

The Venn diagram shows the proportion of deaths among adults in 2021 with CVD, diabetes or CKD as any cause of death. CVD was recorded as the only cause in 38% of deaths, and all 3 diseases were recorded as the underlying or associated cause in 2.4% of deaths.

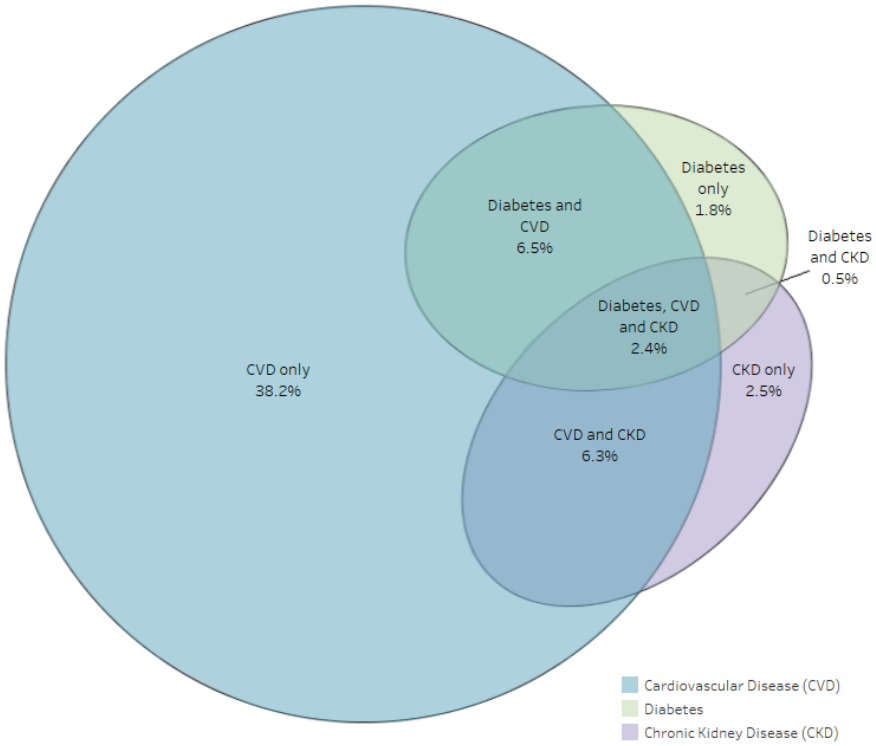

Figure 4: CVD, diabetes and CKD listed as any cause of death (% of all adult deaths), 2021

Note: Due to rounding, percentages may not add up to 100.
Chart: AIHW. Source: AIHW National Mortality Database
https://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 and hypertensive diseases.

Non-CVD causes that were commonly associated with CVD deaths in 2021 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, 2021

Coronary heart disease (I20–I25) **N=17,331**	**Cerebrovascular diseases (I60–I69)** **N=9,800**	**Heart failure (I50–I51)** **N=3,150**
Heart failure (I50) 4,369 (25%)	Hypertensive diseases (I10–I15) 2,681 (27%)	Diseases of urinary system (N00–N39) 803 (26%)
Hypertensive diseases (I10–I15) 4,239 (25%)	Dementia, incl. Alzheimer's disease (F01, F02, F03, F05.1, G30) 1,671 (17%)	Symptoms, signs and abnormal clinical and laboratory findings (R00–R99) 509 (16%)
Coronary heart diseases (I20–I25) 4,016 (23%)	Cerebrovascular diseases (mostly stroke) (I60–I69) 1,446 (15%)	Influenza, pneumonia (J09–J18) 306 (9.7%)

Diseases of urinary system (N00–N39) 2,694 (16%)	Symptoms, signs and abnormal clinical and laboratory findings (R00–R99) 1,373 (14%)	Dementia, incl. Alzheimer's disease (F01, F02, F03, F05.1, G30) 293 (9.3%)
Diabetes mellitus (E10–E14) 2,669 (15%)	Atrial fibrillation (I48) 1,036 (11%)	Cardiac arrest (I46) 258 (8.2%)

Source: AIHW National Mortality Database.

Cardiovascular diseases commonly associated with other causes of death

CVD was listed as an associated cause of death for 45% of all deaths registered in 2021. When a type of CVD was listed as an associated cause in 2021, the most common underlying causes of death include:

- Heart failure as associated cause: common underlying causes included coronary heart disease (22%), malignant neoplasms (cancer) (11%), chronic lower respiratory diseases (8.6%)
- Hypertensive disease as associated cause: common underlying causes include coronary heart disease (19%), malignant neoplasms (cancer) (15%), cerebrovascular diseases (mostly stroke) (12%)
- Coronary heart disease as associated cause: common underlying causes include another form of coronary heart disease (18%), malignant neoplasms (cancer) (18%), diabetes mellitus (13%)
- Atrial fibrillation as associated cause: common underlying causes include coronary heart disease (18%), malignant neoplasms (cancer) (17%), cerebrovascular diseases (mostly stroke) (9.0%).

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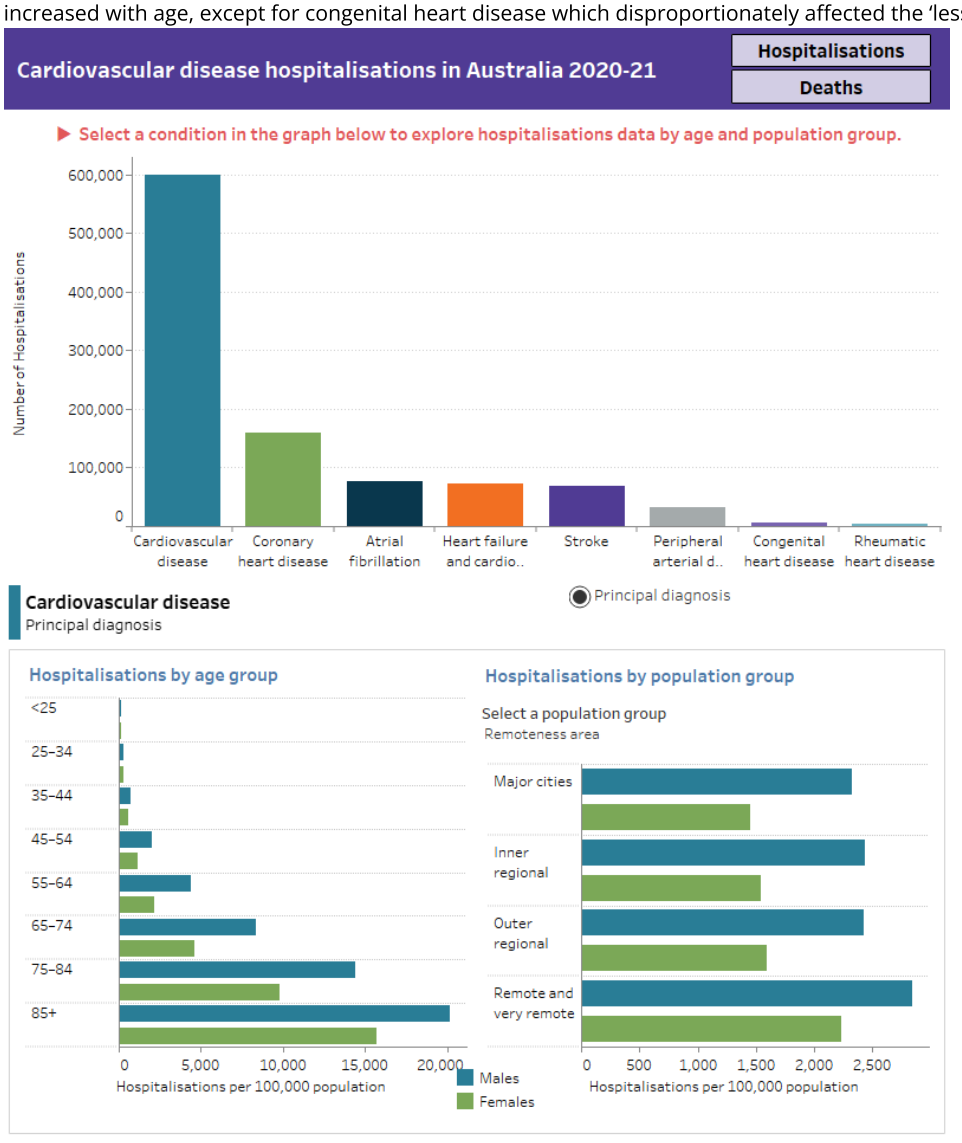
Sypek MP, Dansie KB, Clayton P, Webster AC, Mcdonald S (2018) Comparison of cause of death between Australian and New Zealand Dialysis and Transplant Registry and the Australian National Death Index. Nephrology 24: 322–9.

Explore the data

These data visualisations show hospitalisations and deaths due to Cardiovascular disease in 2020-21. The data can be explored by condition and by age group, Aboriginal and Torres Strait Islander status, Socioeconomic area 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.



Notes

Source: Heart, Stroke and Vascular Disease: Australian Facts.
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 2020-21, there was a gradual decline in the age-standardised rate of hospitalisations and deaths for Cardiovascular disease. The age-standardised hospitalisation an death rates was higher for males than females and the age-specific rate of hospitalisations and deaths for Cardiovascular disease increased with age.

Cardiovascular disease hospitalisation trends

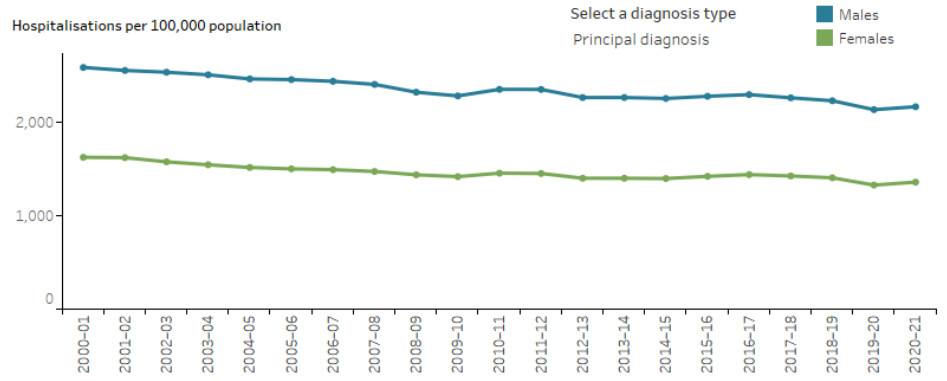
Use the menus below to explore trends in cardiovascular disease hospitalisations over time by age group and sex.

Hospitalisations | **Deaths**

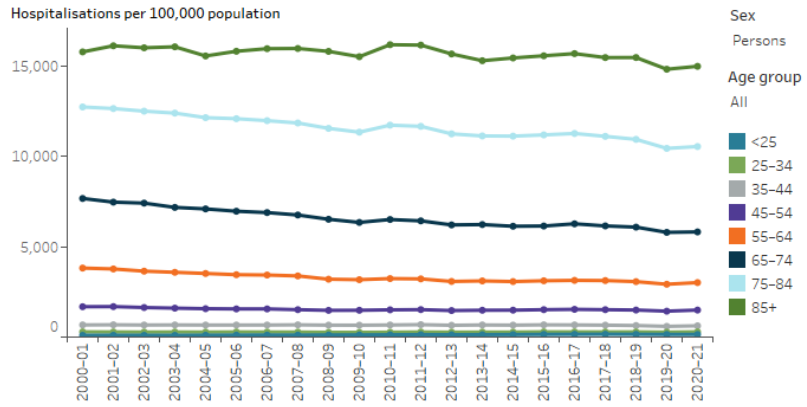
Select a condition

Cardiovascular disease (acute only)

Trends in age-standardised hospitalisation rates for cardiovascular disease (acute only)



Trends in age-specific hospitalisation rates for cardiovascular disease (acute only)



Notes

Source: Heart, Stroke and Vascular Disease: Australian Facts.
http://www.aihw.gov.au

Treatment and management

High blood pressure (hypertension)

was the most common chronic condition newly recorded for patients in 2018–19

600,000 hospitalisations

where CVD was recorded as the principal diagnosis, representing 5.1% of all hospitalisations in Australia

116 million PBS prescriptions

for cardiovascular medicines were dispensed to the Australian community in 2021–22

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

References

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Primary health care

Page highlights:

What cardiovascular problems do general practitioners manage?

- In a 2018–19 survey of general practitioner practices, high blood pressure (hypertension) was the single most common chronic condition.

Heart Health Checks

- In 2021–22, over 112,000 Heart Health Checks (males 55,600, females 57,000) were processed by Medicare.

Prescriptions ordered by general practitioners

- In 2018–19, medicines for the cardiovascular system accounted for the largest proportion of prescriptions (31%) ordered by general practitioners for patients.

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 2021–22, over 112,000 Heart Health Checks (males 55,600, females 57,000) were processed by Medicare. Checks were most commonly conducted among people aged 55–64 (36,600) and 65–74 (33,400) (Services Australia 2022).

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.

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Medicines for cardiovascular disease

Page highlights:

Supply of cardiovascular medicines

- Almost 116 million Pharmaceutical Benefits Scheme prescriptions for cardiovascular medicines were supplied to the Australian community in 2021–22.

Use of cardiovascular medicines

- In a 2018–18 survey, 79% of the estimated 1.2 million Australian adults living with heart, stroke or vascular disease had used a cardiovascular system medicine in the last 2 weeks.

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.

Almost 116 million PBS prescriptions for cardiovascular medicines were dispensed to the Australian community in 2021–22. These comprised 37% of total PBS prescriptions (Department of Health and Aged Care 2022).

- 68% of these medicines (79 million) were subsidised by the PBS, with the remainder (37 million) priced below the co-payment level.
- Rosuvastatin (15.2 million) and atorvastatin (11.8 million), both lipid-modifying medicines – and perindopril (6.9 million), a blood pressure lowering medicine – were among the most commonly supplied PBS medicines in Australia in 2021–22.

- 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.

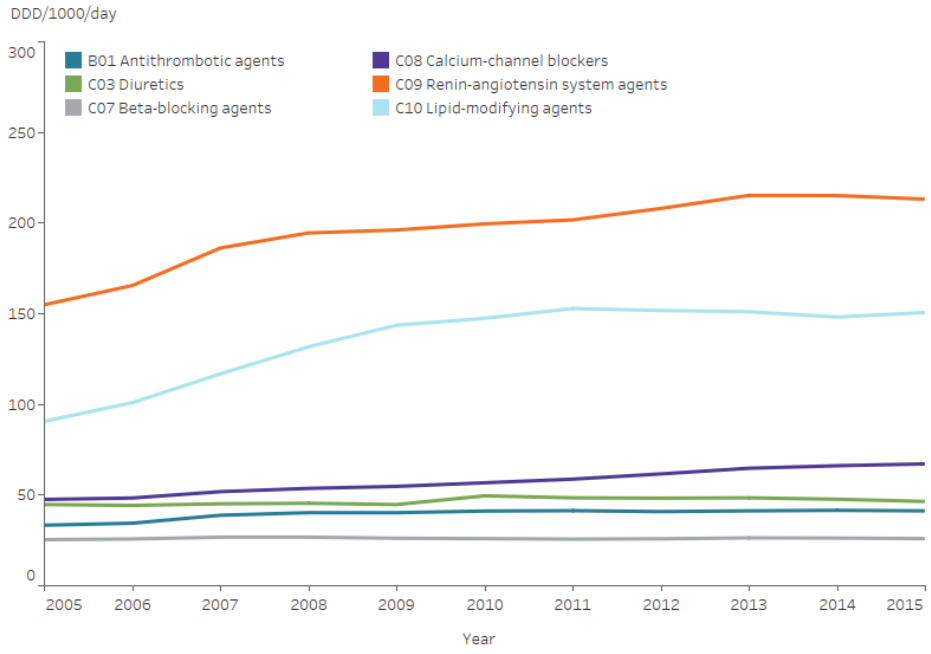

Figure 1: Supply of cardiovascular medicines, 2005-2015

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 $45.6 million dollars were supplied to participating Aboriginal Health Services in 2021–22 (Department of Health and Aged Care 2023).

Use of cardiovascular medicines

More than three-quarters (79%) of the estimated 1.2 million Australian adults aged 18 and over who were living with 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%).

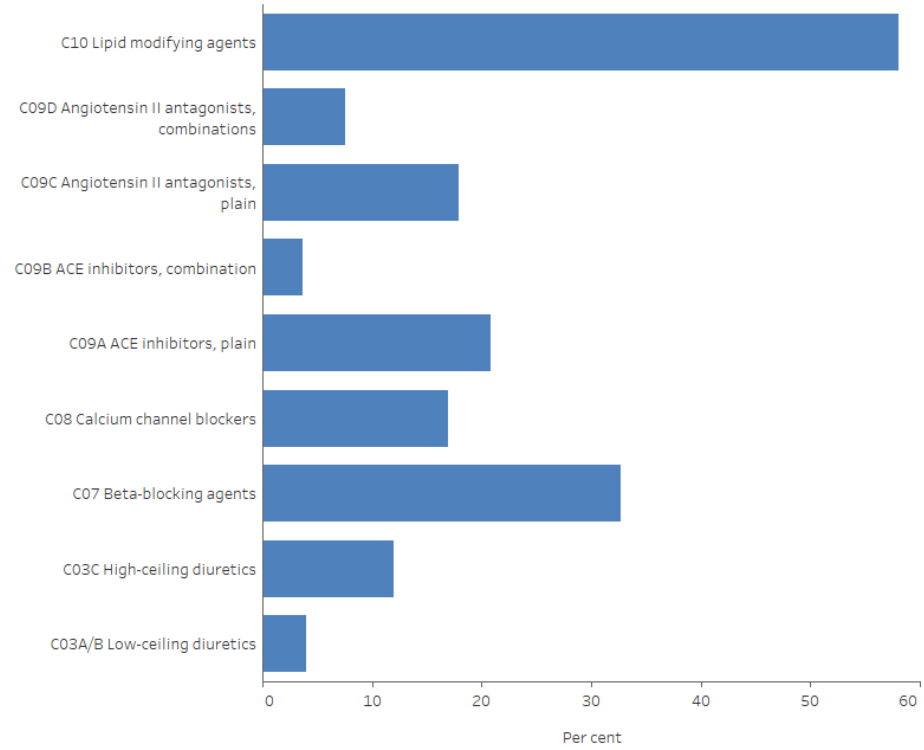

Figure 2: Adults aged 18 years and over with a cardiovascular condition taking cardiovascular system medications in the last 2 weeks, 2017-18

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

References

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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 339,000 presentations to Australian public hospital EDs with a principal diagnosis of cardiovascular disease (CVD) in 2020–21 – 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 2020–21, 15,500 (4.6%) were triaged as 'resuscitation' and needed immediate care, 149,700 (44%) were 'emergency' (within 10 minutes), 127,200 (38%) were 'urgent' (within 30 minutes), 42,200 (12%) were 'semi-urgent' (within 60 minutes) and 4,600 (1.4%) were 'non-urgent' (within 120 minutes) (AIHW 2022).

Almost two-thirds (63%) of ED presentations with a principal diagnosis of CVD were subsequently admitted to the hospital they presented to in 2020–21, with another 30% departing without being admitted or referred, and 5.8% referred to another hospital for admission.

In addition to ED presentations with a principal diagnosis of CVD, there were 385,000 ED presentations with symptoms of 'Pain in throat and chest' (ICD-10-AM R07) in 2020–21. Of these, 158,000 (41%) were subsequently admitted to hospital for further investigation and treatment (AIHW 2022).

Age and sex

In 2020–21:

- there were 179,000 male and 160,000 female presentations to Australian public hospital ED with a principal diagnosis of CVD
- the age-standardised male rate of presentation was 1.2 times as high as the female rate
- more than half of presentations (192,000, or 57%) were among people aged 65 and over
- presentation rates increased with age, to be highest among males and females aged 85 and over – more than twice as high as age 65–74.
- at age 55–64, the male rate of presentation was 1.5 times as high as the female rate. At age 25–34, the female rate of presentation was 1.1 times as high as the male rate.

Variation among population groups

In 2020–21, after adjusting for differences in the age structure of the populations:

- Indigenous people presented to EDs with a principal diagnosis of CVD at 2.4 times the rate of non-Indigenous people
- rates increased with remoteness, being 1.7 times as high in *Remote/very remote* areas compared to *Major cities*
- rates for people living in the lowest socioeconomic areas were 1.9 times as high as for people in highest socioeconomic areas.

Figure 1: Emergency Department presentation rates, principal diagnosis, by age group, 2020–21

The line chart shows the increasing rate of Emergency Department presentations for CVD with age in 2020–21, most notably for heart failure and stroke from age 65–74.

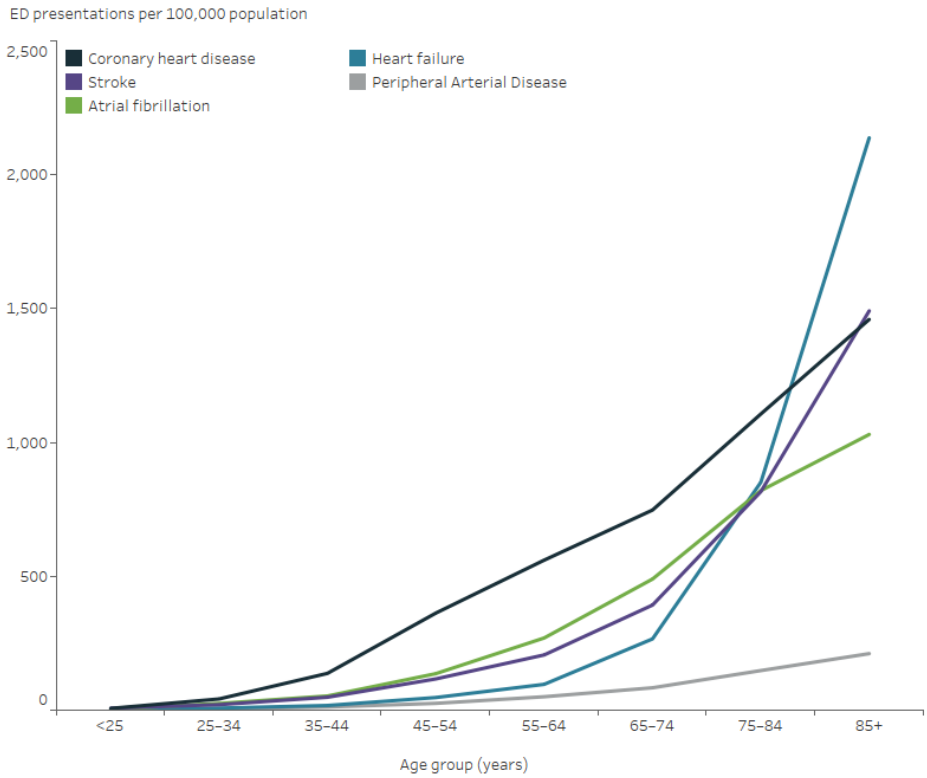


Figure 1: Emergency Department presentation rates, principal diagnosis, by age group, 2020-21

Note: Includes persons with missing information on age and/or sex.

Chart: AIHW. *Source:* AIHW National Non-admitted Patient Emergency Department Care Database.
http://www.aihw.gov.au

Principal diagnosis

In 2020–21:

- there were 75,900 ED presentations with a principal diagnosis of coronary heart disease (CHD), 43,600 with atrial fibrillation (AF), 41,100 with stroke, 34,400 with heart failure and cardiomyopathy, and 8,200 with peripheral arterial disease (PAD)
- the age-standardised rate of ED presentation by principal diagnosis for males compared to females varied, from 1.2 times as high for AF, 1.3 for stroke, 1.4 times for heart failure and cardiomyopathy, 1.7 for CHD and 1.9 times for PAD
- Indigenous Australians had much higher age-standardised ED presentation rates than non-Indigenous people for CHD (3.5 times as high) and for heart failure (3.7 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 (2.8 times as high), heart failure and cardiomyopathy (2.5 times as high) and PAD (2.4 times as high)
- the rate of admission to hospital following ED presentation varied by principal diagnosis, from 62% for AF presentations, to 77% for CHD presentations, and 83% for stroke and for heart failure and cardiomyopathy presentations.

Reference

AIHW 2022. My Hospitals. Emergency department care. Emergency department care 2020–21 data. Table 4.6–4.10. Canberra: AIHW.

Hospital care and procedures

Page highlights:

Hospitalisation for all cardiovascular disease

- In 2020–21, there were 600,000 hospitalisations where cardiovascular disease was recorded as the principal diagnosis.
- In 2020–21, cardiovascular hospitalisation rates were around 40% higher among those living in *Remote and very remote* areas compared with those in *Major cities.*

Hospital procedures

- In 2020–21, there were 146,000 coronary angiography procedures reported for patients admitted to hospital – 97,200 (67%) for males and 48,900 (33%) for females.

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 2021, there were 103 coronary care units in Australian public hospitals and a further 39 cardiac surgery units (AIHW 2022)
- in 2021, there were 93 specialised stroke units (Stroke Foundation 2021).

Hospitalisation for all cardiovascular disease

In 2020–21, there were 600,000 hospitalisations where CVD was recorded as the principal diagnosis. This represented 5.1% of all hospitalisations in Australia in 2020–21.

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 these, 542,000 (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 2020–21:

- 27% had a principal diagnosis of coronary heart disease, followed by
- atrial fibrillation (13%)
- heart failure and cardiomyopathy (12%)
- stroke (11%)
- peripheral arterial disease (5.5%)
- hypertensive disease (2.7%)
- rheumatic heart disease (0.8%) (Figure 1).

Figure 1: Major causes of cardiovascular disease hospitalisations, principal diagnosis, by sex, 2020–21

The bar chart shows the number of hospitalisations for selected cardiovascular diseases in 2020–21, ranging from 160,000 for a principal diagnosis of coronary heart disease to 4,600 for rheumatic heart disease.

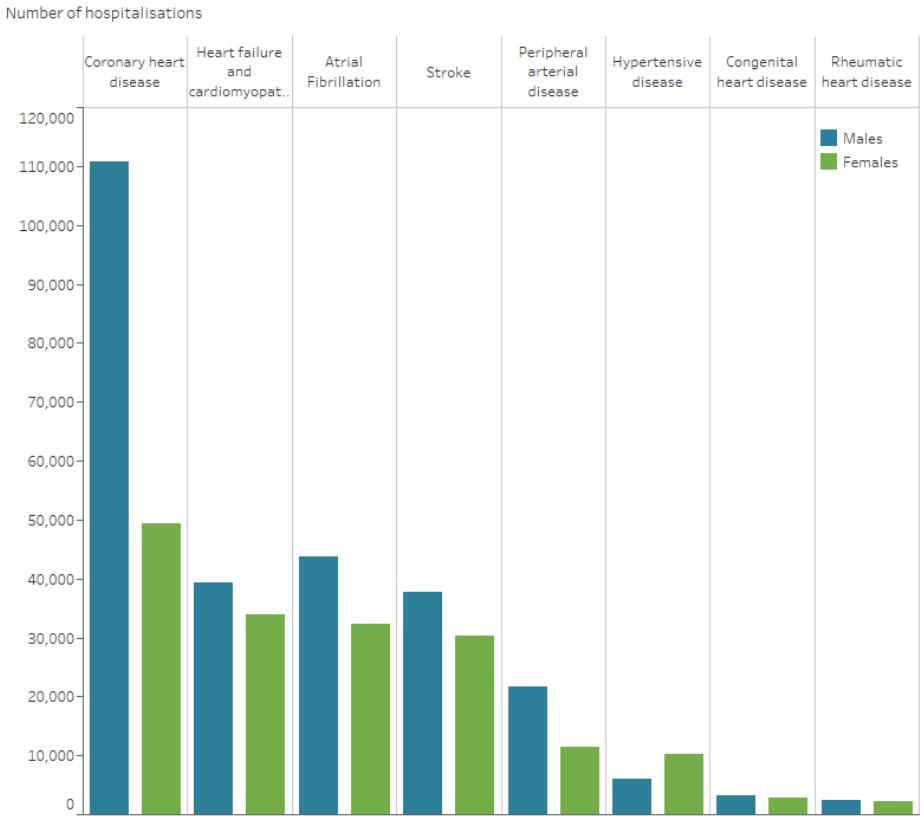


Figure 1: Major causes of cardiovascular disease hospitalisations, principal diagnosis, by sex, 2020–21

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

Age and sex

In 2020–21, rates of hospitalisation with CVD as the principal diagnosis:

- were 1.6 times as high for males compared with females, after adjusting for differences in the age structure of the populations. Age-specific rates were higher among males than females across all age groups (Figure 4)
- increased with age, with over 4 in 5 (84%) 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—1.4 times as high as those in the 75–84 age group for males and 1.6 times as high among females (Figure 2).

Figure 2: Cardiovascular disease hospitalisation rates, principal diagnosis, by age and sex, 2020–21

The bar chart shows cardiovascular disease hospitalisation rates by age group in 2020–21. These were highest among men and women aged 85 and over (20,200 and 15,700 per 100,000 population).

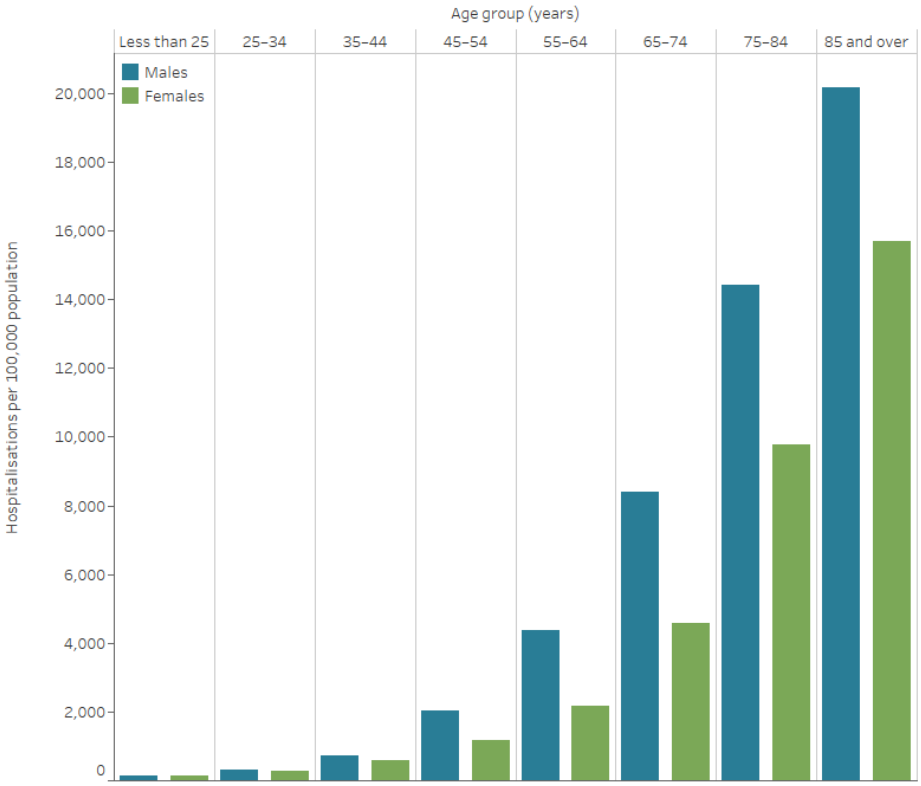


Figure 2: Cardiovascular disease hospitalisation rates, principal diagnosis, by age and sex, 2020–21

Note: Includes persons with missing information on age and/or sex.

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

Trends

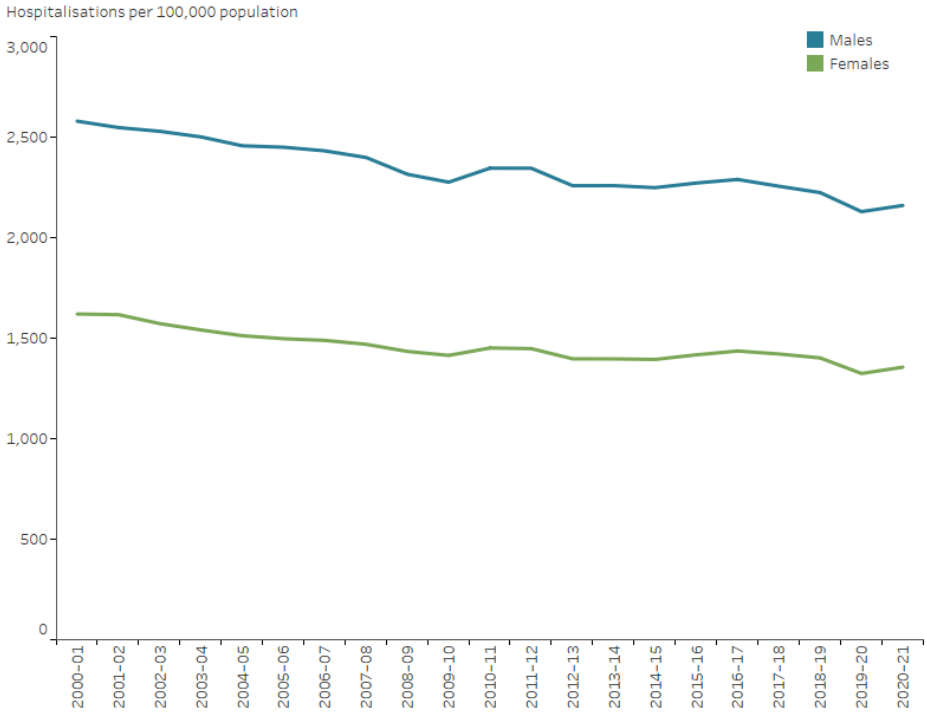
The number of acute care hospitalisations with CVD as the principal diagnosis increased by 38% between 2000–01 and 2020–21, from 393,000 to 542,000 hospitalisations.

Despite increases in the number of hospitalisations, the age-standardised rate declined by 16% over this period, from 2,100 to 1,740 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 2020–21

The line chart shows declines in age-standardised rates of male and female acute care CVD hospitalisations between 2000–01 and 2020–21, from 2,570 to 2,160 per 100,000 population for males, and from 1,614 to 1,356 for females.



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.
3. Includes persons with missing information on age and/or sex.

Chart: AIHW. *Source:* AIHW National Hospital Morbidity Database.
http://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 5.9 days in 2020–21. In 2020–21, 28% of people admitted to hospital with CVD were discharged the same day.

Of those hospitalised with CVD in 2020–21, patients with stroke tended to stay longest – an average of 11.6 days, followed by patients with congenital heart disease (9.2 days) peripheral arterial disease (6.7 days), and coronary heart disease (4.3 days).

Average length of stay in hospital increases with age. Those aged 85 and over stayed an average of 7.1 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 2020–21, there were around 17,300 hospitalisations with a principal diagnosis of CVD among Aboriginal and Torres Strait Islander people, a rate of 2,000 per 100,000 population.

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

- the rate among Indigenous Australians was 1.8 times as high as the non-Indigenous rate
- the disparity between Indigenous and non-Indigenous Australians was greater for females—2.2 times as high compared with 1.6 times as high for males.

Socioeconomic area

In 2020–21, CVD hospitalisation rates were almost 20% higher for people living in the lowest socioeconomic areas compared with those in the highest socioeconomic areas, after adjusting for differences in the age structure of the populations .

The disparity between the lowest and highest socioeconomic areas was greater for females than males (1.2 and 1.1 times as high) (Figure 4).

Remoteness area

In 2020–21, CVD hospitalisation rates were around 40% higher among those living in *Remote and very remote* areas compared with those in *Major cities*, after adjusting for differences in the age structure of the populations.

This largely reflects disparities in female rates (1.5 times as high), compared to male rates (1.2 times as high).

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 2020–21, 19% 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 9% 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, 2020–21
The horizontal bar chart shows that male and female CVD hospitalisation rates in 2020–21 were higher among Indigenous Australians, people living in the lowest socioeconomic areas, and people living in remote and very remote areas.

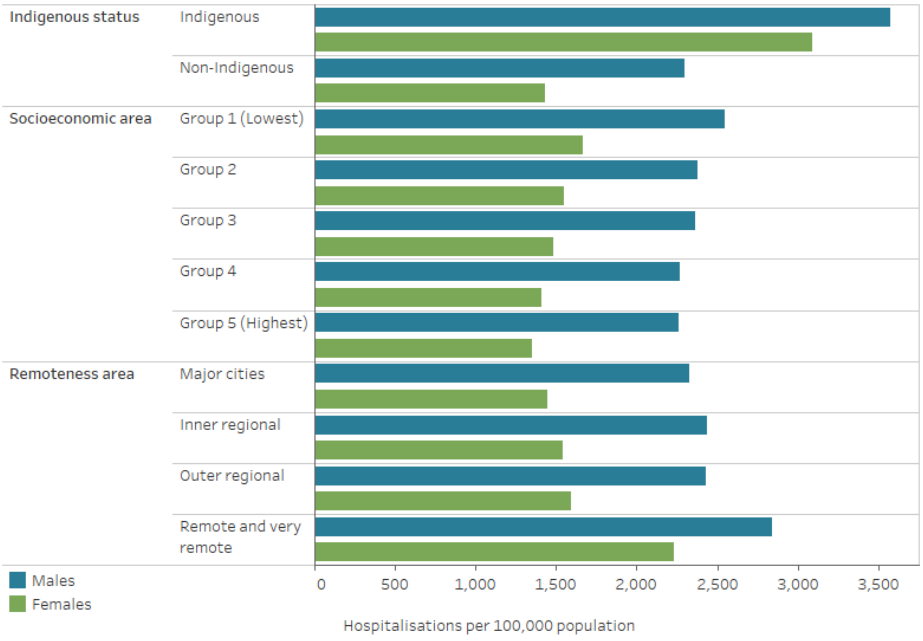


Figure 4: Cardiovascular disease hospitalisation rates, principal diagnosis, by population group and sex, 2020–21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Includes persons with missing information on age and/or sex. Excludes persons whose Indigenous status, remoteness area and/or socioeconomic area was missing.
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

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 2020–21, there were 146,000 coronary angiography procedures reported for patients admitted to hospital – 97,200 (67%) for males and 48,900 (33%) for females.
- Between 2000–01 and 2020–21, the age-standardised rate of coronary angiography procedures in males increased from 572 to 652 per 100,000 population (14%), and from 263 to 295 per 100,000 population (12%) 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 2020–21, there were 49,000 echocardiography procedures reported for patients admitted to hospital – 33,100 (68%) for males and 15,500 (32%) for females.
- The age-standardised rate of echocardiography procedures was 225 per 100,000 population in males, and 99 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 2020–21, 48,000 PCIs were performed on patients admitted to hospital – 36,100 (75%) for males and 12,000 (25%) for females (Figure 1).
- Between 2000–01 and 2020–21, the age-standardised rate of PCIs increased from 178 to 243 per 100,000 population (37%) in males, and from 57 to 72 per 100,000 population (26%) 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 2020–21, there were 12,700 CABG procedures performed on patients admitted to hospital – 10,500 (83%) for males and 2,200 (17%) for females (Figure 1).
- Between 2000–01 and 2020–21, the age-standardised rate of CABG decreased from 140 to 69 per 100,000 population (–51%) in males, and from 39 to 13 per 100,000 population (–67%) 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 5: Percutaneous coronary interventions and coronary artery bypass grafts, by sex, 2000–01 to 2020–21
The line chart shows that the number of percutaneous coronary interventions for both males and females increased between 2000–01 and 2020–21, whereas the number of coronary artery bypass grafts declined.

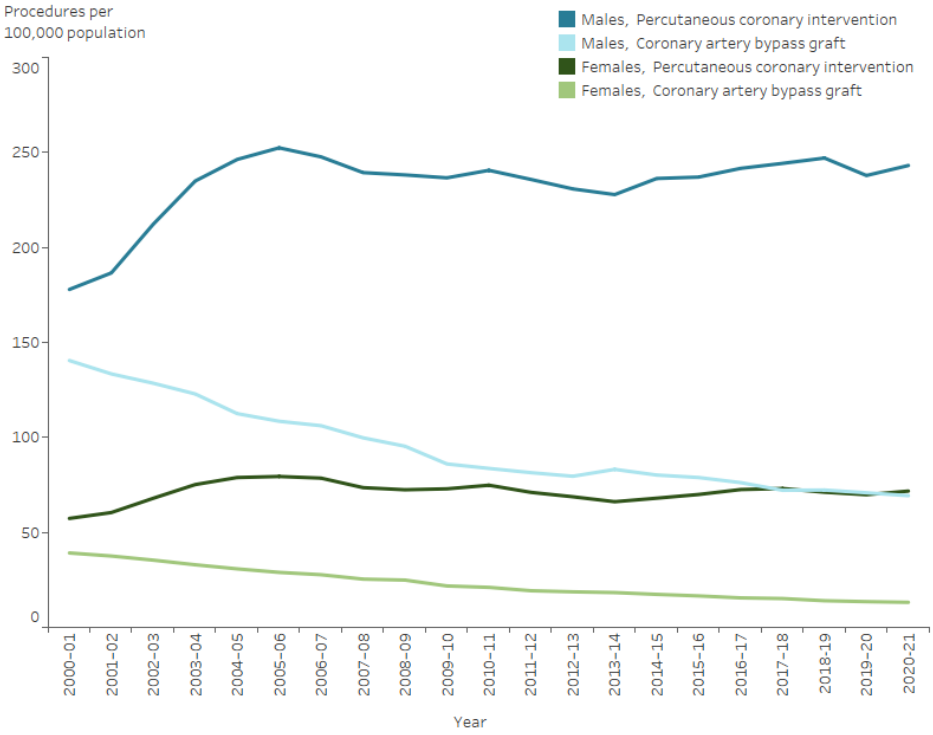


Figure 5: Percutaneous coronary interventions and coronary artery bypass grafts, 2000-01 to 2020-21

Notes:
1. Age-standardised to the 2001 Australian Standard Population.
2. Hospitals procedures are for admitted patients only.
3. Includes persons with missing information on age and/or sex.

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 2020–21, there were 12,000 heart valve repair or replacement procedures performed on patients admitted to hospital – 7,600 (64%) for males and 4,400 (36%) for females.
- The age-standardised rate of heart valve repair or replacement procedures was 52 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 2020–21, there were 19,900 pacemaker insertion procedures performed on patients admitted to hospital – 11,900 (60%) for males and 8,000 (40%) for females.
- The age-standardised rate of pacemaker insertion procedures was 79 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 2020–21, there were 4,000 cardiac defibrillator implant procedures performed on patients admitted to hospital – 3,100 (77%) for males and 909 (23%) for females.

- The age-standardised rate of cardiac defibrillator implant procedures was 21 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 2020–21, there were 1,900 carotid endarterectomy procedures performed on patients admitted to hospital – 1,400 (71%) for males and 550 (29%) for females.
- The age-standardised rate of carotid endarterectomy procedures was 8.9 per 100,000 population in males, and 3.2 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 generally used to treat severe forms of heart failure or coronary artery disease.

- In 2020–21, there were 129 heart transplants performed – 84 (65%) for males and 45 (35%) for females.
- The age-standardised rate of heart transplants was 0.6 per 100,000 population in males, and 0.3 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 421 deceased organ donors in 2021 in Australia, 117 (28%) had a heart retrieved. From these heart donors there were 112 heart transplant recipients. Of these, 4 received heart/double lung transplants and 2 received a combined heart/kidney transplant (ANZOD 2022).

References

AIHW 2022. MyHospitals. Admitted patients. Hospital resources 2020–21 tables. Table 5.6. Canberra: AIHW.

ANZOD (Australia and New Zealand Organ Donation Registry) 2022. ANZOD Annual Report 2022 - external site opens in new window. ANZOD: Adelaide.

NHF (National Heart Foundation of Australia) & CSANZ (Cardiac Society of Australia and New Zealand) 2016. Australian clinical guidelines for the management of acute coronary syndromes 2016. Heart, Lung and Circulation 25: 895–951.

Stroke Foundation 2021. National Stroke Audit—acute services report 2021. Melbourne: Stroke Foundation.

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 2020–21 there were 215,000 cardiac rehabilitation service events conducted by allied health and/or clinical nurse specialists, lower than the 272,000 events in 2019–20 (AIHW 2022).

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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Gallagher R, Ferry C, Candelaria D, Ladak L & Zecchin R 2020. Evaluation of cardiac rehabilitation performance and initial benchmarks for Australia: an observational cross-state and territory snapshot study - external site opens in new window. Heart, Lung and Circulation.

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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 2020).

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 sixth national report 2021 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 2022).

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. 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 12% of total burden of disease in 2023—fourth behind cancer, mental and substance use disorders and musculoskeletal conditions

Coronary heart disease

was the leading single cause of burden in 2023, accounting for 5.4% of the total burden

9.5% of total allocated expenditure

in the Australian health system ($14.3 billion) attributed to CVD in 2020–21

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 2023*.

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 *Health system spending on disease and injury in Australia 2020-21* web report.

Learn more about the impact of cardiovascular disease by section:

- Burden of cardiovascular disease
- Expenditure on cardiovascular disease

Burden of cardiovascular disease

Page highlights:

What is burden of disease?

- In 2023, cardiovascular disease accounted for almost 12% of the total burden of disease (14% males, 10% females), ranking fourth as a disease group behind cancer, mental and substance use disorders and musculoskeletal conditions.

Leading causes

- Coronary heart disease was the leading single cause of burden for males, and sixth leading single cause for females in 2023.

First Nations people

- Cardiovascular disease accounted for 10% of total burden in First Nations people in 2018.

Contribution of risk factors

- The leading risk factor contributing to the total cardiovascular disease burden in 2018 was high blood pressure (36%).

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 2023*.

Note: The ABDS 2023 does not include estimates by Remoteness areas, Socioeconomic groups or risk factors. The most recent estimates are presented in the *Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2018* and *Australian Burden of Disease 2018: Interactive data on risk factor burden reports*.

In 2023, Australians lost an estimated 666,000 years of healthy life (DALY) due to all forms of cardiovascular disease (CVD), equivalent to 25.1 per 1,000 population.

CVD as a disease group accounted for almost 12% of the total burden of disease (14% males, 10% females), ranking fourth behind cancer, mental and substance use disorders and musculoskeletal conditions (Figure 1) (AIHW 2023).

Most of the burden from CVD (74%) came from years of life lost to premature death (YLL), with the remainder (26%) from years lived with illness and injury (YLD).

Figure 1: Cardiovascular disease and other burden of disease groups, 2023

The tree map shows the contribution of the major disease groups to the total burden of disease in Australia in 2023. CVD ranks fourth behind cancer, mental and substance use disorders and musculoskeletal conditions. Within the CVD disease group, coronary heart disease and stroke represent the major contributors to disease burden.

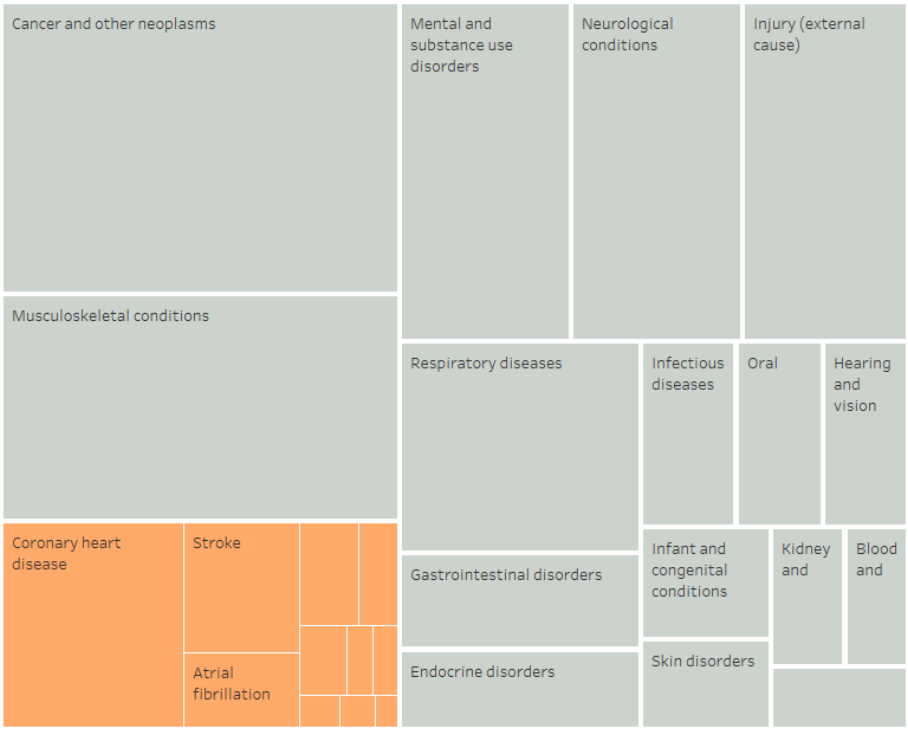

Figure 1: Cardiovascular disease and other burden of disease groups, 2023

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 2023, the burden from CVD:

- for males was 1.8 times as high as for females
- 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 (Figure 2).

Figure 2: Burden of disease for cardiovascular disease, by age group and sex, 2023

The bar chart shows the burden of disease for cardiovascular disease in 2023 increased with age, and was higher among males than females in all age groups.

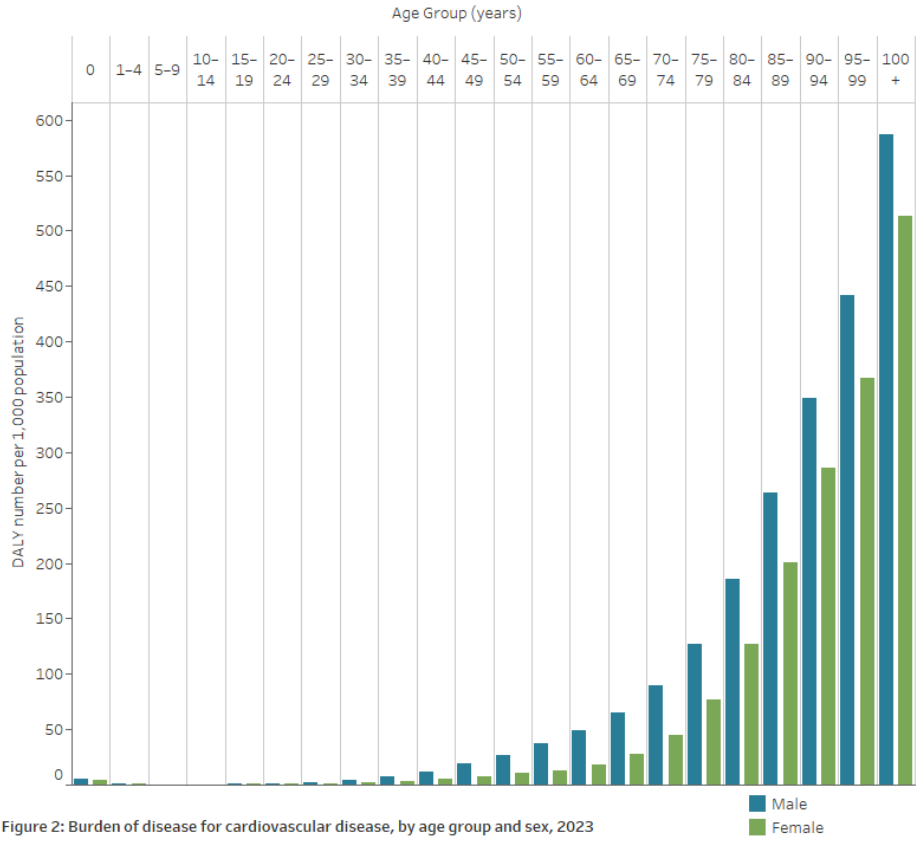

Figure 2: Burden of disease for cardiovascular disease, by age group and sex, 2023

Chart: AIHW. Source: AIHW Australian Burden of Disease Database.
http://www.aihw.gov.au

Population groups

In 2018, the burden from CVD:

- for people living in the lowest socioeconomic areas was 1.8 times as high as for the highest areas – 42% of DALY in the lowest socioeconomic areas could have been avoided if the burden was the same as the highest areas (AIHW 2021)
- in *Remote and very remote* areas was 1.9 times as high as in *Major cities* – 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 rate of burden from CVD fell by 47% between 2003 and 2023 – after adjusting for age.
- The fall in the rate of burden from CHD between 2003 and 2023 (58%) was similar to the fall in the rate of burden from stroke (53%).
- The 12% fall in the number of DALY from CVD between 2003 and 2018 (–90,000 DALY) was driven largely by reduction in disease prevalence and/or severity (-374, 000 DALY), which offset increases attributed to population growth (+168,700 DALY) and population ageing (+115,100 DALY) (AIHW 2021).

Leading causes

Leading causes contributing to the CVD burden of disease in 2023 include coronary heart disease, stroke and atrial fibrillation (Figure 1) (AIHW 2023).

Congenital heart disease was a leading contributor to the burden of disease among infants aged less than 1 year.

Coronary heart disease

- 305,000 years of healthy life were lost due to coronary heart disease (CHD) in 2023, equivalent to 11.5 DALY per 1,000 population.
- CHD was the leading single cause of burden for males, and fifth leading cause for females (Figure 3), accounting for 5.4% of the total burden (7.0% for males and 3.7% for females).

- The contribution of CHD to the total burden of CVD was greater in males (52%) than females (37%).
- 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 living with disease or injury (YLD) accounted for the remainder – 20% for males and 26% for females.

Stroke

- 124,000 years of healthy life were lost in 2023, equivalent to 4.7 DALY per 1,000 population.
- Stroke ranked 12th in the leading diseases causing burden, accounting for 2.2% of total burden (2.1% males, 2.2% females).
- The contribution of stroke to the total burden of CVD was greater in females (23%) than males (16%).
- 83% of the burden from stroke in males and 87% in females was due to premature death (YLL). Years of healthy life lost due to living with disease or injury (YLD) accounted for the remainder – 17% for males and 13% for females.

Atrial fibrillation

- 71,000 years of healthy life were lost due to atrial fibrillation (AF) in 2023, equivalent to 2.7 DALY per 1,000 population
- AF accounted for 1.3% of total burden (1.3% for males, 1.2% for females)
- The contribution of AF to the total burden of CVD was greater in females (12.4%) than males (9.6%)
- 23% of the burden from AF in males and 33% in females was due to premature death (YLL). Years of healthy life lost due to living with disease or injury (YLD) accounted for the remainder – 77% for males and 67% for females.

Congenital heart disease

- Congenital heart disease is a leading cause of burden of disease among infants aged under 1 year, contributing 7.7% in 2023.
- The burden from congenital heart disease fell by 13% between 2003 and 2023, from 14,800 to 12,800 DALY.

Figure 3: Leading causes of total burden of disease, by age group and sex, 2023 ('000 DALY, % age group)

The table shows coronary heart disease was the leading cause of total disease burden for males aged 55–84. Coronary heart disease was the second leading cause of disease burden among females aged 85 and over. Stroke was a top 5 cause of disease burden for males and females aged 75–84 and 85 and over.

	Rank	Age group (years) 25–44	45–54	55–64	65–74	75–84	85+
Men	1	Suicide and self-inflicted injuries (55.1, 10.5%)	Back pain and problems (21.6, 6.7%)	Coronary heart disease (37.0, 8.4%)	Coronary heart disease (49.0, 9.2%)	Coronary heart disease (53.3, 10.3%)	Dementia (36.5, 14.1%)
	2	Back pain and problems (35.9, 6.8%)	Coronary heart disease (21.6, 6.7%)	Back pain and problems (22.7, 5.2%)	COPD (31.5, 5.9%)	Dementia (38.7, 7.5%)	Coronary heart disease (34.9, 13.5%)
	3	Anxiety disorders (34.0, 6.5%)	Suicide and self-inflicted injuries (18.9, 5.9%)	Lung cancer (21.1, 4.8%)	Lung cancer (31.0, 5.8%)	COPD (30.9, 6.0%)	COPD (15.0, 5.8%)
	4	Depressive disorders (30.1, 5.7%)	Other musculoskeletal (13.9, 4.3%)	Other musculoskeletal (20.0, 4.6%)	Type 2 diabetes mellitus (22.3, 4.2%)	Lung cancer (22.8, 4.4%)	Stroke (13.2, 5.1%)
	5	Poisoning (28.1, 5.3%)	Poisoning (12.3, 3.8%)	Type 2 diabetes mellitus (15.9, 3.6%)	Other musculoskeletal (21.0, 3.9%)	Stroke (21.2, 4.1%)	Prostate cancer (11.3, 4.4%)
		25–44	45–54	55–64	65–74	75–84	85+
Women	1	Anxiety disorders (54.8, 11.5%)	Back pain and problems (21.5, 7.5%)	Other musculoskeletal (26.1, 7.0%)	COPD (32.5, 7.2%)	Dementia (49.1, 10.5%)	Dementia (76.3, 22.0%)
	2	Back pain and problems (36.9, 7.7%)	Other musculoskeletal (18.9, 6.6%)	Osteoarthritis (22.4, 6.0%)	Other musculoskeletal (27.7, 6.1%)	COPD (35.4, 7.6%)	Coronary heart disease (35.1, 10.1%)
	3	Depressive disorders (36.3, 7.6%)	Anxiety disorders (17.2, 6.0%)	Back pain and problems (22.0, 5.9%)	Osteoarthritis (26.6, 5.9%)	Coronary heart disease (29.0, 6.2%)	COPD (21.4, 6.2%)
	4	Asthma (22.5, 4.7%)	Breast cancer (14.3, 5.0%)	Breast cancer (17.9, 4.8%)	Lung cancer (23.7, 5.2%)	Stroke (19.2, 4.1%)	Stroke (20.3, 5.8%)
	5	Eating disorders (21.0, 4.4%)	Depressive disorders (13.5, 4.7%)	Lung cancer (17.5, 4.7%)	Dementia (18.9, 4.2%)	Other musculoskeletal (18.8, 4.0%)	Falls (14.0, 4.0%)

Figure 3: Leading causes of total burden of disease, by age group and sex, 2023 ('000 DALY, % age group)

Chart: AIHW. Source: AIHW Australian Burden of Disease Database.
http://www.aihw.gov.au

First Nations people

Burden of disease estimates are available for First Nations people for the year 2018 (AIHW 2022):

- CVD accounted for 10% (25,000 DALY) of total burden in First Nations in 2018 (11% males, 9% females), making it the disease group with the third greatest contribution, behind mental and substance use disorders (23%) and injuries (including suicide) (12%)
- Coronary heart disease accounted for 57% of CVD DALY and stroke 13%. In terms of overall DALY, coronary heart disease caused the most of any disease or injury (5.8% of total DALY) and stroke ranked 20th (1.3% of total DALY)
- 86% of the burden from CVD among First Nations was fatal, and 14% non-fatal. The disease that had the highest proportion due to fatal burden among First Nations was aortic aneurysm (100% fatal, 0% non-fatal)
- the rate of DALY for CVD among First Nations males was 2.2 times that of non-Indigenous males, compared with 2.7 times for First Nations and non-Indigenous females
- CVD was responsible for 14% of the total gap in disease burden between First Nations people and non-Indigenous Australians
- the rate of DALY for rheumatic heart disease among First Nations people was 11 times as high as the rate among non-Indigenous Australians (1.9 and 0.2 DALY per 1,000 population). The rate for CHD was 2.7 times as high (29 and 10 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.

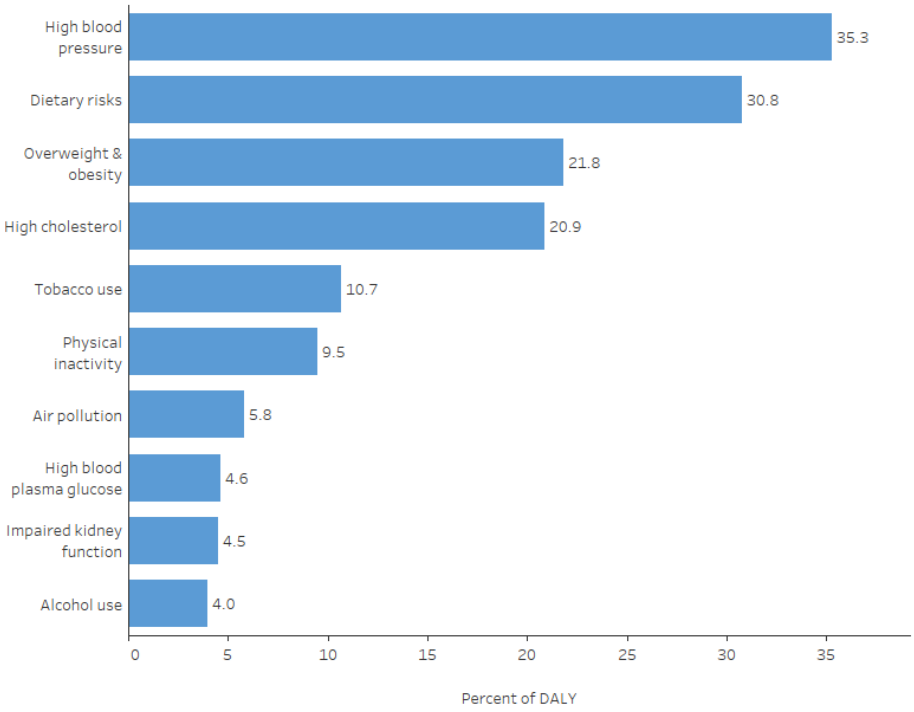

Figure 4: Proportion of cardiovascular disease DALY attributed to selected risk factors, 2018

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 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 (2021) Australian Burden of Disease Study 2018 – Key findings. Cat. no. BOD 30. Canberra: AIHW.

AIHW (2022) *Australian Burden of Disease Study: impact and causes of illness and death in Aboriginal and Torres Strait Islander people 2018*. Australian Burden of Disease Study series no. 26, catalogue number BOD 32, AIHW, Australian Government.

AIHW (2023) *Australian Burden of Disease Study 2023*, AIHW, Australian Government, accessed 14 December 2023.

Expenditure on cardiovascular disease

Page highlights:

How much is spent on cardiovascular disease?

- In 2020–21, an estimated 9.5% of total allocated expenditure in the Australian health system ($14.3 billion) was attributed to cardiovascular disease.

Where is the money spent?

- Nearly two thirds of allocated cardiovascular disease expenditure (65% or $9.2 billion) was spent on hospital services.

Who is it spent on?

- Expenditure on cardiovascular disease in 2020–21 increased with age to be highest among males aged 65–74 and females aged 75–84.

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.

Note: Estimates are not directly comparable to previous disease expenditure estimates due to changes to data and methods. Further information on how the estimates were derived is available from the *Health system spending on disease and injury in Australia 2020-21* web report.

How much is spent on cardiovascular disease?

In 2020–21, an estimated 9.5% of total allocated expenditure in the Australian health system ($14.3 billion) was attributed to CVD (AIHW 2023).

CVD was the disease group with the second highest expenditure in 2020–21, behind musculoskeletal disorders ($14.7 billion) and cancer and other neoplasms ($14.6 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 2020–21 were coronary heart disease, atrial fibrillation and stroke. An estimated:

- 17.7% of CVD expenditure ($2.5 billion) was spent on CHD
- 9.7% of CVD expenditure ($1.4 billion) was spent on AF
- 6.9% of CVD expenditure ($983.8 million) was spent on stroke (Figure 1).

Figure 1: Health care expenditure on selected cardiovascular conditions, 2020–21

The horizontal bar chart shows the leading cardiovascular conditions in terms of health care expenditure in 2020–21. Coronary heart disease was most costly, estimated at $2.5 billion followed by atrial fibrillation and flutter at $1.4 billion and stroke at $1.0 billion.

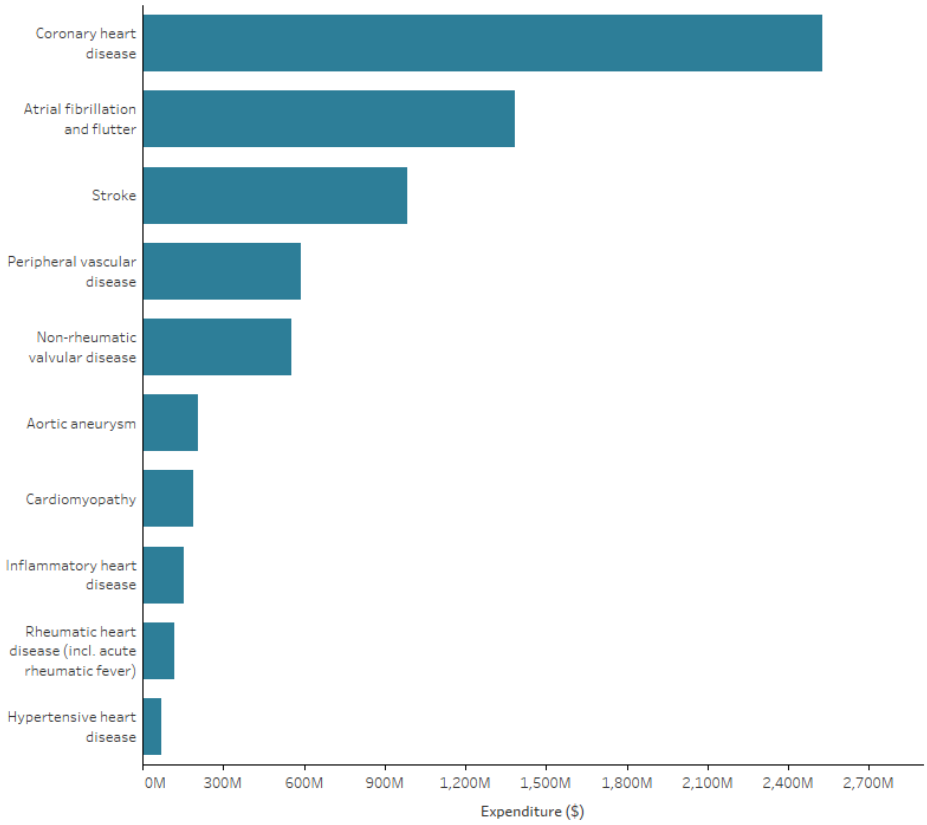

Figure 1: Health care expenditure on selected cardiovascular conditions, 2020–21

Chart: AIHW. Source: AIHW Disease Expenditure Database.
http://www.aihw.gov.au/

Where is the money spent?

In 2020–21, nearly two thirds of allocated CVD expenditure (65% or $9.2 billion) was spent on hospital services. This included expenditure on public hospital admitted patients ($5.4 billion), private hospital services ($2.8 billion), public hospital outpatients ($567.7 million) and public hospital emergency departments ($406.2 million).

Another 20% ($2.9 billion) related to non-hospital medical services (primary care), comprising medical imaging ($1.2 billion), GP services ($955.1 million), specialist services ($450.8 million), pathology ($223.9 million) and allied health and other services ($22.6 million).

A small amount of CVD expenditure (0.8% or $107.2 million) was spent on dental services.

The remaining 14% ($2.0 billion) was spent on prescription pharmaceuticals dispensed through the Pharmaceutical Benefits Scheme (PBS) (Figure 2).

Figure 2: Health care expenditure on cardiovascular disease, by area of expenditure, 2020–21

The horizontal bar chart shows health care expenditure areas for cardiovascular disease in 2020–21. The costliest areas were Public hospital admitted patients at $5.4 billion, Private hospital services at $2.8 billion and Pharmaceutical Benefits Scheme at $2.0 billion.

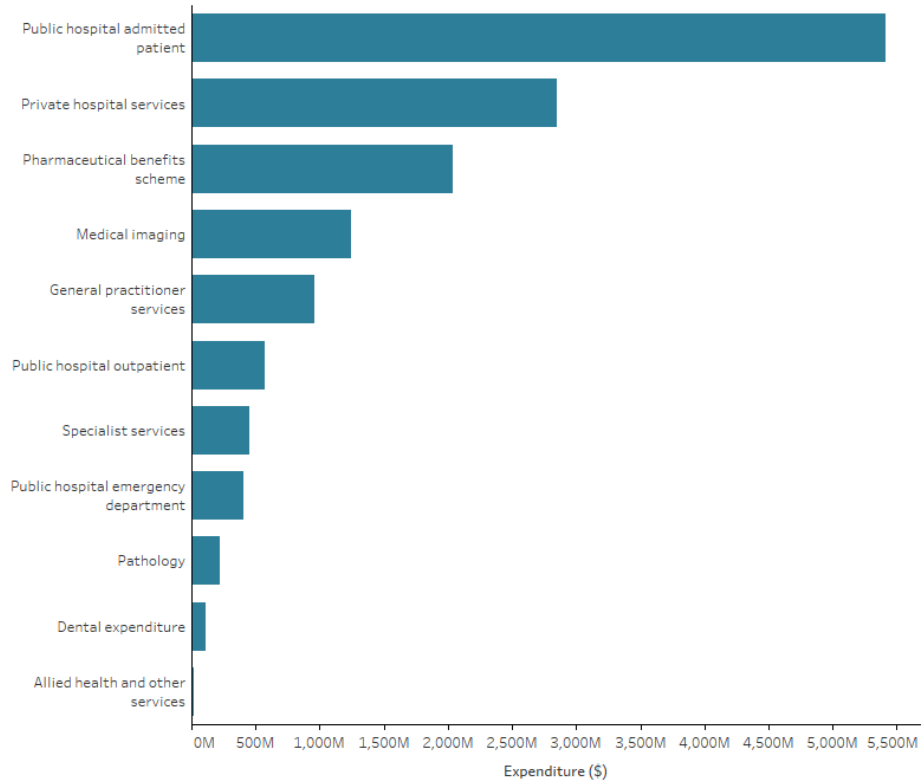

Figure 2: Health expenditure on cardiovascular disease, by area of expenditure, 2020–21

Note: Pharmaceutical benefit expenditure includes over and under copayment prescriptions.

Chart: AIHW. Source: AIHW Disease Expenditure Database.
http://www.aihw.gov.au/

Expenditure was distributed differently for each cardiovascular condition. In 2020–21:

- hospital services represented 82% of CHD expenditure, 57% of AF expenditure, and 88% of stroke expenditure
- non-hospital medical services represented 12% of CHD expenditure, 12% of AF expenditure, and 11% of stroke expenditure
- PBS costs represented 6.2% of CHD expenditure, 31% of AF expenditure, and 1.9% of stroke expenditure.

Who is it spent on?

Expenditure on CVD in 2020–21 was low among young people, but increased sharply from age 45–54 to be highest among males aged 65–74 and females aged 75–84 (Figure 3).

From age 35–44, 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 and 65–74, expenditure for males was more than 1.5 times as high as for females.

Most of this difference was related to expenditure on hospital services, where a total of $5.5 billion was spent on males, compared with $3.7 billion on females.

Expenditure on non-hospital medical services (primary care) was slightly higher among females ($1.5 billion, compared to $1.4 billion among males), despite the higher prevalence of CVD among males.

Expenditure in the area of prescription pharmaceuticals was higher among males ($1.1 billion) compared to females ($949.4 million).

Figure 3: Health care expenditure on cardiovascular disease, by age and sex, 2020–21

The bar chart shows health care expenditure for cardiovascular disease in 2020–21 was highest among males aged 65–74 at $2.3 billion, and females aged 75–84 at $1.6 billion. Expenditure was higher for females than males in the 85 and over age group.

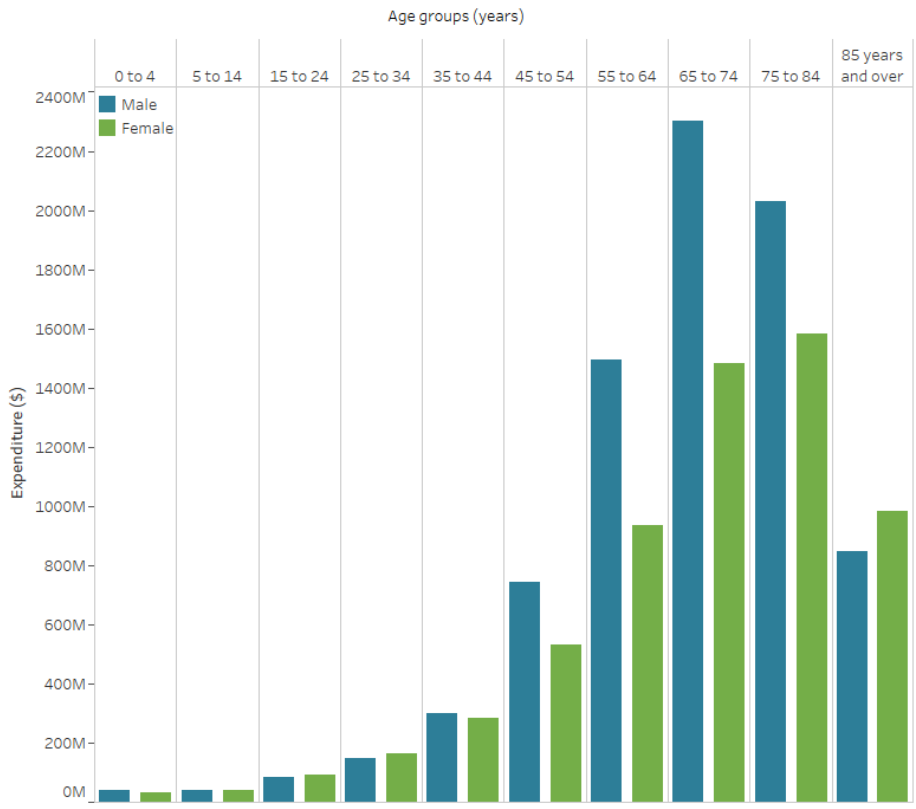

Figure 3: Health care expenditure on cardiovascular disease, by age and sex, 2020–21

Chart: AIHW. Source: AIHW Disease Expenditure Database.
http://www.aihw.gov.au

First Nations people

In 2019–20, expenditure on hospitalisations for First Nations people living with CVD was $260.7 million – equivalent to 3.3% of total expenditure on hospitalisations for people with CVD. This equated to $305 per First Nations person, compared with $307 for non-Indigenous persons (AIHW & NIAA 2023).

Hospitalisation for rheumatic heart disease (RHD) among First Nations people accounted for 3.0% of total First Nations hospital expenditure on CVD. The per person expenditure on RHD hospitalisation for the First Nations population was almost 4 times the per person expenditure for the non-Indigenous population.

References

Australian Institute of Health and Welfare (AIHW) (2023) *Health system spending on disease and injury in Australia 2020-21*, AIHW, Australian Government, accessed 14 December 2023.

AIHW & NIAA (National Indigenous Australians Agency) 2023. *Aboriginal and Torres Strait Islander Health Performance Framework: 3.21 Expenditure on Aboriginal and Torres Strait Islander health compared to need* - external site opens in new window, AIHW, Australian Government, accessed 21 November 2023.

Impact of COVID-19

Page highlights:

Health service use

- An unusually high volume of cardiovascular disease scripts was dispensed in March 2020 (10.0 million), coinciding with the introduction of lockdowns and public health restrictions.

Emergency department presentations

- Presentations fell by almost one quarter (23%) between January and April 2020.

Hospitalisations

- Cardiovascular disease hospitalisations declined by one quarter (24%) from March to April 2020.

Deaths

- Coronary heart disease mortality continued its historical decline in 2020, the first year of the pandemic, but has since increased – the number of deaths in 2022 being 9.1% higher than the number in 2020.

The COVID-19 pandemic has greatly affected Australia's population and health-care system. Cardiovascular disease (CVD) is one of many conditions impacted directly by COVID-19, as well as by the restrictions and changes affecting health care provision which commenced in February 2020 (Zaman et al. 2020, Nadarajah et al. 2022).

Compared with people with no existing CVD, people with existing CVD have a higher risk of cardiac complications from COVID-19 (Pellicori et al. 2021). They have an increased risk of hospitalisation, intensive care admission, poorer health outcomes and death.

People with COVID-19 are at increased risk of acute cardiac injury, heart failure, arrhythmias and acute coronary syndromes (Xie et al. 2022, Hessami et al. 2021). In rare cases, COVID-19 vaccines can cause myocarditis or pericarditis (Department of Health and Aged Care 2022a).

This web page explores some of the aspects of the impact of COVID-19 on people with CVD using national data available across the COVID-19 pandemic period. Note that COVID-19 lockdowns in different jurisdictions at different times will also affect the national total.

Health service use

People living with CVD require regular contact with GPs, medical specialists and allied health services to manage their condition(s). As part of restrictions introduced to deal with COVID-19, some health services were suspended or were required to operate in new or different ways. Adaptive health care delivery models, such as telehealth consultations, and revised resource allocations were needed to help address the needs of CVD patients during COVID-19 (Zaman et al. 2020, Nadarajah et al. 2022).

Care for stroke is one example. The first wave of the pandemic in 2020 negatively impacted access to specialised stroke units in hospitals, with fewer resources available for treatment, leading to concerns about reduced quality of care for patients with stroke (Cadilhac et al. 2022). The impact of diverted resources has been sustained beyond the first wave of the pandemic (Stroke Foundation 2021).

Primary health care

MedicineInsight is a database containing de-identified electronic health records from around 450 Australian general practices. From this data, a series of annual General Practice Insights Reports are released. The data allows exploration of whether the COVID-19 pandemic decreased the likelihood that a patient with a chronic condition such as CVD would visit their GP.

The general pattern in the monthly number of clinical encounters was similar in 2019 and 2020 (NPS MedicineWise 2022). The rate of presentations per 1,000 clinical encounters for patients with a history of CVD also showed little variation over 2019 and 2020. There was no substantial difference when each quarter in 2020 was compared to the corresponding quarter in 2019:

- 27 CVD patients per 1,000 clinical encounters in Quarter 2 of 2020, compared with 28 in Quarter 2 of 2019
- 6.1 heart failure patients per 1,000 clinical encounters in Quarter 2 of 2020, compared with 6.2 in Quarter 2 of 2019.

One factor as to why that rate was unchanged is the rapid uptake of telehealth services via phone or video conferencing in April 2020 after the introduction of temporary MBS items in response to COVID-19 lockdown restrictions (NPS MedicineWise 2022, Department of Health and Aged Care 2022b).

Heart Health Checks were affected by the pandemic. Nationally, the total number of services processed fell to 2,900 per month in April 2020, compared with a monthly average of 7,200 for that year (Figure 1). Monthly averages have since increased to 8,400 in 2021, and 10,000 in January–July 2022, noting that this includes an end-of-year fall to 4,800 in January 2022 which coincided with the Omicron wave of the pandemic.

Figure 1: Heart Health Checks processed by Medicare Australia, April 2019–July 2022

The line chart shows that the number of Heart Health Checks processed by Medicare fell to 2,900 in April 2020, compared with a monthly average of 7,200 for that year, and 4,800 in January 2022, compared with a monthly average of 10,000 for January–July 2022.

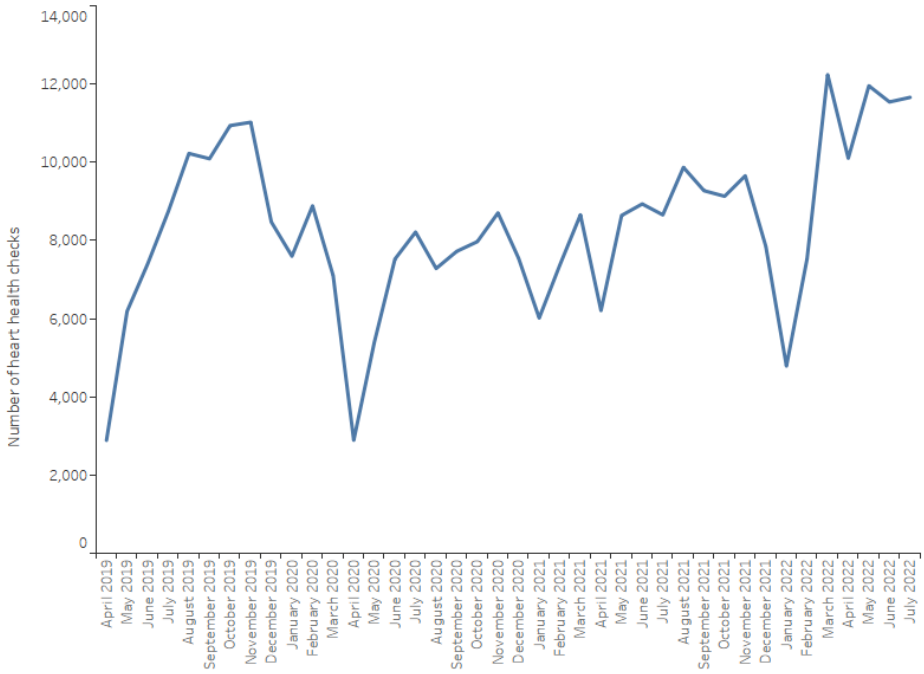

Figure 1: Monthly number of Heart Health Checks processed by Medicare Australia, April 2019–July 2022

Notes:
1. Includes services for MBS items 177 and 699.
2. Includes only those services that qualify for Medicare Benefit and for which a claim has been processed by Medicare Australia. They do not include services provided by hosptial doctors to public patients in public hospitals or services that qualify under a benefit for Department of Veterans' Affairs National Treatment Account.
3. Monthly figures may vary due to the varying number of processing days in a month, which depends on the number of days in a month, public holidays, overtime worked etc.

Chart: AIHW. *Source:* Services Australia 2022.
http://www.aihw.gov.au

Medicine use

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 102.0 million for 2020 (AIHW 2022b).

There were, however, changes in consumer behaviour. An unusually high volume of CVD scripts was dispensed in March 2020 (10.0 million), coinciding with the introduction of lockdowns and public health restrictions, followed by a decrease in April 2020 (7.3 million) (AIHW 2020).

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 one 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).

Pathology

Numbers of Medicare claims for several CVD-related pathology tests fell during the early months of the COVID-19 pandemic following the introduction of lockdowns, and then returning to pre-COVID-19 levels (Table 1):

Table 1: CVD-related pathology tests processed by Medicare, February to June 2020

Medicare item	Feb 2020	Mar 2020	Apr 2020	May 2020	Jun 2020
66503, Lipid studies	35,032	36,054	23,364	29,067	36,243
66518, Cardiac enzymes or cardiac markers	33,845	33,738	26,484	30,362	35,181
66536, Quantitation of HDL cholesterol	146,796	144,972	91,590	117,631	144,720

Source: Services Australia 2022.

The MedicineInsight General Practice Insights Reports shows similar findings. Recorded result rates per 1,000 clinical encounters fell sharply for many pathology tests – including total cholesterol – in April 2020 (NPS MedicineWise 2022):

- 54 total cholesterol results per 1,000 clinical encounters in April 2020, compared with 108 in February 2020

Testing rates for total cholesterol rose from May 2020 onwards but plateaued again in July 2020 at 90 per 1,000 clinical encounters, the time of the second COVID wave in Victoria (NPS MedicineWise 2022).

Emergency department presentations

The number of presentations to emergency departments with a principal diagnosis in the *Cardiovascular* body system fell substantially during the early stages of the COVID-19 pandemic (Figure 2).

Presentations fell by almost one quarter (23%) between January and April 2020 (28,400 to 21,700), leading to declines in admissions to hospital, in referrals to other hospitals for admission and in departures without admission or referral.

Figure 2: End status of Emergency Department presentations with a principal diagnosis of CVD, July 2018–June 2021

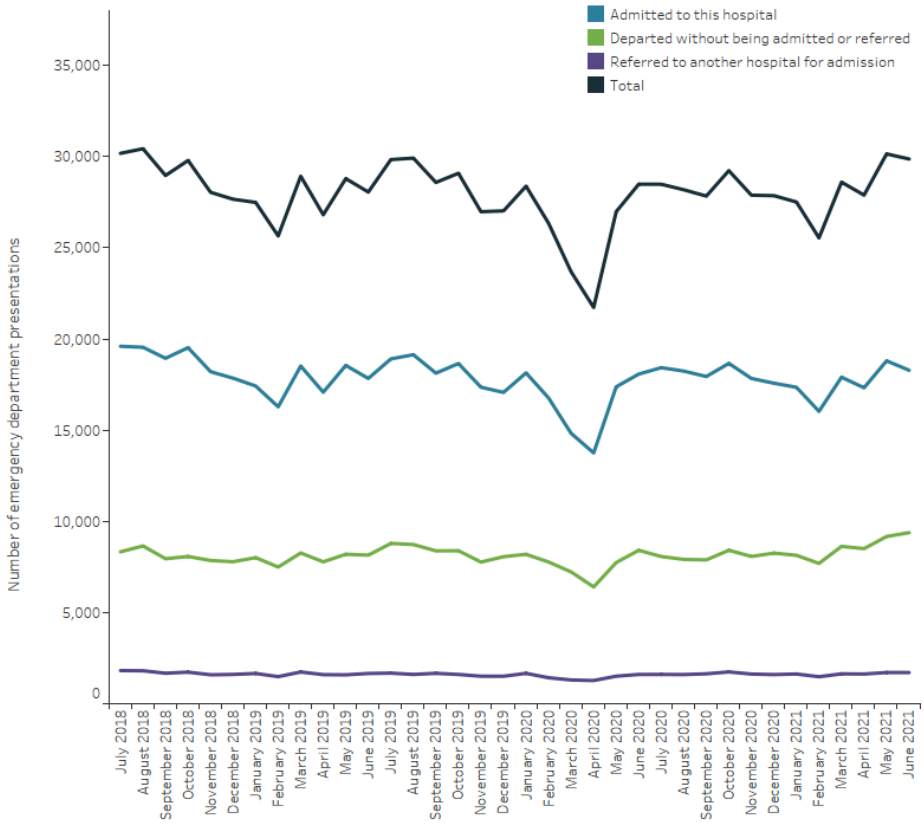

Figure 2: End status of Emergency Department presentations with a principal diagnosis of CVD, July 2018–June 2021.

Chart: AIHW. *Source:* AIHW National Non-Admitted Patient Emergency Department Care Database.
https://www.aihw.gov.au

Hospitalisations

Hospitalisations with a principal diagnosis of CVD fell sharply between March and April 2020, when lockdown measures were introduced nationwide by the Australian Government:

- a decline of one quarter (24%) from March to April 2020 (45,700 to 34,600)
- a decline of 26% when comparing April 2019 with April 2020 (46,600 to 34,600) (Figure 3).

Note that Figure 3 presents the national number of hospitalisations and may be varied across time and across state and territories.

Figure 3: Hospitalisations with cardiovascular disease as a principal diagnosis, by sex, July 2017–June 2021

The line chart shows that hospitalisations with a principal diagnosis of CVD fell sharply for both males and females between March and April 2020, when lockdown measures were introduced nationwide by the Australian Government.

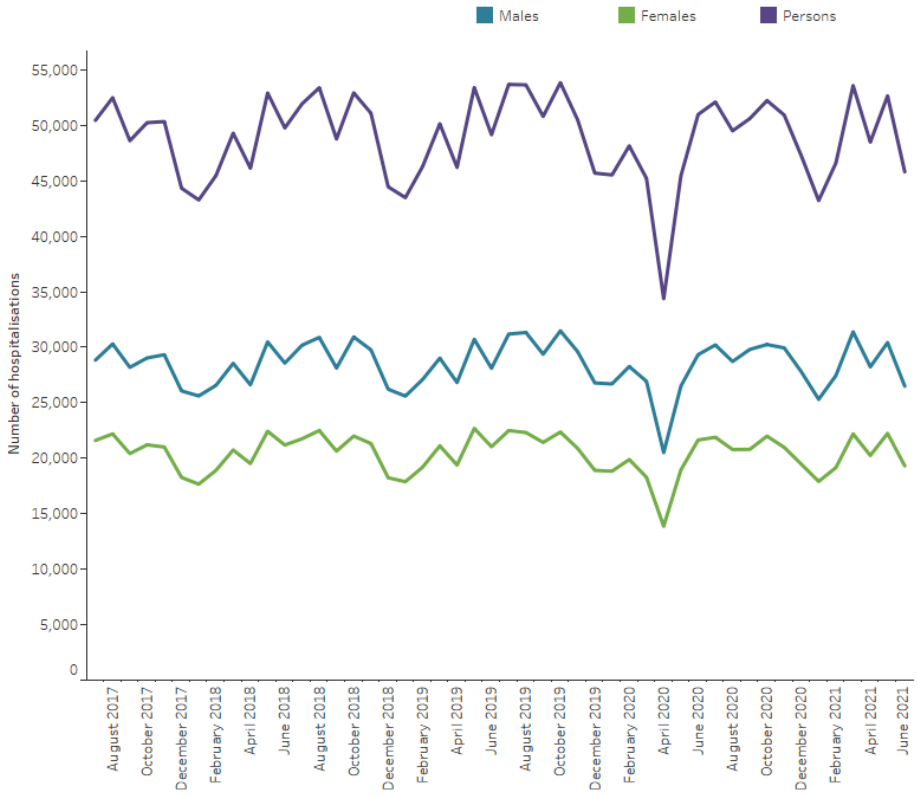

Figure 3: Hospitalisations with cardiovascular disease as a principal diagnosis, by sex, July 2017–June 2021

Chart: AIHW. *Source:* AIHW National Hospital Morbidity Database.
https://www.aihw.gov.au

Comorbidity of COVID-19 and CVD

In 2020–21, there were over 4,700 hospitalisations in Australia that involved a COVID-19 diagnosis (AIHW 2022c).

The most common comorbid conditions associated with COVID-19 hospitalisations over this period were CVD (20%) and type 2 diabetes (20%).

Of those COVID-19 hospitalisations with comorbid diagnosis of CVD in 2020–21:

- 18% involved time spent in an Intensive Care Unit (ICU)
- 12% involved Continuous ventilatory support
- 20% had a separation mode indicating the patient died in hospital.

Procedures

Hospital procedures for CVD – including coronary angiography, percutaneous coronary interventions (PCIs) and coronary artery bypass grafting (CABG) – were variably affected by the COVID pandemic:

- coronary angiographies fell by 27% from 11,600 in March 2020 to 8,400 in April 2020. In April 2019, 11,400 coronary angiographies were performed
- PCI fell by 19% from 3,850 in March 2020 to 3,120 in April 2020. In April 2019, 3,700 PCIs were performed
- CABG fell by 15% from 1,100 in March 2020 to 940 in April 2020. In April 2019, 1,040 CABGs were performed (Figure 4).

Proportionally, the decline from March to April 2020 in the number of coronary angiographies performed (27%) was greater than the declines in PCI (19%) and CABG (15%). Coronary angiography is a diagnostic procedure, whereas PCI and CABG are medical procedures for treating blocked or narrowed coronary arteries. The number of procedures during the COVID pandemic may have impacted by changing clinical recommendations to minimise exposure risk to patients, based on severity and clinical judgement, to reduce length of stay and time spent in ICU (Zaman et al. 2020).

Figure 4: Selected hospital procedures for cardiovascular disease, July 2018–June 2021
The line chart shows that the number of coronary angiographies performed declined between March and April 2020, as restrictions were applied to selected elective surgeries. There were smaller declines for percutaneous coronary interventions (PCIs) and coronary artery bypass grafts (CABG).

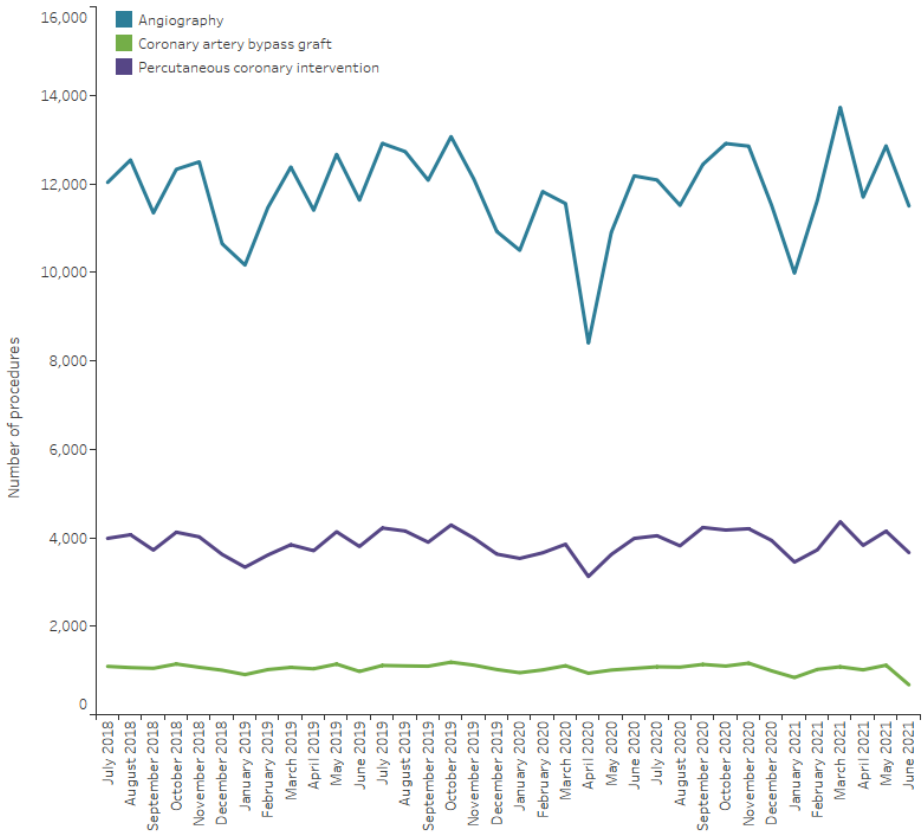

Figure 4: Selected hospital procedures for cardiovascular disease, July 2018–June 2021

Chart: AIHW. *Source:* AIHW National Hospital Morbidity Database.
https://www.aihw.gov.au

Elective surgery

Following a decision by National Cabinet to ensure that the health system maintained adequate capacity to deal with the COVID-19 pandemic, restrictions were applied to selected elective surgeries from 26 March 2020. These restrictions were gradually eased from 29 April 2020 onwards, although further restrictions applied in some areas in later periods as part of the response to further COVID-19 outbreaks (AIHW 2022a).

Waiting times

Waiting times for most intended procedures increased between 2019–20 and 2020–21. One of the greatest increases in median waiting times occurred for varicose veins treatment (94 days, from 129 days in 2019–20 to 223 days in 2020–21), second only to tonsillectomy (123 days) (AIHW 2022a). The mean waiting time for haemorrhoidectomy rose from 57 to 70 days. Waiting times stayed constant for coronary artery bypass graft (18 days).

The proportion of patients waiting more than 365 days for their elective surgery also increased between 2019–20 and 2020–21:

- vascular surgery (1.2% to 4.1%) – including haemorrhoidectomy (1.9% to 6.0%), and varicose veins treatment (6.6% to 19.8%)
- cardio-thoracic surgery (0.1% to 0.5%) (AIHW 2022a).

Admissions from waiting lists

Admissions from waiting lists for elective surgery between 2019–20 and 2020–21:

- fell by 4.4% for cardio-thoracic surgery (11,499 to 10,993) – including a fall of 12% for coronary artery bypass graft (3,073 to 2,713)
- rose by 5.6% for vascular surgery (16,551 to 17,471) – including increases of 12% for haemorrhoidectomy (3,955 to 4,422) and 15% for varicose veins treatment (2,732 to 3,148) (AIHW 2022a).

Increases in admissions from waiting lists in 2020–21 were likely due to the lifting of restrictions in place for certain elective surgeries during 2019–20 in response to COVID-19. Many jurisdictions implemented programs to fast-track elective surgeries and provided increased funding for surgeries which were delayed because of the restrictions.

Deaths

Australia recorded significantly lower-than-expected mortality for the country during 2020, the first year of the COVID-19 pandemic. There were decreases across key causes – most notably, deaths from respiratory disease including influenza. Measures put in place to prevent the spread of COVID-19 can also reduce the spread of other communicable diseases. The total mortality rate remained low during 2021 with the top 5 leading causes of death unchanged and coronary heart disease (CHD) at the top of the list (ABS 2022b).

However, by 2022, the third year of the pandemic, Australia had recorded a 15% increase in the total number of deaths, compared to the historical average (ABS 2023a).

Since the commencement of the pandemic, a total of 16,400 people have died with or from COVID-19 (ABS 2023b).

Cardiovascular disease deaths during COVID

Australian Bureau of Statistics (ABS) provisional mortality statistics indicate that there were:

- 13,700 doctor-certified deaths due to CHD during 2020, rising to 14,100 in 2021 and 14,900 in 2022
- 9,100 doctor-certified deaths due to cerebrovascular diseases (including stroke) during 2020, rising to 9,300 in 2021 and 9,300 in 2022 (ABS 2023a).

CHD mortality continued its historical decline in 2020, the first year of the pandemic, but has since increased – the number of deaths in 2022 being 9.1% higher than the number in 2020.

The increase in cerebrovascular disease deaths also reverses a historical decline, but has been more moderate with the number of deaths in 2022 being 2.2% higher than in 2020.

Note that these data are preliminary, with some deaths that occurred in 2022 not yet registered. In addition, causes of death were not presented for coroner-referred deaths due to the time required to complete coronial investigations (ABS 2023a).

Cardiovascular disease associated with COVID-19 deaths

Most COVID-19 deaths (96%) have other conditions listed on the death certificate (either pre-existing or conditions caused by COVID-19 and its complications):

- chronic cardiac conditions – including coronary atherosclerosis, cardiomyopathies and atrial fibrillation – were the most documented comorbidities, present in 40% of the 10,600 COVID-19 deaths registered until 28 February 2023 that had a pre-existing chronic condition reported on the death certificate. Other CVD-related comorbidities included hypertension (13%) and chronic cerebrovascular diseases (4.1%)
- acute cardiac complications caused by COVID-19 were reported in 9.7% of the 9,300 COVID-19 deaths registered until 28 February 2023 that had a causal sequence described on the death certificate (ABS 2023b).

COVID-19 associated with cardiovascular disease deaths

There were 3,222 people who died with COVID-19 as an associated cause of death until 28 February 2023, rather than directly from the virus itself. Of these, circulatory system diseases (24%) were the second most common underlying cause of death, behind cancer (27%). CHD was the most common cause of circulatory system disease for those people who died where COVID-19 was an associated cause of death (ABS 2023b).

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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 2022). 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

Commonwealth investment in cardiovascular disease research

Between 2000 and 2022, The National Health and Medical Research Council (NHMRC) has expended:

- $897 million towards research relevant to heart disease
- $413 million towards research relevant to stroke
- $1.1 billion towards research relevant to vascular disease.

From its inception in 2015 to 31 March 2023, the Medical Research Future Fund has invested $353 million in 153 grants with a focus on cardiovascular disease research, including heart, stroke and vascular disease research. Examples include:

- $47 million for the MTPConnect Diabetes and Cardiovascular Accelerator Initiative, that focusses on improving the management and treatment of diabetes and cardiovascular disease
- $40 million to University of Melbourne to increase access to acute stroke care by developing lightweight brain scanners to rapidly deliver pre-hospital stroke care by air and road ambulances to all Australians
- $3.0 million to University of Sydney to investigate the use of a common anti-inflammatory drug to inhibit vascular disease-associated inflammation after stroke.

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).

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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

Data sources

This page outlines the data sources used for the *Heart, stroke and vascular disease: Australian facts* report.

National Health Measures Survey

In 2011–13, the Australian Heath Survey incorporated the first Australian Bureau of Statistics (ABS) biomedical collection – the National Health Measures Survey. It involved the collection of a range of blood and urine tests from over 11,000 participants across Australia, which were then tested for various chronic disease and nutrient biomarkers.

Urine samples were collected from respondents aged 5 and over, and blood samples from respondents aged 12 and over. 36% of the survey participants volunteered to get the biomedical tests, covering 85% of the sampled households.

For more information, see:

- Australian Health Survey: biomedical results for chronic diseases - external site opens in new window
- Australian Health Survey: biomedical results for chronic diseases methodology - external site opens in new window.

Data quality statement

The data quality statement for the 2011–12 National Health Measures Survey is available on the ABS website:
Australian Health Survey: biomedical results for chronic diseases methodology - external site opens in new window

National Aboriginal and Torres Strait Islander Health Measures Survey

In 2012–13, the Australian Aboriginal and Torres Strait Islander Health Survey incorporated the first biomedical collection to be undertaken for the First Nations population in an ABS survey – the National Aboriginal and Torres Strait Islander Health Measures Survey (NATSIHMS). It involved the collection of a range of blood and urine tests from approximately 3,300 participants aged 18 years and over across Australia.

The NATSIHMS measured specific biomarkers for chronic disease and nutrition status, derived from tests on blood and urine samples from volunteering participants selected in the Australian Aboriginal and Torres Strait Islander Health Survey.

Further information can be found on the ABS website - external site opens in new window.

National Health Survey

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 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 First Nations 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 - external site opens in new window.

Data quality statement

The data quality statement for the 2017–18 NHS is available on the ABS website:
4363.0 - National Health Survey: Users' Guide, 2017–18 - external site opens in new window.

National Aboriginal and Torres Strait Islander Health Survey

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 First Nations people, 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 First Nations people of all ages in non-remote and remote areas of Australia, including discrete First Nations communities.

Further information can be found in ABS National Aboriginal and Torres Strait Islander Health Survey, 2018–19 - external site opens in new window.

Survey of Disability, Ageing and Carers

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 - external site opens in new window.

AIHW National Hospital Morbidity Database

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).

The National Hospital Morbidity Database include information on people's area of usual residence at the time of hospitalisation.

For 2021–22, this was their SA2 based on the 2016 ASGS. In this report, 2016 SA2 values have been concorded to SA2 values based on the 2021 census prior to calculating rates

Further information about the NHMD can be found in Admitted patient care NMDS 2021–22- external site opens in new window - external site opens in new window.

AIHW National Mortality Database

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 First Nations 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 2019 and earlier are based on the final version of cause of death data; deaths registered in 2020 are based on the revised version; and deaths registered in 2021 and 2022 are based on the preliminary version. Revised and preliminary versions are subject to further revision by the ABS.

For data by Indigenous status, counts of death are reported for 8 jurisdictions combined – New South Wales, Australian Capital Territory, Victoria, Queensland, Western Australia, South Australia, Tasmania and the Northern Territory. Death rates are reported for 5 jurisdictions combined – New South Wales, Queensland, Western Australia, South Australia and the Northern Territory. These jurisdictions are considered to have adequate levels of First Nations identification in mortality data.

This report adjusts for Victorian additional death registrations of deaths that were registered in Victoria in 2017 and 2018 but were not provided to the ABS for compilation until 2019. As a result, the number of diabetes deaths reported for 2017 to 2019 may differ from previously reported numbers. For more detail, see the Technical note: Victorian additional registrations and time series adjustments in Causes of death, Australian methodology- external site opens in new window - external site opens in new window.

The NMD includes information on people's area of usual residence prior to death. For 2022, this was their SA2 based on the 2021 ASGS. This location information from the National Mortality Database, along with IRSD values based on the ABS 2021 Census of Population and Housing, and estimated resident populations for 2022, have been used to approximate statistics for 2022 ASGS Remoteness Areas and 2022 IRSD SEIFA quintiles.

The data quality statements underpinning the AIHW NMD can be found in the following ABS publications:

- ABS quality declaration summary for Deaths, Australia.- external site opens in new window - external site opens in new window
- ABS quality declaration summary for Causes of death, Australia.- external site opens in new window - external site opens in new window

For more information see National Mortality Database (NMD).

AIHW Disease Expenditure Database

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 *Health system spending on disease and injury in Australia, 2020-21*.

In the 2020–21 study compared to previous disease expenditure studies, there were changes to the methods used for MBS mapping, Emergency Department (ED) analysis, Non-admitted patient analysis (NAP) and the identification of COVID-19 cases.

For further details on the methods used, refer to *Health system spending of disease and injury in Australia: Overview of analysis and methodology 2020–21*.

AIHW Australian Burden of Disease Study

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 Australian Burden of Disease Study 2023 includes national estimates for 220 diseases and injuries including estimates of burden for COVID-19 in 2023 based on projections using historical trends in data. The ABDS 2023 is different to the 2003, 2011, 2015 and 2018 studies in that estimates have been produced for the current year (2023). It builds on work from the ABDS 2022, which was the first study where burden was estimated for the year of release (2022). This Study provides burden of disease estimates best matched to the public health context for the Australian population for 2023.

The 2018 study also provides estimates of how much of the burden can be attributed to 20 different risk factors. It also includes a component on the impact and causes of illness and death in First Nations people, which includes estimates of the gap in disease burden between First Nations people and non-Indigenous Australians. Estimates of the burden of disease for First Nations people are available for 2003, 2011 and 2018.

For more information, see the Burden of disease.

AIHW National Non-admitted Patient Emergency Department Care Database

The AIHW National Non-admitted Patient Emergency Department Care Database (NNAPEDCD) is a compilation of episode-level records (including waiting times for care) for non-admitted patients who are registered for care in emergency departments in selected public hospitals. The database captures information only for physical presentations to emergency departments and does not include advice provided via telehealth or videoconferencing.

Patients being treated in emergency departments may be later admitted, including admission in the emergency department, another hospital ward or to hospital-in-the-home. For this reason, there is an overlap in the scope of the NNAPEDCD, the NMDS and the APC NMDS.

For 2022–23, this was their SA2 based on the 2016 ASGS. In this report, 2016 SA2 values have been concorded to SA2 values based on the 2021 census prior to calculating rates.

Principal diagnoses for episodes of care in the NNAPEDCD 2022–23 are coded according to the Emergency Department ICD-10-AM Principal Diagnosis Shortlist. - external site opens in new window - external site opens in new window

Further information about the NNAPEDCD can be found in Non-admitted patient emergency department care NMDS 2022–23- external site opens in new window - external site opens in new window.

MedicineInsight

MedicineInsight is a database containing de-identified electronic health records (EHRs) from over 700 Australian general practices.

MedicineInsight data include information on people living with diabetes and their interaction with the primary health care system through general practice.

Patient population percentages have been weighted to adjust for an over-representation of registered GP sites in Tasmania.

Classifications

This page outlines the classifications used for the *Heart, stroke and vascular disease: Australian facts* report.

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
Cardiovascular disease	**390–459**	**I00–I99**
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 2020–21 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).

For emergency department diagnoses, a classification modified for Australia, the ICD-10-AM (11th Revision) shortlist was used (Table 3).

Table 3: ICD-9-CM and ICD-10-AM codes

Disease	**ICD–9-CM codes**	**ICD–10-AM codes**	**ICD-10-AM shortlist**
Cardiovascular disease	**390–459**	**I00–I99, excluding I84 (haemorrhoids)**	**I00–I99**
Acute rheumatic fever and Rheumatic heart disease	390–398	I00–I09	I00-I02, I05-I09
Hypertensive disease		I10–I15	
Coronary heart disease	410–414	I20–I25	I20–I25
Angina	413	I20	
Acute myocardial infarction	410	I21	
Atrial fibrillation and flutter	427.3	I48	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	I50
Cerebrovascular disease	430–438	I60–I69	
Stroke	430–434, 436	I60–I64	I60.9, I61.9, I62.0, I62.9, I63.9, I64
Peripheral arterial disease	440–444	I70–I74	I71-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 and IHACPA 2022.

Table 4: Australian Classification of Health Interventions (ACHI) codes

Health intervention	ACHI code
Diagnostic procedures	
Coronary angiography	Block no: 668
Echocardiography	Block no: 1942
Therapeutic procedures	
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 (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 - external site opens in new window.

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

Methods

This page outlines the methods used for the *Heart, stroke and vascular disease: Australian facts* report.

Age-standardised rates

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

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 areas

Comparisons of regions in this report use the ABS Australian Statistical Geography Standard (ASGS) 2021 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.

The IRSD values used in this report are based on the 2021 Census.

In some instances, data for remoteness areas have been combined because of small sample sizes. It is possible that not every record in a data set will correspond directly to a remoteness area. Where data do not correspond, they have been excluded from analyses by remoteness area.

Further information on the ASGS is available on the ABS website - external site opens in new window.

Socioeconomic areas

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 2021 Census.

It is possible that not every record in a dataset will correspond directly to one of these socioeconomic areas. Where data do not correspond, they have been excluded from analyses by socioeconomic area.

Further information is available on the ABS website - external site opens in new window.

First Nations persons

In this report, comparisons are made between First Nations persons and people who do not identify as First Nations.

People with 'not-stated' Indigenous status are excluded from any analysis by Indigenous status.

Populations used

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.

The COVID-19 pandemic and the resulting Australian Government closure of the international border from 20 March 2020, caused significant disruptions to the usual Australian population trends. This report uses Australian Estimated Resident Population (ERP) estimates that reflect these disruptions.

In the year July 2020 to June 2021, the overall population growth was much smaller than the years prior – in particular there was a relatively large decline in the population of Victoria. ABS reporting indicates these were primarily due to net-negative international migration.

This may complicate interpretation of statistics calculated from these ERPs. For example, rates and proportions may be greater than in previous years due to decreases in the denominator (population size) of some sub-populations.

For more information: National, state and territory population, June 2023 | Australian Bureau of Statistics - external site opens in new window.

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.

First Nations populations

The ABS 2016 Census base series B First Nations population projections were used to derive rates (ABS 2019). To calculate non-Indigenous estimates, the First Nations projections were subtracted from the total Australian estimated resident population data.

References

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ACCD 2018b. The Australian Classification of Health Interventions (ACHI)–11th edition. Tabular list of interventions, and alphabetic index of interventions. Adelaide: Independent Hospital Pricing Authority.

IHACPA (Independent Health and Aged Care Pricing Authority) 2022. Emergency Department ICD-10-AM Principal Diagnosis Short List - external site opens in new window, accessed 30 November 2022.

WHO (World Health Organization) 2019. International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10). Geneva: WHO.

Notes

Latest data update

17 June 2024

Update to Heart, stroke and vascular disease Summmary page including:

- New 2021–22 hospitalisations data
- New 2022 deaths data
- New 2022–23 emergency department data
- Data table: Heart, stroke and vascular disease: Australian facts added to Data.

14 Dec 2023

- New 2023 Australian Burden of Disease Study data
- New 2020–21 expenditure data
- Data table: HSVD Australian facts added to data.

30 Jun 2023

- New 2020 and 2021 mortality data
- New 2022 Australian Burden of Disease Study data
- New 2019–20 expenditure data
- New 2021–22 Pharmaceutical Benefits Scheme data
- Data table: HSVD Australian Facts added to data.

9 Feb 2023

- New 2020–21 hospitalisations data and updates to information relating to COVID 19.
- Data table: HSVD Australian Facts added to data.

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Australian Government
Australian Institute of Health and Welfare

Data

The data tables present the latest available data on heart, stroke and vascular disease in Australia as reported in the *Heart, stroke and vascular disease: Australian facts* report.

Data tables: Heart, stroke and vascular disease Australian facts

Data
XLSX 547Kb

Report editions

This release

Heart, stroke and vascular disease: Australian facts | 17 Jun 2024

Previous releases

- Cardiovascular disease, diabetes and chronic kidney disease: Australian facts: prevalence and incidence 2014 | **Publication** | 19 Nov 2014
- Cardiovascular disease, diabetes and chronic kidney disease: Australian facts: morbidity—hospital care 2014 | **Publication** | 22 Dec 2014
- Cardiovascular disease, diabetes and chronic kidney disease: Australian facts mortality 2014 | **Publication** | 24 Oct 2014
- An overview of chronic kidney disease in Australia, 2009 | **Publication** | 27 May 2009
- Chronic kidney disease in Australia 2005 | **Publication** | 23 Nov 2005

Related material

Related topics

- Chronic disease
- Heart, stroke & vascular diseases

Archived content

Heart, stroke and vascular disease: Australian facts

Resource | *14 Dec 2023*
PDF 15.6Mb

Heart, stroke and vascular disease: Australian facts

Resource | *30 Jun 2023*
PDF 10.8Mb

Heart stroke and vascular disease: Australian facts

Resource | *09 Feb 2023*
PDF 7.3Mb

Heart, stroke and vascular disease: Australian facts

Resource | *29 Sep 2021*
PDF 6.9Mb

Cardiovascular disease web report 2020

Resource | *15 Jul 2020*
PDF 867Kb

Note: request access to archived data tables via cvd@aihw.gov.au.