Australian Government
Australian Institute of Health and Welfare

Cardiovascular disease in women

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Summary

Cardiovascular disease (CVD) is a leading cause of illness and death among Australian women. Nationally, there is increased recognition of gender differences in CVD risk factors, presentation, treatment and outcomes.

This report gives a statistical overview of the impact of common forms of CVD—coronary heart disease, stroke, heart failure and cardiomyopathy—on Australian women.

More than half a million women have CVD

An estimated 510,000 (4.8%) Australian women aged 18 and over reported 1 or more heart, stroke and vascular diseases in 2017–18.

Around 22,200 women had an acute coronary event (heart attack or unstable angina) in 2016, and 17,900 women had a stroke in 2015.

A major cause of illness and death

CVD accounted for 12% of the total burden of disease among Australian women in 2015, and caused 22,200 female deaths in 2016—more than any other disease group.

Lifestyle changes can reduce risk

The proportion of women who smoked daily has fallen from 24% in 1989–90 to 11% in 2017–18. However, 60% of women were overweight or obese in 2017–18.

Heart attacks and deaths have fallen

The acute coronary event rate among women halved between 2001 and 2016.

Stroke incidence among women fell by 25% between 2001 and 2015.

The share of total female deaths due to CVD fell from 37% in 2006 to 29% in 2016.

Smaller improvements—and a rise in strokes—among younger women

From 2001 to 2015, the incidence of acute coronary events among women aged 35–44 fell by 22%, compared with 65% among women aged 65–74.

Between 2001 and 2015, stroke incidence increased among younger women by 16% for ages 35–44 and 12% for ages 45–54.

Between 2006 and 2016, CVD death rates fell by more than 40% for women aged 65–74 and 75–84 and 13% for women aged 45–54.

Hospitalisation rates rising for younger women

Between 2006–07 and 2015–16, CVD hospitalisation rate for females fell by 5.3%, but rates increased by 11% for ages 25–34, and 4.7% for ages 35–44.

Impact on Indigenous women

An estimated 12,500 Aboriginal and Torres Strait Islander women had a form of heart, stroke or vascular disease in 2012–13; of these, 7,100 had coronary heart disease.

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

1 Introduction

Cardiovascular disease (CVD) is a disease group that has a significant impact on the health of Australians. It costs more lives than any other disease. It imposes a burden—measured in terms of people living with the disease and premature death—that is second only to cancer (AIHW 2019a). It accounts for the highest proportion of health expenditure and the number of people living with CVD is increasing, because of factors such as population ageing and improved treatments.

Although it affects both men and women, CVD is often thought of as a men's health issue. It is true that more men than women have the disease, and men typically present with the condition at younger ages and with greater severity. After accounting for differences in age structure, men are also hospitalised and die from CVD at greater rates than women. However, this picture should not overshadow the substantial, and under-recognised, impact that CVD has on women.

CVD is a leading cause of illness and death among Australian women. It was responsible for more than 200,000 female hospitalisations and over 22,000 female deaths in 2016. It is a major women's health concern, and aspects of its prevention, treatment and management are unique to women.

This report

This report provides a statistical overview of the impact of CVD on Australian women. It presents national data on CVD, as well as on specific types of CVD including coronary heart disease, stroke, and heart failure and cardiomyopathy (Box 1.1).

Age-specific rates investigate the impact of CVD at different stages of women's lives. To highlight differences, results for men are included throughout.

The chapters in this report are structured as follows: prevalence and incidence (Chapter 2), estimations of impact through burden of disease calculations (Chapter 3), hospitalisations (Chapter 4), procedures in hospitals (Chapter 5), deaths (Chapter 6), and the impact on Aboriginal and Torres Strait Islander women (Chapter 7).

Tables relating to this report are published online as Appendix B, Cardiovascular disease in women data tables. See https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/cardiovascular-disease-in-women-main/related-material

1.1 A focus on women

Much of our knowledge of heart disease is based on research conducted primarily among men (McDonnell et al. 2018), which shapes our view of how cardiovascular disease impacts the Australian population. However, it is known that there are important differences between women and men in risk factors for CVD, in symptoms, and in treatment and outcomes.

Need for greater awareness

Many women are unaware of the risk that CVD presents to their health. Their knowledge about heart attack symptoms and CVD as a cause of death is less than optimal—in 2018, for example, only one-fifth (21%) of Australian women correctly perceived heart-related causes to be the leading cause of death (Bairey Merz et al. 2017; Flink et al. 2013; Heart Foundation 2018; Hoare et al. 2017).

Women presenting with CVD often have different symptoms than men. These symptoms may not be recognised as CVD, thus increasing the likelihood of a missed diagnosis. Although men with heart attack typically describe chest pain or discomfort, women are more likely to have non-chest pain symptoms such as shortness of breath, weakness, fatigue and indigestion (Mehta et al. 2016; Wenger 2013), and frequently with worse consequences (Maas et al. 2011; McDonnell et al. 2018; Pagidipati & Peterson 2016).

Women generally present with CVD later in life than do men. Older women are also more likely to have other health conditions, making their CVD more complex to diagnose and treat, which in turn can lead to worse health outcomes (Bennett et al. 2017; Saeed et al. 2017).

Physicians are more likely to underestimate CVD risk in women, and this can influence their diagnosis and treatment (Wenger 2013). Research finds that younger women aged under 55 with acute coronary syndrome are more likely to be misdiagnosed and discharged from emergency departments than men (Bairey Merz et al. 2017; Saw et al. 2014).

Differences in treatment

A number of studies have identified disparities between women and men in CVD treatment and in outcomes. Women with acute coronary syndrome tend to receive fewer medications, are less likely to have their condition treated aggressively and have fewer invasive interventions (Kuhn et al. 2014, 2015, 2017; Pagidipati & Peterson 2016; Saeed et al. 2017).

Similarly, women with ST segment elevation myocardial infarction (STEMI: a type of heart attack) are less likely to receive invasive management, revascularisation or preventive medication at discharge (Khan et al. 2018). Women with stroke are more likely to have a delay in care than men, and are less likely to receive aspirin, statins or thrombolytics (Raeisi-Giglou et al. 2017).

Healthier women

An increased recognition of gender differences in risk factors, presentation, treatment and outcomes will contribute to improving women's cardiovascular health in Australia.

The Australian Government, the Heart Foundation, the Stroke Foundation and other key stakeholders contribute by building awareness among the public and health-care providers about the risks of CVD to women's health.

Chronic conditions, including CVD, and preventative health are a priority for action in the National Women's Health Strategy 2020–2030 (Department of Health 2018). The development and delivery of a national campaign to promote awareness of the different risks for and symptoms of CVD in women is a key action in the current strategy. The ongoing monitoring of the impact of CVD is an important component of policy and programme initiatives that focus on women's health.

Box 1.1: What is cardiovascular disease?

Cardiovascular disease (CVD) is a broad term used to describe the many different conditions that affect the heart and blood vessels.

The main underlying cause of CVD is atherosclerosis, where abnormal deposits of fat, cholesterol and other substances build up in the inner lining of the arteries to form plaque. Atherosclerosis is most serious when it reduces or blocks 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 in childhood and progressing with age.

Coronary heart disease

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

Heart attack—also known as acute myocardial infarction (AMI)—is a life-threatening event that occurs when a blood vessel supplying the heart is suddenly blocked, leading to damage of the heart muscle and compromising 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. Non-ST segment elevation myocardial infarction (NSTEMI) 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.

Stroke

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

Either may result in part of the brain dying, leading to sudden impairment that can affect a number of functions. Stroke can cause paralysis of parts of the body, or speech problems and other symptoms, such as difficulties with swallowing, vision and thinking, and may lead to death.

Cerebrovascular disease is a broad disease category that includes stroke, but also includes other disorders of the blood vessels supplying the brain or its covering membranes.

A condition related to stroke is transient ischaemic attack (TIA). TIA happens 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.

(continued)

Box 1.1 (continued): What is cardiovascular disease?

Heart failure and cardiomyopathy

Heart failure refers to the heart functioning less effectively in pumping blood around the body. It can occur suddenly, although it usually develops slowly as the heart gradually becomes weaker and works less effectively. It can result from a variety of diseases and conditions that impair or overload the heart, notably heart attack, high blood pressure, a damaged heart valve, or primary heart muscle weakness—known as cardiomyopathy. In more severe cases it can result in chronic tiredness, reduced capacity for physical activity and shortness of breath. Severe heart failure is life-threatening and has poor survival.

Cardiomyopathy is a disease where the heart muscle becomes enlarged, thickened or stiff. There are various causes including coronary heart disease, hypertension, viral infections and chronic alcohol abuse. Cardiomyopathy and heart failure commonly occur together.

1.2 Women at risk

Risk factors are attributes, characteristics or exposures that increase the likelihood of a person developing a disease. Risk factors can also influence disease progression and treatment outcomes.

Behavioural risk factors are those that individuals have the most ability to modify. These behaviours include smoking, insufficient physical activity, excessive alcohol consumption and inadequate fruit and vegetable consumption.

Biomedical risk factors are bodily states that are often influenced by behavioural risk factors. Overweight and obesity, high blood pressure, abnormal blood lipids (dyslipidaemia) and impaired glucose regulation are important biomedical risk factors for CVD.

Modifying risk factors that are amenable to change can help reduce the risk of incidence and recurrence of CVD events such as heart attack and stroke in Australian women. Healthy lifestyle choices are key to reducing modifiable CVD risk factors (Box 1.2).

Box 1.2: Risk factor prevalence in Australian women

Behavioural risk factors

- 11% smoked daily in 2017–18 (17% for men)
- 59% did not meet the guideline for physical activity in 2017–18 (50% for men)
- 8.9% drank alcohol at levels that exceeded lifetime risk guidelines in 2017–18 (24% for men)
- 89% did not eat the recommended daily serves of vegetables, and 44% did not eat the recommended serves of fruit in 2017–18 (96% and 53% for men)

Biomedical risk factors

- 30% were overweight and 30% were obese in 2017–18 (42% and 33% for men)
- 20% had uncontrolled high blood pressure in 2017–18 (25% for men)
- 63% had abnormal blood lipids (dyslipidaemia) in 2011–12 (64% for men)
- 2.1% had impaired fasting glucose in 2011–12 (4.1% for men)

Sources: ABS 2013a, 2019.

Different risks

Some CVD risk factors have different impacts on women than on men. In part, this is due to biological differences (McSweeney et al. 2016), but it is also due to differences in health behaviours between women and men. Women have a greater relative risk of heart attack associated with diabetes, smoking and high blood pressure than men (Millett et al. 2018).

Women who smoke, for example, have a 25% increased risk of coronary heart disease than men who smoke (Huxley & Woodward 2011). Further, women who smoke while they take the contraceptive pill greatly increase their risk of heart disease, stroke and blood clots in their legs and lungs (Garcia et al. 2016; Mehta et al. 2015).

Women with diabetes are 4.3 times as likely to have a heart attack than women without diabetes, whereas for men with diabetes the likelihood is 2.7 times as high. The reason for the difference in risk is unknown (Pagidipati & Peterson 2016).

Depression and anxiety have stronger associations with CVD risk in women, and they disproportionately affect women with acute coronary syndrome (Bennett et al. 2017; Maas et al. 2011). Higher rates of depression in women compared with men, and the association of depression with other CVD risk factors including smoking and physical activity may contribute to the differential impact (Saeed et al. 2017).

Unique to women are complications during pregnancy, including pre-eclampsia and gestational diabetes, which are known risk factors for heart disease (Bellamy et al. 2007; Raeisi-Giglou et al. 2017; Tooher et al. 2017; Wu et al. 2017).

Oestrogen is a hormone that plays an important role in women's cardiovascular health. It appears to be protective in women prior to menopause, and may explain the later onset of CVD in women compared with men. However, the exact relationship between menopause and cardiovascular risk requires further research (Maas et al. 2011; Mehta et al. 2016; Pagidipati & Peterson 2016).

Trends in risk factors

Among the major CVD risk factors, only smoking levels have declined substantially in recent decades—in 1989–90, 24% of women aged 18 and over smoked daily, falling to 11% in 2017–18.

Other risk factors, such as overweight and obesity, have increased. Between 1995 and 2017–18, the proportion of women who were overweight or obese increased from 49% to 60%.

Risky alcohol consumption has shown signs of improvement in men, but has remained unchanged in women. Between 2001 and 2007–08, the proportion of women exceeding lifetime alcohol consumption guidelines increased from 8.5% to 11.7%. From 2007–08 to 2017–18, the proportion fell from 11.7% to 8.9%.

Additional biomedical surveys are needed before population-level changes in dyslipidaemia and in impaired fasting glucose can be properly assessed.

Absolute risk

As a woman's number of risk factors increases, so does her risk of developing CVD. A comprehensive individual risk assessment takes into account all risk factors: modifiable, non-modifiable and related conditions. Assessing cardiovascular risk in this way 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).

One recent study estimated that around 14% of Australian women aged 45–74 (522,000 women) were at high absolute risk of a future CVD event—such as heart attack, stroke or death from CVD—over the next 5 years. A further 2.9% (108,000 women) were at moderate risk (Banks et al. 2016).

Of those women at high absolute risk who already had CVD, many were not receiving recommended treatment. Less than half (48%) were receiving lipid-lowering medication, 63% were receiving blood pressure-lowering medication, and only 34% were receiving both blood pressure and lipid-lowering medication.

Absolute CVD risk was higher among Aboriginal and Torres Strait Islander women, with 23% aged 35–74 at high absolute risk of a future CVD event (Calabria et al. 2018). Their elevated risk was attributed to the greater prevalence of CVD risk factors in the Indigenous population than in the general Australian population, particularly of diabetes, dyslipidaemia, chronic kidney disease and smoking. High absolute risk was evident at younger ages among Indigenous women than among the general population.

2 How many Australian women have cardiovascular disease?

Key findings

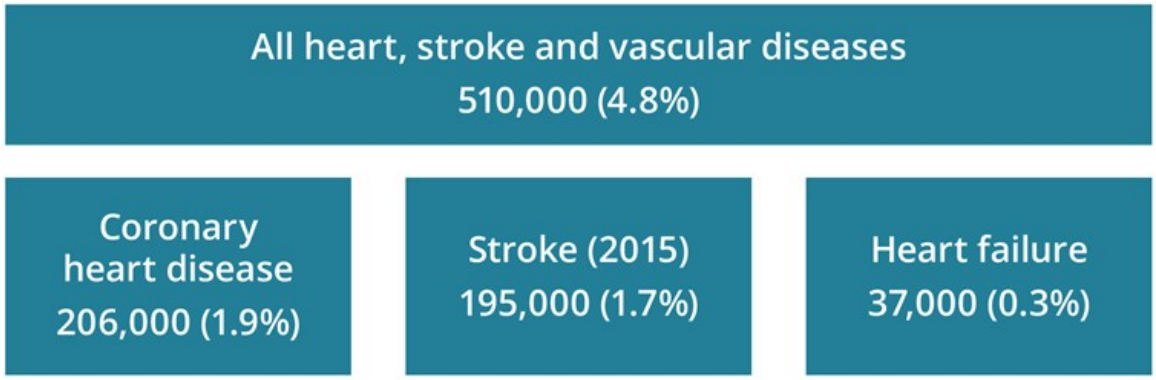
- In 2017–18, an estimated 510,000 Australian women aged 18 and over (4.8%) had some form of heart, stroke or vascular disease, based on self-reported data.
- CHD was less common among women (1.9%) than men (3.8%) in 2017–18. Similar proportions of women and men had stroke and heart failure.
- The proportion of women with CVD increased with age, with the highest rates among women aged 75 and over.
- In 2016, an estimated 22,200 women experienced an acute coronary event (heart attack or unstable angina)—around 61 events per day—and, in 2015, an estimated 17,900 females experienced a stroke—around 50 per day.
- Between 2001 and 2016, the incidence of acute coronary events among women fell by 57%. Younger women experienced less improvement than younger men, while women aged 55 and over experienced greater improvements than men of the same age.
- Women experienced a 24% fall in the incidence of stroke between 2001 and 2015. However, the incidence of stroke increased among younger women over the period—by 16% among those aged 35–44, and 12% for those aged 45–54.

Heart, stroke and other vascular diseases are reported as a category of circulatory conditions in the Australian Bureau of Statistics (ABS) National Health Survey (NHS) (Box 2.1). This category includes angina, heart attack, other ischaemic heart diseases, stroke, other cerebrovascular diseases, oedema, heart failure, and diseases of the arteries, arterioles and capillaries.

An estimated 510,000 women and 641,000 men aged 18 and over had 1 or more heart, stroke and vascular diseases in 2017–18, based on self-reported data from the 2017–18 NHS (ABS 2018). Overall, the prevalence of heart, stroke and vascular diseases was slightly lower in women (4.8%) than in men (6.5%).

The prevalence of stroke and heart failure were similar in women and men, whereas the prevalence of CHD was lower among women (1.9%) than men (3.8%) (Figure 2.1).

Figure 2.1: Prevalence of major types of cardiovascular disease among women, 2017–18



Note: Percentages are age-standardised to the 2001 Australian population.

Sources: ABS 2019, ABS 2018, ABS 2016b.

2.1 Coronary heart disease

Prevalence

An estimated 206,000 women and 374,000 men aged 18 and over had CHD in 2017–18, based on self-reported data.

For women with CHD, 89,000 experienced angina, while 115,000 had a heart attack (ABS 2018). The corresponding values for men were 142,000 and 260,000, respectively. Note that a person may report more than 1 disease.

Sex and age

Overall, the prevalence of CHD among women was around half that in men—an age-standardised rate of 1.9% and 3.8%, respectively.

The prevalence of CHD was higher among older age groups, ranging from less than 1% of women aged 18–44, to 8% among those aged 75 and older (compared with less than 1% of men aged 18–44, to over 20% of men aged 75 and over) (Figure 2.2).

Box 2.1: Data considerations

Cardiovascular disease

Prevalence data based on self-reported data from the ABS 2017–18 NHS may underestimate the number of people with CVD.

People in institutional care facilities, such as hospitals and aged care, were not included in the survey. This excludes a section of the population where high levels of CVD are expected to exist. Some respondents may not have known, or could not accurately report, their health status.

Coronary heart disease

There are no reliable national data that count new cases of CHD. AIHW has developed a proxy measure that combines hospital and mortality data to estimate the incidence of acute coronary events (heart attacks and unstable angina). The measure uses unlinked episode-based hospital data from the AIHW National Hospital Morbidity Database (NHMD) and deaths data from the AIHW National Mortality Database (NMD).

Stroke

The ABS Survey of Disability, Ageing and Carers (SDAC) is the source used to estimate 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. Stroke is associated with increasing age, and many people living with stroke require the special care that these facilities provide. The data presented from SDAC combine information from both private and non-private dwellings.

There are no reliable national data to measure the incidence of stroke events. In this report, a proxy method that uses data from the NHMD and the NMD was used to estimate the incidence of stroke events in Australia.

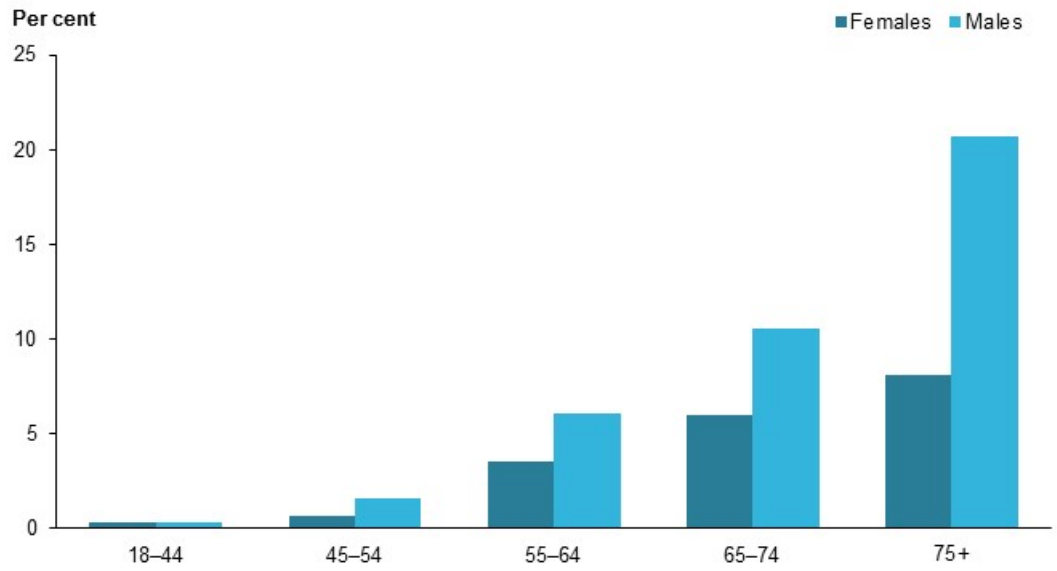
Heart failure

There are no national registers or administrative data sets that record the prevalence or incidence of heart failure. Prevalence was estimated using self-reported data from the ABS NHS. These estimates may under-report the true burden of heart failure because its early stages are only mildly symptomatic, and many people may be unaware that they have the condition.

Prevalence estimates of heart failure in this report should be interpreted with caution.

See Appendix A for further details.

Figure 2.2: Prevalence of self-reported CHD among persons aged 18 and over, by age and sex, 2017–18



Note: See Appendix table B2.1.

Source: ABS 2019.

Incidence of acute coronary events

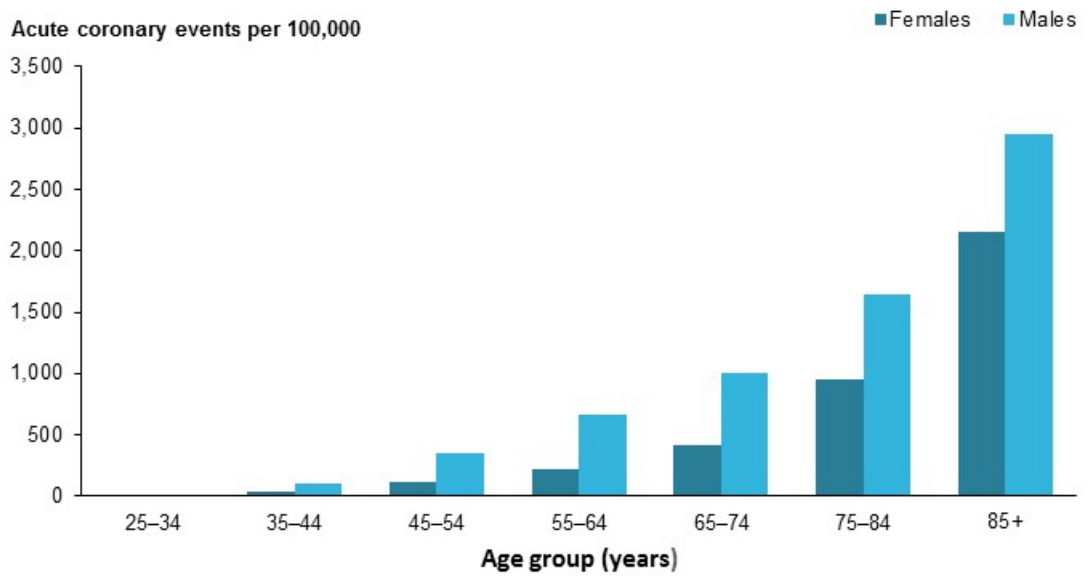
In 2016, based on hospital and mortality data, an estimated 22,200 women aged 25 and over had an acute coronary event in the form of a heart attack or unstable angina: around 61 events every day. The corresponding figure for men was 40,200: around 110 events every day.

Sex and age

Overall, the rate of acute coronary events in women was less than half that of men, at 215 and 468 per 100,000 population, respectively. Women had lower rates than men in all age groups (Figure 2.3).

The incidence of acute coronary events increased markedly with increasing age, from 5 per 100,000 among women aged 25–34 (13 per 100,000 for men) to 2,100 per 100,000 among women aged 85 and over (2,900 per 100,000 for men).

Figure 2.3: Acute coronary event rates, by age and sex, 2016



Note: See Appendix tables B2.2 and B2.3.

Sources: AIHW National Hospital Morbidity Database and AIHW National Mortality Database.

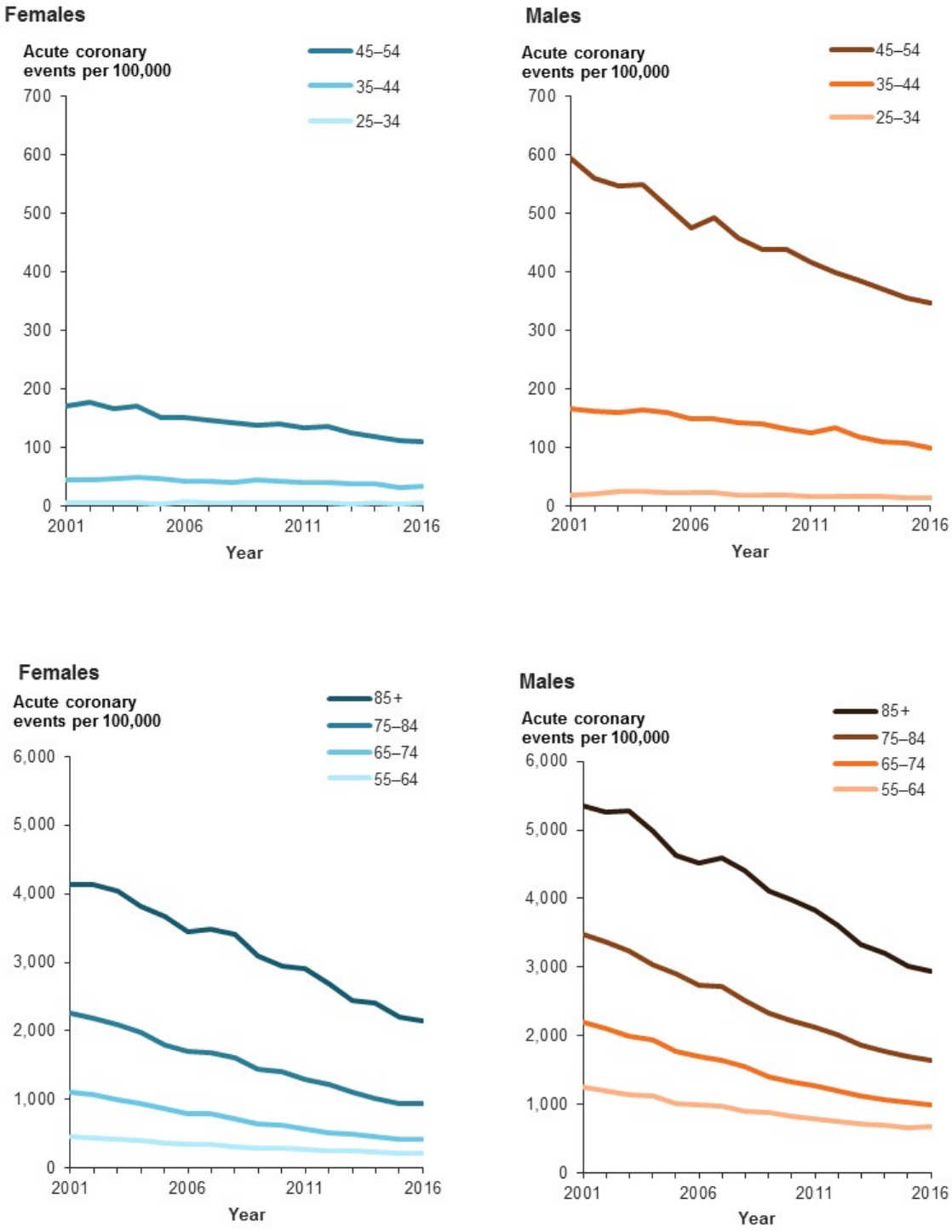
Overall trends

The rate of acute coronary events declined rapidly between 2001 and 2016: by 57% for women (from 465 to 215 events per 100,000) and 52% for men (from 916 to 468).

Age-specific trends

Although the incidence of acute coronary events fell across all age groups between 2001 and 2016, there was variation in the level of improvement (Figure 2.4). Younger women experienced less improvement than younger men: among ages 35–44, the rate fell by 26% among women, and 39% among men. Older women experienced greater improvements than men: among ages 65–74, the rate fell by 67% among women and 61% among men.

Figure 2.4: Acute coronary event rates, by age and sex, 2001 to 2016



Notes

1. Different scales have been used in the upper and lower panels.
2. Acute coronary events include heart attack (acute myocardial infarction) and unstable angina.
3. See Appendix tables B2.2 and B2.3.

Sources: AIHW National Mortality Database and AIHW National Hospital Morbidity Database.

2.2 Stroke

Prevalence

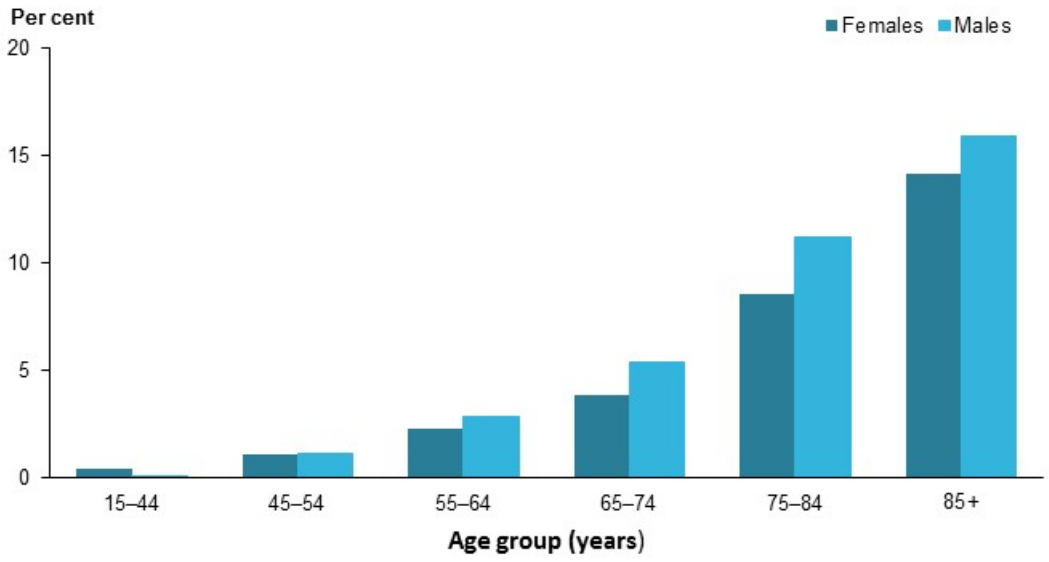
In 2015, an estimated 195,000 females had experienced a stroke at some time in their lives, based on self-reported data. The corresponding figure for males was 199,000.

Sex and age

The overall prevalence of stroke was similar for females (1.7%) and males (1.7%).

The prevalence of stroke increased with age, affecting 3.8% of women aged 65–74 (5.4% for men), and 14% of women aged 85 and over (16% for men) (Figure 2.5).

Figure 2.5: Prevalence of self-reported stroke, by age and sex, 2015



Note: See Appendix Table B2.4.

Source: ABS 2016b.

Overall trends

The estimated prevalence of stroke in females remained similar between 2003 and 2015, ranging from 1.3 to 1.7% (Appendix Table B2.5). Stroke prevalence in males ranged from 1.7% to 2.0%.

Incidence of stroke events

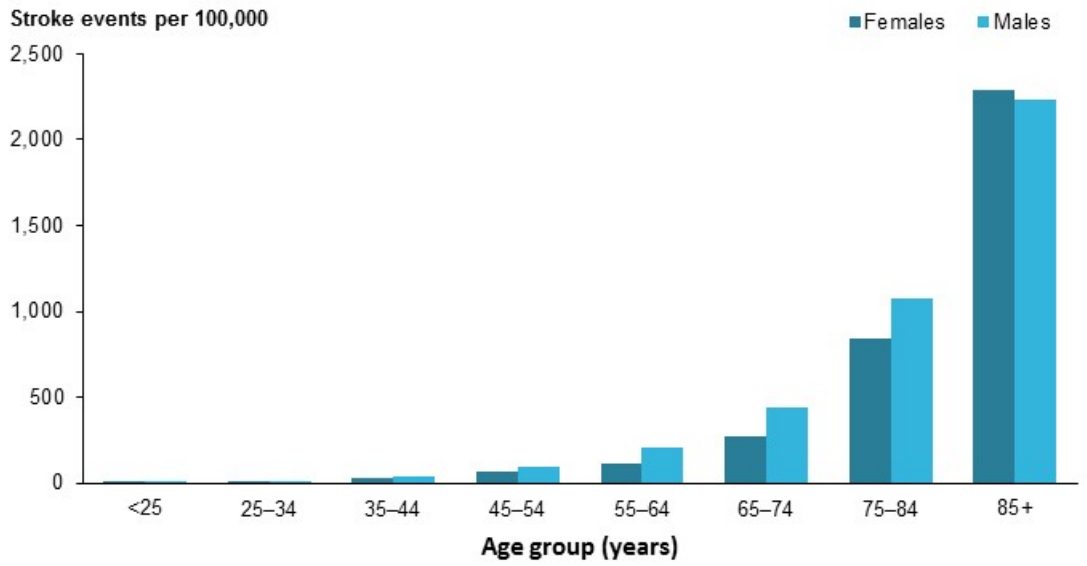
In 2015, there were an estimated 17,900 stroke events in females and 18,800 in males: around 50 events per day for each.

Sex and age

The age-standardised stroke incidence rate was 113 per 100,000 in females, compared with 150 per 100,000 in males.

Incidence rates of stroke increased with increasing age in both sexes. Rates were lower in females, with the exception of those aged 85 and over (2,300 per 100,000 in women and 2,200 per 100,000 in men) (Figure 2.6).

Figure 2.6: Stroke event rates, by age and sex, 2015



Note: See Appendix tables B2.6 and B2.7.

Sources: AIHW analysis of AIHW National Hospital Morbidity Database and AIHW National Mortality Database.

Overall trends

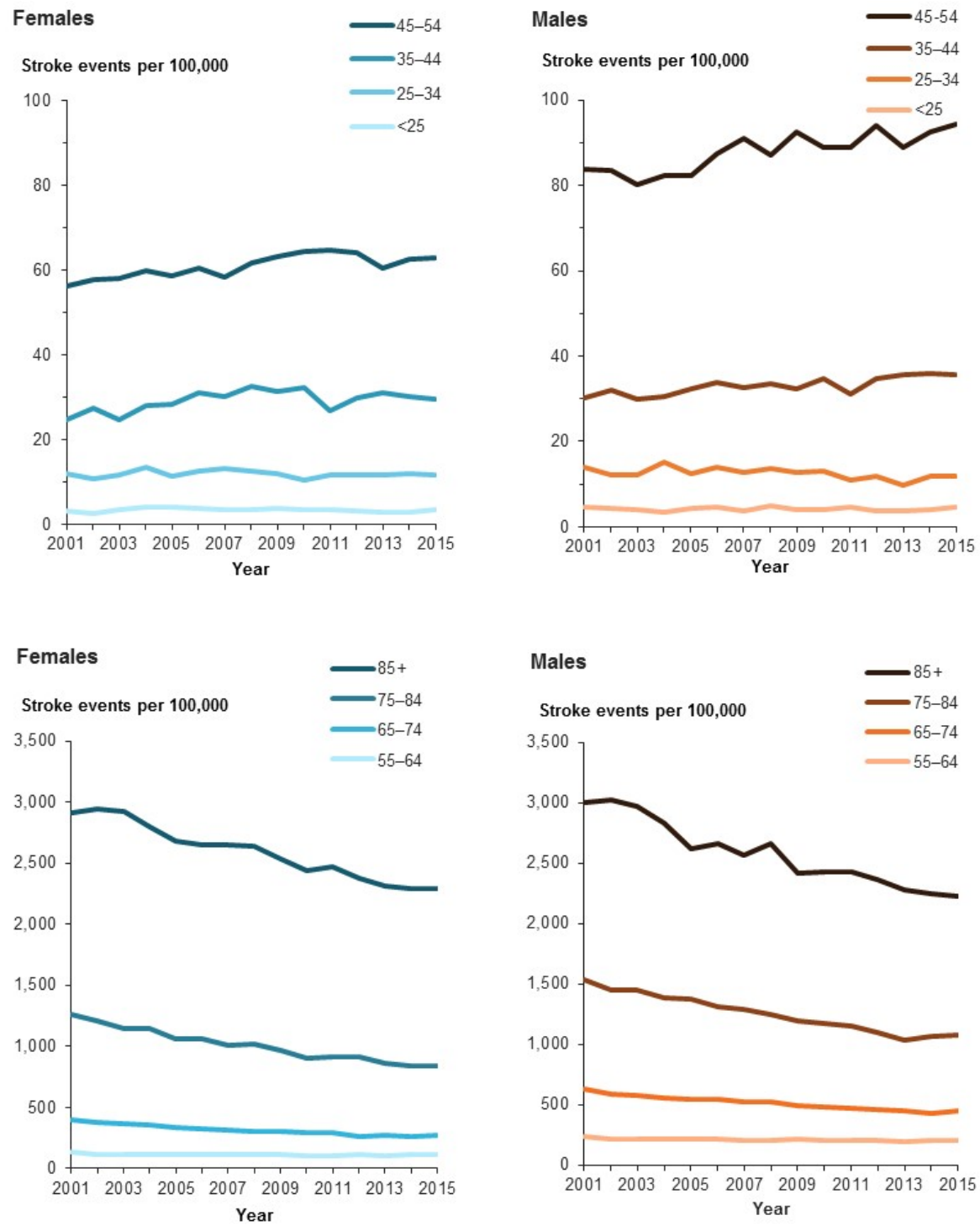
The rate of stroke events fell by 25% in females between 2001 and 2015 (from 148 to 113 events per 100,000) and by 24% in males (from 193 to 150).

Age-specific trends

Between 2001 and 2015, stroke event rates declined among those aged 55 and older in both women and men (Figure 2.7).

In contrast, rates increased among younger age groups for both females and males. Rates increased by 16% in women aged 35–44 (from 25 to 29 per 100,000), and by 18% in men of the same age (from 30 to 36).

Figure 2.7: Stroke event rates, by age and sex, 2001–2015



Notes

1. Different scales have been used in the upper and lower panels.
2. See Appendix tables B2.6 and B2.7.

Sources: AIHW analysis of AIHW National Hospital Morbidity Database and AIHW National Mortality Database.

2.3 Heart failure

An estimated 37,300 Australian women, and 67,700 men aged 18 and over had heart failure in 2017–18, based on self-reported data from the 2017–18 NHS (ABS 2019).

This corresponds to age-standardised rates of 0.3% for women and 0.7% for men. Heart failure predominantly affects older Australians.

3 The burden of cardiovascular disease

Key findings

- CVD as a disease group accounted for 12% of the burden of disease and injury among Australian females (15% for males), ranking fourth behind cancer, musculoskeletal conditions, and mental and substance use disorders.
- CHD was responsible for 5.0% of the total burden of disease and injury in females (8.6% for males)—greater than any other specific disease—and stroke was responsible for 2.9% (2.5% for males).
- 78% of the CVD burden for females in 2015 was 'fatal'—due to premature death. As a disease group, CVD was the second leading cause of fatal burden, behind cancer.
- Despite accounting for a large share of the health burden, the CVD burden among females fell by 37% between 2003 and 2015. There were similar falls for CHD (47%) and stroke (41%) over the same period.

Burden of disease analysis assesses the health impact on a population of different diseases, conditions, injuries and risk factors. It uses information from a range of sources to quantify the fatal and non-fatal effects of these diseases. These 2 measures are then combined into a summary measure of health called 'disability-adjusted life year' (DALY) (Box 3.1). DALYs combine the estimates of 'years of life lost' due to premature death (YLL) and 'years lived in ill health or with disability' (YLD) to count the total years of healthy life lost from disease and injury. This health loss represents the difference between the current health status of the population and an ideal situation where everyone lives a long life, free of disease (AIHW 2019b).

Burden of disease estimates capture both the quantity and health-related quality of life, and reflect the magnitude, severity and impact of disease and injury within a population. Burden of disease does not attempt to quantify the social or financial consequences of disease and injury.

This chapter uses burden of disease analysis to evaluate the combined impact of fatal and non-fatal cardiovascular disease on Australian females (AIHW 2019a, 2019b). It examines separately the impacts of coronary heart disease and stroke.

Box 3.1: Key terms

Burden of disease (and injury): The quantified impact of a disease or injury on a population, using the disability-adjusted life year (DALY) measure.

DALY (disability-adjusted life year): Measure (in years) of healthy life lost, either through premature death defined as dying before the ideal life span (YLL) or, equivalently, through living with ill health due to illness or injury (YLD).

Fatal burden: The burden from dying 'prematurely' as measured by years of life lost. Often used synonymously with YLL, and also referred to as 'life lost'.

Non-fatal burden: The burden from living with ill-health as measured by years lived with disability. It is often used synonymously with YLD.

Premature death: Death that occurs at a younger age than a selected cut-off.

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

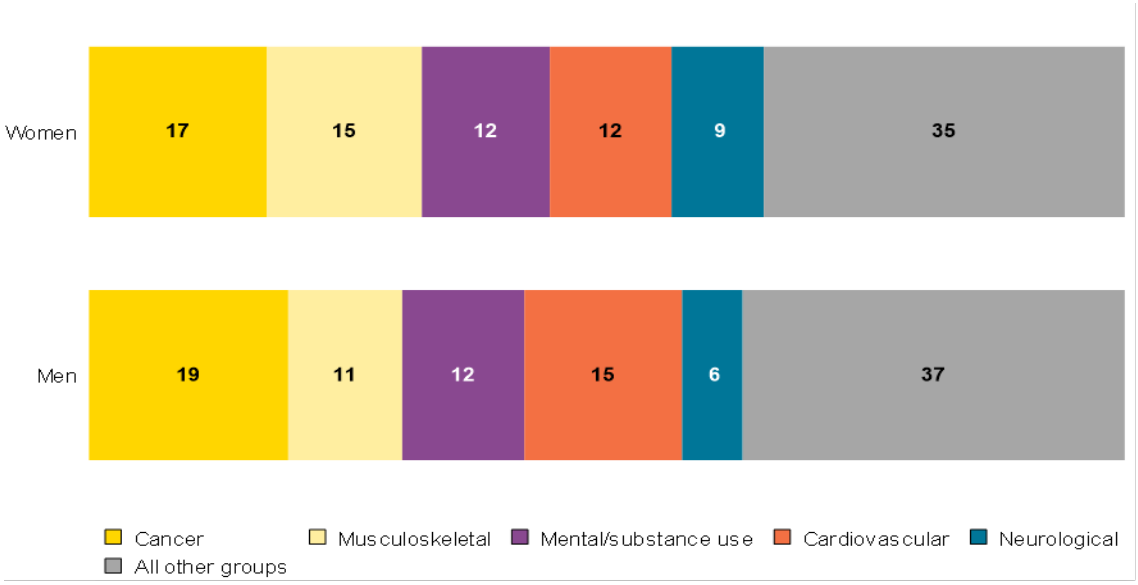
YLL (years of life lost): Years of life lost due to premature death. YLL represents fatal burden.

3.1 All cardiovascular disease

In 2015, CVD was responsible for 12% of the total burden of disease and injury suffered by females (equivalent to an age-standardised rate of 16.8 DALYs per 1,000 females); making it the fourth most burdensome disease group after cancer, musculoskeletal conditions, and mental and substance use disorders (Figure 3.1).

The burden from CVD in males (30.6 DALYs per 1,000 males) was 1.8 times as high as that in females. Females accounted for 41% of the total burden from cardiovascular diseases, and males 59%.

Figure 3.1: Total burden, by disease group and sex, 2015 (%)



Source: AIHW 2019a, based on analyses of the Australian Burden of Disease Database 2015.

The burden from CVD was low in childhood—although congenital cardiovascular anomalies were among the leading causes of total burden for children under 5 years—and increased with age. Mental and substance use disorders were the main causes of burden in late childhood, adolescence and adulthood to age 49. Cancer caused the most burden for ages 50–79, while CVD was the major cause of burden in older Australians.

The rate of CVD burden was lower in females than in males at most ages, except for the very young (aged under 5) and very old (aged 100 and over).

Non-fatal burden

Most of the CVD burden is fatal. For females, 22% of the overall burden from CVD was non-fatal in 2015.

In 2015, CVD was responsible for 57,100 YLD, equivalent to 4.6% of the non-fatal disease burden for females (7.1% for males).

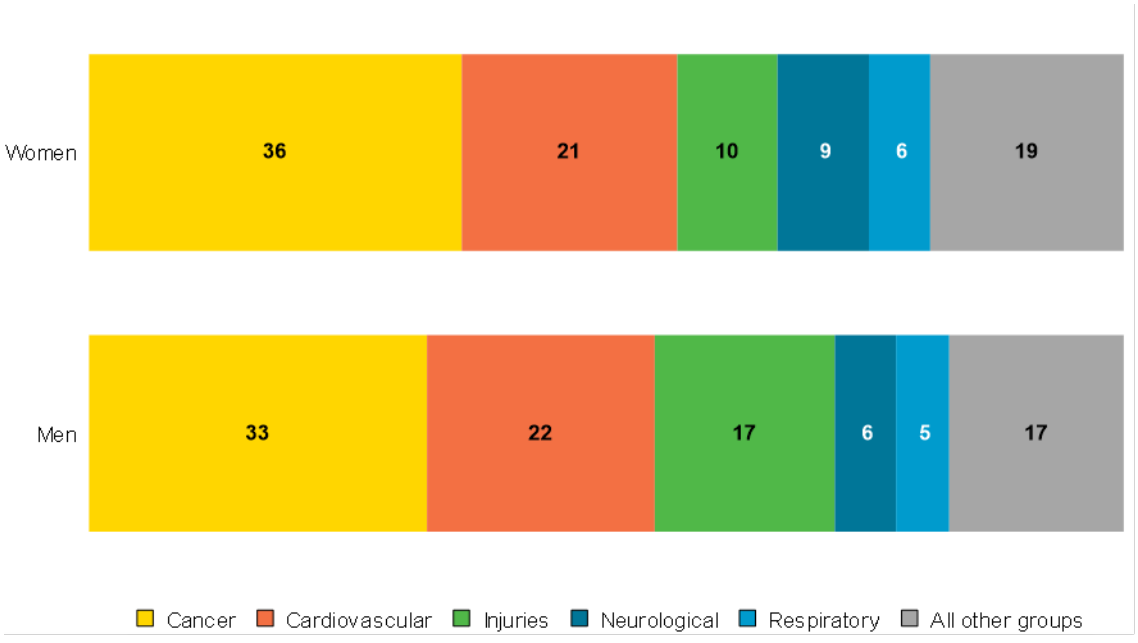
CVD was the fifth largest cause of the non-fatal disease burden, behind musculoskeletal conditions (26%), mental and substance use disorders (22%), respiratory diseases (10%) and neurological conditions (9.0%).

Fatal burden

The burden of CVD is dominated by premature deaths. Most of the CVD burden (78%) for females in 2015 was due to YLL. CVD was responsible for more female deaths than any other disease group.

CVD was responsible for 21% of fatal burden in females, ranking second in proportion behind cancer (36%) (Figure 3.2).

Figure 3.2: Fatal burden, by disease group and sex, 2015 (%)



Source: AIHW 2019a, based on analyses of the Australian Burden of Disease Database 2015.

Changes since 2003

CVD was responsible for 312,000 DALYs for females in 2003. Despite population growth and ageing, this figure fell to 262,000 in 2015.

After adjusting for differences in age structure and population size using age-standardised rates, the CVD burden fell from 26.8 DALYs per 1,000 females in 2003 to 16.8 in 2015: a reduction of 37%.

In 2003, CVD was the second leading cause of disease burden for females, falling to fourth in 2015.

3.2 Coronary heart disease

In 2015, CHD was responsible for 5% of the total female disease burden—equivalent to an age-standardised rate of 7.0 DALYs per 1,000 females—and 43% of the total female CVD burden. CHD caused a greater burden among females than any other disease.

Of the total burden from CHD, females comprised 34% and males 66%.

Among females, the contribution of CHD as a cause of disease burden increased with age. For women aged 65–74, it was the fourth ranked disease, responsible for 5.7% of total burden. For women in age groups 75–84 and 85 and over, it ranked second behind dementia, and was responsible for 8.6% and 13% of total burden, respectively (Figure 3.3).

Figure 3.3: Leading causes of total burden, by age and sex, 2015 (thousand DALYs, proportion of age group)

Women

	Age group (years)					
	25–44	45–54	55–64	65–74	75–84	85+
1st	Anxiety disorders (36.3, 9.5%)	Back pain and problems (18.2, 6.7%)	Osteoarthritis (20.6, 6.3%)	COPD (23.0, 6.4%)	Dementia (33.6, 9.7%)	Dementia (59.7, 20%)
2nd	Back pain and problems (30.4, 7.9%)	Anxiety disorders (17.1, 6.2%)	Lung cancer (18.3, 5.6%)	Osteoarthritis (20.7, 5.8%)	Coronary heart disease (29.8, 8.6%)	Coronary heart disease (40.0, 13%)
3rd	Depressive disorders (30.1, 7.8%)	Breast cancer (15.5, 5.6%)	Breast cancer (18.2, 5.5%)	Lung cancer (20.6, 5.8%)	COPD (25.2, 7.3%)	Stroke (24.2, 8.1%)
4th	Asthma (19.1, 5.0%)	Depressive disorders (14.1, 5.1%)	Back pain and problems (17.8, 5.4%)	Coronary heart disease (20.3, 5.7%)	Stroke (19.1, 5.5%)	COPD (14.2, 4.8%)
5th	Suicide/self-inflicted injuries (13.8, 3.6%)	Osteoarthritis (11.1, 4.0%)	COPD (13.3, 4.0%	Breast cancer (15.1, 4.2%)	Lung cancer (12.2, 3.5%)	Falls (11.8, 4.0%)

Men

	25–44	45–54	55–64	65–74	75–84	85+
1st	Suicide/self-inflicted injuries (47.7, 10%)	Coronary heart disease (28.5, 8.9%)	Coronary heart disease (43.7, 11%)	Coronary heart disease (53.0, 11%)	Coronary heart disease (47.8, 13%)	Coronary heart disease (30.7, 16%)
2nd	Back pain and problems (29.2, 6.3%)	Back pain and problems (18.9, 5.9%)	Lung cancer (23.7, 5.8%)	COPD (32.8, 7.0%	COPD (27.0, 7.2%	Dementia (25.5, 13%)
3rd	Alcohol use disorders (27.8, 6.0%)	Suicide/self-inflicted injuries (18.4, 5.8%)	Back pain and problems (18.2, 4.4%)	Lung cancer (31.7, 6.8%)	Dementia (25.4, 6.8%)	Stroke (12.8, 6.6%)
4th	Poisoning (27.2, 5.9%)	Anxiety disorders (11.7, 3.7%)	Type 2 diabetes (15.5, 3.8%)	Type 2 diabetes (17.2, 3.7%)	Lung cancer (19.3, 5.1%)	COPD (11.1, 5.7%)
5th	Depressive disorders (25.9, 5.6%)	Depressive disorders (10.4, 3.3%)	COPD (15.5, 3.8%	Prostate cancer (16.2, 3.5%)	Stroke (18.4, 4.9%)	Prostate cancer (8.9, 4.6%)

Source: AIHW 2019a, based on analyses of Australian Burden of Disease Database 2015.

Fatal and non-fatal burden

In 2015, CHD was the leading cause of fatal burden in Australia for both sexes, accounting for 8.9% and 13% of total YLL, respectively.

The contribution of CHD as a cause of fatal burden increased with age. For females, it was not among the leading 5 causes of fatal disease burden until age 45–54, where it ranked fifth and was responsible for 4.9% of fatal burden. It ranked third for age group 55–64 and second for 65–74. It was the leading cause of fatal disease burden for women aged 75–84 (11%) and 85 and over (18%) (Figure 3.4).

CHD caused less non-fatal than fatal burden. For females, CHD was the 12th most significant cause of non-fatal burden, contributing 2.0% of the total burden in 2015. For males, it ranked eighth, contributing 3.7% of the non-fatal burden.

Figure 3.4: Leading causes of fatal burden, by age and sex, 2015 (thousand YLL, proportion of age group)

Women

	Age group (years)					
	25–44	45–54	55–64	65–74	75–84	85+
1st	Suicide/self-inflicted injuries (13.5, 15%)	Breast cancer (13.7, 13%)	Lung cancer (18.1, 12%)	Lung cancer (20.2, 11%)	Coronary heart disease (22.7, 11%)	Coronary heart disease (34.0, 18%)
2nd	Poisoning (9.9, 11%)	Lung cancer (8.4, 8.2%)	Breast cancer (15.9, 11%)	Coronary heart disease (14.3, 8.0%)	Dementia (19.5, 9.7%)	Dementia (31.0, 16%)
3rd	Breast cancer (7.1, 7.8%)	Suicide/self-inflicted injuries (6.7, 6.5%)	Coronary heart disease (8.7, 6.0%)	COPD (12.9, 7.2%	Stroke (16.6, 8.3%)	Stroke (22.1, 12%)
4th	Bowel cancer (4.0, 4.4%)	Bowel cancer (5.9, 5.8%)	Bowel cancer (7.4, 5.1%)	Breast cancer (12.7, 7.1%)	COPD (12.3, 6.1%	COPD (7.3, 3.8%)
5th	Road traffic/motor vehicle (3.6, 3.9%)	Coronary heart disease (5.1, 4.9%)	COPD (6.0, 4.1%	Bowel cancer (9.0, 5.0%)	Lung cancer (11.9, 5.9%)	Lower respiratory infections (6.6, 3.4%)

Men

	25–44	45–54	55–64	65–74	75–84	85+
1st	Suicide/self-inflicted injuries (47.4, 26%)	Coronary heart disease (24.6, 15%)	Coronary heart disease (35.0, 15%)	Coronary heart disease (39.9, 14%)	Coronary heart disease (37.2, 15%)	Coronary heart disease (26.1, 19%)
2nd	Poisoning (27.0, 15%)	Suicide/self-inflicted injuries (18.3, 11%)	Lung cancer (23.4, 9.8%)	Lung cancer (31.1, 11%)	Lung cancer (18.8, 7.5%)	Dementia (15.2, 11%)
3rd	Coronary heart disease (11.6, 6.4%)	Chronic liver disease (10.2, 6.2%)	Chronic liver disease (13.8, 5.8%)	COPD (15.4, 5.5%	Dementia (16.2, 6.5%)	Stroke (11.3, 8.2%)
4th	Road traffic/motor vehicle (10.3, 5.7%)	Poisoning (9.5, 5.8%)	Bowel cancer (12.0, 5.0%)	Bowel cancer (14.3, 5.1%)	Stroke (15.4, 6.2%)	COPD (7.5, 5.5%)
5th	Chronic liver disease (4.8, 2.7%)	Lung cancer (9.2, 5.6%)	Liver cancer (9.2, 3.8%)	Prostate cancer (11.6, 4.1%)	COPD (15.4, 6.1%	Prostate cancer (7.2, 5.2%)

Source: AIHW 2019a, based on analyses of Australian Burden of Disease Database, 2015.

Changes since 2003

CHD was responsible for 157,000 DALYs for females in 2003, falling to 112,000 in 2015. After adjusting for age, CHD burden fell from 13.3 DALYs per 1,000 females in 2003 to 7.0 in 2015: a reduction of 47%. In both 2003 and 2015, CHD was the leading cause of disease burden among females.

For males, the CHD burden fell from 29.2 DALYs per 1,000 in 2003 to 17.2 in 2015: a reduction of 41%. CHD was the leading cause of male disease burden in both years.

3.3 Stroke

In 2015, stroke was responsible for 2.9% of the total female burden of disease and injury, equivalent to an age-standardised rate of 4.1 DALYs per 1,000 females, and 25% of the total female CVD burden. Stroke was the 12th leading cause of DALY for females.

Of the total burden from stroke, females comprised 51% and males 49%.

The burden from stroke was more prominent among older age groups. Stroke did not appear in the leading 5 cause of total burden in females until age 75–84, where it ranked fourth, being responsible for 5.5% of total burden for this group. It was the third leading cause for women aged 85 and over, behind dementia and CHD (Figure 3.3).

Fatal and non-fatal burden

Stroke is a major cause of premature death in Australia. It accounted for 5.8% of fatal burden in 2015, ranking fifth behind CHD (8.9%) and breast cancer (6.1%).

The contribution of stroke to fatal burden increased with age. For females, stroke was not among the 5 leading causes of fatal burden until age 75–84, where it ranked third, responsible for 8.3% of fatal burden. It was also ranked third among the leading causes of fatal burden for women aged and 85 and over (12%) (Figure 3.4).

Stroke accounted for just 1% of total non-fatal burden in both sexes.

Changes since 2003

Stroke was responsible for 82,100 DALYs for females in 2003, falling to 65,500 in 2015. After adjusting for age, stroke burden fell by 41%: from 7.0 DALYs per 1,000 females in 2003 to 4.1 in 2015. In 2003, stroke was the third leading cause of disease burden for females, falling to 12th in 2015.

For males, stroke burden also reduced by 43% from 8.7 DALYs per 1,000 in 2003 to 5.0 per 1,000 in 2015. Stroke was the fifth leading cause of disease burden in 2003, and eighth in 2015.

3.4 Heart failure

Heart failure is not identified separately in burden of disease analysis. Instead, the effects of heart failure are included as a consequence of underlying diseases such as coronary heart disease, rheumatic heart disease and cardiomyopathy.

Heart failure can also be a consequence of congenital heart disease, the burden for which is included in the infant and congenital conditions group.

4 Hospitalisations

Key findings

In 2015–16:

- 208,000 female hospitalisations were for CVD (3.7% of total female hospitalisations).
- 22% of female CVD hospitalisation were for CHD, 14% for heart failure and cardiomyopathy, and 8.2% for stroke.
- female CVD hospitalisation rates increased rapidly with age.

Between 2006–07 and 2015–16:

- The female CVD hospitalisation rate fell by 5.3%, from 1,490 to 1,420 per 100,000.
- However, rates rose among younger women: by 11% for women aged 25–34, and by 4.7% for women aged 35–44.
- The female CHD hospitalisation rate fell for those aged 25 and over.
- The female stroke hospitalisation rate fell for women aged 65 and over, and remained steady for women aged 25–64.
- Female heart failure and cardiomyopathy hospitalisation rates rose by 41% for women aged 45–54 and by 18% for women aged 55–64.

This chapter provides an overview of CVD hospitalisations in 2015–16, and examines trends from 2006–07 to 2015–16.

In addition to the number and rate of hospitalisations, data are presented on allied health interventions accessed while in hospital, average length of stay and hospitalisations ending in death.

Box 4.1: Data considerations

Data in this chapter are sourced from the AIHW National Hospital Morbidity Database (NHMD). A 'hospitalisation' refers to an episode of admitted care, which can be a total hospital stay (from admission to discharge, transfer or death) or a portion of a hospital stay beginning or ending in a change of type of care (for example, from acute care to rehabilitation).

Clinical information recorded in the NHMD includes information on principal and additional diagnoses (AIHW 2018a):

- Principal diagnosis is 'the diagnosis established after study to be chiefly responsible for occasioning an episode of admitted patient care, an episode of residential care or an attendance at the health-care establishment, as represented by a code'.
- An additional diagnosis is 'a condition or complaint either coexisting with the principal diagnosis or arising during the episode of admitted patient care, episode of residential care or attendance at a health-care establishment, as represented by a code'.

(continued)

Box 4.1 (continued): Data considerations

Additional diagnoses give information on the conditions that are significant in terms of

This chapter focuses on acute hospitalisations with CVD as the principal diagnosis. Some data on heart failure and cardiomyopathy use principal and additional diagnoses.

Persons can have multiple hospitalisations. Without linking records of multiple hospitalisations to individuals, it is not possible to count individual hospitalisations nationally. For this reason, the data presented in this report count hospitalisations and not persons.

Note that:

- For allied health interventions accessed in hospital, if the same intervention was performed more than once during a hospitalisation, it was only counted once.
- for length of stay in hospital, patients who were admitted and separated on the same day were excluded.
- for in-hospital death, the cause of death is not recorded.

See Appendix A for further information.

4.1 All cardiovascular disease hospitalisations

In 2015–16, there were 208,000 female hospitalisations with CVD as the principal diagnosis, and 292,000 for males. This equates to 3.7% of all female hospitalisations in this year.

Of these, 22% were for CHD, followed by 14% for heart failure and cardiomyopathy and 8.2% for stroke (Appendix Table B4.1).

Females were hospitalised for CVD at a lower rate than males (1,400 compared with 2,300 per 100,000 population).

Sex and age

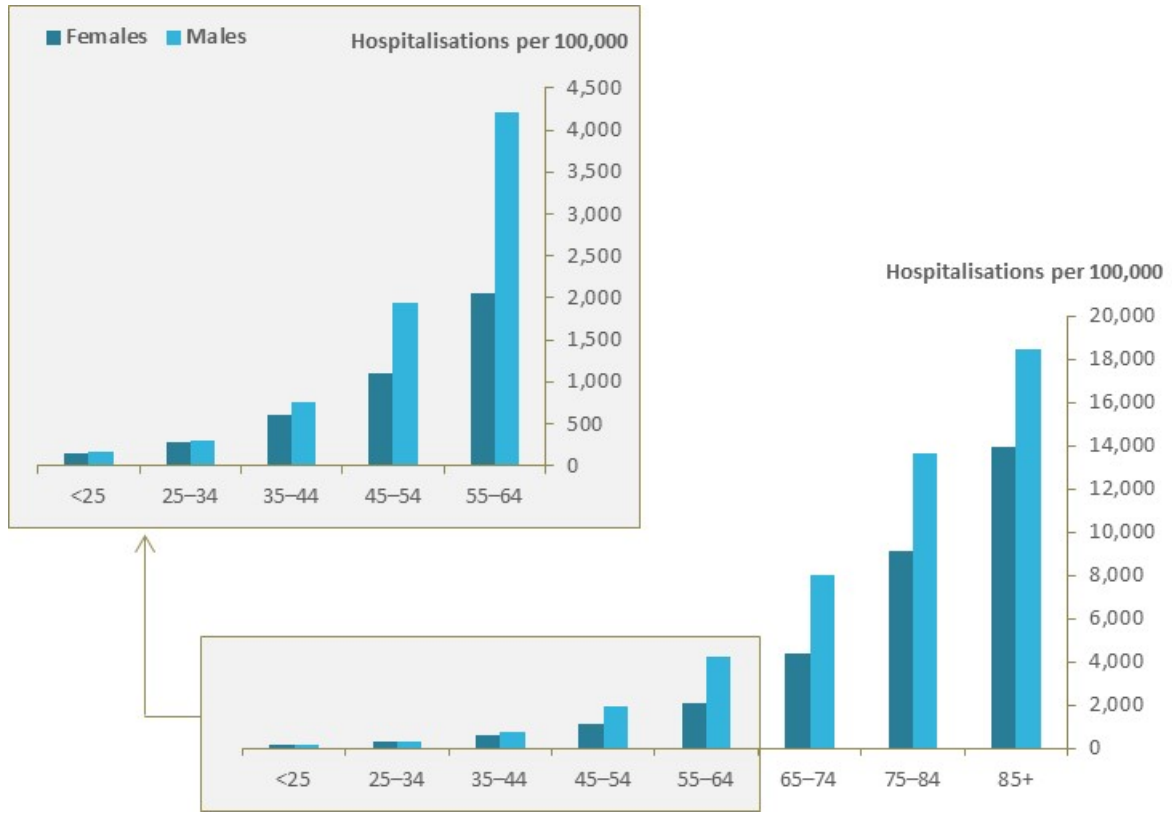
The proportion of CVD hospitalisations for females was lower than for males in every age group, except for those aged 85 and over.

The number of CVD hospitalisations was highest among females aged 75–84 (26%), whereas for males it was highest among those aged 65–74 (28%). This reflects the earlier onset of CVD among males.

CVD hospitalisation rates increased with age for females—from 139 per 100,000 among those aged under 25, to 13,900 among those aged 85 and over (Figure 4.1).

Hospitalisation rates were lower for females than males in every age group except for those aged 25–34, where rates were similar: 282 compared with 294 per 100,000, respectively.

Figure 4.1: Cardiovascular disease hospitalisation rates, by age and sex, 2015–16



Note: See Appendix tables B4.2 and B4.3.

Source: AIHW National Hospital Morbidity Database.

Overall trends

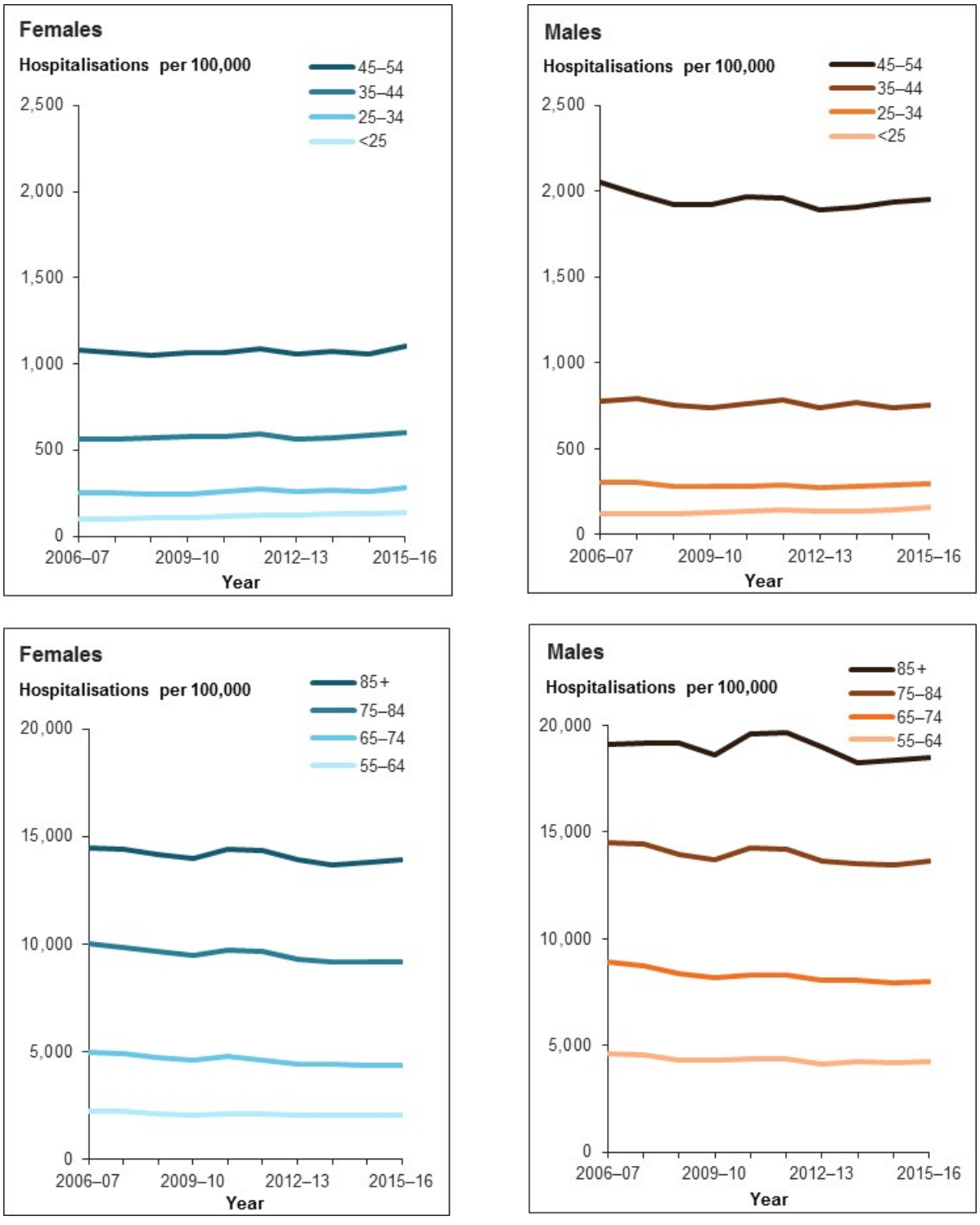
From 2006–07 to 2015–16, the number of female CVD hospitalisations increased by 17%, from 178,000 to 208,000. A similar pattern was seen for males (19% increase).

CVD hospitalisation rates declined during this period; by 5% for females (from 1,500 to 1,400 per 100,000) and 6% for males (from 2,400 to 2,300).

Age-specific trends

Between 2006–07 and 2015–16, hospitalisation rates for CVD increased for younger females aged 0–54, but decreased for older females aged 55–84. The pattern for males differed: rates decreased for all age groups except for those aged under 25 (Figure 4.2).

Figure 4.2: Cardiovascular disease hospitalisation rates, by age and sex, 2006–07 to 2015–16



Notes

1. Different scales have been used in the upper and lower panels.
2. See Appendix tables B4.2 and B4.3.

Source: AIHW National Hospital Morbidity Database.

Allied health interventions accessed in hospital

In 2015–16, 40% of female CVD hospitalisations had at least 1 allied health intervention (37% for males).

The most common allied health interventions for females were physiotherapy (27%), pharmacy (17%) and occupational therapy (15%). The pattern for males was similar (24% for physiotherapy, 16% for pharmacy and 12% for occupational therapy).

Length of stay in hospital

In 2015–16, the average length of stay for female CVD hospitalisations was 5.2 days (5.0 days for males).

The average length of stay increased with age, from 4.0 days for those aged 0–44, to 6.4 days for those aged 85 and over. The pattern for males was similar (4.3 and 6.2 days, respectively).

Longer length of stay among older people are associated with increased complexity and multiplicity of conditions, or difficulties in moving into subacute or residential care (Brittion et al. 2017; Tran et al. 2018).

In-hospital death

In 2015–16, 2.6% of female CVD hospitalisations ended in death during the episode of care (2.2% for males) (Appendix Table B4.13). Proportions were similar for females and males across all age groups.

4.2 Coronary heart disease

CHD was the largest contributor to CVD hospitalisations for females in 2015–16, accounting for just over one-fifth of all female CVD hospitalisations (46,700 or 22%).

This figure is lower than in 2006–07, when CHD accounted for almost one-third of all female CVD hospitalisations (54,800 or 31%).

Of all female CHD hospitalisations, acute myocardial infarction accounted for 38% (17,700) and angina 33% (15,600). The age-standardised rate for female CHD hospitalisations was 317 per 100,000 population, less than half the rate for males (774 per 100,000).

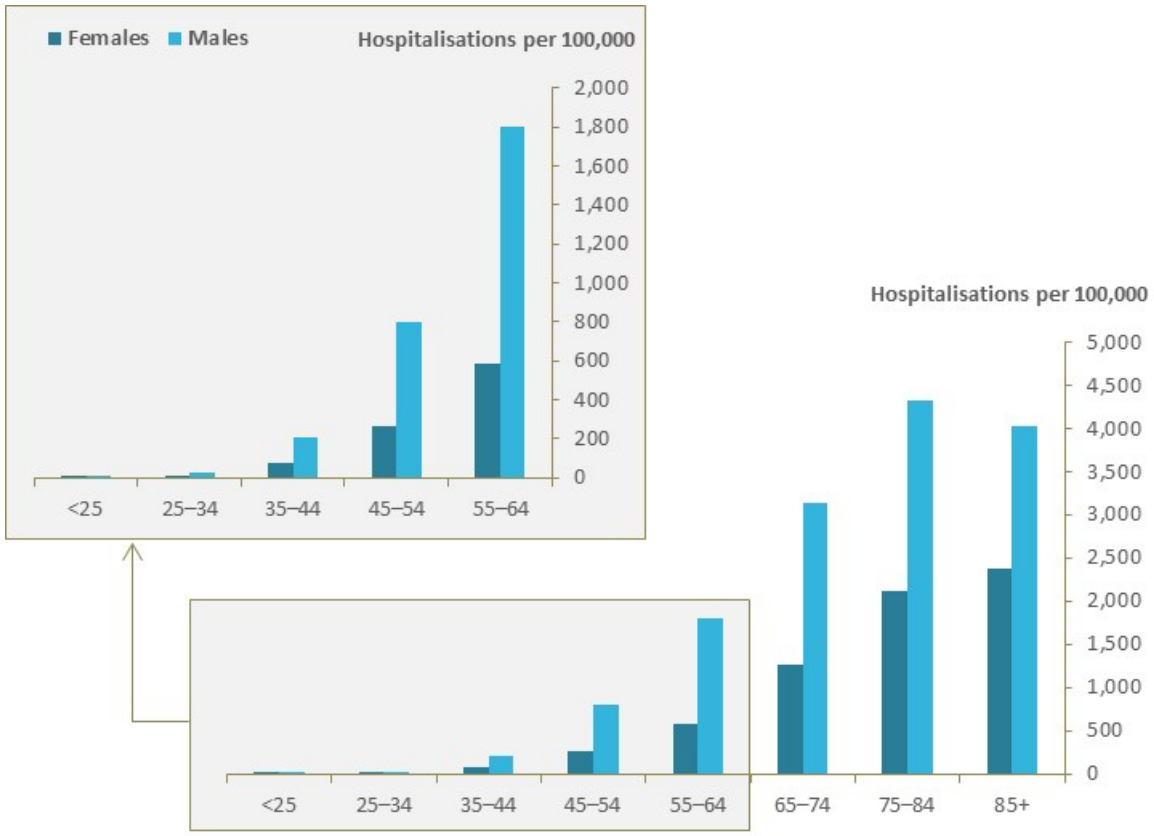
Sex and age

The number of CHD hospitalisations for females was lower than males in every age group, except age 85 and over. For females, most CHD hospitalisations occurred among those aged 65–84 (55%), whereas for males it was for age 55–74 (55%).

CHD hospitalisation rates increased rapidly with age, from 1 per 100,000 among under 25 to 2,400 per 100,000 among age 85 and over (Figure 4.3).

Females were less likely to be hospitalised than males for CHD at all ages, with the gap greatest at age 45–64 where rates were around one-third of those for men.

Figure 4.3: Coronary heart disease hospitalisation rates, by age and sex, 2015–16



Note: See Appendix tables B4.4 and B4.5.

Source: AIHW National Hospital Morbidity Database.

Overall trends

Both the number and rate of CHD hospitalisations decreased between 2006–07 and 2015–16, with greater improvements seen in females than males.

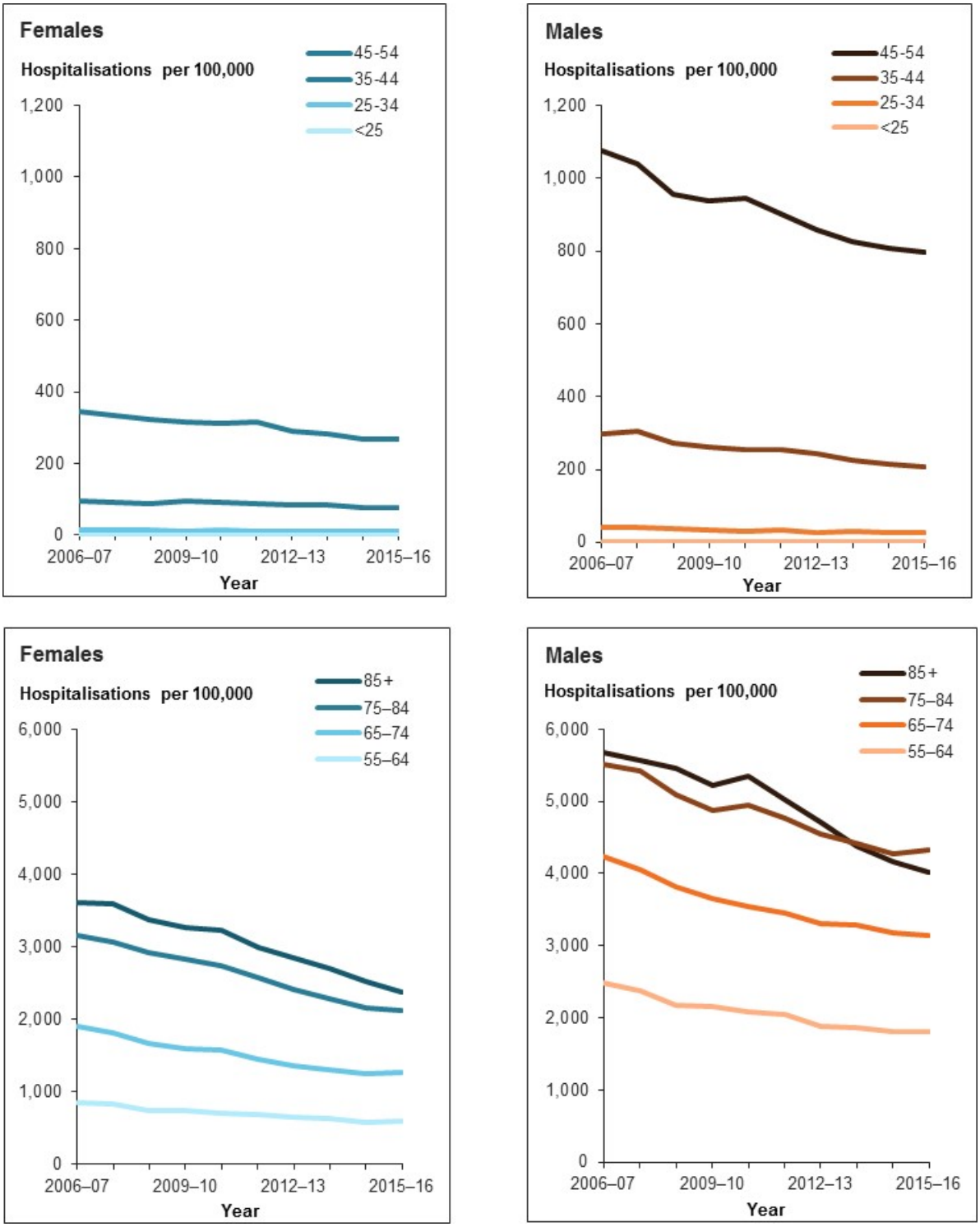
The number of CHD hospitalisations fell by 15% for females and 6% for males, while rates fell by 33% for females (from 461 to 317 per 100,000) and 27% for males (from 1,000 to 774).

Age-specific trends

Between 2006–07 and 2015–16, hospitalisation rates for CHD decreased across all age groups for both women and men aged 25 and over. Rates of decline varied across age groups (Figure 4.4).

For females, the greatest improvements were seen among those aged 65–74 and 75–84, where rates of hospitalisations fell by 35%. In contrast, the greatest improvement among males was in those aged 25–34 and 35–44, where rates fell by 37% and 31%, respectively.

Figure 4.4: Coronary heart disease hospitalisation rates, by age and sex, 2006–07 to 2015–16



Notes

1. Different scales have been used in the upper and lower panels.
2. See Appendix tables B4.4 and B4.5.

Source: AIHW National Hospital Morbidity Database.

Allied health interventions accessed in hospital

In 2015–16, 31% of all female CHD hospitalisations had at least 1 allied health intervention during their episode of care (31% for males).

The most common interventions accessed by females were physiotherapy (16%), pharmacy (15%), and occupational therapy and social work (7% for both).

Length of stay in hospital

In 2015–16, the average length of stay for females hospitalised for CHD was 4.1 days (4.2 days for males).

The length of stay increased with age, from 3.2 days for those aged 0–44, to 5.1 days for those aged 85 and over. The pattern for males was similar, at 3.4 and 4.8 days, respectively.

In-hospital death

Of all female CHD hospitalisations in 2015–16, 2.0% resulted in death during the episode of care (males 1.2%) (Appendix Table B4.13).

The proportions of CHD hospitalisations that ended in death were similar for females and males aged 0–74. For age 75–84, the proportion was higher for women than men (2.1% and 1.6%).

4.3 Acute coronary syndrome

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).

In 2015–16, ACS contributed to 53% (25,100) of female CHD hospitalisations (49% for males).

The age-standardised rate for ACS hospitalisations of females was 169 per 100,000 population, which was lower than for males (382 per 100,000).

Sex and age

In 2015–16, the number of female ACS hospitalisations was lower than for males in every age group, except 85 and over (Appendix tables B4.6 and B4.7). For females, the majority of ACS hospitalisations occurred among ages 65–84 (50%), whereas for males it was for ages 55–74 (51%).

Female ACS hospitalisation rates increased rapidly with age, from less than 1 hospitalisation per 100,000 aged under 25, to 1,700 per 100,000 aged 85 and over.

Females were less likely to be hospitalised for ACS at all ages, with the gap greatest among those aged 25–64 where rates were around one-third those of men.

Overall trends

Both the number and rate of ACS hospitalisations decreased between 2006–07 and 2015–16, with greater improvements in females.

Rates fell by 40% for females (from 273 to 169 per 100,000) and by 36% for males (from 585 to 382).

Age-specific trends

Between 2006–07 and 2015–16, hospitalisation rates for ACS decreased across all age groups for both women and men aged 25 and over. The rates of decline varied across age groups.

For both sexes, the greatest improvements were seen among age groups 65–74 and 75–84, where the number of hospitalisations per 100,000 fell by around 45% for females, and by 40% and 37%, respectively, for males.

Allied health interventions accessed in hospital

In 2015–16, 41% of all female ACS hospitalisations had at least 1 allied health intervention (39% for males).

The most common interventions were physiotherapy (21%), pharmacy (20%), social work and occupational therapy (both 11%).

Length of stay in hospital

In 2015–16, the average length of stay for females hospitalised for ACS was 4.6 days and for males 4.5 days.

The average length of stay increased with age, from 3.2 days for those aged 0–44 to 5.6 days for those aged 85 and over. The pattern for males was similar (3.5 and 5.2 days).

In-hospital death

Of the 25,100 female ACS hospitalisations in 2015–16, 3.4% ended in death during the episode of care (males 2.1%) (Appendix Table B4.13).

The proportion of ACS hospitalisations that resulted in death was similar for females and males aged 0–74. For age 75–84, the proportion was higher for women (3.7%) than for men (2.9%).

4.4 Stroke

Stroke was the third largest contributor to female CVD hospitalisations in 2015–16 (17,100 or 8.2%, compared with males 20,200 or 6.9%).

The age-standardised rate for stroke hospitalisations among females was 112 per 100,000 population (males 158 per 100,000).

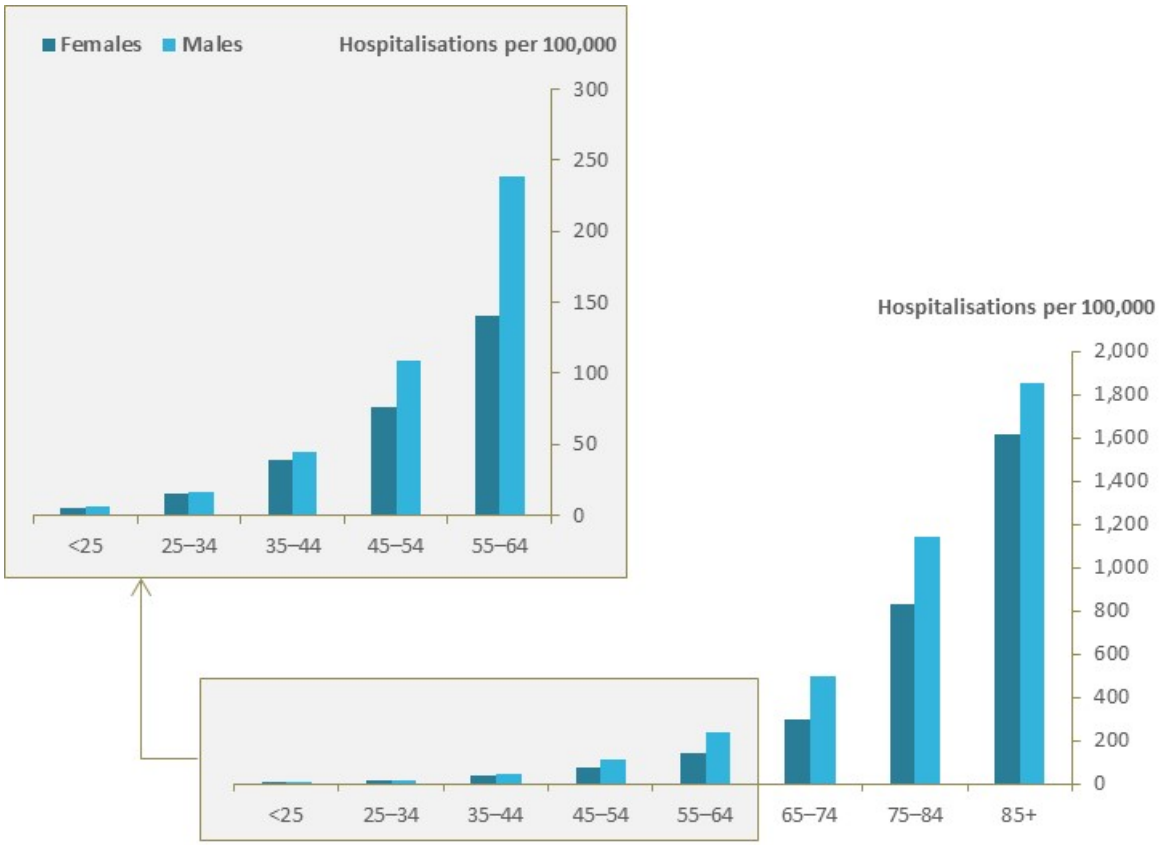
Sex and age

The number of stroke hospitalisations for females was lower than for males in all age groups, except 85 and over.

The majority of stroke hospitalisations occurred in older age groups, with 57% of female stroke hospitalisations in women aged 75 and over (45% for men).

Stroke hospitalisation rates increased among older women, with a threefold increase between ages 65–74 and 75–84, and fivefold increase to age 85 and over (297 compared with 827 and 1,600 per 100,000, respectively) (Figure 4.5).

Figure 4.5: Stroke hospitalisation rates, by age and sex, 2015–16



Note: See Appendix tables B4.8 and B4.9.

Source: AIHW National Hospital Morbidity Database.

Overall trends

The number of stroke hospitalisations increased from 2006–07 to 2015–16 (by 6.0% for females and 18% for males).

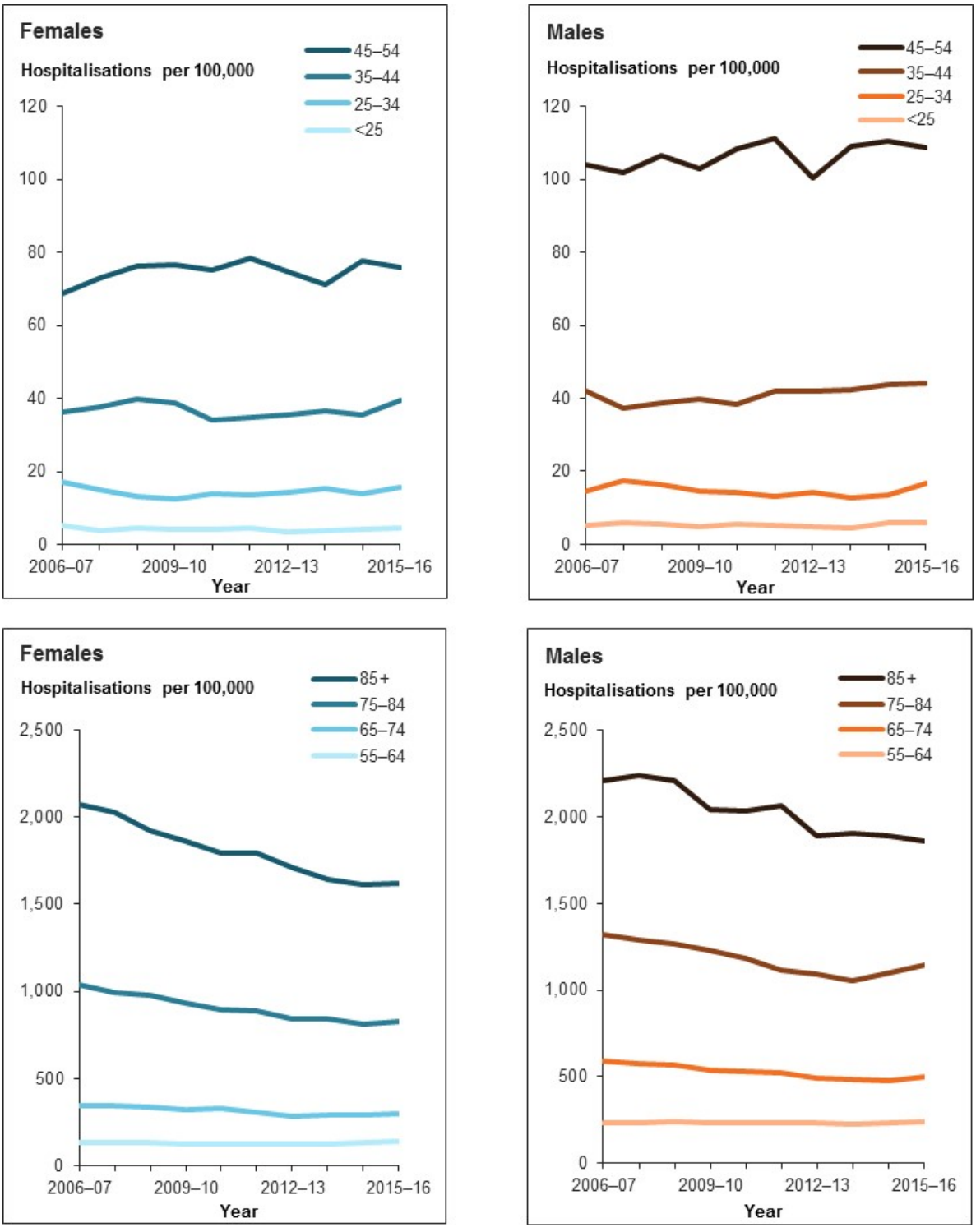
Stroke hospitalisation rates decreased during this period, falling 16% from 128 to 112 per 100,000 for females, and 13% from 175 to 158 for males.

Age-specific trends

Between 2006–07 and 2015–16, stroke hospitalisation rates declined in older age groups, with less evidence of decline in younger ages (Figure 4.6).

The rate fell by around 19% among both women and men aged 65–74 and 75–84. Women aged 85 and over saw a greater improvement than men: a fall of 23% compared with 18%.

Figure 4.6: Stroke hospitalisation rates, by age and sex, 2006–07 to 2015–16



Notes

1. Different scales have been used in the upper and lower panels.
2. See Appendix tables B4.8 and B4.9.

Source: AIHW National Hospital Morbidity Database.

Allied health interventions accessed in hospital

In 2015–16, 81% of female stroke hospitalisations had at least 1 allied health intervention during their episode of care (82% for males).

The majority received physiotherapy (71%), occupational therapy (60%) and speech pathology (58%).

Length of stay in hospital

In 2015–16, the average length of stay for stroke hospitalisations was similar for females (8.1 days) and males (7.7 days).

This pattern did not vary by age: lengths of stay for females aged 0–44 and 85 and over were 8.7 and 8.0 days, respectively (for males, 9.0 and 8.0 days).

In-hospital death

In 2015–16, 11% of female stroke hospitalisations ended in death during the episode of care (7.8% for males) (Appendix Table B4.13).

Older women hospitalised with stroke were more likely to die in hospital than were older men. The proportion of hospitalisations that resulted in death for women aged 75–84 was 1.3 times as high as for men (11.3% compared with 8.7%).

4.5 Heart failure and cardiomyopathy

Heart failure and cardiomyopathy were the second largest contributor to female CVD hospitalisations in 2015–16, at 14% or 28,700 hospitalisations (Box 4.2).

The age-standardised rate for heart failure and cardiomyopathy hospitalisations among females was 176 per 100,000 population (males 269 per 100,000).

Box 4.2: Contribution of heart failure and cardiomyopathy to hospitalisations

Hospital data in this report examine heart failure and cardiomyopathy as the principal diagnosis only. This may underestimate their real contribution to hospitalisations, because these conditions often occur alongside other chronic conditions and are more likely to be reported as additional diagnoses.

Appendix Table B4.10 compares heart failure and cardiomyopathy hospitalisations as the principal diagnosis only or as a principal and/or additional diagnosis. For females, heart failure and cardiomyopathy hospitalisations based on principal diagnosis only (28,700) made up 41% of all hospitalisations for which heart failure and cardiomyopathy were a principal and/or additional diagnosis (70,200). The male proportion was similar (41%, with 34,100 principal, 82,500 principal and/or additional).

Sex and age

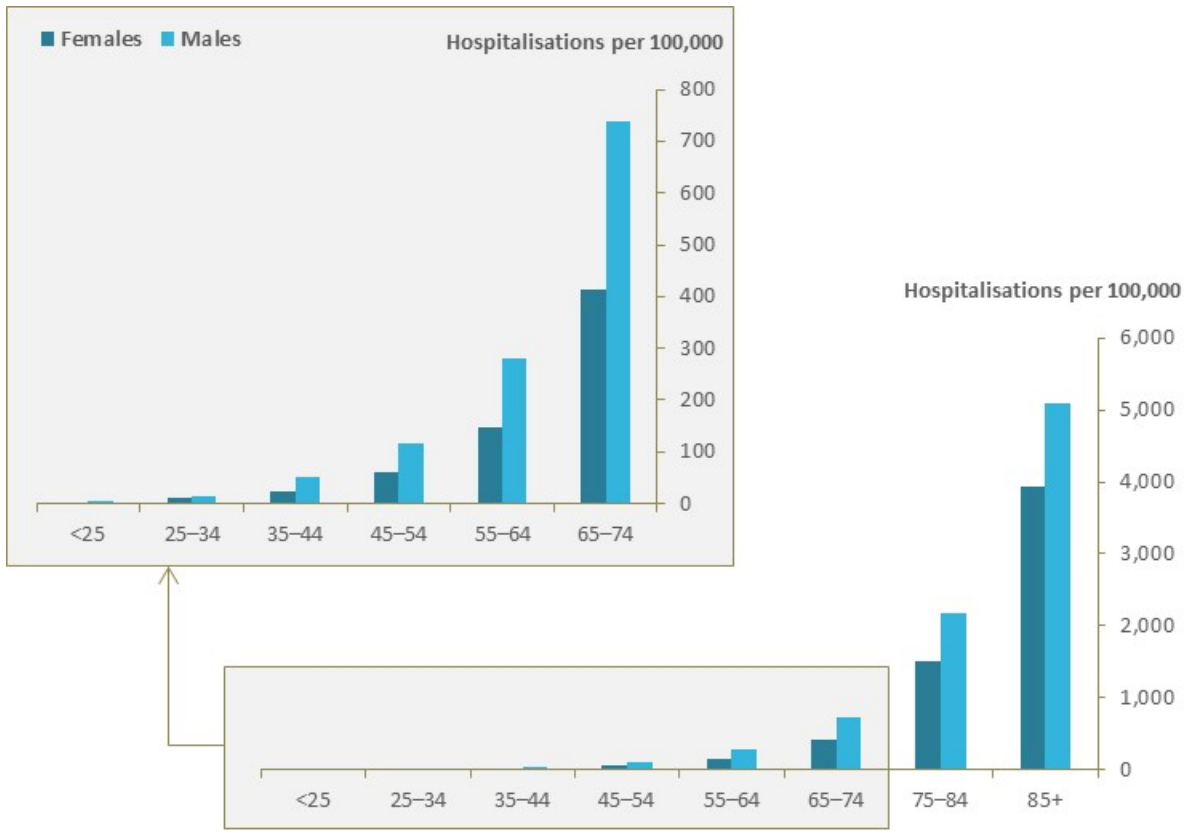
In 2015–16, the number of female heart failure and cardiomyopathy hospitalisations was lower than for males in every age group, except 85 and over.

The majority of hospitalisations occurred in older age groups, with 72% of female heart failure and cardiomyopathy hospitalisations in women aged 75 and over (58% for men).

Female heart failure and cardiomyopathy hospitalisation rates increased from 147 per 100,000 women aged 55–64 to 3,900 per 100,000 for those aged 85 and over (Figure 4.7).

Females were less likely than males to be hospitalised for heart failure and cardiomyopathy at all ages, with the gap greatest at ages 35–64, where rates among women were around half those for men.

Figure 4.7: Heart failure and cardiomyopathy hospitalisation rates, by age and sex, 2015–16



Note: See Appendix tables B4.11 and B4.12.

Source: AIHW National Hospital Morbidity Database.

Overall trends

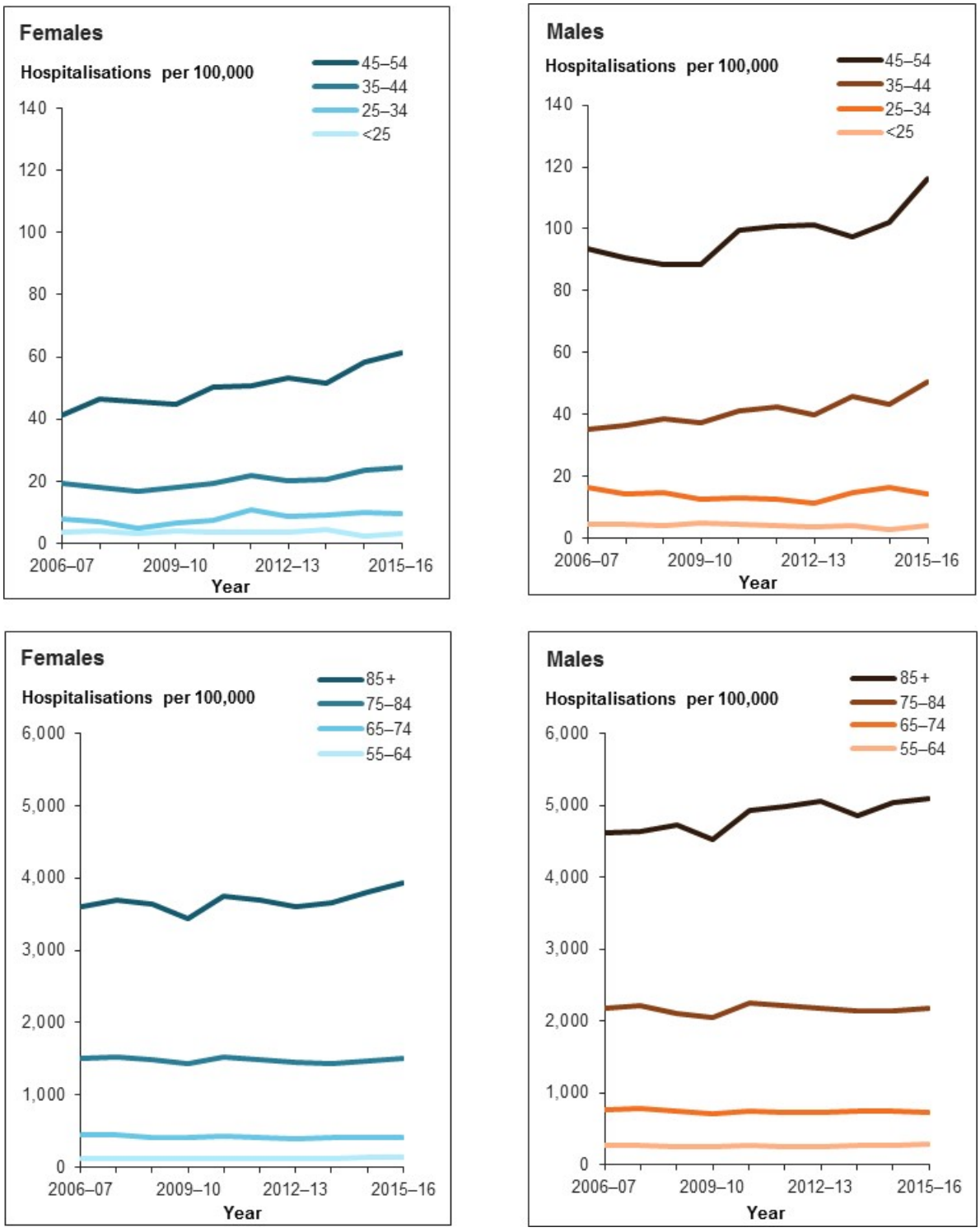
From 2006–07 to 2015–16, the number of heart failure and cardiomyopathy hospitalisations increased by 31% for females and 38% for males, while rates increased by 4% for both: from 168 to 176 per 100,000 for females and 258 to 269 for males.

Age-specific trends

Between 2006–07 and 2015–16, female age-specific heart failure and cardiomyopathy hospitalisation rates were lower than those for males (Figure 4.8).

However, rates increased by 41% and 18% for women aged 45–54 and 55–64, respectively, compared with 23% and 2% for their male counterparts.

Figure 4.8: Heart failure and cardiomyopathy hospitalisation rates, by age and sex, 2006–07 to 2015–16



Notes

1. Different scales have been used in the upper and lower panels.
2. See Appendix tables B4.11 and B4.12.

Source: AIHW National Hospital Morbidity Database.

Allied health interventions accessed in hospital

In 2015–16, 64% of all female heart failure and cardiomyopathy hospitalisations had at least 1 allied health intervention during their episode of care (58% for males).

The most common interventions were physiotherapy (45%), pharmacy (25%) and occupational therapy (23%).

Length of stay in hospital

In 2015–16, the average length of stay for female heart failure and cardiomyopathy hospitalisations was 6.8 days (6.6 days for males).

This pattern did not vary by age: 8.2 and 7.3 days for females aged 0–44 and 85 and over, respectively (8.1 and 7.2 days for males).

In-hospital death

Of all female heart failure and cardiomyopathy hospitalisation, 4.5% resulted in death during the episode of care (4.5% for males) (Appendix Table B4.13).

Younger females aged 0–34 hospitalised with heart failure and cardiomyopathy were almost twice as likely as their male counterparts to die in hospital (4.6% compared with 2.4%).

5 Hospital procedures

Key findings

- In 2015–16, for females with selected CVD hospitalisations, there were 31,000 coronary angiographies, 9,500 percutaneous coronary interventions (PCIs), 1,900 coronary artery bypass grafts (CABGs), and 5,400 pacemaker insertions.
- Female procedure rates were lower than those for males for coronary angiography, PCI, CABG, cardiac defibrillator implant and carotid endarterectomy.
- Females were less likely than males to receive a PCI or CABG, among CHD hospitalisations where patients had either none, 1 or 2 comorbidities.
- In the 10 years to 2015–16, female procedure rates increased for coronary angiography, PCI, pacemaker insertion and cardiac defibrillator implants. Rates declined over this period for carotid endarterectomy procedures.

Many procedures are used to diagnose and treat CVD. This chapter reports on both diagnostic procedures, which identify the type, severity and location of problems, and therapeutic procedures, which treat problems once they have been identified (Box 5.1).

Although the results show that females often have lower procedure rates than males, data have not been adjusted for disease severity or case complexity. To examine the potential influence of case complexity, selected CVD procedure rates were examined by different levels of comorbidity.

Box 5.1: Data considerations

Data in this chapter are sourced from the AIHW National Hospital Morbidity Database, and refer to procedures provided to admitted patients in hospitals. Procedures were counted once only, regardless of whether the same procedure was conducted more than once in a hospitalisation.

Rates are for procedures provided to people hospitalised with particular cardiovascular diagnoses relevant to each procedure. Rates for coronary artery bypass grafting (CABG) procedures are presented as the number of CABGs per 100 hospitalisations with CHD, while the rates of carotid endarterectomy are presented as the number per 100 hospitalisations with stroke, other cerebrovascular diseases or transient ischaemic attack (TIA).

This approach provides greater insight into treatment patterns among those diagnosed with a particular cardiovascular condition. For this reason, findings are not comparable with other procedure statistics in AIHW publications, which present rates of procedures for the total population.

See Appendix A for further details.

5.1 Coronary angiography

Coronary angiography provides a picture of the coronary arteries—those that supply blood to the heart itself—to determine whether they may be narrowed or blocked. To do this, a catheter is guided to the heart, and a special dye is released into the coronary arteries when an X-ray is taken. Coronary angiography provides medical professionals with the information to decide on treatment options, such as the need for coronary revascularisation procedures.

Results in this section relate to coronary angiography procedures performed on patients hospitalised with a principal diagnosis of CHD, heart failure, cardiomyopathy or other selected forms of heart disease (see Appendix A).

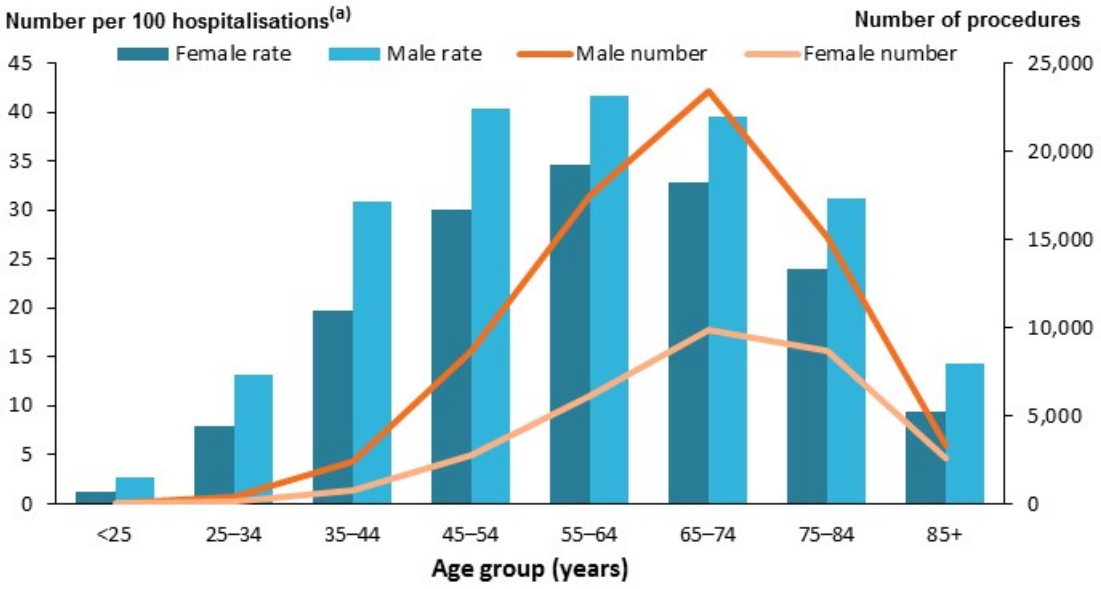
Sex and age

In 2015–16, 102,000 coronary angiography procedures were performed, of which 30% were for females (31,000) and 70% for males (70,800). Most coronary angiography procedures were provided to those aged 55–84: 80% in women (24,700) and 79% in men (56,000).

Coronary angiography rates were lower in females (26 per 100 hospitalisations) than in males (34 per 100 hospitalisations).

The rates for females were lower than those for males across all age groups (Figure 5.1). Rates peaked in females and males aged 55–64 (35 and 42 per 100 hospitalisations, respectively).

Figure 5.1: Coronary angiography procedures, by age and sex, 2015–16



(a) Hospitalisations with principal diagnosis ICD-10-AM codes I20–I25, I30–I52.

Note: See Appendix tables B5.1 and B5.2.

Source: AIHW National Hospital Morbidity Database.

Overall trends

Between 2006–07 and 2015–16, the annual number of coronary angiography procedures increased from 25,100 to 31,000 (24%) in females, and from 57,400 to 70,800 (23%) in males.

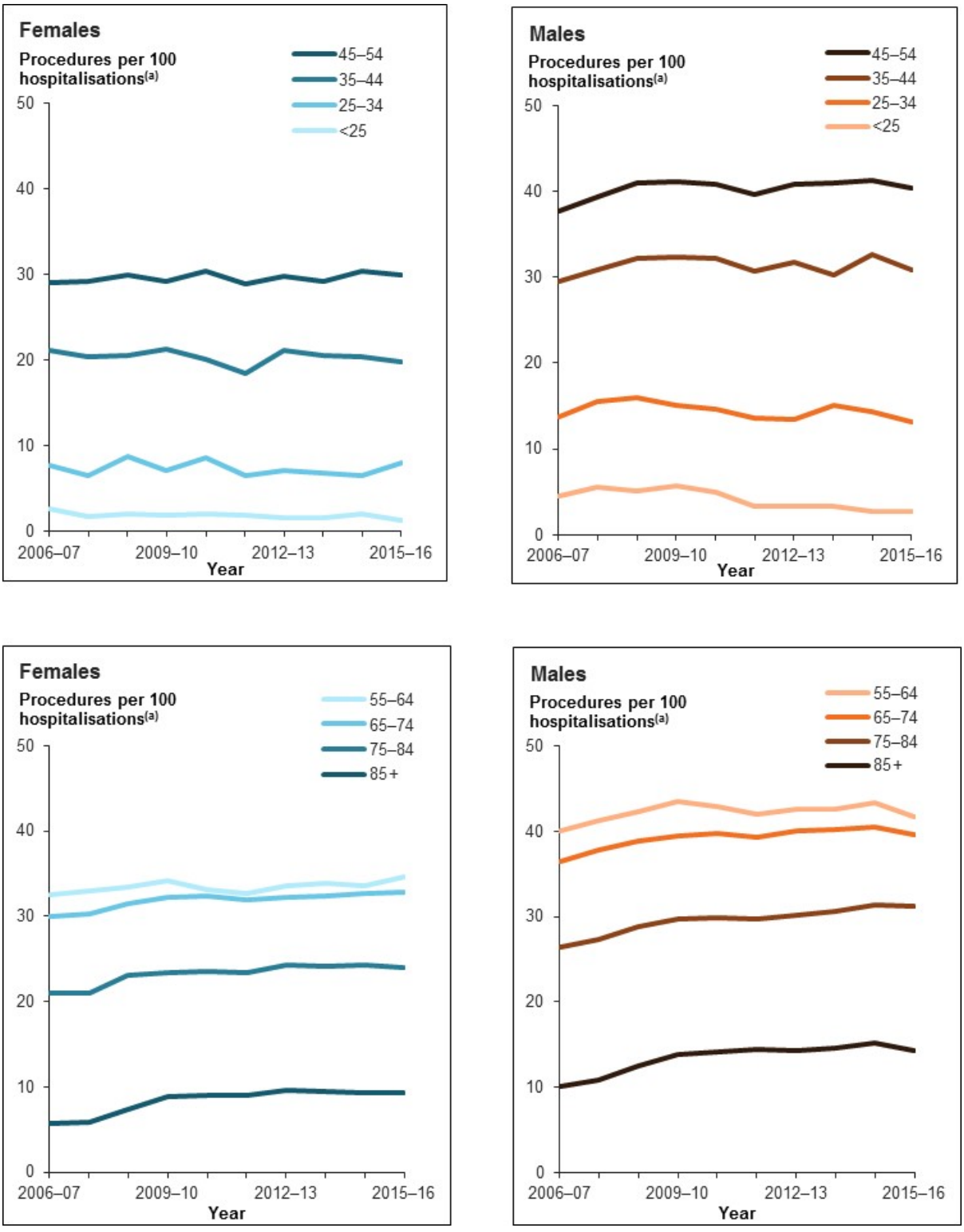
Age-standardised rates increased from 24 to 26 per 100 selected CVD hospitalisations (8%) in females, and from 30 to 34 (9%) in males.

Age-specific trends

Over this period, rates of coronary angiography fell in females aged under 25, remained steady among women aged 25–54, and increased in women aged 55 and over (Figure 5.2).

Rates rose from 5.8 to 9.4 per 100 selected CVD hospitalisations (59%) among women aged 85 and over.

Figure 5.2: Coronary angiography procedures, by age and sex, 2006–07 to 2015–16



(a) Hospitalisations with principal diagnosis ICD-10-AM codes I20–I25, I30–I52.

Note: See Appendix tables B5.1 and B5.2.

Source: AIHW National Hospital Morbidity Database.

5.2 Percutaneous coronary intervention

Percutaneous coronary interventions (PCIs) are used to restore blood flow to blocked coronary arteries. Two types of procedures are used: 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 the insertion of a stent (an expandable mesh tube) into the affected coronary arteries.

Data are presented separately for PCIs among all CHD hospitalisations, followed by PCIs among the ACS subset of CHD hospitalisations. ACS accounts for around half of all CHD hospitalisations and is a clinically important subset to report.

PCIs in CHD hospitalisations

Sex and age

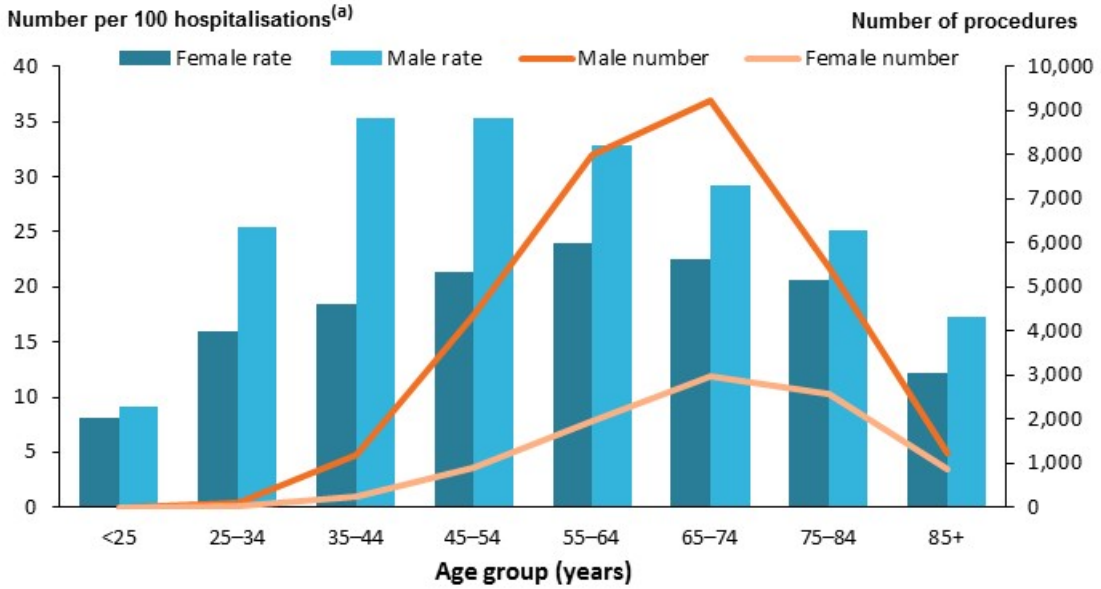
In 2015–16, 39,000 PCI procedures occurred among patients hospitalised with a principal diagnosis of CHD: 9,500 (24%) were performed on females and 29,500 (76%) on males.

Females (20 per 100 CHD hospitalisations) were less likely to receive a PCI than males (28 per 100 CHD hospitalisations).

Age-specific rates were lower in females than males (Figure 5.3). The greatest difference was at age 35–44, where women were around half as likely as men to receive a PCI (18 compared with 35 per 100 CHD hospitalisations).

Rates peaked among women aged 55–64 (24 per 100 hospitalisations). The highest rates for males were in the 35–44 and 45–54 age groups (35 per 100 CHD hospitalisations). The absolute number of procedures peaked in age group 65–74 for both sexes (Figure 5.3).

Figure 5.3: Percutaneous coronary intervention procedures, by age and sex, 2015–16



(a) Hospitalisations with principal diagnosis ICD-10-AM codes I20–I25.

Note: See Appendix tables B5.3 and B5.4.

Source: AIHW National Hospital Morbidity Database.

Overall trends

Between 2006–07 and 2015–16, the annual number of PCI procedures increased by 10% in females (from 8,700 to 9,500), and by 17% in males (from 25,200 to 29,500).

Rates of PCI increased in both females (from 16 to 20 per 100 CHD hospitalisations) and males (from 22 to 28).

Age-specific trends

PCI rates increased in all age groups (Figure 5.4), with greater increases in women than men aged 45–54 (33% and 21% higher, respectively), and in men than women aged 65–74 (27% and 19% higher, respectively).

PCI rates almost doubled in women aged 85 and over, from 6.5 to 12 per 100 CHD hospitalisations.

PCIs in ACS hospitalisations

Sex and age

In 2015–16 there were 21,600 PCIs in hospitalisations with a principal diagnosis of ACS (Appendix tables B5.5 and B5.6). One-quarter (5,400, or 25%) of these were undertaken in females.

Females hospitalised for ACS were less likely than males to receive a PCI, with age-standardised rates of 22 and 31 per 100 ACS hospitalisations, respectively.

Age-specific rates of PCI were lower in females in every age group. The highest rate among females was in the 55–64 age group (29 per 100 ACS hospitalisations). For males, the age-specific PCI rate peaked in the 45–54 age group, at 42 per 100 ACS hospitalisations.

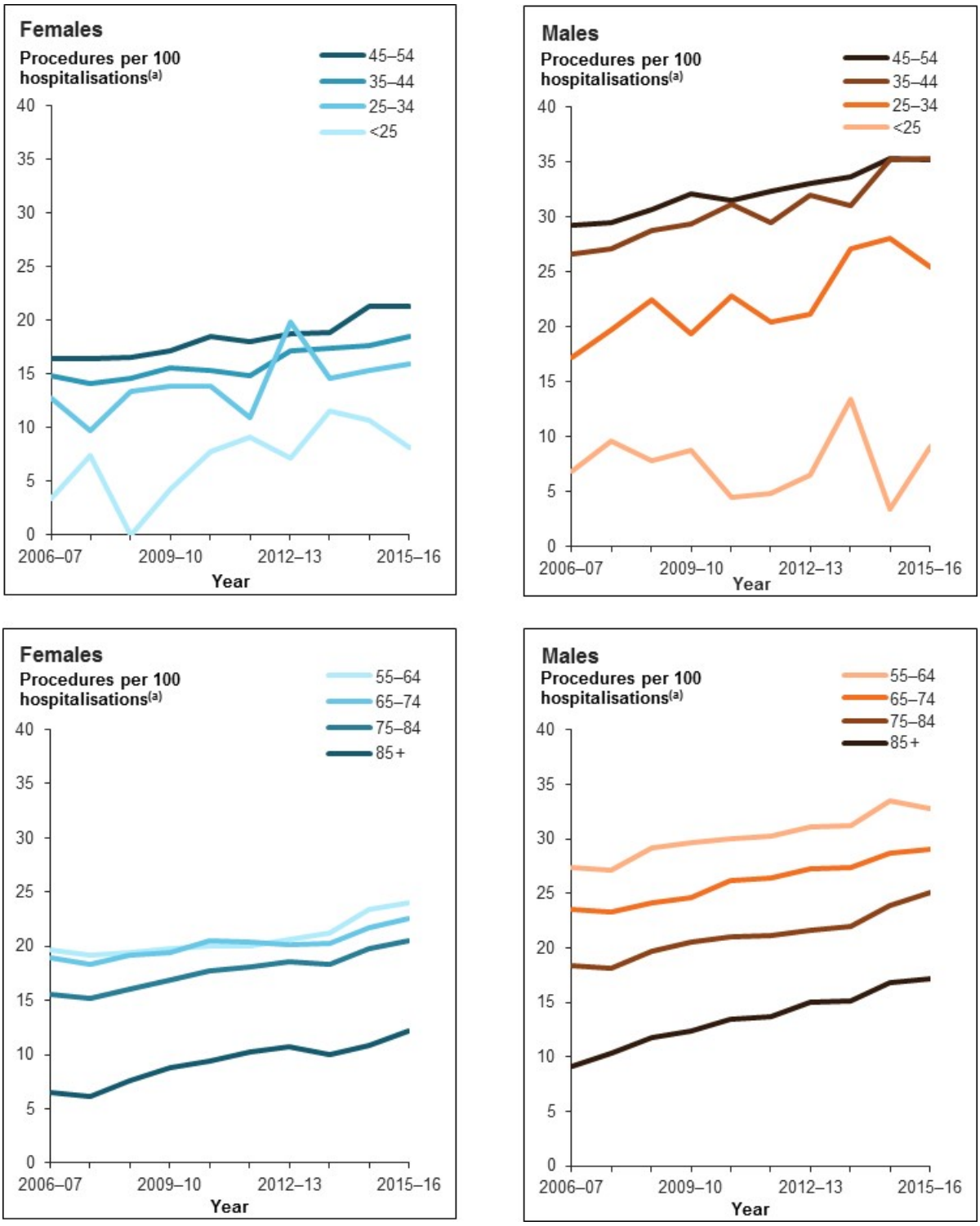
Overall trends

Between 2006–07 and 2015–16, rates of PCI for females increased from 16 to 22 per 100 ACS hospitalisations (from 22 to 31 for males).

Age-specific trends

Over this period, PCI rates in ACS hospitalisations increased in females and males in all age groups. Percentage changes between 2006–07 and 2015–16 were largest for women aged 85 and over (84%), 45–54 (48%) and 55–64 (42%).

Figure 5.4: Percutaneous coronary intervention procedures, by age and sex, 2006–07 to 2015–16



(a) Hospitalisations with principal diagnosis ICD-10-AM codes I20–I25.

Note: See Appendix tables B5.3 and B5.4.

Source: AIHW National Hospital Morbidity Database.

5.3 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.

The following data relate to CABG procedures performed on patients hospitalised with a principal diagnosis of CHD.

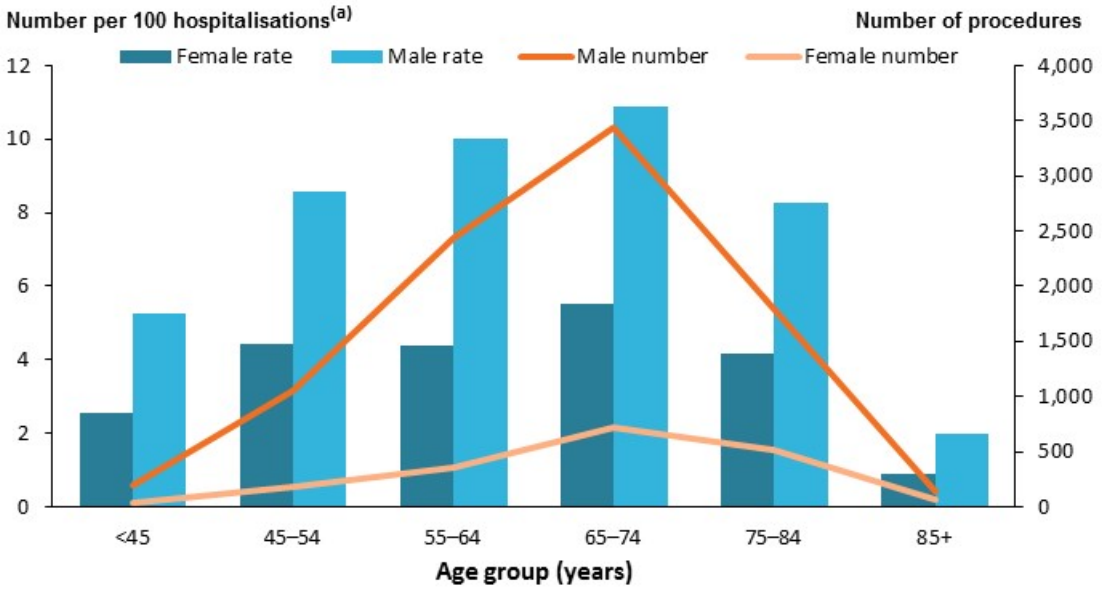
Sex and age

In 2015–16, 11,000 CABG procedures were performed: 1,900 for females (17%) and 9,100 for males (83%).

Females hospitalised with CHD were half as likely as males to undergo CABG, with an age-standardised rate of 4.2 per 100 CHD hospitalisations, compared with 8.4 for males.

Age-specific rates were lower in females compared with males all age groups (Figure 5.5). CABG procedure rates increased in both women and men to age 65–74 and declined for older age groups.

Figure 5.5: Coronary artery bypass grafting procedures, by age and sex, 2015–16



(a) Hospitalisations with principal diagnosis ICD-10-AM codes I20–I25.

Note: See Appendix tables B5.7 and B5.8.

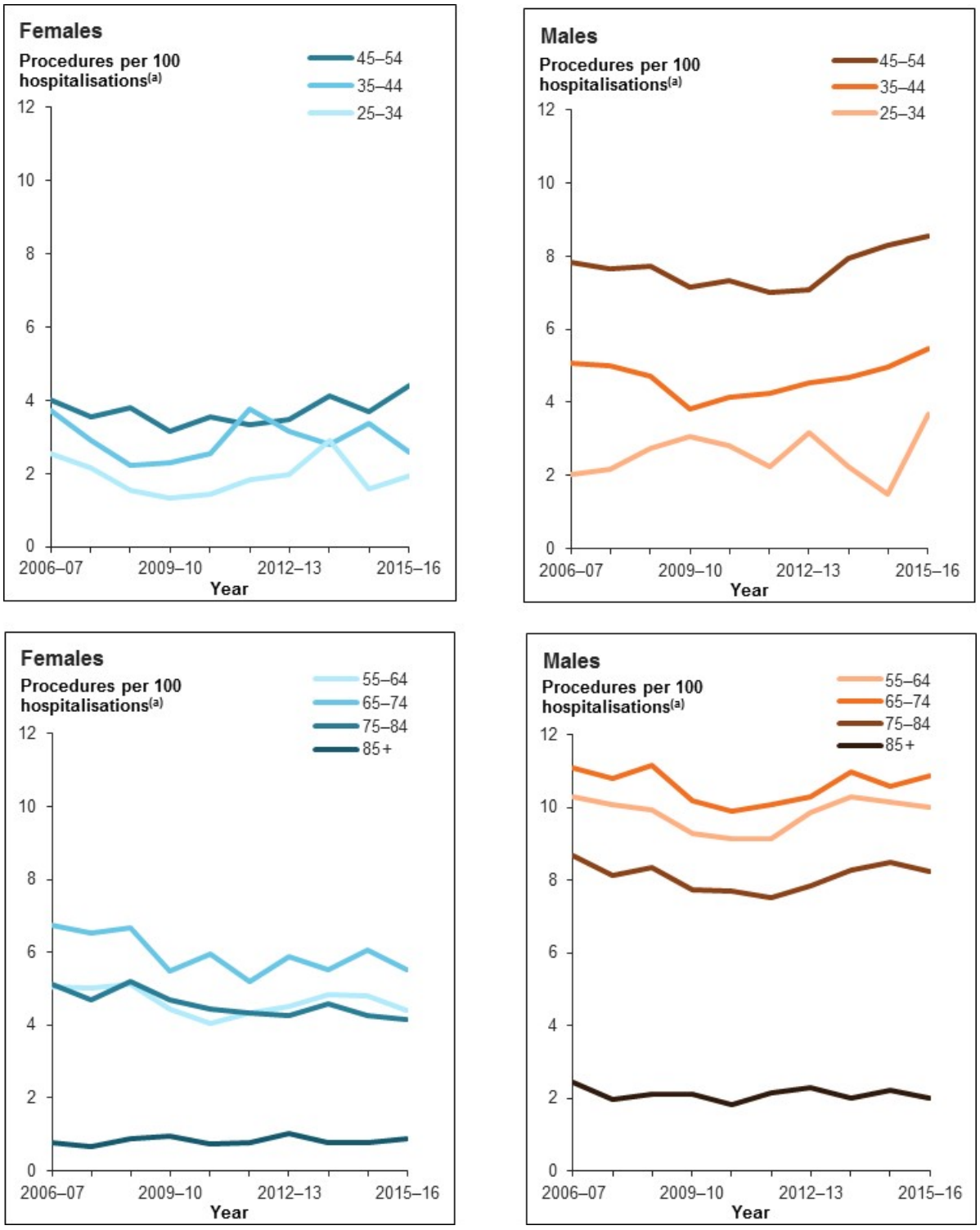
Source: AIHW National Hospital Morbidity Database.

Overall trends

Between 2006–07 and 2015–16, there was an 11% decline in the number of CABG procedures performed, from 12,300 to 11,000. The fall was greater in females (27%) than in males (7%).

The overall CABG procedure rate over the period fell in females, from 4.8 to 4.2 per 100 CHD hospitalisations. The rate for males also fell, from 8.4 in 2006–07 to 7.4 in 2011–12, but rose again to 8.4 in 2015–16.

Figure 5.6: Coronary artery bypass graft procedures, by age and sex, 2006–07 to 2015–16



(a) Hospitalisations with principal diagnosis ICD-10-AM codes I20–I25.

Notes

1. Different scales have been used in the upper and lower panels.
2. See Appendix tables B5.7 and B5.8.

Source: AIHW National Hospital Morbidity Database.

Age-specific trends

CABG rates were relatively stable in females across most age groups between 2006–07 and 2015–16. The exception was for women aged 65–74 (falling from 6.7 to 5.5 per 100 CHD hospitalisations), and aged 75–84 (from 5.1 to 4.2) (Figure 5.6).

5.4 Heart valve repair or replacement

Heart valve repair or replacement procedures are performed when normal blood flow is disrupted by damaged valves, making it harder for the heart to pump blood around the body effectively. The damage to heart valves may be caused by rheumatic heart disease, coronary heart disease or forms of congenital heart disease, and can lead to heart failure.

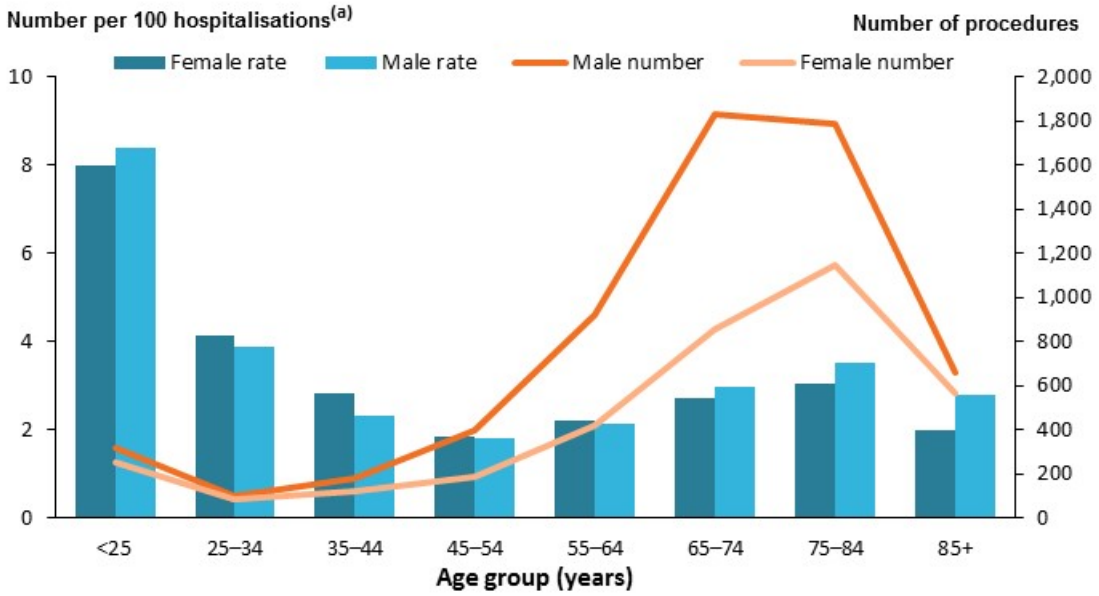
The following data relate to heart valve repair or replacement procedures performed on patients hospitalised with a principal diagnosis of CHD, heart failure, cardiomyopathy or other selected forms of heart disease (see Appendix A for details).

Sex and age

In 2015–16, there were 9,800 heart valve repair or replacement procedures performed: 3,600 (37%) on females and 6,200 (63%) on males.

Age-standardised rates for heart valve repair or replacement were similar among females and males (2.7 and 2.9 per 100 selected CVD hospitalisations, respectively).

Figure 5.7: Heart valve repair or replacement procedures, by age and sex, 2015–16



(a) Hospitalisations with principal diagnosis ICD-10-AM codes I05–I09, I20–I25, I33–I39, I42–I52, Q20–Q25, T82.

Note: See Appendix tables B5.9 and B5.10.

Source: AIHW National Hospital Morbidity Database.

Age-specific rates were highest in the 0–24 age group: 8.0 per 100 selected CVD hospitalisations in females, and 8.4 per 100 selected CVD hospitalisations in males (Figure 5.7). Females aged 25–64 had slightly higher age-specific rates than males, while rates were higher in males aged 65 and over.

The majority of heart valve repair or replacement procedures occurred in people aged 65–84: 55% of all procedures reported in women and 58% in men.

Overall trends

Between 2006–07 and 2015–16, the number of heart valve repair or replacement procedures increased by 40% in females, from 2,600 to 3,600. In males, the increase was larger at 52%, (from 4,100 to 6,200).

The rate increased by 16% for females, from 2.2 to 2.7 per 100 selected CVD hospitalisations, with a larger increase for males (29%), from 2.2 to 2.9.

Age-specific trends

In women aged 75–84, the rate of heart valve repair or replacement procedures increased by 32% between 2006–07 and 2015–16, from 2.3 to 3.0 per 100 selected CVD hospitalisations.

The rate in women aged 85 and older increased 2.5 times from 0.8 to 2.0 per 100 selected CVD hospitalisations. The rate in men aged 85 and over also increased 2.5 times from 1.1 to 2.8.

5.5 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.

The following data relate to initial pacemaker insertion procedures performed on patients hospitalised with a principal diagnosis of acute myocardial infarction, heart failure, cardiomyopathy or other selected forms of heart disease (see Appendix A).

Sex and age

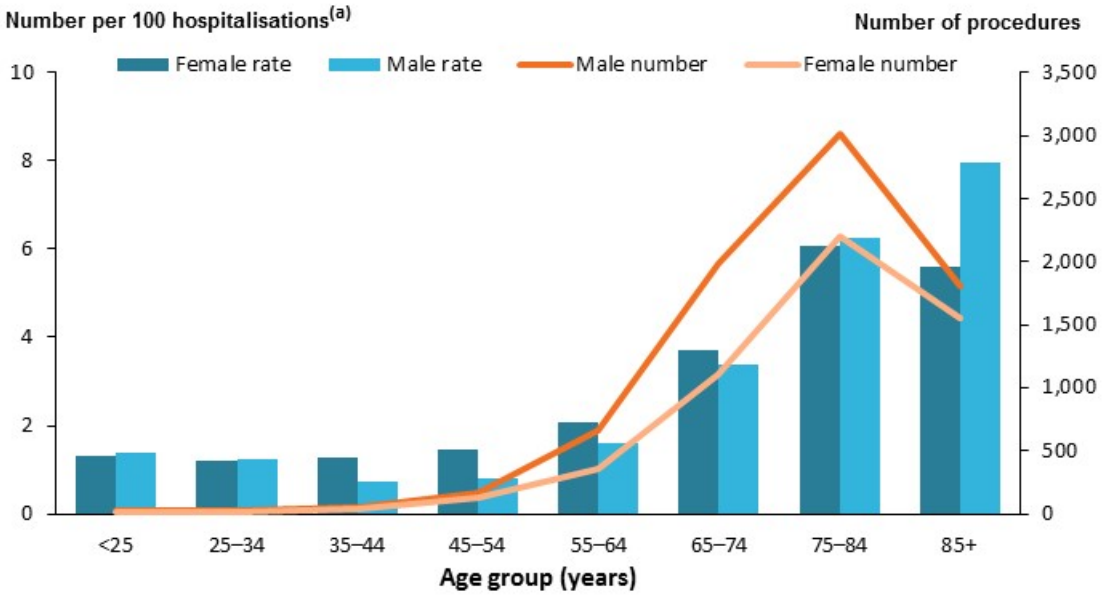
In 2015–16, 13,200 pacemaker insertion procedures were reported, of which 41% (5,400) were provided to females and 59% (7,700) to males. The age-standardised rate of pacemaker insertion was 3.8 per 100 hospitalisations in both sexes.

Age-specific rates peaked in the 75–84 age group among females (6.1 per 100 selected CVD hospitalisations) and in the 85 and over age group among males (8.0 per 100 selected CVD hospitalisations) (Figure 5.8).

The rates for females were almost twice those for males at age 35–44 (1.3 and 0.7 per 100 selected CVD hospitalisations, respectively) and age 45–54 (1.5 and 0.8 per 100). The rate for females was lower at age 85 and over (5.6 per 100 hospitalisations compared with 8.0 for males).

The majority of pacemaker insertion procedures occur in older age groups: in 2015–16, women and men aged 65 and over accounted for 90% and 88% of procedures, respectively.

Figure 5.8: Pacemaker insertion procedures, by age and sex, 2015–16



(a) Hospitalisations with principal diagnosis ICD-10-AM codes I08, I20, I21, I25, I34–I39, I42–I52.

Note: See Appendix tables B5.11 and B5.12.

Source: AIHW National Hospital Morbidity Database.

Overall trends

Between 2006–07 and 2015–16, the number of pacemaker insertion procedures increased by 34% in females (from 4,100 to 5,400) and 28% in males (from 6,000 to 7,700).

Over this period, rates increased by 22% in females (from 3.2 to 3.8 per 100 hospitalisations) and 8% in males (from 3.6 to 3.8).

Age-specific trends

Between 2006–07 and 2015–16, the greatest increases in rates for females were at ages 75–84 (from 4.8 to 6.1 per 100 selected CVD hospitalisations, or 32%) and 85 and over (from 4.6 to 5.6, or 25%).

Age-specific rates increased by 14% in men aged 75–84 (from 5.7 to 6.3 per 100 selected CVD hospitalisations), and 13% in men aged 85 and older (from 7.1 to 8.0).

5.6 Cardiac defibrillator implant

Cardiac defibrillator implants are devices implanted into a patient's chest which monitor the heart rhythm and deliver electric shocks to the heart when required, in order 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.

The following data relate to initial cardiac defibrillator implant procedures performed on patients hospitalised with a principal diagnosis of acute myocardial infarction, heart failure, 7cardiomyopathy or other selected forms of heart disease (see Appendix A).

Sex and age

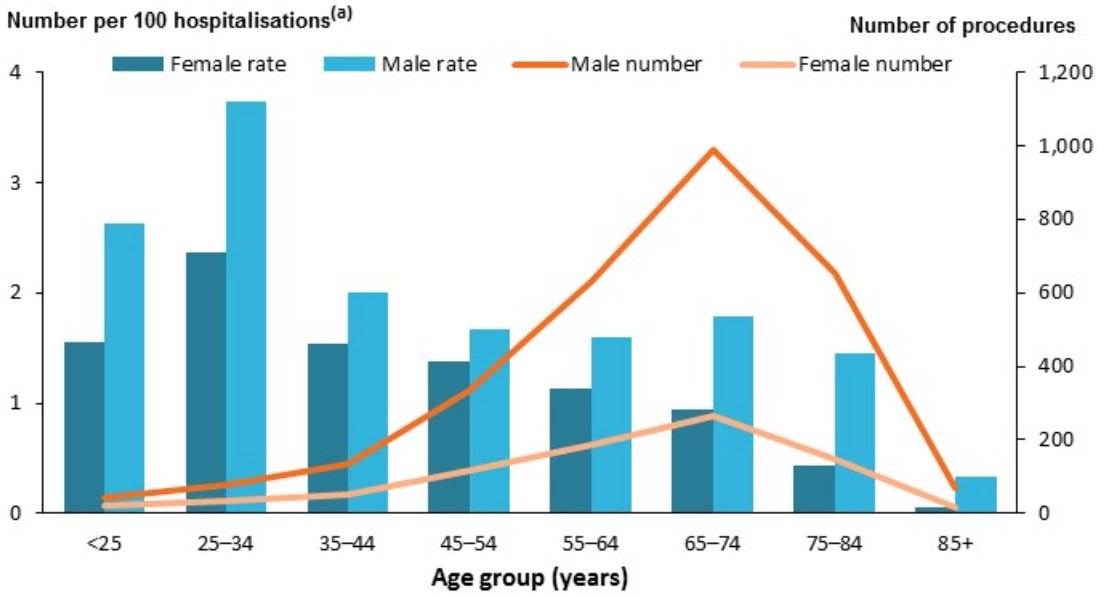
In 2015–16, there were 3,800 cardiac defibrillator implant procedures performed: 836 (22%) in females and 2,900 (78%) in males.

The age-standardised rate for females (0.9 per 100 selected CVD hospitalisations) was lower than for males (1.6).

The highest rates for cardiac defibrillator implants were in women and men aged 25–34 (2.4 and 3.7 per 100 selected CVD hospitalisations, respectively), although the number of implants peaked at age 65–74 in both women and men (Figure 5.9).

The rates for cardiac defibrillator implants in females were lower than in males in all age groups, with the gap greatest among those aged 75 and over.

Figure 5.9: Cardiac defibrillator implant procedures, by age and sex, 2015–16



(a) Hospitalisations with principal diagnosis ICD-10-AM codes I20, I21, I25, I42–I51.

Note: See Appendix tables B5.13 and B5.14.

Source: AIHW National Hospital Morbidity Database.

Overall trends

Between 2006–07 and 2015–16, the total number of cardiac defibrillator implants increased 54%, from 542 to 836, in females, and 35% in males, from 2,200 to 2,900.

Age-standardised rates increased for both females (0.6 to 0.9 per 100 selected CVD hospitalisations) and males (from 1.3 to 1.6).

Age-specific trends

Over this period, age-specific rates for females increased in most age groups. The largest increases were in the 45–54 age group (46%, from 0.8 to 1.4 per 100 selected CVD hospitalisations) and age 55–64 (48%, from 0.7 to 1.1).

In men, the largest increase was at age 25–34, from 1.3 to 3.7 per 100 selected CVD hospitalisations. There were also large increases in men aged 35–44 (65%, from 1.2 to 2.0) and 45–54 (52%, from 1.1 to 1.7).

5.7 Heart transplant

A heart transplant involves implanting a working heart from a recently deceased organ donor into a patient. This procedure is usually used for the treatment of the most severe forms of heart failure or coronary heart disease.

Sex and age

In 2015–16, 116 heart transplants were performed, of which 38 (33%) were provided to females, and 78 (67%) to males.

The age-standardised rate for females was half the rate for males (0.3 and 0.6 per 100,000 hospitalisations, respectively).

Age-specific heart transplant rates were lower in females than in males in all age groups. All heart transplants occurred before the age of 75.

Overall trends

The total number of heart transplant procedures performed on females increased by 73%, from 22 in 2006–07 to 38 in 2015–16 (Appendix tables B5.15 and B5.16). In males, the number increased by 34%, from 58 to 78.

Age-standardised rates rose in females from 0.2 to 0.3 per 100,000, and in males from 0.5 to 0.6.

Age-specific trends

The age specific rate of heart transplants remained stable between 2006–07 and 2015–16 for both sexes.

5.8 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.

The following data relate to carotid endarterectomy procedures performed on patients hospitalised with a principal diagnosis of stroke, cerebrovascular disease or transient ischaemic attack (TIA).

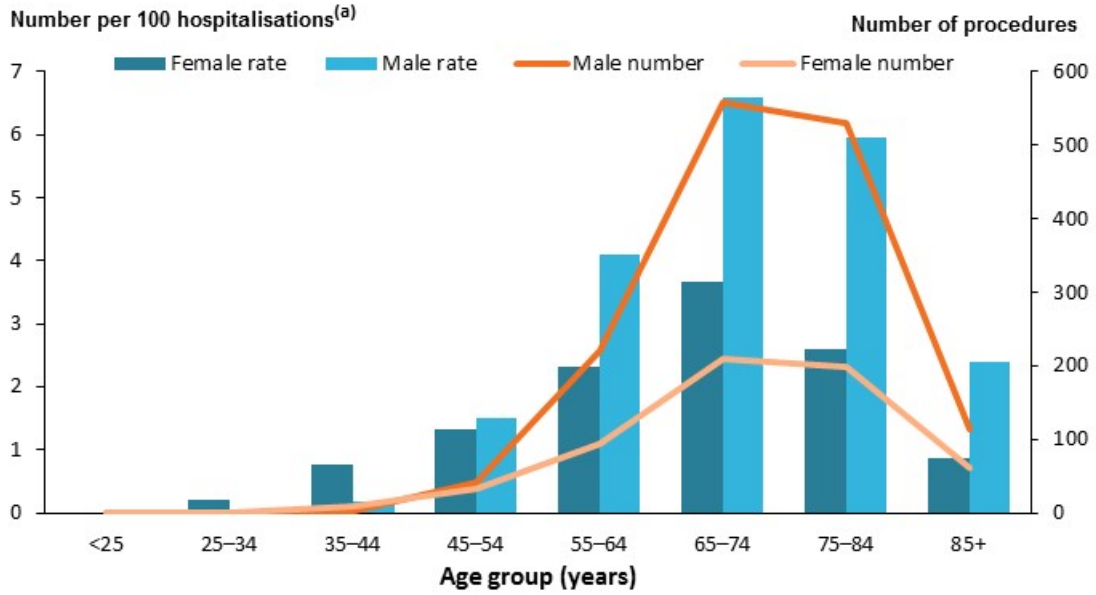
Sex and age

In 2015–16, 2,100 carotid endarterectomy procedures were performed. Of these, 29% (600) occurred in females and 71% (1,500) in males.

The age-standardised rate for females (2.3 per 100 selected CVD hospitalisations), was around half that for males (4.4).

Age-specific carotid endarterectomy rates were lower in women than in men aged 55 and over (Figure 5.10). The difference was most pronounced in those aged 85 and over (0.9 per 100 selected CVD hospitalisations for women, compared with 2.4 for men), and 75–84 (2.6 compared with 6.0). The majority of carotid endarterectomy procedures in both females (67%) and males (74%) were for those aged 65–84.

Figure 5.10: Carotid endarterectomies, by age and sex, 2015–16



(a) Hospitalisations with principal diagnosis ICD-10-AM codes I60–I69, G45.

Note: See Appendix tables B5.17 and B5.18.

Source: AIHW National Hospital Morbidity Database.

Overall trends

The number of carotid endarterectomy procedures performed on females fell by 11% between 2006–07 and 2015–16, from 680 to 610. In males, the number fell by 9%, from 1,600 to 1,500.

The age-standardised rate fell by 20% in females, from 3.1 to 2.3 carotid endarterectomy procedures per 100 selected CVD hospitalisations, while the rate for males fell by 16%, from 5.5 to 4.4.

Age-specific trends

Rates of carotid endarterectomy were stable over this period in young females and in women aged 75 and older. The greatest decline was in women aged 55–64: a fall of 37% from 3.4 to 2.3 per 100 hospitalisations. The rate among men aged 55–64 fell by 29%, from 5.9 to 4.1.

5.9 Case complexity and procedure rates

Females were less likely than males to receive a range of CVD-related procedures, including coronary angiographies, percutaneous coronary interventions, coronary artery bypass grafts and carotid endarterectomies.

The results, however, do not account for case complexity, through comorbidities and/or complications. Case complexity can affect the likelihood of receiving a procedure—more complex cases may be less suitable for a procedure—although patient suitability for procedures is also affected by a range of other factors including age, diagnosis, degree of severity or stage of the disease, operative risk, patient preferences and the goals of therapy/expected quality-of-life improvement (Gunaratnam & Bernstein 2018; Head et al. 2013).

Further analysis was undertaken to examine case complexity among persons hospitalised with CHD, and the extent to which this might affect PCI and CABG procedure rates. Case complexity was measured by the presence of comorbidities; that is, selected additional diagnoses for hospitalisations with a principal diagnosis of CHD.

Note that the presence of comorbidities is a proxy measure only, because case complexity is influenced by other factors, such as the risk factor profile of the patient (AIHW 2006). Further, not all comorbidities will be captured, given that a condition is only recorded as an additional diagnosis if it coexists with the principal diagnosis, or arises during the hospitalisation and affects patient management. An additional diagnosis must be significant in terms of treatment required, investigations needed and resources used in each episode of care.

The additional diagnoses included in this analysis are: diabetes, hypertensive diseases, high cholesterol, heart failure and cardiomyopathy, chronic kidney disease, chronic obstructive pulmonary disease, chronic rheumatic heart disease or other valve disorders, and cerebrovascular disease (see Appendix A).

These conditions have been chosen because they are common CHD comorbidities and are likely to be present on admission, rather than conditions that may be complications of the current CHD event.

CHD hospitalisations by sex and case complexity

Among hospitalisations for CHD, females and males had similar levels of case complexity, as measured by the proportion with comorbidities.

In 2015–16, 30% of females hospitalised with a principal diagnosis of CHD had at least 1 of the 8 comorbidities, 11% had 2 comorbidities and 5% had 3 or more comorbidities.

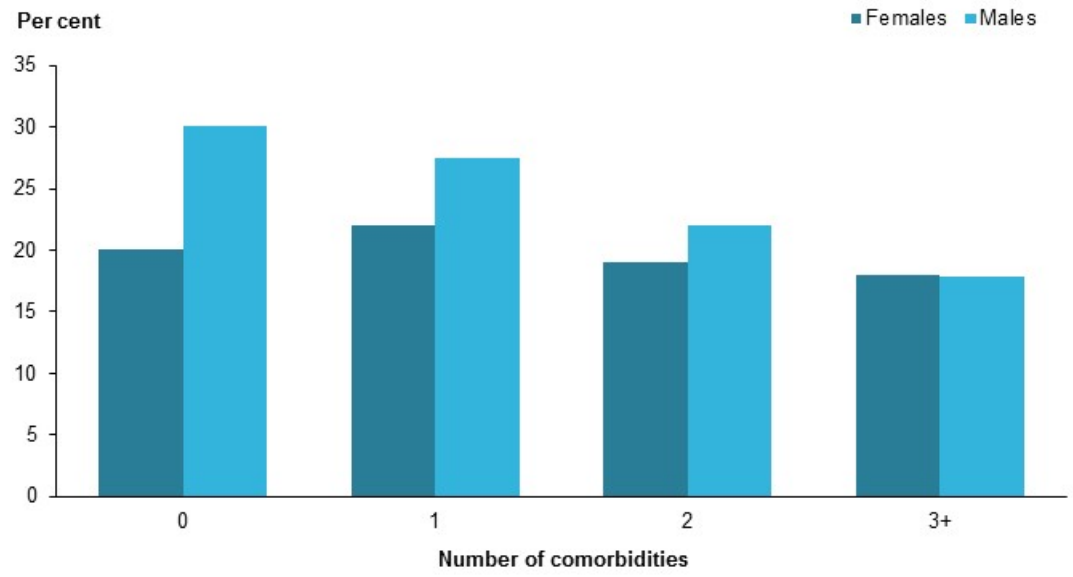
The pattern for males was similar; 30% had 1 comorbidity, 11% had 2 comorbidities and 4% had 3 or more comorbidities, respectively.

PCI

In 2015–16, among hospitalisations with low levels of case complexity (that is, if they had none or 1 of the 8 comorbidities examined) females were less likely than males to receive a PCI (Figure 5.11).

After adjusting for age, 20% of females hospitalised with CHD and with no comorbidities received a PCI, compared with 30% for corresponding males. The gap in PCI procedure rates between females and males lessened for hospitalisations with 2 comorbidities. PCI procedure rates were the same for females and males who had 3 or more comorbidities.

Figure 5.11: Proportion of CHD hospitalisations with a PCI by number of comorbidities, 2015–16



Notes

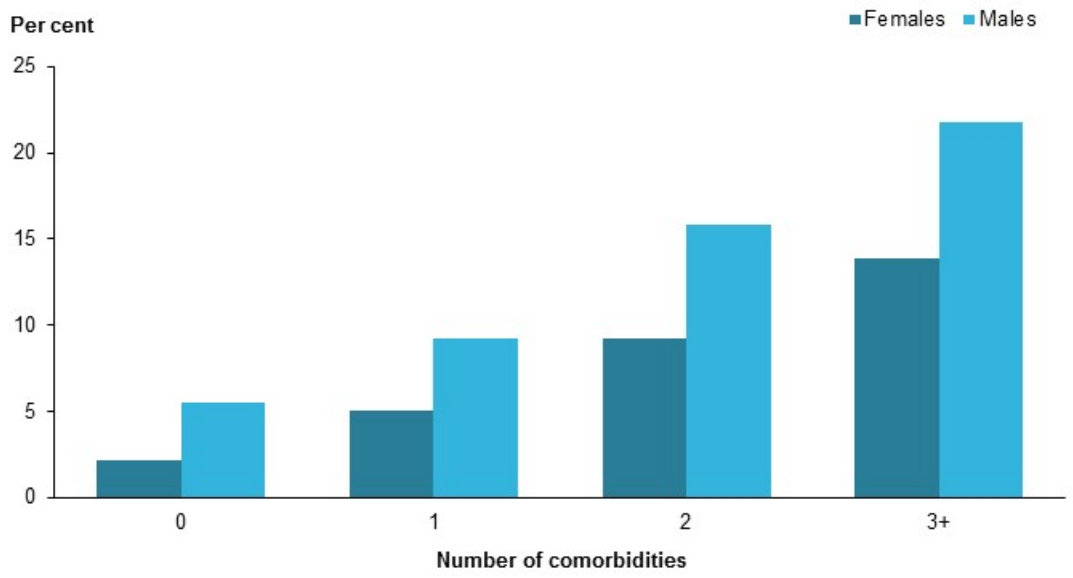
1. Comorbidities examined include diabetes, hypertensive diseases, high cholesterol, heart failure and cardiomyopathy, chronic kidney disease, chronic obstructive pulmonary disease, chronic rheumatic heart disease or other valve disorders, and cerebrovascular disease.
2. Age-standardised to the total number of CVD hospitalisations for 2000–01.

Source: AIHW National Hospital Morbidity Database.

CABG

In 2015–16, females were less likely than males to receive CABG across all complexity groups (Figure 5.12).

Figure 5.12: Proportion of CHD hospitalisations with a CABG by number of comorbidities, 2015–16



Notes

1. Comorbidities examined include diabetes, hypertensive diseases, high cholesterol, heart failure and cardiomyopathy, chronic kidney disease, chronic obstructive pulmonary disease, chronic rheumatic heart disease or other valve disorders, and cerebrovascular disease.
2. Age-standardised to the total number of CVD hospitalisations for 2000–01.

Source: AIHW National Hospital Morbidity Database.

Overall, age-standardised rates of CVD procedures in 2015–16 were lower among females than males, after taking into account higher hospitalisation rates in men. Females were less likely than males to undergo coronary angiography, PCI, CABG, cardiac defibrillator implant and carotid endarterectomy.

Males had higher rates of coronary angiography, PCI, CABG and cardiac defibrillator implant than females in most age groups. From the age of 45, males also had higher procedure rates for carotid endarterectomy than females.

Examining comorbidity as a proxy for case complexity, females were less likely than males to receive a PCI or CABG among CHD hospitalisations where patients had either none, 1 or 2 comorbidities.

The results suggest that neither age or case complexity account for the treatment differences found between females and males.

Other research has suggested that poor awareness of risk, and late presentation or diagnosis in women may account for gender differences in investigation and treatment, and that further investigation is required to determine the reasons behind differences (Khan et al. 2018; Kuhn et al. 2014, 2015).

6 Deaths

Key findings

- In 2016, CVD caused more female deaths than any other disease group—responsible for 22,200, or 29% of all female deaths.
- Coronary heart disease (11%) and cerebrovascular diseases (mostly stroke, 8.0%) were 2 of the top 3 leading causes of all female deaths in 2016, along with dementia and Alzheimer disease (11%).
- Deaths due to CVD increased with age—CVD accounted for nearly 4 in 10 (38%) deaths among women aged 85 and over in 2016.
- CVD also makes a significant impact among younger age groups—nearly 1 in 10 deaths (8.4%) of females aged under 45.
- The share of all female deaths due to CVD has fallen—from 37% in 2006 to 29% in 2016—with similar patterns for CHD (17% to 11%) and stroke (8.0% to 6.4%).
- CVD death rates fell across all age groups over the period 2006 to 2016: by 13% for women aged 45–54, and by more than 40% for women aged 65–74 and 75–84. Younger women have not experienced the same levels of improvement as older women.

6.1 Leading causes of death

CVD caused more female deaths (22,200) than any other disease group in 2016, followed by cancer (20,200) (ABS 2017). For males, cancer (26,100) caused more deaths than CVD (21,700).

Box 6.1: Data considerations

Death certificates record the diseases considered to be instrumental in causing a death. A medical practitioner or coroner usually completes these certificates. Data on causes of death in Australia are considered to be of high quality (Naghavi et al. 2010).

The **underlying cause of death** is the condition, disease or injury that initiated the sequence of events leading directly to death; that is, the primary or main cause. For each death, only a single underlying cause is selected from all the conditions reported on a death certificate.

Associated causes of death are all causes listed on the death certificate, other than the underlying cause of death. They include the immediate cause, any intervening causes, and conditions that contributed to the death but were not related to the disease or condition causing the death.

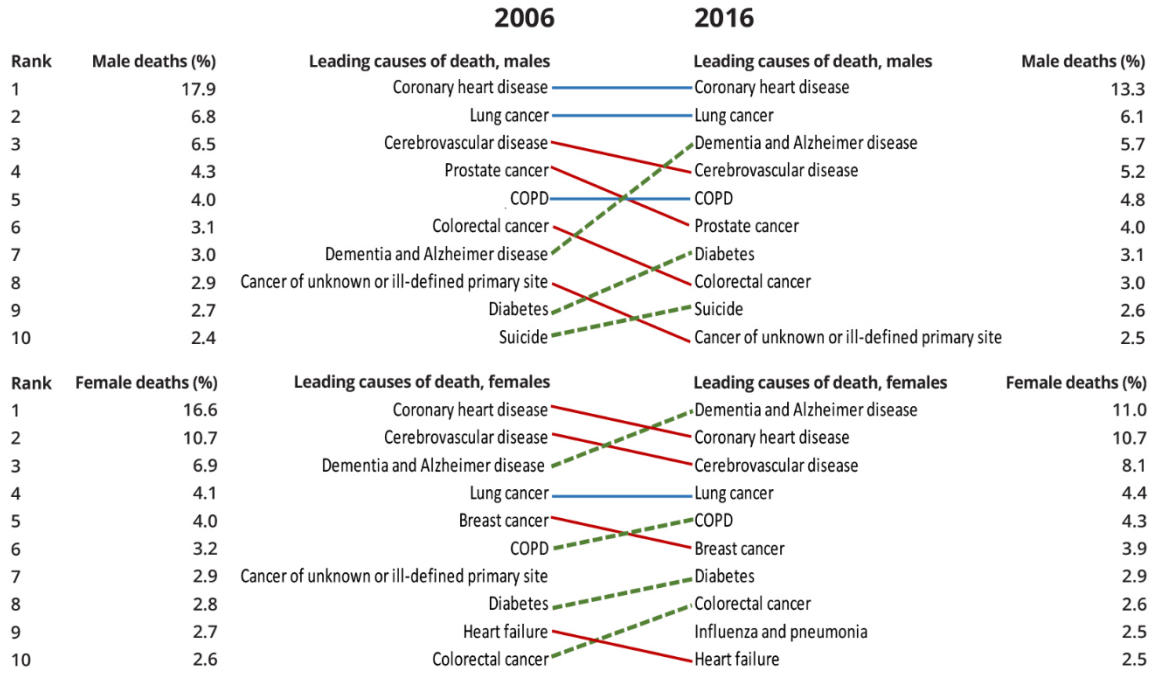
Data in this report relate to underlying cause only, with the exception of some data on heart failure and cardiomyopathy that use both underlying and associated causes of death.

CHD (11%) and cerebrovascular diseases (predominantly stroke, 8%) were 2 of the 3 leading causes of female deaths in 2016, along with dementia and Alzheimer disease (Figure 6.1).

CHD has been the leading cause of female death since the early 20th century. However, it was surpassed by dementia and Alzheimer disease in 2016 (11%). This is related to the increase in the proportion of elderly people in the Australian population (ABS 2017).

There are close associations between CVD and dementia. CVD itself is a cause of dementia, and it is often listed as an associated cause of death when dementia is the underlying cause of death (AIHW 2017a).

Figure 6.1: Leading causes of death, by sex, 2006 and 2016



Notes

1. Rankings are based on the number of deaths; a decline in rank does not necessarily mean a decline in the number of deaths.
2. Data for 2016 are preliminary and are subject to further revision by the Australian Bureau of Statistics.
3. Coloured lines link the leading causes of death in 2006 with those in 2016: a blue line means that the ranking of the cause of death remained the same in 2016 as in 2006; a green line, that the ranking of the cause of death rose compared with that in 2006; and a red line, that the ranking of the cause of death in 2016 decreased compared with that in 2006.

Source: AIHW 2018a, based on analyses of the AIHW National Mortality Database.

The leading underlying causes of death differ by age group (Figure 6.2). In general, chronic diseases feature more prominently among people aged 45 and over, while the leading causes of death among people aged under 45 are external causes such as land transport accidents and suicides.

For females, CHD and cerebrovascular disease were leading causes of death from age 45 onwards. Heart failure is a leading cause of death for age 85 and over (Figure 6.2).

Figure 6.2: Leading causes of death, by age and sex, 2014–2016

		Age group (years)				
		25–44	45–64	65–74	75–84	85 and over
Women	1st	Suicide (786; 13.9%)	Breast cancer (2,766; 11.5%)	Lung cancer (3,073; 10.8%)	Coronary heart disease (5,499; 10.1%)	Dementia and Alzheimer (18,374; 16.1%)
	2nd	Accidental poisoning (494; 8.8%)	Lung cancer (2,451; 10.2%)	Chronic obstructive pulmonary disease (1,966; 6.9%)	Dementia and Alzheimer disease (5,167; 9.5%)	Coronary heart disease (17,161; 15.0%)
	3rd	Breast cancer (470; 8.3%)	Coronary heart disease (1,246; 5.2%)	Breast cancer (1,957; 6.9%)	Cerebrovascular disease (4,456; 8.2%)	Cerebrovascular disease (12,471; 10.9%)
	4th	Land transport accidents (268; 4.8%)	Colorectal cancer (1,120; 4.7%)	Coronary heart disease (1,928; 6.8%)	Chronic obstructive pulmonary disease (3,160; 5.8%)	Heart failure 4,348; 3.8%)
	5th	Colorectal cancer (198; 3.5%)	Cerebrovascular disease (859; 3.6%)	Cerebrovascular disease (1,256; 4.4%)	Lung cancer (2,953; 5.4%)	Influenza and pneumonia (3,806; 3.3%)
Men	1st	Suicide (2,588; 24.1%)	Coronary heart disease (5,310; 13.7%)	Coronary heart disease (5,748; 12.9%)	Coronary heart disease (8,878; 13.2%)	Coronary heart disease (12,430; 16.6%)
	2nd	Accidental poisoning (1,410; 13.1%)	Lung cancer (3,171; 8.2%)	Lung cancer (4,739; 10.6%)	Lung cancer (4,684; 6.9%)	Dementia and Alzheimer disease (7,944; 10.6%)
	3rd	Land transport accidents (975, 9.1%)	Suicide (2,139; 5.5%)	Chronic obstructive pulmonary disease (2,524; 5.6%)	Dementia and Alzheimer disease (4,116; 6.1%)	Cerebrovascular disease (5,742; 7.6%)
	4th	Coronary heart disease (663, 6.2%)	Liver disease (1,773; 4.6%)	Colorectal cancer (1,820; 4.1%)	Cerebrovascular disease (4,107; 6.1%)	Chronic obstructive pulmonary disease (3,999; 5.3%)
	5th	Other ill-defined causes (323; 3.0%)	Colorectal cancer (1,634; 4.2%)	Prostate cancer (1,816; 4.1%)	Chronic obstructive pulmonary disease (4,082; 6.1%)	Prostate cancer (3,644; 4.8%)

Note: 'Other ill-defined causes' include the following codes: Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (ICD-10 codes R00–R99, excluding R95: Sudden infant death syndrome (SIDS); Cardiac arrest, unspecified (I46.9); Respiratory failure of newborn (P28.5); Other unspecified convulsions (R56.8).

Source: AIHW National Mortality Database.

6.2 All cardiovascular mortality

In 2016, CVD was the underlying cause of 22,200 female deaths, corresponding to an age-standardised rate of 120 deaths per 100,000 population. This was lower than the rate for males (169).

CVD caused a slightly higher proportion of deaths among females (29%) than males (27%) in 2016. This proportion was lower than in 2006 when CVD was responsible for 37% of all female deaths (32% for males) (AIHW 2010).

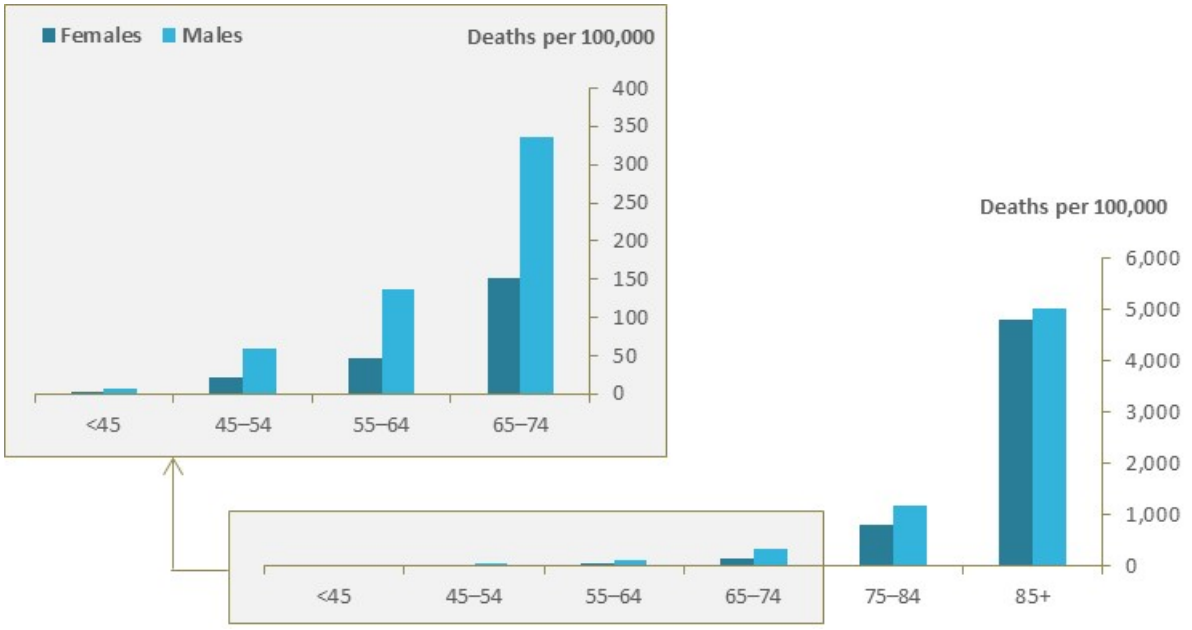
Sex and age

The proportion of all female deaths due to CVD varied by age, from 8% for those aged under 45 to 38% for age 85 and over.

Most female CVD deaths occurred in the oldest age group in 2016: two-thirds (66%) among those aged 85 and over (41% for males).

CVD death rates increased with age. There was a fivefold increase between females aged 65–74 and 75–84 (150 per 100,000 and 800 per 100,000, respectively), and a sixfold increase for those aged 85 and over (4,800 per 100,000) (Figure 6.3).

Figure 6.3: Cardiovascular disease death rates, by age and sex, 2016



Note: See Appendix tables B6.1 and B6.2.

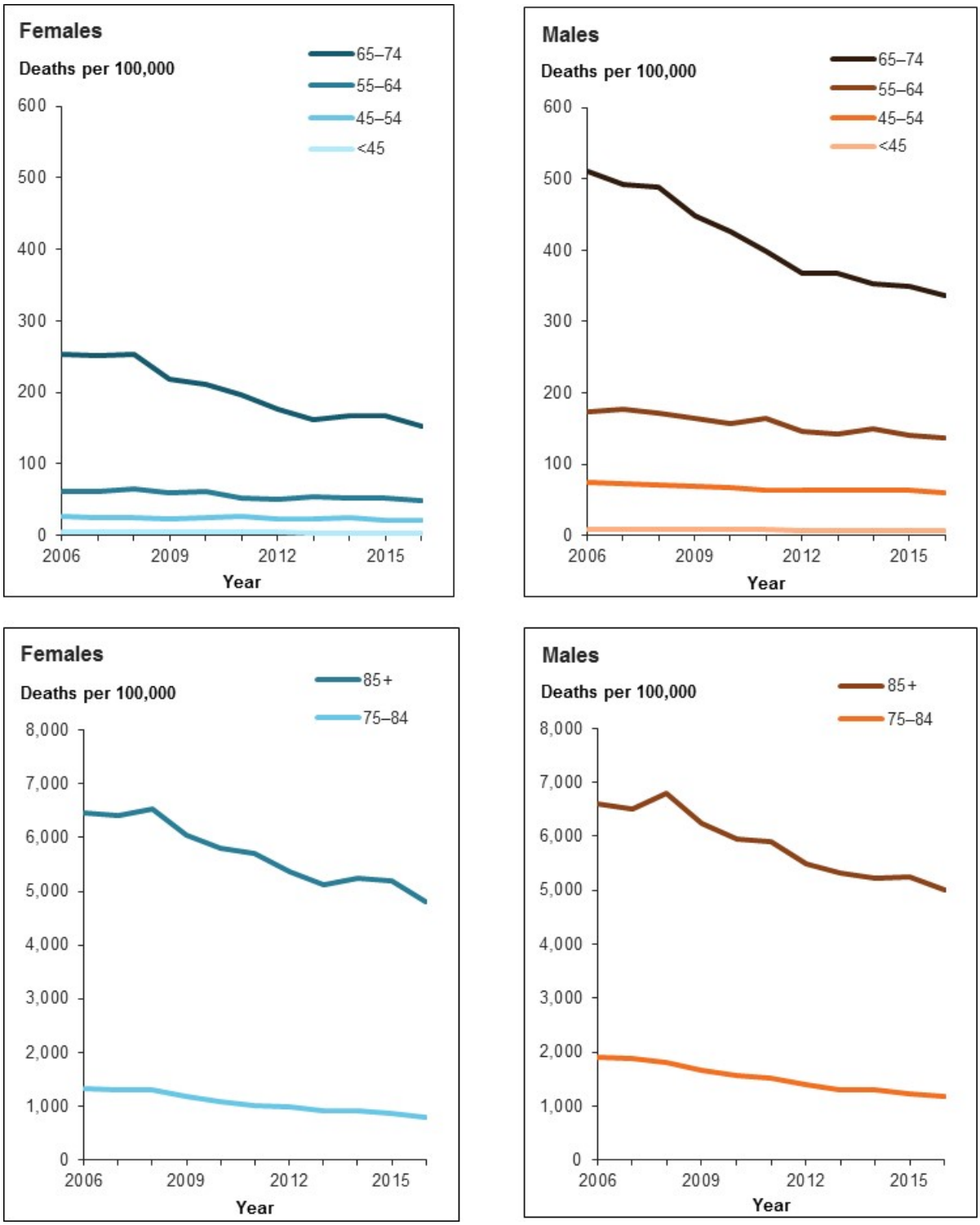
Source: AIHW National Mortality Database.

Overall trends

Since its peak in the late 1960s, the CVD rate has declined substantially, and the gap between females and males has narrowed (AIHW 2014). The main driver of this decline was a large fall in CHD deaths accompanied by falling rates of cerebrovascular disease deaths (AIHW 2017a).

From 2006 to 2016, rates fell by one-third: from 174 to 120 per 100,000 population for females, and 241 to 169 per 100,000 for males.

Figure 6.4: Cardiovascular disease death rates, by age and sex, 2006–2016



Notes

1. Different scales have been used in the upper and lower panels.
2. See Appendix tables B6.1 and B6.2.

Source: AIHW National Mortality Database.

Age-specific trends

From 2006 to 2016, CVD death rates fell across all age groups, but the rate of decline varied across age groups (Figure 6.4).

For both sexes, the greatest improvements—falls of around 40%—were among those aged 65–74 and 75–84.

6.3 Coronary heart disease

CHD was the leading cause of death among women until 2016, when it was surpassed by dementia and Alzheimer disease (Figure 6.1).

CHD is the most common cause of CVD deaths: accounting for 37% of female CVD deaths (50% for males). Almost half (46%) of female CHD deaths were due to ACS (39% for males) (Box 6.2).

In 2016, CHD was the underlying cause of 8,200 female deaths (an age-standardised rate of 44 deaths per 100,000 population), and 10,900 male deaths (84 deaths per 100,000).

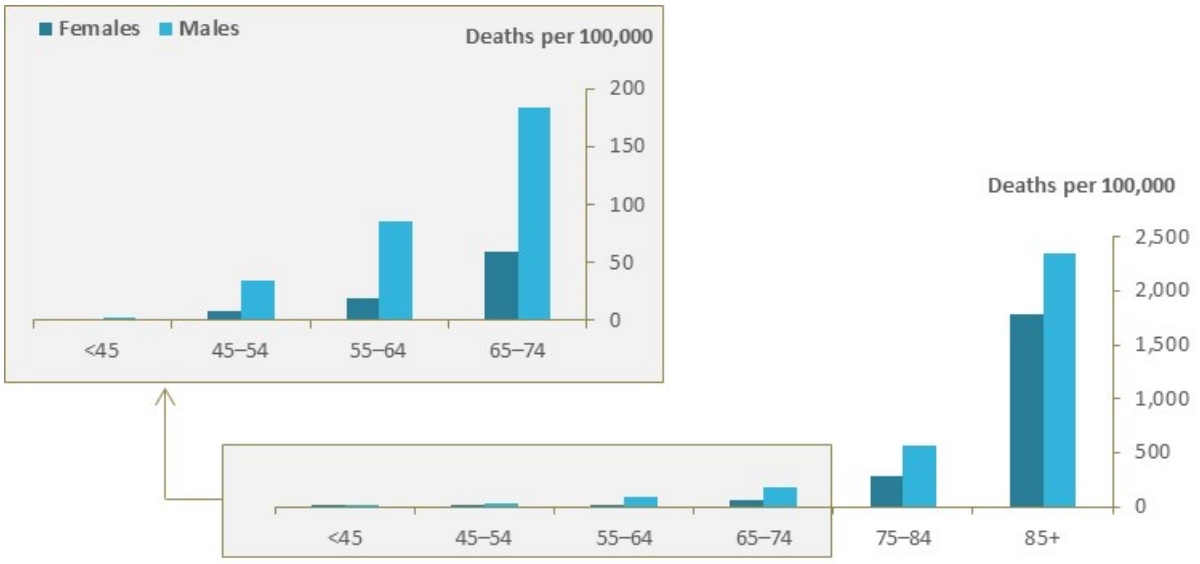
CHD accounted for more than 1 in 10 female deaths in 2016 (11%): a decrease from 2006 when it accounted for about 1 in 6 female deaths (17%) (AIHW 2010).

Sex and age

The majority of female CHD deaths occurred in older age groups, with 66% among women aged 85 and over (39% for males).

CHD death rates increased with age, from less than 1 per 100,000 population for females aged under 45 to 1,800 per 100,000 for females aged 85 and over (Figure 6.5).

Figure 6.5: Coronary heart disease death rates, by age and sex, 2016



Note: See Appendix tables B6.3 and B6.4.

Source: AIHW National Mortality Database.

The rate among females aged 75–84 (285 per 100,000) was almost 5 times as high as for those aged 65–74 (59 per 100,000). There was a further sixfold increase between females aged 75–84 and those aged 85 and over.

Females were less likely than males to die from CHD at all ages (Figure 6.5).

Overall trends

CHD death rates have been declining in Australia since the late 1960s (AIHW 2017a). From 2006 to 2016, the rate fell by 46% for females (from 78 to 44 per 100,000 population) and 40% for males (from 135 to 84).

Age-specific trends

There have been large declines in CHD mortality in all age groups over recent decades, with the rate of decline greatest in older age groups (AIHW 2017a).

From 2006 to 2016, the greatest improvements were among females aged 65–74 and 75–84, where both death rates fell by 56%.

Box 6.2: Acute coronary syndrome

ACS was responsible for around half (46%) of female CHD deaths in 2016 (39% for males).

Overall, females were less likely than males to die from ACS—it was the underlying cause of 3,800 deaths among females (20 deaths per 100,000 population), and 4,300 deaths among males (33 deaths per 100,000).

Sex and age

The majority of ACS deaths occurred in older age groups, with 65% of female ACS deaths among women aged 85 and over (41% for males).

Age-specific death rates increased with age. In 2016, there was less than 1 death per 100,000 population for females aged under 45, rising to 140 for ages 75–84 and 801 for age 85 and over.

Females were less likely than males to die from ACS at all ages.

Overall trends

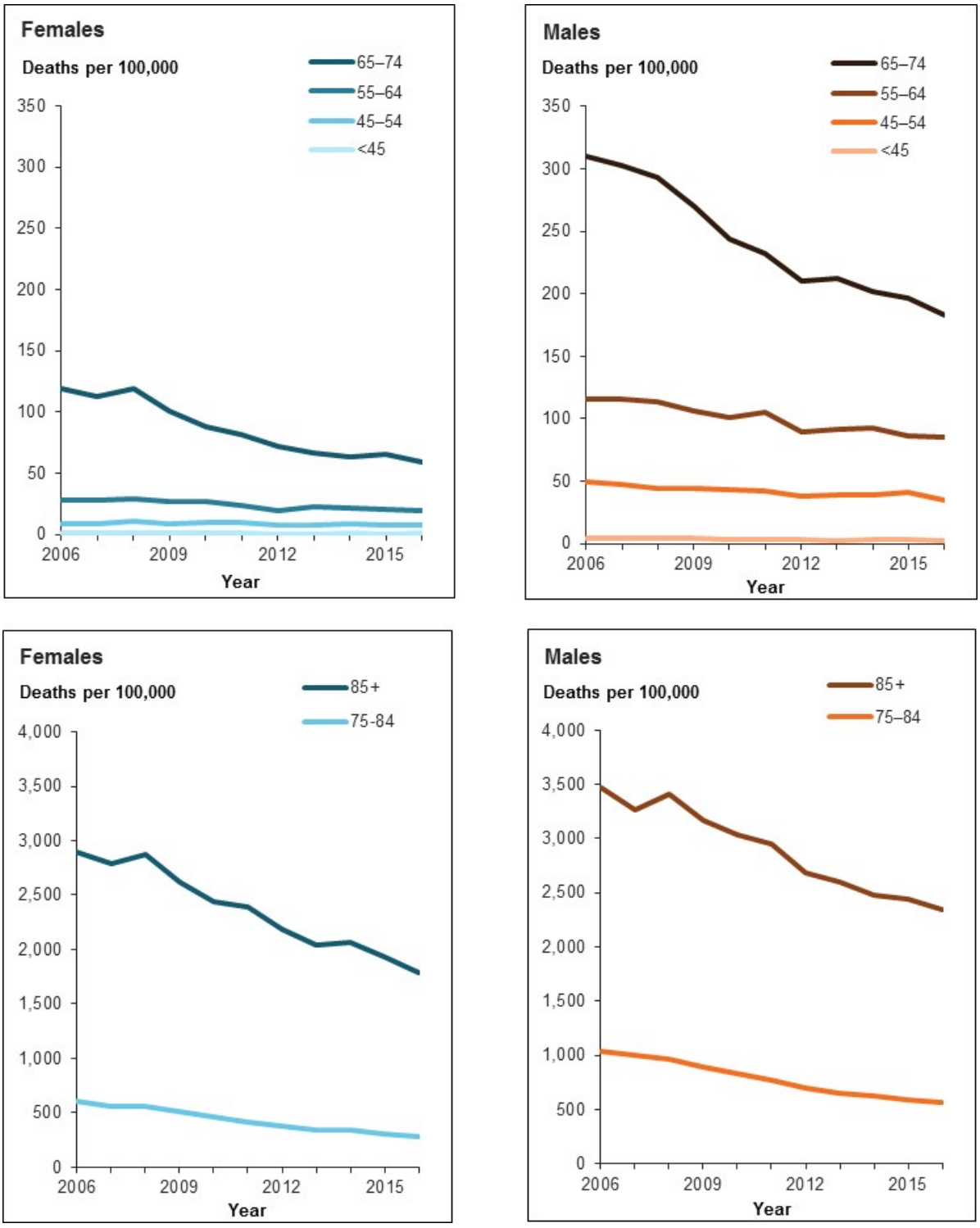
From 2006 to 2016, both the number and rate of ACS deaths fell. The number of ACS deaths fell from 5,700 to 3,800 (34%) for females, and from 5,800 to 4,300 (27%) for males. The age-standardised ACS death rate fell from 41 to 20 per 100,000 population (53%) for females, and from 64 to 33 (52%) for males.

Age-specific trends

From 2006 to 2016, ACS death rates have fallen across all age groups for both sexes, but the rate of decline varied across age groups.

For females, the greatest improvements were among those aged 65–84 where the rate fell by 61%. Among those aged under 65, improvements ranged from 35% to 54%.

Figure 6.6: Coronary heart disease death rates, by age and sex, 2006–2016



Notes

1. Different scales have been used in the upper and lower panels.
2. See Appendix tables B6.3 and B6.4.

Source: AIHW National Mortality Database.

6.4 Stroke

In 2016, stroke was the second most common cause of CVD deaths, accounting for 22% of female CVD deaths (15% for males).

Stroke was the underlying cause of more deaths among females (4,900 or 6.4% of all female deaths) than males (3,300 or 4.1%) in 2016.

This is lower than in 2006, when stroke was responsible for 8.0% of all female deaths (5.0% for males) (AIHW 2010).

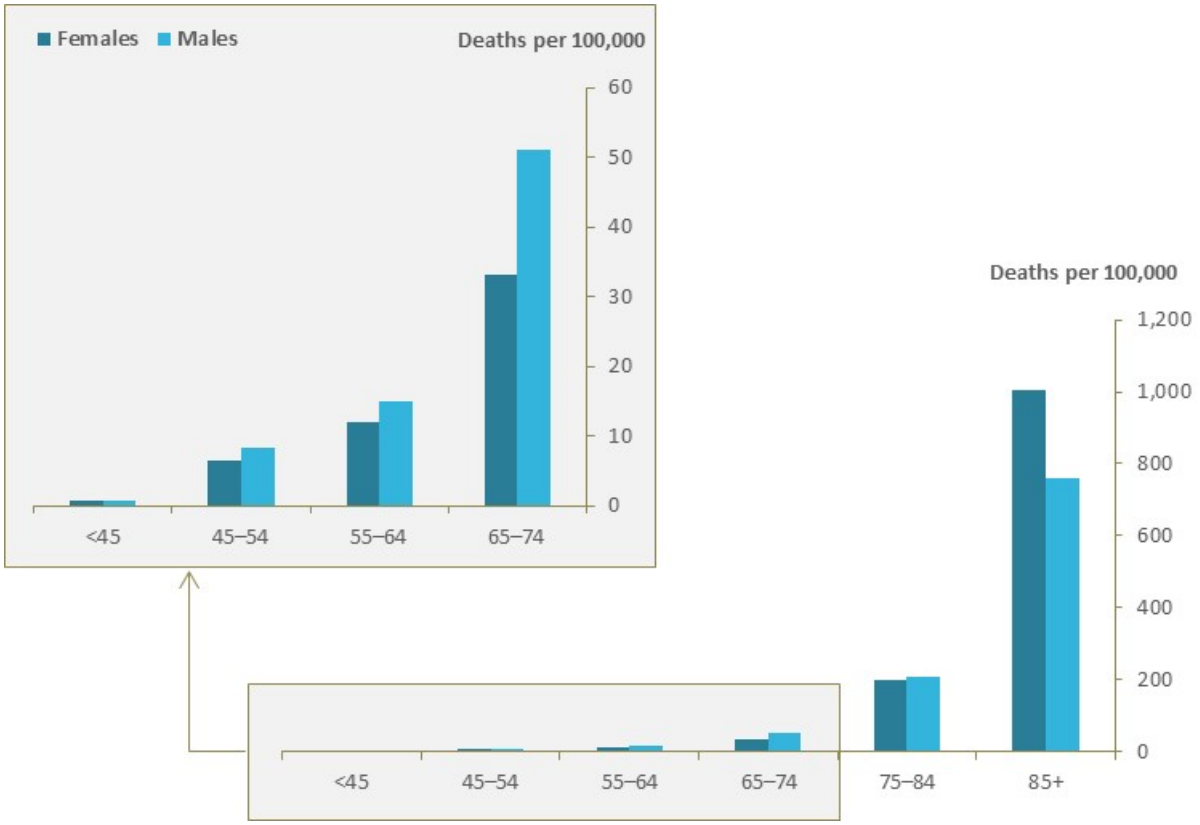
The age-standardised death rate from stroke was similar in females (27 deaths per 100,000) and males (26 deaths per 100,000).

Sex and age

The majority of stroke deaths occurred in older age groups, with 62% of female deaths among women aged 85 and over (41% for males).

Age-specific death rates from stroke increased with age (Figure 6.7). In 2016, there was less than 1 death per 100,000 population for females aged under 45, rising to 1,000 deaths per 100,000 for those aged 85 and over.

Figure 6.7: Stroke death rates, by age and sex, 2016



Note: See Appendix tables B6.7 and B6.8.

Source: AIHW National Mortality Database.

The rate among women aged 75–84 (200 per 100,000) was sixfold that of those aged 65–74 (33 per 100,000), with a further fivefold increase between women aged 75–84 and 85 and over.

Females aged under 45 were about 30% more likely to die from stroke than their male counterparts (0.8 compared with 0.6 deaths per 100,000, respectively), as were women aged 85 and over (1,000 compared with 760 deaths per 100,000).

Overall trends

Stroke mortality has declined since the early 1970s (AIHW 2014). Between 2006 and 2016, rates declined from 37 to 27 per 100,000 population (28%) for females, and from 38 to 26 per 100,000 population (34%) for males.

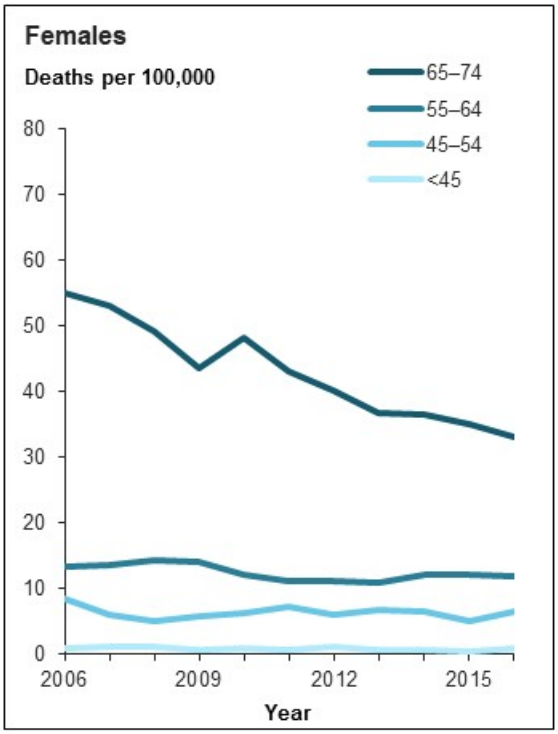
Age-specific trends

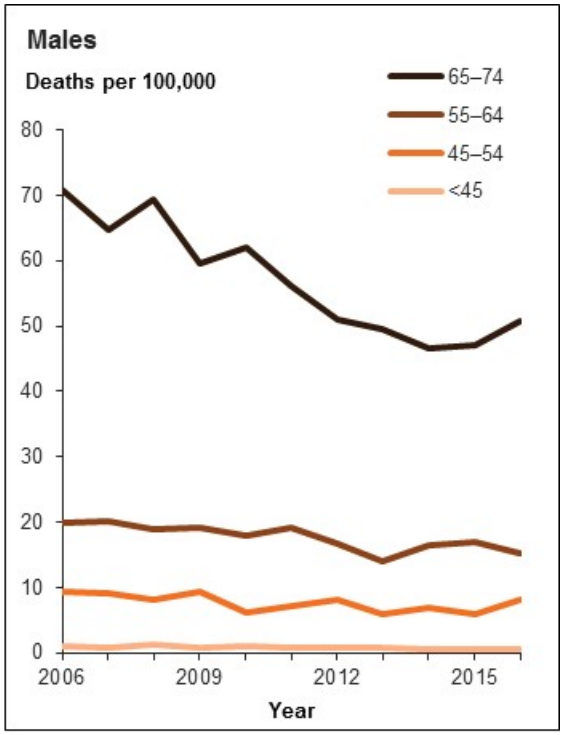
From 2006 to 2016, stroke death rates fell across all age groups for both sexes (Figure 6.7).

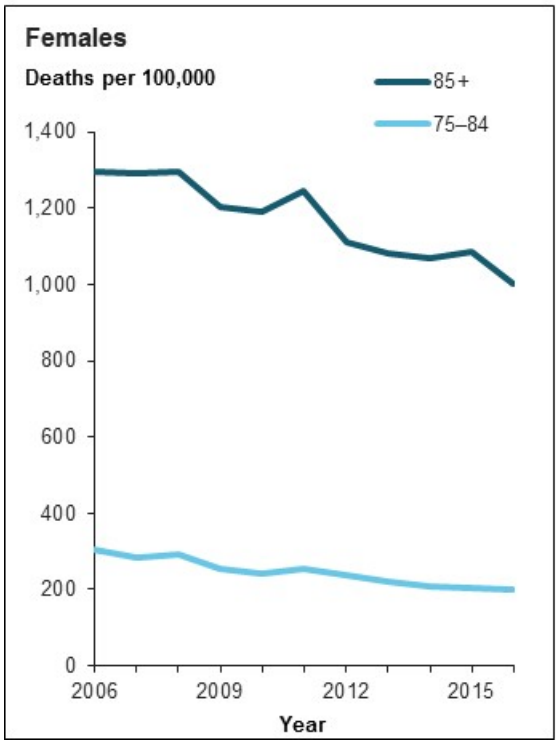
For females, the greatest improvements were among ages 65–74 and 75–84, where the number of deaths per 100,000 fell by 41% and 36%, respectively.

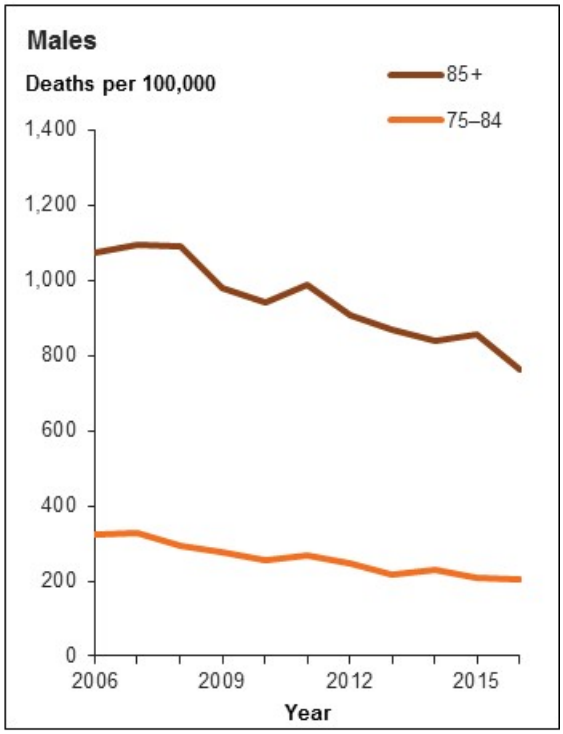
Females experienced less improvement than males across most age groups, with the exception of those aged 65–74 (41% for females compared with 36% for males).

Figure 6.8: Stroke death rates, by age and sex, 2006–2016









Notes

1. Different scales have been used in the upper and lower panels.
2. See Appendix tables B6.7 and B6.8.

Source: AIHW National Mortality Database.

6.5 Heart failure and cardiomyopathy

Heart failure and cardiomyopathy was the third most common cause of CVD deaths in 2016: 10% of female CVD deaths (11% for males) (Box 6.3).

Females (2,200 deaths, 11 per 100,000 population) were less likely than males (2,300 deaths, 18 per 100,000 population) to die from heart failure and cardiomyopathy in 2016.

Box 6.3: Assessing the contribution of heart failure and cardiomyopathy to deaths

Data in this chapter relate to underlying cause of death only, and understate the true contribution of heart failure and cardiomyopathy to deaths. Heart failure, which results from a variety of diseases and conditions that impair or overload the heart, is often regarded as a 'mode of death' rather than a primary 'cause of death' and is more likely to be reported as an associated cause rather than the underlying cause (Najafi et al. 2007).

Older people dying of heart failure are likely to have multiple comorbidities, which have an impact on accurate diagnosis and reporting of the underlying cause of death (Najafi et al. 2007). Heart failure is often listed as an associated cause of death when the underlying cause is chronic and unspecified kidney failure, CHD, diabetes, chronic obstructive pulmonary disease or asthma (AIHW 2012).

Appendix Table B6.9 provides a comparison of heart failure and cardiomyopathy deaths based on underlying cause only compared with deaths based on underlying and associated cause. For females, heart failure and cardiomyopathy deaths based on underlying cause only (2,200) made up 18% of all deaths for which heart failure and cardiomyopathy were either the underlying or an associated cause (11,800). The corresponding figure for males was 20% (2,300 underlying, 11,400 underlying and associated).

Sex and age

Most deaths caused by heart failure and cardiomyopathy occurred in older age groups, with 70% of heart failure and cardiomyopathy deaths among women aged 85 and over (45% for males).

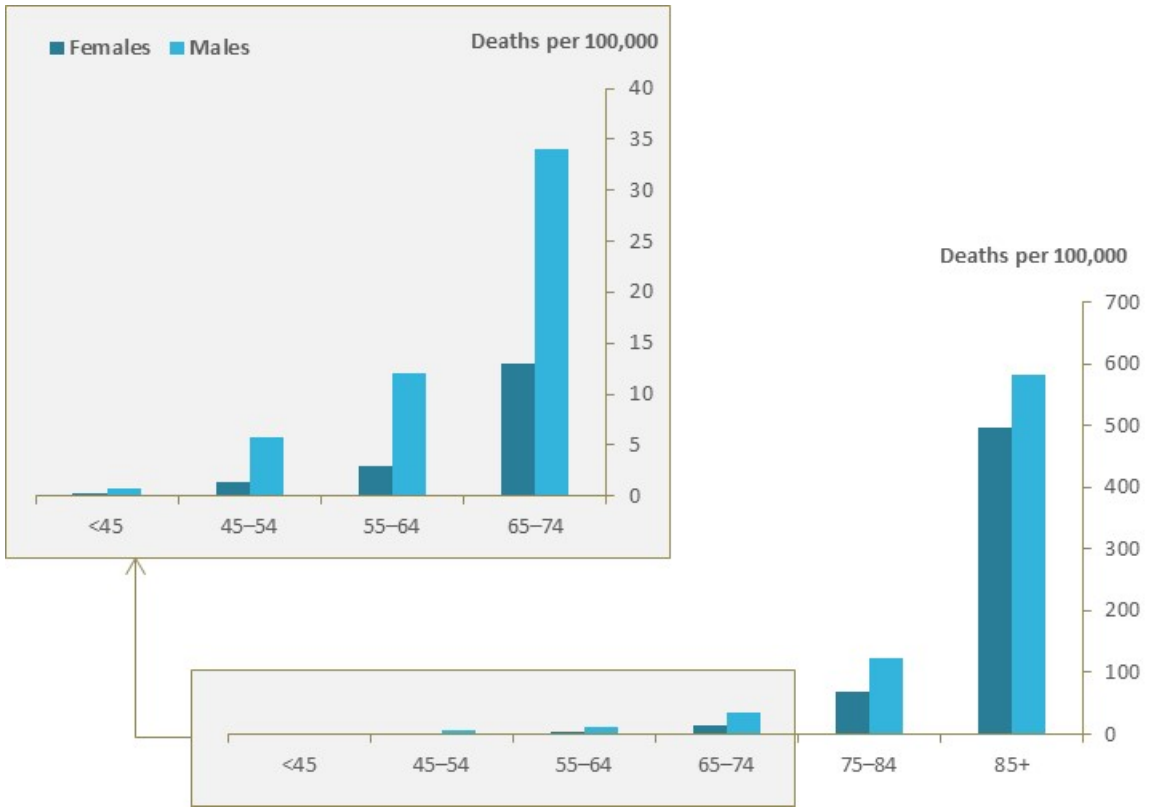
Heart failure and cardiomyopathy were responsible for 3% of all female deaths in 2016.

Age-specific heart failure and cardiomyopathy death rates increased with age (Figure 6.9). In 2016, there was less than 1 death per 100,000 population for females aged under 45, rising to 498 per 100,000 population for women aged 85 and over.

There was a sixfold increase in the female death rate between the ages of 65–74 (13 deaths per 100,000) and 75–84 (70 per 100,000), followed by a further sevenfold increase between the ages of 75–84 and 85 and over.

Females were less likely to die from heart failure and cardiomyopathy than males in all age groups (Figure 6.9).

Figure 6.9: Heart failure and cardiomyopathy death rates, by age and sex, 2016



Note: See Appendix tables B6.10 and B6.11.

Source: AIHW National Mortality Database.

Overall trends

Between 2006 to 2016, the number of female heart failure and cardiomyopathy deaths increased by 14%, from 1,900 to 2,200 (compared with 38%, from 1,700 to 2,300, for males).

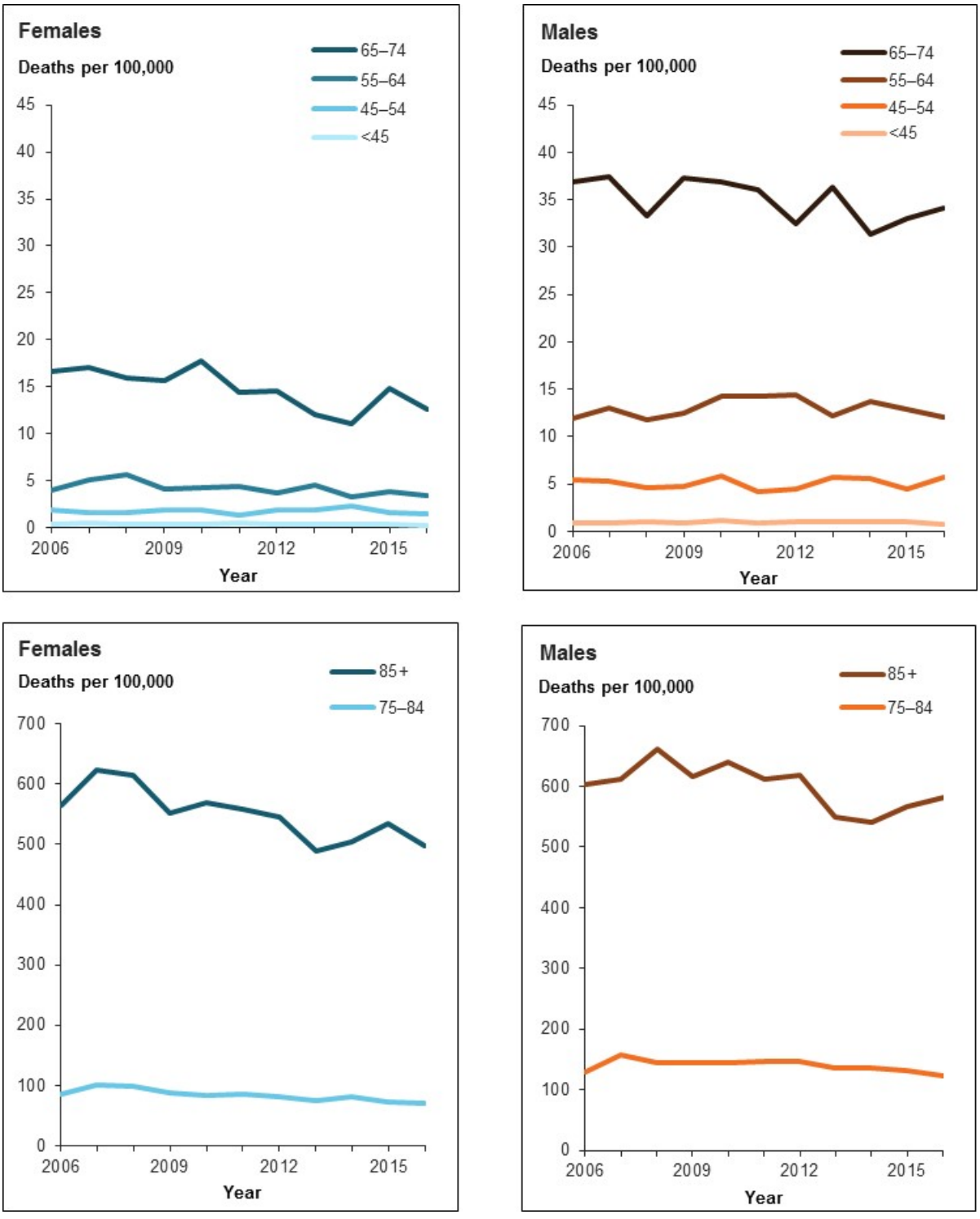
Over this period, the female death rate fell by 20%, from 13 to 11 per 100,000 population (9% for males from 19 to 18).

Age-specific trends

Between 2006 to 2016, heart failure and cardiomyopathy death rates fell among females aged 55 and over (Figure 6.10).

Females generally experienced greater improvements than males. For females aged 65–74, 75–84, and 85 and over, rates fell by 29%, 25%, and 18%, respectively, compared with an 11% improvement for the corresponding male age groups.

Figure 6.10: Heart failure and cardiomyopathy death rates, by age and sex, 2006–2016



Notes

1. Different scales have been used in the upper and lower panels.
2. See Appendix tables B6.10 and B6.11.

Source: AIHW National Mortality Database.

7 Aboriginal and Torres Strait Islander women

Key findings

- In 2012–13, around 12,500 Aboriginal and Torres Strait Islander women (6.9%) were estimated to have heart, stroke and vascular disease, including 7,100 who had CHD.
- CVD accounted for 11% (9,900 DALYs) of the total burden of disease in Indigenous females in 2011, making CVD as a disease group the third leading cause of burden. The rate of DALY for CVD was 3.2 times as high as for non-Indigenous females.
- CHD was the leading specific cause of disease burden among Indigenous females, responsible for 6% of all disease and injury in 2011.
- In 2015–16, there were 6,500 CVD hospitalisations of Indigenous females. Indigenous females had a CVD hospitalisation rate 2.3 times that of non-Indigenous females.
- CVD was responsible for 870 deaths among Indigenous females in 2014–2016: a rate of 90 per 100,000 population. The CVD death rate was almost twice (1.9 times) that of non-Indigenous females.

Cardiovascular disease contributes substantially to poor health and reduced life expectancy among Aboriginal and Torres Strait Islander people (AIHW 2015).

This chapter presents information on CVD prevalence and incidence, burden of disease, hospitalisations, procedures and deaths among Indigenous women. It compares results with Indigenous men, and with non-Indigenous women and men (see Box 7.1).

Box 7.1: Data considerations and terminology

Indigenous CVD rates presented in this chapter are crude rates. However, rates have also been age-standardised for the purpose of comparison with the non-Indigenous population.

Comparisons between the Indigenous and non-Indigenous populations have been presented using rate ratios, and are referred to as ‘the gap’. The gap is a measure derived by comparing the 2 groups for their likelihood of an event, based on age-standardised rates—calculated as the rate for Indigenous people divided by the rate for non-Indigenous people (see Appendix A).

7.1 How many Indigenous women have CVD?

An estimated 12,500 Indigenous women aged 18 and over (6.9%) had heart, stroke and vascular disease in 2012–13, based on self-reported data from the ABS 2012–13 Australian Aboriginal and Torres Strait Islander Health Survey (AATSIHS) (ABS 2013b).

Indigenous women were almost twice as likely as non-Indigenous women (3.8%) to have heart, stroke and vascular diseases, after accounting for differences in the age structure of the populations.

Coronary heart disease

In 2012–13, around 7,100 Indigenous women had CHD, based on self-reported data from the ABS 2012–13 AATSIHS (8,600 for men).

Indigenous women were 2.3 times as likely to have CHD as non-Indigenous women.

Acute coronary events

In 2016, an estimated 960 Indigenous women aged 25 and over experienced an acute coronary event in the form of a heart attack or unstable angina: a rate of 617 per 100,000. (798 per 100,000 in Indigenous males).

Indigenous women were 3.8 times as likely as Other Australian women to experience an acute coronary event.

Stroke

Limited information on the incidence of stroke is available for the Indigenous population.

Using hospitalisations data from the Northern Territory, the estimated first-ever stroke incidence rate was 307 per 100,000 population for the period 1999–2011, which is more than twice as high as for the non-Indigenous population (138 per 100,000 population (You et al. 2015).

Another study from Western Australia reported non-fatal stroke incidence rates of 304 per 100,000 for Indigenous males and 267 per 100,000 for Indigenous females for 1997–2002, which is 2.6 and 3.0 times as high as for non-Indigenous females and males, respectively (Katzenellenbogen et al. 2011).

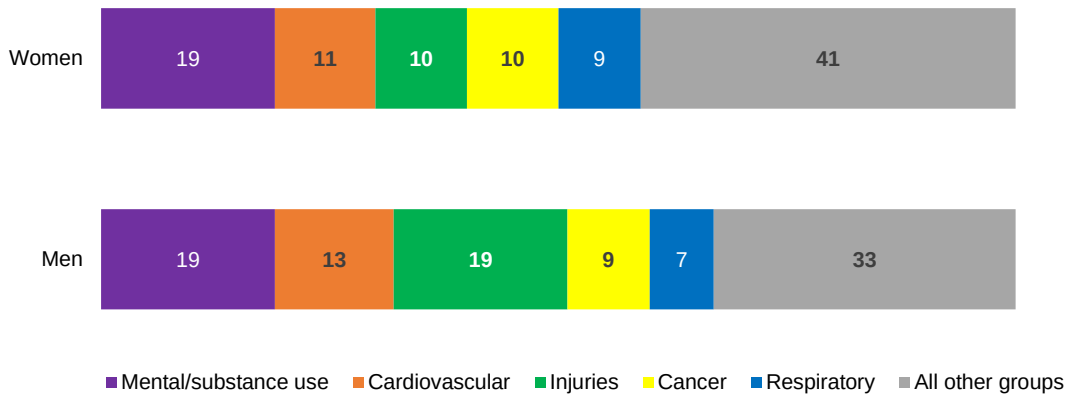
7.2 Burden of cardiovascular disease for Indigenous women

Cardiovascular diseases accounted for 11% (9,900 DALYs) of the total burden of disease in Indigenous females in 2011 (compared with 13%, or 3,900 DALYs in Indigenous males). The disease group was the second leading cause of burden for Indigenous females and third for Indigenous males (Figure 7.1).

The rate of DALY for CVD among Indigenous females was 3.2 times that of non-Indigenous females (compared with 2.6 times for males).

A gap in disease burden exists between Indigenous and non-Indigenous females: CVD account for about one-fifth (18%) of the overall gap, ahead of mental and substance use disorders (13%) and respiratory diseases (12%).

Figure 7.1: Total burden, Indigenous Australians, by disease group and sex, 2011 (%)



Source: AIHW 2016, based on analyses of Australian Burden of Disease Database 2011.

Coronary heart disease

CHD was the specific disease responsible for the greatest proportion of disease burden among Indigenous females (6%).

The rate of DALY for CHD among Indigenous females was 3.4 times that of non-Indigenous females. This difference accounts for 9% of the overall gap in disease burden between Indigenous and non-Indigenous females, making CHD the largest single contributor to the gap, ahead of diabetes (8%) and chronic obstructive pulmonary disease (COPD) (7%).

Stroke

Stroke was the 12th ranked cause of disease burden for Indigenous females, accounting for 2.2% of total burden (1,904 DALYs).

The rate of DALY for stroke for Indigenous females was 2.6 times that of non-Indigenous females. This difference accounts for 4% of the overall gap in disease burden between Indigenous and non-Indigenous females, making stroke the eighth largest contributor to the gap.

7.3 Hospitalisations

Cardiovascular disease

There were around 6,500 hospitalisations for CVD among Aboriginal and Torres Strait Islander females in 2015–16, corresponding to a rate of 1,800 hospitalisations per 100,000 population. Among Indigenous males, there were 6,900 CVD hospitalisations (1,900 per 100,000).

Indigenous females were hospitalised with CVD at 2.3 times the rate of non-Indigenous females (compared with 1.6 times as high for Indigenous males) (Figure 7.2).

Coronary heart disease

CHD contributed to 2,200 hospitalisations of Indigenous females (608 per 100,000 population) and 2,800 hospitalisations of Indigenous males (759 per 100,000) in 2015–16.

The CHD hospitalisation rate for Indigenous females was 3.6 times as high as for non-Indigenous females (1.9 times as high for Indigenous males) (Figure 7.2).

Stroke

Stroke contributed to 449 hospitalisations among Indigenous females (122 per 100,000 population), and 405 hospitalisations among Indigenous males (110 per 100,000) in 2015–16.

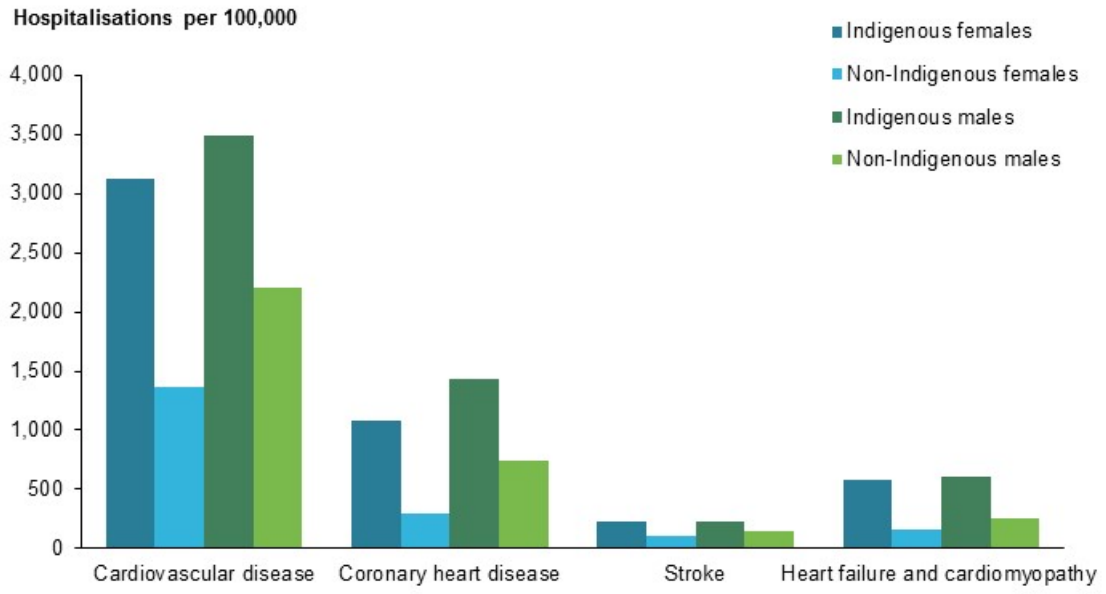
The stroke hospitalisation rate for Indigenous females was 2.1 times as high as for non-Indigenous females (1.5 times as high for non-Indigenous males) (Figure 7.2).

Heart failure and cardiomyopathy

Heart failure and cardiomyopathy contributed to 1,031 hospitalisations of Indigenous females (280 per 100,000 population), and 1,005 hospitalisations of Indigenous males (272 per 100,000) in 2015–16.

The heart failure and cardiomyopathy hospitalisation rate for Indigenous females was 3.5 times as high as for non-Indigenous females (2.3 times as high for non-Indigenous males) (Figure 7.2).

Figure 7.2: Major types of cardiovascular disease hospitalisations, by Indigenous status and sex, 2015–16



Source: AIHW National Hospital Morbidity Database.

7.4 Hospital procedures

Indigenous people are generally less likely than non-Indigenous people to undergo coronary angiography, PCI and CABG procedures (AIHW 2015, 2018b).

However, Indigenous women had similar PCI and CABG procedure rates as non-Indigenous women for hospitalised events for ACS, and similar PCI rates in STEMI hospitalisations (AIHW 2018b).

7.5 Deaths

The following data relate to the 5 jurisdictions with adequate and sufficient identification of Indigenous status: New South Wales, Queensland, Western Australia, South Australia and the Northern Territory.

Cardiovascular disease

In 2014–2016, CVD was the underlying cause of death for 867 Indigenous females (90 deaths per 100,000 population) and 1,083 Indigenous males (112 per 100,000).

The CVD death rate for Indigenous females was 1.9 times as high as for non-Indigenous females (1.7 times as high for Indigenous males) (Figure 7.3).

Coronary heart disease

CHD was the underlying cause of death for 402 Indigenous females (42 deaths per 100,000 population) and 715 Indigenous males (74 per 100,000) in 2014–2016.

The CHD death rates for Indigenous females was 2.1 times as high as for non-Indigenous females (2.1 times as high for Indigenous males).

Stroke

In 2014–2016, stroke was the underlying cause of death for 148 Indigenous females (15 deaths per 100,000 population) and 99 Indigenous males (10 per 100,000).

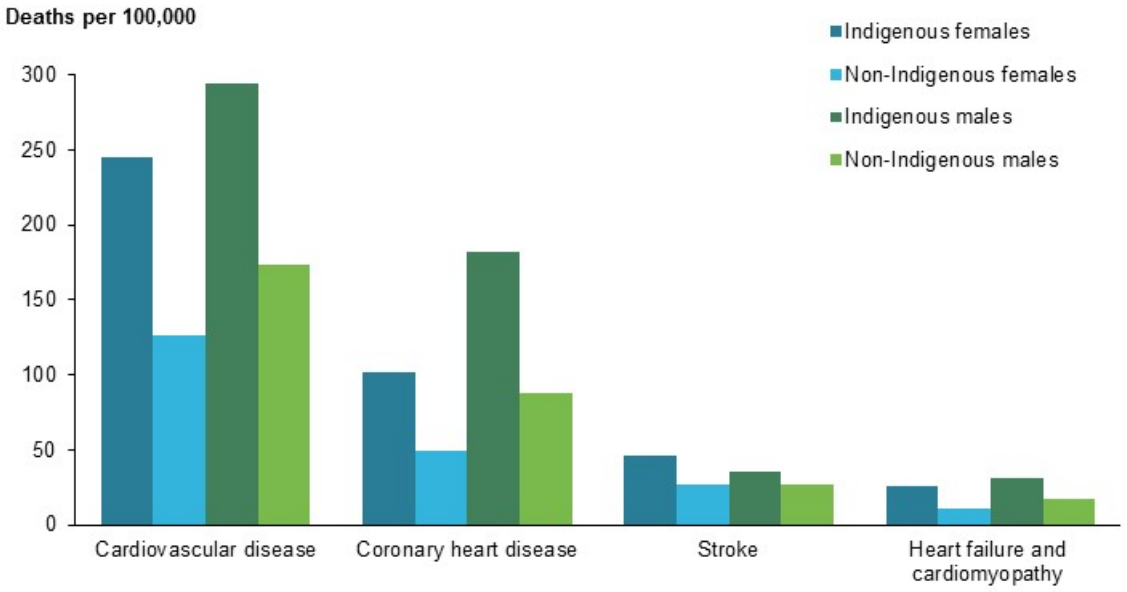
The stroke death rate for Indigenous females was 1.7 times as high as for non-Indigenous females (1.3 times as high for Indigenous males).

Heart failure and cardiomyopathy

Heart failure and cardiomyopathy were the underlying cause of death for 83 Indigenous females (9 deaths per 100,000 population) and 111 Indigenous males (12 per 100,000) in 2014–2016. These deaths relate to underlying cause only, and as such will understate the true contribution of heart failure and cardiomyopathy to deaths in the Aboriginal and Torres Strait Islander population (see Box 6.3).

The heart failure and cardiomyopathy death rate for Indigenous females was 2.4 times as high as for non-Indigenous females (1.8 times as high for Indigenous males) (Figure 7.3).

Figure 7.3: Major types of cardiovascular disease deaths, by Indigenous status and sex, 2014–2016



Note: Includes NSW, Qld, WA, SA and NT.

Source: AIHW National Mortality Database.

Table 7.1: Gap in cardiovascular diseases among Indigenous and non-Indigenous women

	Indigenous women / Non-Indigenous women	Indigenous women – Non-Indigenous women
	Rate ratio	***Rate difference***
Cardiovascular disease		
Burden of disease (DALYs)	3.2	40 per 1,000
Having CVD	1.8	3,100 per 100,000
Hospitalised for CVD	2.3	1,760 per 100,000
Death from CVD	1.9	199 per 100,000
Coronary heart disease		
Burden of disease (DALYs)	3.4	20 per 1,000
Having coronary heart disease	2.4	2,500 per 100,000
Having an acute coronary event	3.8	635 per 100,000
Hospitalised for coronary heart disease	3.6	785 per 100,000
Death from coronary heart disease	2.2	55 per 100,000
Stroke		
Burden of disease (DALYs)	2.6	7.6 per 1,000
Hospitalised for stroke	2.1	123 per 100,000
Death from stroke	1.7	19 per 100,000
Heart failure and cardiomyopathy		
Hospitalised for heart failure and cardiomyopathy	3.5	417 per 100,000
Death from heart failure and cardiomyopathy	2.4	14 per 100,000

Notes

1. Rate ratio is the relative difference of Indigenous women compared with non-Indigenous women, calculated as the Indigenous women age-standardised rate divided by the non-Indigenous women age-standardised rate.
2. Rate difference is the absolute difference in rates in Indigenous women compared with non-Indigenous women, calculated as the Indigenous women age-standardised rate minus the non-Indigenous women age-standardised rate

Appendix A: Data sources, methods and classifications

Data sources

ABS 2017–18 National Health Survey

The ABS 2017–18 National Health Survey (NHS) collected information on the health status of Australians, their use of health services and facilities, and health-related aspects of their lifestyle. It was conducted from a sample of around 16,400 private dwellings and includes 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.

When interpreting data from the 2017–18 NHS, some limitations need to be considered:

- Much of the data is self-reported and relies on respondents knowing and providing accurate information.
- The survey is community-based and does not include information from people living in nursing homes or otherwise institutionalised.
- Residents of very remote areas and discrete Aboriginal and Torres Strait Islander communities were excluded from the survey.

For more information on the NHS, see:
http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4364.0.55.001Explanatory%20Notes12017-18

The data quality declaration for the 2017–18 NHS can be found in the ABS publication *National Health Survey: users' guide, 2017–18*
https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4363.0~2017-18~Main%20Features~Data%20quality~9

ABS 2015 Survey of Disability, Ageing and Carers

The ABS Survey of Disability, Ageing and Carers (SDAC) measures the prevalence of disability in Australia, and the need for support of older people and those with disability. It provides a demographic and socioeconomic profile of people with disability, older people and carers, and gives information about those who provide care to people with disability and older people.

The surveys included people in both private and non-private dwellings, including people in establishments where care is provided.

For more information on the SDAC:
http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/4430.0Main%20Features152015?opendocument&tabname=Summary&prodno=4430.0&issue=2015&num=&view=.

The data quality declaration for the 2015 SDAC can be found in the ABS publication *Disability, ageing and carers, Australia: summary findings, 2015*
http://www.abs.gov.au/Ausstats/abs@.nsf/0/0CD3AF801A5AF108CA25804F000F61FB?OpenDocument.

ABS 2012–13 Australian Aboriginal and Torres Strait Islander Health Survey

The ABS 2012–13 Australian Aboriginal and Torres Strait Islander Health Survey (AATSIHS) collected information from a sample of around 12,900 people from 8,300 households.

A core set of data items collected household information, demographics, self-assessed health status and self-assessed body mass. All Aboriginal and Torres Strait Islander people aged 18 and over were then invited to participate in the voluntary National Aboriginal and Torres Strait Islander Health Measures Survey (NATSIHMS).

The AATSIHS may underestimate the number of people with CVD, because people living in institutional care facilities such as hospitals and aged care facilities were not included in the survey. This excludes a section of the population where high levels of chronic diseases are expected to occur.

For further information on the scope and data quality of the AATSIHS, see the ABS publication *Australian Aboriginal and Torres Strait Islander Health Survey: users' guide, 2012–13*: http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/4727.0.55.002Main%20Features12012-13?opendocument&tabname=Summary&prodno=4727.0.55.002&issue=2012-13&num=&view.

National Hospital Morbidity Database

The National Hospital Morbidity Database (NHMD) is a compilation of episode-level records from admitted patient morbidity data collection systems in Australian hospitals.

The data supplied are based on the National Minimum Data Set (NMDS) for Admitted patient care and include 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 purpose of the NMDS for Admitted patient care is to collect information about care provided to admitted patients in Australian hospitals. The scope of the NMDS is episodes of care for admitted patients in all public and private acute and psychiatric hospitals, free-standing day hospital facilities, and alcohol and drug treatment centres in Australia. Hospitals operated by the Australian Defence Force, corrections authorities and in Australia's offshore territories are not in scope but some are included.

The counting unit in the NHMD is a separation, described as hospitalisations in this report. Separation is the term used to refer to the episode of admitted patient care, which can be a total hospital stay (from admission to discharge, transfer or death) or a portion of a hospital stay beginning or ending in a change of type of care (for example, from acute care to rehabilitation).

Although hospital separations data are a valuable source of information about admitted patient care, they have limitations as indicators of ill health. Sick people who are not admitted to hospital are not counted and those who have more than 1 separation in a reference year are counted on each occasion.

The hospital separations data do not include episodes of non-admitted patient care provided in outpatient clinics or emergency departments. Patients in these setting may be admitted subsequently, with the care provided to them as admitted patients being included in the NHMD.

Diagnosis and procedure data for 2015–16 were reported to the NHMD using the 9th edition of the *International statistical classification of diseases and related health problems, 10th revision, Australian modification* (ICD-10-AM) (ACCD 2014), incorporating the *Australian classification of health interventions* (ACHI) (ACCD 2015).

A complete data quality statement for the NHMD is available online at <meteor.aihw.gov.au>.

Hospitalisations in this report

Hospitalisation type

The focus of this report was acute hospitalisations for CVD, and was restricted to the following 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).

Changes to ICD-10-AM/ACHI classifications

Information presented over time may be affected by changes to ICD-10-AM/ACHI codes and coding standards. The major changes affecting the interpretation of information presented in this report are:

- • the reporting of principal diagnoses for Rehabilitation care separations
- • the deletion of the category I84 Haemorrhoids and the creation of the category K64 Haemorrhoids and perianal venous thrombosis.

For further information on the changes to ICD-10-AM/ACHI classifications please see the report *Admitted patient care 2015–16: Australian hospital statistics* (AIHW 2017b).

Quality of Indigenous status data

There is some under-identification of Indigenous Australians in the NHMD, but NHMD data for all states and territories are considered to have adequate Indigenous identification from 2010–11 onwards (AIHW 2013).

An AIHW study in 2011–12 found that the 'true' number of hospitalisations nationally for Indigenous Australians was about 9% higher than reported (AIHW 2013). NHMD data presented in this report have not been adjusted for under-identification, so are likely to underestimate the true level of Indigenous hospitalisations.

Reporting on hospital procedures in this report

The data reported in Chapter 5 are rates of procedures among those hospitalised with a particular diagnosis. The ICD-10 codes used in the analysis are shown in Table A1. The method adopted here enables an investigation of treatment patterns among those diagnosed with a particular condition, giving a more robust comparison of the rates for females and males.

Age-standardised rates were calculated using the total number of CVD hospitalisations for 2000–01 as the standard population.

National Mortality Database

The AIHW National Mortality Database (NMD) holds records for deaths in Australia from 1964. Cause of Death Unit Record File 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 Australian Bureau of Statistics (ABS). The data are maintained by the AIHW in the NMD.

The database comprises information about causes of death and other characteristics of the person, such as sex, age at death, area of usual residence and Indigenous status. In this report, mortality data by Indigenous status are reported for 5 jurisdictions combined: New South Wales, Queensland, Western Australia, South Australia and the Northern Territory. The AIHW considers the quality of Indigenous identification in mortality data for these 5 jurisdictions to be adequate from 1998.

Deaths registered in 2013 and earlier are based on the final version of cause of death data; deaths registered in 2014 are based on the revised version; deaths registered in 2015 and 2016 are based on the preliminary version. Revised and preliminary versions are subject to further revision by the Australian Bureau of Statistics (ABS).

The data quality statements underpinning the AIHW NMD can be found on the following ABS internet pages:

ABS quality declaration summary for *Deaths, Australia*

http://www.abs.gov.au/ausstats/abs%40.nsf/mf/3302.0/

ABS quality declaration summary for *Causes of death, Australia*

http://www.abs.gov.au/ausstats/abs%40.nsf/mf/3303.0/.

For more information on the AIHW NMD see 'Deaths data' at AIHW

https://www.aihw.gov.au/about-our-data/our-data-collections/national-mortality-database.

Australian Burden of Disease Study 2015

Data to develop the burden of disease estimates In the Australian Burden of Disease Study 2015 were obtained from numerous sources. Deaths data used to estimate fatal burden were sourced from the AIHW's National Mortality Database. Morbidity data used to estimate non-fatal burden were drawn from disease registers, administrative data, surveys and epidemiological studies.

Risk factor exposure data were sourced from national surveys, registry data and monitoring programs. Relative risks were obtained from the Global Burden of Disease Study 2016, and from an AIHW review of literature.

Other inputs, such as the standard life table for fatal burden, and the health states and disability weights for non-fatal burden, were obtained from the Global Burden of Disease Study 2010, 2013 or 2015. Population estimates were sourced from the ABS.

For full details on methods, data sources and standard inputs see *Australian Burden of Disease Study: methods and supplementary material 2015* (AIHW 2019b), available on the AIHW website at: https://www.aihw.gov.au/reports-statistics/health-conditions-disability-deaths/burden-of-disease/reports.

Methods

Age-specific rates

Age-specific rates are calculated by dividing the number of cases occurring in a specified age group by the corresponding population in the same age group, expressed as a rate (for example, number per 100,000 population).

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.

Two different methods of age-standardisation can be used: direct and indirect. 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.

Rate ratio

A rate ratio provides a measure of the relative difference in rates between 2 populations. A rate ratio of 1 indicates no difference in the rates between the populations; less than 1 indicates that the rate for population A (for example, females) is lower than that for population B (for example, males); and greater than 1 indicates that the rate for population A is higher than that for population B.

Analysing trends

This report presents trend data on CVD hospitalisation, including procedures, and on death rates by age groups.

Data from the AIHW National Hospital Morbidity Database (for 2006–07 to 2015–16) and the National Mortality Database (from 2006 through to 2016) were used to calculate age-specific hospitalisation, procedure and death rates.

To assess the change over time, linear regression modelling was used to reduce the impact of volatility in the series. This allows all years of data to inform the result, rather than basing it on the first and final years alone.

Two measures in this report describing trends—the annual change (the number of deaths per 100,000 per year) and the percentage change over the period—were determined using linear regression analysis and its outputs.

Estimating heart attack events

Currently, there is no national heart disease register for calculating the incidence of acute coronary events. The AIHW has developed a proxy measure that uses unlinked episode based hospital data from the NHMD and deaths data from the NMD to estimate acute coronary events. An algorithm takes account of duplicates across the 2 data sets and multiple episodes for the 1 event within the NHMD (see Box A1).

Box A1: Algorithm for estimating the incidence of acute coronary events

Number of fatal events:

Count the number of deaths where 'acute coronary heart disease' (ICD-10 codes I20–I24) is the underlying cause of death in each calendar year (based on year of registration of death).

PLUS the number of non-fatal events:

Count the number of non-fatal hospitalisations where 'acute myocardial infarction' (AMI) (ICD-10-AM I21) or 'unstable angina' (ICD-10-AM 120.0) are the principal diagnosis, and separation mode is not equal to 'died' or 'transferred to another acute hospital', and care type is not equal to 'new born-unqualified days only' or 'organ procurement—posthumous'

The incidence of acute coronary events is calculated using the current algorithm and the following formula:

$$\text{Incidence of heart attack events} = \frac{\text{Non-fatal events + Fatal events}}{\text{Estimated resident population Australia}} \times 100{,}000$$

Estimating stroke events

Currently, there is no national stroke events register that can be used to estimate stroke events. However, a method developed by Thrift and colleagues (2012) estimates first and recurrent stroke events by counting acute stroke hospitalisations and stroke deaths in a given year (Box A2).

Box A2: Algorithm for estimating stroke events

Number of stroke deaths

Count the number of deaths where stroke (ICD-10 codes I60–I64) is the underlying cause of death registered in each calendar year.

PLUS the number of acute and non-fatal stroke hospitalisations (first and recurrent stroke events)

Count the number of acute and non-fatal hospitalisations defined as separations where the care type was 'Acute, Newborn' (for separations with at least 1 qualified days) or was 'Not reported' with a principal diagnosis of stroke (ICD-10-AM codes I60–I64), excluding any separation that had a mode of admission of 'Admitted patient transferred from another hospital' or 'Statistical admission: care type change', or had a mode of separation of 'Died' in each calendar year, based on discharge date from hospital (see Glossary).

$$\text{Incidence of stroke events} = \frac{\text{Non-fatal acute stroke hospitalisations + Stroke deaths}}{\text{Estimated resident population Australia}} \times 100{,}000$$

Disease classifications

Table A1: ICD-10-AM (9th edition) codes used to define conditions in hospitalisations data

Condition	ICD-10-AM codes
Cardiovascular disease	I00–I99
Acute rheumatic fever	I00–I02
Chronic rheumatic heart diseases	I05–I09
Hypertensive diseases	I10–I15
Coronary heart disease	I20–I25
Acute coronary syndrome	I20.0, I21
Acute myocardial infarction	I21
ST-elevation myocardial infarction (STEMI)	I21.0, I21.1, I21.2, I21.3
Non-ST-elevation myocardial infarction (NSTEMI)	I21.4
Angina	I20
Heart failure and cardiomyopathy	I25.5, I42.0, I42.5–I42.9, I43, I50
Pulmonary heart disease and diseases of pulmonary circulation	I26–I28
Other forms of heart disease	I30–I52
Cerebrovascular diseases	I60–I69
Stroke	I60–I64
Diseases of arteries, arterioles and capillaries	I70–I79
Diseases of veins, lymphatic vessels and lymph nodes, not elsewhere classified	I80–I89
Other and unspecified disorders of the circulatory system	I95–I99
Transient ischaemic attacks	G45
Congenital heart diseases	Q20–Q25
Complications of cardiac and vascular prosthetic devices, implants and grafts	T82

Source: ACCD 2014.

Table A2: ACHI (9th edition) codes used to define cardiovascular disease related procedures

Procedure codes	ACHI codes
Coronary angiography in hospitalisations	Block: 668
Percutaneous coronary interventions in hospitalisations	Block: 670, 671
Coronary artery bypass grafting in hospitalisations	Block: 672-679
Heart transplant	Block: 660
Cardiac defibrillator implants	Block: 653
Valve replacement, repair or reconstruction	Block: 621–638
Pacemaker insertion	Block: 650–652
Carotid endarterectomy	33500–00 (Block: 700)

Source: ACCD 2015.

Table A3: ICD-10 codes used to define cardiovascular disease deaths

Cardiovascular disease type	ICD-10 codes
Cardiovascular disease	I00–I99
Coronary heart disease	I20–I25
Acute coronary syndrome	I20.0, I21
Acute myocardial infarction	I21
Angina	I20
Heart failure and cardiomyopathy	I25.5, I42.0, I42.5–I42.9, I43, I50
Stroke	I60–I64

Source: WHO 2016.

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Abbreviations

AATSIHS	Australian Aboriginal and Torres Strait Islander Health Survey
ABS	Australian Bureau of Statistics
ACHI	Australian Classification of Health Interventions
ACS	acute coronary syndrome
AIHW	Australian Institute of Health and Welfare
AMI	acute myocardial infarction
CABG	coronary artery bypass grafting
CHD	coronary heart disease
COPD	chronic obstructive pulmonary disease
CVD	cardiovascular disease
DALY	disability-adjusted life year
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10th revision
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, 10th revision, Australian Modification
NATSIHMS	National Aboriginal and Torres Strait Islander Health Measures Survey
NHMD	National Hospital Morbidity Database
NHS	National Health Survey
NMD	National Mortality Database
NMDS	National Minimum Data Set
NSTEMI	non-ST segment elevation myocardial infarction
NVDPA	National Vascular Disease Prevention Alliance
PCI	percutaneous coronary intervention
SDAC	Survey of Disability and Carers
STEMI	ST segment elevation myocardial infarction
TIA	transient ischaemic attack
WHO	World Health Organization
YLD	years of health life lost due to disability
YLL	years of life lost

Glossary

Aboriginal or Torres Strait Islander: A person of Aboriginal and/or Torres Strait Islander descent who identifies as an Aboriginal and/or Torres Strait Islander.

Acute care: Care provided to patients admitted to hospital that is intended to cure illness, alleviate symptoms of illness or manage childbirth.

Additional diagnosis: The diagnosis of a condition or recording of a complaint—either coexisting with the principal diagnosis or arising during the episode of admitted patient care (**hospitalisation**), episode of residential care or attendance at a health-care establishment—that requires the provision of care. Multiple diagnoses may be recorded.

Admission: An admission to hospital. In this report, the term **hospitalisation** is used to describe an episode of hospital care that starts with the formal admission process and ends with the formal **separation** process. The number of separations has been taken as the number of admissions; hence, the admission rate is the same as the separation rate.

Angina: Temporary chest pain or discomfort when the heart's own blood supply is inadequate to meet extra needs, as when exercising.

Associated cause(**s**) **of death:** A cause(s) listed on the Medical Certificate of Cause of Death, other than the **underlying cause of death**. They include the immediate cause, any intervening causes, and conditions that contributed to the death but were not related to the disease or condition causing death. See also **cause of death**.

Atherosclerosis: a disease in which plaque (fatty deposits) builds up inside the arteries

Burden of disease and injury: A term referring to the quantified impact of a disease or injury on an individual or population, using the **disability-adjusted life year (DALY)** measure.

Cardiomyopathy: A condition where there is direct and widespread damage to the heart muscle, weakening it. It can be due to various causes, such as viral infections and severe alcohol abuse. It can lead to an enlarged, thickened and dilated heart as well as **heart failure**.

Cardiovascular disease: Any disease of the circulatory system, namely the heart (cardio) or blood vessels (vascular). Includes **angina, heart attack, stroke** and peripheral vascular disease. Also known as circulatory disease.

Cause(s) of death: All diseases, morbid conditions or injuries that either resulted in or contributed to death—and the circumstances of the accident or violence that produced any such injuries—that are entered on the Medical Certificate of Cause of Death. Causes of death are commonly reported by the **underlying cause of death**. See also **associated cause(s) of death** and **multiple causes of death**.

Cerebrovascular disease: Any disorder of the blood vessels supplying the brain or its covering membranes. A notable and major form of cerebrovascular disease is **stroke**.

Cholesterol: Fatty substance produced by the liver and carried by the blood to supply the rest of the body. Its natural function is to supply material for cell walls and for steroid hormones, but if levels in the blood become too high this can lead to atherosclerosis and heart disease.

Comorbidity: A situation where a person has 2 or more health problems at the same time. Also known as multimorbidity.

Coronary heart disease: A disease due to blockages in the heart's own (coronary) arteries, expressed as **angina** or a **heart attack**. Also known as ischaemic heart disease.

Disability-adjusted life year (DALY): A year of healthy life lost, either through premature death or equivalently through living with disability due to illness or injury. It is the basic unit used in burden of disease and injury estimates.

Dyslipidaemia: Abnormal levels of fats, such as cholesterol or triglycerides, in the blood.

Fatal burden: Quantified impact on a population of premature death due to disease or injury. Measured as **years of life lost (YLL)**.

Haemorrhagic stroke: A type of **stroke** caused by the rupture and subsequent bleeding of an artery in the brain or its surroundings.

Heart attack: Life-threatening emergency that occurs when a vessel supplying blood to the heart muscle is suddenly blocked completely by a blood clot. The medical term commonly used for a heart attack is myocardial infarction. See also **cardiovascular disease**.

Heart failure: A condition that occurs when the heart functions less effectively in pumping blood around the body. It can result from a wide variety of diseases and conditions that can impair or overload the heart, such as heart attack, other conditions that damage the heart muscle directly (see **cardiomyopathy**), **high blood pressure**, or a damaged heart valve.

High cholesterol: Total cholesterol levels above 5.5 mmol/L.

High blood pressure/hypertension: Definitions can vary, but a well-accepted definition is from the World Health Organization: a systolic blood pressure of 140 mmHg or more or a diastolic blood pressure of 90 mmHg or more, or if [the person is] receiving medication for high blood pressure.

Hospitalisation: Synonymous with **admission** and **separation**; that is, an episode of hospital care that starts with the formal admission process and ends with the formal separation process. An episode of care can be completed by the patient's being discharged, being transferred to another hospital or care facility, or dying, or by a portion of a hospital stay starting or ending in a change of type of care (for example, from acute to rehabilitation).

Ischaemic stroke: A type of **stroke** due to a reduced or blocked supply of blood in the brain. Also known as cerebral infarction.

Multiple causes of death: All the causes listed on the Medical Certificate of Cause of Death. These include the **underlying cause of death** and all **associated cause**(**s**) **of death.** See also **cause of death**.

Non-fatal burden: The burden from living with ill-health as measured by years lived with disability. It is often used synonymously with YLD.

Non-Indigenous: People who have declared that they are not of Aboriginal or Torres Strait Islander descent. Compare with **Other Australians**.

Other Australians: People who have declared that they are not of Aboriginal or Torres Strait Islander descent, and people whose Indigenous status is unknown. Compare with **non-Indigenous**.

Premature death: Death that occurs at a younger age than a selected cut-off.

Principal diagnosis: The diagnosis established after study to be chiefly responsible for occasioning an episode of patient care (**hospitalisation**), an episode of residential care or an attendance at the health-care establishment.

Procedure: A clinical intervention that is surgical in nature, carries a procedural risk, carries an anaesthetic risk, and requires specialist training and/or special facilities or equipment available only in the acute-care setting.

Revascularisation: A procedure to restore adequate blood flow to the heart or other part of the body, usually after the supply has been reduced or blocked, as in **angina** or a **heart attack**. Revascularisation includes methods such as angioplasty and coronary artery bypass graft surgery.

Risk factor: Any factor that represents a greater risk of a health disorder or other unwanted condition or event. Some risk factors are regarded as causes of disease; others are not necessarily so.

Separation (from hospital): The formal process where a hospital records the completion of an episode of treatment and/or care for an admitted patient—in this report, described by the term **hospitalisation**.

Stroke: An event that occurs when an artery supplying blood to the brain suddenly becomes blocked or bleeds. A stroke often causes paralysis of parts of the body normally controlled by that area of the brain, or speech problems and other symptoms. It is a major form of **cerebrovascular disease**.

Transient ischaemic attack: An event that occurs when the blood supply to the brain is blocked temporarily. The signs for a transient ischaemic attack are the same as for a stroke, but they disappear within a short time. Often, they are only present for a few minutes.

Underlying cause of death: The disease or injury that initiated the train of events leading directly to death, or the circumstances of the accident or violence that produced the fatal injury. See also **cause of death** and **associated cause**(**s**) **of death**.

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

Years of life lost (YLL): Years of life lost due to premature death. YLL represents fatal burden.

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Related publications

The following AIHW publications relating to cardiovascular disease in women might also be of interest:

- AIHW 2019. Cardiovascular disease in Australian women—a snapshot of national statistics. Cat. no. CDK 10. Canberra: AIHW.
- AIHW 2010. Women and heart disease: cardiovascular profile of women in Australia. Cardiovascular disease series no. 33. Cat. no. CVD 49. Canberra: AIHW.

Cardiovascular disease is a leading cause of illness and death. With increasing recognition that aspects of its prevention, treatment and management are unique to women, this report focuses on the impact of cardiovascular disease on the health of Australian women.

Over half a million Australian women had 1 or more heart, stroke and vascular diseases in 2017–18, and more than 22,200 died from cardiovascular disease in 2016.

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